

Offshore Wind Energy in Scottish Waters

Regional Locational Guidance

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Report prepared by:



For:



marinescotland

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1 Introduction

1.1 Background

- 1.1.1 The Scottish Government is developing a plan for future commercial scale offshore wind development in Scottish waters in the period to 2050. The plan builds on the previous draft plan for offshore wind published in 2013¹ and 2011 offshore wind plan². The plan seeks to provide opportunities for conventional fixed bottom technologies and for deep water wind technologies which may become commercially viable over this time period.
- 1.1.2 The geographical scope of the plan covers Scottish Waters (0-200 nautical miles). This includes Scottish Territorial Waters (0-12 nautical miles) and the Scottish Offshore Marine Area (12-200 nautical miles) which is executively devolved to Scottish Ministers under the Marine and Coastal Access Act 2009 (Figure 1).
- 1.1.3 The plan is being developed in accordance with Marine Scotland's sectoral marine planning process (Figure 2). The National Marine Plan refers to this process in plan policy RENEWABLES 1. Once adopted, it is intended that the plan will also be reflected in the preparation or revision of relevant Regional Marine Plans.
- 1.1.4 An informal public consultation on the initial stages of development of the draft Plan was held in June 2018³. This included consultation on the following scoping documents:
- Context Report⁴;
 - Social and Economic Impact Assessment scoping report⁵;
 - Habitats Regulations Appraisal Pre-screening Report⁶;
 - Strategic Environmental Assessment Screening and Scoping Report⁷; and

¹ The Scottish Government. 2013. Planning Scotland's Seas - Sectoral Marine Plans for Offshore Wind, Wave and Tidal Energy in Scottish Waters Consultation Draft. Available at: <https://beta.gov.scot/binaries/content/documents/govscot/publications/consultation-paper/2013/07/draft-sectoral-marine-plans-offshore-renewable-energy-scottish-waters-consultation/documents/00428241-pdf/00428241-pdf/govscot:document/>

² The Scottish Government, 2011. Blue Seas - Green Energy. A Sectoral Marine Plan for Offshore Wind Energy in Scottish Territorial Waters Part A, The Plan. Available at: <https://www.gov.scot/Topics/marine/marineenergy/wind>

³ Scottish Government, 2018. Offshore Wind Sectoral Marine Plan Scoping Consultation. Available at <https://consult.gov.scot/marine-scotland/offshore-wind-scoping/>.

⁴ Scottish Government, 2018. Sectoral marine plan for offshore wind energy: context report. Available at <https://www.gov.scot/publications/sectoral-marine-plan-offshore-wind-energy-encompassing-deep-water-plan/>.

⁵ Scottish Government, 2018. Sectoral marine plan for offshore wind energy: social and economic impact assessment scoping report. Available at <https://www.gov.scot/publications/sectoral-marine-plan-offshore-wind-energy-encompassing-deep-water-plan-options/>.

⁶ Scottish Government, 2018. Sectoral marine plan for offshore wind energy: strategic habitat regulations appraisal pre-screening report. Available at <https://www.gov.scot/publications/sectoral-marine-plan-offshore-wind-energy-encompassing-deep-water-plan-9781788519632/>.

⁷ Scottish Government, 2018. Sectoral marine plan for offshore wind energy: strategic environmental assessment screening and scoping report. Available at <https://www.gov.scot/publications/sectoral-marine-plan-offshore-wind-energy-encompassing-deep-water-options/>.

- Areas of Search Scoping Report⁸.
- 1.1.5 Currently the majority of offshore wind farms have been built using conventional fixed bottom substructure technology. The maximum depth considered economically and technically feasible for these to be installed is approximately up to 60m of depth⁹. This depth requirement significantly limits the amount of seabed space that can be exploited in Scottish waters. New floating wind turbine technology attached to the seabed by chains and anchors can potentially open up new areas of sea as they are theoretically not limited by depth. At present the maximum depth considered for offshore deployment is 800m as expressed by Statoil in reference to its Hywind technology¹⁰. Construction and deployment prices of floating foundations may eventually compete with those of fixed bottom technologies¹¹, if floating wind sees a similarly rapid cost reduction to that which has taken place in the fixed foundation wind industry.
- 1.1.6 In order to provide space for the potential development of fixed bottom and deep water offshore wind options, the Areas of Search Scoping study considered the full range of water depths down to 800m. Full details on the criteria applied in the development of the Areas of Search are provided in the Scoping report¹².
- 1.1.7 The Scoping report identified an initial 24 Areas of Search (AoS) (Figure 3) that could provide suitable locations for conventional and deep-water wind options. These 24 AoS were subsequently reviewed and updated, resulting in the identification of 17 Draft Plan Options (DPO) taken forwards for further assessment (Figure 3 and reproduced to provide increased detail in a larger image in Figure 4). A full description of the process undertaken to identify the 17 DPOs is included in Section 1.2 below.

⁸ Scottish Government, 2018. Search areas for offshore wind energy: scoping study. Available at <https://www.gov.scot/publications/scoping-areas-search-study-offshore-wind-energy-scottish-waters-2018/>.

⁹ The Carbon Trust (2015) Floating Offshore Wind : Market and Technology Review. Available at: <http://www.carbontrust.com/media/670664/floating-offshore-wind-market-technology-review.pdf>

¹⁰ Statoil (2015) Hywind Scotland Pilot Park - Environmental Statement. doi:<http://www.statoil.com/en/EnvironmentSociety/Environment/impactassessments/NewEnergy/IntWind/Pages/HywindScotland.aspx>.

¹¹ The Carbon Trust (2015) Floating Offshore Wind : Market and Technology Review. Available at: <http://www.carbontrust.com/media/670664/floating-offshore-wind-market-technology-review.pdf>

¹² Scottish Government, 2018. Search areas for offshore wind energy: scoping study. Available at <https://www.gov.scot/publications/scoping-areas-search-study-offshore-wind-energy-scottish-waters-2018/>.

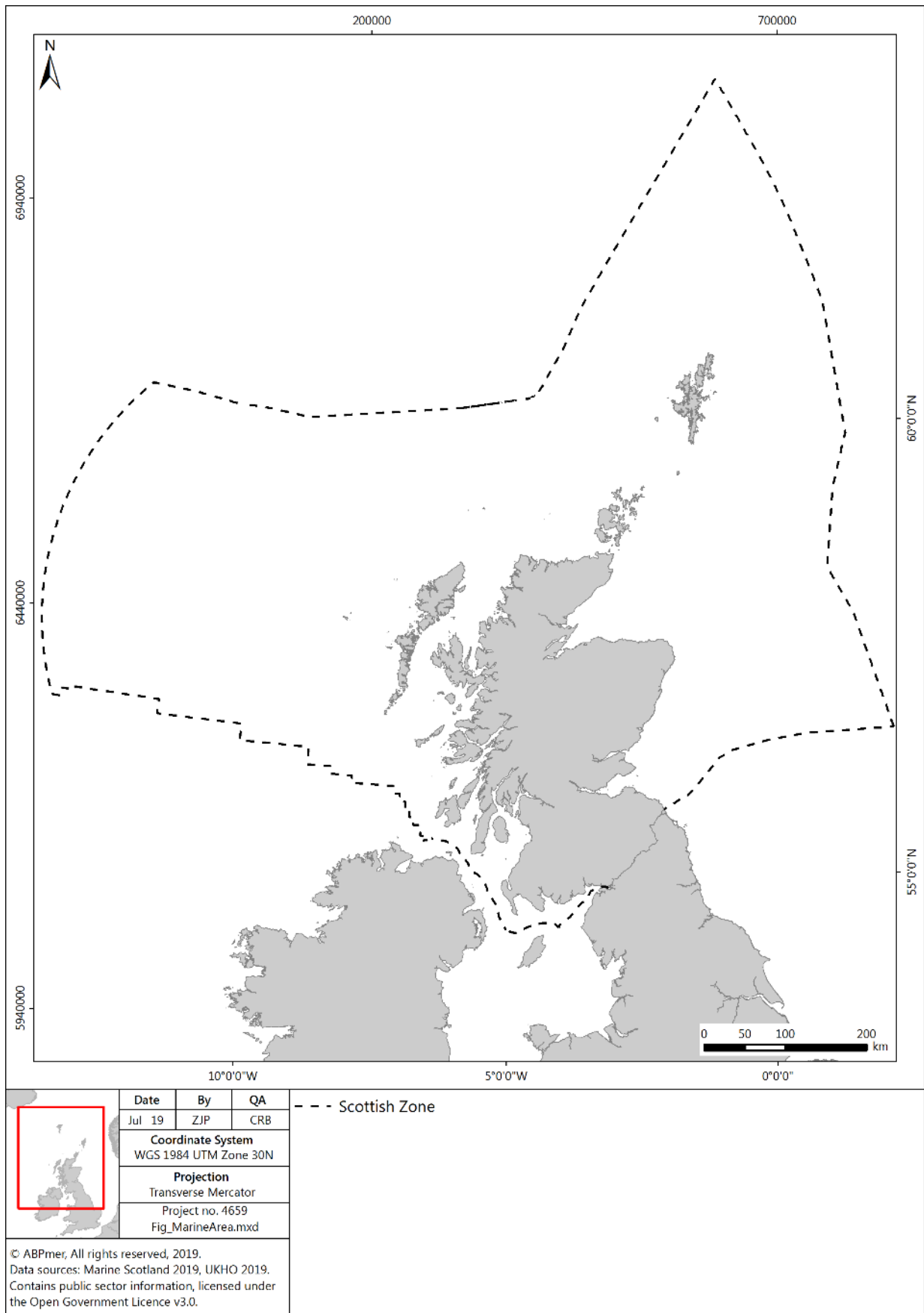


Figure 1 Map of Scottish zone

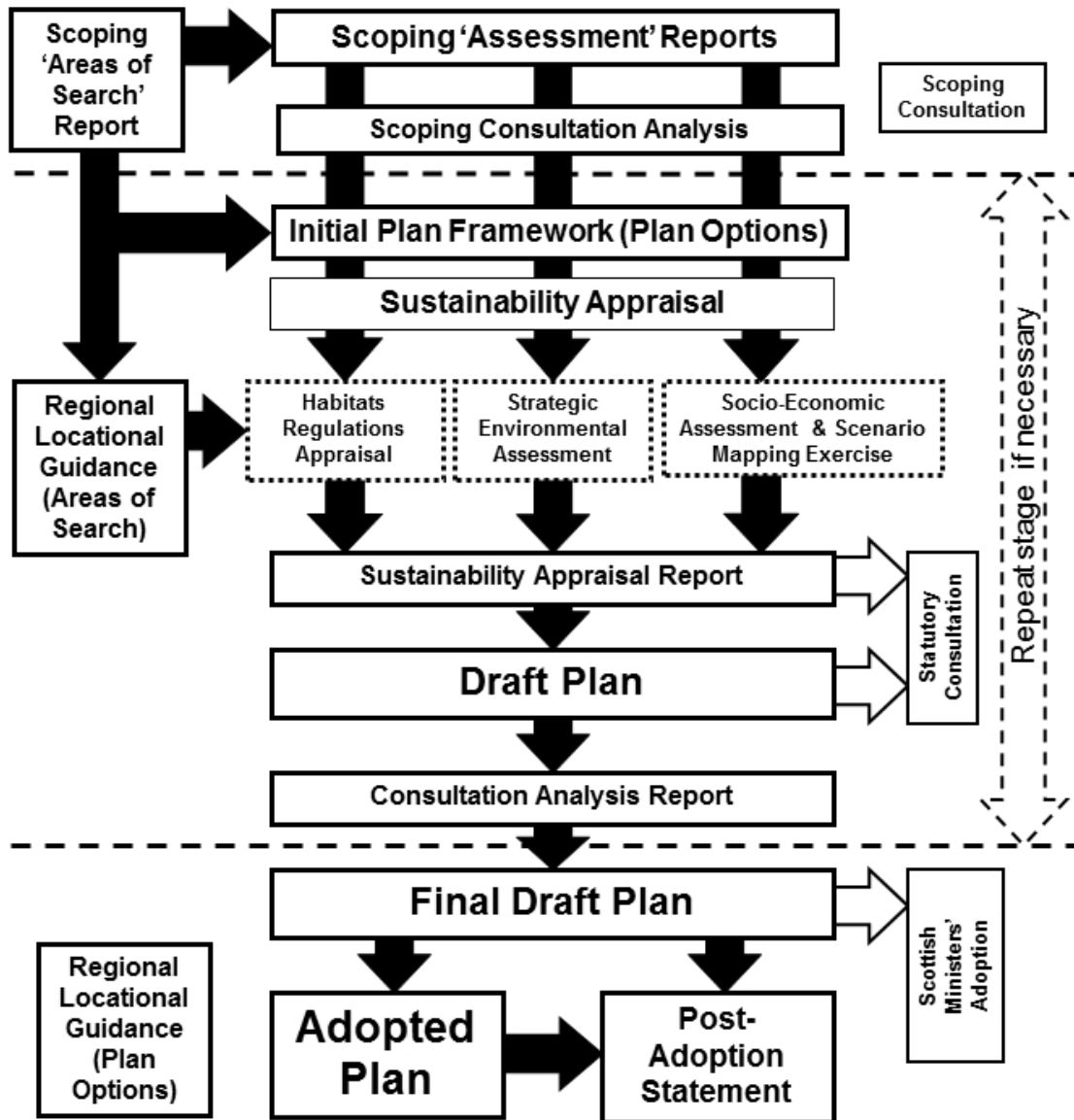


Figure 2 Marine Scotland's sectoral marine planning process

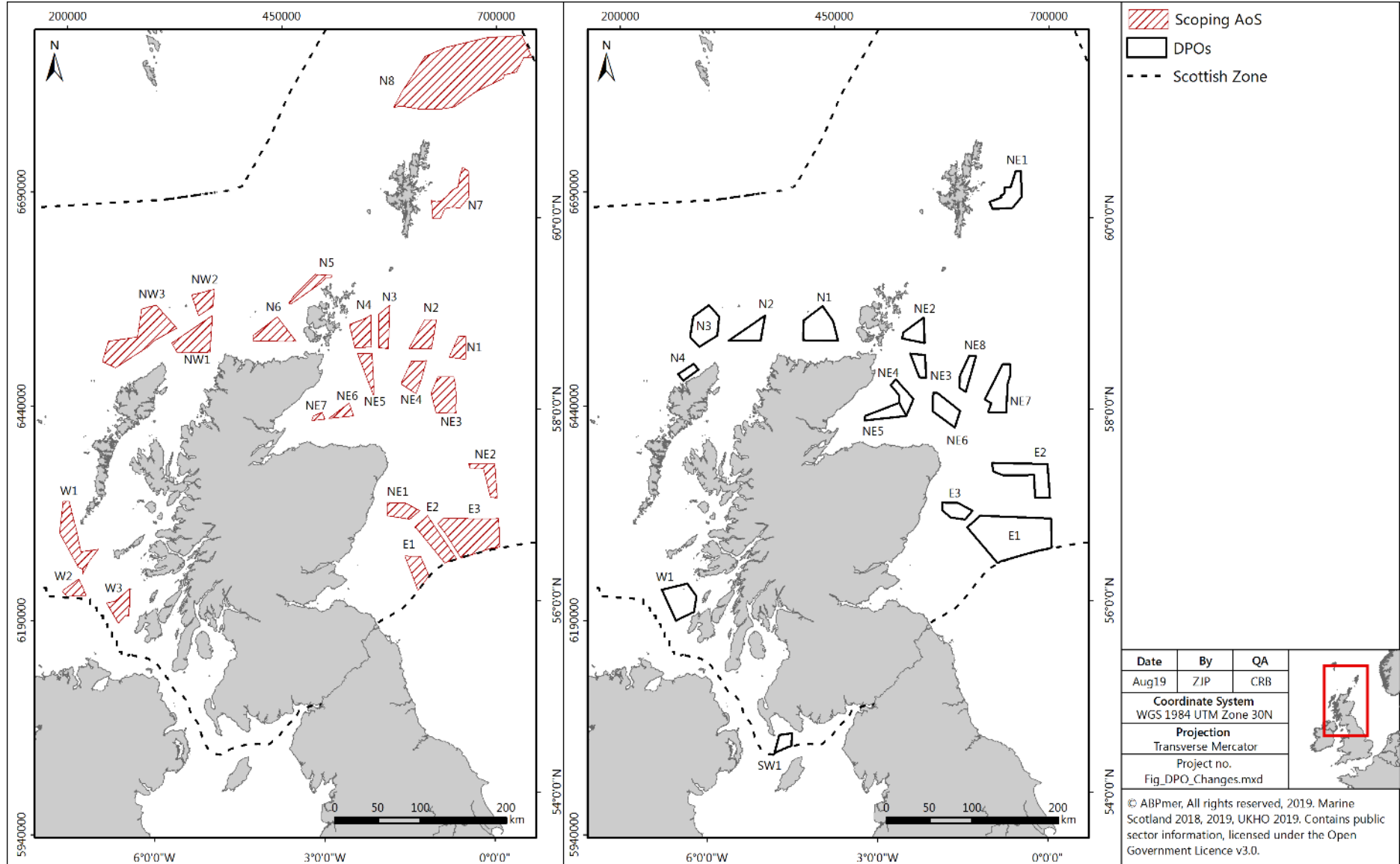


Figure 3 Evolution of AoS to DPOs

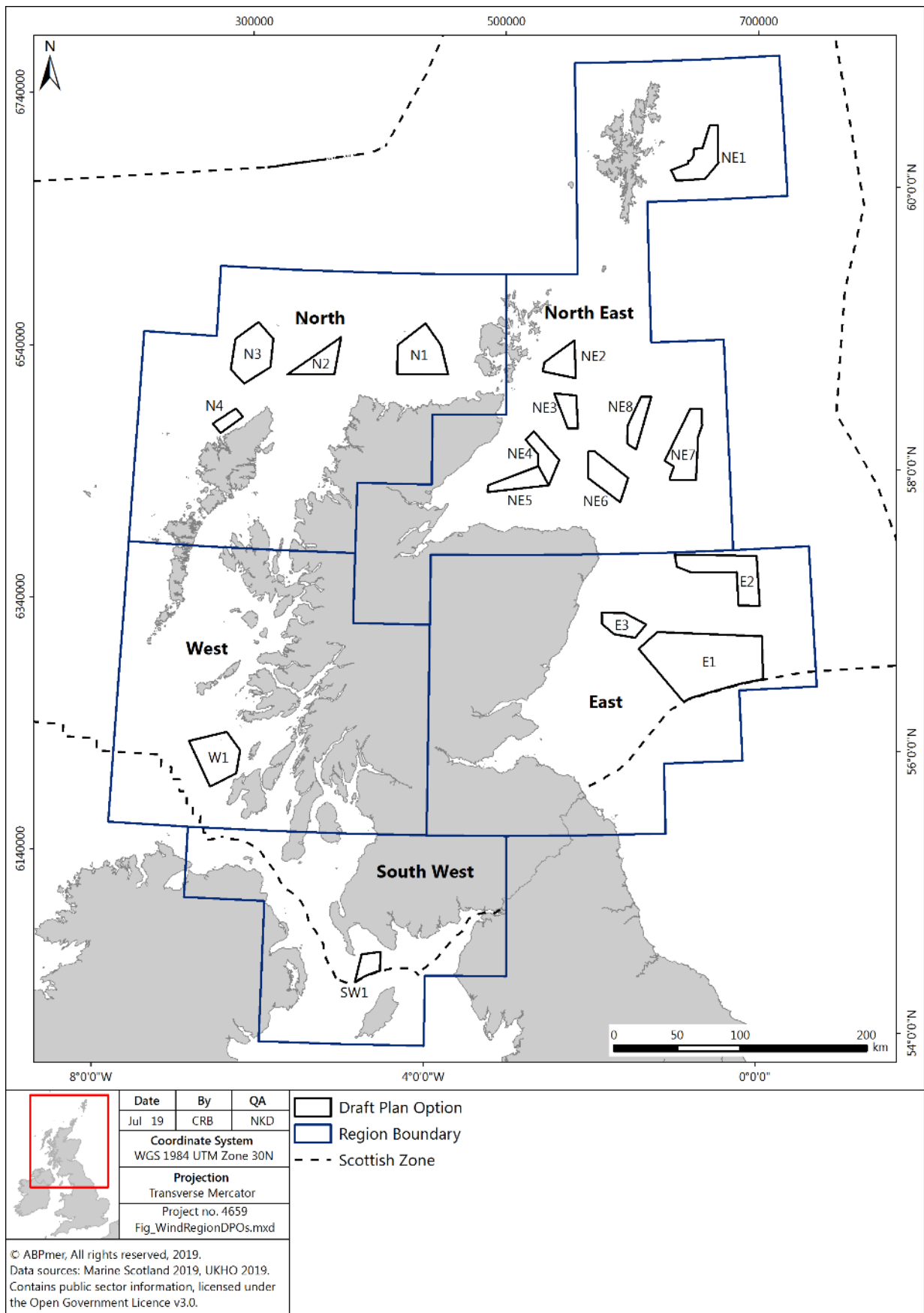


Figure 4 RLG offshore wind regions and draft plan option areas

1.2 Identification of Draft Plan Options

- 1.2.1 The sectoral marine planning process (as shown in Figure 2) is an iterative process, informed through stakeholder engagement and evidence from the related social, economic and environmental assessments. All of the information and consultation feedback gathered supports the Scottish Ministers in identifying Draft Plan Options (DPOs) to progress to the next phase of the plan process.
- 1.2.2 The DPOs have emerged through an examination of spatial data considerations in addition to advice and other related information provided by members of the Steering Groups, as well as stakeholders
- 1.2.3 The key stages of the planning process in relation to the identification of the Draft Plan Options, described in greater detail below, are:
- Opportunity and Constraint (O&C) Analysis – Iteration 1;
 - Opportunity and Constraint (O&C) Analysis – Iteration 2 - Single Issue Constraint Analysis;
 - Scoping Consultation;
 - Opportunity and Constraint (O&C) Analysis – Iteration 3; and
 - Identification of Draft Plan Options.

Opportunity and Constraint (O&C) Analysis – Iteration 1

- 1.2.4 The identification of initial AoS was carried out through the use of an O&C analysis. It built upon previous work carried out by Marine Scotland Science in 2011 and the production of draft regional locational guidance for potential deep water floating offshore wind test sites in 2014. The analysis was iterative, so updates could be incorporated as required in order to reflect stakeholder feedback.
- 1.2.5 Full details of the O&C analysis can be found in the AoS scoping report published for consultation in 2018. The O&C analysis sought to identify areas of opportunity for the future development of offshore wind, whilst also identifying areas that minimised potential negative impacts to the environment, other sectors and users of the sea. This analysis was completed through the use of GIS and numerous spatial data resources.

Opportunity and Constraint (O&C) Analysis – Iteration 2

- 1.2.6 Sectoral engagement workshops were held in spring 2018. The AoS were then refined with consideration to specific spatial issues and feedback from the workshops.
- 1.2.7 This refinement process identified a range of distinct AoS (Figure 3). As the draft Plan is technology neutral, no commercial or technology specific information was used in this refinement process.

Scoping Consultation – Screening and Scoping Reports

- 1.2.8 Scottish Ministers then consulted on the screening and scoping stages of the Plan process during June and July 2018. Screening and scoping reports were prepared and published online for the SEA, HRA and SEIA alongside the AoS scoping study.

Opportunity and Constraint (O&C) Analysis – Iteration 3

- 1.2.9 Iteration 3 of the O&C analysis was undertaken, which considered the responses received during the Scoping Consultation. For more details see the Consultation Analysis.
- 1.2.10 The AoS were refined with consideration to the outputs of the Iteration 3 O&C Analysis. As a result, certain AoS were either removed or refined to avoid/incorporate certain areas of Scottish Waters.
- 1.2.11 This stage also considered the areas of seabed proposed by stakeholders via the scoping consultation. A number of the areas proposed overlapped with existing AoS, while others overlapped with areas with higher levels of constraint or entirely new areas. This information was provided to Scottish Ministers to inform their decision on the selection of DPOs.
- 1.2.12 Upon review of the above information, Scottish Ministers identified areas to move forward in the plan process. It should be noted that some additional areas were included at this stage, where there was significant stakeholder interest, but also increased constraint. The Sustainability Appraisal stage will assess these areas in greater detail.

Identification of Draft Plan Options

- 1.2.13 The 22 revised Areas of Search, with a potential capacity for around 90 GW (calculated at 5MW/km²) were made available to the Sectoral Marine Plan Project Board and two Project Steering Groups for consideration and comment.
- 1.2.14 Responses from both the Board and Steering Groups, together with the outputs of the initial assessments, were presented to Scottish Ministers to inform their decision on which AoS should progress to the Sustainability Appraisal for more detailed assessment.
- 1.2.15 Seventeen revised AoS were selected as DPOs (Figure 4, Table 1).
- 1.2.16 This Regional Locational Guidance (RLG) represents a key stage in the development of the draft plan by providing a baseline for environmental, technical, socio-economic and planning issues in relation to the offshore renewable energy regions of Scotland and the DPOs.
- 1.2.17 The RLG will be used:
- To provide detailed information in relation to the DPOs taken forwards into the assessment phase of the draft plan;

- To provide a baseline of detailed information to support assessment of the DPOs in the SEA and SEIA;
- To inform key stakeholders and other interested parties of the key regional issues in relation to developing offshore wind energy in Scottish Waters; and
- To inform the process for determining marine licence applications to develop offshore renewable energy in Scottish Waters.

1.2.18 The DPOs identified (Figure 4) have been subject to strategic environmental assessment (SEA), habitats regulations appraisal (HRA), socio-economic assessment and consultation analysis. The outputs of this work will inform a future leasing round for commercial scale offshore wind energy development in Scottish Waters and ensure developments are brought forward in the most sustainable locations.

1.2.19 Section 2 of the RLG provides an overview of the key strategic issues in relation to the Scottish Marine Area.

1.2.20 Sections 3 to 7 provide more detailed baseline for each of the five offshore regions. For each topic, where appropriate information is available, the RLG provides an overview of the baseline topic for each region and information in relation to the relevant Areas of Search identified within each Region.

Table 1 Offshore wind areas of search

Region	DPO	Area km ²
South-west	SW1	292
West	W1	1107
North	N1	1163
	N2	560
	N3	1106
	N4	200
North-east	NE1	776
	NE2	464
	NE3	339
	NE4	440
	NE5	496
	NE6	699
	NE7	1027
	NE8	401
East	E1	3816
	E2	1287
	E3	474

2 Scottish Marine Area- National Overview of Key Issues

2.1 Physical Considerations

Offshore Wind Resource

- 2.1.1 The wind conditions across Scottish seas are generally favourable for commercial exploitation. Available data indicate that offshore areas to the west and north of Scotland provide the greatest resource. However, exploitable wind resource exists nearly everywhere in the offshore environment. The limitations on harvesting the wind resources are therefore principally due to technical limitations, including water depth, ground conditions and distance to electricity grid connections, although over time the grid can adapt to serve new locations for electricity generation.
- 2.1.2 Available wind resource data (Atlas of UK Marine Renewable Energy Resources¹³) show that sea areas west and north-east of Scotland provide the strongest resource. While areas to the east show relatively less wind resource, they are still sufficient to consider its exploitation, as indicated by the distribution of offshore wind farm developments currently within the consenting process.
- 2.1.3 Out to the 200 nm limit, as shown in Figure 5, the mean annual maximum power density (i.e. the amount of energy available at a site that can be converted to power by wind turbines) can reach a mean annual output of 1.8kWm^{-2} . Mean wind speeds within Scottish waters reach a maximum of 11.8ms^{-1} to the West of the Hebrides¹⁴.
- 2.1.4 The mean values used to express this resource do not illustrate seasonal differences in the power density, or the extreme wind conditions that can occur. For example, at the 200 nm limit the mean summer power density of 0.86kWm^{-2} is dwarfed by the mean winter figure of 2.8kWm^{-2} . Energy is available but the high temporal and spatial variability of this resource will influence development, this is discussed further when considering the wind resource available within the DPOs in Sections 3 to 7 below.

¹³ ABPmer. 2017. Atlas of UK Marine Renewable Energy Resources. Available at: <http://www.renewables-atlas.info/>. Accessed 30/09/2018.

¹⁴ *ibid*

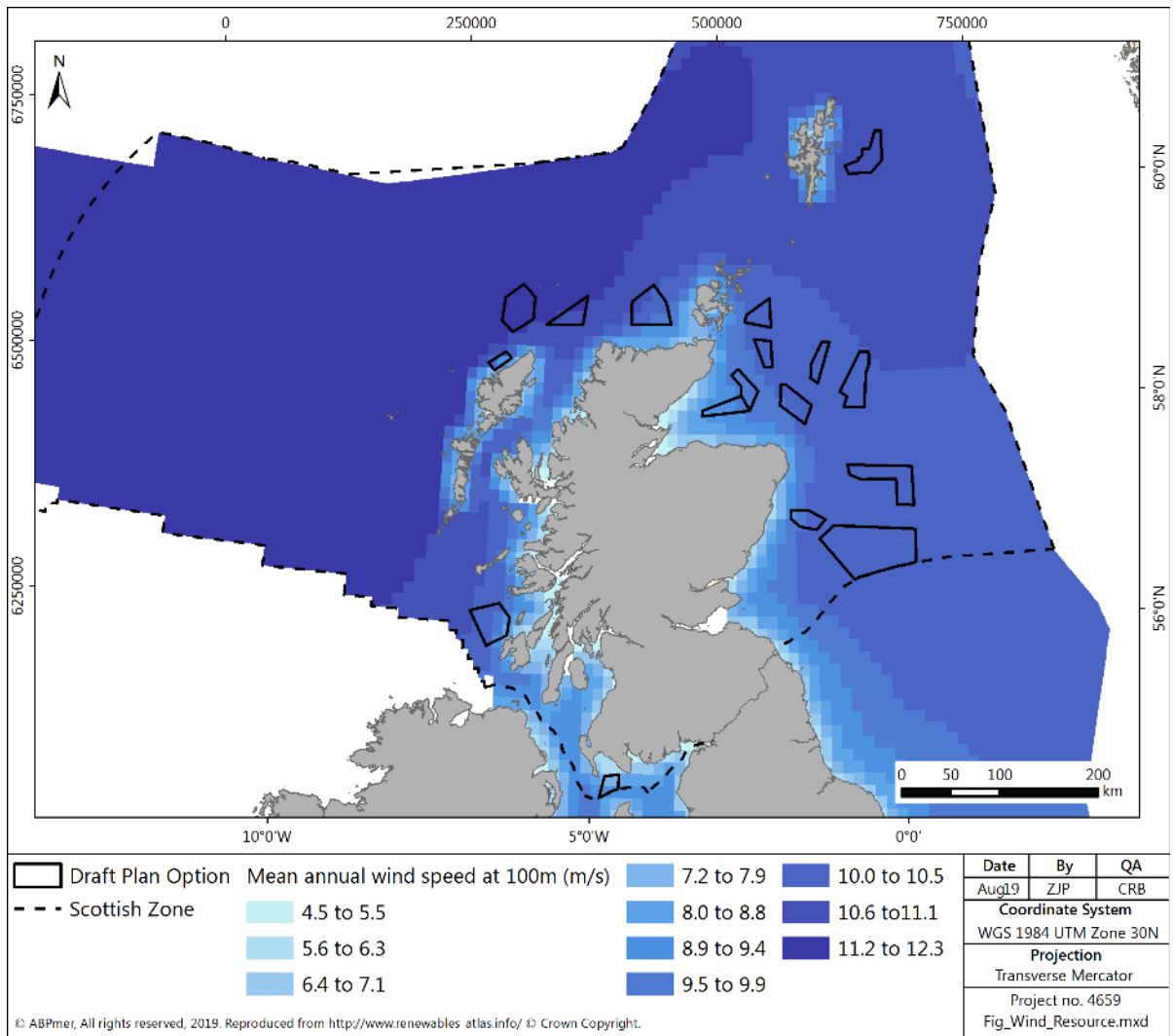


Figure 5 Offshore wind mean annual wind speed in Scottish seas

Grid Connection

- 2.1.5 With current technology, there is a requirement for all offshore wind developments to be physically connected into the UK electrical grid in order to supply generated electricity for use.
- 2.1.6 Depending on the distance of a proposed development from pre-existing infrastructure, there is both a financial and environmental cost associated with developing the connection into the grid, including establishment of subsea cables, integration into pre-existing networks or substations and the associated maintenance requirements.
- 2.1.7 While the Scottish transmission grid is fixed in the short term, development of new connections and increased capacity will occur over the medium to long term to connect new sources of electricity generation, for example the East Coast onshore 275 kV upgrade (ECU2) which is progressing with an earliest in-service date of 2023. The required reinforcements of the transmission grid are identified by National Grid against the four Future Energy Scenarios¹⁵ and are assessed for priority in the Network Options Assessment¹⁶.

Bathymetry and Seabed

- 2.1.8 The water depth and bathymetry of the DPOs will influence the feasibility of development, in both a technical and a financial sense. As described in Section 1, conventional fixed bottom substructure technologies are currently limited to depths of around 60m with floating technology more suited to deeper water. The distribution of water depths in Scottish waters is shown in Figure 6, with contours to highlight 60m and 100m limits.
- 2.1.9 The seabed in Scottish waters is highly varied, with areas of hard, rocky substrate, sand, gravel and mud (Figure 7). Muddy sediments tend to be confined to the Firths and offshore on the east coast, inshore of the Outer Hebrides or further offshore on the west coast. Hard substrates are found primarily on the west coast, with further areas to the north, and around the Orkney Islands. Sand and gravel sediments are prevalent throughout Scottish waters.

¹⁵ National Grid. 2018. Future Energy Scenarios. Available at <http://fes.nationalgrid.com/media/1363/fes-interactive-version-final.pdf>. Accessed 15/10/2018

¹⁶ National Grid. 2018. Network Options Assessment 2017/2018. Available at <https://www.nationalgrid.com/sites/default/files/documents/Network-Options-Assessment-2017-18.pdf>. Accessed 15/10/2018

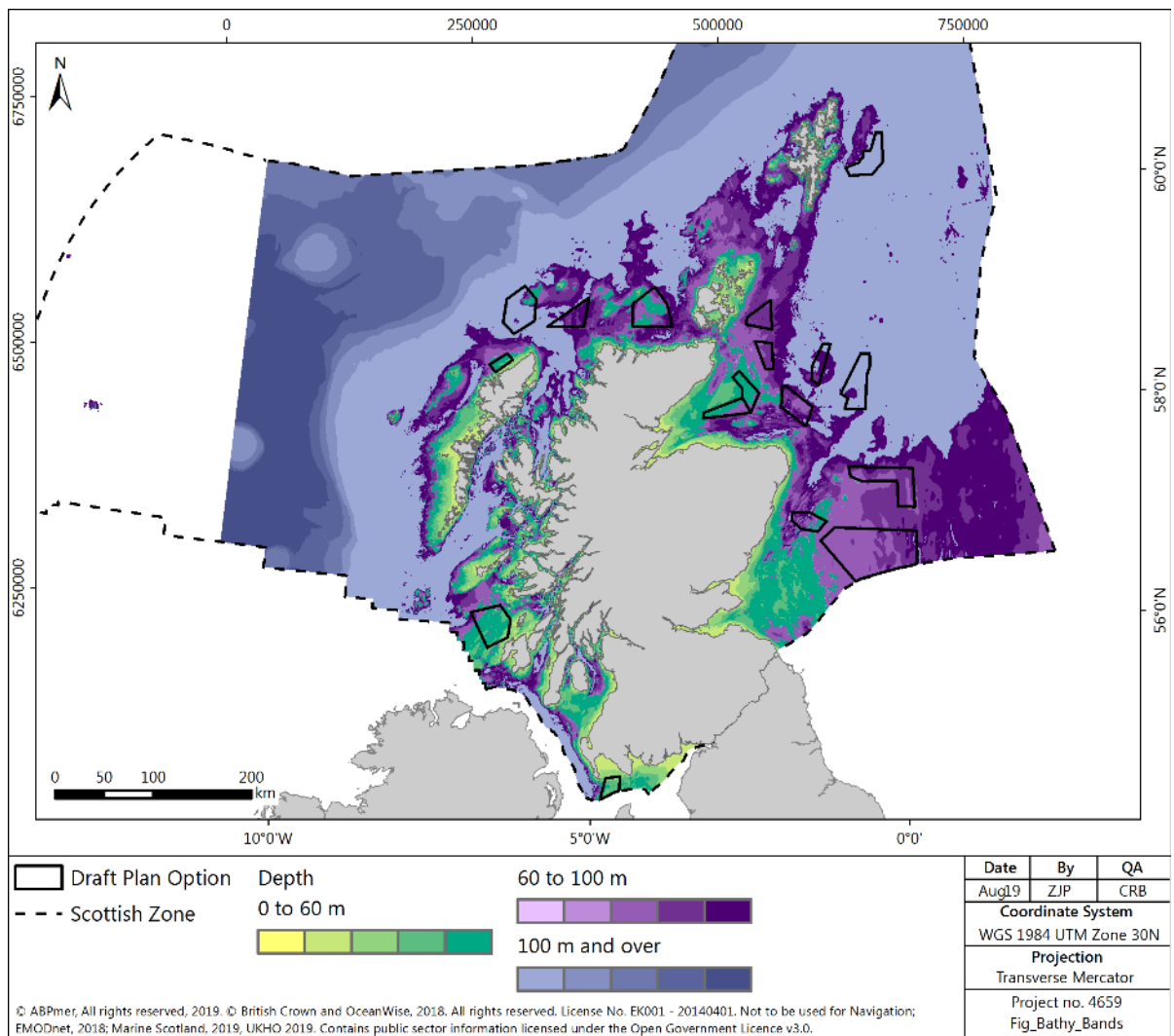


Figure 6 Banded water depths in Scottish waters

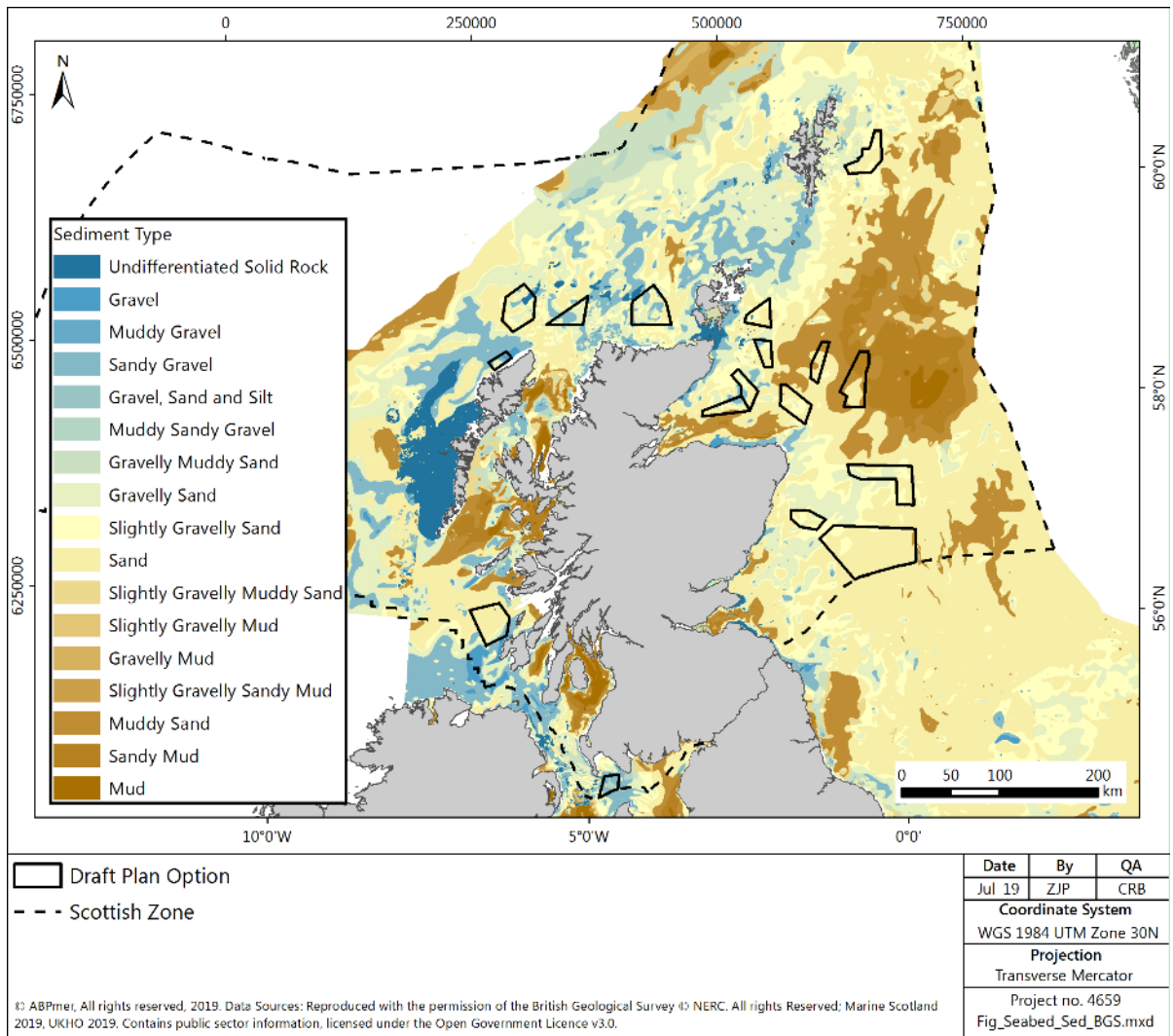


Figure 7 Seabed sediment morphology in Scottish waters

2.2 Socio Economics

Supply Chain

2.2.1 The supply chain for offshore wind energy covers all the jobs associated with manufacturing, transporting and installing renewable devices, as well as related tasks such as maintenance, surveying, and operations.

2.2.2 The socio-economic impact of offshore wind in Scotland is integrally linked to the development of the supply chain within Scotland¹⁷. Currently, a large proportion of the materials and components for offshore windfarms are outsourced from China and mainland Europe and thus associated employment is focused outside the UK¹⁸. However, there is significant potential to develop local supply chains, both to support manufacturing; and operation and maintenance activities with particular opportunities identified around blade manufacture and substation construction¹⁹. The offshore wind supply chain is still in the early stages of development but there is existing capacity in the Scottish supply chain to support offshore wind development. Strengths of the supply chain established within Scotland include:

- Offshore engineering with expertise in construction, operations and maintenance;
- Project management and training (due to the offshore oil and gas sector);
- Design and development services including consultancy, engineering and project development services;
- Research and development expertise in the private sector, academia and the public sector funded programmes;
- Existing port facilities with North Sea access and surrounding offshore service networks; and
- Fabrication and manufacturing of components.

2.2.3 The National Renewables Infrastructure Plan (NRIP) has identified a list of priority sites which could be developed to further support offshore wind, shown in Figure 8. These include:

- Leith- integrated manufacturing;
- Dundee- distributed manufacturing and operation/maintenance;
- Nigg- integrated manufacturing;
- Energy Park Fife at Methil- further manufacturing;
- Aberdeen- distributed manufacturing and operations and maintenance;

¹⁷ ch2m. 2016. Scenario Mapping: The economic benefits of offshore wind energy in the East and North East regions of Scotland. Report to Marine Scotland, East Coast Renewables and The Crown Estate, April 2016.

¹⁸ Celtic Seas Partnership. 2016. Future Trends in the Celtic Seas, Scenarios Report, ABPmer Report No. R.2584d. A report produced by ABPmer & ICF International for Celtic Seas Partnership, August 2016.

¹⁹ ch2m. 2016. Scenario Mapping: The economic benefits of offshore wind energy in the East and North East regions of Scotland. Report to Marine Scotland, East Coast Renewables and The Crown Estate, April 2016.

- Hunterston- integrated manufacturing;
- Arnish- distributed manufacturing;
- Campbeltown/Machrihanish- further maintenance and operation/maintenance;
- Ardersier- integrated manufacturing;
- Peterhead- distributed manufacturing and operation/maintenance; and
- Kishorn- distributed manufacturing.

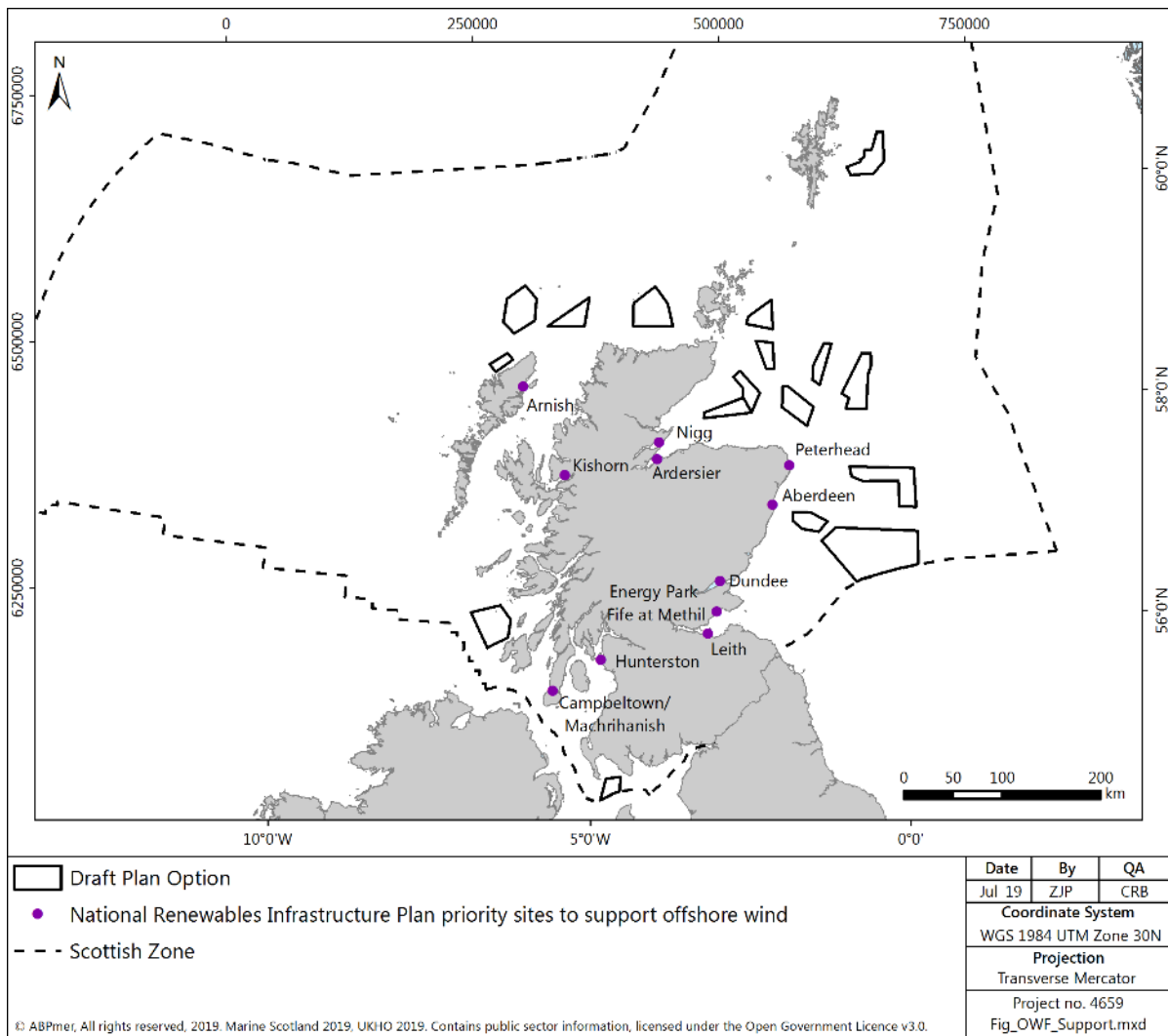


Figure 8 Sites identified by the NRIP with potential to support OWF

Energy Generation

- 2.2.4 Scottish energy generation in the marine environment is related to the generation of energy through wave, tidal and wind devices and the transmission of this power through submarine export cables to land. Figure 9 identifies the location of existing and planned wind, wave and tidal energy development, and possible future wave and tidal plan areas.
- 2.2.5 All wave and tidal DPOs and planned tidal developments in Scotland are located off the west coast of Scotland, the far north east coast of mainland Scotland, Orkney and the Shetland Islands (Figure 9). A dedicated renewable device test area (European Marine Energy Centre (EMEC)) has been in operation in Orkney since 2003 allowing developers to install single or multiple machines in a variety of site conditions.
- 2.2.6 At present there are no commercial wave arrays in Scotland. Wave Energy Scotland (WES) was created in 2014 (at the request of the Scottish Government), to facilitate the commercialisation of the wave energy sector through supporting projects focused on Wave Energy Converter technology, with the aim of producing reliable technology which will result in cost effective wave energy generation²⁰.
- 2.2.7 There are two operational commercial tidal-stream projects in Scotland, MeyGen in the Pentland Firth, and Bluemull Sound in Shetland, shown in Figure 9. MeyGen entered its operational phase in April 2018 following the completion of the installation of 6MW (four 1.5MW turbines) capacity in 2017, making it the world's largest tidal stream array²¹. Forty three percent of the project expenditure was in Scotland. The MeyGen project has a further potential 392MW capacity to be installed over three further phases. The tidal array at Bluemull Sound currently operates three 100kW turbines, utilising eighty percent Scottish supply chain content, with a further three 100kW turbines planned under the EnFAIT project²².
- 2.2.8 As of March 2019, offshore wind projects in waters around Scotland comprised 752MW of installed capacity²³, including Robin Rigg (Solway Firth), the European Offshore Wind Development Centre (EOWDC) (Aberdeen), Beatrice (Moray Firth), and Hywind Scotland (Moray Firth), a further 53MW in construction and 3,256MW consented and awaiting construction²⁴. Further areas licenced for potential future development are shown in Figure 9.
- 2.2.9 In addition to the ongoing development of renewable energy in Scottish waters, there are a number of coastal power stations, including nuclear (Hunterston B

²⁰ Wave Energy Scotland. 2017. Available at <http://www.waveenergyscotland.co.uk/>. Accessed 04/10/2018.

²¹ SIMEC Atlantis Energy. 2018. Available at <https://simecatlantis.com/2018/04/12/meygen-phase-1a-completes-construction-phase-and-officially-enters-25-year-operations-phase/>. Accessed 04/10/2018.

²² Nova Innovation. 2018. Available at <https://www.novainnovation.com/bluemull-sound>. Accessed 04/10/2018.

²³ Scottish Government. 2019. Renewable Electricity Planning Statistics for Scotland. Available at <https://www.gov.scot/Topics/Statistics/Browse/Business/Energy/planningdata>. Data as at March 2019.

²⁴ *ibid.*

and Torness), gas (Peterhead) and diesel (generally located on the Hebrides, Orkneys or Shetland) generators (Figure 9).

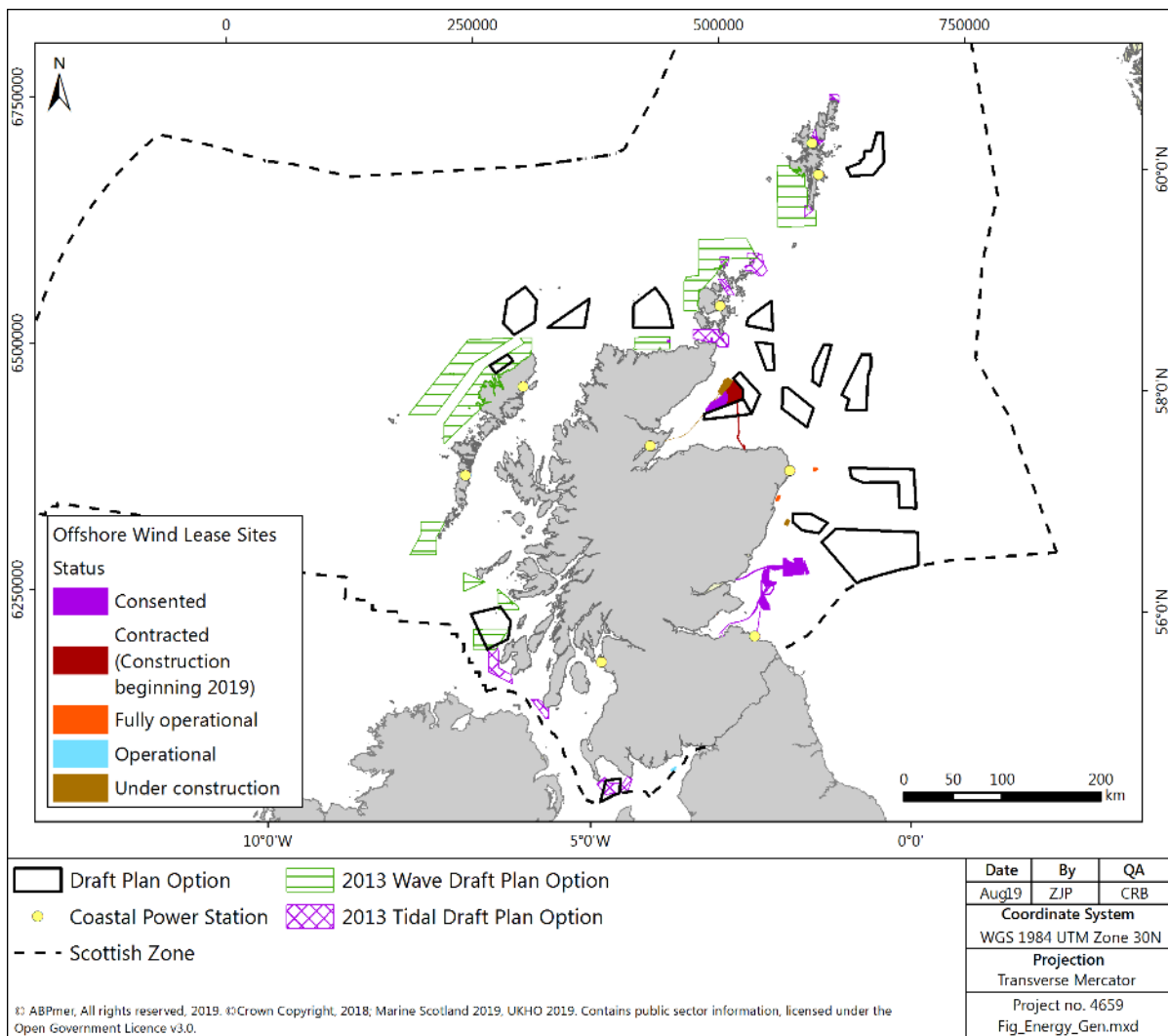


Figure 9 Current, planned and potential future offshore energy generation around Scottish coasts

Power Interconnectors

- 2.2.10 There are approximately 650km of submarine power interconnector cables in Scottish waters²⁵, predominately created to connect island communities to the mainland national grid infrastructure²⁶ (Figure 10). The length of operational cable has now increased due to the commissioning of the Western Link High Voltage Direct Current (HVDC), with about 100km of it in Scottish waters. The new link has a capacity of 2.2 Gigawatts (GW) which will support the export of renewable energy from Scotland to England and Wales.
- 2.2.11 Furthermore, the Caithness-Moray HVDC transmission link has recently been constructed. It is 113km long and provides an additional 1,200MW of transmission capacity in the north of Scotland²⁷.
- 2.2.12 The power cable industry is experiencing significant growth, with several new projects currently in the installation and planning phases. Investment in these activities may be affected by economic factors in the short term. Long-term drivers for competitive electricity markets and international energy cooperation are likely to maintain the push towards increasing the level of interconnector capacity²⁸. To support the future growth of renewable generation, large-scale investment in Scotland's transmission system is being delivered by a series of network development and reinforcement projects (Figure 10).
- 2.2.13 Scottish and Southern Electricity Networks (SSEN) plan to connect Shetland to the National Electricity Transmission System for the first time by 2021. The proposal includes a sub-sea, 260-km long, 60MW cable with on-island backup generation to replace Lerwick power station. It is currently in the early stages of development.
- 2.2.14 In August 2018, SSEN submitted a final needs case to Ofgem to obtain permission for a 600MW subsea cable transmission link between the Western Isles and the Scottish mainland. The company referenced the UK Government's decision to allow remote island onshore wind to be included in future Contracts for Difference (CfD) auctions. The existing Western Isles

²⁵ Baxter, J.M., Boyd, I.L., Cox, M., Donald, A.E., Malcolm, S.J., Miles, H., Miller, B., Moffat, C.F. 2011. Scotland's Marine Atlas: Information for the national marine plan. Marine Scotland, Edinburgh. Available at <https://www.gov.scot/Publications/2011/03/16182005/0>.

²⁶ United Kingdom Marine Monitoring and Assessment Strategy (UKMMAS). 2010. Charting Progress 2 Feeder Report Productive Seas. Department for Environment Food and Rural Affairs on behalf of UKMMAS (Eds. Saunders, J. and McKie, J.) 472pp Available online: <http://chartingprogress.defra.gov.uk/>

²⁷ Scottish and Southern Electricity Networks. 2018. Completion of Caithness-Moray transmission link. Available at: <https://www.ssen-transmission.co.uk/news-views/articles/2019/1/completion-of-caithness-moray-transmission-link/> Accessed 15/07/2019.

²⁸ AECOM and ABPmer. 2015. ISLES spatial planning and sustainability appraisal. Irish Scottish links on energy study: ISLES II: Towards implementation.

network is close to full capacity and it is unlikely that further generation could connect without significant reinforcement²⁹.

- 2.2.15 There is a North Connect project proposing to develop a 665km, 1400MW HVDC interconnector between Peterhead in Scotland and Simadalen in Norway. It will provide an electricity transmission link between the two nations to exchange power and increase the use of renewable energy. The intention is for the HVDC interconnector to be operational by 2023³⁰.
- 2.2.16 In addition, the Maali interconnector is proposed to link Shetland to Norway³¹, in order to provide for the transfer of energy from proposed wind farms on the islands to Norway in periods of high production, and from Norway in periods of low wind.

²⁹ SSEN. 2019. SSEN statement on Western Isles and Shetland Needs Case consultations. Available at: <https://www.ssen-transmission.co.uk/news-views/articles/2019/3/ssen-statement-on-western-isles-and-shetland-needs-case-consultations/>

³⁰ North Connect. 2018. HVDC Cable Infrastructure- UK Construction Method Statement. Available at: <http://northconnect.no/file/hvdc-cable-infrastructure-uk-construction-method-statement.pdf>. Accessed 08/10/2018.

³¹ European Network of Transmission Systems. Undated. Project 294- Maali. Available at <https://docstore.entsoe.eu/Documents/TYNDP%20documents/TYNDP%202016/projects/P0294.pdf>. Accessed 24/10/2018

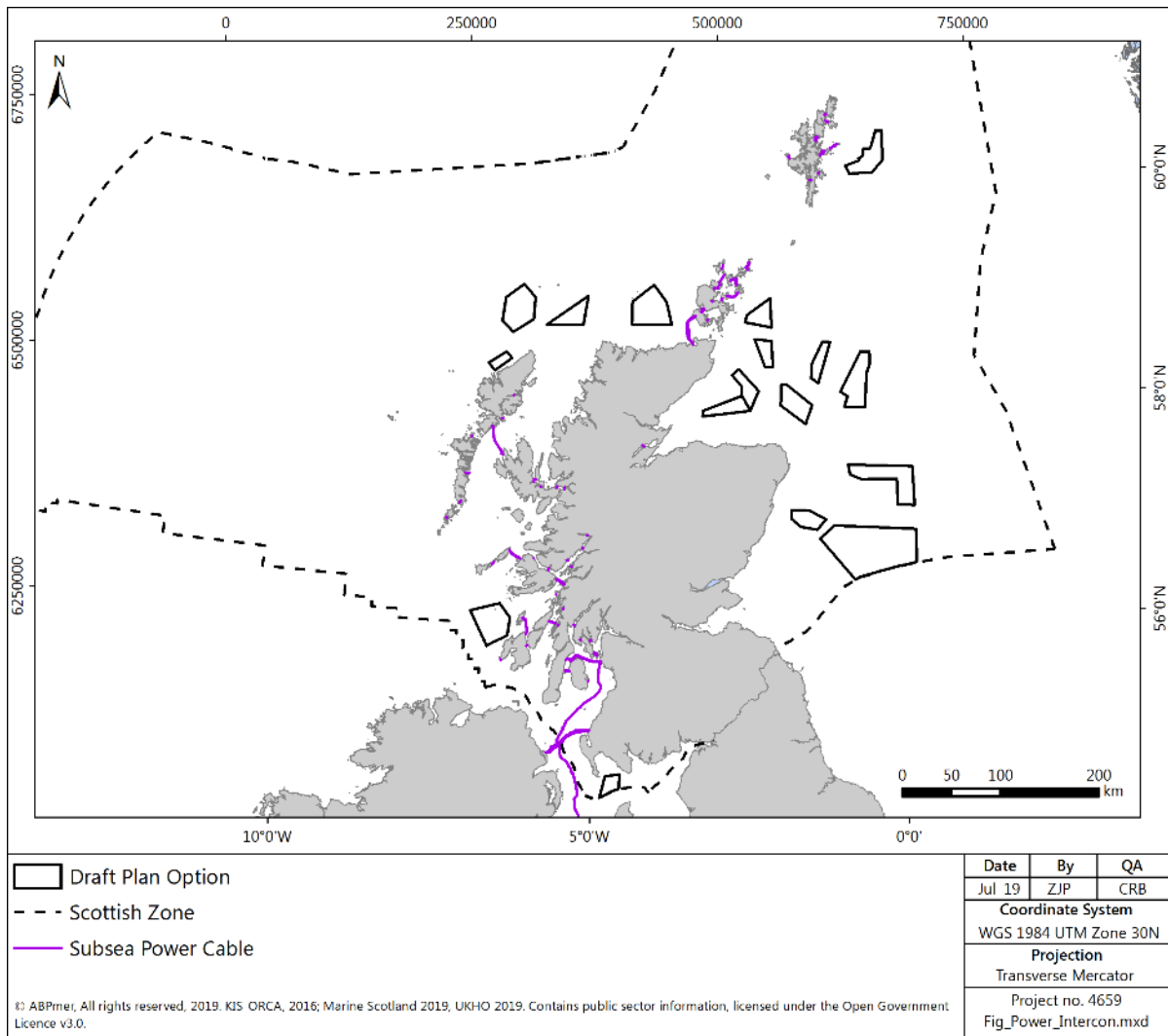


Figure 10 Power interconnectors in Scottish waters³²

³² Awaiting data to include planned and potential future interconnector routes.

Telecom Cables

- 2.2.17 Telecommunication cables carry telephone calls, internet connections and data. Within the Scottish Continental shelf there are fibre optic international cable links and domestic inter-island cables which are mainly made from copper wire. There are 88 active cables in Scottish waters, spanning approximately 3,500km of international cables and 1,100km of inshore cables (Figure 11). An international network passes North and South of Shetland connecting Europe to North America, Faroe Islands, Iceland and Greenland, while networks connecting Scotland and Northern Ireland occur in waters off the west and south west of Scotland. Cables also connect the Scottish mainland and island communities. Cables tend to be laid on or under the seabed with shallow gradient and soft sediment and finding the most suitable route around obstructions.
- 2.2.18 The overall UK telecoms and communications sector has recently been estimated to contribute approximately £63 billion to the economy³³ and employs approximately 270,000 people across 8,000 companies³⁴.
- 2.2.19 A further preliminary estimate of the economic value of the UK telecommunications subsea cables industry to the digital economy values it at £62.8 billion per annum³⁵. The only known estimate that has been published estimates that about 26,750 jobs in the UK telecommunications sector are marine-related³⁶. Through an analysis of cable ownership data, a crude estimate could be made of the average investment in telecommunication cables by the UK at £134m per year³⁷.
- 2.2.20 Increasing use of the internet and e-commerce has led both to an increasing demand for communication cables and for faster services which has meant that the capacity of cables has also grown³⁸.

³³ ABPmer. 2018. Study of the socio-economic benefits of marine industries included in the Seabed User and Developer Group. ABPmer Report No. R.3060.

³⁴ Department for International Trade. 2014. Communications industry in the UK: investment opportunities. February 2014. Available at <https://www.gov.uk/government/publications/communications-industry-in-the-uk-investment-opportunities/communications-industry-in-the-uk-investment-opportunities>.

³⁵ Elliott, C., Al-Tabbaa, O., Semeyutin, A. and Tchouamou Njoya, E. 2016. An Economic and Social Evaluation of the UK Subsea Cables Industry. University of Huddersfield. A report commissioned by Subsea Cables UK and The Crown Estate. Available at <http://eprints.hud.ac.uk/id/eprint/31526>.

³⁶ Pugh, D. 2008. Socio-economic Indicators of Marine-related Activities in the UK economy. The Crown Estate, 68pp.

³⁷ TeleGeography. not dated. Submarine Cable Map. Available at: <https://www.submarinecablemap.com/>.

³⁸ AECOM and ABPmer. 2015. ISLES spatial planning and sustainability appraisal. Irish Scottish links on energy study: ISLES II: Towards implementation. Available at <https://www.gov.scot/Publications/2015/02/7308/downloads>.

2.2.21 According to the European Subsea Cables Association (ESCA) around 97% of international trans-ocean traffic is carried by cable, hence, submarine cables will be vital for the foreseeable future. However, there is little information available on the extent to which new cables will be laid in Scottish waters³⁹.

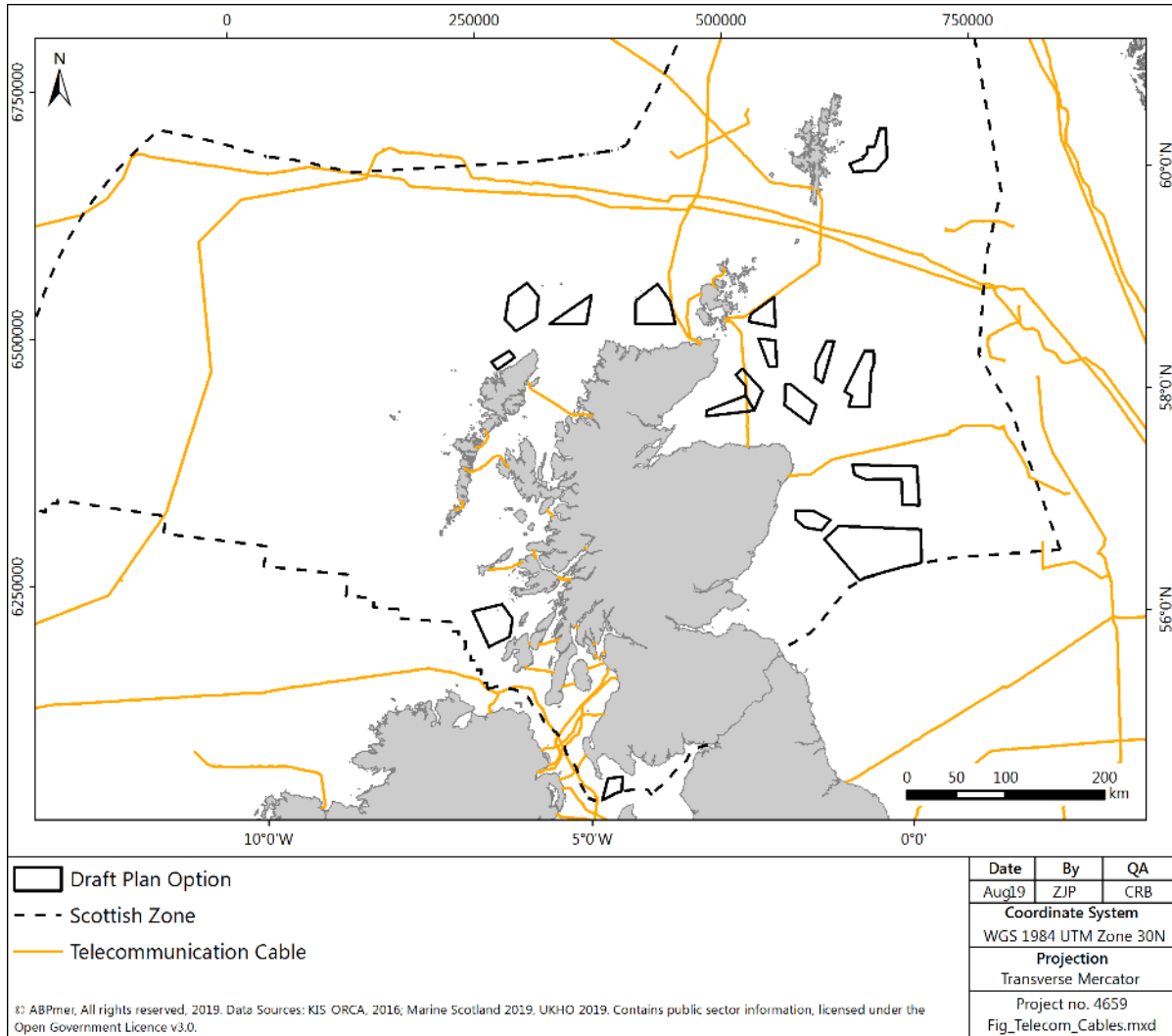


Figure 11 Active telecom cables in Scottish waters

³⁹ Baxter, J.M., Boyd, I.L., Cox, M., Donald, A.E., Malcolm, S.J., Miles, H., Miller, B., Moffat, C.F. 2011. Scotland's Marine Atlas: Information for the national marine plan. Marine Scotland, Edinburgh. Available at <https://www.gov.scot/Publications/2011/03/16182005/0>.

Carbon Capture and Storage

- 2.2.22 Carbon capture and storage (CCS) is a technology that will enable fossil fuels to be used with substantially reduced CO₂ emissions. CCS combines three distinct processes:
- Capturing the CO₂ from power stations and other industrial sources;
 - Transporting it (usually via pipelines) to storage points; and
 - Injection of the CO₂ into deep geological formations (e.g. deep saline formations or depleted Oil and Gas fields) for long term storage.
- 2.2.23 There are currently no full-scale demonstration or commercial projects in operation within the UK. However, Drax, power station (Selby) has started a pilot project to capture CO₂ from its wood combustion and other projects are anticipated to begin by the 2020s⁴⁰. Previously, Scotland has been identified as having a large CO₂ storage resource⁴¹, with 29 hydrocarbon fields and 10 saline aquifers identified as having the apparent potential to store CO₂, all of which are in offshore waters within the Central and Northern North Sea. Figure 12 identifies the saline aquifers within Scottish waters. Of the identified aquifers, the Captain aquifer may have the highest likelihood of being developed, having been identified by the ACT Acorn project as its principal site for development in the early 2020s utilising pre-existing oil and gas pipelines to transport the CO₂, thus reducing project costs⁴².
- 2.2.24 As an emerging sector there remains uncertainty regarding the likely future development of CCS in Scotland. A number of CCS programmes initiated within Scottish waters have been unsuccessful, following changes in UK Government policy and lack of funding⁴³. The UK government⁴⁴ has committed to funding development and innovation in Carbon Capture Usage and Storage technology. The Committee on Climate Change (CCC) continues to highlight CCS as an important sector for the UK as a whole⁴⁵ and Scotland⁴⁶ to meet CO₂ emissions targets. The CCC has recommended that the Carbon Capture Usage and Storage Council publishes a CCS deployment pathway, and reviews delivery

⁴⁰ Department of Business, Energy and Industrial Strategy. 2018. Plan to enable first UK carbon capture project from the mid 2020s announced at world-first summit. Available at: <https://www.gov.uk/government/news/plan-to-enable-first-uk-carbon-capture-project-from-the-mid-2020s-announced-at-world-first-summit>. Accessed on 15/07/2019.

⁴¹ Scottish Centre for Carbon Storage (SCCS). 2009. Opportunities for CO₂ storage around Scotland: An integrated strategic research study. Report for the Scottish Government. April 2009.

⁴² ACT Acorn. 2018. ACT Acorn feasibility study. www.actacorn.eu.

⁴³ Shell U.K Limited (Shell). 2015. Peterhead CCS Project Announcement. Available at <https://www.shell.co.uk/about-us/latest-news-and-features/2015-news-and-features/peterhead-ccs-project-announcement.html>. Accessed 17/09/2018.

⁴⁴ HM Government. 2017. The Clean Growth Strategy, Leading the way to a low carbon future.

⁴⁵ Committee on Climate Change. 2018. Reducing UK emissions, 2018 Progress Report to Parliament. Available at: <https://www.theccc.org.uk/publication/reducing-uk-emissions-2018-progress-report-to-parliament/>.

⁴⁶ Committee on Climate Change. 2018. Reducing emissions in Scotland, 2018 Progress Report to Parliament. Available at <https://www.theccc.org.uk/publication/reducing-emissions-in-scotland-2018-progress-report-to-parliament/>.

and investment models⁴⁷, consistent with achieving the goal of having the first CCS cluster operational by 2026.

2.2.25 There is currently no information available on the economic value or employment associated with CCS, however the Scottish Government and Scottish Enterprise stated that emerging CCS-based industry in Scotland could support up to an estimated 10,000 jobs by 2025⁴⁸. This figure was estimated prior to the loss of funding for a number of CCS projects in Scotland, therefore whilst the CCS sector still has the potential for considerable job creation, this is likely to be delayed beyond the 2025 date identified above.

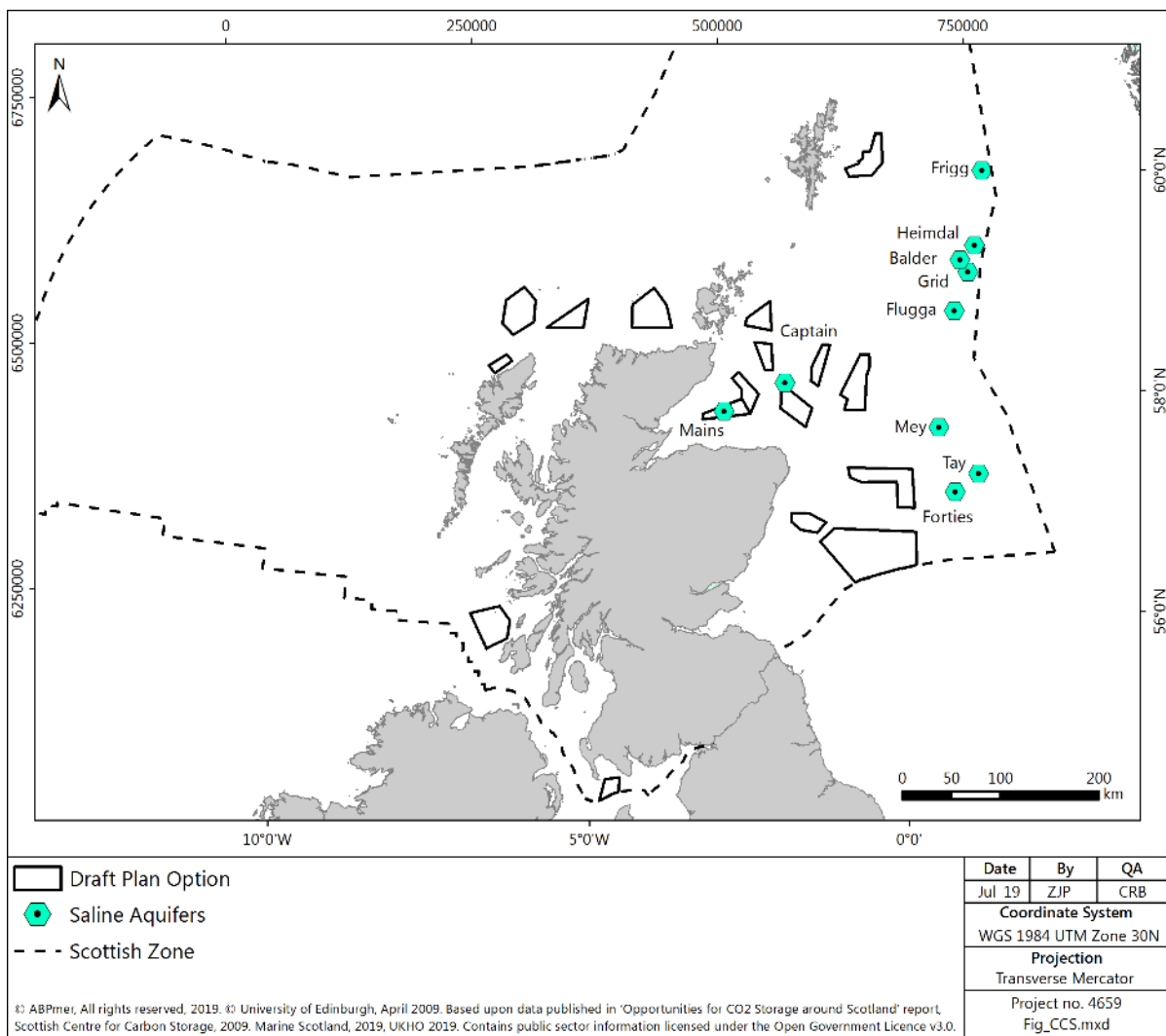


Figure 12 Saline aquifers in Scottish waters

⁴⁷ Committee on Climate Change. 2018. Reducing UK emissions, 2018 Progress Report to Parliament. Available at <https://www.theccc.org.uk/publication/reducing-uk-emissions-2018-progress-report-to-parliament/>.

⁴⁸ Scottish Government and Scottish Enterprise. 2011. Carbon Capture and Storage – A Roadmap for Scotland. Progress Report – May 2011. Available at <https://www.gov.scot/Publications/2010/03/18094835/0>.

Oil and Gas

- 2.2.26 This sector relates to the extraction of oil and gas from offshore reserves. Oil reserves include both oil and the liquids and the liquefied products obtained from gas fields, gas-condensate fields and from the associated gas in oil fields. Gas reserves are the quantity of gas expected to be available for sale from dry gas fields, gas-condensate fields and oil fields with associated gas.
- 2.2.27 The offshore extraction of oil and gas makes a significant contribution to the UK economy. In 2017 the UK accounted for 1.1% of the total production of oil and gas. The industry generated £13.4bn in 2016 and supports more than 36,000 jobs⁴⁹.
- 2.2.28 The oil and gas industry is the principal source of fuel and power for Scotland, meeting approximately 90% of the primary energy need in Scotland in 2015⁵⁰. The total revenue from oil, Natural Gas Liquids (NGL) and gas progressively decreased between 2014 (20,326 million tonnes) and 2016 (15,293 million tonnes) before increasing in 2017 (18,824 million tonnes). It was estimated that the oil and gas industry was worth £9.2 billion to the Scottish economy in 2016⁵¹ and in 2017-18 the sector accounted for 96% of the UK's crude oil and NGL production⁵². However, the Scottish oil and gas sector has experienced a significant decline in production revenue compared to previous years as a result of depletion of reserves and low oil and gas prices.
- 2.2.29 The oil and gas sector provides an important source of income and employment and in 2017 employed approximately 114,000 people across Scotland⁵³. The sector currently supports over 280,000 jobs across the UK, including 36,800 directly employed by oil and gas companies and major contractors. Around 127,000 people are employed in the wider supply chain and 119,700 people are in jobs induced by the economic activities of employees.
- 2.2.30 About 39% of the jobs supported by the sector are in Scotland, not only in major cities such as Aberdeen but across the whole of Scotland including more remote areas of the country.

⁴⁹ ABPmer and ICF. 2018. Study of the socio-economic benefits of marine industries included in the Seabed User and development Group. ABPmer Report No. 3060.

⁵⁰ Scottish Government. 2017. Scottish Energy Strategy: The future of energy in Scotland. Available at: <https://www.gov.scot/Resource/0052/00529523.pdf>. Accessed 10/10/2018

⁵¹ Scottish Government. 2018. Energy in Scotland 2018. Available at: <https://gov.scot/Resource/0053/00531701.pdf>. Accessed 10/10/2018

⁵² Scottish Government. 2018. Oil and Gas Production Statistics. Available at: <https://www.gov.scot/Resource/0054/00540203.pdf>. Accessed 10/10/2018

⁵³ Oil and Gas UK. 2017. Economic Report 2017. Available at: <https://oilandgasuk.co.uk/product/economic-report-2017/>. Accessed 10/10/2018

- 2.2.31 There is extensive infrastructure associated with oil and gas development in Scottish waters, including seabed and platform mounted production facilities and networks of pipelines bringing oil and gas ashore for processing⁵⁴, as shown in Figure 13. It is estimated that there is approximately 12,800km of oil and gas pipeline in Scottish waters with most pipelines outside the 12 nm limit. Virtually all hydrocarbon fields, platforms, pipelines and infrastructure occur within the central and northern North Sea and to the west of Shetland.
- 2.2.32 The North Sea fields are generally mature, but there is the potential for significant new development to occur west of Shetland. This includes the gas discovery announced in September 2018 of a significant gas reservoir at Glendronach to the west of Shetland⁵⁵. The discovery has the potential to be developed quickly, due to the proximity of current infrastructure to the site.
- 2.2.33 Oil and gas production is projected to gradually decrease in the period to 2035. Oil and Gas UK forecasts that 66% of the UK's energy mix will still come from oil and gas by 2035 (Ibid). National Grid predicts that by 2050, green gas will make up 39% of the UK's gas demand⁵⁶ and the CCC considers that low carbon energy generation could contribute to 75% of the UK's energy by 2030⁵⁷.

⁵⁴ Baxter, J.M., Boyd, I.L., Cox, M., Donald, A.E., Malcolm, S.J., Miles, H., Miller, B., Moffat, C.F. 2011. Scotland's Marine Atlas: Information for the national marine plan. Marine Scotland, Edinburgh. Available at <https://www.gov.scot/Publications/2011/03/16182005/0>.

⁵⁵ Total. 2018. Total announces major gas find offshore UK 24/09/2018. Available at <https://www.total.com/en/media/news/press-releases/total-announces-major-gas-find-offshore-uk>. Accessed 24/10/2018.

⁵⁶National Grid. 2018. Future Energy Scenarios in five minutes. Available at: <http://fes.nationalgrid.com/media/1357/fes-2018-in-5-minutes-web-version.pdf>. Accessed 10/10/2018.

⁵⁷ Committee on Climate Change. 2018. Reducing UK emissions. Available at: <https://www.theccc.org.uk/wp-content/uploads/2018/06/CCC-2018-Progress-Report-to-Parliament.pdf>. Accessed 10/10/2018

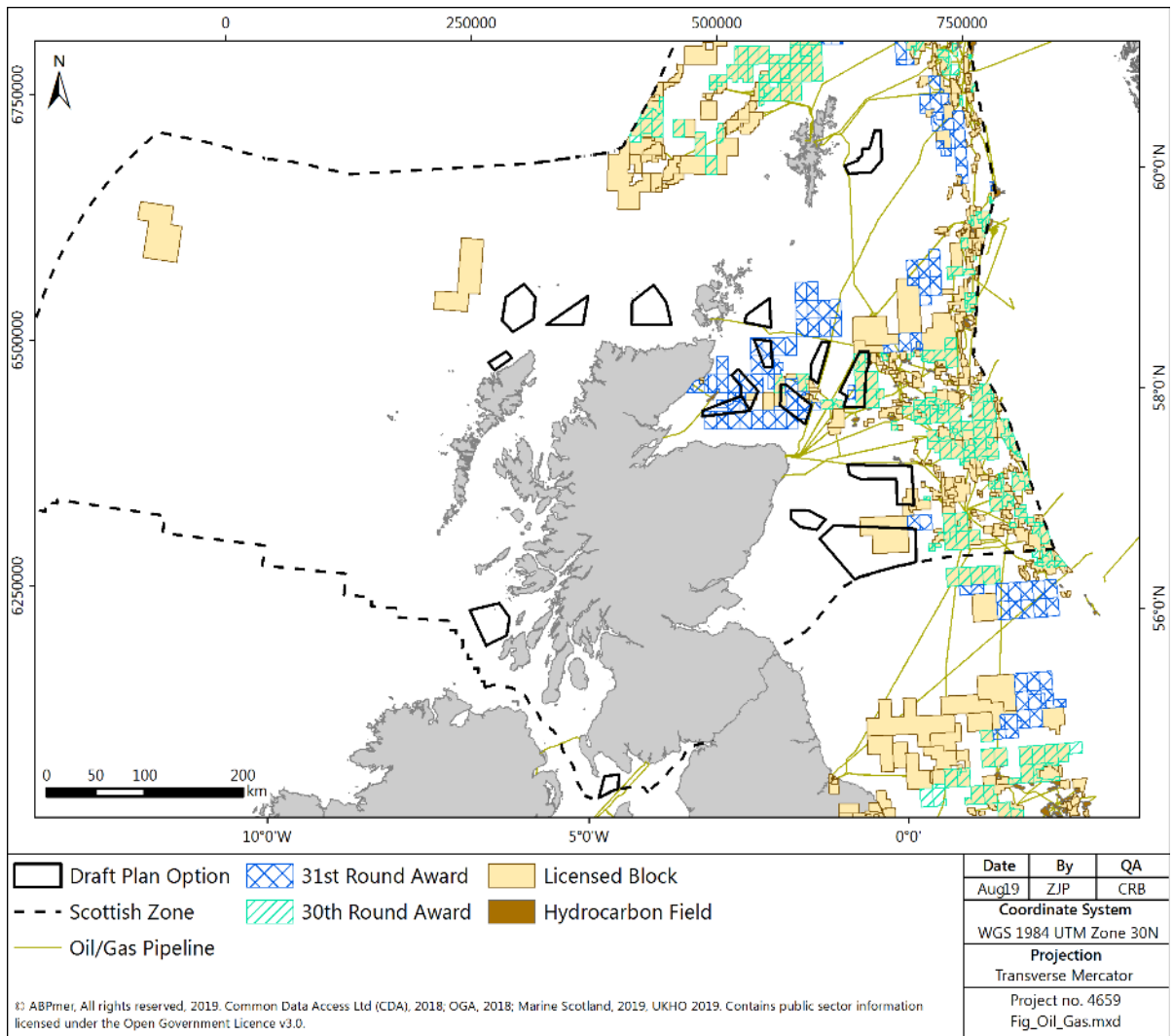


Figure 13 Oil and Gas infrastructure and recent licence awards in Scottish waters⁵⁸

⁵⁸ Awaiting data to include oil and gas pipeline infrastructure

Aviation

- 2.2.34 Aviation forms a critical component of Scotland's economy by providing both direct access to markets and lifeline services to otherwise inaccessible settlements throughout the mountainous and island terrain. Helicopter routes are also important in servicing offshore oil and gas installations (Figure 14).
- 2.2.35 Scotland's five major airports are in the west (Glasgow and Glasgow Prestwick), north east (Inverness and Aberdeen) and east (Edinburgh). Smaller airports are located on the mainland in the east (Dundee), north east (Wick) and west (Campbeltown) and on the islands in the north (Scrabster, Lerwick and Sumburgh in the Shetlands; Kirkwall in the Orkneys), north west (Stornoway, Benbecula and Barra in the Outer Hebrides) and west (Coll, Colonsay, Tiree and Islay). All Scottish airports are shown on Figure 14.
- 2.2.36 Primary and secondary surveillance radars are used by air traffic control at airports. Large portions of the Scottish coast are within radar surveillance areas (Figure 14). The areas with greatest coverage are around Tiree, Aberdeen and Peterhead. There are also secondary surveillance radars around Tiree, Aberdeen, Peterhead, Glasgow, Sumburgh and Stornoway.
- 2.2.37 Edinburgh is the busiest airport in Scotland and in 2016 contributed almost £1 billion into the Scottish economy and employed approximately 23,000 people⁵⁹.
- 2.2.38 Major or important airports in Scotland are safeguarded aerodromes, protecting the aerodrome operations from interference, such as from developments, wildlife strike, inappropriate lighting and radar interference. In the context of wind turbines, the Airport Operators Association recommends that any proposed wind developments within 30km of a safeguarded airport should be assessed by the aerodrome for potential physical impacts⁶⁰. Further, all proposed wind developments should undertake consultation with the aerodrome and NATS regarding impacts on radar services.

⁵⁹ Edinburgh Airport Consultative Committee. 2018. Available at <https://www.edinburghairport.com/about-us/edinburgh-airport-consultative-committee-eacc>. Accessed 23/10/2018.

⁶⁰ Airport Operators Association and Civil Aviation Authority. 2016. Safeguarding of Aerodromes, Advice Note 5. Renewable Energy and Impact on Aviation. Available at <https://www.aoa.org.uk/wp-content/uploads/2016/09/Advice-Note-5-Renewable-Energy-2016.pdf>. Accessed 25/10/2018.

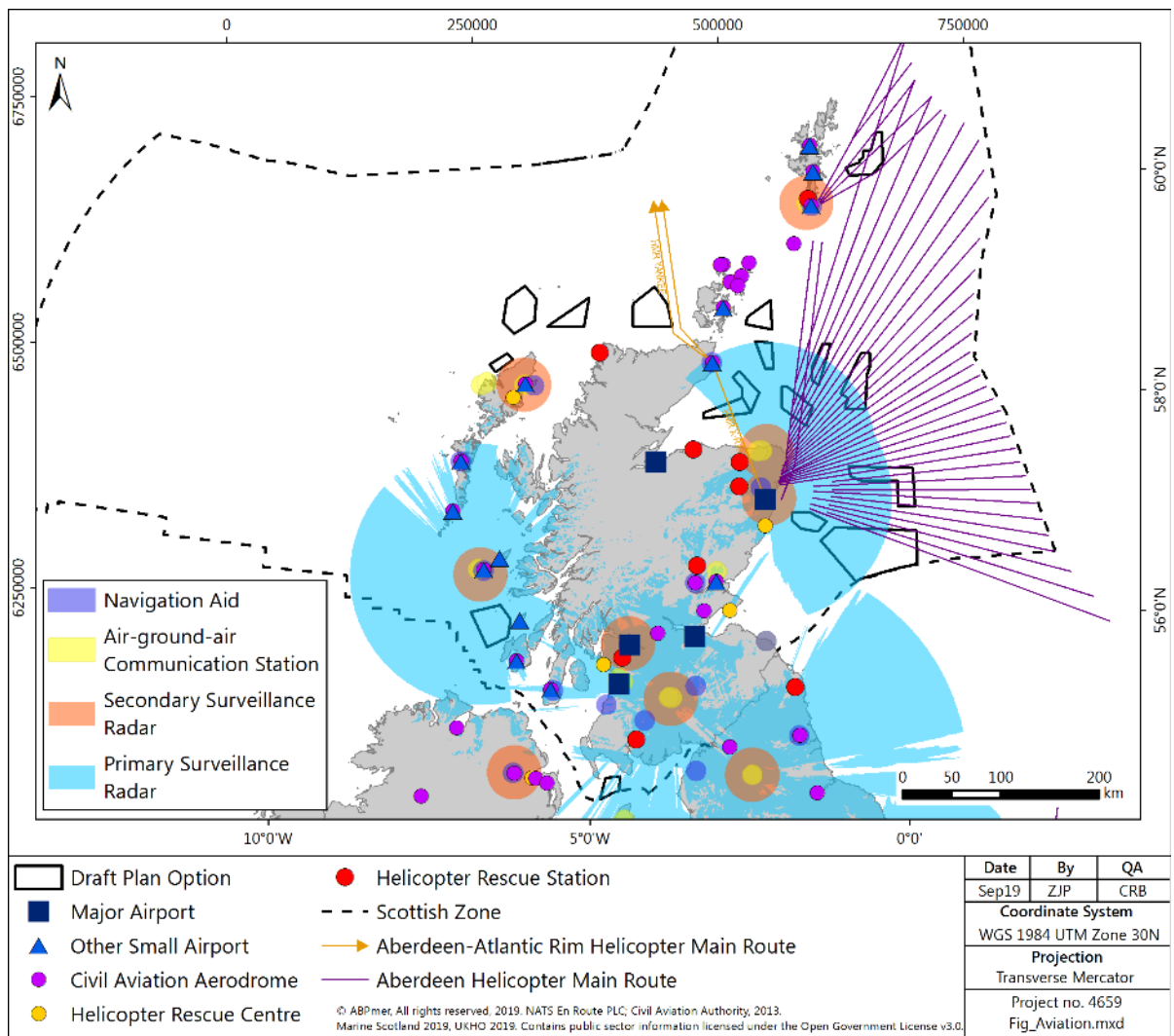


Figure 14 Aviation infrastructure, routes and radar coverage

Defence

- 2.2.39 Scottish Waters (including territorial waters and the Exclusive Economic Zone) are extensively used in direct support of UK defence. MOD strategic interests relevant to the Scottish zone are to:
- Retain the capability to store, maintain and deploy the deterrent;
 - Free navigation for surface and subsurface naval vessels for national defence;
 - Safeguarding of navigational routes and nationally critical infrastructure;
 - Safeguard the usage of designated Danger Areas and Exercise Areas for military training and defence test & evaluation purposes; and
 - Retain strategic maritime infrastructure, installations and coastal MOD facilities.
- 2.2.40 Military activities occur in both inshore and offshore waters around Scotland. Principal marine-related defence activities include sea transport by naval vessels and sea training. Activities relating to maritime transport are mainly associated with naval bases and the only naval base in Scotland is Her Majesty's Naval Base (HMNB) Clyde at Faslane in the West Region. Sea training is carried out within defined military practice and exercise (PEXA) training areas. The Navy's Scottish Exercise Areas (SXAs) occur around the coast of Scotland, although these are predominantly located off the west coast, while firing danger areas and 'other' exercise areas occur in all offshore energy regions (Figure 15). Although the PEXA cover large areas of sea, military exercises cover only a proportion of these areas at any one time and are restricted temporally to a few weeks per year. The major training exercise each year is the Joint Maritime Course in which Navy, Army and RAF exercises are conducted off the Scottish North West coast and which lasts for two weeks⁶¹.
- 2.2.41 There are two low flying Tactical Training Areas in Scotland, however the majority of training is overland as the sea does not provide a challenging enough environment for training purposes⁶².
- 2.2.42 In addition to military establishments in the public domain (Figure 15), it is recognised that further military assets may be present in the region. Any concerns regarding assets of this type will be identified in consultation with the MOD at a project level.
- 2.2.43 Historically, areas of sea around Scotland have been used to dispose of munitions, both conventional (explosives) and chemical. Methods of disposal varied, but included disposal of munitions individually, particularly focussed on

⁶¹ United Kingdom Marine Monitoring and Assessment Strategy (UKMMAS). 2010. Charting Progress 2 Feeder Report Productive Seas. Department for Environment Food and Rural Affairs on behalf of UKMMAS (Eds. Saunders, J. and McKie, J.) 472pp Available online: <http://chartingprogress.defra.gov.uk/>

⁶² UK Government. 2013. Guidance: Military low flying. Available at <https://www.gov.uk/guidance/military-low-flying>. Accessed 18/10/2018

the area around Beaufort's Dyke⁶³. In addition, a number of ships were loaded with a variety of munitions, prior to being scuttled in the seas around Scotland. The records of the vessel locations and cargoes are generally poorly kept; however, the majority of wrecks lie in water depths greater than 200 m⁶⁴ and current records do not indicate overlap between the Areas of Search and potential munitions disposal sites (Figure 15).

- 2.2.44 Defence activities do not generate a tangible output and therefore cannot be valued. However, information is available on the expenditure within relevant departments, e.g. the Commander-in-Chief (C-in-C) Navy Command which is responsible for the operation, resourcing and personnel training of ships, submarines and aircraft⁶⁵.
- 2.2.45 The MOD employs people throughout the UK in support of its operations in the marine environment, including HM naval bases, MOD ranges and coastal estates. Gross Value Added (GVA) of UK military activity in the sea was estimated to be approximately £400 million in 2012⁶⁶. Marine activities and hence the location of the value to the economy are mainly related to the location of the naval bases and exercise areas.
- 2.2.46 In 2017/18, UK military defence expenditure in Scotland was £1,649 million, supporting 10,000 jobs in Scottish Industry⁶⁷, with an overall increase from 2013/14.
- 2.2.47 In terms of direct employment, at October 2017, there were 9,970 military (armed forces) personnel and 3,970 civilian personnel based in Scotland. The armed forces comprised 4,050 Navy, 4,190 Army and 1,730 RAF personnel⁶⁸.

⁶³ Fisheries Research Services. 1996. Report No. 15/96 Surveys of the Beauforts Dyke Explosives Disposal Site, November 1995 – July 1996.

⁶⁴ Scottish Government. 2015. Defence (Military)- Historic munitions disposal sites – January 2015.

⁶⁵ United Kingdom Marine Monitoring and Assessment Strategy (UKMMAS). 2010. Charting Progress 2 Feeder Report Productive Seas. Department for Environment Food and Rural Affairs on behalf of UKMMAS (Eds. Saunders, J. and McKie, J.) 472pp Available online: <http://chartingprogress.defra.gov.uk/>

⁶⁶ Marine Science Co-ordination Committee. 2015. Economic value and employment in the UK of activities carried out in the marine environment. Available at <https://www.gov.scot/Resource/0046/00466811.pdf>.

⁶⁷ MOD. 2019. Data tables relating to Finance and economics annual statistical bulletin: MOD regional expenditure with UK industry and commerce and supported employment 2017/18. Available for download from: <https://www.gov.uk/government/statistics/mod-regional-expenditure-with-uk-industry-and-supported-employment-201718>

⁶⁸ MOD. 2017. Quarterly Location Statistics(QLS) 1 October 2017. Available at <https://www.gov.uk/government/statistics/location-of-uk-regular-service-and-civilian-personnel-quarterly-statistics-2017>. Accessed 11/10/2018.

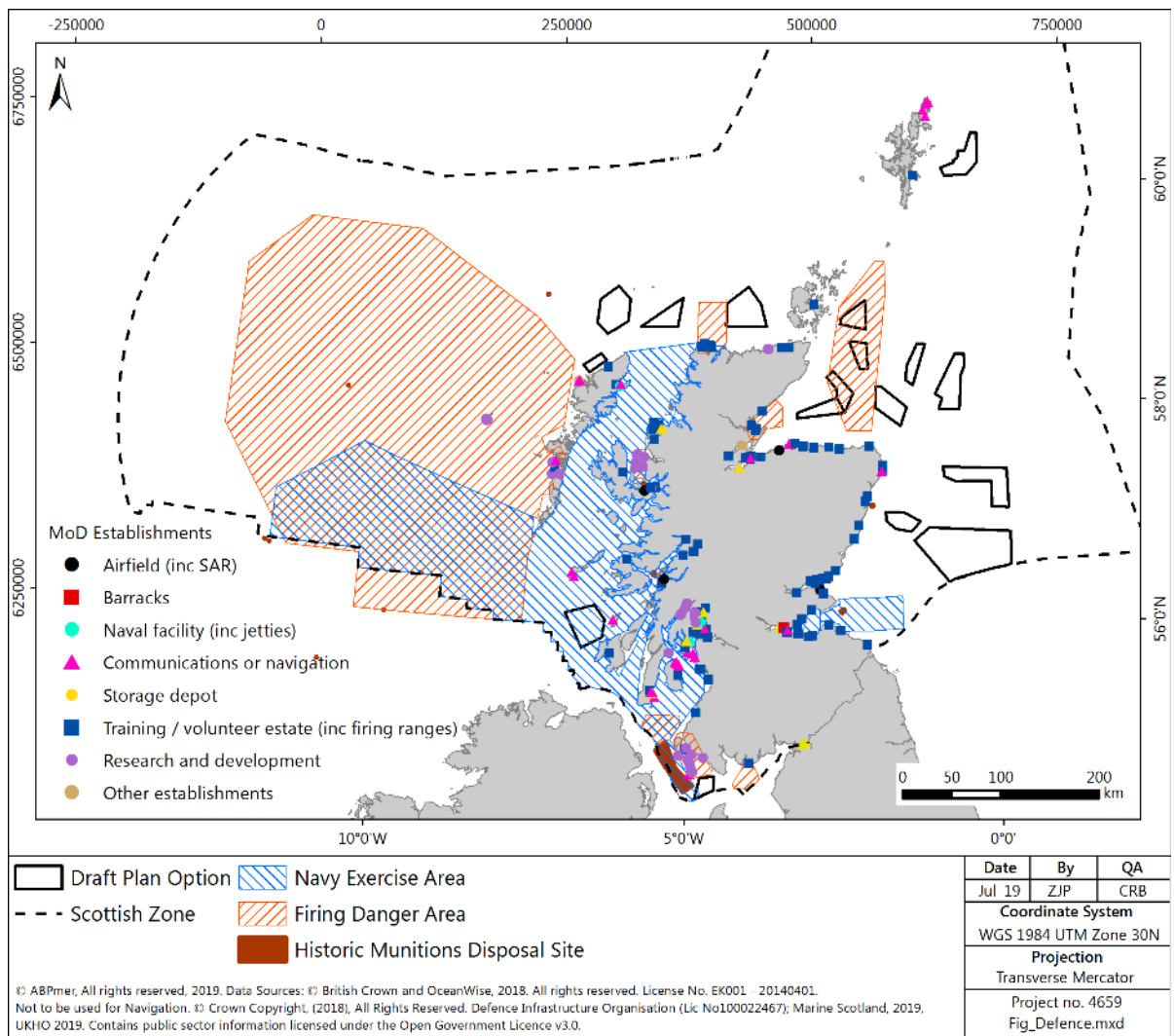


Figure 15 Defence infrastructure sites and exercise areas in Scottish seas

Fishing

- 2.2.48 Fishing is an important economic activity in Scottish waters and has strong socio-cultural elements in maintaining the vigour and coherence of coastal communities, particularly in rural and island locations.
- 2.2.49 Scotland is one of the largest sea fishing nations in Europe and in 2017 Scottish-based vessels landed 466,000 tonnes of fish and shellfish into the UK and abroad, with a value of £560 million⁶⁹. Compared to 2016, this represents a 1% decrease in value in real terms and a 3 % increase in the quantity landed. These landings constituted 64 % of the quantity, and 57 % of the value, of all landings by UK vessels into the UK and abroad⁷⁰. The overall trend over the last ten years has been of increasing value of landings, with a significant increase in volume of landings in 2014 from the pelagic sector (Figure 16).
- 2.2.50 The pelagic species mackerel and herring are of particular importance to the Scottish fleet and in 2017, these species (together with blue whiting and horse mackerel) made up 65% by volume and 35% (£197 million) of the total value of landings made by Scottish vessels. Demersal species (including haddock, monkfish and cod) made up 22% by volume and 33% by value of landings by Scottish vessels, with a total value of £184 million. Shellfish landings (including *Nephrops*, scallops and crabs) made up 13% by volume and 32% by value of all landings by Scottish vessels with a total value of £180 million⁷¹.
- 2.2.51 Mackerel is the single most valuable species to the Scottish fishing industry at £162 million (29% of the total value of Scottish landings in 2017) followed by *Nephrops* at £75 million (13% of the total value of Scottish landings in 2017). Haddock (£42 million), scallops (£40 million) and monkfish (£36 million) were the next most valuable species landed by Scottish vessels in 2017⁷².
- 2.2.52 Shellfish is particularly important (from a value perspective), particularly for inshore areas of all regions and also for the offshore areas of the north-east and east regions. Demersal fishing is most valuable for the offshore areas of the north, north-east and Shetland regions, whilst pelagic fishing is important for the offshore areas of the north, Shetland and north-east regions.
- 2.2.53 The location of fishing activities is dependent on the species being targeted. Mackerel is fished in the North Sea from September to December and off the west coast from January to March. Herring is caught in the North Sea, around Fair Isle, and Cape Wrath in the summer months. *Nephrops* fishing is very tightly linked with the areas of muddy seabed favoured by this species.

⁶⁹ Scottish Government, 2018. Scottish Sea Fisheries Statistics 2017. Available at: <https://www.gov.scot/Topics/Statistics/Browse/Agriculture-Fisheries/PubFisheries>. Accessed 22/10/2018.

⁷⁰ MMO, 2018. UK Sea Fisheries Statistics, 2017. Available at: <https://www.gov.uk/government/statistics/uk-sea-fisheries-annual-statistics-report-2017>. Accessed 22/10/2018.

⁷¹ Scottish Government, 2018. Ibid.

⁷² Scottish Government, 2018. Ibid.

- 2.2.54 The most actively-fished grounds are in the Fladens, Moray Firth, Firth of Forth and the Long Forties in the east. On the west coast, this fishery is active from the North Minch down to the Clyde⁷³.
- 2.2.55 A variety of sizes of vessel participate in the Scottish fishing industry, from the 70 metre pelagic trawlers to the under-10 metre inshore creelers. There were 2,065 active Scottish-based vessels in 2017, made up of 1,503 vessels of fleet ten metres and under in length (73%) and 562 vessels over ten metres in length⁷⁴. Vessels larger than 12 m in length are obliged to carry a Vessel Monitoring System (VMS) that allows fishery compliance offices to monitor their activity. VMS has been a requirement for vessels over 12 m length since 2012, however full implementation across the fleet was delayed and so for some of the time-series of data reported, VMS data were not available for all years for vessels 12-15m length. In this report, activity of non-VMS vessels has been represented using other methods, including ScotMap (from participatory mapping by under-15m vessel operators) and landings at the scale of International Council for the Exploration of the Sea (ICES) statistical rectangles. The value of landings by larger vessels is approximately ten times that of the smaller inshore vessels. However, monetary value and the cultural significance of fishing are not necessarily synonymous.
- 2.2.56 Over-15m vessels using mobile demersal gears (Figure 17) operate in inshore areas around the Scottish coast, targeting *Nephrops* and scallops, as well as further offshore on the Fladen Grounds in the North Sea for *Nephrops*. Gears targeting demersal fish (e.g. cod, haddock) operate off the west coast along the shelf edge, around Shetland and in the North Sea. Over-15m vessels targeting pelagic species (Figure 18) operate offshore west of Scotland and around Shetland for mackerel, and north of Scotland and in the North Sea for herring. Over-15m vessels using static gears (Figure 19) operate mostly north and west of Scotland – inshore in North Minch and the Clyde with *Nephrops* creels, west of the Outer Hebrides and around Orkney targeting lobster, off the north and west coasts targeting crab, and along the shelf edge targeting demersal fish.
- 2.2.57 Under-15m vessels operate mostly in inshore areas, having a more limited operating range (Figure 20). *Nephrops* trawls are active on the west coast, from North Minch to the Clyde, and in the Moray Firth and Firth of Forth. Other (non-*Nephrops*) trawls operate on the Moray, Banff and Buchan coasts. Creels or pots for crab, lobster and *Nephrops* (Figure 21) are used throughout the west coast, around Orkney and in the Firth of Forth.

⁷³ Scottish Government. 2012. Offshore Wind Energy in Scottish Waters - Draft Regional Locational Guidance. doi: 10.7489/1686-1

⁷⁴ Scottish Government, 2018. Scottish Sea Fisheries Statistics 2017. Available at: <https://www.gov.scot/Topics/Statistics/Browse/Agriculture-Fisheries/PubFisheries>. Accessed 22/10/2018.

2.2.58 The data in Figure 20 and Figure 21 do not cover the Shetland area, where 39,000 tonnes of fish and shellfish, worth £50 million were landed by Shetland boats from Shetland waters in 2016⁷⁵. Whitefish made up 53% of the value, pelagics 39% and shellfish 8%.

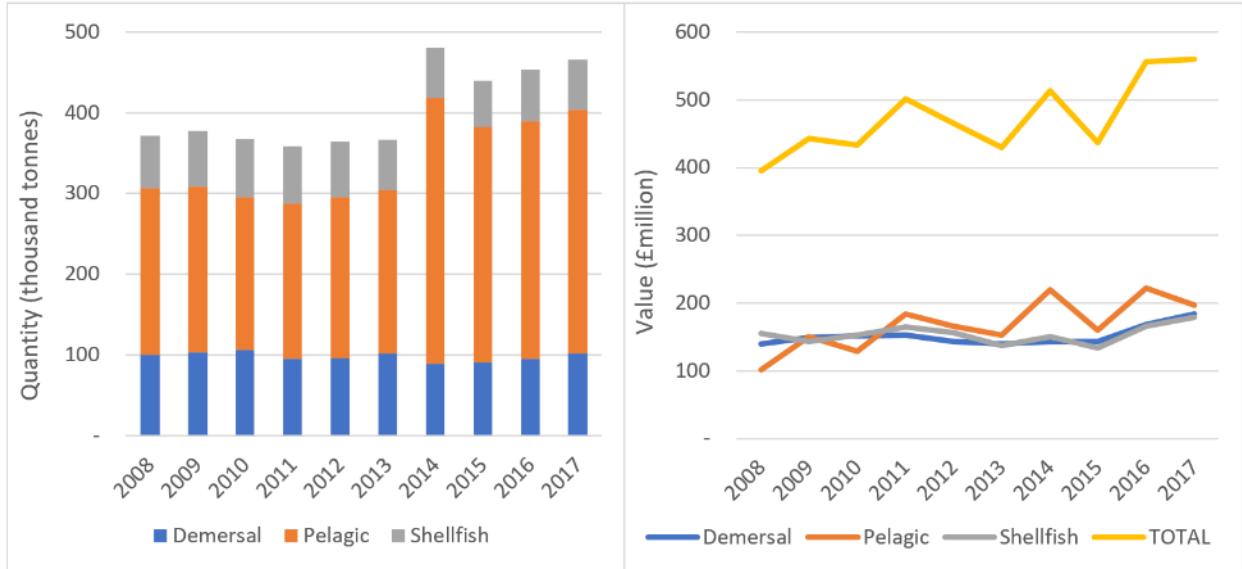


Figure 16 Trends in volume of landings (left) and value of landings (right) by Scottish vessels to the UK and abroad

⁷⁵ NAFC, 2017. Shetland Fisheries Statistics 2016. Ian R. Napier. NAFC Marine Centre, University of the Highlands and Islands. Available at: https://www.nafc.uhi.ac.uk/t4-media/one-web/nafc/research/document/shetland-fisheries-statistics/statistics/Shetland_Fisheries_Statistics_2016.pdf/. Accessed 22/10/18.

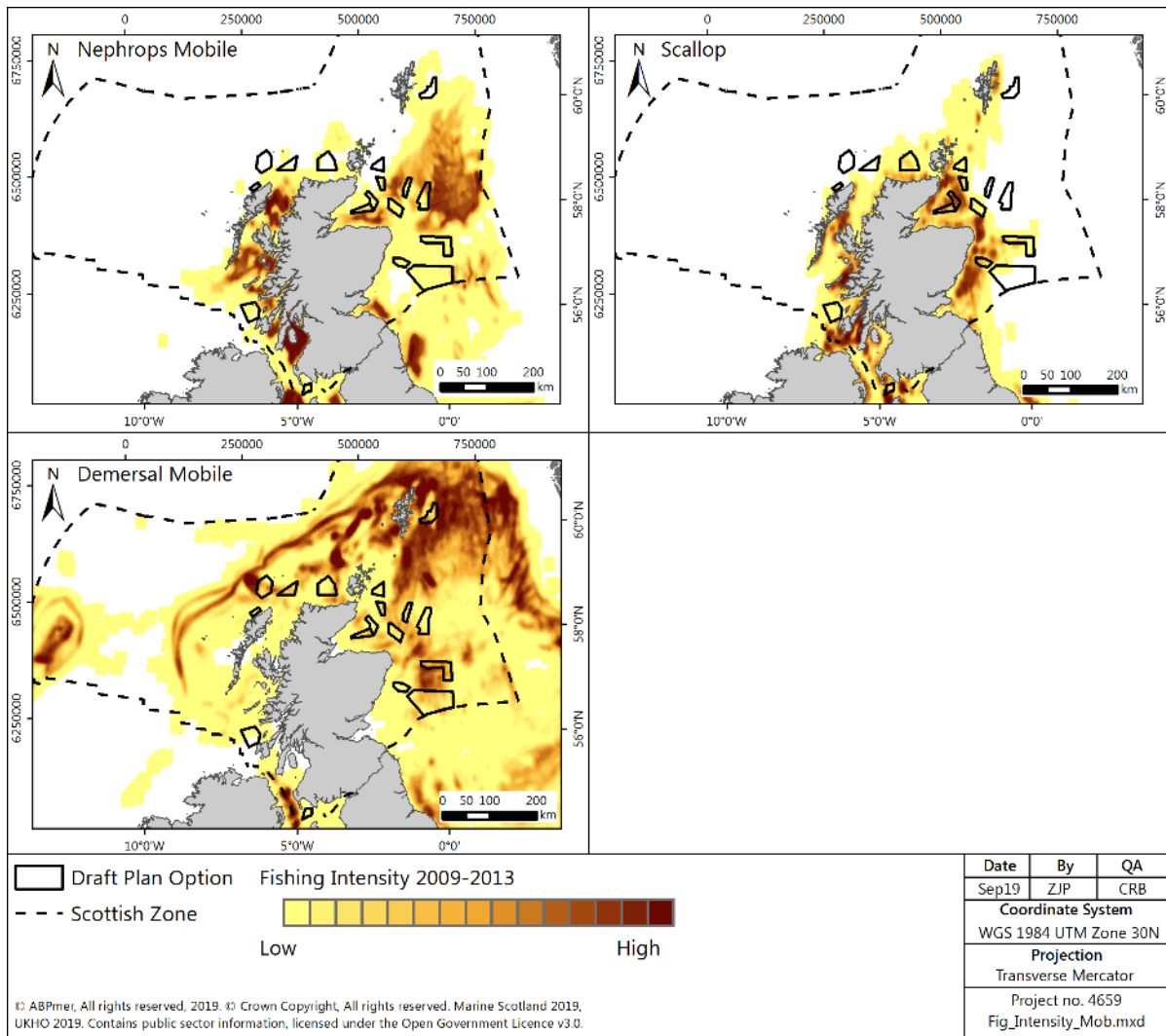


Figure 17 Fishing intensity for over-15m vessels using demersal mobile gear (2009-2013)

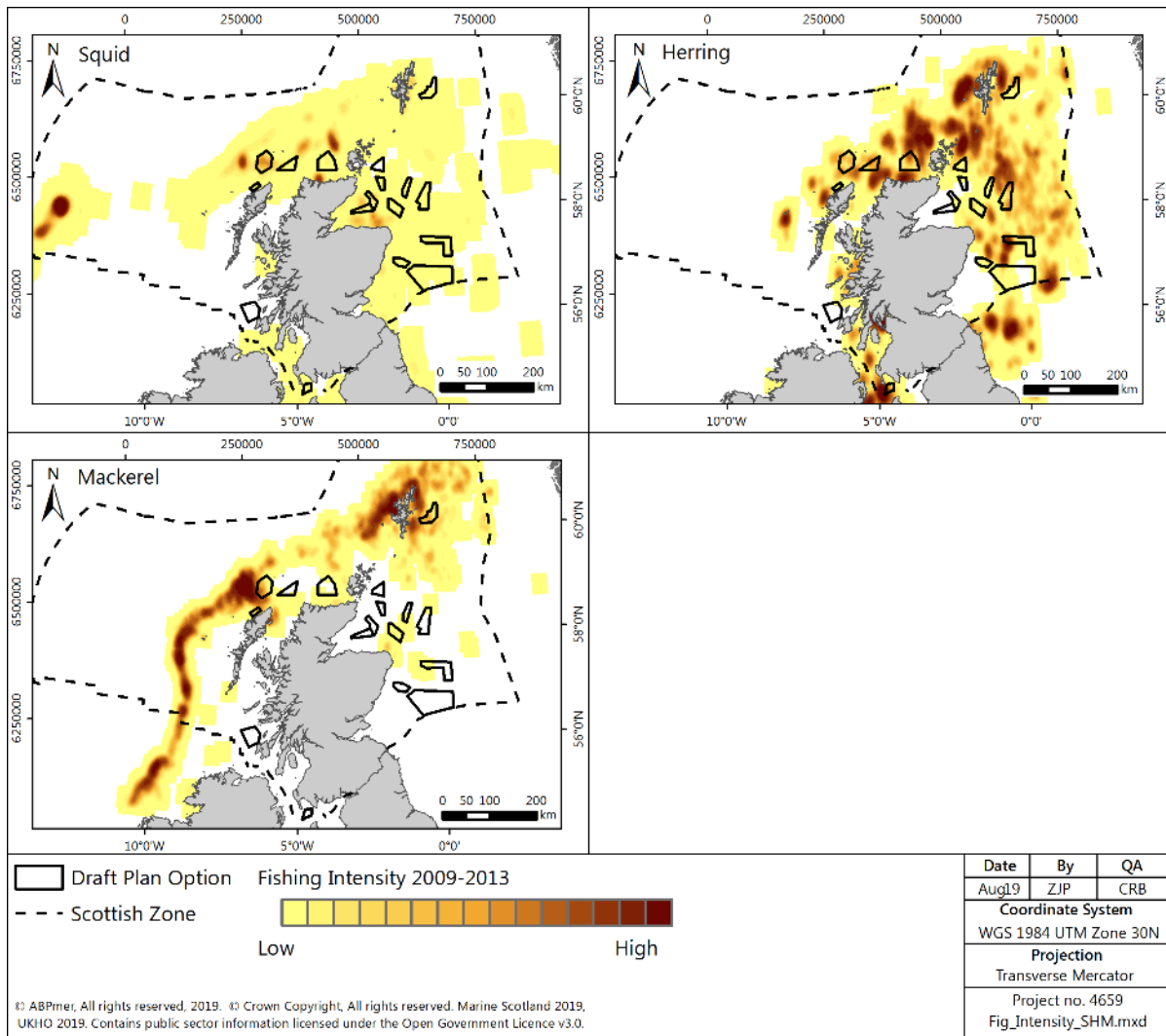


Figure 18 Fishing intensity for over-15m vessels targeting pelagic species (2009-2013)

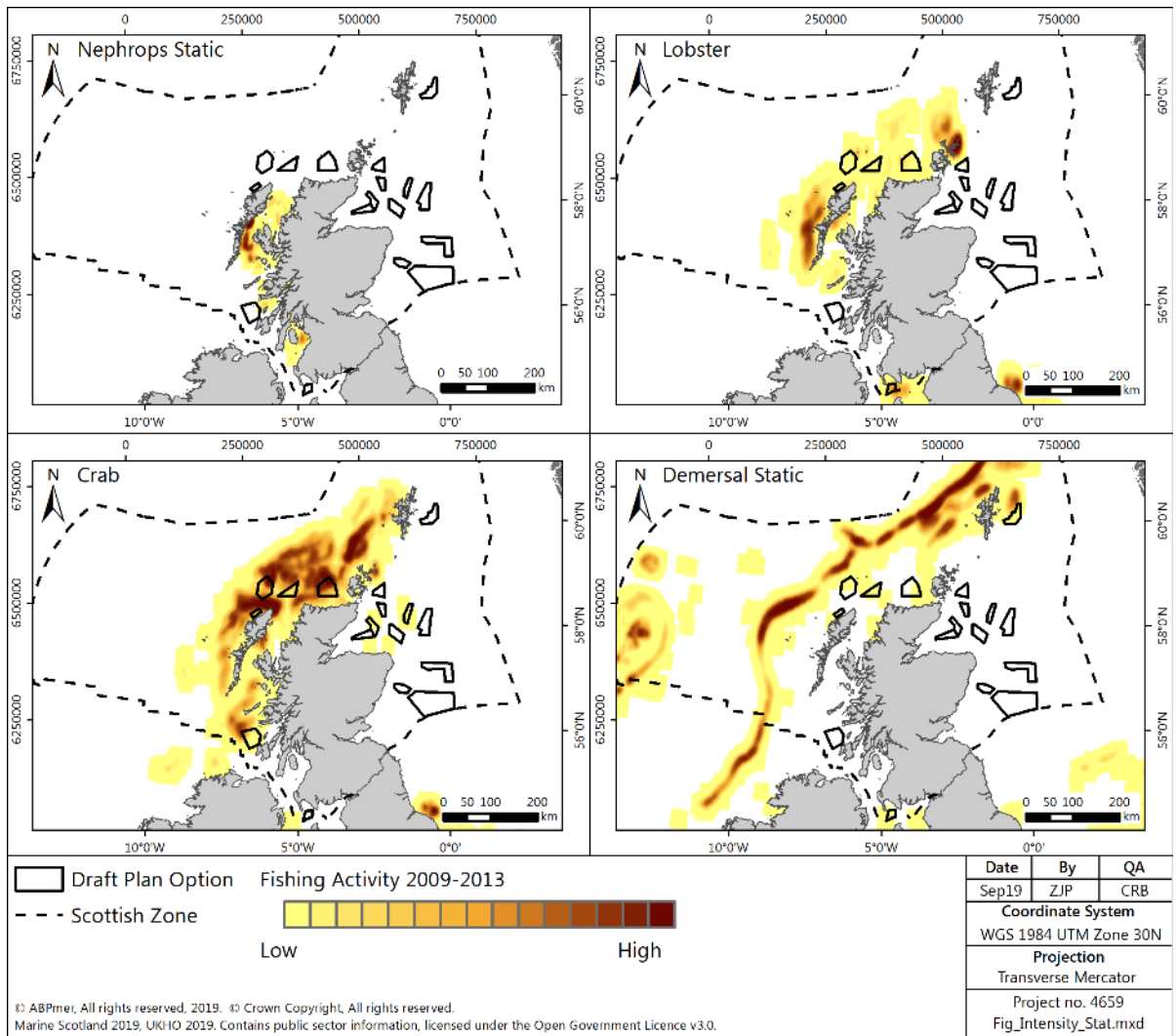


Figure 19 Fishing intensity for over-15m vessels using static gear (2009-2013)

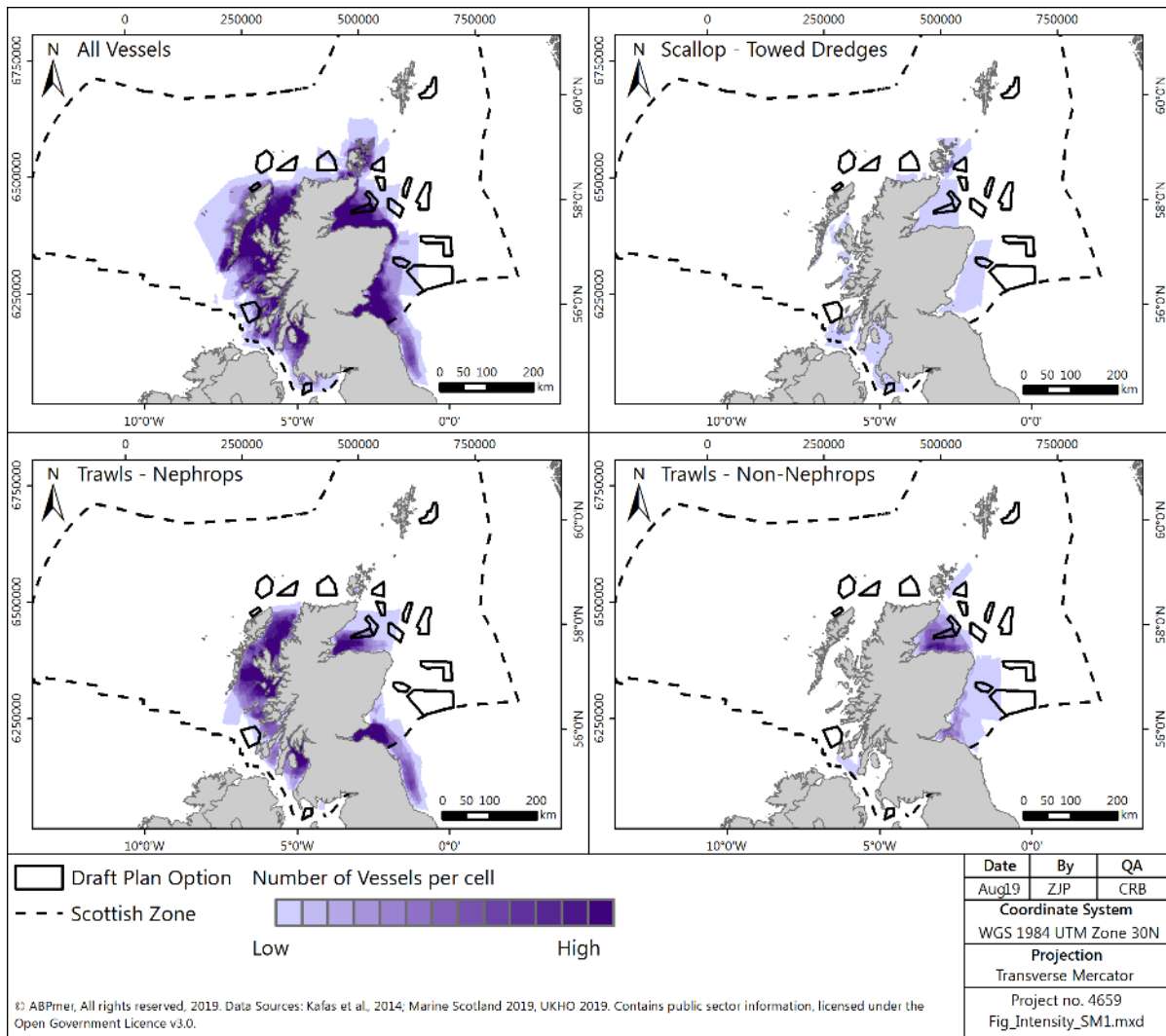


Figure 20 Number of vessels for under-15m vessels all gears and mobile demersal gears, from ScotMap

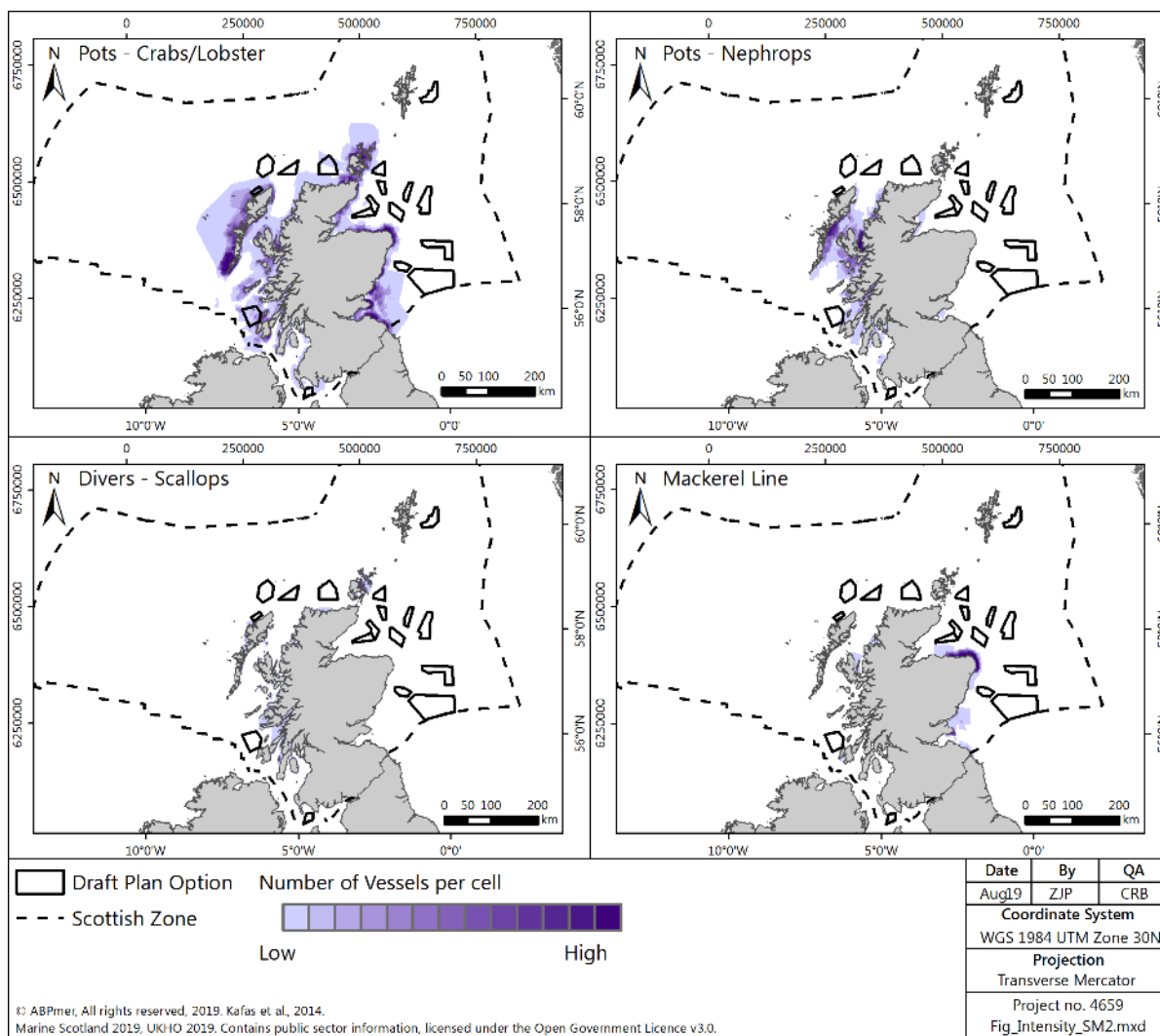


Figure 21 Number of vessels for under-15m vessels pots, divers and mackerel lines, from ScotMap

2.2.59 In 2017, 341,000 tonnes of fish and shellfish were landed into Scotland with a value of £505 million. This represents a 2% decrease in both tonnage and in real value since 2016⁷⁶. Landings into ports on the south-west coast and south-east coast were dominated by shellfish, while landings into north-west ports were mostly demersal and into the north-east were mostly pelagic. The three largest districts in Scotland in terms of total tonnage landed were Peterhead (east coast), Shetland (north) and Fraserburgh (east coast) (Figure 22).

⁷⁶ Scottish Government, 2018. Scottish Sea Fisheries Statistics 2017. Available at: <https://www.gov.scot/Topics/Statistics/Browse/Agriculture-Fisheries/PubFisheries>. Accessed 22/10/2018.

- 2.2.60 In 2017, 4,799 fishers were working on Scottish-based vessels, representing 0.2% of the total Scottish labour force⁷⁷, and 6% of the marine economy employment⁷⁸. Fraserburgh is the district with the largest number of fishers (753), accounting for 16% of the total in 2017. However, employment in fishing accounts for a higher percentage of overall employment in island communities (Shetland, Orkney and Na h-Eileanan Siar local authorities) and in Argyll and Bute, where it exceeded 2% and 1%, respectively⁷⁹. This highlights the importance of fishing to these communities.
- 2.2.61 In 2016, fishing generated £296 million GVA, accounting for 0.2% of the overall Scottish economy, and 8% of the marine economy. From 2015 to 2016 the GVA from fishing (adjusted to 2016 prices) increased by 34%, while the longer term trend from 2008 to 2016 showed that fishing GVA increased by 63%.⁸⁰ The highest GVA by district was generated in Aberdeenshire (£131 million), the Shetland Islands (£72 million), Highland (£30 million) and Argyll and Bute (£14 million).⁸¹
- 2.2.62 There were 152 fish processing sites in Scotland in 2016 (for the processing of saltwater (sea fish) and salmon & freshwater fish)⁸². The majority of these (39%) were in the Grampian region, with 23% in Highlands and Islands, and the remainder in 'Other Scotland'. This provided 8,380 full-time equivalent (FTE) jobs in Scotland, a decline of 12% since 2008. GVA of the sector was £341 million in 2014. Over half of UK processing sites for salmon and freshwater fish processing are in Scotland. Of the 3,606 FTEs in the salmon and freshwater fish processing sector in Scotland, 68% were in 'Other Scotland' and 23% in 'Highlands and Islands', making it particularly important in rural locations.

⁷⁷ *ibid*

⁷⁸ Marine Scotland, 2018. Scotland's Marine Economic Statistics. Published by The Scottish Government, October 2018. 77 pages. Available at: <https://www.gov.scot/Resource/0054/00542012.pdf>. Accessed 22/10/18.

⁷⁹ Scottish Government, 2018. *Ibid*.

⁸⁰ Marine Scotland, 2018. Scotland's Marine Economic Statistics. Published by The Scottish Government, October 2018. 77 pages. Available at: <https://www.gov.scot/Resource/0054/00542012.pdf>. Accessed 22/10/18.

⁸¹ Marine Scotland, 2018. *Ibid*.

⁸² Seafish, 2017. 2016 Seafood Processing Industry Report. Available at: <http://www.seafish.org/research-economics/industry-economics/processing-sector-statistics>. Accessed 22.10.18.

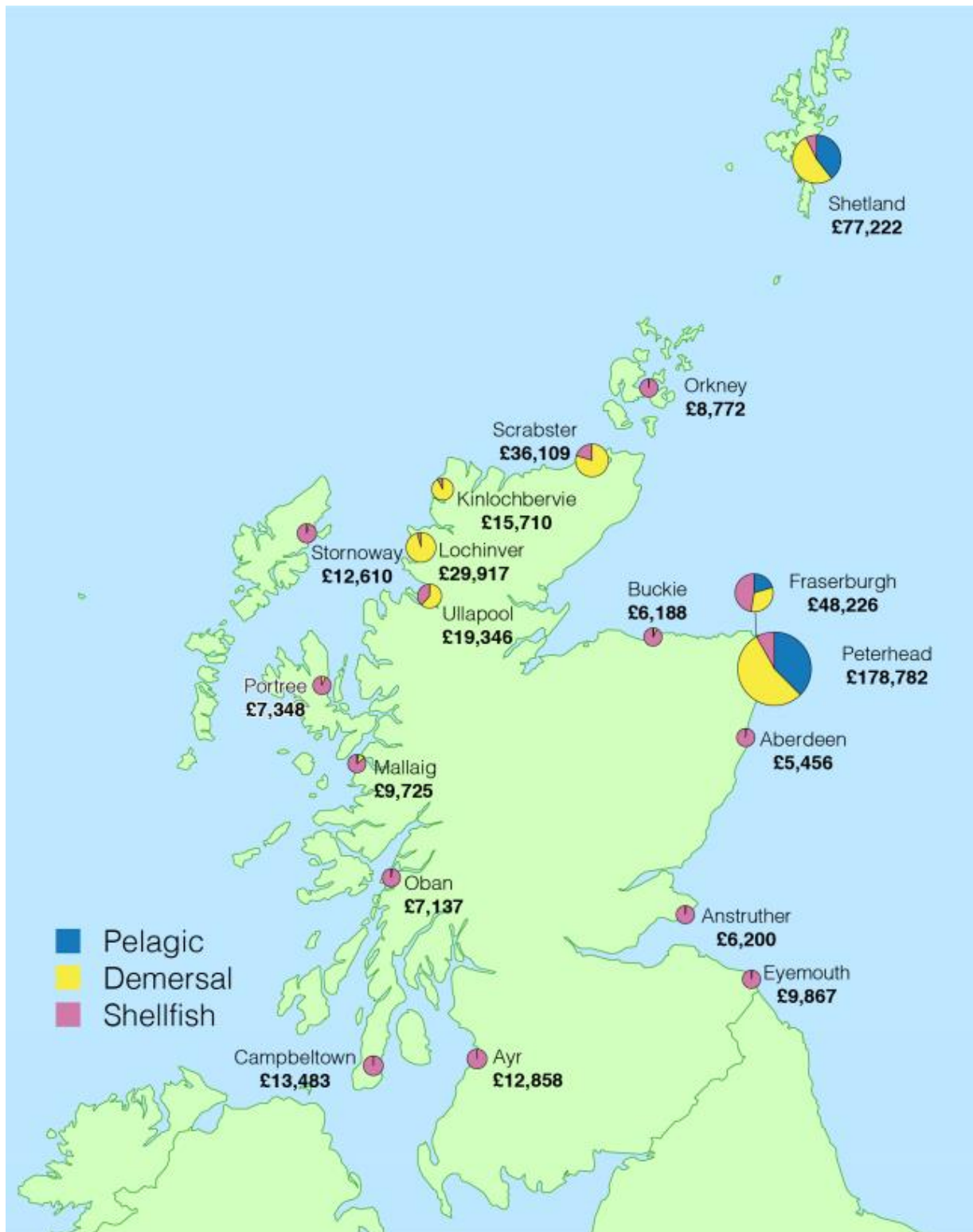


Figure 22 Value of landings into Scotland in 2017 by all vessels by district⁸³

⁸³ Scottish Government, 2018. Scottish Government, 2018. Scottish Sea Fisheries Statistics 2017. Available at: <https://www.gov.scot/Topics/Statistics/Browse/Agriculture-Fisheries/PubFisheries>. Accessed 22/10/2018.

Aquaculture

- 2.2.63 Marine aquaculture is an increasingly important industry for Scotland and helps to sustain economic growth in rural and coastal communities. It involves the farming or culturing of fish, molluscs, crustaceans or algae and produces Scotland's most valuable food exports. Aquaculture sites in Scotland are currently situated in coastal areas within a few miles of the shore with no sites found further offshore. Most sites are located in the sheltered lochs, bays and sounds of the West coast including the Hebrides and around Shetland with far fewer sites located on the East coast (Figure 23). The Scottish Government⁸⁴ aims to double the economic contribution of the sector from £1.8 billion in 2016, to £3.6 billion by 2030.
- 2.2.64 Finfish aquaculture is important to the Scottish economy. Scotland is the largest producer of farmed Atlantic salmon in the EU⁸⁵ and the third largest worldwide⁸⁶. Finfish aquaculture in Scotland is dominated by the farming of Atlantic salmon, although the production of rainbow trout significantly contributes to the industry. Other species farmed in 2016 included brown/sea trout, halibut, lumpsucker and several species of wrasse (the latter two species produced for use as cleaner fish for the biological control of parasites in the Atlantic salmon production industry).
- 2.2.65 In 2016, there were 253 active sites farming salmon, producing a total of 162,817 tonnes of Atlantic salmon, virtually all of which was produced in sea cages (only 21 tonnes of salmon were produced in seawater tanks on land). In the same year, there were 44 active sites farming rainbow trout (although only 7 sites which were sea-based), producing a total of 8,096 tonnes, of which 3,759 tonnes (46%) were produced from sea cages⁸⁷.
- 2.2.66 The number of staff employed in the production of Atlantic salmon was 1,486 (1,379 full time and 107 part-time)⁸⁸. In the same year, 121 staff were employed in the production of rainbow trout (100 full-time and 21 part-time), whilst 53 staff were employed in the production of other fish species (43 full-time and 20 part-time)⁸⁹.

⁸⁴ Scottish Government. 2018. Aquaculture Growth to 2030, A strategic plan for farming Scotland's seas. Available at <https://aquaculture.scot/>.

⁸⁵ Scottish Government. 2018. Aquaculture. Available at: <http://marine.gov.scot/themes/aquaculture>. Accessed 15/10/2018.

⁸⁶ SPICe, 2018. Salmon farming in Scotland. 13 February 2018, SB 18-12 rev

⁸⁷ Marine Scotland Science, 2017. Scottish fish farm production survey 2016. Available online at: <https://www.gov.scot/Resource/0052/00524803.pdf>

⁸⁸ These figures refer specifically to fish production and do not include the associated processing and marketing activities.

⁸⁹ Ibis

- 2.2.67 In 2017, there were 132 authorised shellfish aquaculture businesses in Scotland, operating 332 active sites, of which 53% were producing shellfish for the market (i.e. for consumption)⁹⁰.
- 2.2.68 Shellfish production was dominated by mussels and Pacific oyster, although small quantities of scallop, queen scallop and native oyster were also produced. Additional species farmed in small quantities in 2017 were shrimp and periwinkle.
- 2.2.69 In 2017, shellfish aquaculture in Scotland produced 8,232 tonnes of mussel and 403 tonnes of Pacific oysters for consumption. The vast majority of the mussel production in Scotland is located in Shetland, which accounted for 6,647 tonnes (81%) of the total mussel production in Scotland in 2017⁹¹. The production of Pacific oysters was mostly limited to the Strathclyde and Highland regions.
- 2.2.70 In 2017 the total value of shellfish aquaculture in Scotland was estimated at £12.4 million. Mussel cultivation contributed the most to the value of the sector during 2017; valued at £10 million, while Pacific oysters amounted to £2 million; native oysters £0.12 million; scallops £0.09 million and Queen scallops £0.003 million⁹².
- 2.2.71 The Scottish shellfish cultivation industry employed a total of 146 full-time and 182 part-time and casual workers during 2017. The highest number of full-time staff were employed in Shetland (61), followed by Strathclyde (41), although Strathclyde had the highest number of staff in total (105 full-time and part-time/casual, compared to 100 in Shetland)⁹³.
- 2.2.72 Although there is interest and research into the viability of cultivating seaweed (e.g. for bioenergy production and speciality food ingredients) in Scotland, at present, there is no commercial scale cultivation of seaweed and this sector is limited to research/trial sites. As such, seaweed is not considered further within the RLG, as the location and scale of seaweed aquaculture is very uncertain.
- 2.2.73 The Scottish finfish aquaculture industry has ambition to grow aquaculture production to 350,000 tonnes for marine finfish (approximately double the average harvest for 2014/2015) by 2030^{94 95}. The shellfish aquaculture industry

⁹⁰ Marine Scotland. 2018. Marine Scotland Science, Scottish Shellfish Farm Production Survey 2017. May 2018. Available at <https://www.gov.scot/Topics/marine/Fish-Shellfish/FHI/surveys>.

⁹¹ ibid

⁹² ibid

⁹³ ibid

⁹⁴ Black, K. and Hughes, A. 2017. Future of the sea: Trends in aquaculture. Foresight – Future of the sea evidence review. Foresight Government Office for Science. Available online: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/635209/Future_of_the_sea_-_trends_in_aquaculture_FINAL_NEW.pdf

⁹⁵ Highland and Islands Enterprise (HIE) and Marine Scotland, 2017. The value of aquaculture to Scotland. June 2017.

has ambition to grow production to 21,000 tonnes for mussels by 2030⁹⁶. How expansion of the industry is achieved (e.g. via expansion of on-shore, near-shore and/or offshore aquaculture) and to what extent these ambitions are realised will depend on several factors including the level of social acceptance of aquaculture, markets and economics, availability of marine space at sites with suitable environmental conditions and technological developments. Future potential scenarios for aquaculture in Scotland have been explored in several studies^{97,98,99}. There is likely to be continued growth in the aquaculture sector in the future, however, the location, timing and intensity of such development remain uncertain. It is likely that there will be some development further offshore.

⁹⁶ Black and Hughes. 2017. Future of the Sea: Trends in Aquaculture. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/635209/Future_of_the_sea_-_trends_in_aquaculture_FINAL_NEW.pdf. Accessed 22/10/2018.

⁹⁷ Black and Hughes. 2017. Future of the Sea: Trends in Aquaculture. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/635209/Future_of_the_sea_-_trends_in_aquaculture_FINAL_NEW.pdf. Accessed: 22/10/2018.

⁹⁸ HIE and Marine Scotland. 2017. The Value of Aquaculture to Scotland, A report for Highlands and Islands Enterprise and Marine Scotland. June 2017. Available at <http://www.hie.co.uk/regional-information/economic-reports-and-research/archive/value-of-aquaculture-2017.html>.

⁹⁹ Celtic Seas Partnership. 2016. What does the future hold for the Celtic Seas? Available at: <http://futuretrends.celticseaspartnership.eu/>. Accessed 22/10/2018.

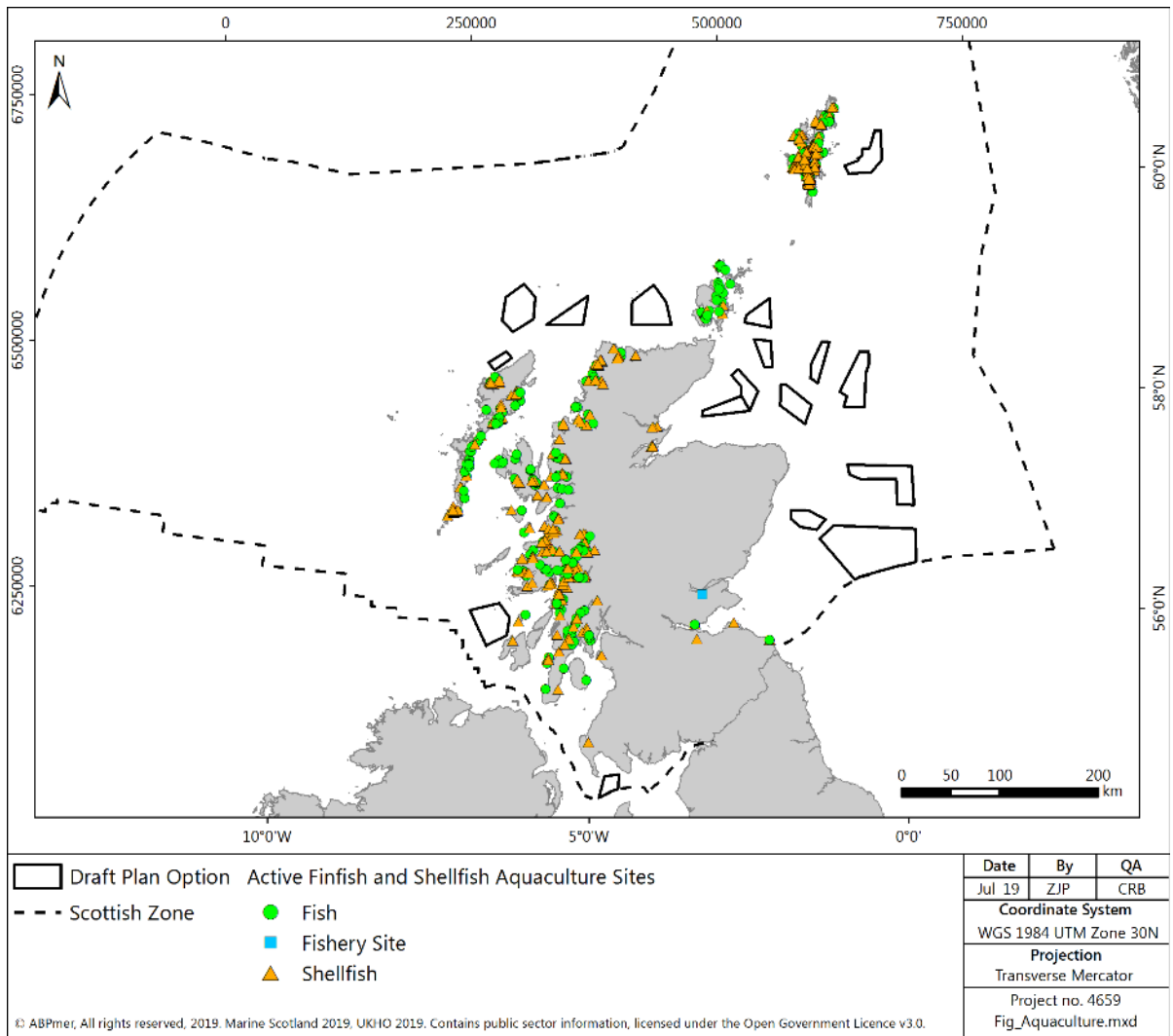


Figure 23 Aquaculture sites in Scottish waters

Ports and Harbours

- 2.2.74 Within Scottish waters, the ports and harbours sector supports the largest fishing industry in the UK and provides facilities for a significant offshore oil and gas industry, as well as maintaining ferry links to island communities and providing the recreational sector with support services.
- 2.2.75 There are 11 Scottish ports classified under the EC Maritime Statistics Directive as a major port handling at least 1 million tonnes of cargo per year; an additional 5 major Scottish ports are also reported by the Scottish Government. Overall, there are around 270 ports and harbours in Scottish waters, ranging from very small piers and landing stages, to those with major facilities. Figure 24 shows their distribution. They include:
- Large Oil and Gas terminals, e.g. Hound Point (Firth of Forth), Sullom Voe (Shetland), Flotta (Scapa Flow, Orkney);
 - A large quarry product port, e.g. Glensanda;
 - Large fishing ports, e.g. Peterhead, Fraserburgh;
 - Smaller fishing ports, e.g. Buckie, Mallaig;
 - Oil supply ports, e.g. Aberdeen, Cromarty Firth;
 - Multi-purpose ports, e.g. Leith, Clyde;
 - Large container ports, e.g. Grangemouth; and
 - Major ferry ports serving Ireland and Europe, e.g. Cairnryan, Stranraer and Rosyth.
- 2.2.76 Anchorages are located all around the Scottish coastline in inshore waters, but areas of highest densities are along the west coast, Orkney, the Moray Firth and the Firth of Forth, as shown in Figure 25.
- 2.2.77 Cargo and passenger figures are published each year in the Scottish Transport Statistics and the Department for Transport Maritime Statistics^{100,101}. In 2016, Scottish ports handled 66.7 million tonnes of cargo and 10.1 million passengers were carried by ferries, with 33,000 vessels arriving at Scottish ports from Europe during the same period. In 2015, a total of 44.5 million tonnes of freight was recorded as being lifted by water transport in Scotland: 14.2 million tonnes of coastwise traffic to other ports in the UK (including Scotland), and 2.2 million tonnes of one port traffic to offshore installations.

¹⁰⁰ Transport Scotland. 2018. Scottish Transport Statistics. No. 36, 2017 Edition.

<https://www.transport.gov.scot/media/41863/scottish-transport-statistics-2017-with-correction-to-table-214.pdf>

¹⁰¹ Department for Transport. 2017. Transport Statistics Great Britain 2017. Available from:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/661933/tsqb-2017-report-summaries.pdf

- 2.2.78 Smaller scale local ferry services, mainly between the Scottish mainland and outlying islands provide an important lifeline for residents. This service also opens a gateway for tourists to visit areas that might otherwise be inaccessible by car or train. Examples of this type of link include services provided by CalMac, Orkney Ferries, Northlink Ferries and Shetland Islands Council. For example, the total number of passengers carried on routes within Scotland was 8.3 million in 2016. This provides considerable economic and social benefit to both the port and harbour operators and dependent communities, allowing for the movement of commercial traffic, local passenger traffic and growing numbers of tourists and visitors¹⁰².
- 2.2.79 Within Scotland's National Marine Plan¹⁰³ five objectives for "Shipping, Ports, Harbours and Ferries" were set out. These seek to ensure the industry develops as a key part of Scotland's economy. The future use, growth and development of ports are intrinsically linked to world trade patterns and the economic climate and are reactive to changing economic circumstances.

¹⁰² Fraser of Allander Institute. 2015. The Economic and Social Impact of CalMac Ferries Ltd on Scotland. Available at <https://www.calmac.co.uk/article/3313/New-study-reveals-economic-impact-of-CalMac-services>.

¹⁰³ Scottish Government. 2015. Scotland's National Marine Plan. Available at: <https://www.gov.scot/Publications/2015/03/6517>

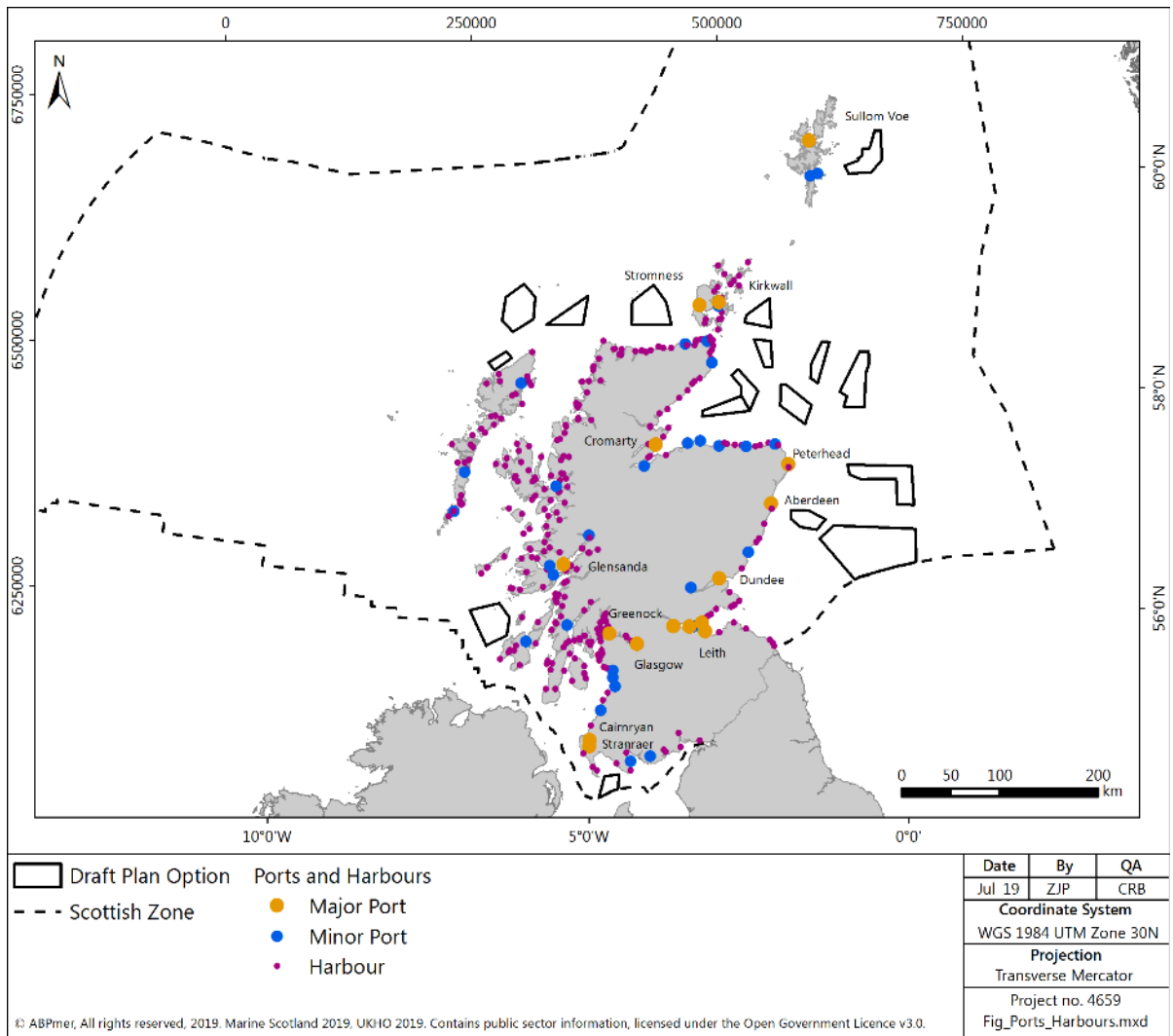


Figure 24 Distribution of ports and harbours in Scottish waters

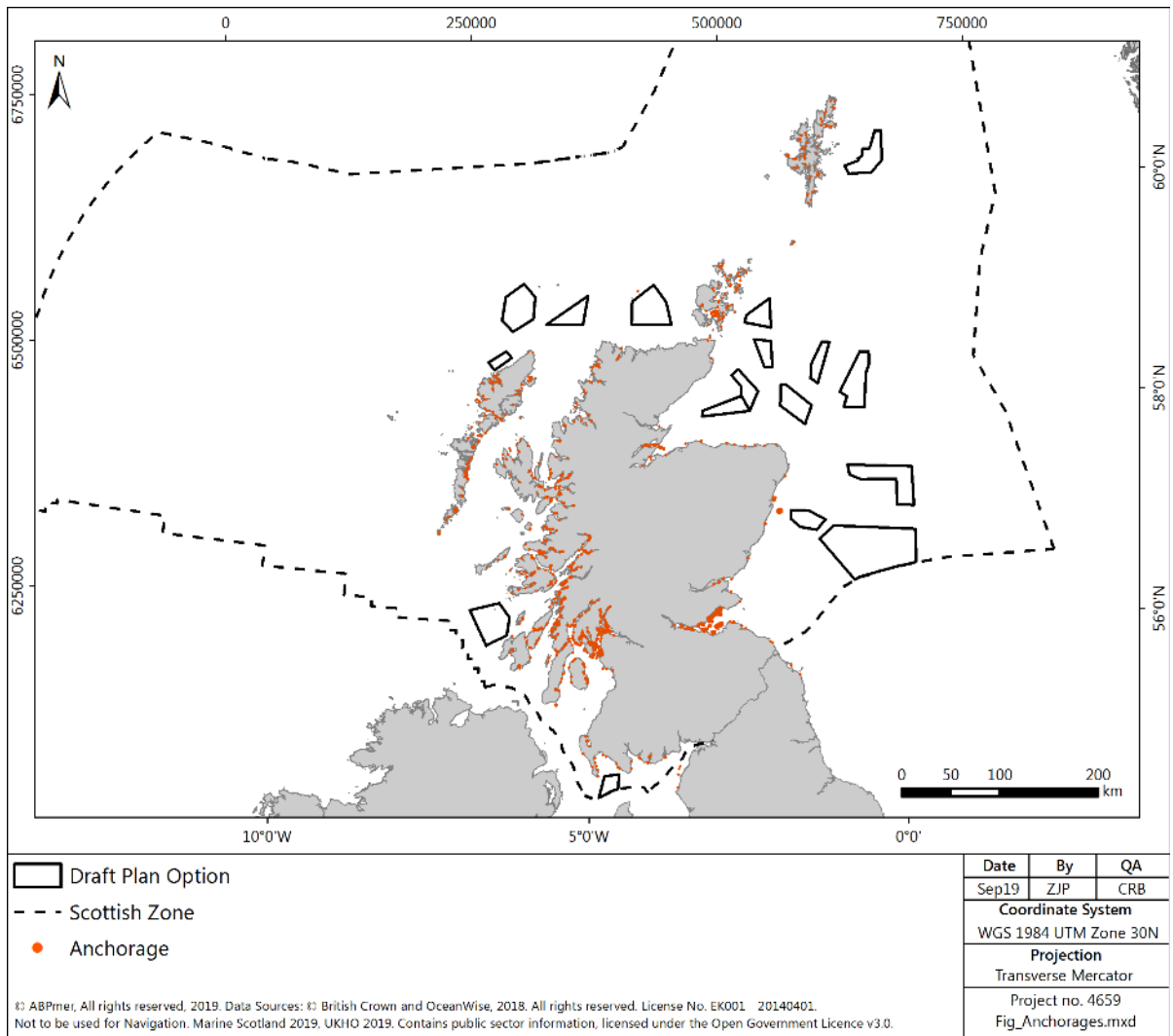


Figure 25 Anchorages in Scottish waters

Shipping

- 2.2.80 Shipping is an important industry for Scotland, with shipping movements related to the movement of cargo, ferry lifeline services and oil and gas operations alongside large shipbuilding centres in the Clyde and Firth of Forth.
- 2.2.81 AIS density grid data (Figure 26) indicates key transport routes up the west coast of Scotland through the North Channel (or Straits of Moyle) and the Minches, and east–west between the northern coast of the mainland and Orkney, from where vessels access the North Sea. In addition, there are routes transiting through Scottish waters, such as to the north of Shetland connecting Denmark to the Faroe Islands and onwards to Iceland and routes crossing the Atlantic to America.
- 2.2.82 Some of the areas showing the highest intensity of vessel movement include ferry routes (e.g. between Northern Ireland and Loch Ryan, between the Outer Hebrides and Oban via the Sound of Mull and between the Shetland Islands, Orkney and the Scottish mainland) and within the Clyde.
- 2.2.83 There are two International Maritime Organisation (IMO) Traffic Separation Schemes (TSS) (Figure 26), designed to ensure safe shipping in areas of particularly high density, one in the North Channel between the Mull of Kintyre and Northern Ireland, and the other in the Minches between Skye and the Outer Hebrides. There is additionally one IMO recommended deep water route to encourage deep drafted vessels to the west of the Outer Hebrides to reduce traffic in the Minches.
- 2.2.84 Ferry services to the Scottish islands are considered lifeline services, in that they provide key connections between communities on the islands and mainland Scotland, allowing for transport of key commodities and people, including supporting the tourism trade. The key ferry paths, identified in Figure 26, are of high importance to the Scottish population.
- 2.2.85 Oil and Gas related traffic, correlated to the port services traffic identified in Figure 26, is concentrated on the east coast of Scotland, with hubs around Aberdeen, Peterhead and Fraserburgh contributing to the high density of maritime traffic in that area.
- 2.2.86 There are Areas To Be Avoided (ATBA) within Scottish waters (Figure 26), with large areas notified around the Shetland Islands, Fair Isle, and the Orkney Islands aimed at reducing risks associated with high traffic density around the islands.
- 2.2.87 Whilst the high density of traffic is an indication of importance of an area to the industry, there are areas of lower density for which navigational access is of relatively higher importance, such as related to the transit of oil and gas rigs to oil fields or returning to ports for decommissioning.
- 2.2.88 In 2015, shipping contributed an estimated £3,600 million GVA to Scotland (25% of the UK total) and it was estimated 39,300 of the UK nationals

employed in the shipping industry (21% of the UK total) were based in Scotland¹⁰⁴.

2.2.89 Shipping volumes bear a direct relationship to the global economic market. As markets react to the changing financial situation, shipping lines respond with services to move goods and people. The most notable variable to affect the volume and intensity of shipping into the future will be the technology and innovations used to design future shipping. Ship design seeks for bigger, faster and more economic transshipment of goods and people¹⁰⁵.

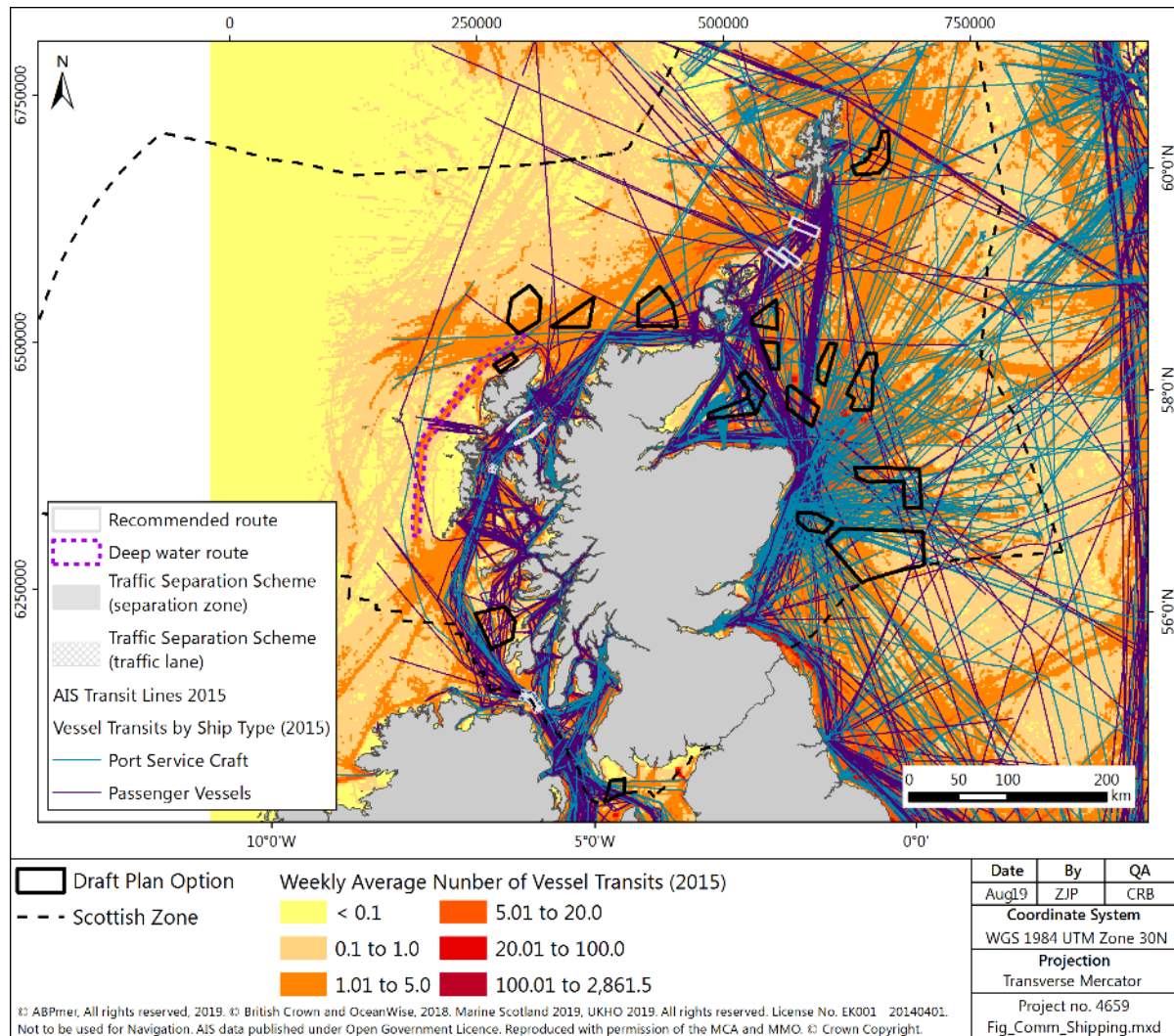


Figure 26 AIS shipping density in 2015 and key routes in Scottish waters

¹⁰⁴ Cebr, 2017. The economic contribution of the UK Maritime Sector, A report for Maritime UK. Available at <https://www.maritimeuk.org/value/maritime-sector-all/>.

¹⁰⁵ ABPmer and RPA, 2013. Developing the socio-economic evidence base for offshore renewable sectoral marine plans in Scottish Waters. Report R.2045, June 2013. Appendix B. Available at <https://www.gov.scot/Publications/2013/07/5841/downloads>.

Coastal and Flood Protection

- 2.2.90 There is currently no nationally collated database of historic coastal and flood defence assets, although coastal flood protection schemes that had been approved since 1961 are archived by the Scottish Government in the Scottish Flood Defence Asset Database (SFDAD). Scottish Natural Heritage (SNH) estimated that 307km of shoreline on mainland Scotland's coast comprises coastal defences¹⁰⁶. The distribution of coastal protection schemes and hard and soft engineered flood prevention schemes constructed since 1961 is shown in Figure 27.
- 2.2.91 Future sea level rise and the potential for increasingly severe storm events due to climate change may place Scotland's coastal infrastructure and habitats under increasing threat^{107,108}. The Flood Risk Management (Scotland) Act, came into force in November 2009. This legislation implemented a framework for a co-ordinated and sustainable approach to flood risk management in Scotland. At the heart of this approach is a series of assessments and plans designed to improve the understanding of flooding and to target investment in actions where they are most needed. Scottish Environment Protection Agency (SEPA) conducted a national assessment of flood risk in 2011 and a flood risk management planning report in 2012 which described in more detail how the flood risk management planning process will work. In December 2015, following consultation, 14 local FRMS were published which set out how flood risk will be managed, coordinated, funded and delivered between 2016 and 2022. Each FRMS identified priority areas at significant flood risk and 42 suggested schemes were put forward to reduce the impact in these areas¹⁰⁹.

¹⁰⁶ Baxter, J.M., Boyd, I.L., Cox, M., Donald, A.E., Malcolm, S.J., Miles, H., Miller, B., Moffat, C.F. 2011. Scotland's Marine Atlas: Information for the national marine plan. Marine Scotland, Edinburgh. Available at <https://www.gov.scot/Publications/2011/03/16182005/0>.

¹⁰⁷ *ibid*

¹⁰⁸ United Kingdom Marine Monitoring and Assessment Strategy (UKMMAS). 2010. Charting Progress 2 Feeder Report Productive Seas. Department for Environment Food and Rural Affairs on behalf of UKMMAS (Eds. Saunders, J. and McKie, J.) 472pp Available online: <http://chartingprogress.defra.gov.uk/>

¹⁰⁹ SEPA. 2016. Prioritised flood protection schemes. Available at: www.sepa.org.uk/media/163528/42-flood-protection-schemes.pdf

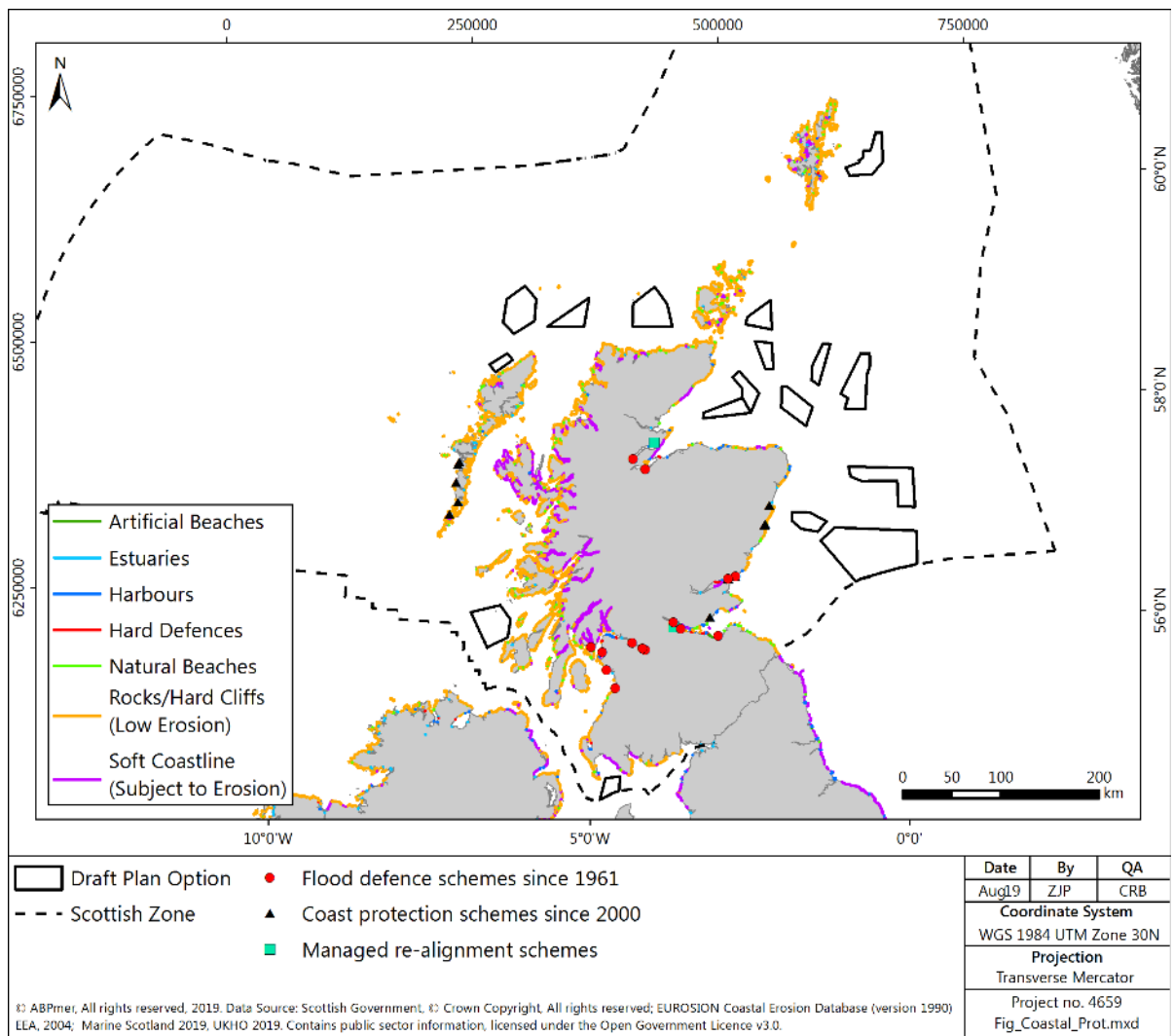


Figure 27 Coastal and Flood defences, incorporating coastline type

Marine and Coastal Recreation

2.2.92 A wide variety of recreational activities take place in coastal and inshore areas (Figure 28). The annual expenditure on marine recreation activities in Scotland was estimated to be around £3.7 billion in 2016¹¹⁰. It is expected that levels of participation in water sports activities will increase in the long term and the key locations that water sports are currently undertaken around the Scottish coast are likely to remain the same due to access, facilities and necessary sea conditions.

Boating

2.2.93 Recreational boating is a popular pastime in Scotland and is economically important for the country. The Scottish coast, and particularly the West coast, is identified as being one of the world's best destinations for sailing. Data from the Royal Yachting Association¹¹¹ indicates that boating is concentrated in the Clyde and along the West coast, the Moray Firth, Solway Firth and the Firths of Tay and Forth which are traditional cruising grounds for recreational sailors and power boaters (evidenced by the high density of activity and RYA infrastructure in these areas in Figure 29). Recent developments along the East coast, and within the Orkney and Shetland Isles, have increased the potential for cruising between the Caledonian Canal and the Shetlands with well-placed facilities and stopping points *en route*.

2.2.94 In 2016 recreational boating was estimated to have contributed £67.7 million GVA and supported 2,740 jobs¹¹². With respect to future trends, it is estimated that with development of the market (e.g. increased berths and facilities), the net additional increase in GVA of this sector could increase by between £9.7 to £11.9 million over the period to 2020 compared to 2016, with associated increases in employment of between 394 to 480 jobs. Scotland's Marine Tourism Strategy 'Awakening the Giant' sets a target to develop and lead the growth of sailing in Scotland from £101 million visitor expenditure in 2015 to £145 million by 2020¹¹³.

¹¹⁰Land Use Consultants. 2016. Scottish marine recreation and tourism survey 2015. Available at <https://www.gov.scot/Topics/marine/seamanagement/national/RecandTourism>.

¹¹¹ RYA. 2016. UK Coastal Atlas of Recreational Boating. Second Edition. Available at <https://www.rya.org.uk/knowledge-advice/planning-environment/Pages/uk-coastal-atlas-of-recreational-boating.aspx>

¹¹² EKOS. 2016. Sailing Tourism in Scotland, Report for The Crown Estate, Highlands and Islands Enterprise and Scottish Canals. December 2016.

¹¹³ Marine Tourism Development Group (MTDG). 2015. Awakening the Giant: A strategic framework for Scotland's marine tourism sector. Available at https://scottishtourismalliance.co.uk/uploads/TS2020%20Marine/Awakening_the_Giant_final.pdf.

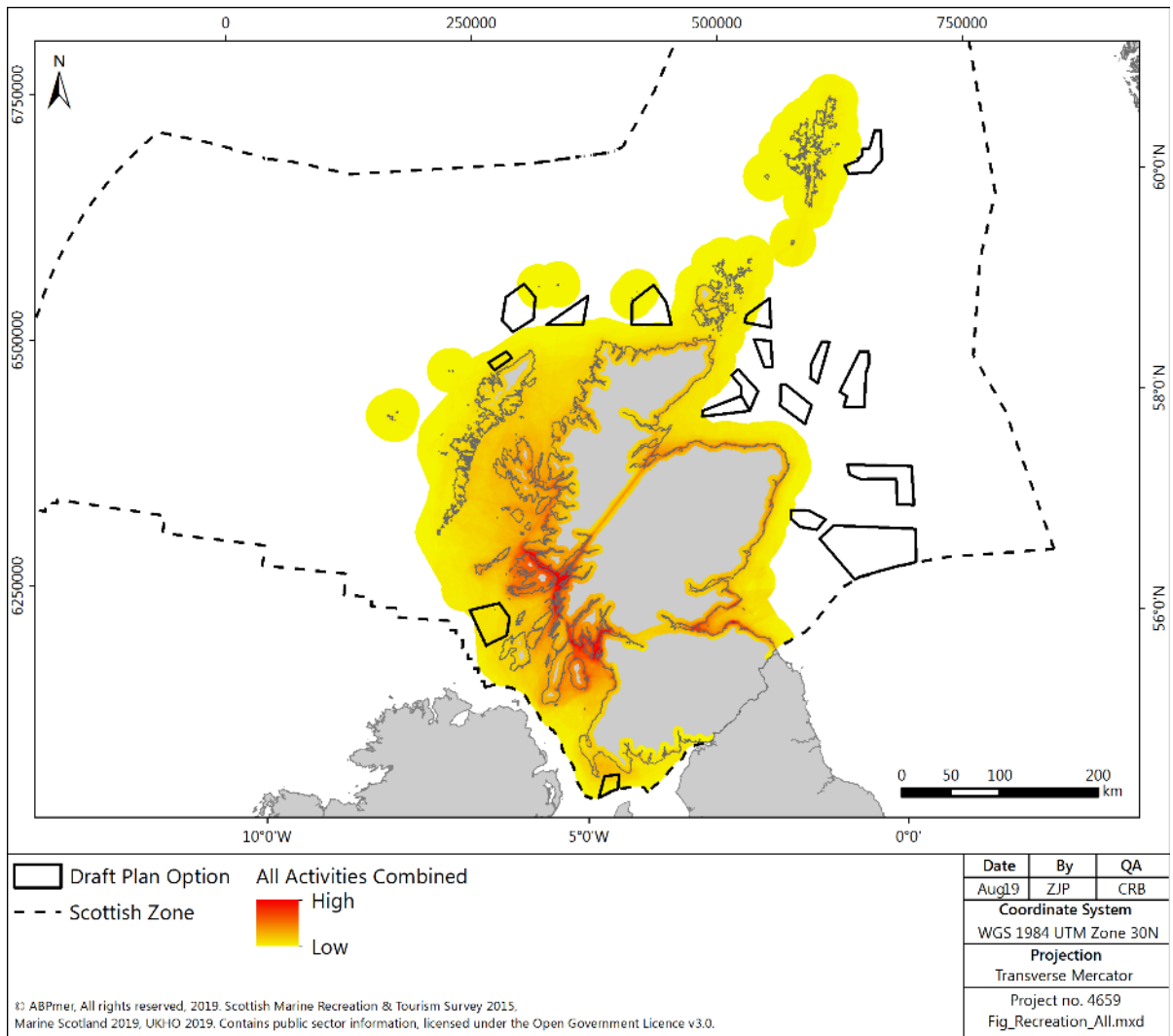


Figure 28 Distribution of recreational activities in Scottish seas

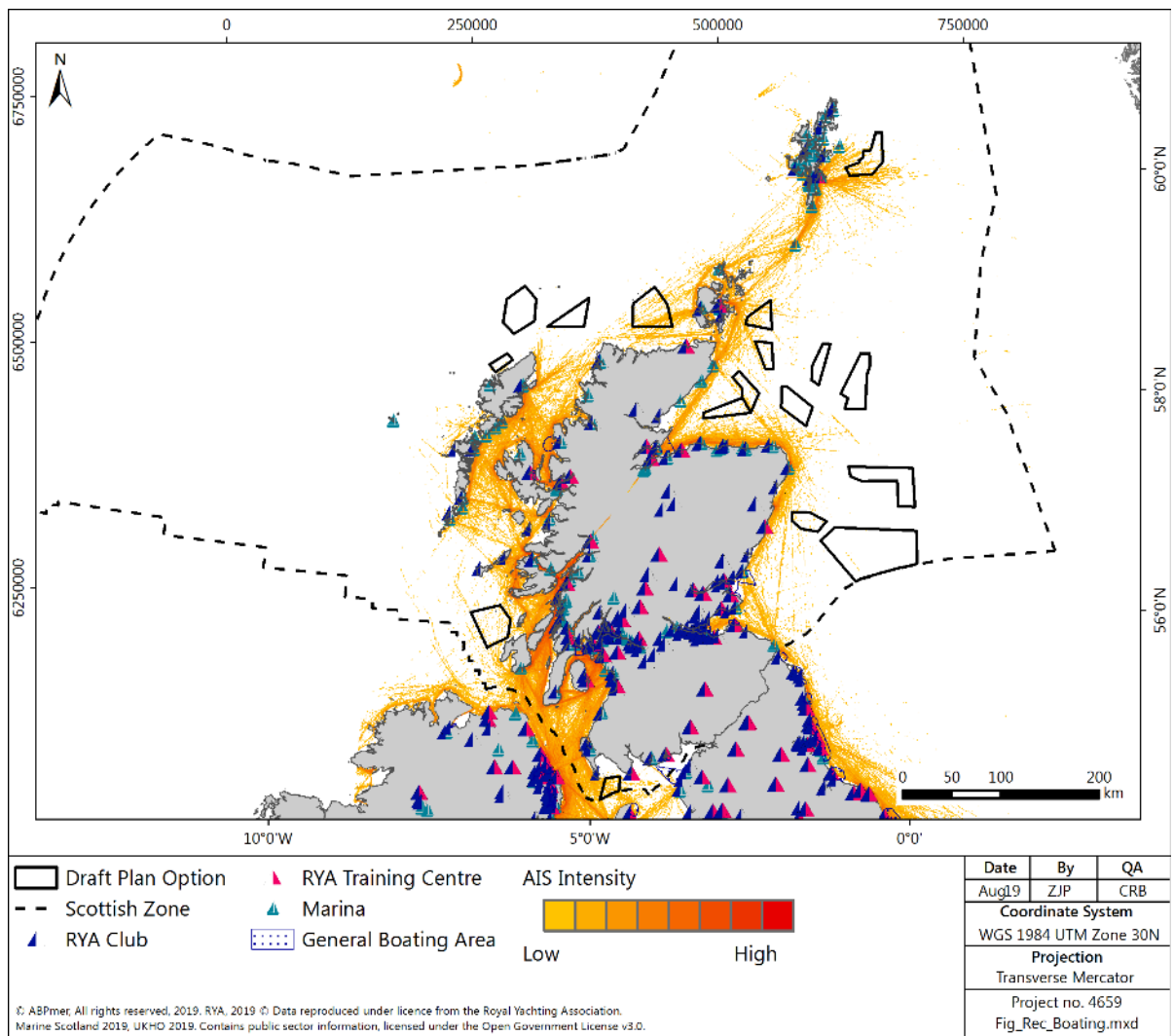


Figure 29 Recreational boating facilities and recreational boating density (from 2015 AIS data)

Angling

2.2.95 Recreational sea angling is carried out along most of the Scottish coastline, both from the shore and from boats (generally within 6 nm) (Figure 30). The Scottish Sea Angling Conservation Network (SSACN) confirms that the highest densities of anglers are found in the more heavily populated areas of coast around Glasgow, Clyde, Edinburgh and Fife¹¹⁴. Sea angling launch points are also concentrated along the Argyll coast and islands, Solway Firth, Firth of Clyde, Firth of Tay, North coast, and East Grampian coast¹¹⁵. Sea angling in Scotland supported 3,148 jobs in 2008, representing an income of around £70 million¹¹⁶.

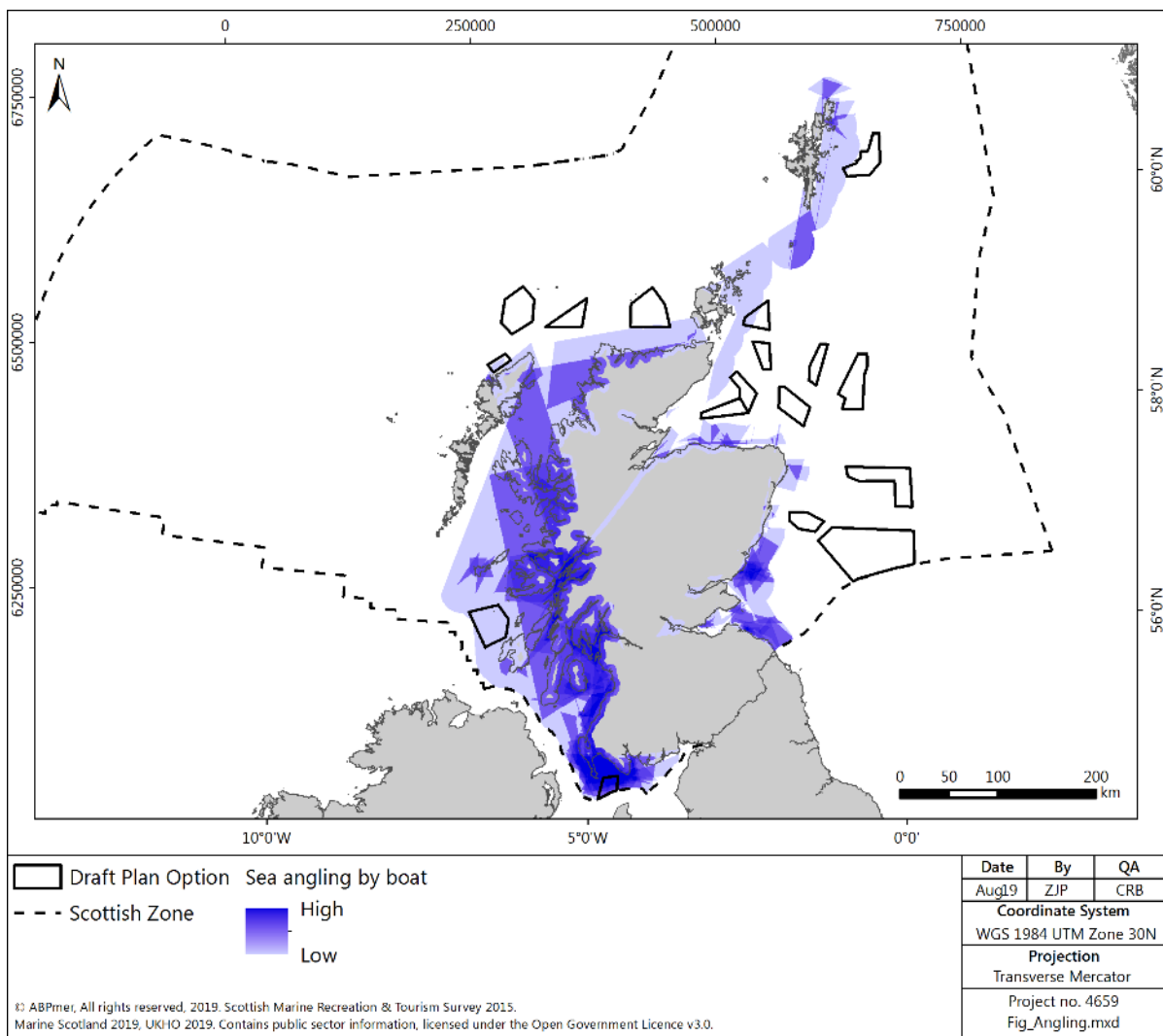


Figure 30 Sea angling (by boat) density in Scottish waters

¹¹⁴ Baxter, J.M., Boyd, I.L., Cox, M., Donald, A.E., Malcolm, S.J., Miles, H., Miller, B., Moffat, C.F. 2011. Scotland's Marine Atlas: Information for the national marine plan. Marine Scotland, Edinburgh. Available at <https://www.gov.scot/Publications/2011/03/16182005/0>.

¹¹⁵ Land Use Consultants. 2007. A Review of Marine and Coastal Recreation in Scotland. Report No. F05AA608.

¹¹⁶ Radford, A., Riddington, G. and Gibson, H. 2009. Economic Impact of Recreational Sea Angling in Scotland. Prepared for the Scottish Government. July 2009. ISBN: 978-0-7559-8130-4. Available at <https://www.gov.scot/Publications/2009/07/31154700/0>.

Scuba Diving

2.2.96 The most popular locations for scuba diving around Scotland are Scapa Flow, Orkney (considered to be one of the best wreck diving areas in the world) and the Marine Reserve of St Abbs and Eyemouth off the Berwickshire coastline. The islands of the Inner Hebrides, the Firth of Forth and the East coast from North of Dundee to the Dornoch Firth are also popular diving destinations (Figure 31).

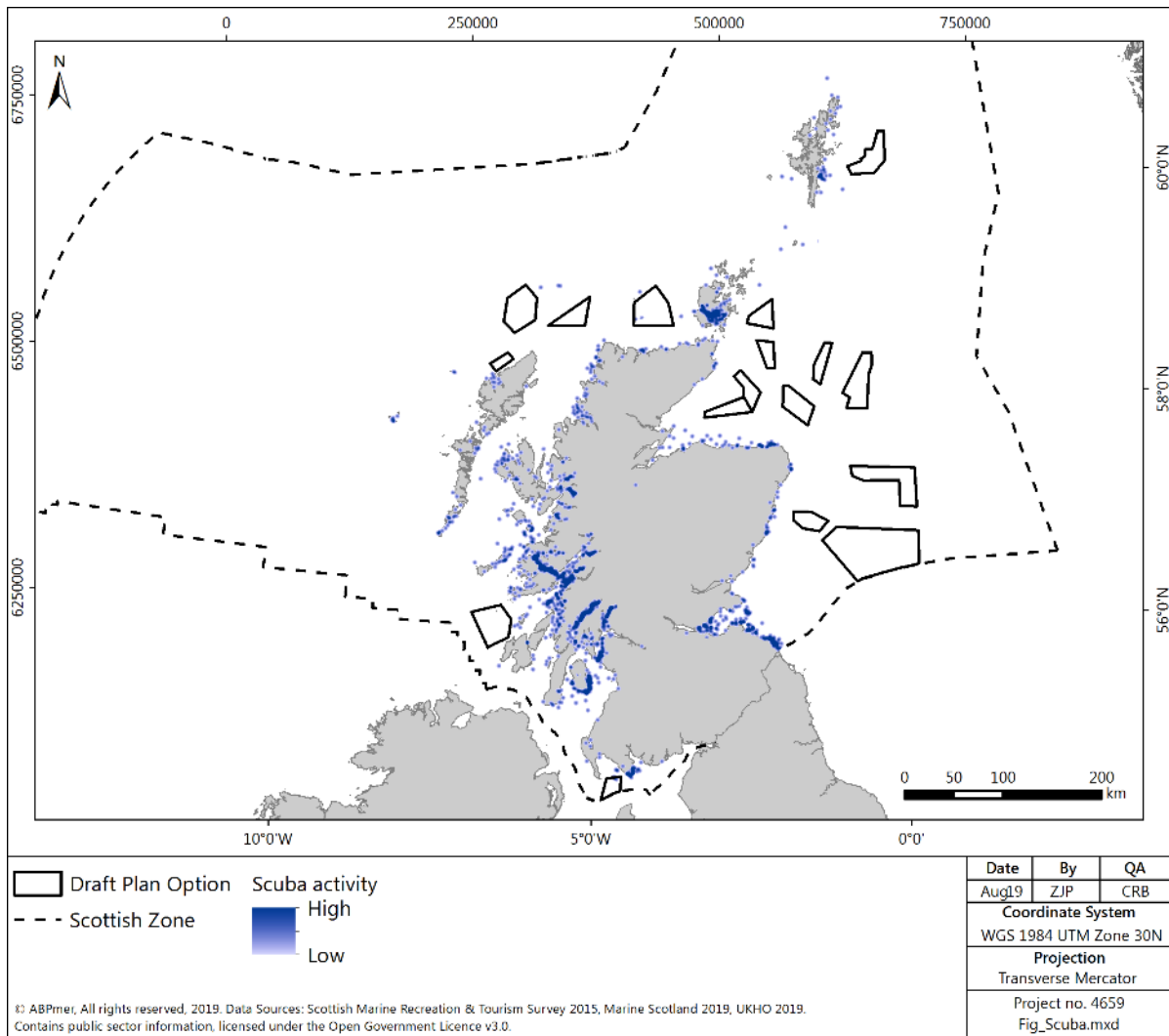


Figure 31 Scuba diving activity density in Scottish waters

Sea Kayaking and Canoeing

2.2.97 The Scottish coastline provides high quality opportunities for kayakers and canoeers with an abundance of interesting sea caves, inlets and wildlife to explore. The majority of trips are close inshore, however, open crossings are regularly undertaken by more experienced paddlers (Figure 32). Sea kayaking and canoeing has the potential to be undertaken along most of the Scottish coast and is only constrained by the availability of suitable launching spots such as beaches or slipways.

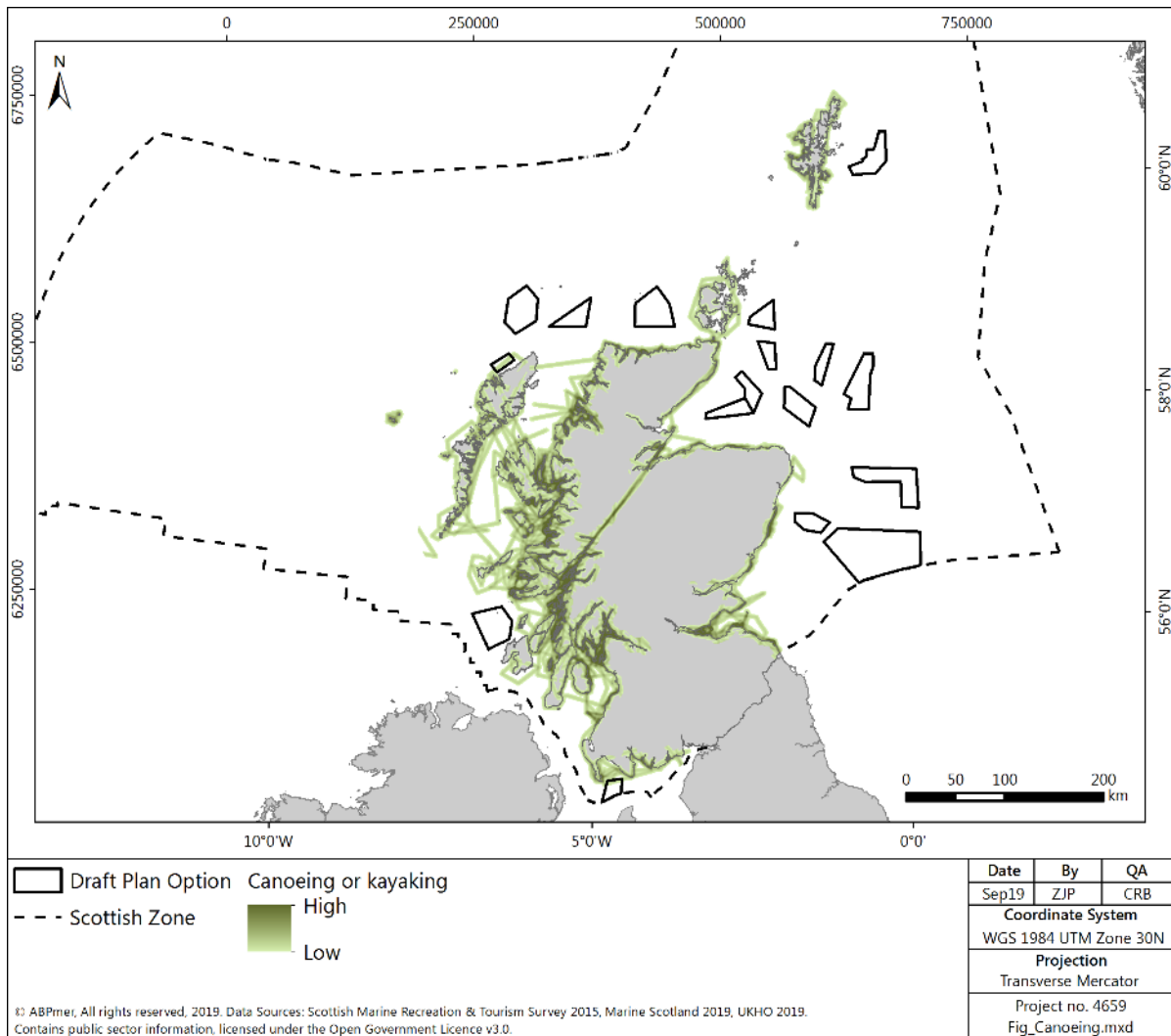


Figure 32 Canoeing and kayaking density in Scottish waters

Surfing and Windsurfing

2.2.98 With its long coastlines, clear waters and surrounded by the Atlantic Ocean with swells throughout the year, Scotland is one of Europe's top surfing destinations. Surfers are willing to travel large distances to undertake surfing at good quality spots, meaning that remote areas with good waves bring economic benefits to rural areas from the visiting surfers (Figure 33 and Figure 34). Surfing is popular along the Southeast coast. But bigger waves can often be found on the Western and Northern coasts with competitions such as the Tiree Wave Classic and events by the Professional Windsurf Association being held there.

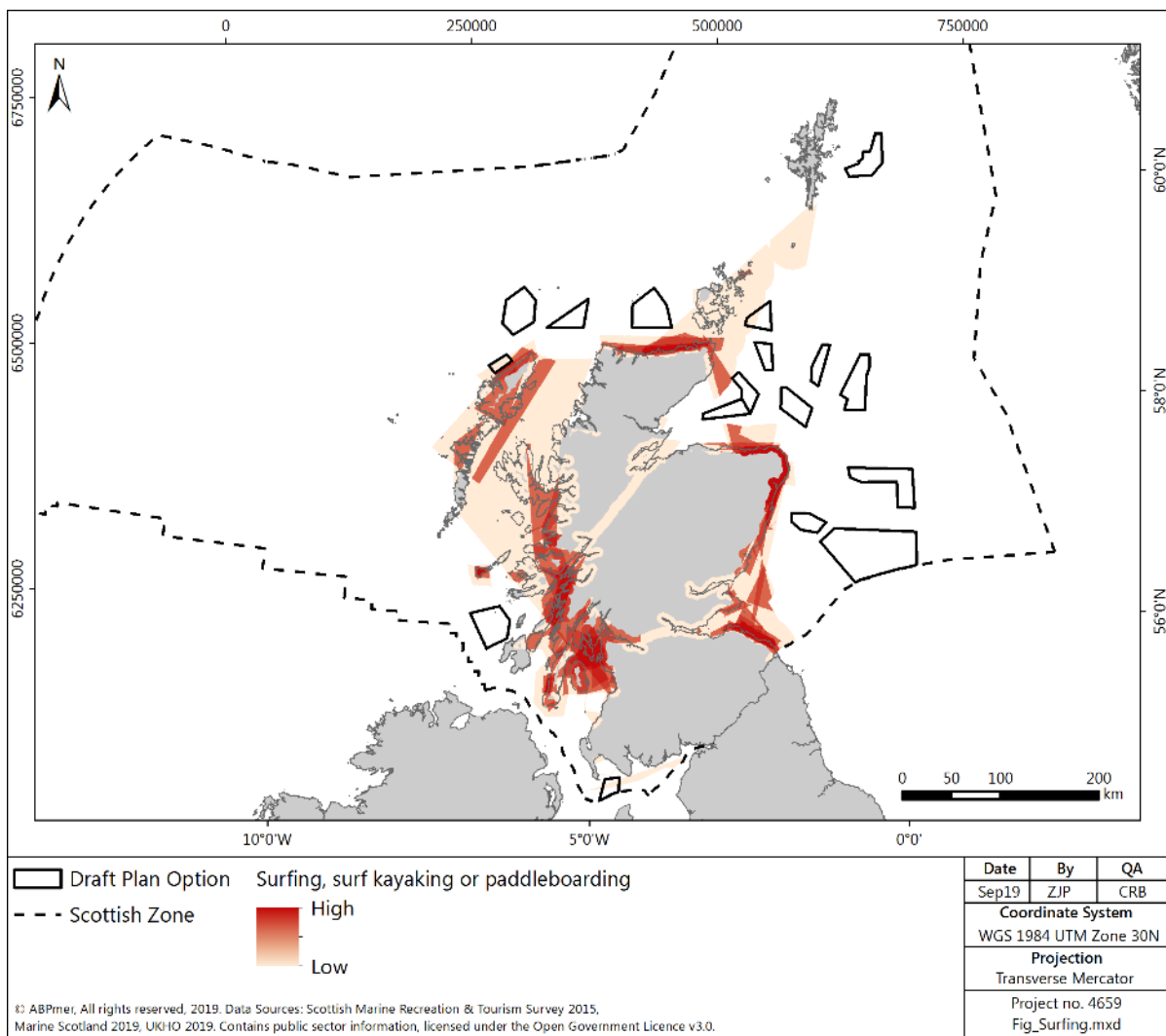


Figure 33 Surfing activity density in Scottish waters

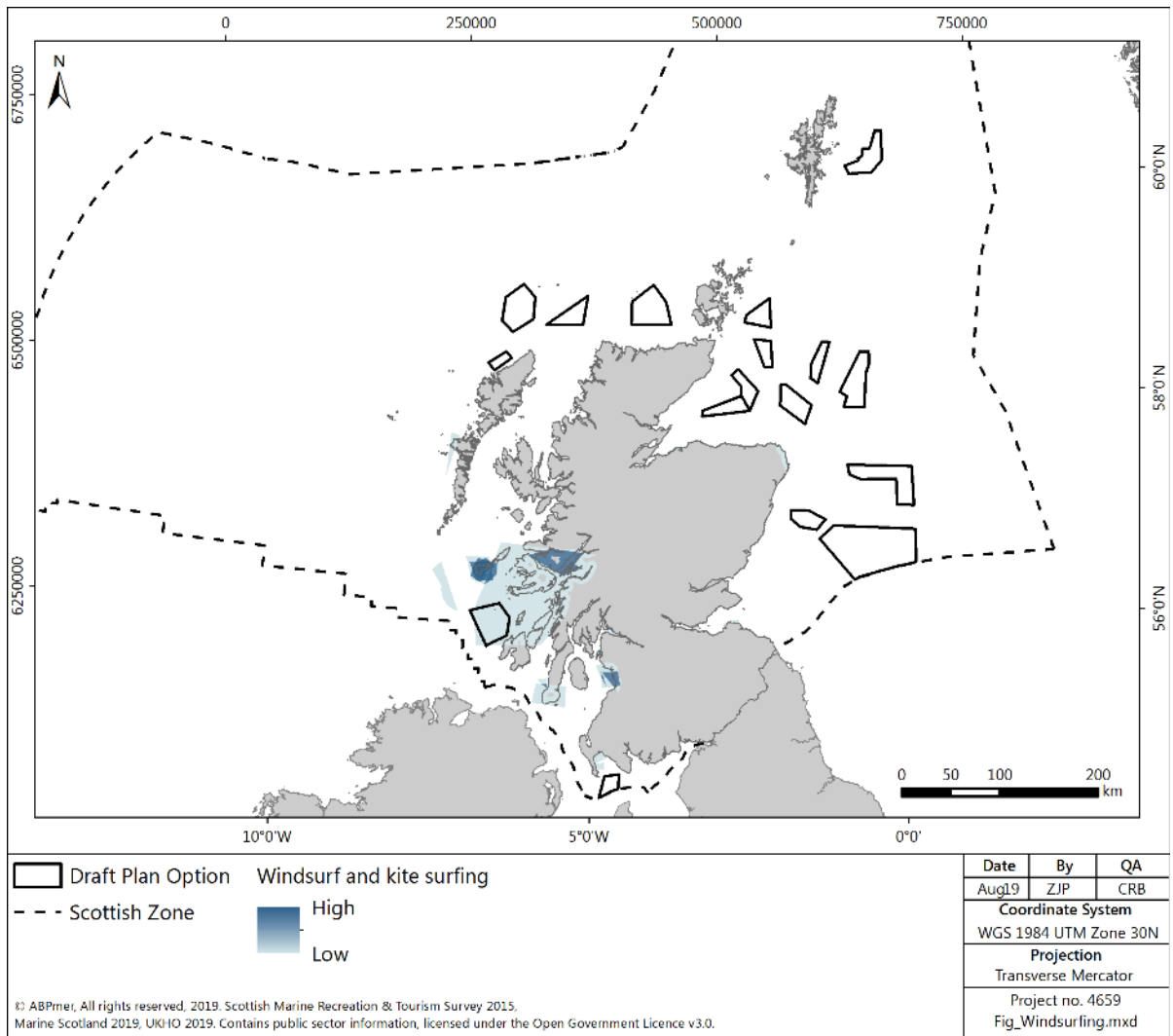


Figure 34 Windsurfing activity density in Scottish waters

Tourism

- 2.2.99 Tourism is essential to the Scottish economy and the marine environment is a key attraction for tourists.
- 2.2.100 Tourism has been defined by Visit Scotland as ‘a stay of one or more nights away from home for holidays, visits to friends or relatives, business/conference trips or any other purpose excluding activities such as boarding education or semi-permanent employment¹¹⁷’. For the purpose of this RLG, day trips have also been included. This can include a range of activities such as walking along the sea-front to surfing. Both non-motorised (walking/picnicking) and motorised (boat-based tourism such as wildlife viewing) activities are considered here.
- 2.2.101 The value of Scotland’s marine tourism sector in 2015 was estimated to be £360 million. The Scottish Tourism Alliance is seeking to increase this turnover by 25% by 2020¹¹⁸.
- 2.2.102 The popularity of wildlife tourism in Scotland is likely to be influenced by the high quality marine environment and opportunities for wildlife watching. There are a number of designated Marine Protected Areas (MPAs) which cover approximately 20% of the Scottish marine environment reflecting the quality of wildlife and habitats within Scottish waters. There are 48 marine Special Areas of Conservation (SACs) in place to protect species and habitats such as coral reefs, seals and bottlenose dolphins. There are 45 Special Protection areas (SPAs) that help protect a variety of migratory birds and 61 Sites of Specific Scientific Interest (SSSI) which offer further environmental protection.
- 2.2.103 Use of the marine environment for Tourism related activities is reflected in distribution as shown in Figure 35. There are particularly high concentrations in the West region around the Clyde and the Inner and Outer Hebrides with other hotspots around the Firth of Forth, Firth of Tay and Moray Firth.

¹¹⁷ Visit Scotland. 2018. Up-to-date facts, figures and analysis. Available at: <https://www.visitscotland.org/research-insights>. Accessed 15/10/2018.

¹¹⁸ Marine Tourism Development Group (MTDG). 2015. Awakening the Giant: A strategic framework for Scotland’s marine tourism sector. Available at https://scottishtourismalliance.co.uk/uploads/TS2020%20Marine/Awakening_the_Giant_final.pdf.

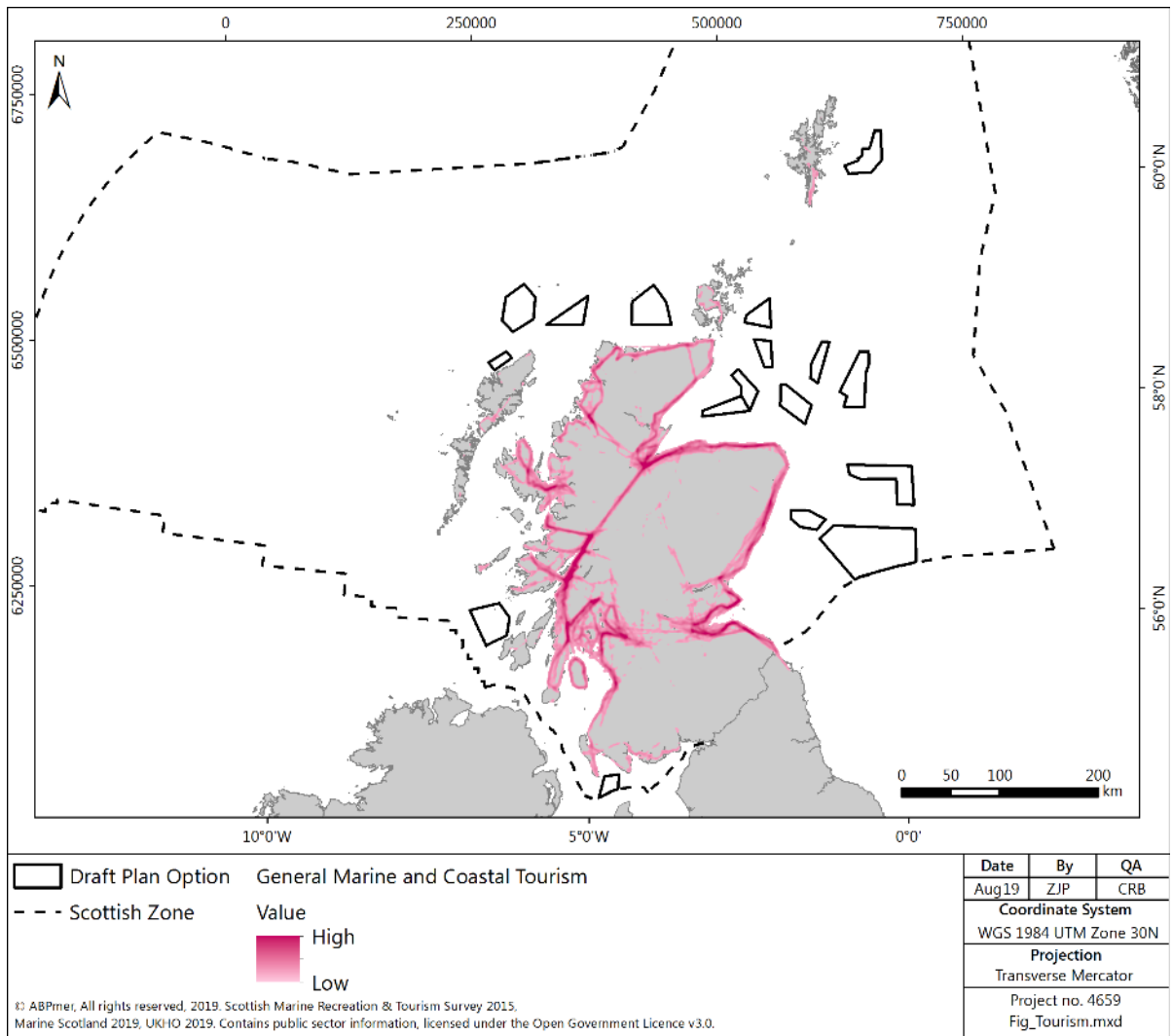


Figure 35 Tourism activity density in Scotland

Social Considerations

- 2.2.104 Coastal communities, living within 5km of the coast, account for an estimated 41%¹¹⁹ of Scotland's total population and the regional analysis shows that the characteristics of these coastal communities varies significantly between the different regions.
- 2.2.105 Different parts of the Scottish coast experience different types of pressures. Some areas are sparsely populated and have fragmented communities, and others are more densely populated city regions.
- 2.2.106 Most parts of the coast have an ageing population, and all regions are expected to experience an increase in the average age of the population over the coming years¹²⁰.
- 2.2.107 The Scottish Index of Multiple Deprivation (SIMD) highlights that coastal communities have varying levels of access to employment, education and services. The views on quality of life also vary between coastal communities. Regions such as the north, north east and east show positive trends, whereas the east and north west are experiencing a decline¹²¹.
- 2.2.108 The profile of key employment sectors varies between regions. There is a high dependence on the service economy, but other industries such as agriculture, forestry and fishing accounts for a greater portion of jobs in the more remote, rural regions than in communities closer to the urban and accessible parts of the coast.

2.3 Environment

Designated Sites

- 2.3.1 The importance of Scotland's marine ecosystems is reflected in the range of designations which protect them at the international and national levels. All designations are included and incorporated into Scotland's Marine Protected Area (MPA) Network currently covering approximately 20% of Scottish seas. The current designations, shown in Figure 36, Figure 37, Figure 38, Figure 39 and Figure 40 are:
- Special Areas of Conservation (SAC): these include both inshore and offshore SAC and cover eleven different marine habitat types which occur in Scotland (sandbanks which are slightly covered by seawater all the time; estuaries; mudflats and sandflats not covered by seawater at low tide; coastal lagoons; large shallow inlets and bays; reefs; submarine structures

¹¹⁹ The James Hutton Institute. 2010. Scotland's Coastal Assets. Available at https://www.hutton.ac.uk/sites/default/files/files/publications/hutton_coast_booklet_web.pdf. Accessed 24/10/2018.

¹²⁰ Scottish Government. 2018. Summary: Age demographics. Available at: <https://www.gov.scot/Topics/People/Equality/Equalities/DataGrid/Age/AgePopMig>. Accessed 15/10/2018.

¹²¹ Scottish Government, 2018. The Scottish Index of Multiple Deprivation (SIMD). Available at: <https://www.gov.scot/Topics/Statistics/SIMD>. Accessed 15/10/2018.

made by leaking gases; and submerged or partially submerged sea caves). Seven marine species that occur in Scotland are also protected (bottlenose dolphin, harbour porpoise, grey seal, harbour seal, sea lamprey, Atlantic salmon and otter). There are further SACs within riverine environments which are designated for migratory fish, whose migration routes may intersect the DPOs;

- Special Protection Areas (SPAs): these protect and are of international importance for a number of bird species (e.g. seabirds, waders, ducks and geese). SPAs are designated in both the coastal / marine and terrestrial environments for species which have the potential to interact with regions within the DPOs;
- Nature Conservation MPAs (NCMPA: these protect habitats and species such as maerl beds, coral gardens, and common skate; and
- Sites of Specific Scientific Interest (SSSI): these are nationally designated sites which protect species such as seabirds and seals, and habitats such as sea caves and rocky shores.

2.3.2 In addition, Ramsar sites (Figure 40) are designated for their internationally important wetlands. Each Ramsar site is also designated as either a SPA or SAC, depending on the features present.

2.3.3 Currently there are 17 NCMPAs (Figure 38) designated for nature conservation purposes under the Marine (Scotland) Act 2010 (NCMPAs) and 37 SACs designated under the EU Habitats Directive (Figure 36) located within territorial waters (i.e. within 12nm of the territorial baseline). A further 13 MPAs and 11 SACs are designated in the offshore environment (i.e. from 12 nm from the territorial baseline, or within non-territorial waters). There is one additional MPA designated for demonstration and research purposes, Fair Isle D&R MPA, designated in 2016. The Scottish Government is considering plans for the designation of four additional NCMPAs around the Scottish coast and there is potential for an additional deep sea MPA.

2.3.4 There are 58 current SPAs in Scotland (Figure 37) with marine or coastal components, 31 of which are extensions to seabird colony SPAs designated under the EU Birds Directive to protect a range of vulnerable breeding, overwintering or migratory bird species and assemblages. The Scottish Government is consulting on a further 15 proposed SPA which are identified for designation in the marine environment (consultation closes 9 November 2018).

2.3.5 There are 61 SSSI (Figure 39) for the further protection of species such as seabirds and seals and habitats ranging from sea caves and rocky shores. There are also 51 Ramsar sites (Figure 40) designated as internationally important wetlands, covering a total area of about 313,000 hectares.

2.3.6 The Habitats Directive also affords protection to certain species of plants and animals (European Protected Species). In the marine environment these include cetaceans and otters.

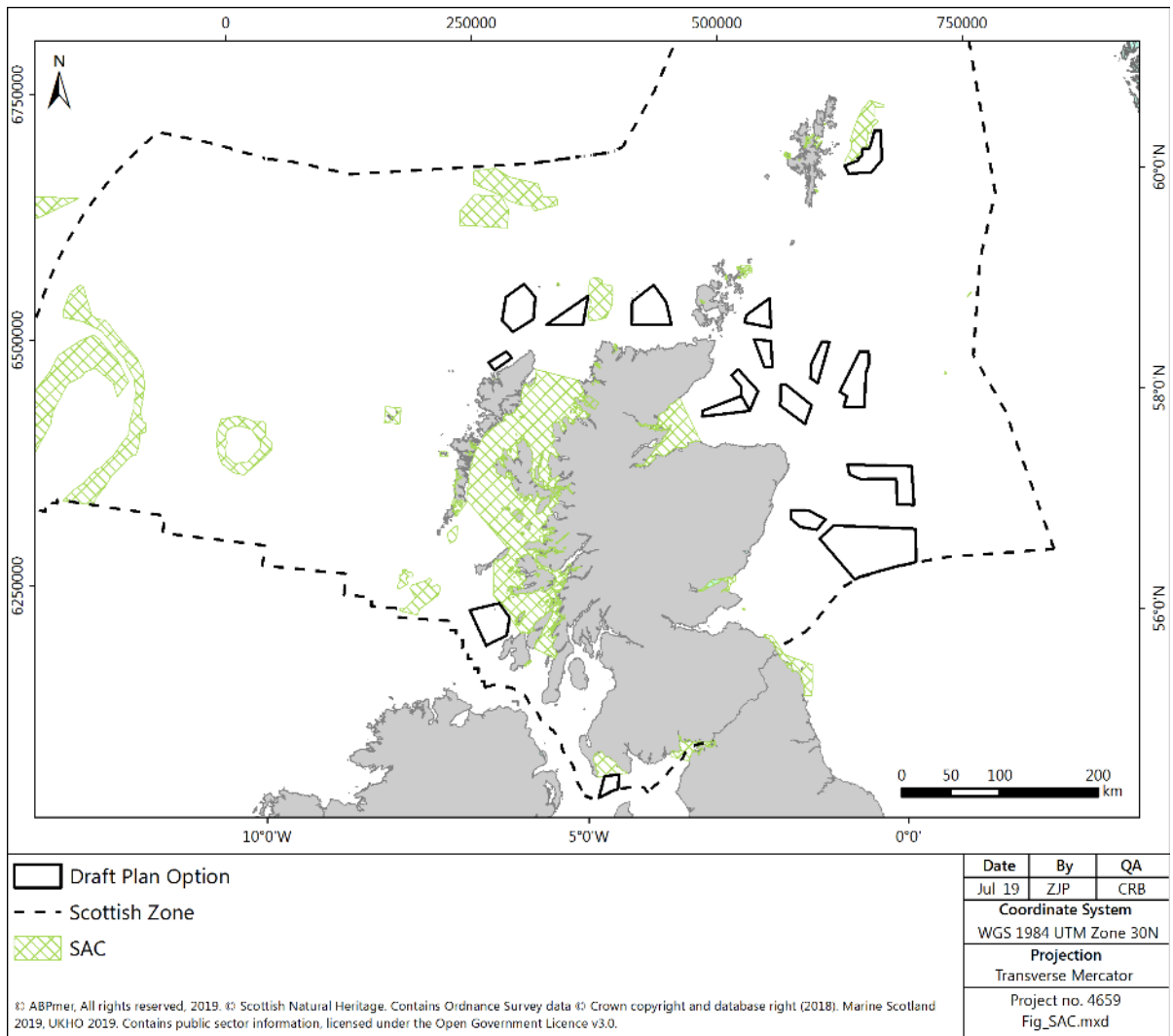


Figure 36 Special Areas of Conservation with marine or coastal features

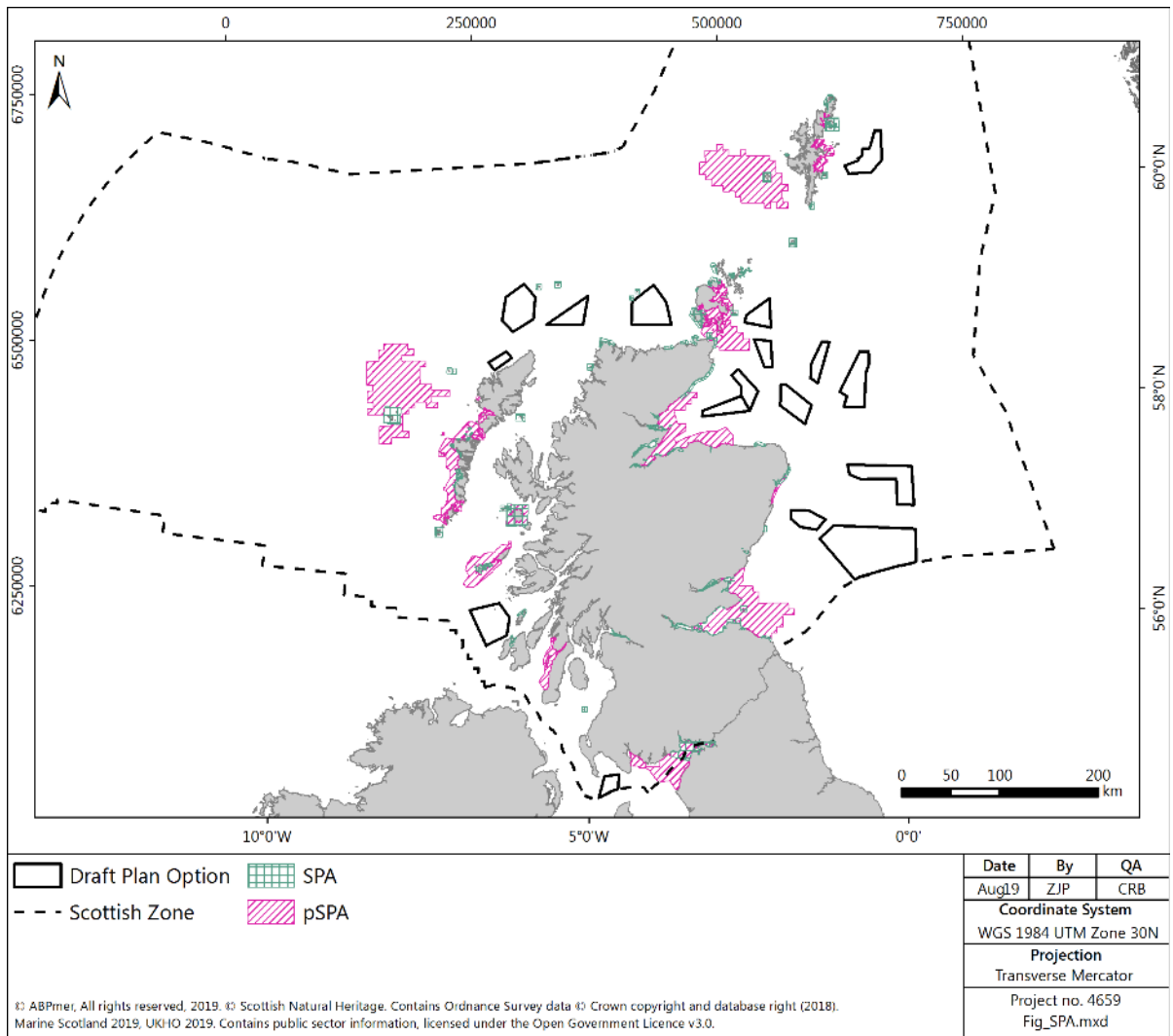


Figure 37 Special Protection Areas with marine or coastal elements

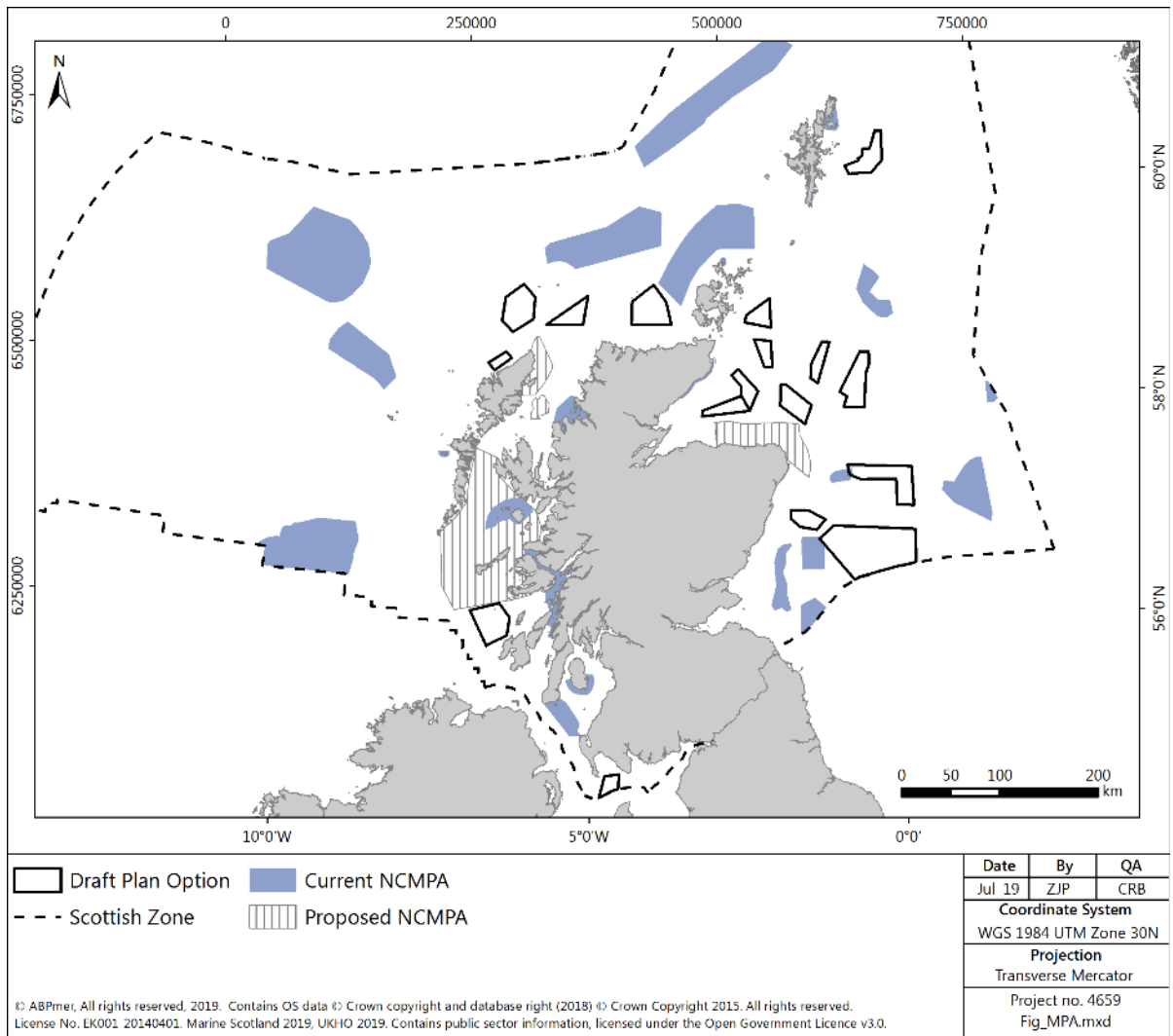


Figure 38 Nature Conservation Marine Protected Areas in Scottish waters

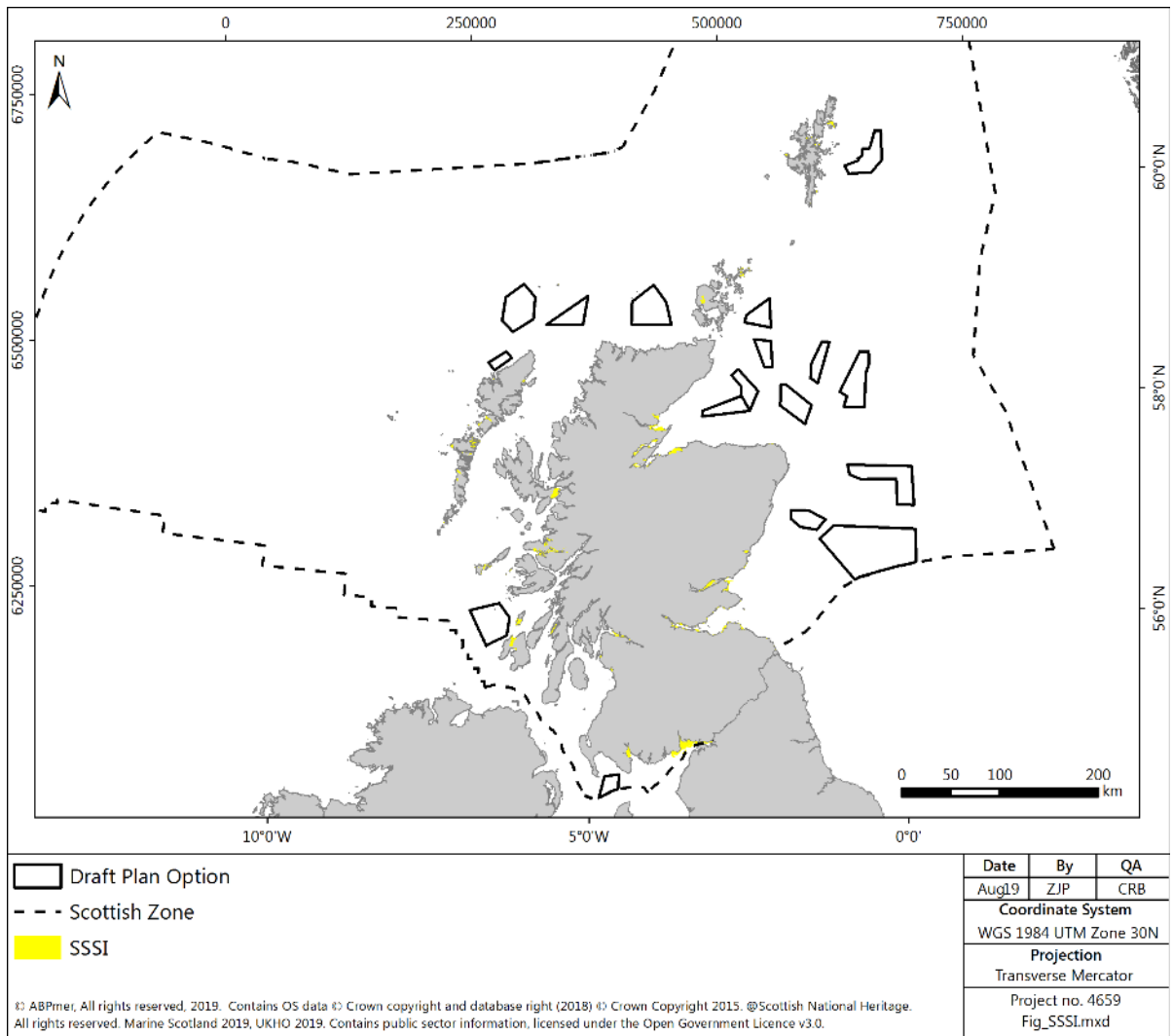


Figure 39 Sites of Special Scientific Interest with Marine or Coastal elements

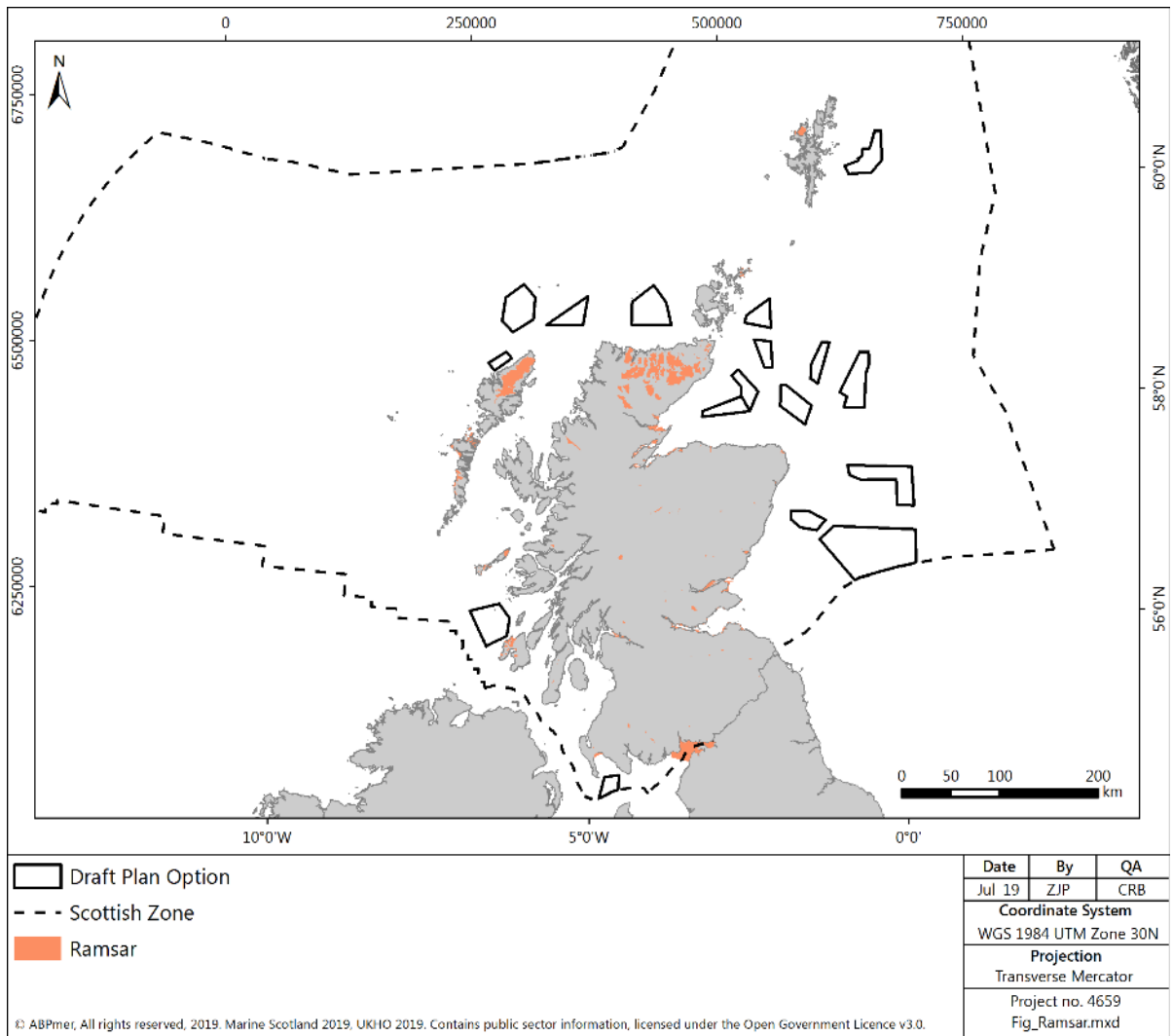


Figure 40 Ramsar sites in Scotland

Priority Marine Features

- 2.3.7 In July 2014, Scottish Ministers adopted a list of 81 Priority Marine Features (PMFs). PMFs are species and habitats which have been identified as being of conservation importance to Scotland. Most are a subset of species and habitats identified on national, UK or international lists. The National Marine Plan includes a policy (GEN 9 Natural Heritage) for safeguarding PMFs whereby “Development and use of the marine environment must not result in significant impact on the national status of PMFs”.
- 2.3.8 The list of 81 PMFs comprise 26 broad habitats (e.g. burrowed mud), seven low or limited mobility species (e.g. ocean quahog), and 48 mobile species, including fish (e.g. blue ling) and marine mammals (e.g. minke whale).

Water Quality

- 2.3.9 The Water Framework Directive (WFD) requires that Member States monitor and assess surface and ground waters and develop and implement plans for improvements in water quality where standards are not met. The majority of the 505 coastal and transitional water bodies in Scottish Waters, as represented in Figure 41, are classified as either good status (342) or high status (155), however some areas have been classified as moderate (7) or poor (1), principally due to pressures on morphology and macro-invertebrates¹²².
- 2.3.10 There are 86 designated bathing areas in Scotland, of which 59 are assessed as excellent or good status, 16 are assessed as at target objective and 11 are assessed as poor status. There are 80 designated shellfish waters in Scotland. Twenty nine are assessed as at target objective, with the remaining 51 assessed as not at target objective.

¹²² SEPA. 2018. SEPA Water Classification Hub. Available at <https://www.sepa.org.uk/data-visualisation/water-classification-hub/>. Accessed 04/10/2018.

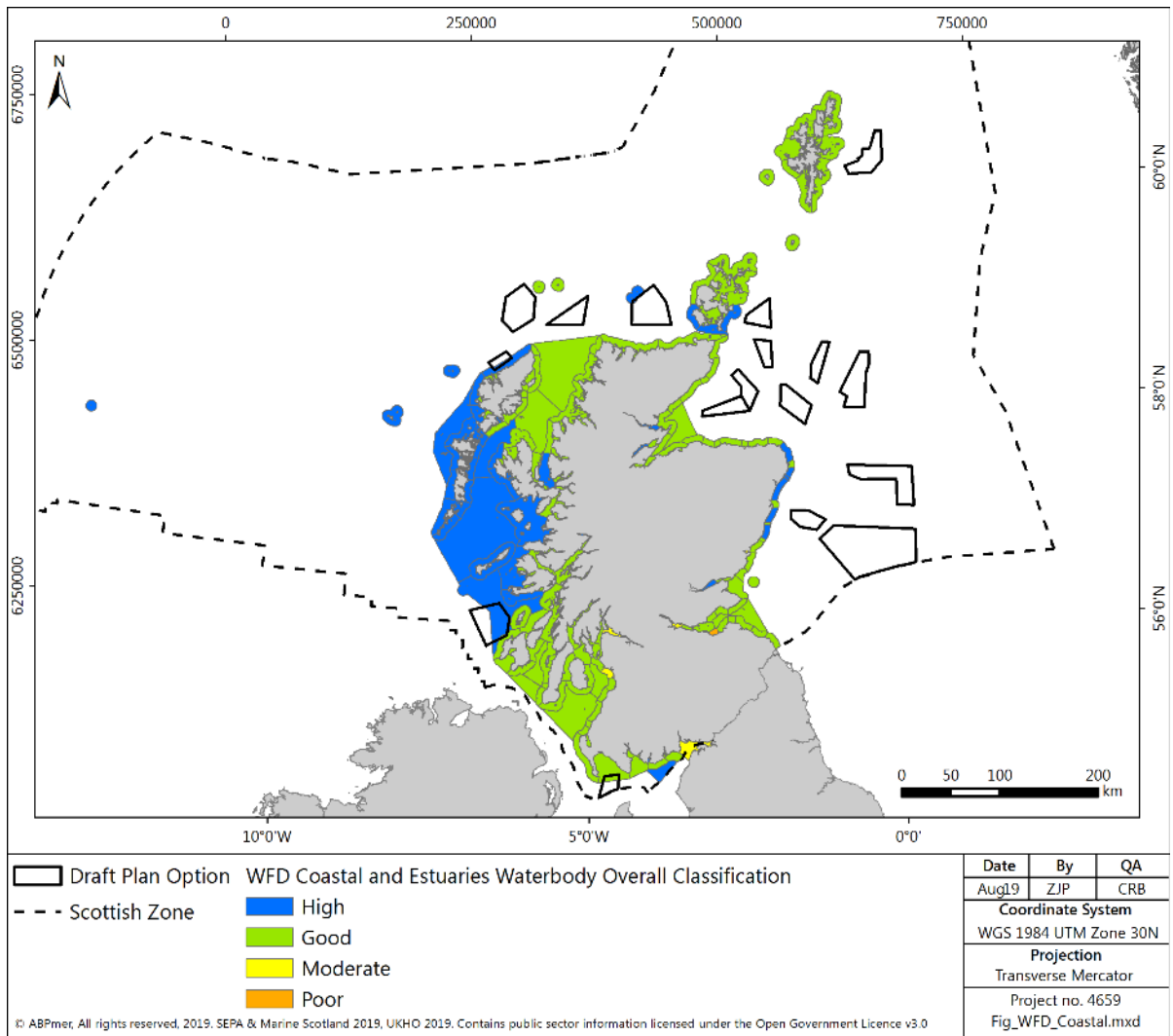


Figure 41 Coastal and transitional waterbodies overall classifications

Benthic Habitats and Species

- 2.3.11 Benthic (seafloor) habitats and species are vital natural resources, as many marine species rely, directly or indirectly, on the seafloor to feed, hide, rest or reproduce. Generally benthic habitats are characterised by low mobility species¹²³. Habitats within the Scottish marine environment can be characterised into broad groups; intertidal habitats, subtidal (inshore and shelf sea), and deep sea habitats, broken down by substrate type (Figure 42) and discussed below.
- 2.3.12 The Scottish Marine Atlas¹²⁴ assessed the current condition and any potential trends associated with benthic habitats at a regional level¹²⁵. The current condition of benthic habitat within Scottish waters is varied, with certain habitats under greater pressure, generally dependent on the level of human activity undertaken. There were few or no concerns about subtidal rock. Intertidal rock and sediments show evidence of deterioration, with one concern being the introduction of non-native invasive species such as wireweed (*Sargassum muticum*), a brown alga. The most significant level of concern related to the condition of shallow and shelf subtidal sediments, mainly as a result of fishing practices such as demersal fishing (trawling) and scallop dredging. There were also some concerns about the effects of trawling on deep sea habitat, although such activity has now been banned under EU regulation 2016/2336¹²⁶.

¹²³ OSPAR. 2017. Condition of Benthic Habitat Communities: Subtidal habitats of the Southern North Sea. Available at <https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017/biodiversity-status/habitats/condition-of-benthic-habitat-defining-communities/subtidal-habitats-southern-north-sea/>.

¹²⁴ Baxter, J.M., Boyd, I.L., Cox, M., Donald, A.E., Malcolm, S.J., Miles, H., Miller, B., Moffat, C.F. 2011. Scotland's Marine Atlas: Information for the national marine plan. Marine Scotland, Edinburgh. Available at <https://www.gov.scot/Publications/2011/03/16182005/0>.

¹²⁵ *ibid*

¹²⁶ Regulation (EU) 2016/2336 of the European Parliament and of the Council of 14 December 2016 establishing specific conditions for fishing for deep-sea stocks in the north-east Atlantic and provisions for fishing in international waters of the north-east Atlantic and repealing Council Regulation (EC) No 2347/2002. Available at <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32016R2336>

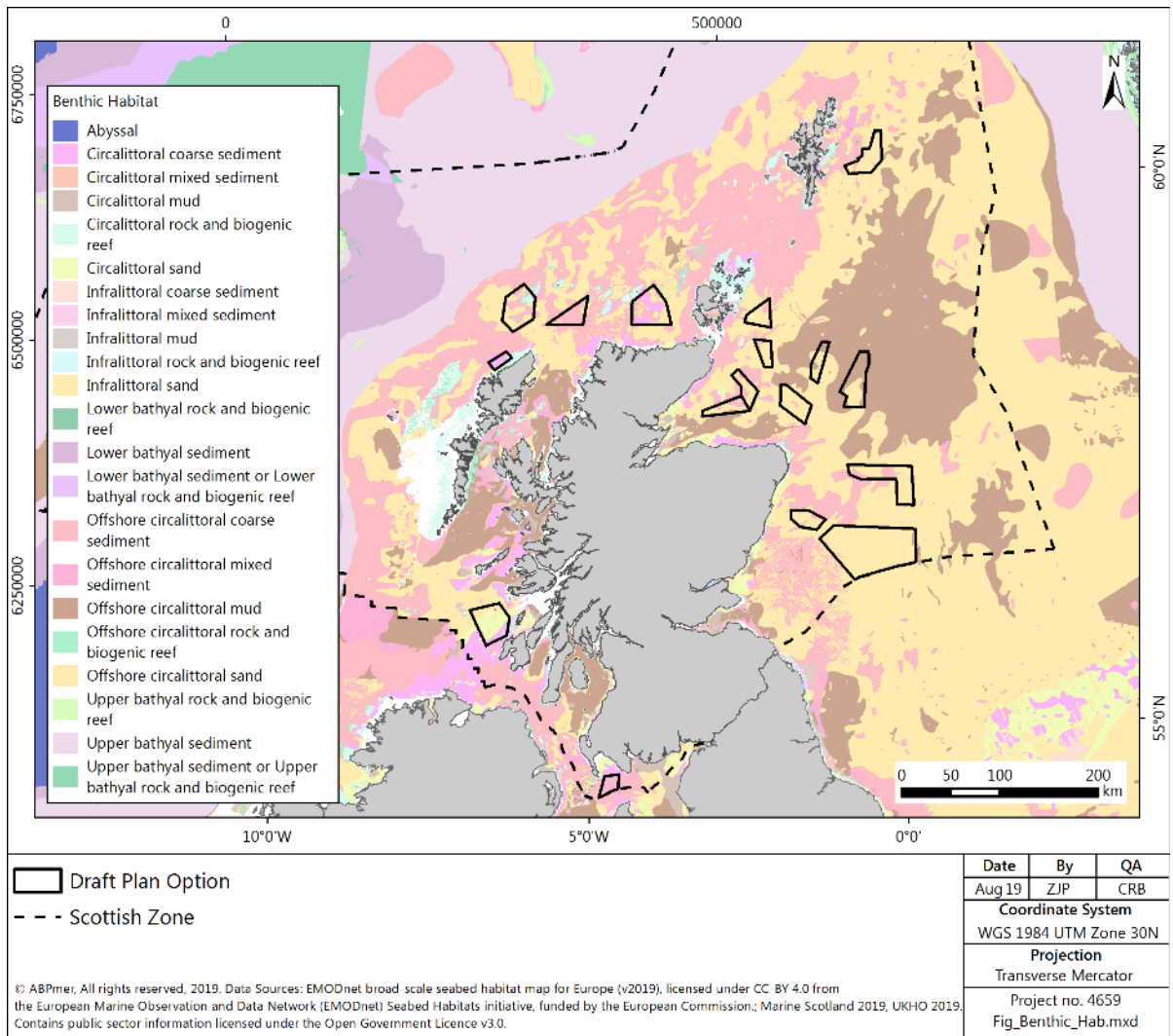


Figure 42 Benthic habitats in Scottish seas

Intertidal Habitats

- 2.3.13 The intertidal area of the Scottish coastline can be characterised based on substrate type, including rocky (48%) and sedimentary (mobile shingle and gravel, sand and mud (50%), sandflats and mudflats (2%)),¹²⁷.
- 2.3.14 Intertidal rocky habitat, which is usually sub-divided using wave exposure ranging from extremely exposed to extremely sheltered, supports an abundance of marine life in Scottish seas, including macroalgae and various invertebrate assemblages, some of which are nationally and internationally important populations. The upper foreshore is generally species poor, with species richness increasing with depth below mean high water springs.
- 2.3.15 Intertidal sediment supports communities of vascular plants (saltmarsh), biogenic reefs, mussel beds, burrowing worms, crustaceans and bivalve molluscs that are adapted to be tolerant of exposure to air, and varying temperatures and salinities. The community structure tends to be species poor, but high in productivity¹²⁸. Priority Marine Features supported by intertidal sediments include seagrass beds, blue mussel beds and native oysters.

Subtidal (Inshore and Shelf Sea) Habitats

- 2.3.16 Subtidal habitats in Scottish waters in water depths less than 200 m are predominantly subtidal rock or inshore and shelf subtidal sediment.
- 2.3.17 Subtidal rock communities, particularly prevalent on the west coast, are typically dominated by seaweed in the photic (light) zone above approximately 20m, with animal dominated communities at greater depths. Kelp forests are prevalent, particularly on the west coast where water clarity and the proportion of subtidal rock habitat is high. Subtidal rock supports populations of several PMFs in Scottish waters as described by the Scottish Marine Atlas¹²⁹.
- 2.3.18 Subtidal inshore sediments are defined as extending from the lower limit of the intertidal to the point where there is no effect from waves (limit at approximately 50-70 m) with subtidal shelf sediments defined as extending from the limit of inshore sediments to the edge of the continental shelf (limit at approximately 200 m). The inshore and shelf subtidal sediments comprise an extensive area of the subtidal seabed within Scotland, with subtidal shelf sediments comprising the majority of the east coast subtidal area within the North Sea. Inshore and shelf sediments support a variety of animal assemblages including several PMFs¹³⁰.

¹²⁷ Baxter, J.M., Boyd, I.L., Cox, M., Donald, A.E., Malcolm, S.J., Miles, H., Miller, B., Moffat, C.F. 2011. Scotland's Marine Atlas: Information for the national marine plan. Marine Scotland, Edinburgh. Available at <https://www.gov.scot/Publications/2011/03/16182005/0>.

¹²⁸ Baxter, J.M., Boyd, I.L., Cox, M., Donald, A.E., Malcolm, S.J., Miles, H., Miller, B., Moffat, C.F. 2011. Scotland's Marine Atlas: Information for the national marine plan. Marine Scotland, Edinburgh. Available at <https://www.gov.scot/Publications/2011/03/16182005/0>.

¹²⁹ *ibid*

¹³⁰ *ibid*

- 2.3.19 In addition, subtidal inshore mud sediments support the commercially important Norwegian lobster (*Nephrops norvegicus*, otherwise known as langoustine), discussed in Section 2.2 above.

Deep Sea Habitats

- 2.3.20 Within Scottish waters, deep sea habitats are found almost exclusively to the west and north of Scotland and include cold water coral reefs, coral carbonate mounds, submarine canyons, sea mounts and deep-sea sediments. There is also some (> 200 m water depth) abyssal plain habitat within Scottish waters.
- 2.3.21 Benthic habitats in the deep-sea support a considerable biomass and are considered to be the largest ecosystem on earth¹³¹. However, ecological information is sparse for deep sea habitats for all but a few species¹³².

¹³¹ T. J. Webb, E. Vanden Berghe, R. O'Dor. 2010. Biodiversity's big wet secret: The global distribution of marine biological records reveals chronic under-exploration of the deep pelagic ocean, PLoS One. Available at <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0010223>.

¹³² K. J. Mengerink, C. L. Van Dover, J. Ardron, M. Baker, E. Escobar-Briones, K. Gjerde, L. A. Levin. 2014. A call for deep-ocean stewardship, Science. Available at <http://science.sciencemag.org/content/344/6185/696.full>.

Fish

- 2.3.22 Scotland's territorial waters support approximately 250 different species of fish, with additional species occurring in deeper waters within the Scottish Marine area. Some species are commercially important to the Scottish fishing industry (discussed in Section 2.2 above). Of the 250 species identified in Scottish waters 40 are cartilaginous fish (Chondrichthyes), incorporating species of shark, rays and skates¹³³. There are 31 species of fish identified as Priority Marine Features within Scottish waters¹³⁴.
- 2.3.23 Basking sharks are distributed around the Scottish coastlines, shown in Figure 43, with areas of increased observations on the west coast. The aggregations on the west coast have been highlighted as potential breeding grounds¹³⁵. Basking sharks have been identified as a key species for protection within Scottish waters and are a designated feature in the Sea of Hebrides pMPA.
- 2.3.24 There are several migratory anadromous fish species found within Scottish waters and which use Scottish rivers for spawning, including Atlantic salmon, shad, sea trout and lamprey. Many migratory species are protected, generally through SAC in riverine environments. The key likely migration routes for anadromous fish are shown in Figure 44. This indicates that some of the migratory pathways are likely to intersect with the DPOs in all regions.
- 2.3.25 There are important fish spawning grounds around the Scottish coastline for a number of species, including herring, sandeel, cod, whiting, ling, plaice and sole¹³⁶.

¹³³ Davidson. 1996. An estimation of the total number of marine species that occur in Scottish coastal waters. Available at <https://www.nature.scot/sites/default/files/2017-06/063.pdf>.

¹³⁴ Tyler-Walters, H., James, B., Carruthers, M. (eds.), Wilding, C., Durkin, O., Lacey, C., Philpott, E., Adams, L., Chaniotis, P.D., Wilkes, P.T.V., Seeley, R., Neilly, M., Dargie, J. & Crawford-Avis, O.T. 2016. Descriptions of Scottish Priority Marine Features (PMFs). Scottish Natural Heritage Commissioned Report No. 406. Available at <https://www.nature.scot/sites/default/files/Publication%202016%20-%20SNH%20Commissioned%20Report%20406%20-%20Descriptions%20of%20Scottish%20Priority%20Marine%20Features%20%28PMFs%29.pdf>.

¹³⁵ *ibid.*

¹³⁶ Ellis, J.R., Milligan, S.P., Readdy, L., Taylor, N. and Brown, M.J. 2012. Spawning and nursery grounds of selected fish species in UK waters. *Sci. Ser. Tech. Rep.*, Cefas, Lowestoft, 147: 56 pp.

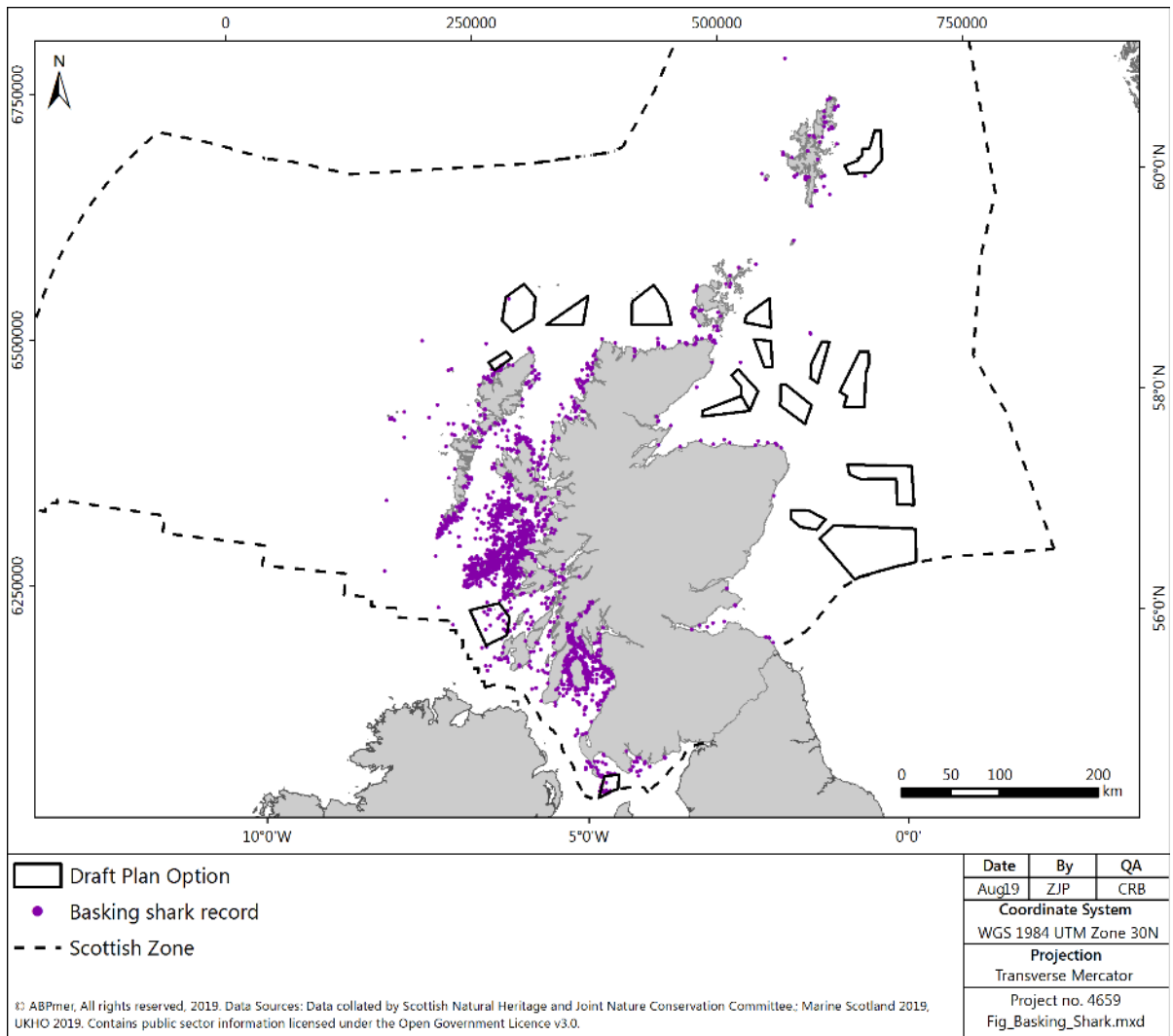


Figure 43 Basking shark distribution in Scottish waters

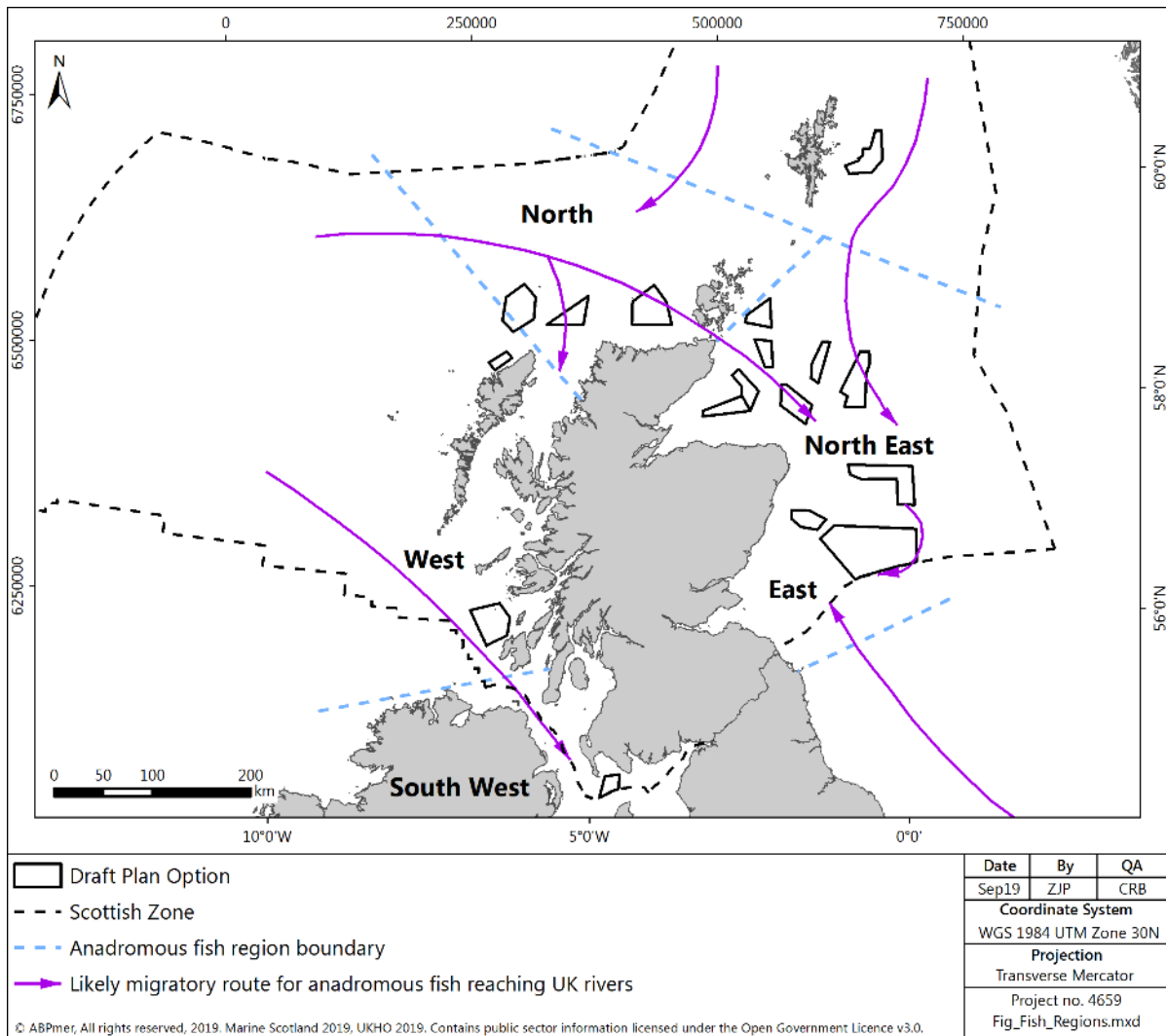


Figure 44 Anadromous fish expected migration pathways

Marine Mammals

2.3.26 Scotland's ecologically rich seas support populations of a number of marine mammals and provide feeding / transit areas for further species not endemic to Scottish waters. Species of key marine mammals found within Scottish seas include:

- Grey Seal;
- Harbour Seal;
- Otter;
- Harbour Porpoise;
- Bottlenose dolphin;
- White-beaked dolphin;
- Fin whale;
- Minke whale;
- Short-beaked common dolphin;
- Atlantic white-sided dolphin;
- Risso's dolphin;
- Long-finned pilot whale;
- Killer whale; and
- Sperm whale.

2.3.27 All the above species are PMFs.

2.3.28 Marine Mammals are widely distributed around the Scottish Coastline, with species distributions a function of prey availability and habitat distribution. There is limited information with regard to the condition of cetacean populations within Scottish waters. Where the condition can be assessed the populations are assessed as favourable¹³⁷ (Harbour porpoise, bottlenose dolphin, minke whale, white beaked dolphin and fin whale). Grey seals are found widely distributed around the Scottish coastline (Figure 45 and Figure 46), with a stable but fluctuating population¹³⁸.

¹³⁷ Baxter, J.M., Boyd, I.L., Cox, M., Donald, A.E., Malcolm, S.J., Miles, H., Miller, B., Moffat, C.F. 2011. Scotland's Marine Atlas: Information for the national marine plan. Marine Scotland, Edinburgh. Available at <https://www.gov.scot/Publications/2011/03/16182005/0>.

¹³⁸ Duck, C.D. & Morris, C.D. 2016. Surveys of harbour and grey seals on the south-east (border to Aberlady Bay) and south-west (Sound of Jura to Solway Firth) coasts of Scotland, in Shetland, in the Moray Firth and in the Firth of Tay in August 2015. Scottish Natural Heritage Commissioned Report No. 929. Available at <http://marine.gov.scot/data/snh-commissioned-report-929-surveys-harbour-and-grey-seals-south-east-border-aberlady-bay-and>.

- 2.3.29 There has been a general decline in harbour seal numbers since 2001 in several regions of the north and east of Scotland, particularly Orkney and the Firth of Tay^{139,140}. However, the patterns of decline are not universal. For example, the Moray Firth harbour seal count declined prior to 2005, remained relatively stable for four years, then increased by 40% in 2010 and has fluctuated since then, showing no significant trend since 2000¹⁴¹. 2014 and 2015 surveys have identified an increasing harbour seal population on the west coast, although east coast populations remain low¹⁴². Usage of Scottish seas by harbour seal (Figure 47) reflects the changes in the population distribution.
- 2.3.30 Otter are present around the Scottish coast, with the most recent population estimated at approximately 8,000¹⁴³. They are protected through the designation of coastal and riverine sites throughout Scotland, with particularly significant populations on the west coast and the islands¹⁴⁴. Foraging distances for otters are unknown, however they are unlikely to directly interact with the DPOs, where water depths are greater than that commonly used by otters. There is, however, potential for interaction between otters and the location of potential cable landfalls from the DPOs.

¹³⁹ *ibid*

¹⁴⁰ Arso Civil, M., Smout, S., Thompson, D., Brownlow, A., Davison, N., Doeschate, M., Duck, C., Morris, C., Cummings, C., McConnell, B. and Hall, A. J. (2018) Harbour Seal Decline – vital rates and drivers. Report to Scottish Government HSD2. Available at [https://risweb.st-andrews.ac.uk/portal/en/researchoutput/harbour-seal-decline--vital-rates-and-drivers\(e63c0fbe-b5dd-44ef-b341-457c7bdda315\).html](https://risweb.st-andrews.ac.uk/portal/en/researchoutput/harbour-seal-decline--vital-rates-and-drivers(e63c0fbe-b5dd-44ef-b341-457c7bdda315).html).

¹⁴¹ SCOS (2017) Scientific Advice on Matters Related to the Management of Seal Populations: 2017. Available at: <http://www.smru.st-andrews.ac.uk/files/2018/01/SCOS-2017.pdf>. Accessed 15/06/2018.

¹⁴² *ibid*.

¹⁴³ Jefferies, D.J., Strachan, C. & Strachan, R. 2003. Estimated numbers of the three interacting riparian mammals in Britain using survey data. In: Jefferies, D.J. (Ed) The water vole and mink survey of 1996–1998 with a history of the long-term changes in the status of both species and their causes, pp. 188–197. Vincent Wildlife Trust, Ledbury.

¹⁴⁴ Scottish Natural Heritage. 2015. Trend Note: Trends of Otters in Scotland. Available at <https://www.nature.scot/trend-notes-trends-otters-scotland>.

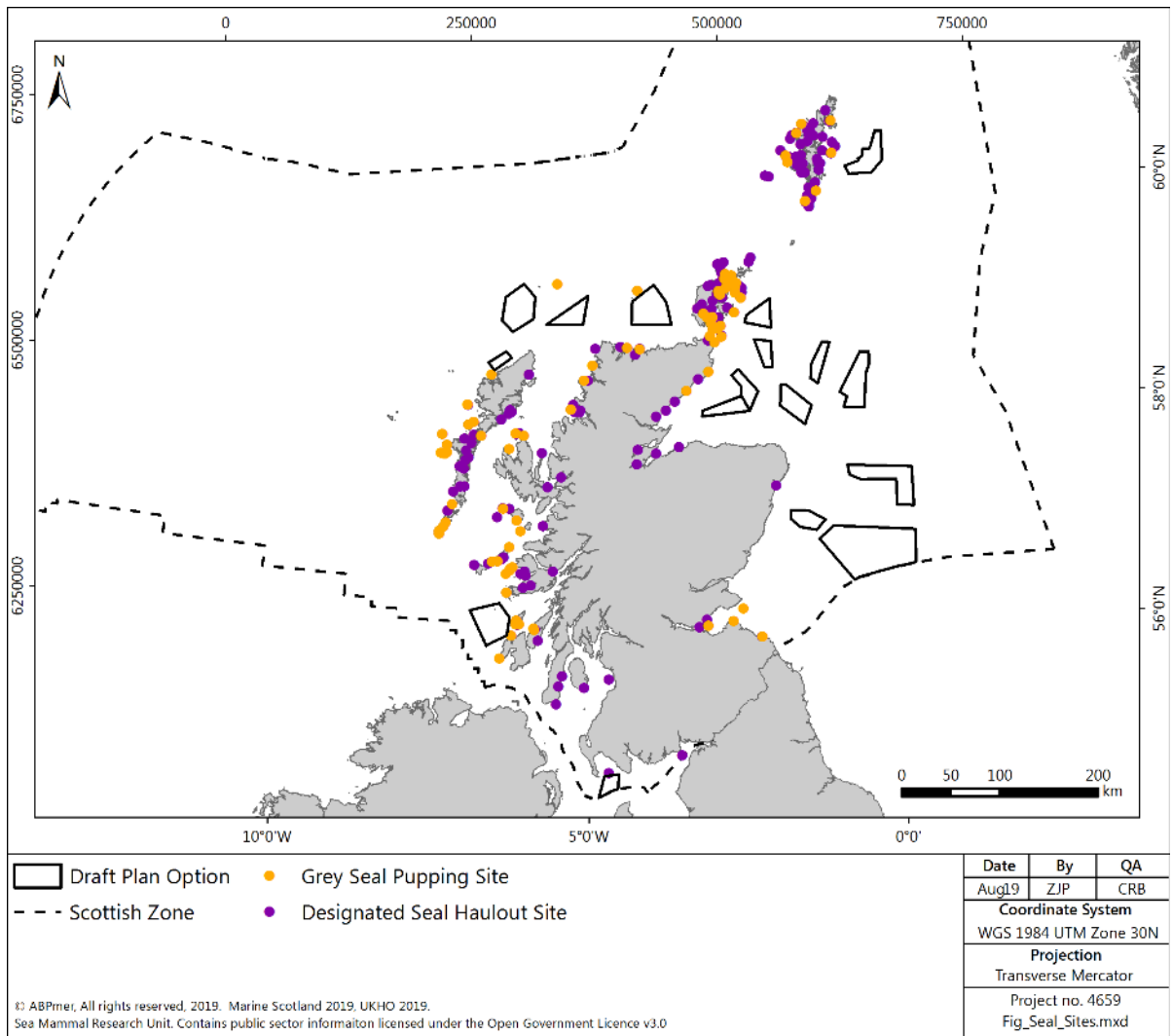


Figure 45 Seal haul out sites and grey seal breeding colonies

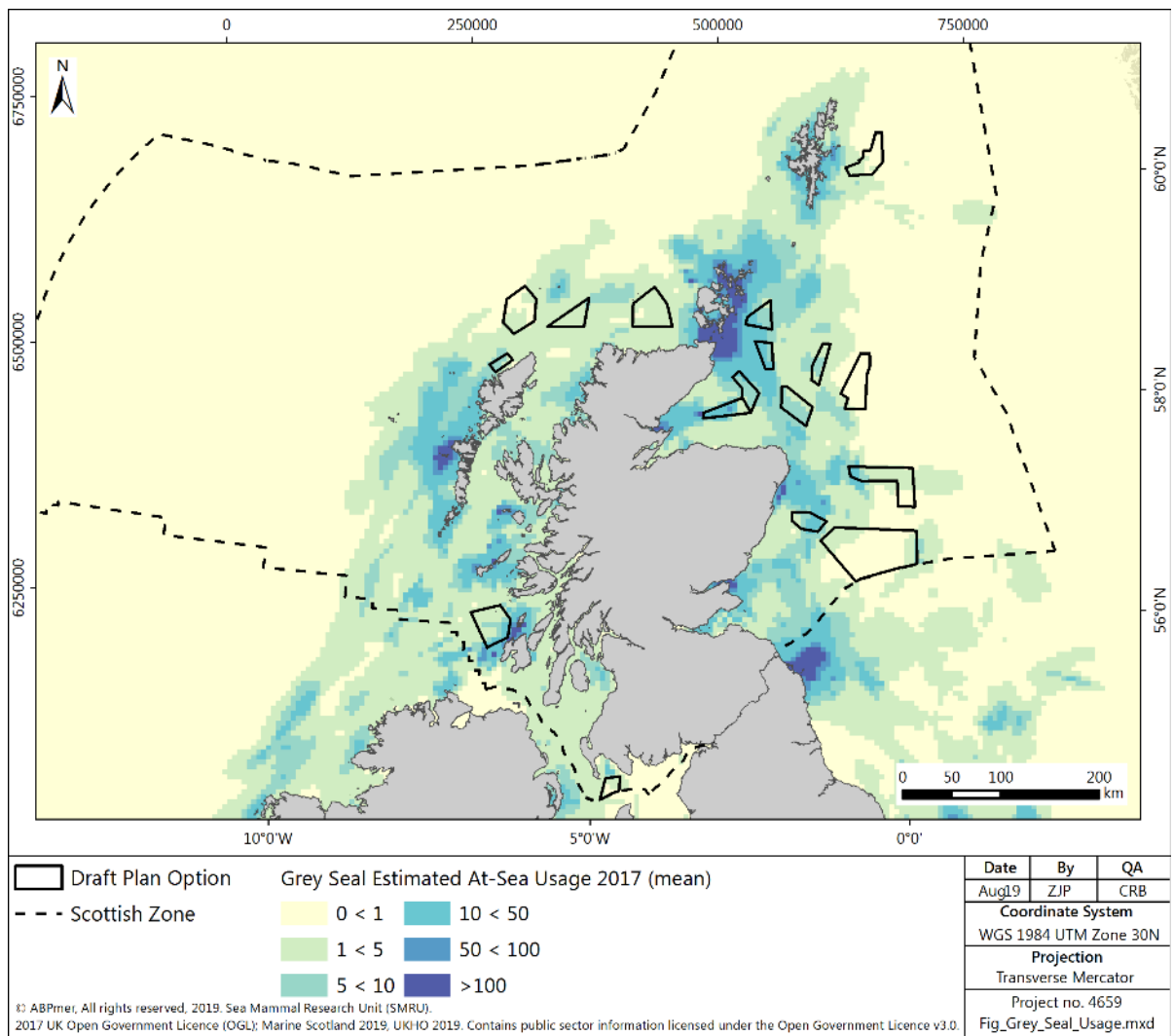


Figure 46 Grey seal at sea usage

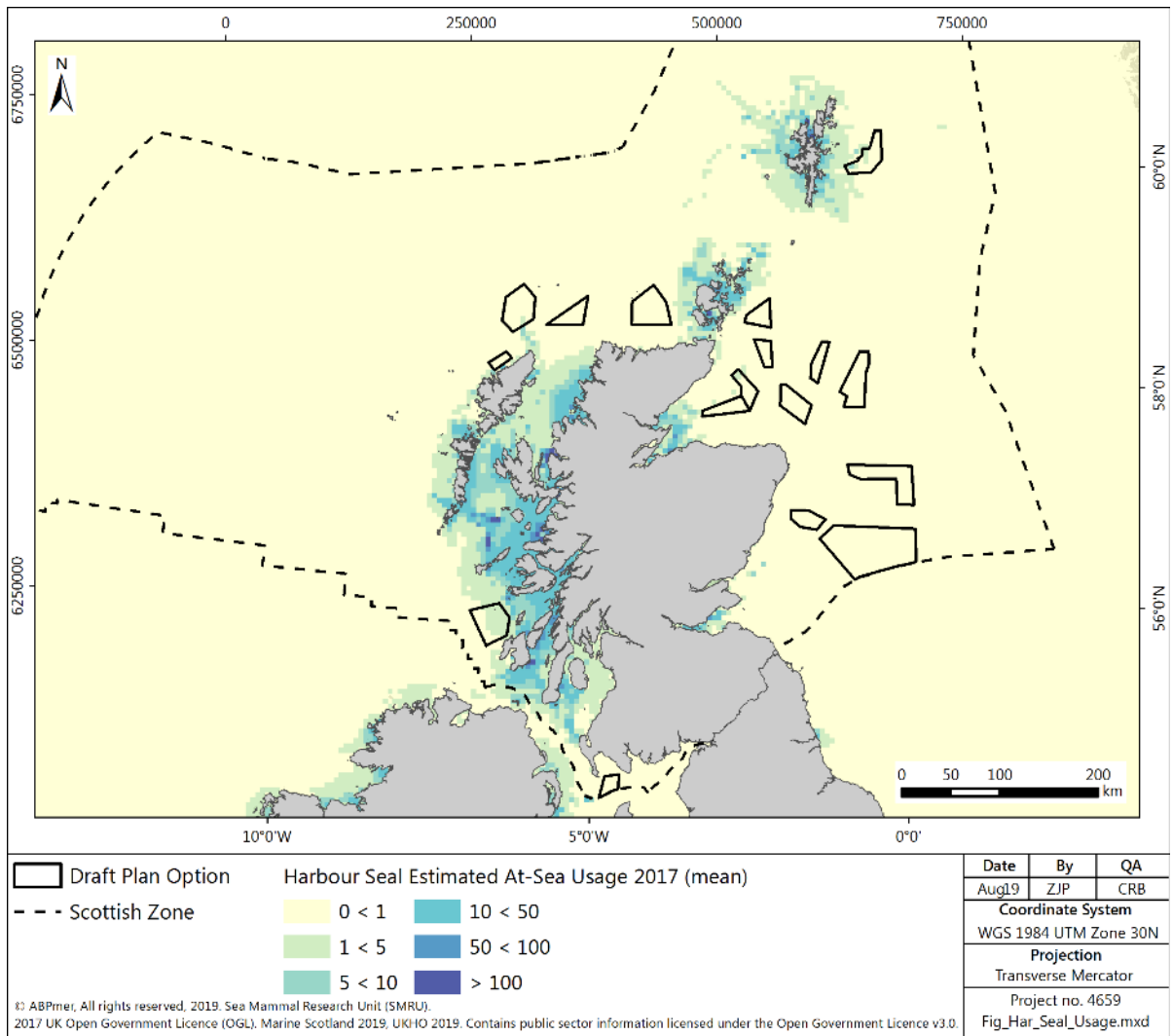


Figure 47 Harbour seal at sea usage

Birds

- 2.3.31 Scotland, and its coastline, is important for marine and coastal birds, including seabirds, seaducks, divers, grebes, waders and waterfowl. Scotland provides an essential feeding station for migrating birds, a safe winter haven for ducks, geese and shorebirds, and provides nesting sites for seabird species. It holds internationally significant numbers of 24 species of breeding seabirds, with additional migratory species of waterbird overwintering on Scotland's coasts.
- 2.3.32 Seabirds respond to a range of factors, such as changes in food availability, weather, predation and pollution. Breeding abundance and productivity is assessed for several species that breed in Scotland based on a representative sample of colonies around Scotland, which are monitored as part of the UK Seabird Monitoring Programme.
- 2.3.33 Scotland hosts large numbers of wintering seaduck, divers and grebes. Seaducks undertake surface diving to capture molluscs such as mussels and clams as well as crustacea. Divers and grebes are piscivores, preying on a variety of small fish such as clupeids, sandeel and small gadoids by undertaking pursuit diving. In addition, Scotland is important for large numbers of terrestrial species, several of which are known to migrate over long distances, including potentially over areas of sea that are included as part of the DPOs.
- 2.3.34 Important populations of other wintering and passage waterbirds are recorded in estuaries and sheltered coastal sites in Scotland. Some of these sites lie on major migratory flyways for both seabirds and terrestrial species, and in spring and autumn birds utilise the area as a staging post during onward migration to wintering grounds.
- 2.3.35 White tailed sea eagles have in recent years been re-introduced to Scotland, and a breeding population has established on the west coast and in the Western Isles. Sea eagles, particularly juveniles, are known to travel widely, and therefore have the potential to transit through the DPOs.
- 2.3.36 As discussed in Section 2.3 above, there are 58 SPAs established under the Birds Directive in Scottish waters to conserve bird species or assemblages of international importance.
- 2.3.37 Scotland's Marine Atlas¹⁴⁵ reported that seabird populations are increasing in some areas (Solway Firth and the Firth of Clyde, for example) and decreasing in others for certain species. In East and West Shetland and along the North Scotland coast, this decrease is most probably related to a shortage of prey species resulting from changes in oceanographic conditions. Like seabirds, waterbirds (wildfowl and waders) are also both increasing and decreasing year on year, depending on the species and location. The reasons for the changes

¹⁴⁵ Baxter, J.M., Boyd, I.L., Cox, M., Donald, A.E., Malcolm, S.J., Miles, H., Miller, B., Moffat, C.F. 2011. Scotland's Marine Atlas: Information for the national marine plan. Marine Scotland, Edinburgh. Available at <https://www.gov.scot/Publications/2011/03/16182005/0>.

remain to be fully explained but may in part be due to redistribution of wintering birds across northwest Europe due to climate change effects.

- 2.3.38 A more recent assessment of seabird trends between 1986 and 2016 found that the mean numbers of 12 species of breeding seabirds in Scotland had declined by 62% compared to the 1986 baseline level¹⁴⁶. Out of the 12 species assessed for breeding numbers, Arctic skua had experienced the largest declines (77%). The Northern Isles are their key breeding area and there have been declines in the availability of sand eels, which they obtain from other seabirds, such as kittiwake, by chasing them to make them release their food. Similar patterns of decline have occurred for the species they parasitise, particularly kittiwakes and terns. Increased predation from great skua has also been linked to their decline. Some species trends, although less prominent, appear to be stabilising possibly at a new level which differs from the 1986 baseline. Numbers of common terns increased in 2016, which may reflect a rapid response to favourable breeding conditions.
- 2.3.39 The assessment found that seabird breeding productivity between 1986 and 2016 varied for the 12 species analysed. Breeding success was above the long-term average for Arctic tern; black-legged kittiwake; common tern; little tern; northern gannet and Sandwich tern. Great skua and herring gull had lower breeding success. All other species were around the long-term average.
- 2.3.40 The European Seabirds At Sea database data (Figure 48) highlights the areas of high bird sightings which can be used as an indicator of high bird density. Areas on the east coast in the Moray Firth and Firth of Forth are of particular importance, alongside some areas around the Hebrides, Orkney and Shetland Islands. Whilst this data gives a good indication of the seabird density, there is likely to be bias in the reporting based on the effort in an area, (this can be seen on Figure 48 where some areas of higher densities correlate with higher shipping densities, discussed in Section 2.2 above, indicating greater effort).

¹⁴⁶ SNH. 2018. Biodiversity Indicator: The numbers and breeding success of seabirds, S005, July 2018.

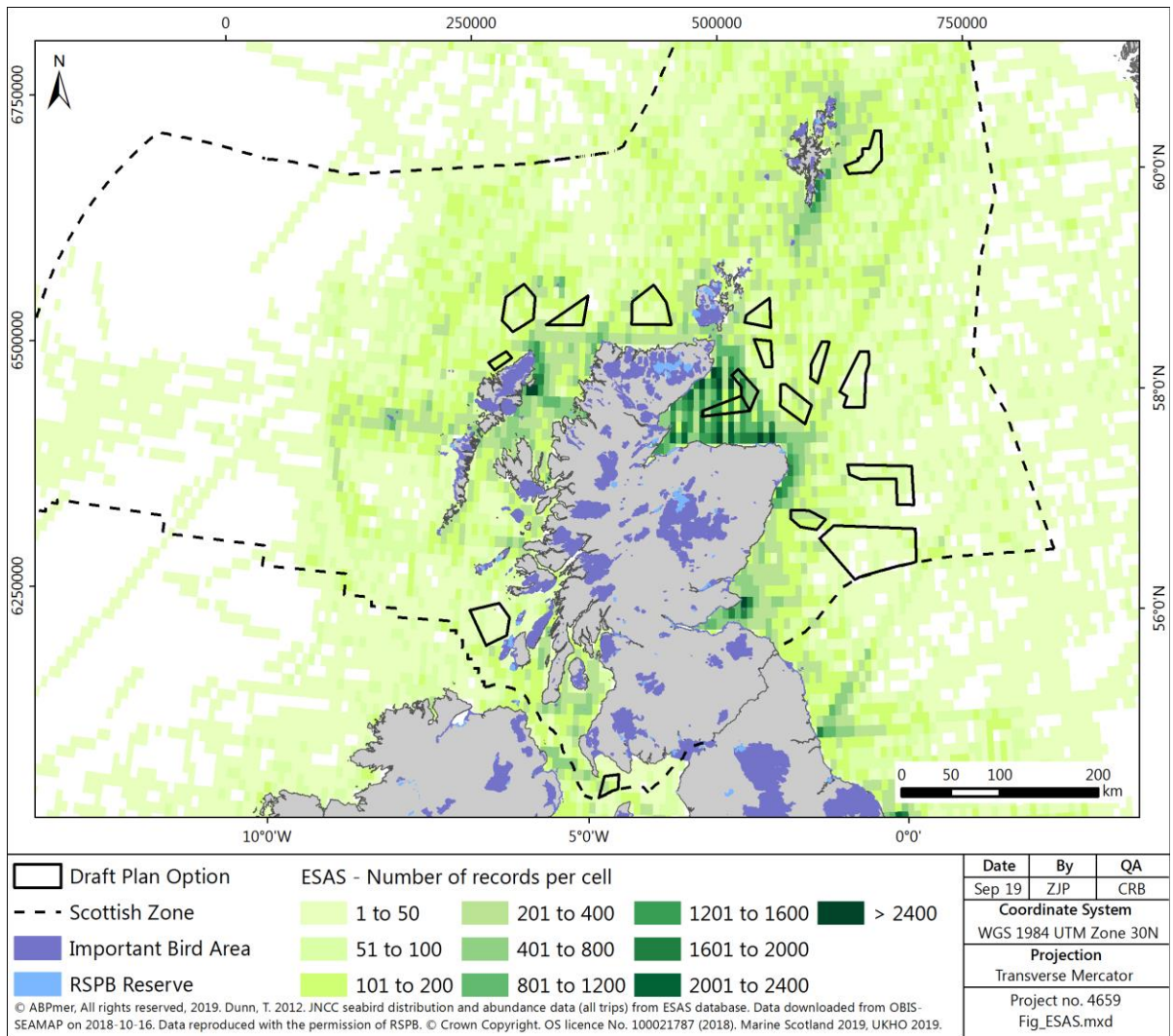


Figure 48 Number of ESAS records per 0.1 degree cell

Cultural Heritage

- 2.3.41 Scotland's coastal and marine environments are rich in cultural heritage. There are many scheduled monuments and listed buildings clustered along the coast, with designated wrecks and military remains sites identified offshore. Key coastal features include a number of Category A listed lighthouses, ecclesiastical remains, military defences, forts and castles. Two of Scotland's World Heritage Sites (St. Kilda and the Heart of Neolithic Orkney) are on the coast, with other non-Scottish sites (including Hadrian's Wall in England and the Giant's Causeway in Northern Ireland) on adjacent coastlines.
- 2.3.42 Within Scottish waters there are a number of marine sites, designated as Historic MPAs, which are considered to contain marine historic assets of national importance. All Historic MPAs are designated within Scottish Territorial Waters (up to 12 nautical miles (nm)) and are shown in Figure 49.
- 2.3.43 Sea level rise, on historic timescales has changed the position of the coastline of the United Kingdom considerably in the time since hominid occupation of the United Kingdom is first known to have occurred. As areas of land became submerged, any artefacts in this area were submerged with it, and therefore there is potential for culturally significant artefacts to be in the subtidal areas around Scotland. The largest areas of land which have been submerged are in the southern North Sea and the English Channel¹⁴⁷, although there are areas around the coast of Scotland, including in the Firth of Forth and Aberdeenshire coastlines, which were previously above sea level (Figure 50).
- 2.3.44 There is therefore potential for submerged archaeological remains in these areas. Except for some areas in the North-east and East regions, and an area in the Shetland region, these potential areas are inshore of the DPOs, and therefore the impacts of development on these areas are limited to infrastructure associated with cable landfalls. The likelihood of archaeological remains is, however, difficult to quantify on a regional scale, due to the small areas of archaeological interest (potentially in the scale of metres) associated with hominid occupation¹⁴⁸ and therefore it is expected that consideration would have to be made at a project level to manage the impacts of cable landfalls and offshore wind farm development.
- 2.3.45 Further areas of potential historic importance including shipwrecks, which are common and widely distributed around the Scottish coast, shown in Figure 51,

¹⁴⁷ Amkreutz, L., Verpoorte, A., Waters-Rist, A., Niekus, M., van Heekeren, V., van der Merwe, A., van der Plicht, H., Glimmerveen, J., Stapert, D., Johansen, L. 2018. What lies beneath...Late Glacial human occupation of the submerged North Sea landscape, *Antiquity* vol 92 Issue 361. Available at <https://www.cambridge.org/core/journals/antiquity/article/what-lies-beneath-late-glacial-human-occupation-of-the-submerged-north-sea-landscape/D97FDC8DDCE649ABAD716FC78F21A1BC>.

¹⁴⁸ Bicket, A., Tizzard, L., Firth, A. and Benjamin, J. 2014. Heritage Management and Submerged Prehistory in the United Kingdom. *Prehistoric Archaeology on the Continental Shelf*. 10.1007/978-1-4614-9635-9_12. Available at https://www.researchgate.net/publication/258120283_Heritage_Management_and_Submerged_Prehistory_in_the_United_Kingdom.

may be known on a regional scale, where data is available this will be considered within the regional discussions below.

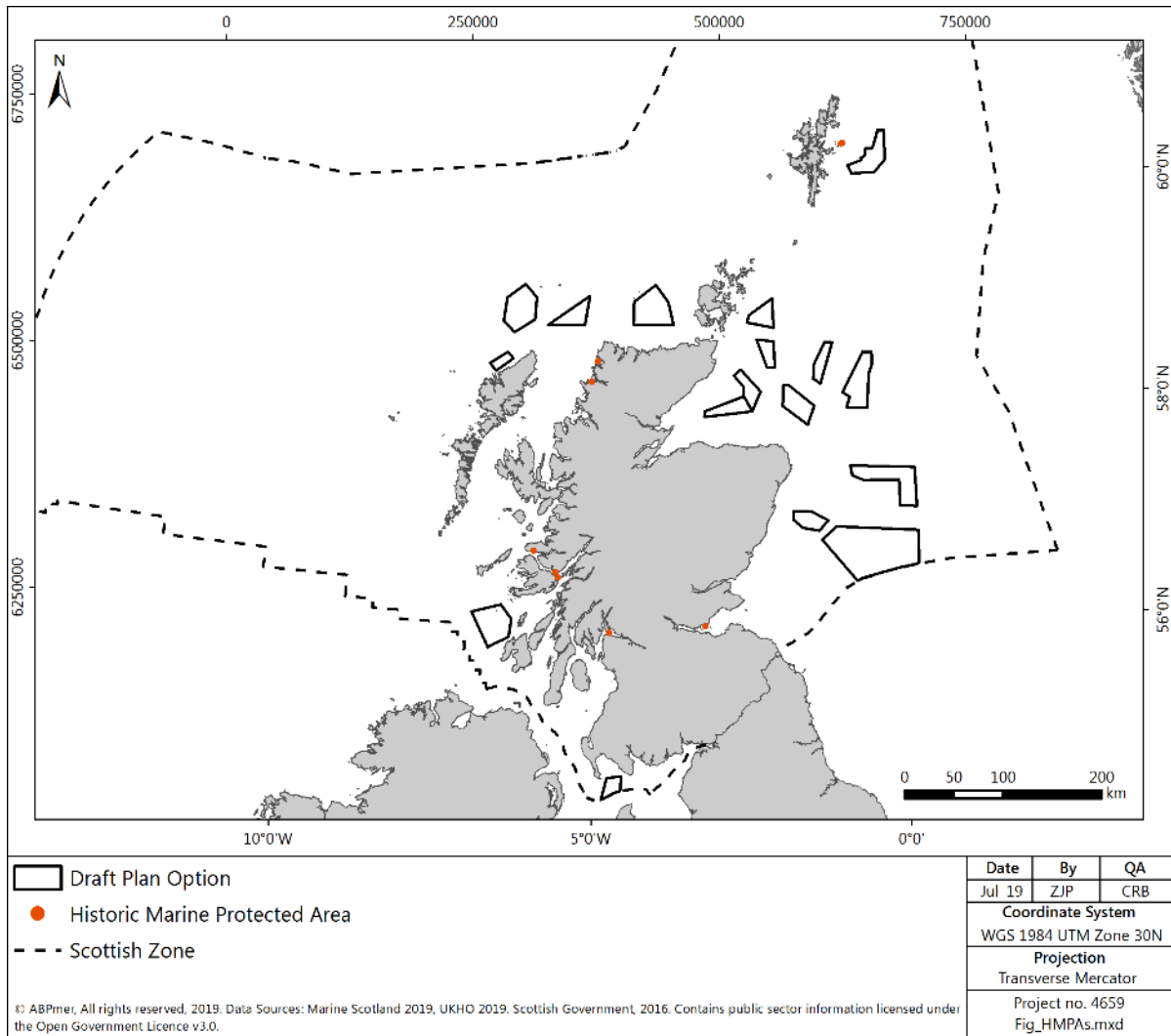


Figure 49 Historic MPAs in Scottish waters

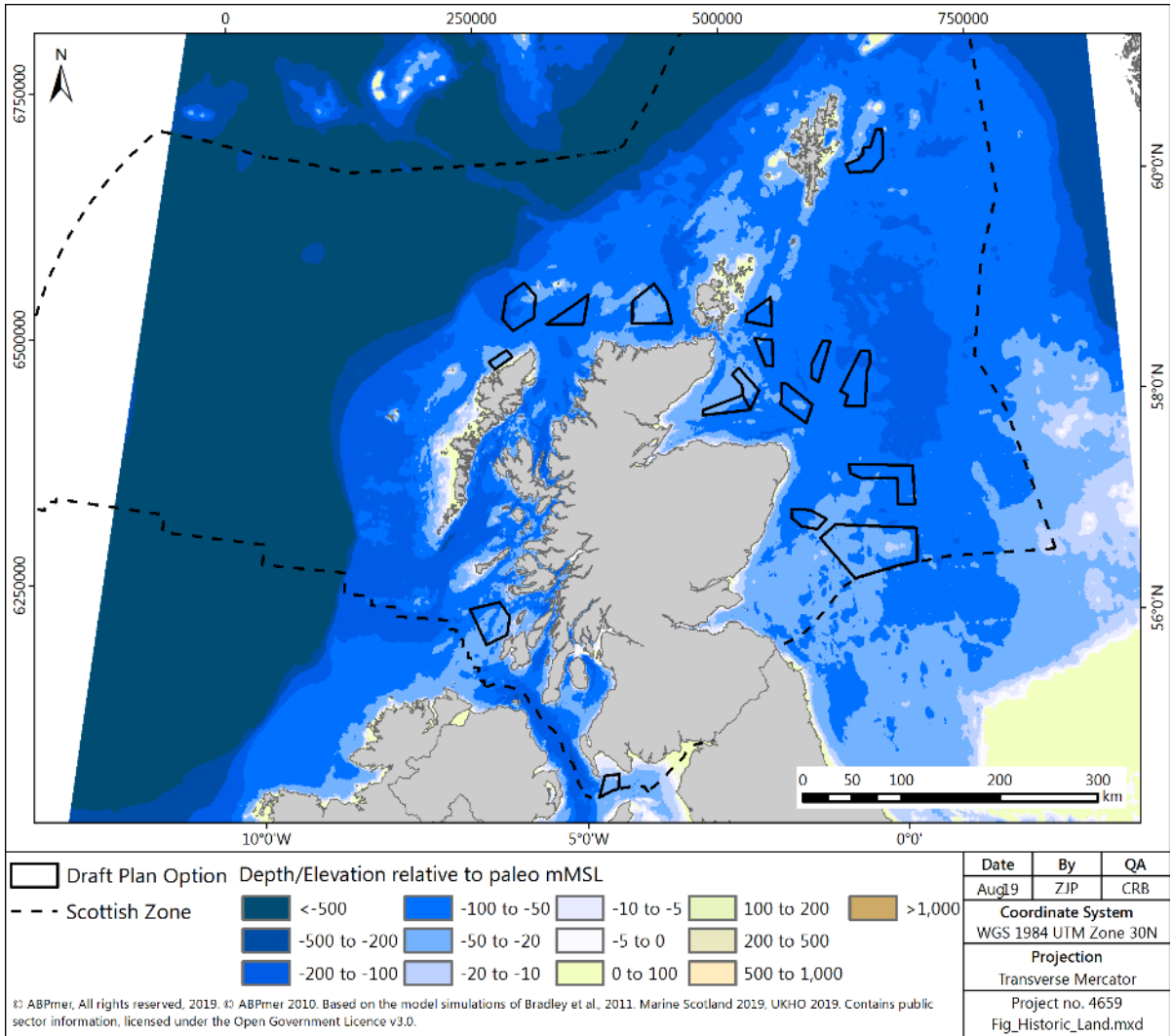


Figure 50 Historical land area¹⁴⁹

¹⁴⁹ Awaiting data

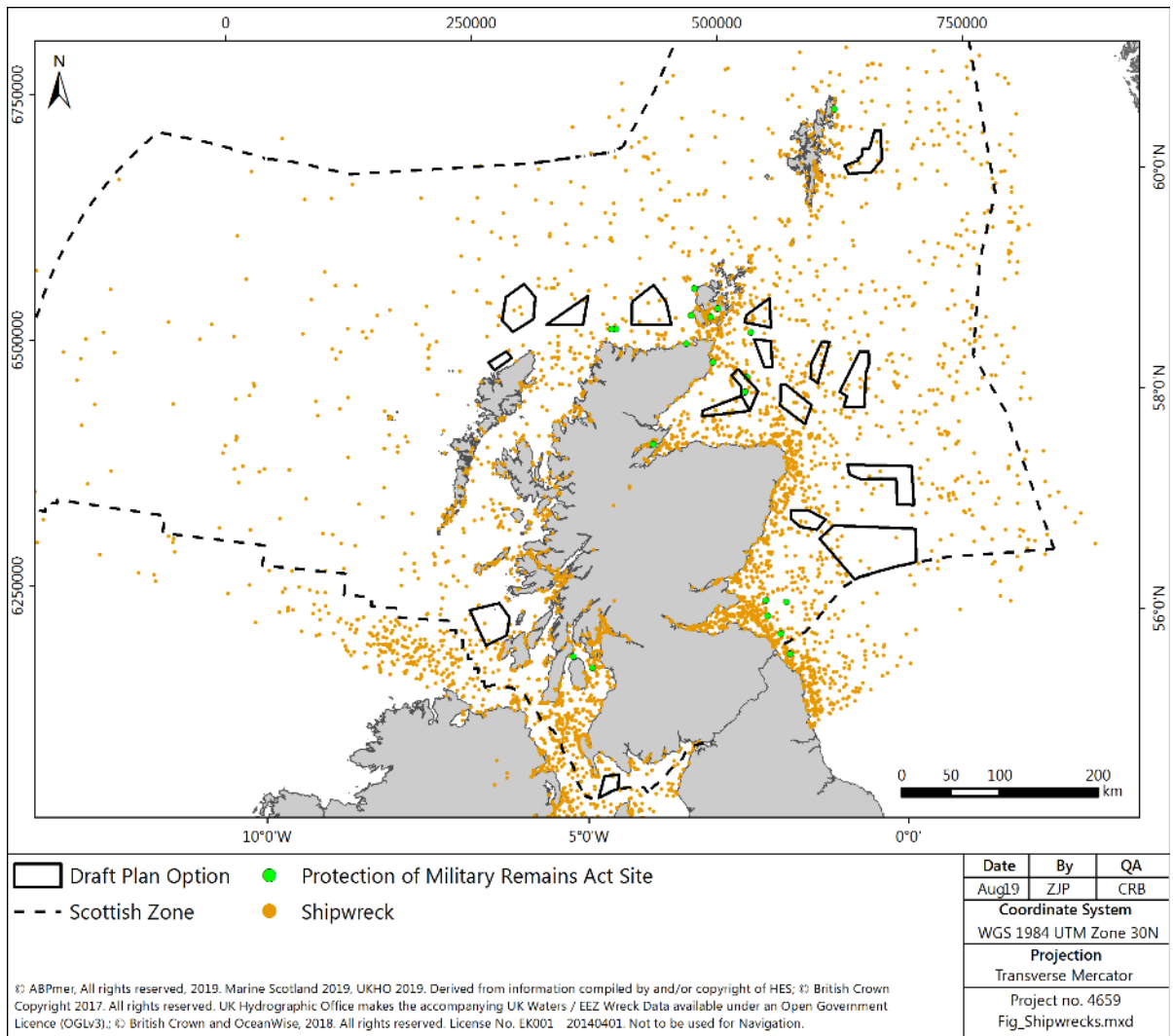


Figure 51 Shipwrecks around the Scottish coast

Landscape / Seascape

- 2.3.46 Scottish Natural Heritage (SNH) has undertaken an assessment of the landscape and seascape of Scotland, developing the Landscapes of Scotland map¹⁵⁰, dividing Scotland into 79 areas, each of which has a description of the landscape and seascape within that area.
- 2.3.47 There are 40 National Scenic Areas (NSAs), defined as areas of outstanding scenic value in a national context, which are protected for their value in aesthetic and landscape terms (Figure 52). Of the 40 NSA, many have coastal elements, the characters of which are defined in the rationale for selection¹⁵¹. The NSA designations are integrated into Scottish Planning Policy, whereupon any development with the potential to affect an NSA should only be permitted where:
- the objectives of the designation and the overall integrity of the NSA won't be compromised; or
 - any significant adverse effects on its special qualities are outweighed by social, environmental or economic benefits of national importance.
- 2.3.48 Scott *et al*, (2005)¹⁵², developed a methodology to characterise seascapes, and define their sensitivity. The sensitivity of the seascapes is increased where there is greater intricacy, stillness, low lighting and where the seascape is currently unmodified and experienced from a secluded coastline. The distance to which offshore windfarms can be seen is also discussed, identifying maximum visual ranges of 40 to 50km, although assessments were based on a visual range of 35km.

¹⁵⁰ Geographic Information Group. 2012. Landscapes of Scotland Map. [online] available at <https://www.nature.scot/sites/default/files/2017-07/A736465%20-%20Landscapes%20of%20Scotland%20-%20map.pdf>.

¹⁵¹ Countryside Commission for Scotland. 1978. Scotland's Scenic Heritage.

¹⁵² Scott, K.E., Anderson, C., Dunsford, H., Benson, J.F. and MacFarlane, R. 2005. An assessment of the sensitivity and capacity of the Scottish seascape in relation to offshore windfarms. Scottish Natural Heritage Commissioned Report No.103 (ROAME No. F03AA06). Available at <https://www.nature.scot/snh-commissioned-report-103-assessment-sensitivity-and-capacity-scottish-seascape-relation-windfarms>.

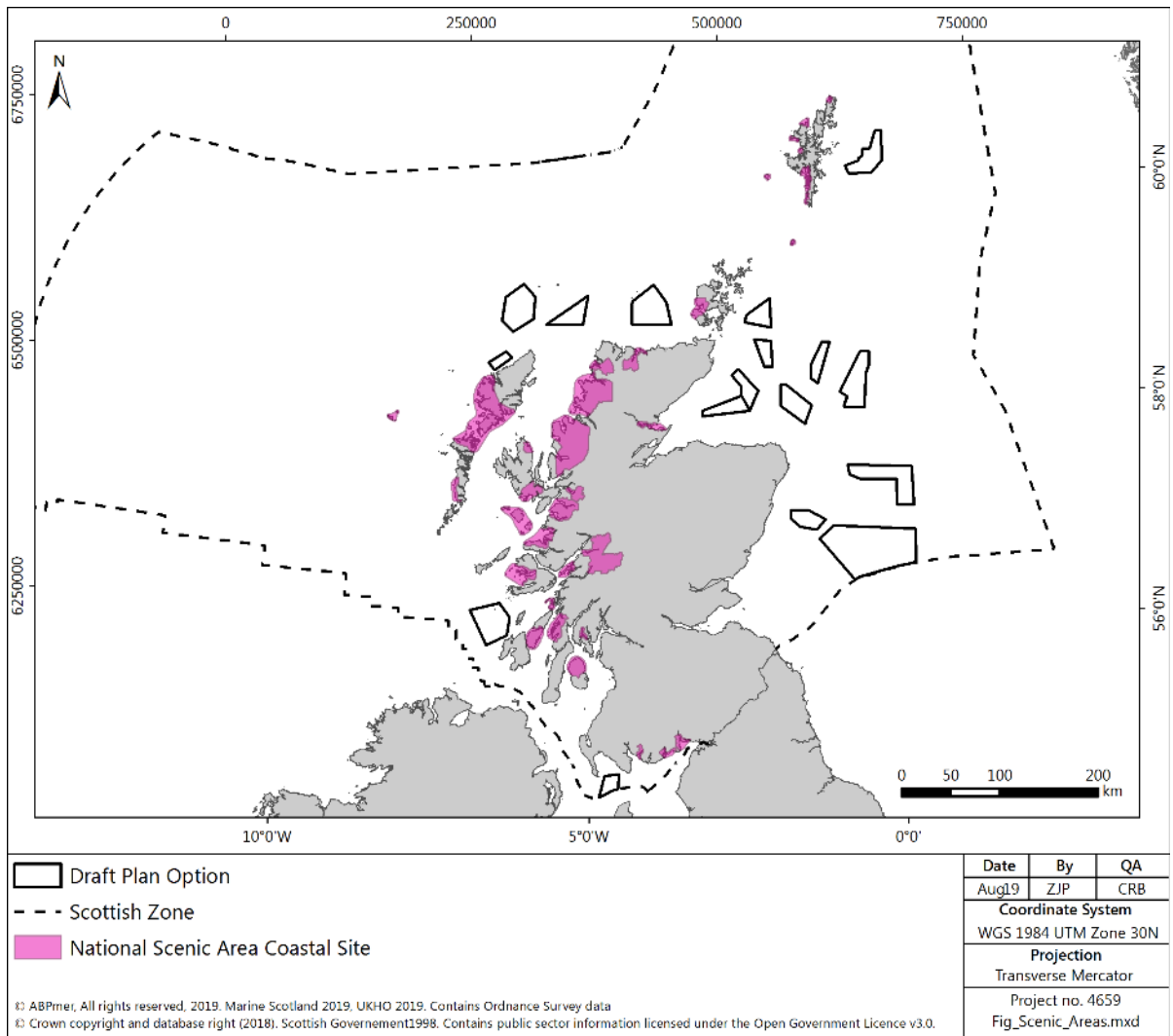


Figure 52 National Scenic Areas with marine and coastal elements in Scotland

2.4 Planning Issues

- 2.4.1 National, city-region and local development plans aim to strike an appropriate balance between supporting sustainable economic growth and protecting and enhancing quality of life and the environment.

Offshore Wind

- 2.4.2 The outcome of the RLG and subsequent development of the Offshore Wind Plan will provide guidance and direction for future development of the offshore wind industry in Scotland.
- 2.4.3 The consenting process for offshore wind, through the marine licencing process, will consider the potential economic and environmental impacts of a development. In addition, there is a requirement to consider cumulative impacts associated both with other offshore wind and other sector developments (oil and gas, CCS etc.).
- 2.4.4 The development of a well-considered plan for offshore wind should reduce the burden placed on the consenting process and allow a smoother route for appropriate developments.

Onshore Development

- 2.4.5 To realise the economic potential of Scottish offshore wind resources, not only will the offshore development projects have to progress through the consenting process, associated infrastructure will also need to be developed within Scotland under the terrestrial planning system. To encourage the realisation of opportunities within Scotland the National Renewable Infrastructure Plan (NRIP) was developed, which identifies the extent of investment required in three broad geographic manufacturing clusters- Forth / Tay, Moray Firth and West Coast; and a subsea operations and maintenance cluster – Aberdeen / Peterhead.
- 2.4.6 The NRIP has subsequently fed into the development of the National Planning Frameworks, now at revision 3 (NPF3) which contains high level planning policy. NPF3 presents a strategy for the future development of Scotland, expressing the Scottish Government's economic strategy and planning for infrastructure investment. In line with this, it is expected that local policy development and planning decisions should take note of its contents and support its delivery.
- 2.4.7 Whilst the development of the NPFs has shown consideration to the direction of development, it has been identified that there has been limited success in the delivery of the infrastructure developments, and therefore Scottish Government is currently undertaking to develop a Planning Bill to drive forward the delivery

and implementation of the NPF through increased emphasis on local development plans¹⁵³.

- 2.4.8 A key infrastructure requirement for the development of offshore wind is the enhancement of the electricity grid to transport the generated electricity from source to where it is required. These enhancements, both within the marine and terrestrial environments, will require further planning and marine consents. The Electricity Ten Year Statement¹⁵⁴ identifies the currently planned expansions to the grid, however it is likely that these plans would need further enhancement to integrate significant offshore wind development in the future.

¹⁵³ Scottish Government. 2017. Places, People and Planning consultation: Scottish Ministers' position statement. Available at <https://beta.gov.scot/publications/places-people-planning-position-statement/>.

¹⁵⁴ National Grid. 2017. Electricity Ten Year Statement, November 2017. Available at <https://www.nationalgrideso.com/insights/electricity-ten-year-statement-etys>.

3 South-West

3.1 Introduction

3.1.1 The South-west region extends northwards from the Scotland-England border, incorporating the Solway Firth, the North Channel and the southern tips of the Mull of Kintyre and the Isle of Arran (Figure 53). There is one DPOs identified within the South-west region, adjacent to Luce Bay, in addition to current offshore wind development in the area, focussed in the Solway Firth.

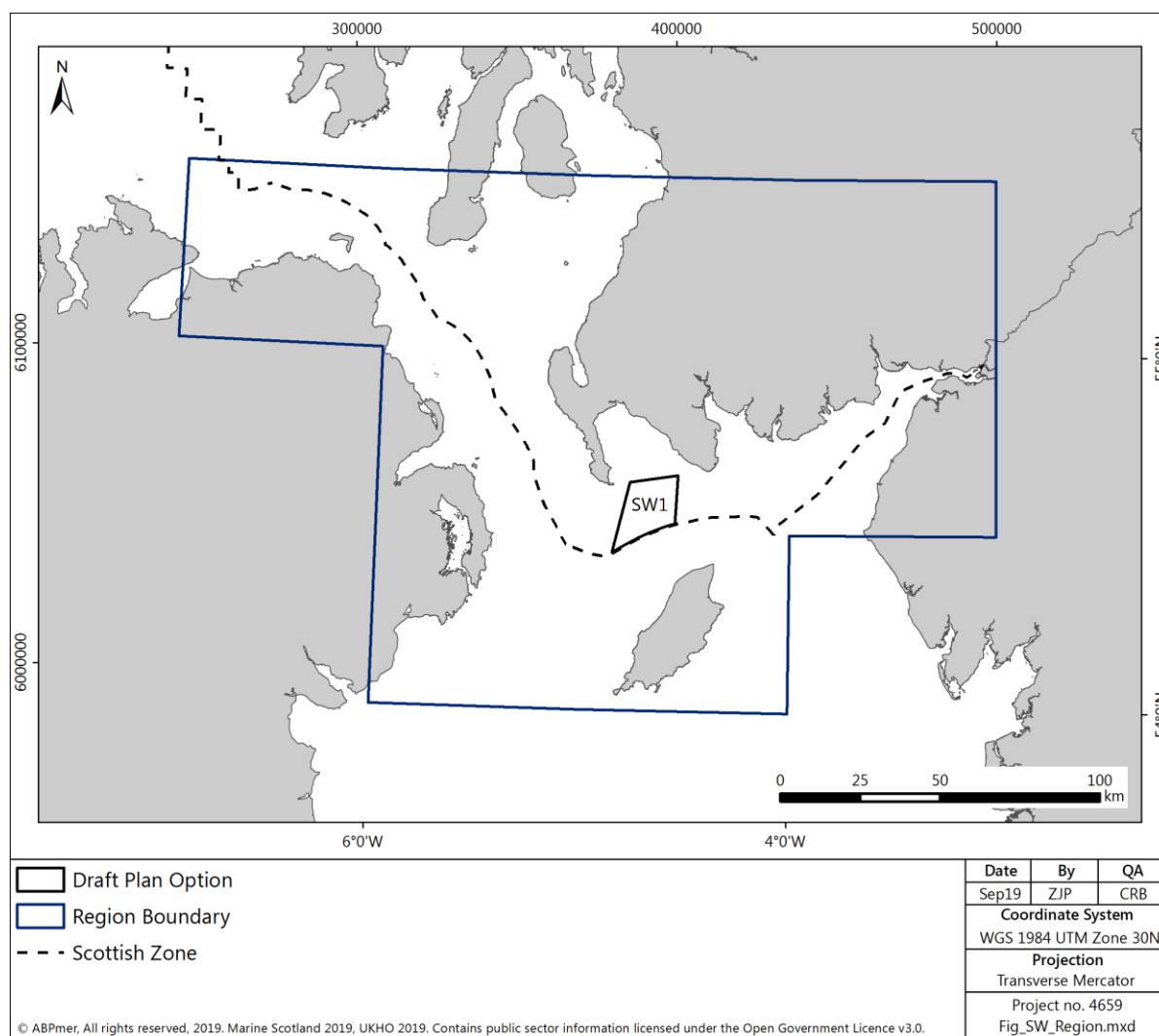


Figure 53 Map of the South-west region including DPOs

3.2 Physical Considerations

Offshore Wind Resource

3.2.1 Within the South-west region, encompassing one DPO (SW1), there is available resource, some of which is being exploited by development within the Solway Firth. There is less resource available when compared to the more exposed regions, particularly the West and North as shown in Figure 54 using the mean annual wind speed as a proxy, and shown in [Table 3](#).

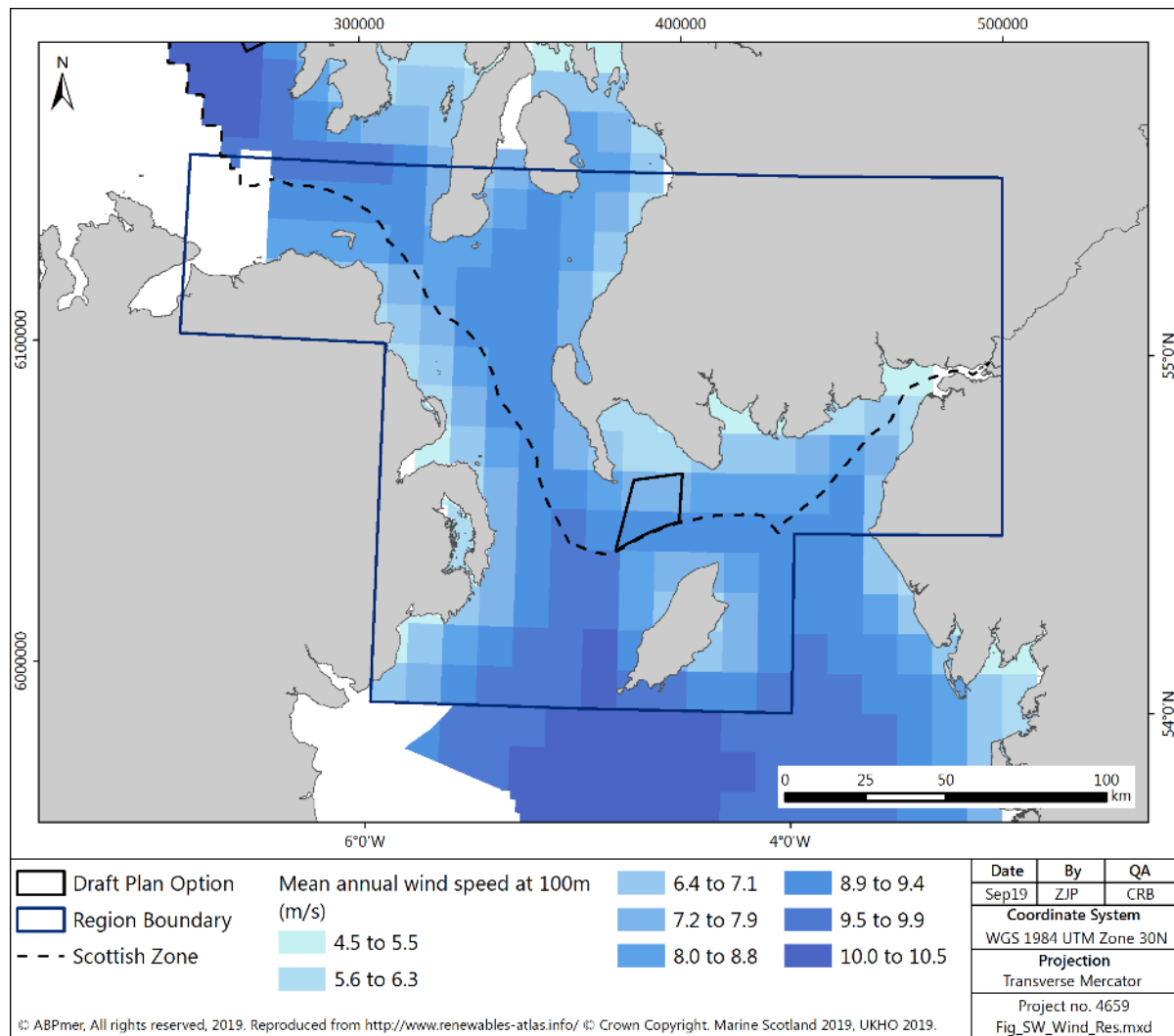


Figure 54 South-west region: mean annual wind speed

Table 2 South-west region: Potential installed capacity in the DPO

Area of Search	Region	Area (square km)	Potential Installed capacity (GW) ¹⁵⁵
SW1	South-west	292	1.5
South-west Total		292	1.5

¹⁵⁵ The figures within this column, and throughout the subsequent regional discussions are based upon an assumption of 5MW potential installed capacity per km². The source of this assumption is based on available literature as summarised in: Borrmann, R., Rehfeldt, K., Wallasch, A-K., Luers, S. 2018. Capacity Densities of European Offshore Wind Farms.

Grid Connection

- 3.2.2 The grid provision in the South-west region is predominantly linked into 132kv substations, however there are areas of higher capacity, particularly associated with the Moyle Interconnector (275kv) and the transmission south across the border close to the upper reaches of the Solway Firth.

Bathymetry and Seabed

- 3.2.3 The water depth in the South-west region ranges from shallow water (less than 60 m) in extensive areas within the Solway Firth and towards the Firth of Clyde, but shelves sharply to greater than 100 m in the North Channel (Figure 55). SW1 lies within the 0-60m depth contours.
- 3.2.4 Seabed sediments are principally mud in areas within the Firth of Clyde, to the east of the Mull of Kintyre, and towards the inner Solway Firth. In areas where the water depth is greater, the sediments are principally sand, or sand and gravel, including throughout the North Channel, to the south and west of the Mull of Kintyre, and in the outer Solway Firth (Figure 56). SW1 overlaps substrates that include sandy gravel and gravel, sand and silt and muddy sandy gravel.

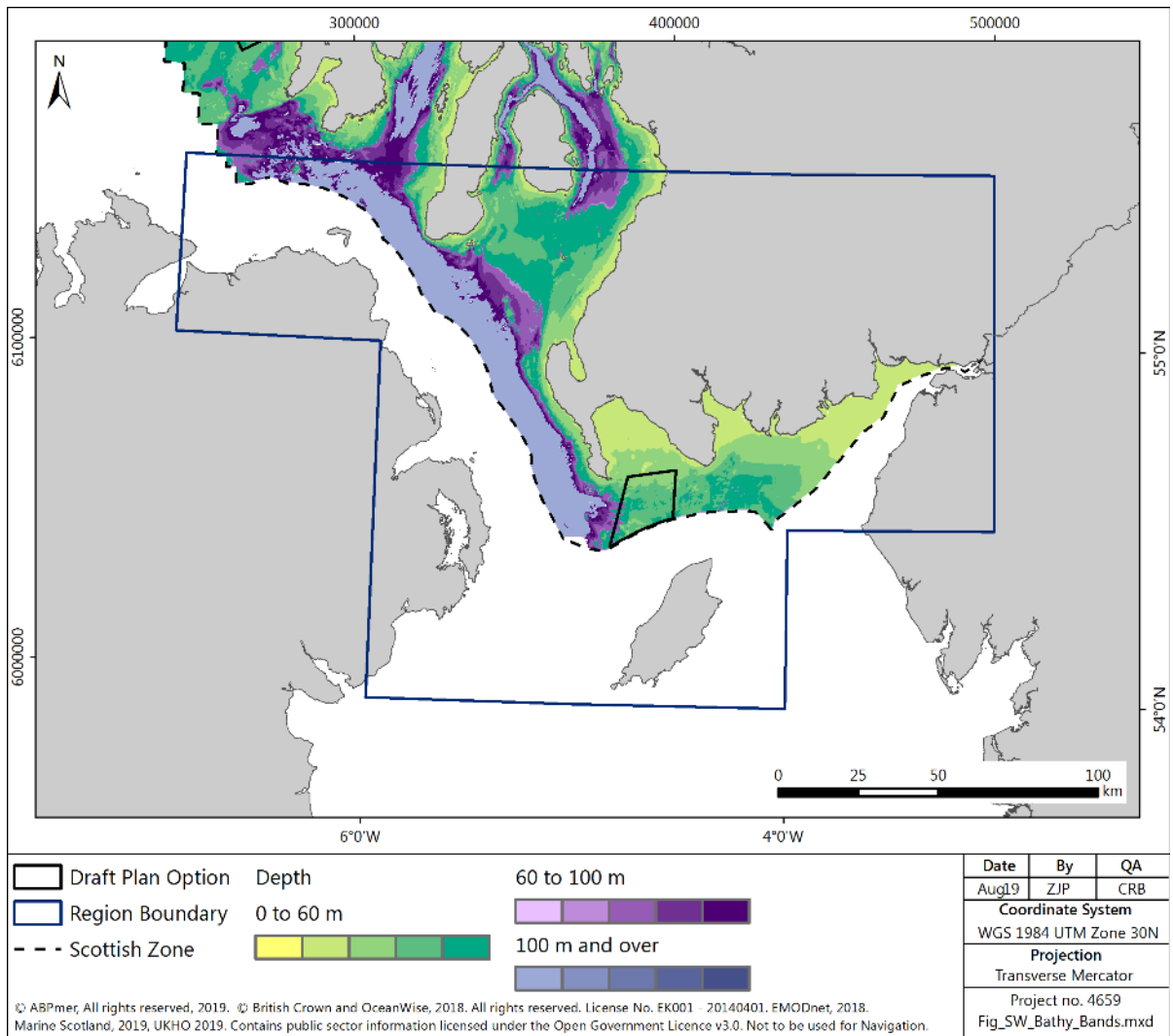


Figure 55 South-west region: banded water depth

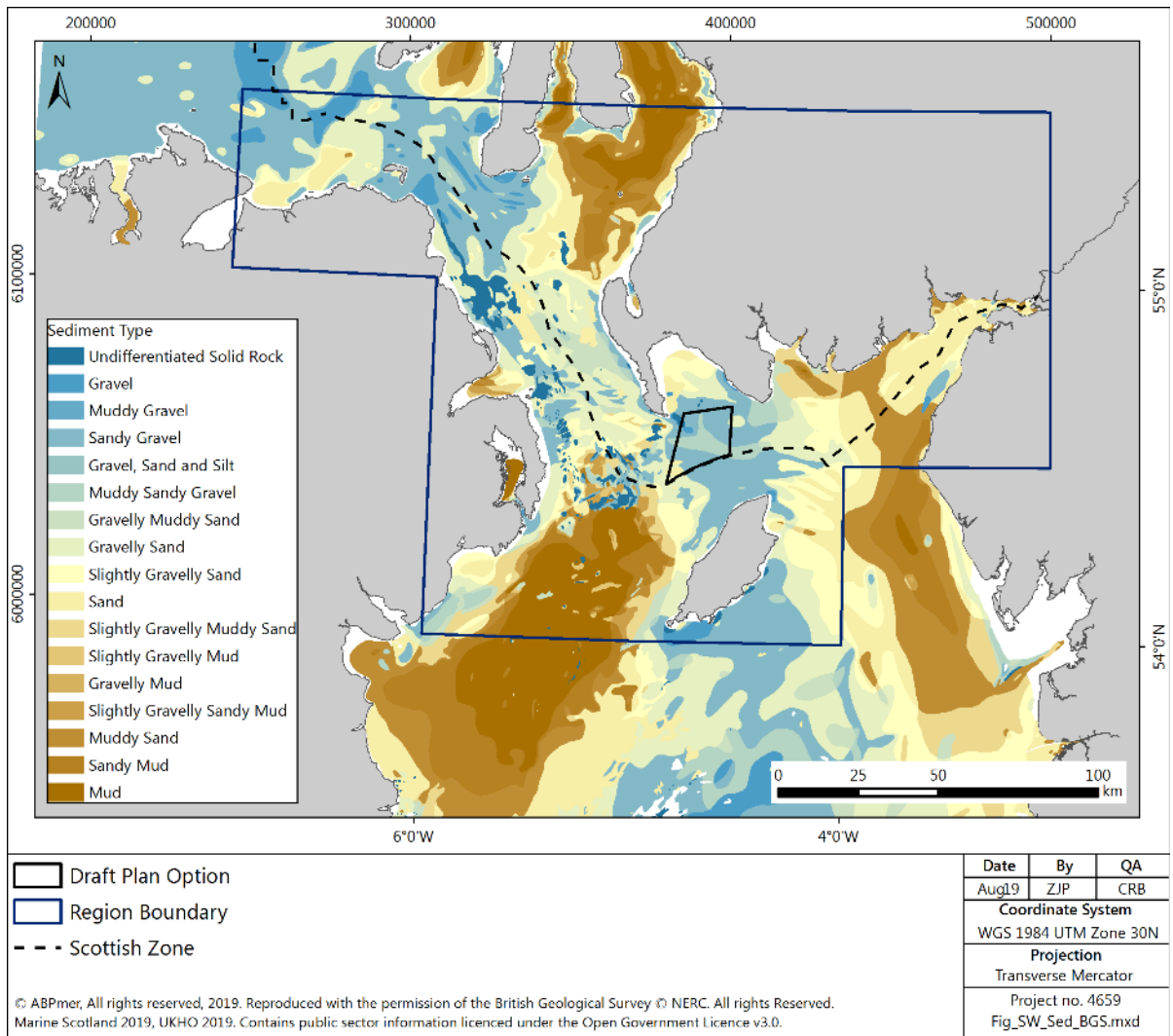


Figure 56 South-west region: seabed sediments

3.3 Socio Economics

Supply Chain

- 3.3.1 There is one area currently identified at the northern edge of the South-west region¹⁵⁶ which could be developed to support the construction, operation and maintenance of offshore wind in the DPO. This is Campbeltown / Machrihanish, on the Mull of Kintyre, which is identified as having potential to support further maintenance and operation / maintenance and was engaged to manufacture of towers for the Beatrice offshore wind farm, producing up to 200 towers between 2017 and 2019¹⁵⁷.
- 3.3.2 The development of the Robin Rigg array in the Solway Firth, was identified as having 11% Scottish content, of which 0.2% was attributed to the local council area, Dumfries and Galloway¹⁵⁸. The array was identified as having approximately 26% content from other UK regions, including North-west England, and Wales
- 3.3.3 There is potential for further development within the South-west region to utilise supply chains present in other regions, or south of the border in England or Wales.

Energy Generation

- 3.3.4 There is one offshore wind farm currently operational in the South-west region, Robin Rigg in the Solway Firth (180MW) which has been fully operational since 2010 (Figure 57). This does not overlap with the proposed SW1.
- 3.3.5 Tidal stream energy generation is currently being developed within the South-west region, there are two draft plan option areas within the region and there are two agreements for lease issued by Crown Estate Scotland for proposed tidal stream installations (Figure 57):
- Mull of Kintyre; and
 - Solway Firth.
- 3.3.6 Neither of the sites is currently operational, and neither has applied for, or been granted, consent to date.
- 3.3.7 One of these proposed Tidal DPOs overlaps with SW1.

¹⁵⁶ Scottish Enterprise and Highlights and Islands Enterprise. 2010. National Renewables Infrastructure Plan Stage 2.

¹⁵⁷ Offshorewind.biz. 2018. Available at <https://www.offshorewind.biz/2018/06/27/cs-wind-sends-off-second-batch-of-beatrice-turbine-towers/>. Accessed 05/10/2018.

¹⁵⁸ BVG Associates, 2011. UK content analysis of Robin Rigg offshore wind farm, a report commissioned by E.ON Climate and Renewables. Available at <https://www.eonenergy.com/-/media/PDFs/Generation/wind/offshore/EONRobinRiggUKcontentreportOctober2011.pdf>, accessed 15/11/2018.

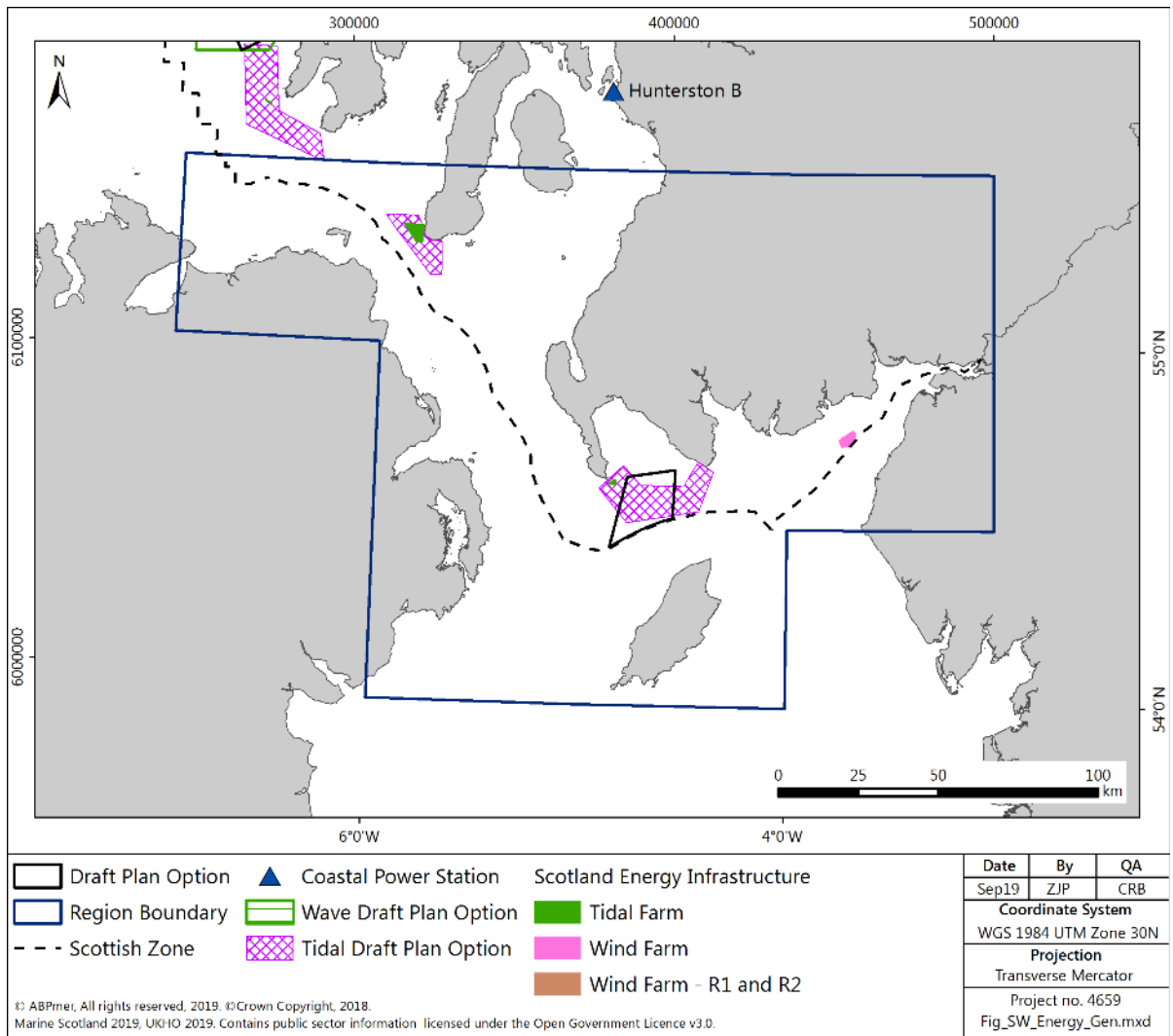


Figure 57 South-west region: current, planned and potential future offshore energy generation infrastructure

Power Interconnectors

- 3.3.8 There are 140km of power interconnectors in Scottish waters in the South-west region, connecting Scotland to Northern Ireland (HVDC Moyle interconnector) and England (Western HVDC link) (Figure 58). None of these interconnectors intersect or lie in the vicinity of SW1.

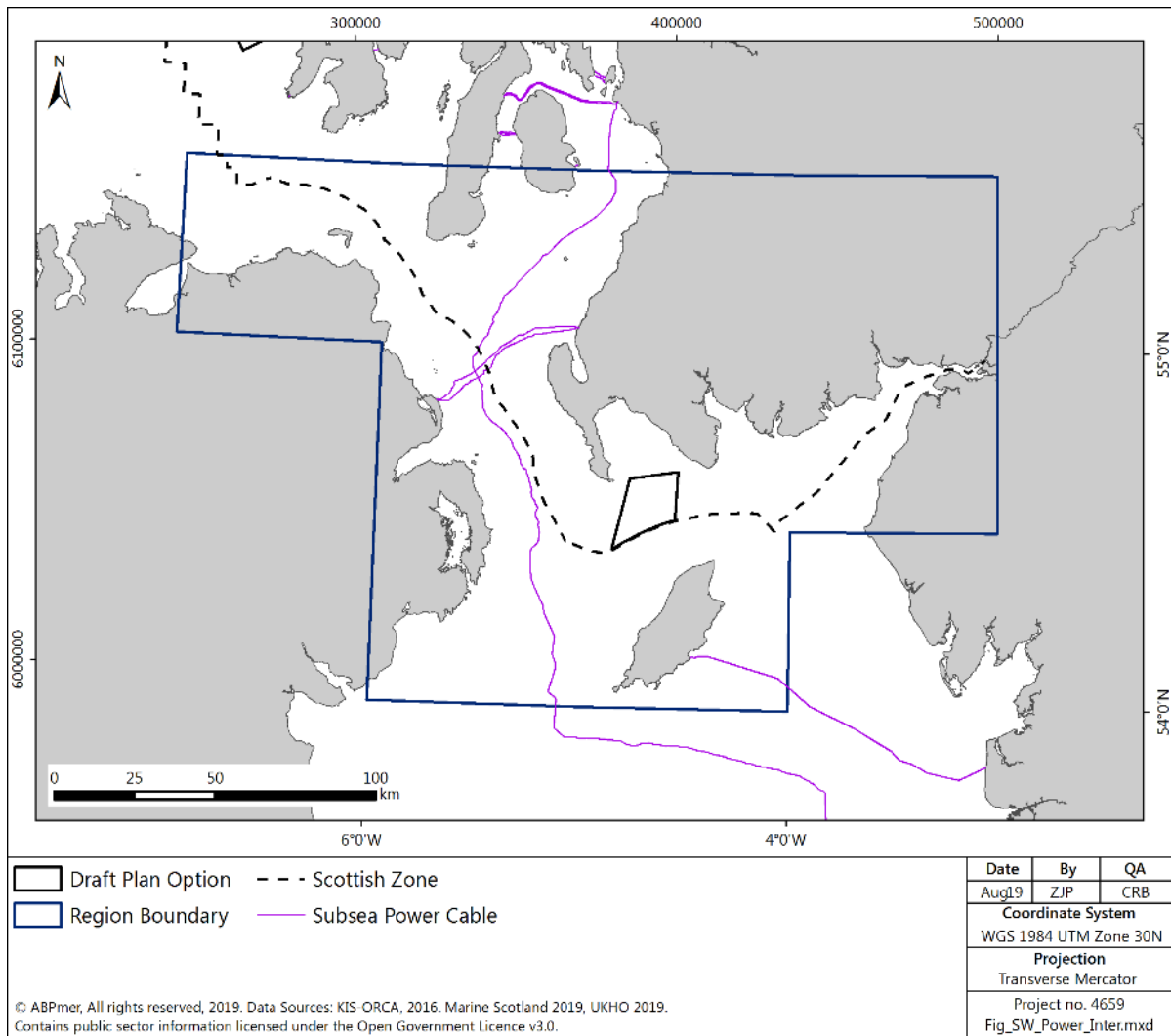


Figure 58 South-west region: power interconnectors

Telecom Cables

- 3.3.9 There are 341km of active telecom cables in Scottish waters in the South-west region, principally connecting mainland UK to Northern Ireland (Figure 59). The majority of these cables originate from the Firth of Clyde, with some additional cables running through the North Channel. There are no telecom cables within the Solway Firth. None of these telecom cables intersect or lie in the vicinity of SW1.

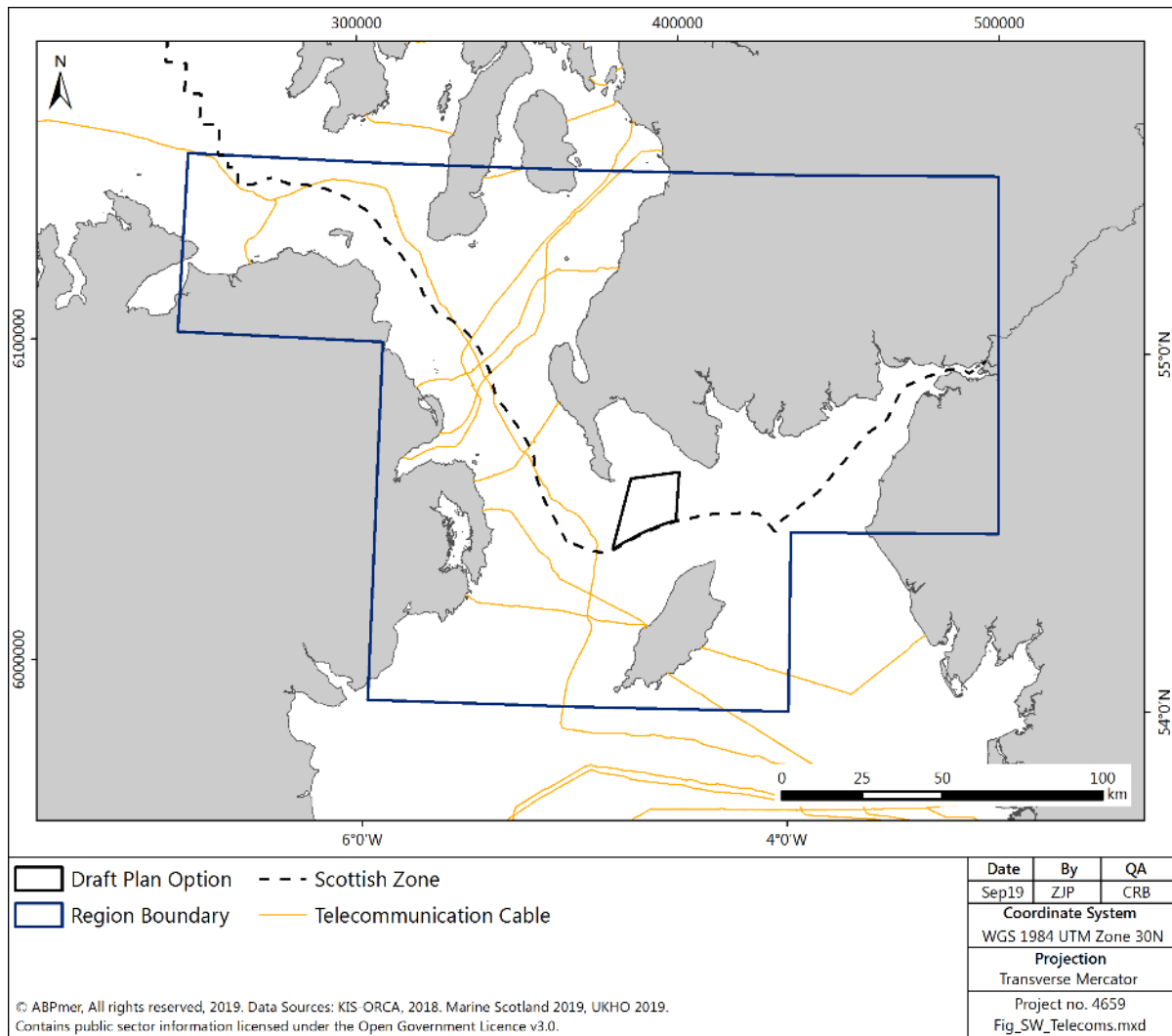


Figure 59 South-west region: active telecom cables

Carbon Capture and Storage

3.3.10 There are currently no identified potential CCS storage areas on the west coast of Scotland. All potential saline aquifers, and most of the oil and gas infrastructure, are off the East coast.

Oil and Gas

3.3.11 There are very few oil and gas related activities currently taking place within this Region. There are three pipelines, connecting mainland Scotland to Northern Ireland and Ireland (Figure 60). The potential for future exploration and development in the South-west region is low. One of the pipelines lies close to the proposed SW1 site but does not intersect the DPO.

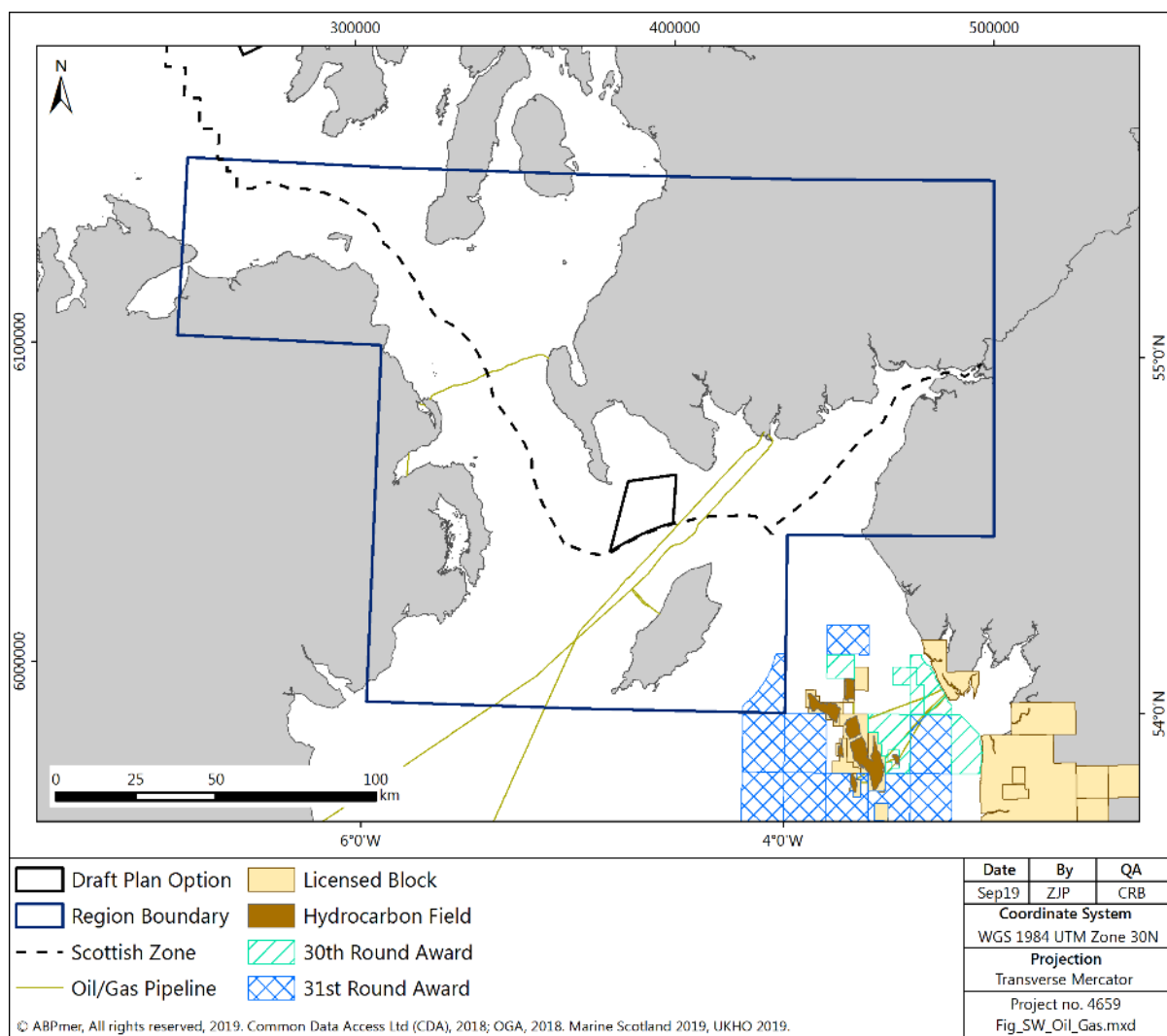


Figure 60 South-west region: oil and gas infrastructure

Aviation

3.3.12 There are no major airports, and one minor airport (Campbeltown) in the South-west region, with patchy radar coverage, limited to areas covering the Solway Firth (Figure 61). However, there is some overlap between primary surveillance radar coverage and SW1.

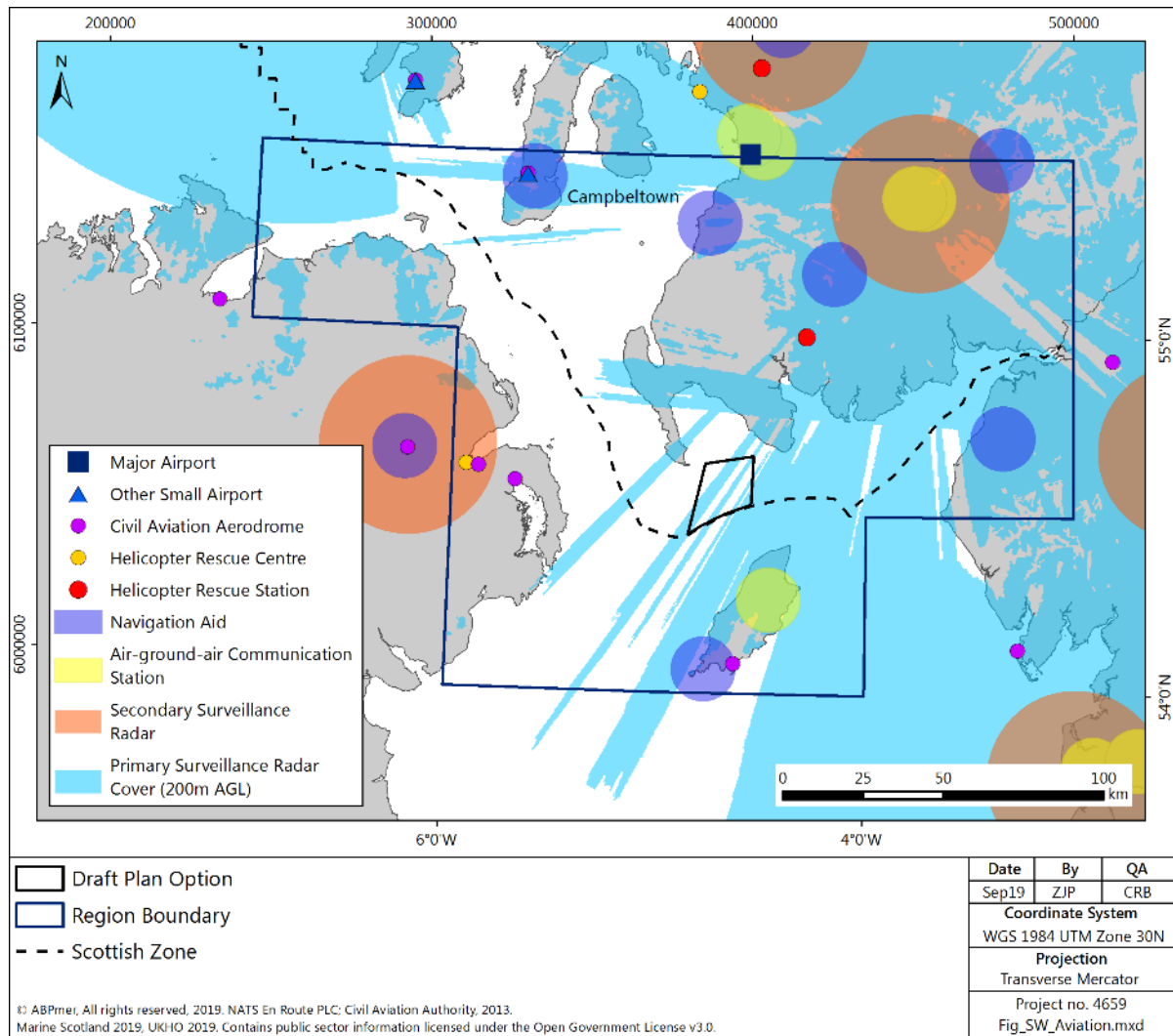


Figure 61 South-west region: aviation infrastructure and radar coverage

Defence

- 3.3.13 There are several defence sites within the South-west region. The largest establishment is MOD West Freugh, used as a firing range for testing and evaluation and training. The range includes air, sea and land danger areas. The sea danger area is approximately 380km² (Figure 62). The facility supports direct employment of 30 staff¹⁵⁹, and is likely to support additional indirect employment in the region.
- 3.3.14 There is a significant historic munitions disposal site in the South-west region, centred on Beaufort's Dyke (Figure 62). Beaufort's Dyke is an area of deep water, just off the coast of the Rhins of Galloway, used by the MOD and its predecessor organisation, the War Office, to dispose of conventional, incendiary and chemical weapons. Up to a million tonnes of munitions were disposed of, the majority of which are within the Dyke itself, however there are known to be munitions on the seabed surrounding the dyke, outside of the official boundaries of the dump site¹⁶⁰. In 1995 a significant number of munitions were discovered on beaches in the area, coinciding and potentially linked to the laying of a submarine gas pipeline linking Scotland and Northern Ireland¹⁶¹.
- 3.3.15 Of particular relevance to SW1 is the MOD West Freugh, which lies immediately to the north and the Naval exercise area which overlaps with the southwest corner of SW1. Additionally, whilst not adjoined, Beaufort's Dyke lies close to the west of SW1 (Figure 62).

¹⁵⁹ Parliamentary Questions, 2018. MOD West Freugh: Written question - 130817 Available at <https://www.parliament.uk/business/publications/written-questions-answers-statements/written-question/Commons/2018-03-05/130817/> accessed 16/11/2018.

¹⁶⁰ Fisheries Research Services, undated. Case Study: Munitions Dumping at Beaufort's Dyke.

¹⁶¹ *ibid*

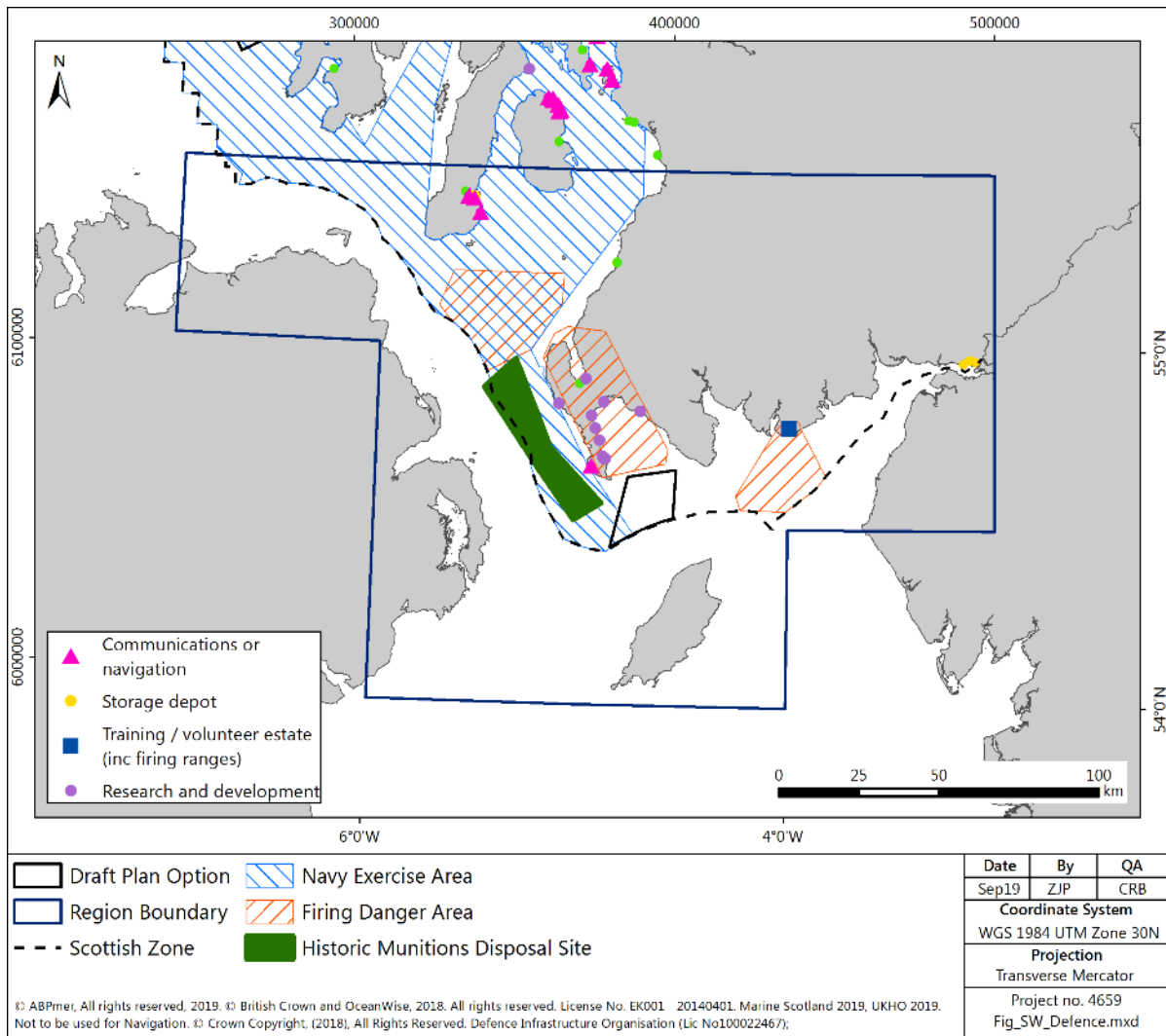


Figure 62 South-west region: defence infrastructure and exercise areas

Fishing

- 3.3.16 Landings from UK-registered vessels from ICES rectangles in the South-west region had an average annual value of £173 million and an average live weight of 19,272,898 tonnes for the five-year period 2013-2017.
- 3.3.17 The majority of landings were shellfish (92%) with the majority of landings by over 12 m vessels (74%).
- 3.3.18 Figure 63 shows over-15m *Nephrops* trawlers work in the Clyde, towards the north of the South-west region, and in Northern Irish waters to the south west of the region. Scallop dredgers work the Sound of Jura, Firth of Lorn and across to the Northern Ireland coast, as well as around the Rhins of Galloway. Demersal fish trawlers operate in the deep water of the North Channel off the Rhins of Galloway. Herring is fished in some areas, particularly to the south and north-west of the Rhins of Galloway (Figure 64). There is no mackerel fishing by over-15m vessels in the South-west region. Over-15m vessels using static gear to target *Nephrops* are focussed in the outer Firth of Clyde. Those targeting lobster are predominantly to the south of the Rhins of Galloway and in the outer Solway Firth. There is very little crab fishing in Scottish waters in the south-west region, with the majority in Northern Irish waters (Figure 65).
- 3.3.19 Areas important for under-15m vessels are predominantly inshore. *Nephrops* trawlers work mostly to the north of the South-west region in the Firth of Clyde. There is limited scallop dredging, with low numbers of vessels operating in the outer Firth of Clyde, Solway Firth and around the Rhins of Galloway (Figure 66). There are low levels of *Nephrops* and crab/lobster creelers throughout the inshore region, with crab/lobster creels focussed inshore around the Rhins of Galloway and outer Solway Firth (Figure 67).
- 3.3.20 There were 179 fishing vessels with their Home Port registered within the South-west region in 2016¹⁶². The majority (56%) of these were in the ten metres and under length category. The ports with the most registered vessels were Campbeltown (77), Ayr (62), Kirkcudbright (17), Annan (4) and Ballantrae (4). Home ports within the South-west region are shown in Figure 68.
- 3.3.21 Of particular relevance to the SW1 site, are the scallop fishing grounds (dredging), lobster (potting) and herring grounds (pelagic trawling).

¹⁶² MMO, 2016. UK Fishing Vessel Numbers by Home Port 2016. Available at: https://www.geostore.com/environment-agency/rest/catalogue/download/mmo_wms_united_kingdom_fishing_vessel_numbers_by_home_port_2016?format=ESRI_Shapefile. Accessed 25/10/2018.

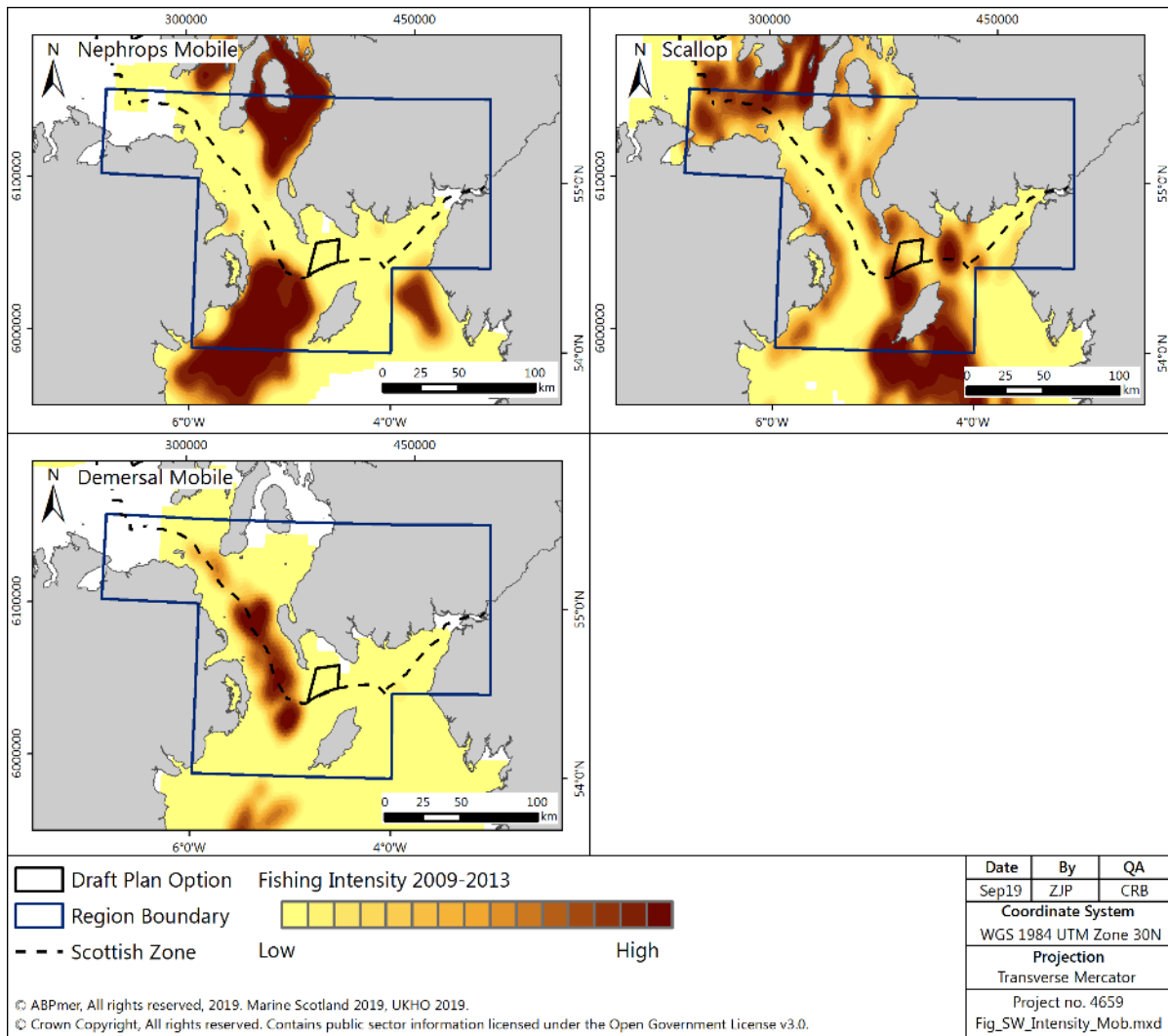


Figure 63 Fishing intensity for over-15m vessels in the South-west region using demersal mobile gear (2009-2013)

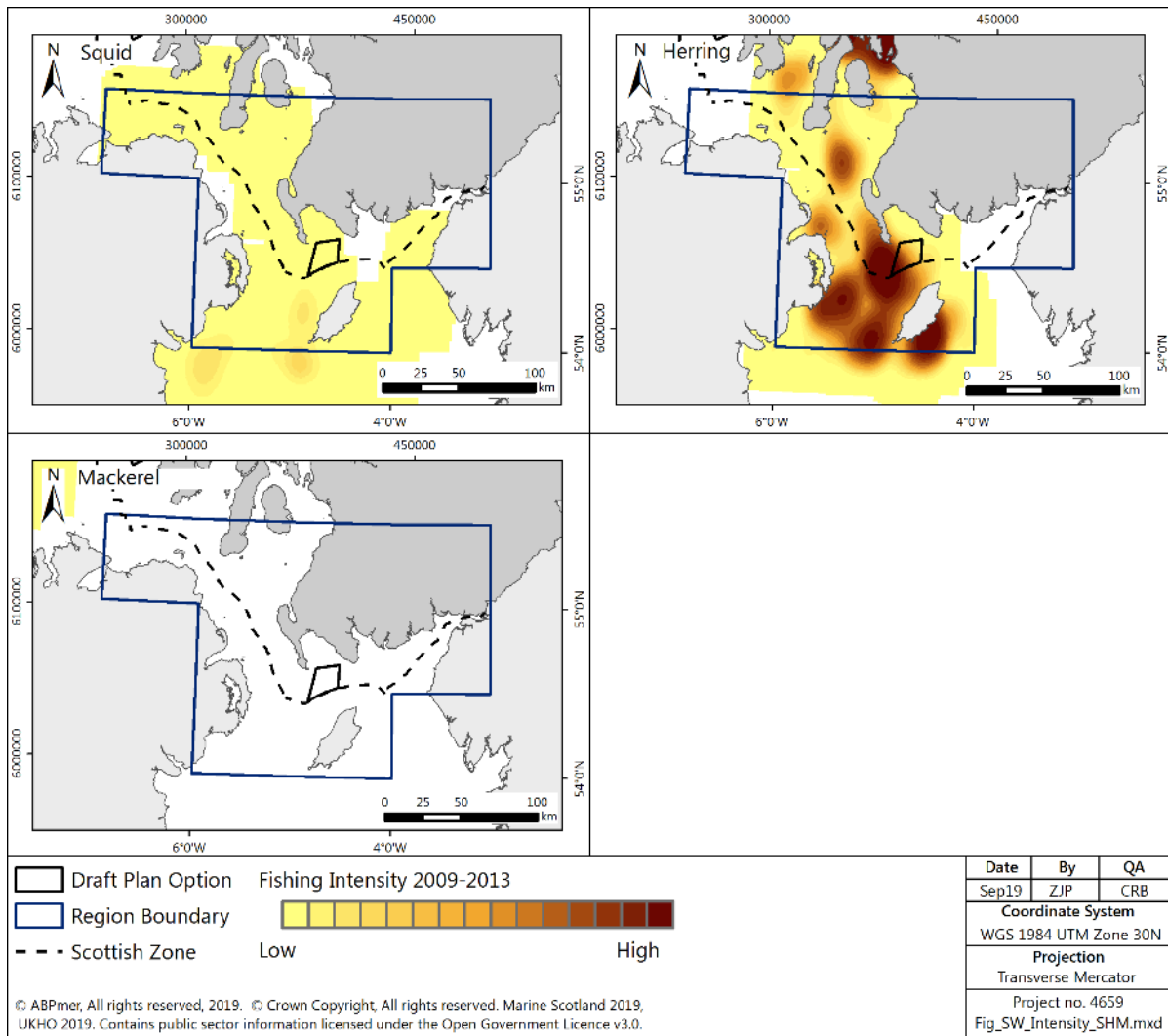


Figure 64 Fishing intensity for over-15m vessels in the South-west region targeting pelagic species (2009-2013)

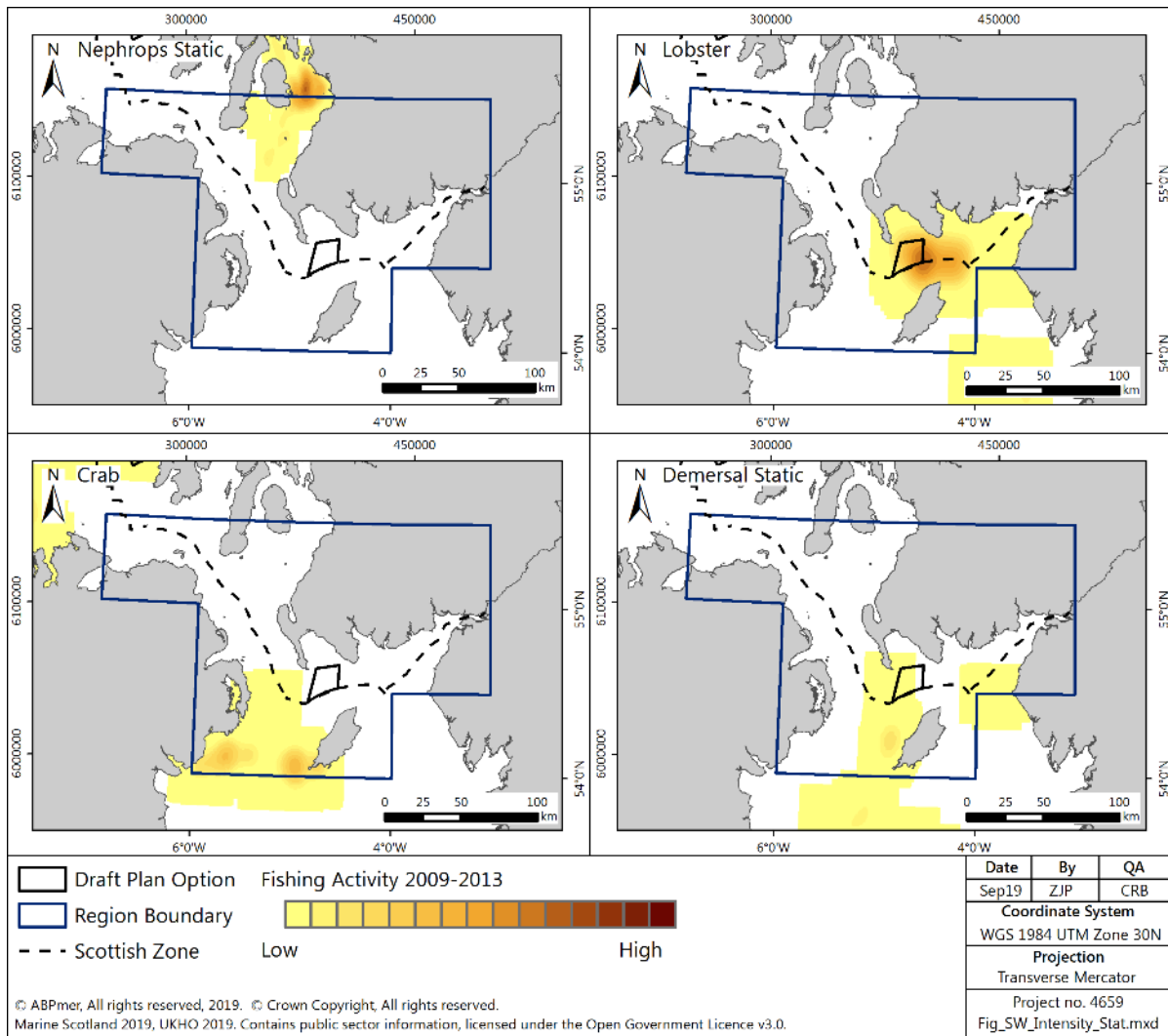


Figure 65 Fishing intensity for over-15m vessels in the South-west region using static gear (2009-2013)

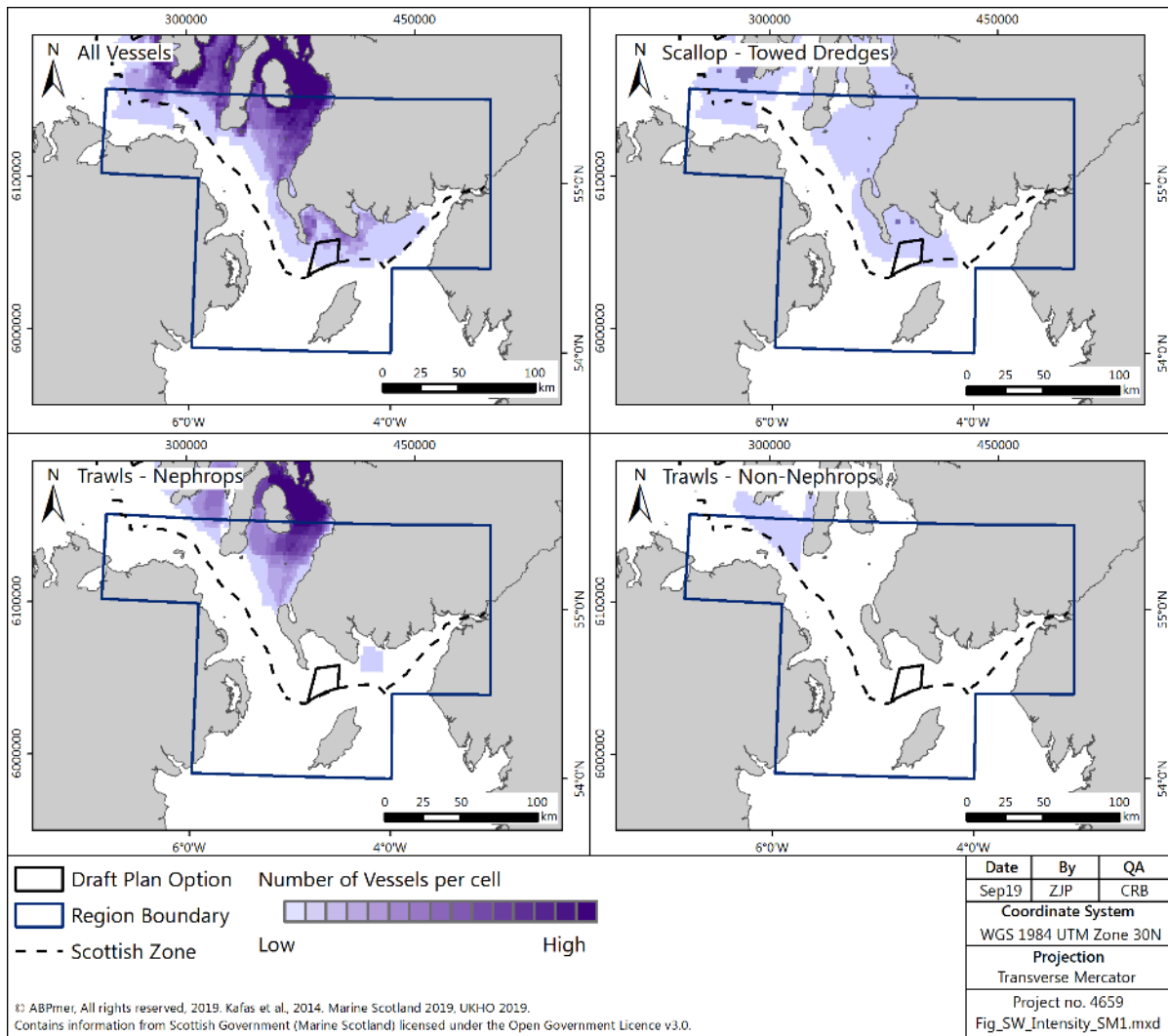


Figure 66 Number of vessels for under-15m vessels in the South-west region, all gears and mobile demersal gears, from ScotMap

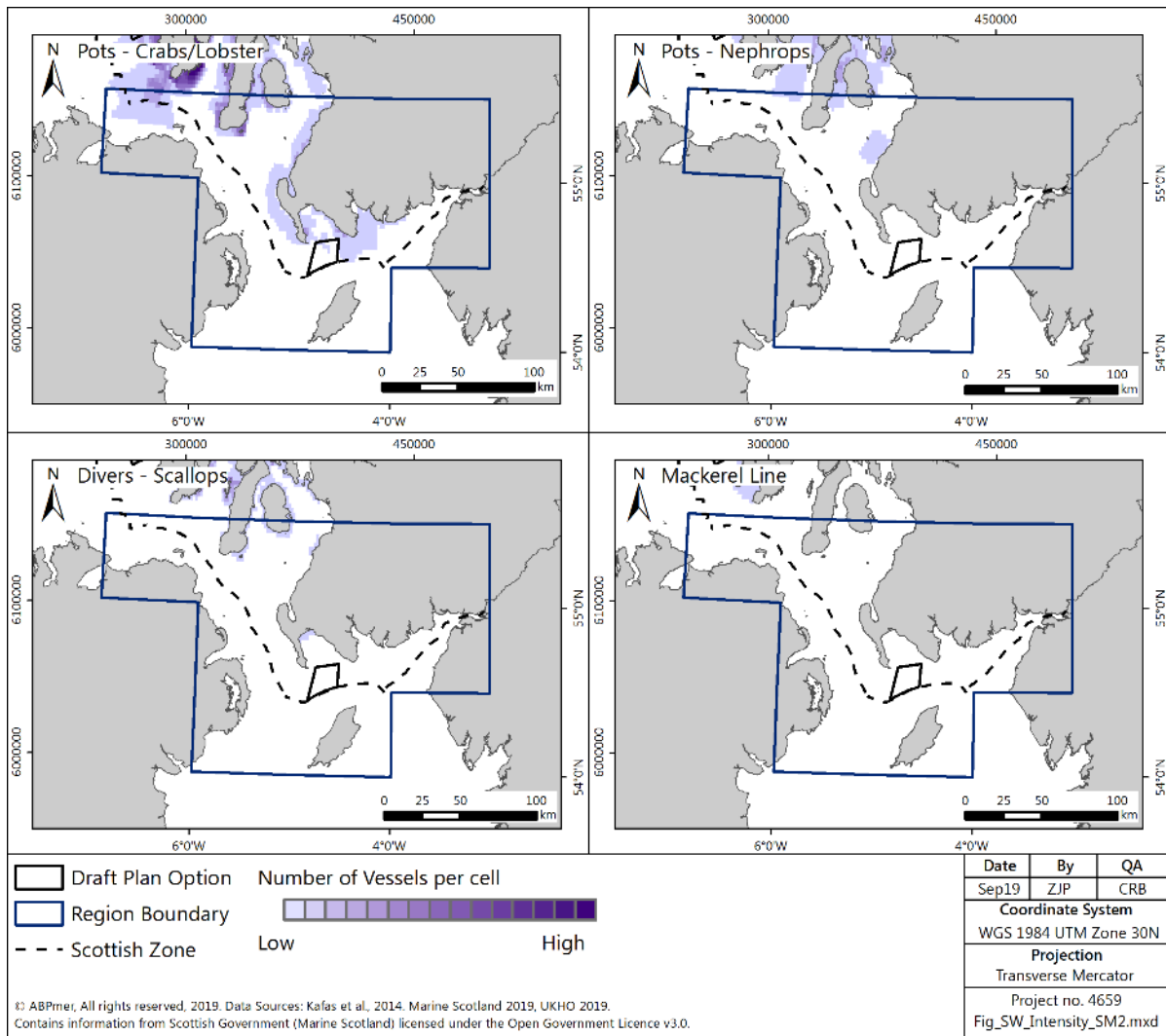


Figure 67 Number of vessels for under-15m vessels in the South-west region, pots, divers and mackerel lines, from ScotMap

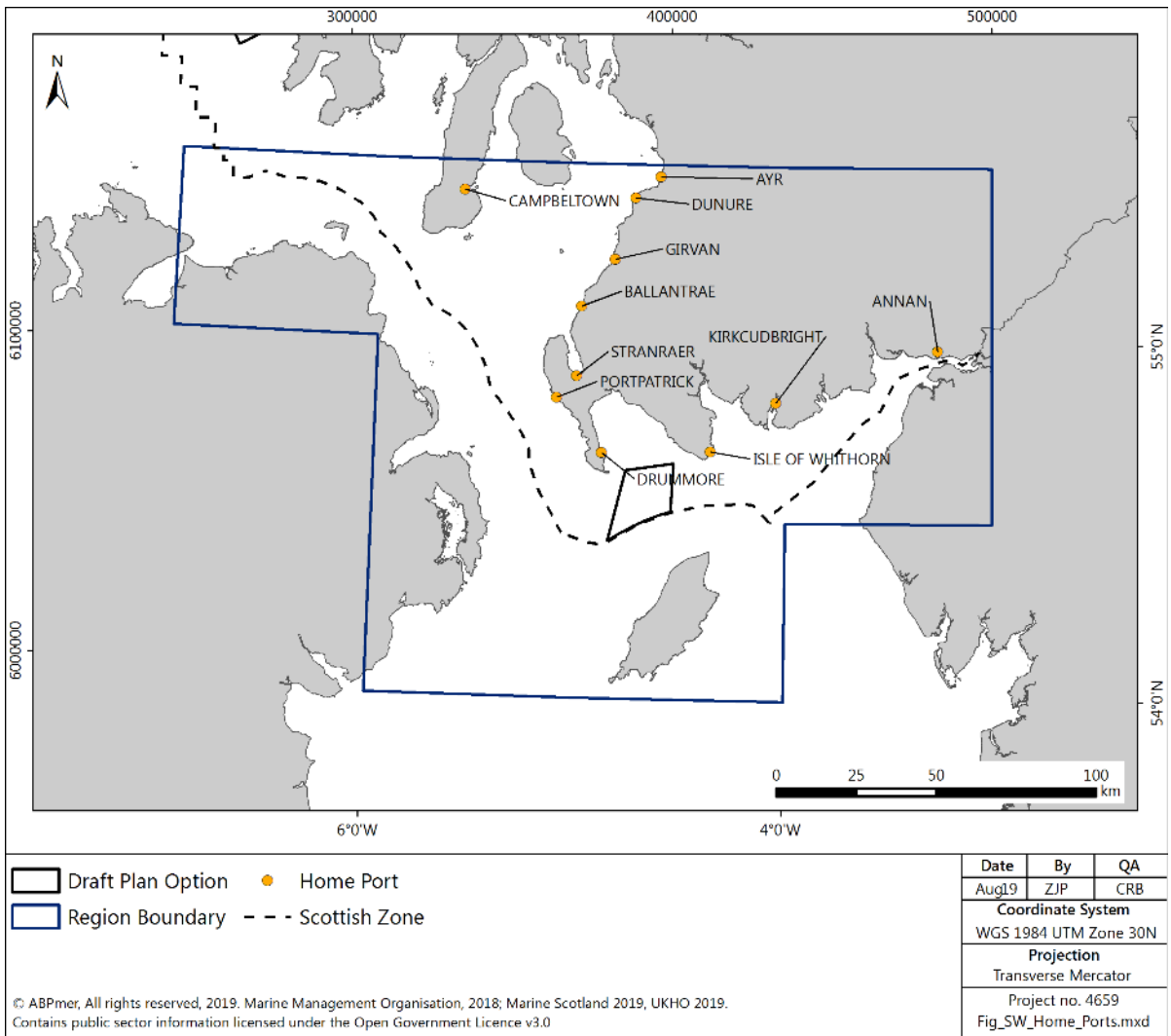


Figure 68 South-west region: distribution of home ports

- 3.3.22 The main landing ports (in terms of value of landings in 2016) in the South-west region were Kirkcudbright (£4.8 million), Campbeltown (£4.0 million) and Girvan (£1.0 million)¹⁶³.
- 3.3.23 In the period 2011-2016 there were 16 fixed engine netting sites in the South-west region for wild salmon and sea trout, and two net and coble sites (Figure 69).
- 3.3.24 The main rod and line fishing rivers in this region are the Border Esk, Annan, Nith, Urr, Cree and Bladnoch.¹⁶⁴

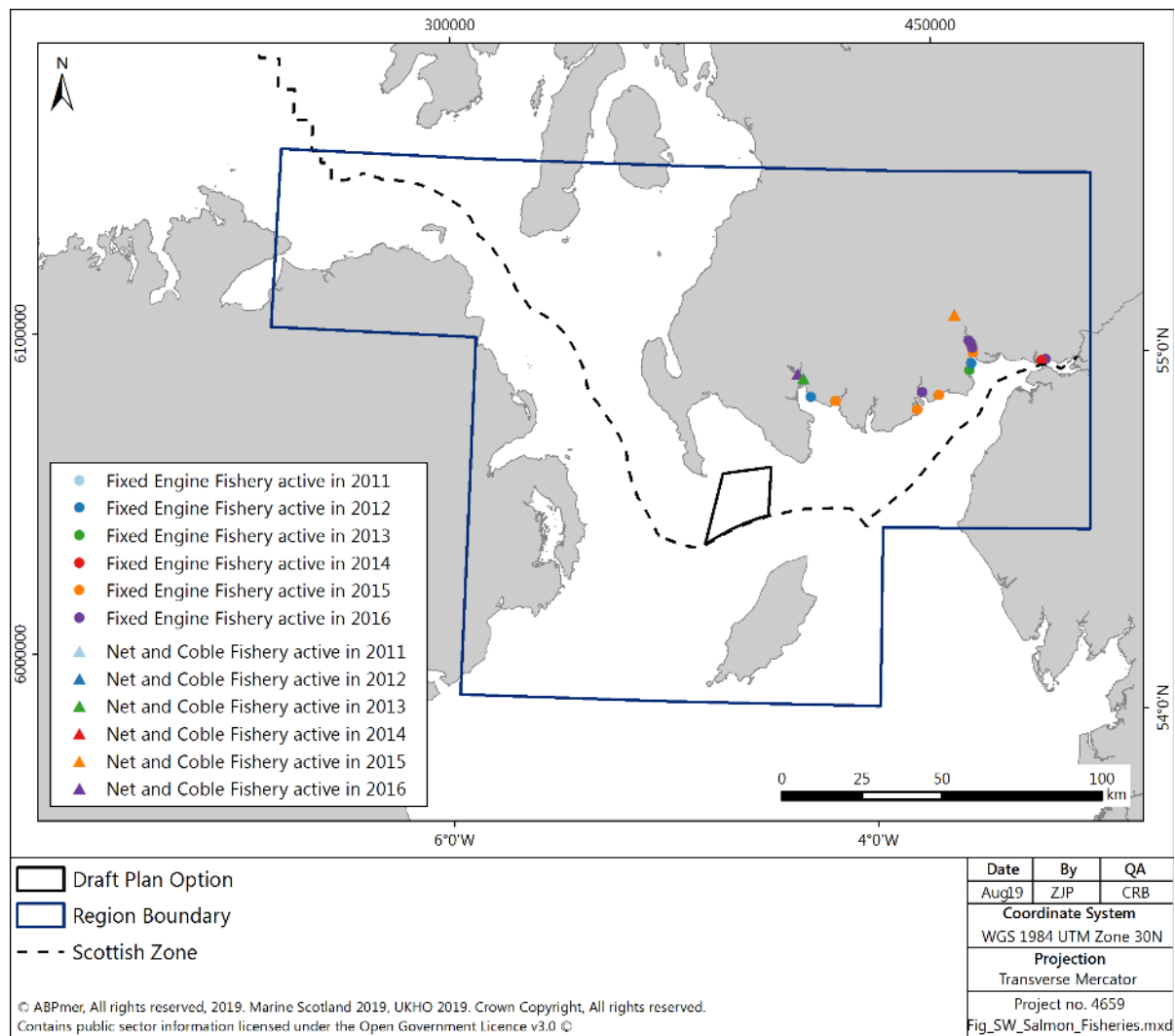


Figure 69 Salmon and sea trout net fisheries reporting catches in 2011–2016 in the South-west region

¹⁶³ MMO, 2016. Fish Landings to UK Ports. Available at: https://www.geostore.com/environment-agency/rest/catalogue/download/mmo_wms_fish_landings_to_united_kingdom_ports_2016?format=ESRI_Shapefile. Accessed 25/10/2018.

¹⁶⁴ Scottish Government. 2012. Offshore Wind Energy in Scottish Waters - Draft Regional Locational Guidance. doi: 10.7489/1686-1.

Aquaculture

- 3.3.25 Marine aquaculture sites within the South-west region are shown in Figure 70. There are two licensed shellfish sites and one licensed finfish site. One shellfish site and one finfish site are at the northern boundary of the South-west region, on the Mull of Kintyre, with a further shellfish site to the north of the Rhins of Galloway in Loch Ryan.
- 3.3.26 There is no available breakdown of production that can be used to establish production volumes, value or employment for the South-west region, however it is likely to be low when compared to other regions, particularly the West, North and Shetland regions where the number of sites is much greater.

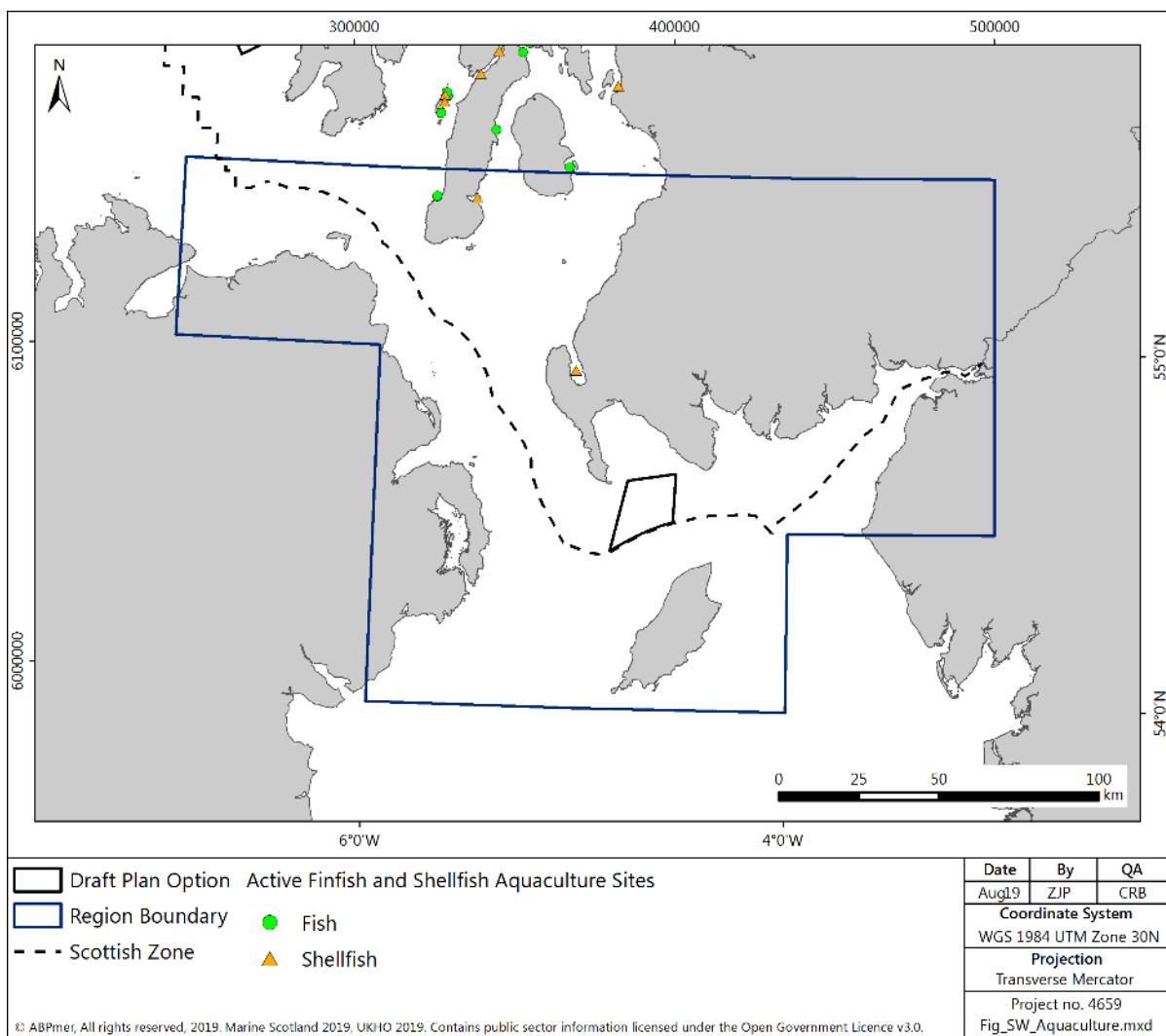


Figure 70 South-west region: marine aquaculture sites

Ports and Harbours

3.3.27 Figure 71 shows that there are 2 major ports, 4 minor ports and numerous smaller harbours and marinas supporting commercial and recreational fishing activities, yachting and recreation throughout the South-west region.

3.3.28 Cairnryan is principally used as the port of departure for ferry services to Larne in Northern Ireland. The route is the shortest and fastest commercial ferry crossing between Great Britain and Northern Ireland with up to 16 scheduled ferries daily¹⁶⁵. Stranraer was historically used as a ferry port, however with the transfer of services to Cairnryan it is used as a fishing harbour and for recreational purposes. However, these ports are not in the vicinity of SW1, rather, Port William and Drummore harbours are closer to the site, albeit attracting lower levels of vessel traffic.

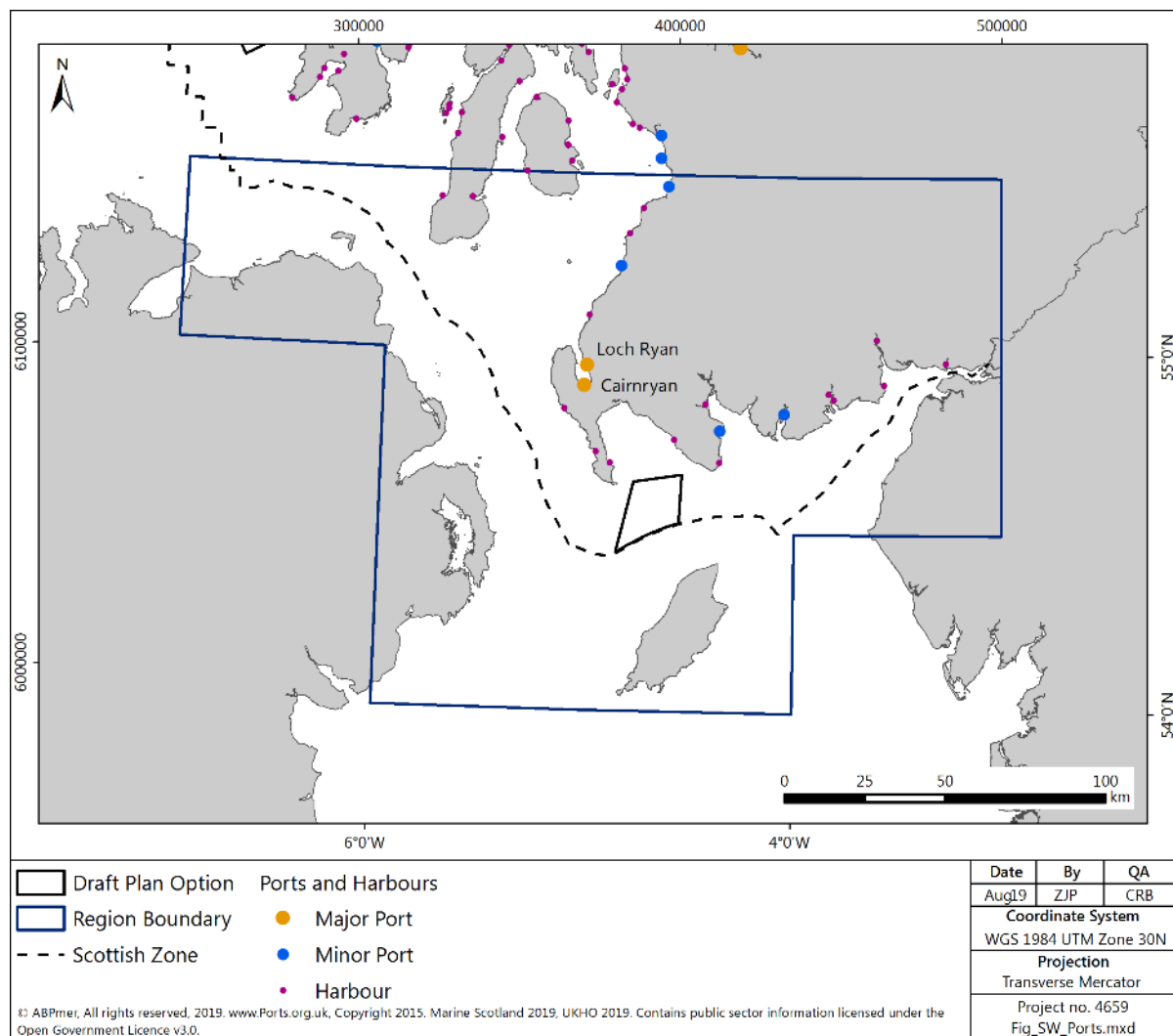


Figure 71 South-west region: ports and harbours

¹⁶⁵Port of Cairnryan. 2018. Port of Cairnryan. Available at: <http://www.portofcairnryan.co.uk/>. Accessed 12/10/2018.

Shipping

- 3.3.29 Areas of sea within the South-west region include key shipping routes with areas of very high density traffic (Figure 72). To the north of the region this includes routes transiting to the Firth of Clyde, whilst to the west the key routes with highest density are those through the North Channel, including the North Channel TSS.
- 3.3.30 There are a number of ferry routes which transit through the North Channel and link Scotland to Northern Ireland, particularly from Cairnryan (discussed above).
- 3.3.31 There is an overlap between SW1 and one of the main transit routes through the region. In addition, Figure 72 shows that port service craft and passenger vessels utilise the area overlapping the site SW1.

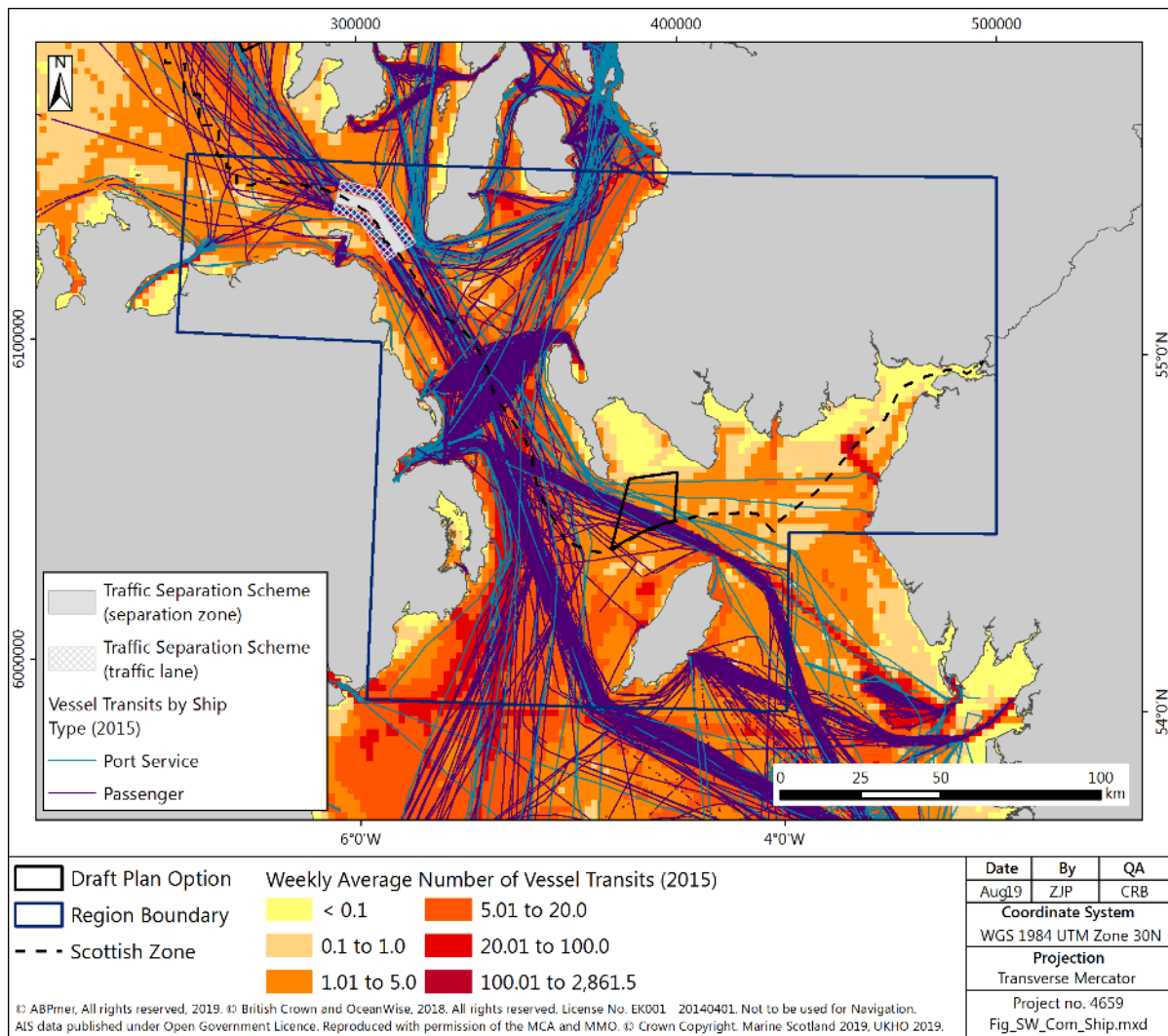


Figure 72 South-west region: shipping densities and key routes

Coastal and Flood Protection

3.3.32 There are relatively few coastal or flood protection shorelines in the region. However, there are areas of hard defences in Loch Ryan, and areas of hard defences associated with port and harbour facilities (Figure 73).

3.3.33 The coastline closest to the SW1 site (Mull of Galloway) is characterised by a mixture of coastline types, including rocks/ hard cliffs (low erosion), soft coastline (which are subject to erosion) and natural beaches). Those coastlines found in Luce Bay are characterised by soft coastline and natural beaches but are located >5km away from site SW1.

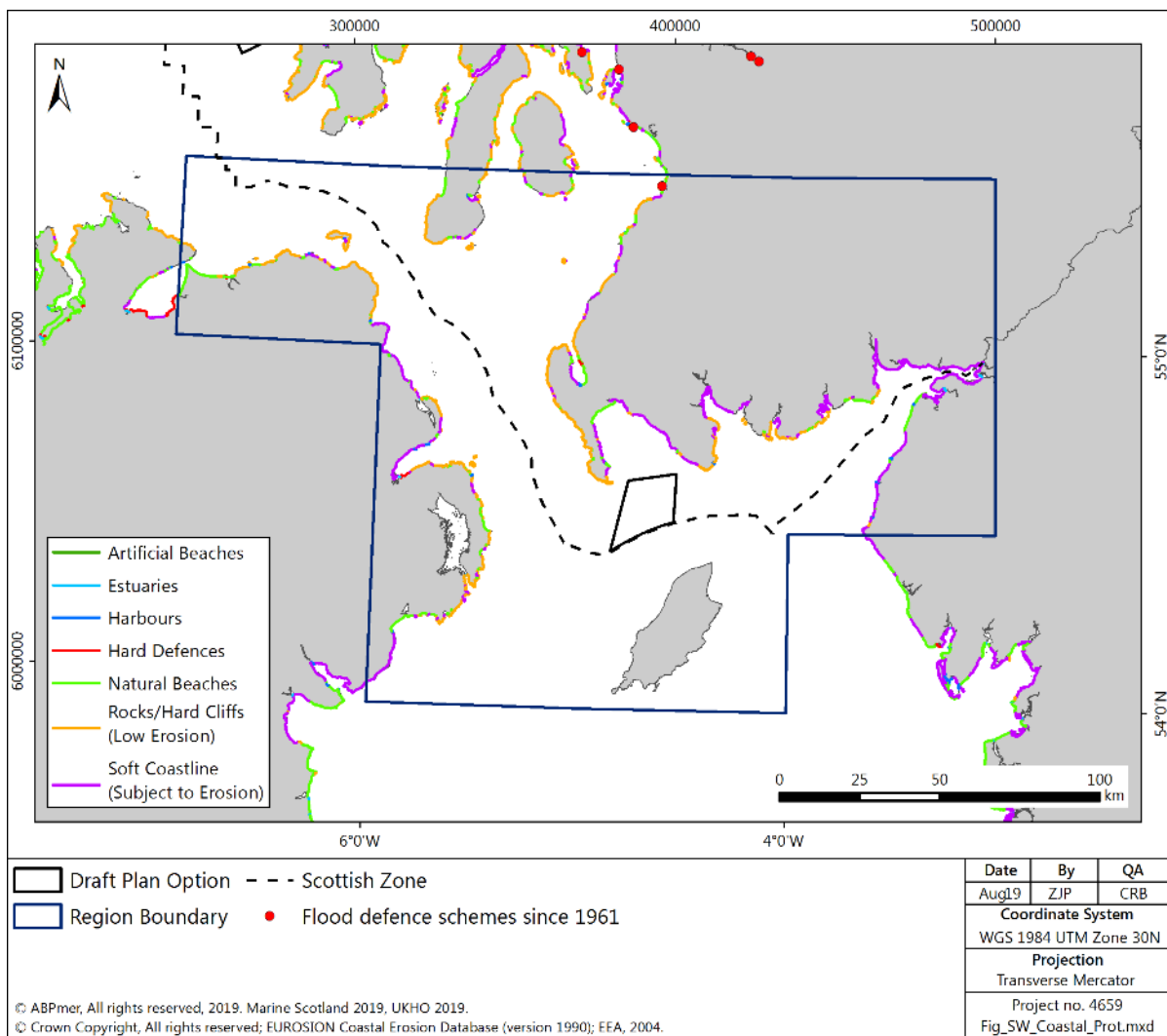


Figure 73 South-west region: coastal and flood protection schemes

Marine and Coastal Recreation

- 3.3.34 Overall recreational activity in the South-west region is shown in Figure 74. There is relatively low activity throughout the region, with the majority of activity either in close proximity to the coastline or towards the northern edge of the region, towards the entrance to the Firth of Clyde.
- 3.3.35 With the exception of recreational angling, discussed below, there is considered to be a low-level of recreational activities conducted in the area in or around SW1.

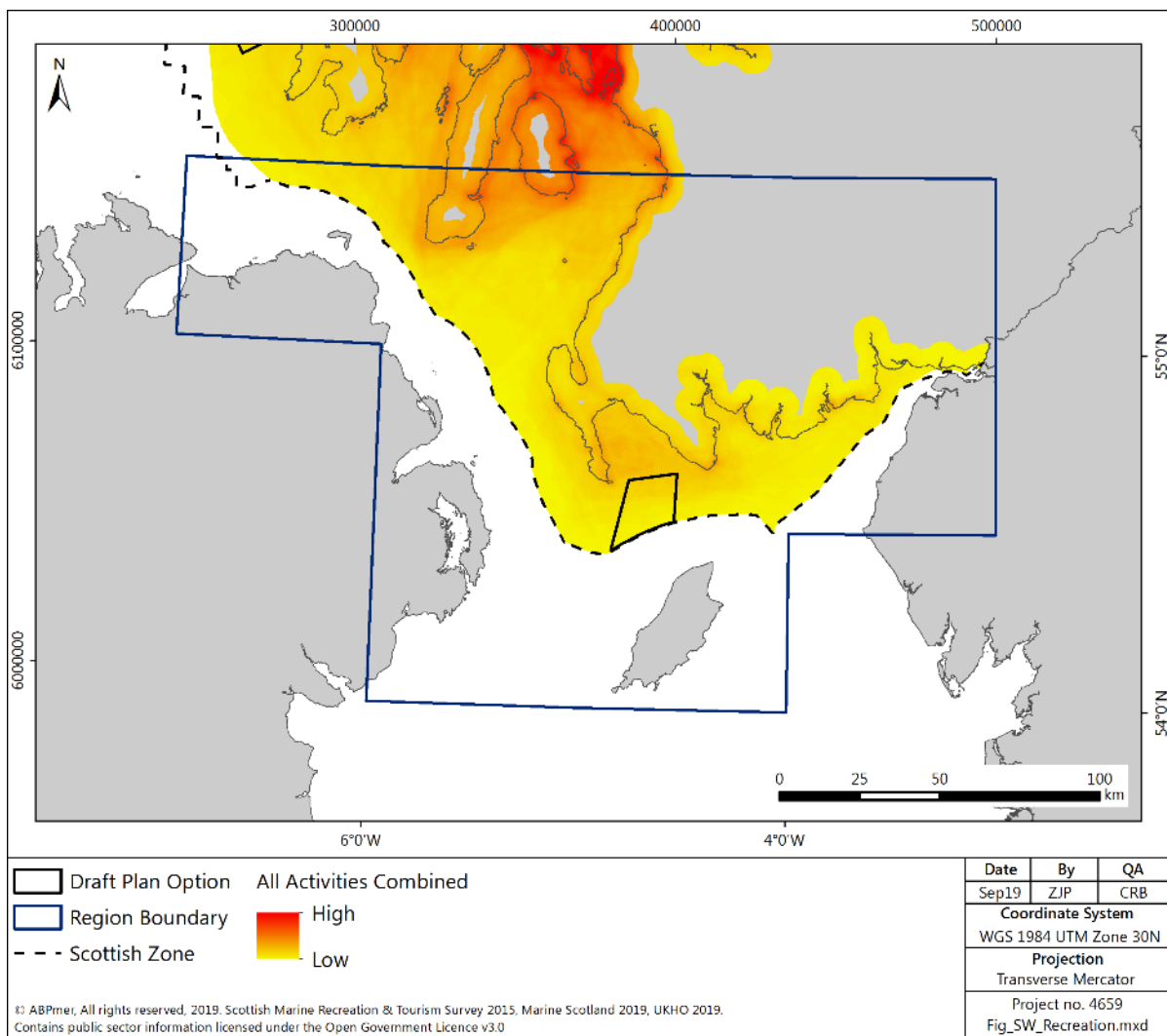


Figure 74 South-west region: density of recreational activities

Boating

- 3.3.36 The west coast of Scotland is well known for sailing, although the majority of the activity is concentrated in the West and North regions, with lower concentrations of activity in the Solway Firth (Figure 75).
- 3.3.37 There is some activity associated with routes from Belfast in Northern Ireland, including routes north through the North Channel and across the North Channel to the Rhins of Galloway. There are a small number of RYA facilities, including marinas, clubs and training centres in the South-west region, principally in the Solway Firth.
- 3.3.38 Figure 75 shows that there is a low – medium density of AIS transits occurring in the area overlapping SW1.

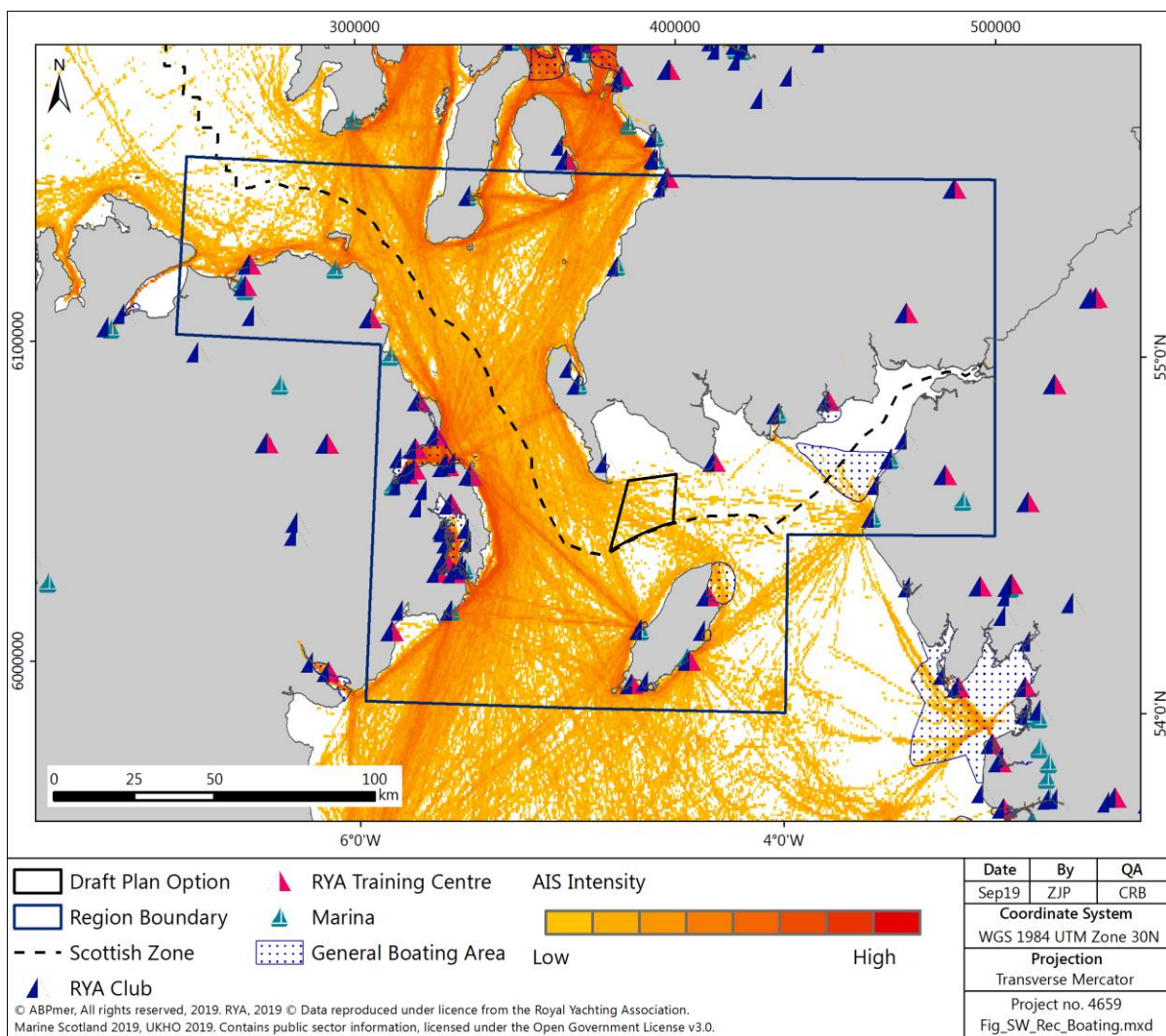


Figure 75 South-west region: recreational boating facilities and recreational boating density (from 2015 AIS data)

Angling

- 3.3.39 There is a high concentration of sea angling activity within the South-west region. This is concentrated in the outer Solway Firth and to the west of the Rhins of Galloway. There is further activity along the coastline in the north towards the Firth of Clyde (Figure 76).
- 3.3.40 There is a high-level of overlap between SW1 and angling activities shown in Figure 76. The main angling fisheries in the area target tope, mackerel, herring and thornback ray.

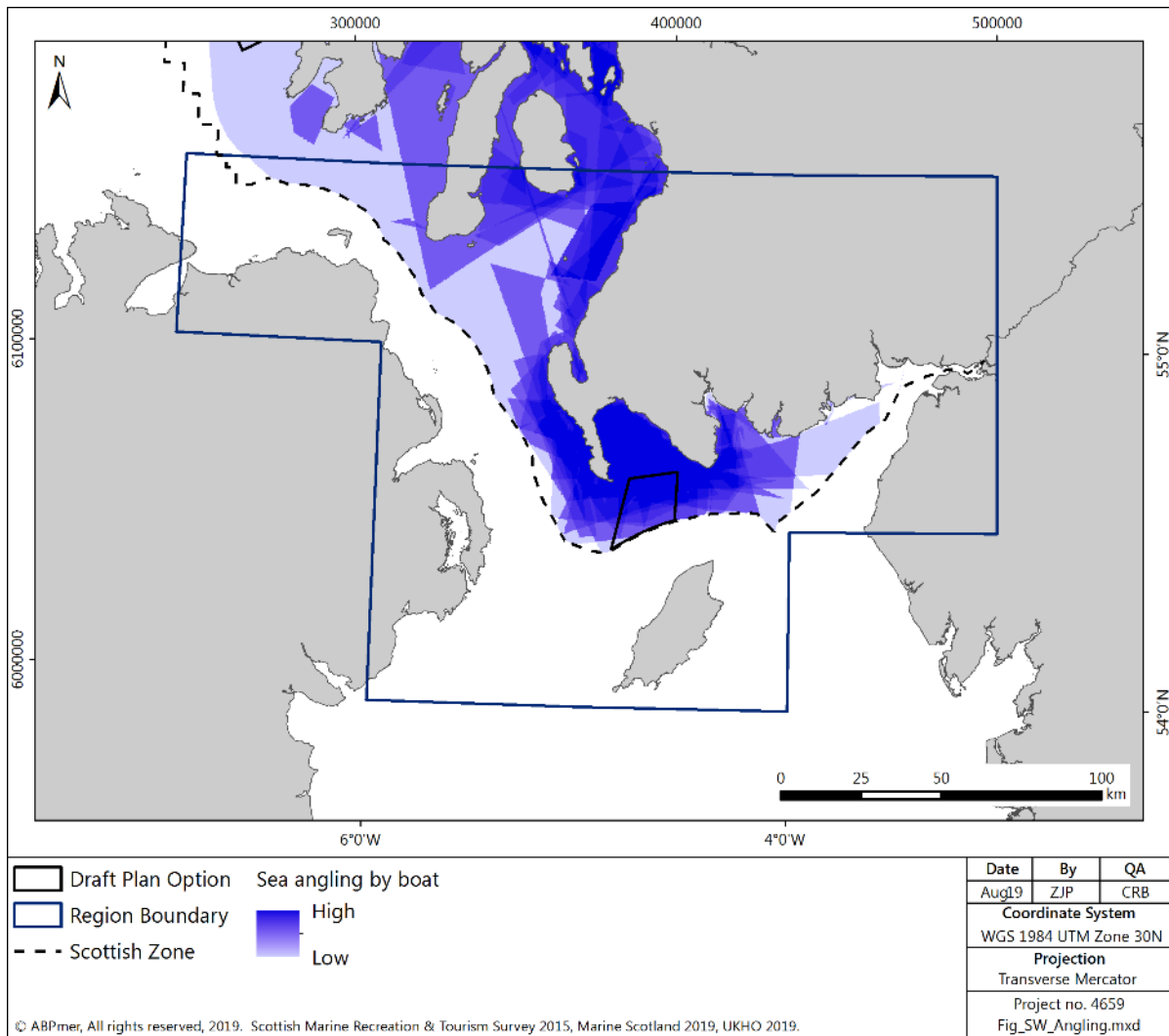


Figure 76 South-west region: sea angling (by boat) activity density

Scuba Diving

- 3.3.41 The South-west region is the least popular region for scuba diving. There is a high concentration of scuba activity that takes place on the south coast of the Isle of Arran in the Firth of Clyde and the Isle of Whithorn (approximately 5km to the north-east of SW1). There is a lower level of activity that takes place around Campbeltown and Southend, with most of the coastline having no significant scuba diving activity (Figure 77).
- 3.3.42 There is some overlap between scuba diving activity recorded at the northern boundary and SW1.

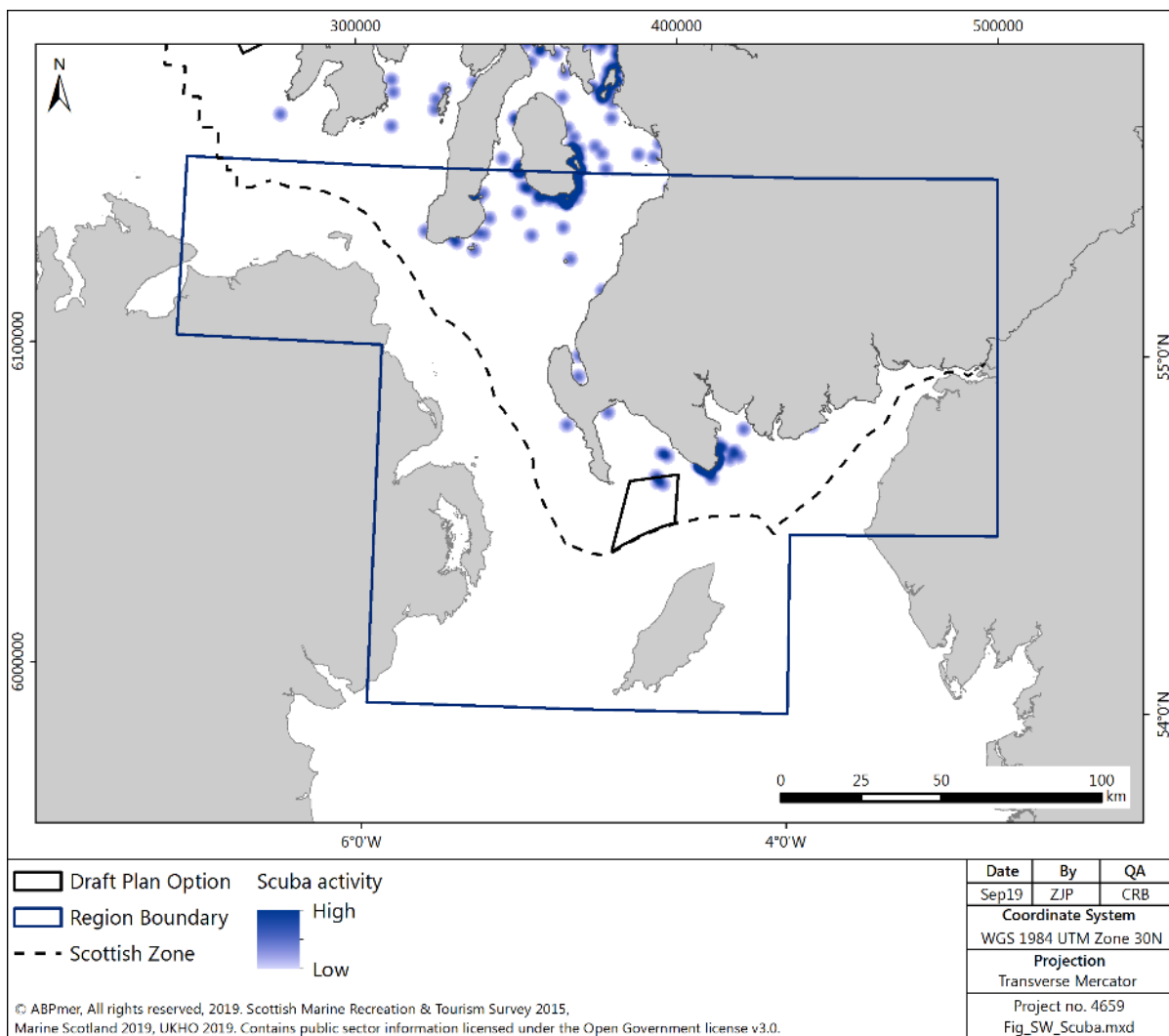


Figure 77 South-west region: scuba diving activity density

Kayaking and canoeing

3.3.43 Kayaking and canoeing takes place at most locations around the South-west coast where there are suitable launching spots such as beaches and slipways. The majority of trips are close inshore or short distances between headlands (Figure 78).

3.3.44 Kayaking and canoeing are conducted close to SW1 and around the coastline of Luce Bay, particularly around the Mull of Galloway.

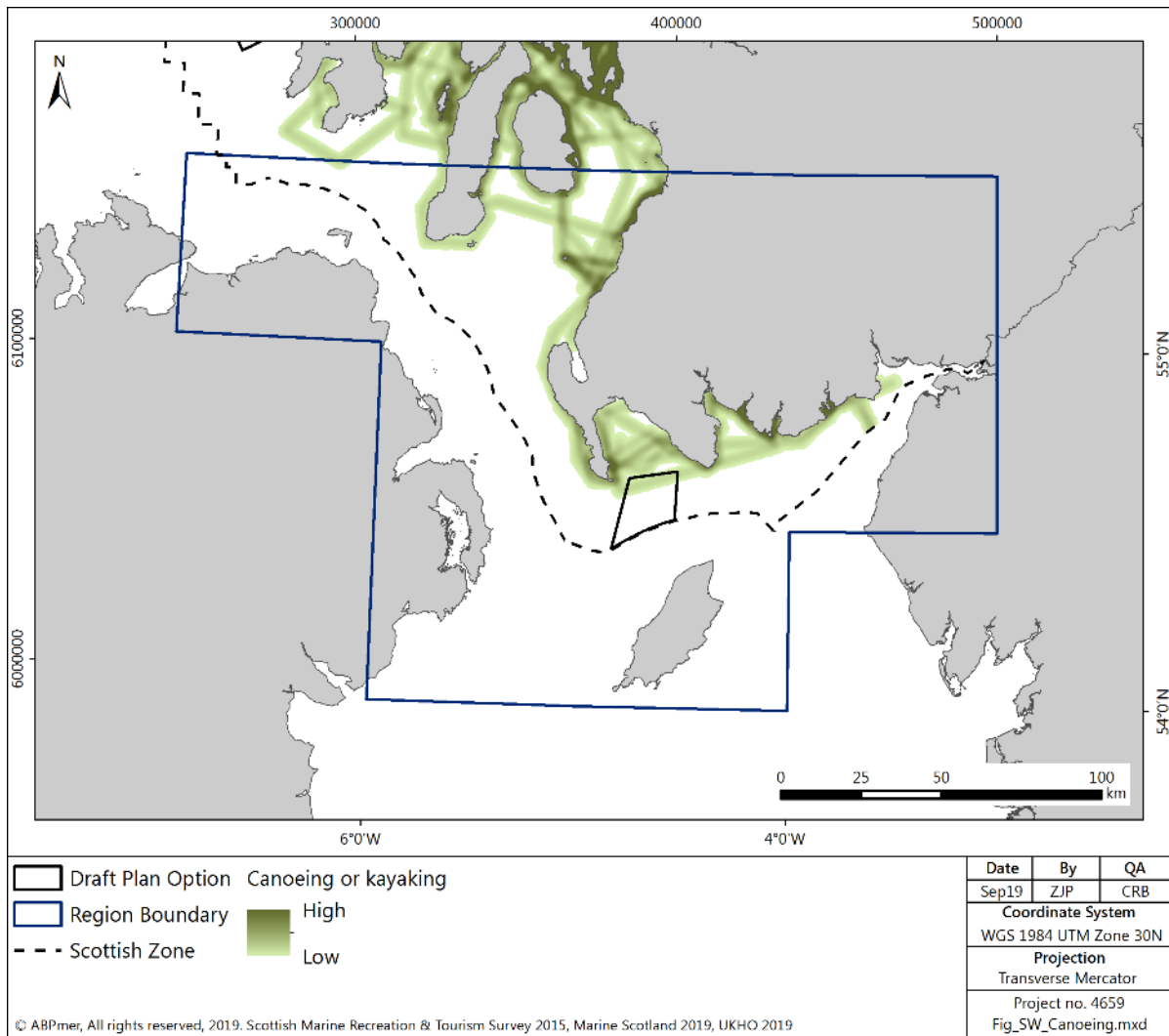


Figure 78 South-west region: canoeing or kayaking activity density

Surfing and Windsurfing

3.3.45 There is a very low level of surfing and windsurfing activity that takes place in the South-west region (Figure 79). Available data indicate that there is may be some overlap with these activities and SW1, albeit at low levels.

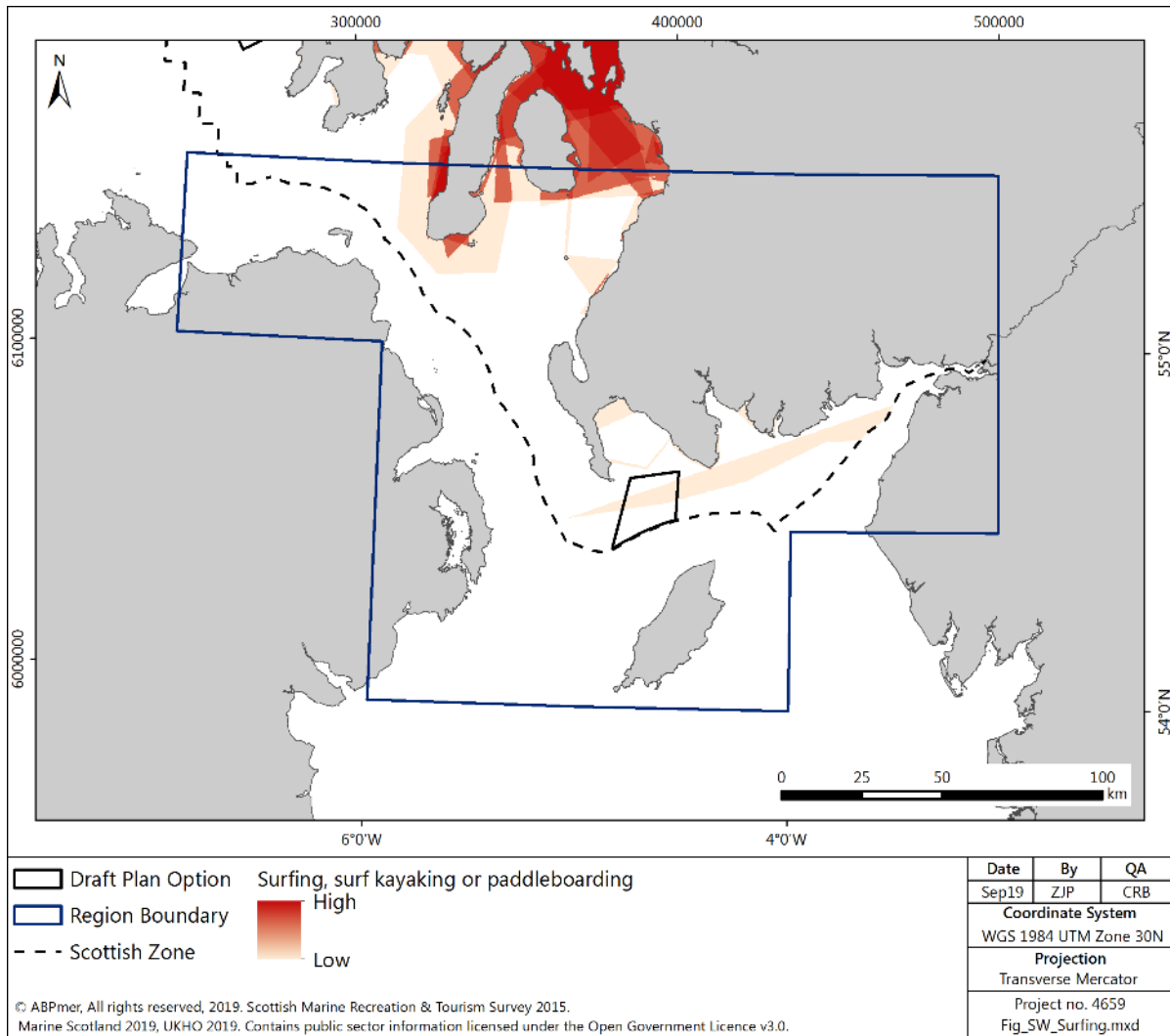


Figure 79 South-west region: surfing, surf kayaking and paddleboarding activity density

Tourism

- 3.3.46 The South-west region has a range of tourist destinations throughout the region. The highest levels of visitors are seen along the coast (Figure 80). In 2017, 56% of visitors came to the region on holiday.
- 3.3.47 The South-west region contains a wide range of different landscapes which are of substantial economic value to the region because they bring tourists to the area. The region also has the Nith Estuary, Fleet Valley and the East Stewarty Coast which are designated as National Scenic Areas. The top attractions in the region include; the Gretna Green Blacksmith shop, Galloway Forest Park, Mable Farm Park and Theave Garden¹⁶⁶. There is a moderate to high concentration of tourism activity on the Mull of Galloway, from which development in SW1 may be visible.

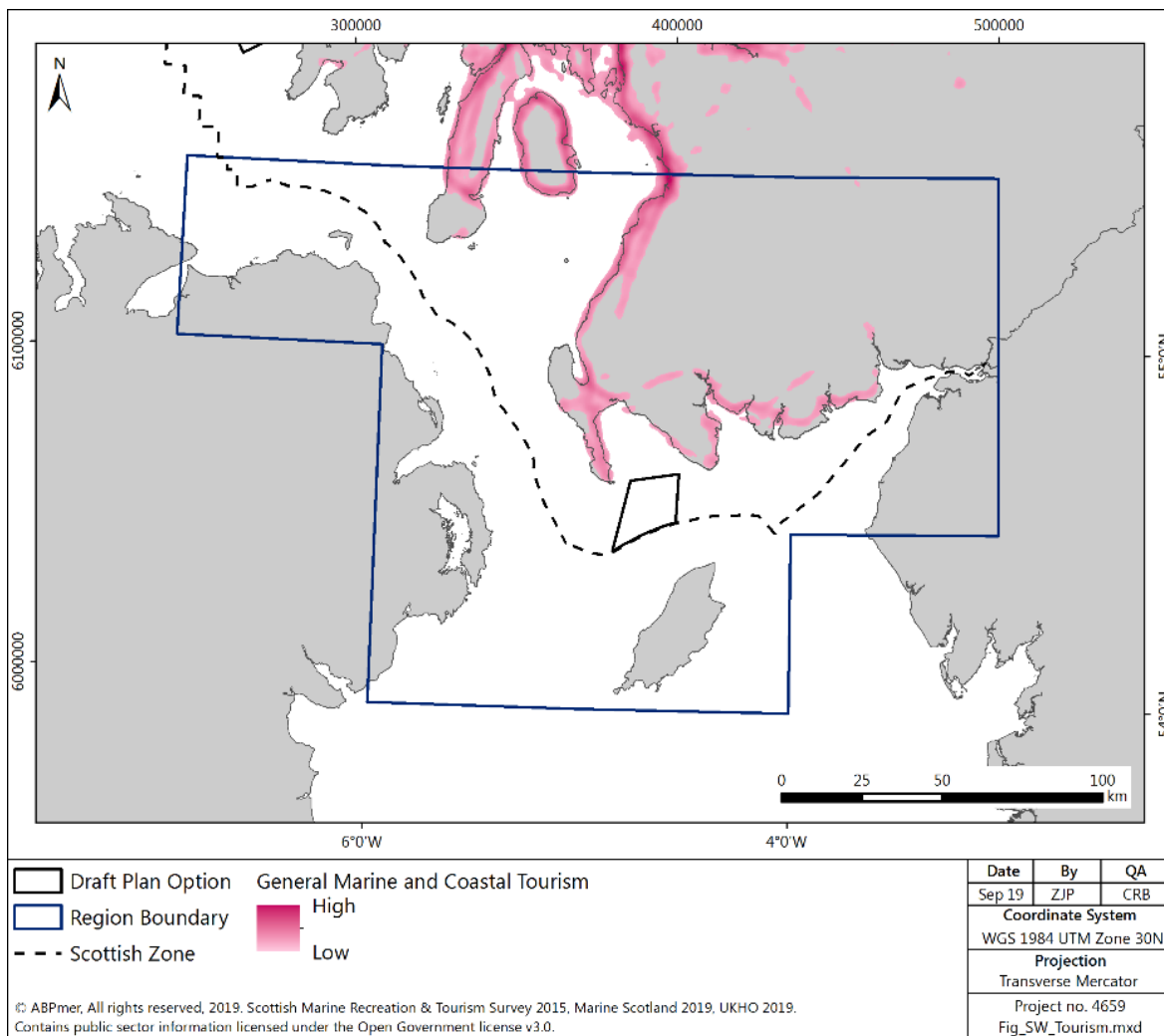


Figure 80 South-west region: tourism activity density

¹⁶⁶ Visit Scotland. 2018. Insight Department: Visitors to Dumfries and Galloway. Available at: <https://www.visitscotland.org/binaries/content/assets/dot-org/pdf/research-papers-2/regional-factsheets/dumfries-and-galloway-.pdf>. Accessed 21/11/18.

Social Considerations

- 3.3.48 The Dumfries and Galloway Council areas have been used to obtain approximate values for the South-west region. The total population of the South-west region is approximately 262,000. The average age in the region is 47.5, which is 6.5 years greater than the national average of 41 years old. Roughly 16% of the population is under 16 years old, 57% are of working age and 27% of pensionable age.
- 3.3.49 In 2017 the employment rate was 92.8%, down from the previous year at 94.5%. The greatest number of jobs in the South-west region are associated with public admin, education and health (31.6%). Other important industry sectors are distribution, hotels and restaurants (19.5%) and banking, finance and insurance (12.3%).

3.4 Environment

Designated Sites

- 3.4.1 Within the South-west region, there are several designated sites and sites proposed for designation in the future, including SPA, SAC, Ramsar, NCMPA, and SSSI. These sites are designated for a range of features considered important on an international or national level.
- 3.4.2 Sites within the region include 4 SPA (including 2 pSPA), 2 SAC, 2 NCMPA and 9 SSSI, shown in Figure 81, Figure 82, Figure 83 and Figure 84.
- 3.4.3 SW1 adjoins Luce Bay and Sands SAC but does not intersect any other designated site. The site is designated for features including reefs and whilst these have not been designated within the SW1 site, they have the potential to extend out to the DPO.

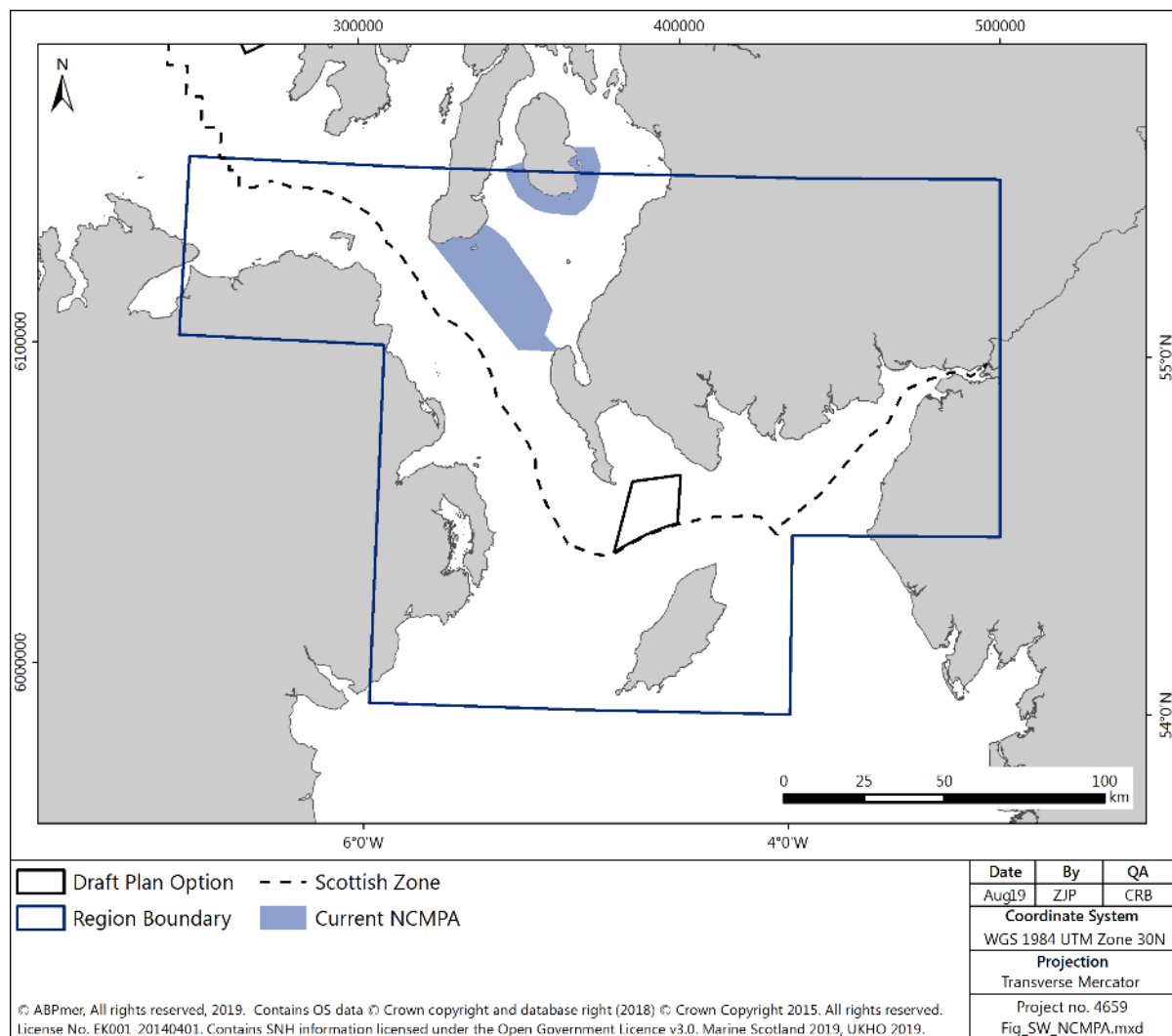


Figure 81 South-west region: NCMPA sites

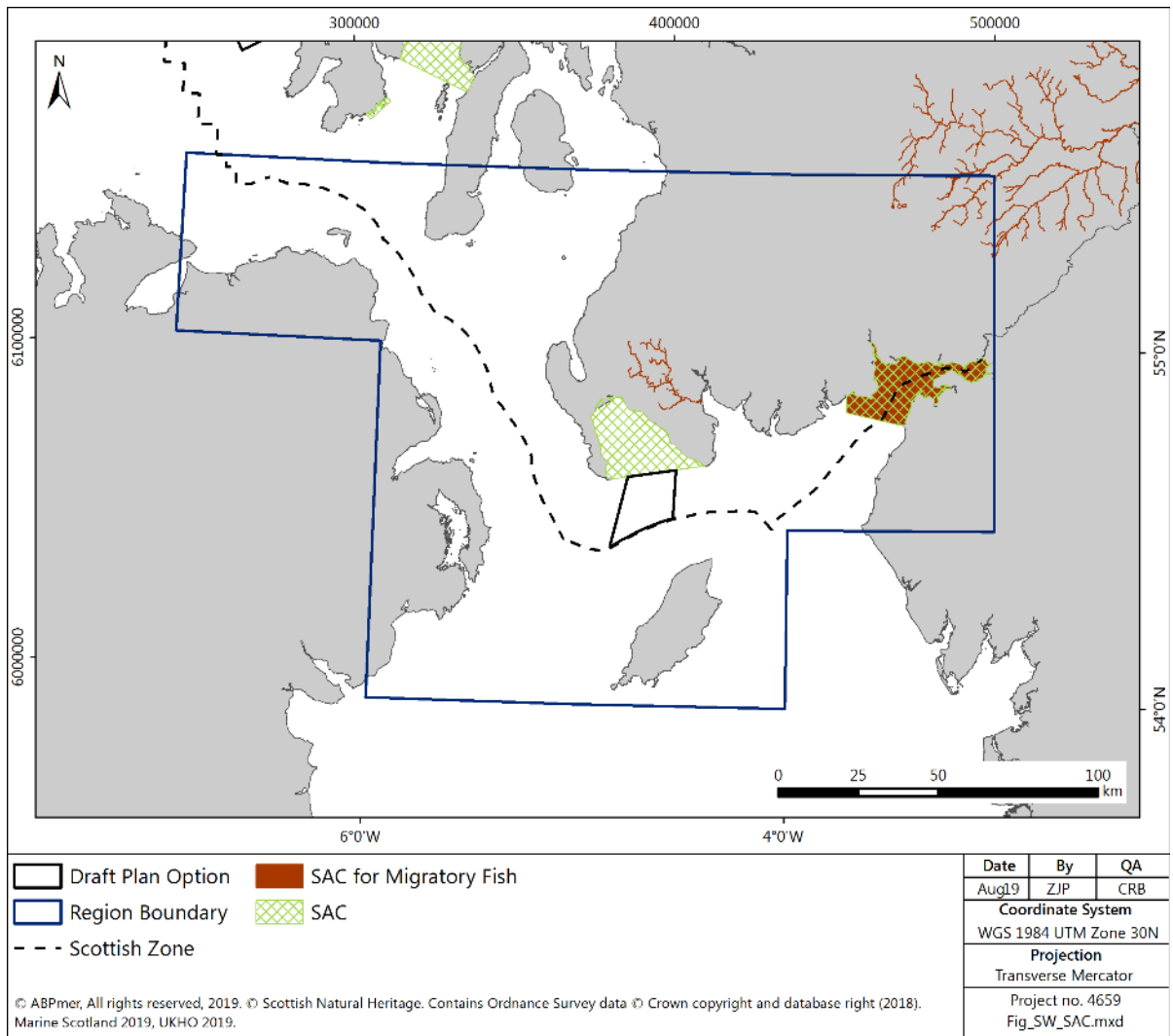


Figure 82 South-west region: marine and coastal SAC sites

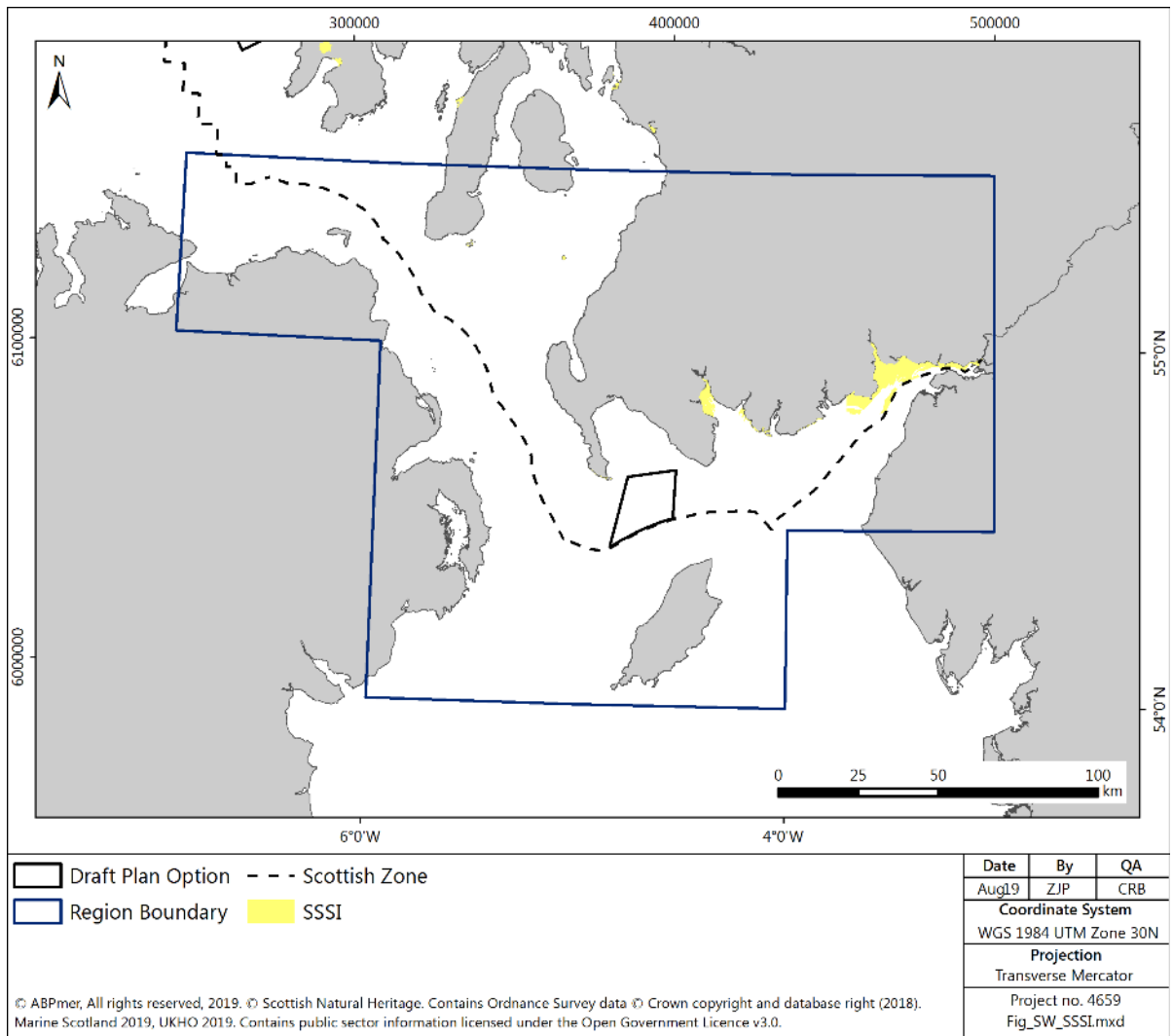


Figure 83 South-west region: marine and coastal SSSI sites

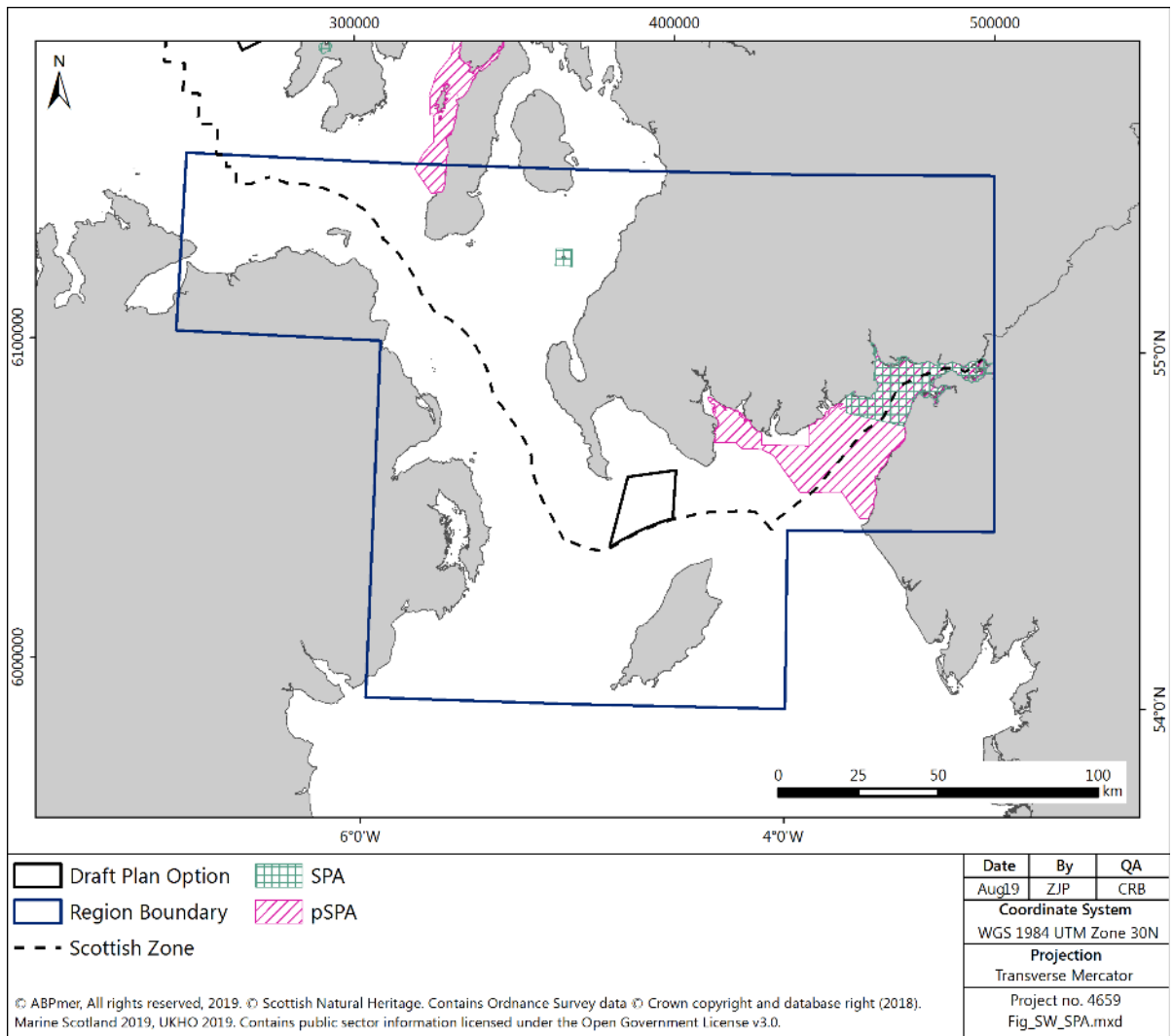


Figure 84 South-west region: marine and coastal SPA sites

Water Quality

- 3.4.4 WFD monitoring incorporates coastal and transitional waters in the marine environment. There are 27 water bodies within the South-west region, 33 of which are at High or Good status. There is one site at moderate status and three noted as having good ecological potential (Figure 85). SW1 overlaps with the Luce Bay water body, currently assessed as being at Good status.
- 3.4.5 There are no protected waters for shellfish production in the South-west region.
- 3.4.6 There are 14 classified bathing waters in the South-west region (Figure 86). Of these 6 are at poor status, with the remainder either meeting target objectives, or at good or excellent status.

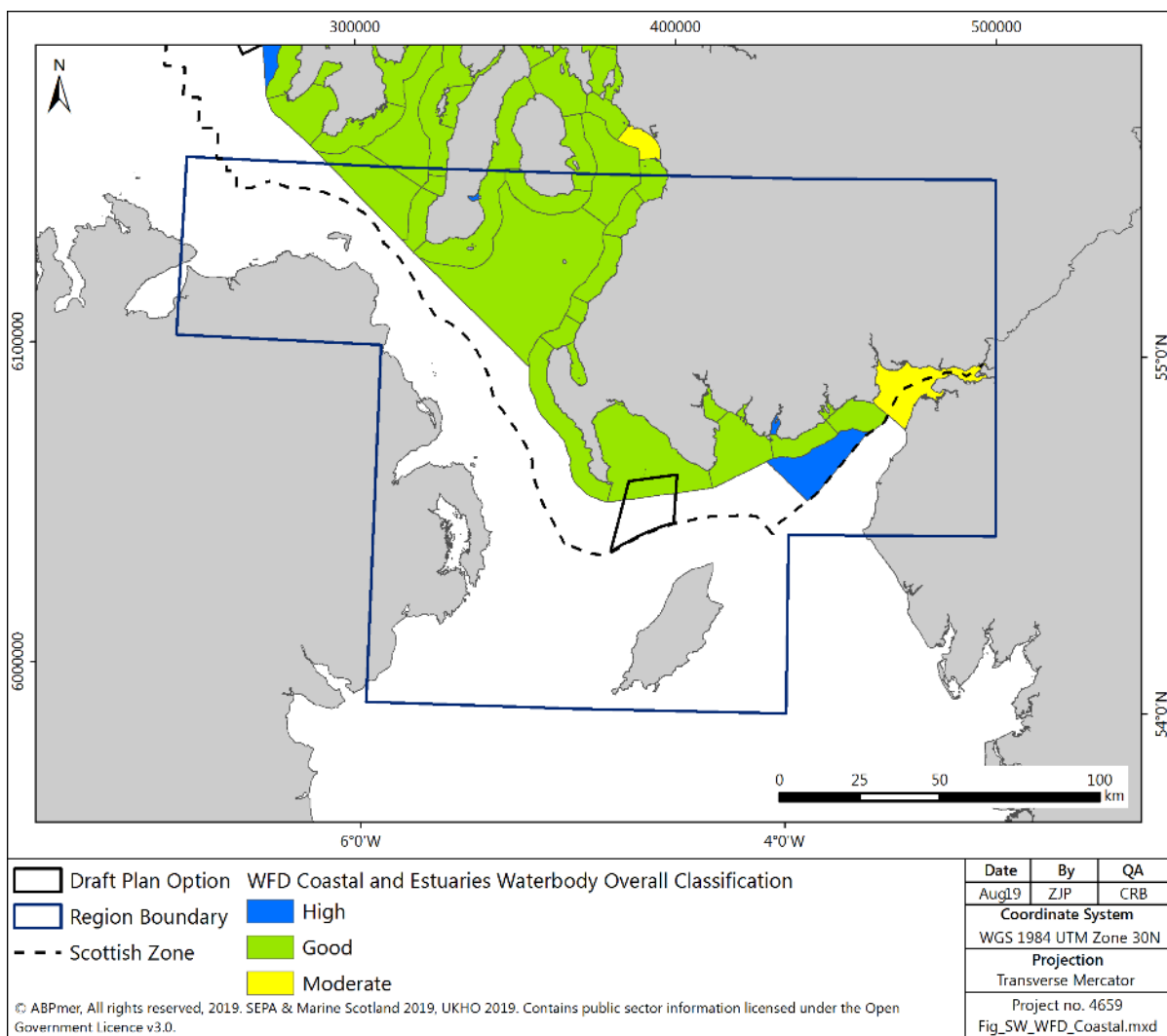


Figure 85 South-west region: WFD coastal and transitional waterbody classifications

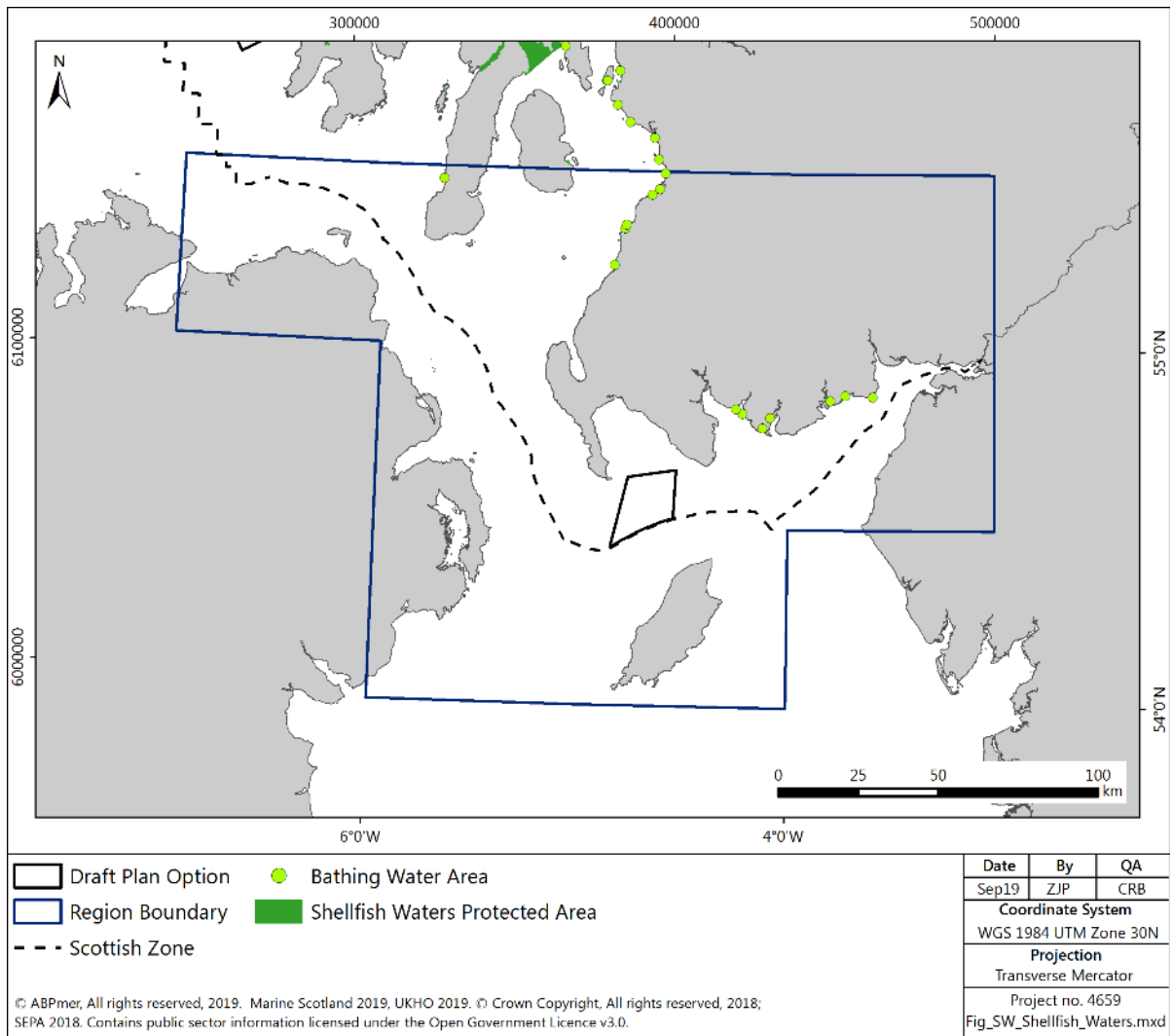


Figure 86 South-west region: shellfish and bathing water protected areas

Benthic Habitats and Species

- 3.4.7 As identified in Section 3.2 above, the majority of the benthic sediment is characterised by mud in the shallower regions, within the Firth of Clyde and the inner Solway Firth. As water depth increases this gradates to sand and gravel sediments (Figure 87). The substrate that overlaps the DPO is characterised by infralittoral mixed sediment and circalittoral mixed sediments.
- 3.4.8 There are a number of records of benthic PMFs throughout the South-west region, including kelp and seaweed species, fan mussel (*Atrina fragilis*), maerl (*Phymatolithon calcareum*), seagrass species, burrowed mud, tall sea pens (*Funiculina quadrangularis*), native oyster (*Ostrea edulis*) and blue mussel (*Mytilus edulis*).

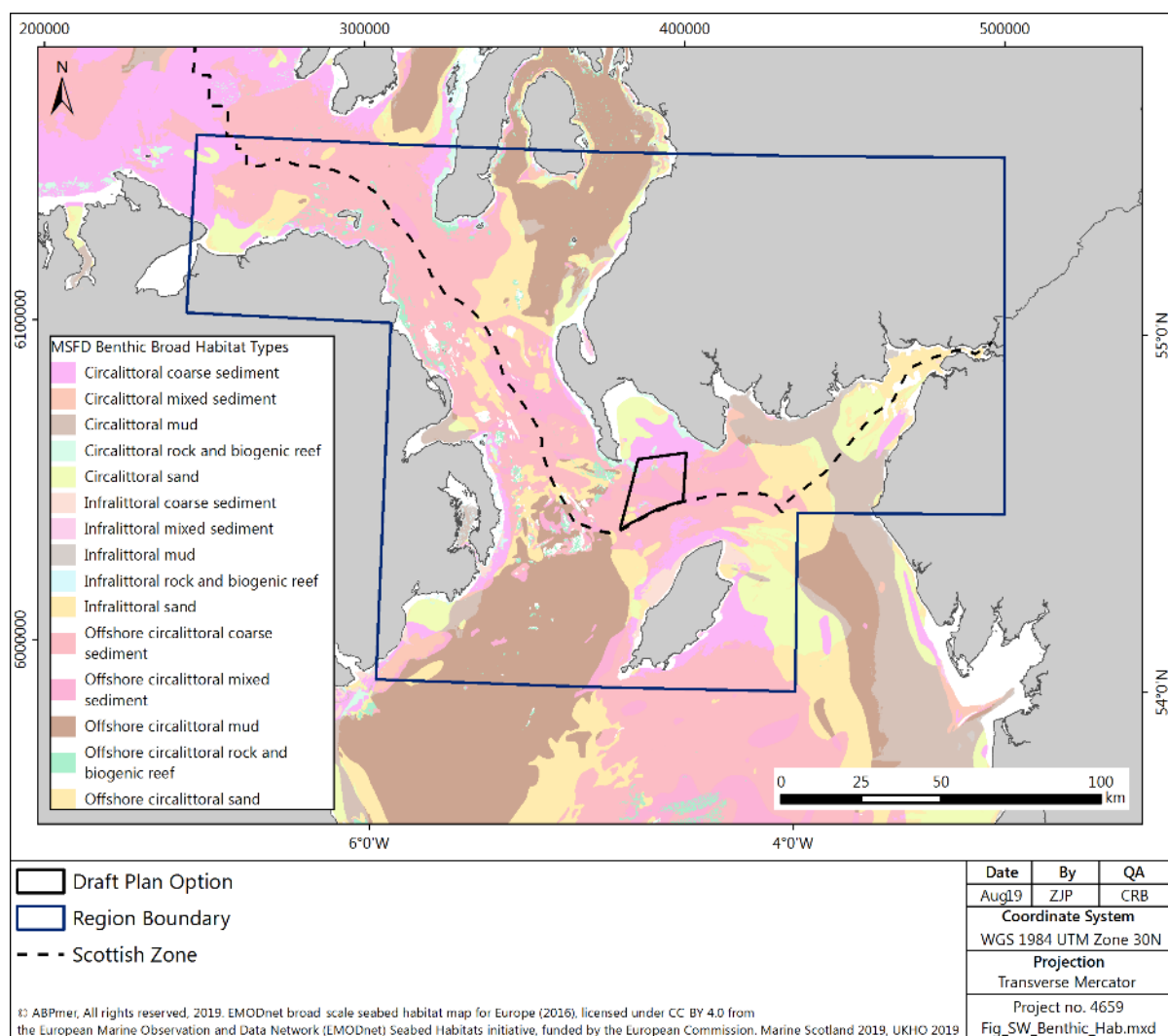


Figure 87 South-west region: benthic habitats

Fish

- 3.4.9 The fish community in the South-west region is varied, although population sizes are generally lower than within the West region. Several species are commercially-important and are discussed above under Fishing in Section 3.3.
- 3.4.10 There are a number of sightings of basking shark within the South-west region (Figure 88), a number of which overlap with SW1, in addition to known populations of other shark and skate species, including porbeagle sharks and spiny dogfish.
- 3.4.11 The North Channel is a likely migration route for anadromous fish (Figure 44 above in Section 2.3 shows the approximate routes, although should not be used to infer “safe” zones). Migratory fish, including shad species and sea lamprey are protected through the SAC network in the South-west region, specifically within the Solway Firth.
- 3.4.12 The South-west region is an important spawning ground for fish species including sole, plaice, sandeel, whiting, anglerfish, cod and herring. Whilst there are a lack of data available to show available spawning sites for elasmobranch species, there are many known nursery ground areas in the area, which overlap the SW1 site, including tope, thornback ray, spotted ray, with high-intensity nursery grounds for spurdog and neighbouring common skate nursery grounds¹⁶⁷.

¹⁶⁷ Ellis, J.R., Milligan, S.P., Readdy, L., Taylor, N. and Brown, M.J. 2012. Spawning and nursery grounds of selected fish species in UK waters. Sci. Ser. Tech. Rep., Cefas. Lowestoft, 147: 56 pp.

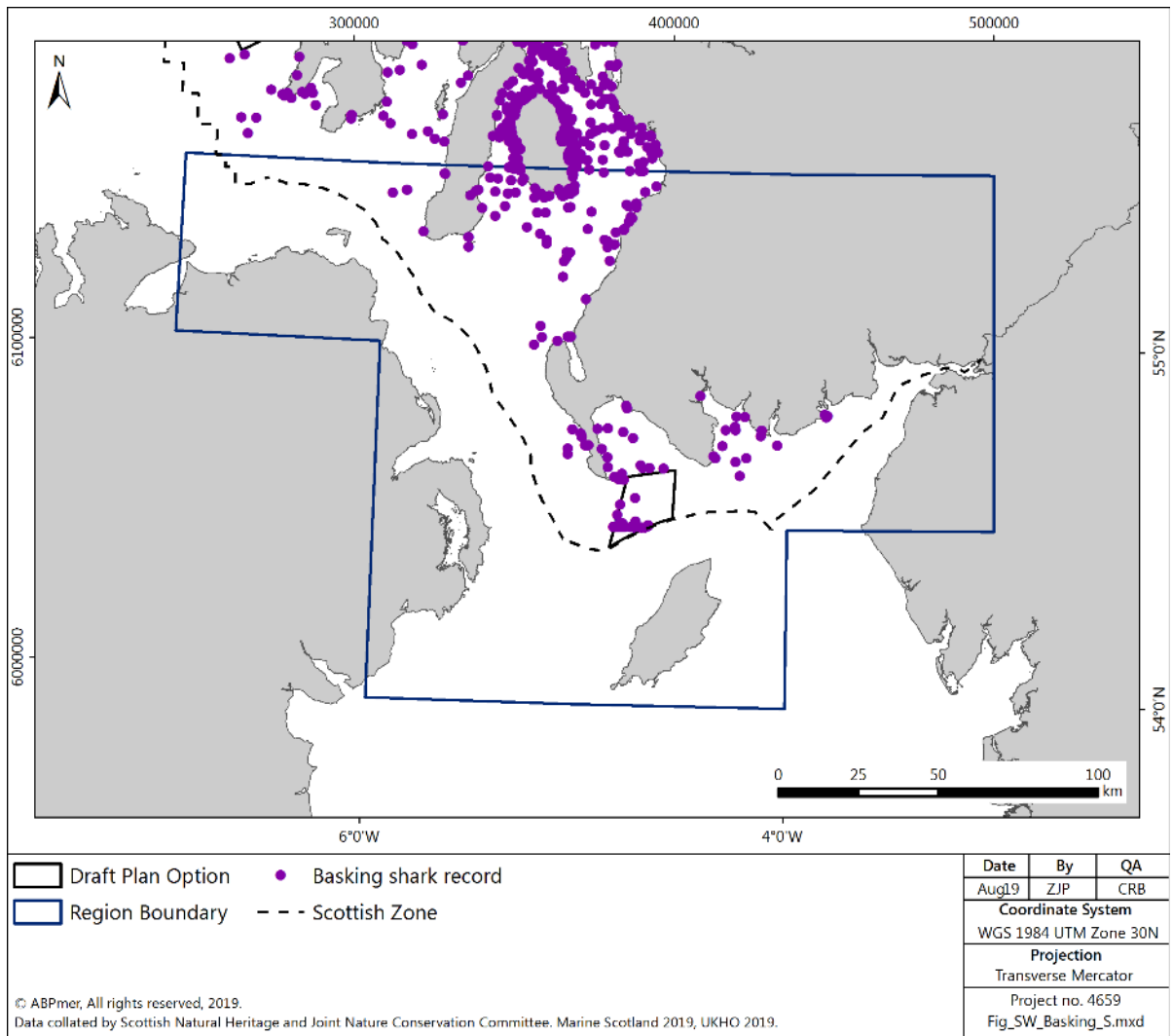


Figure 88 South-west region: basking shark sightings distribution

Marine Mammals

- 3.4.13 There are known to be populations of marine mammals in the South-west region, including harbour seals, grey seals, harbour porpoise and short beaked common dolphin.
- 3.4.14 The populations of both grey and harbour seals within the South-west region are comparatively low in comparison to the West region, as reflected in the low at sea usage of the area by both species (Figure 90 and Figure 91) and the scarcity of haulout sites, with small sites in the Solway Firth and to the south east of the Mull of Kintyre (Figure 89). Identified haulout sites (Figure 89) largely do not overlap with the one DPO identified, however one small area neighbours the northerly edge of the DPO. A relatively low level of grey seal at-sea usage was identified within SW1, however, higher levels were identified within the neighbouring area. Relatively low levels of harbour seal at-sea usage were identified around SW1. There are no areas protected for otter in the south-west region, however there is potential for their presence in coastal and riverine environments within the region.

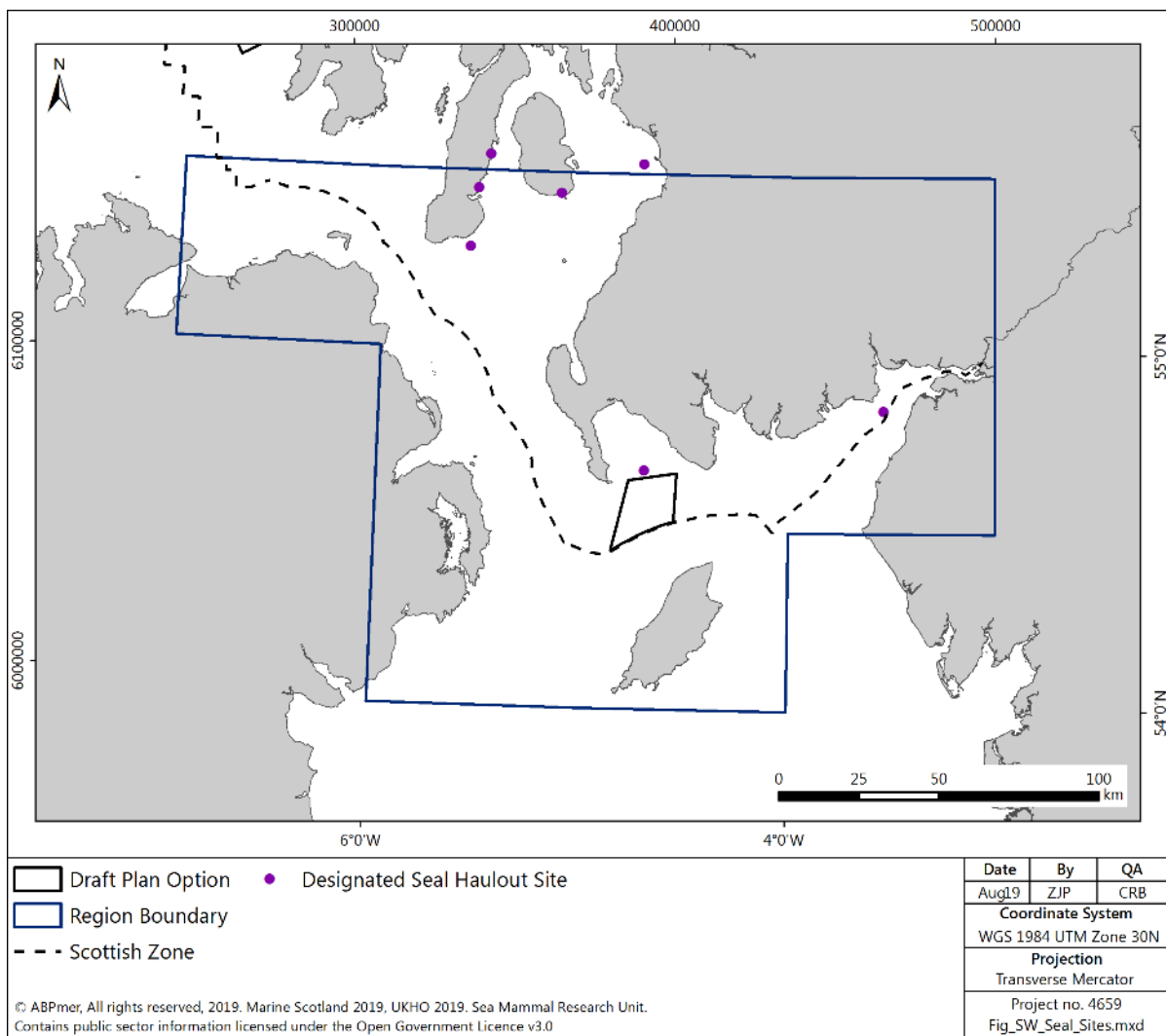


Figure 89 South-west region: seal haulout sites and grey seal pupping sites

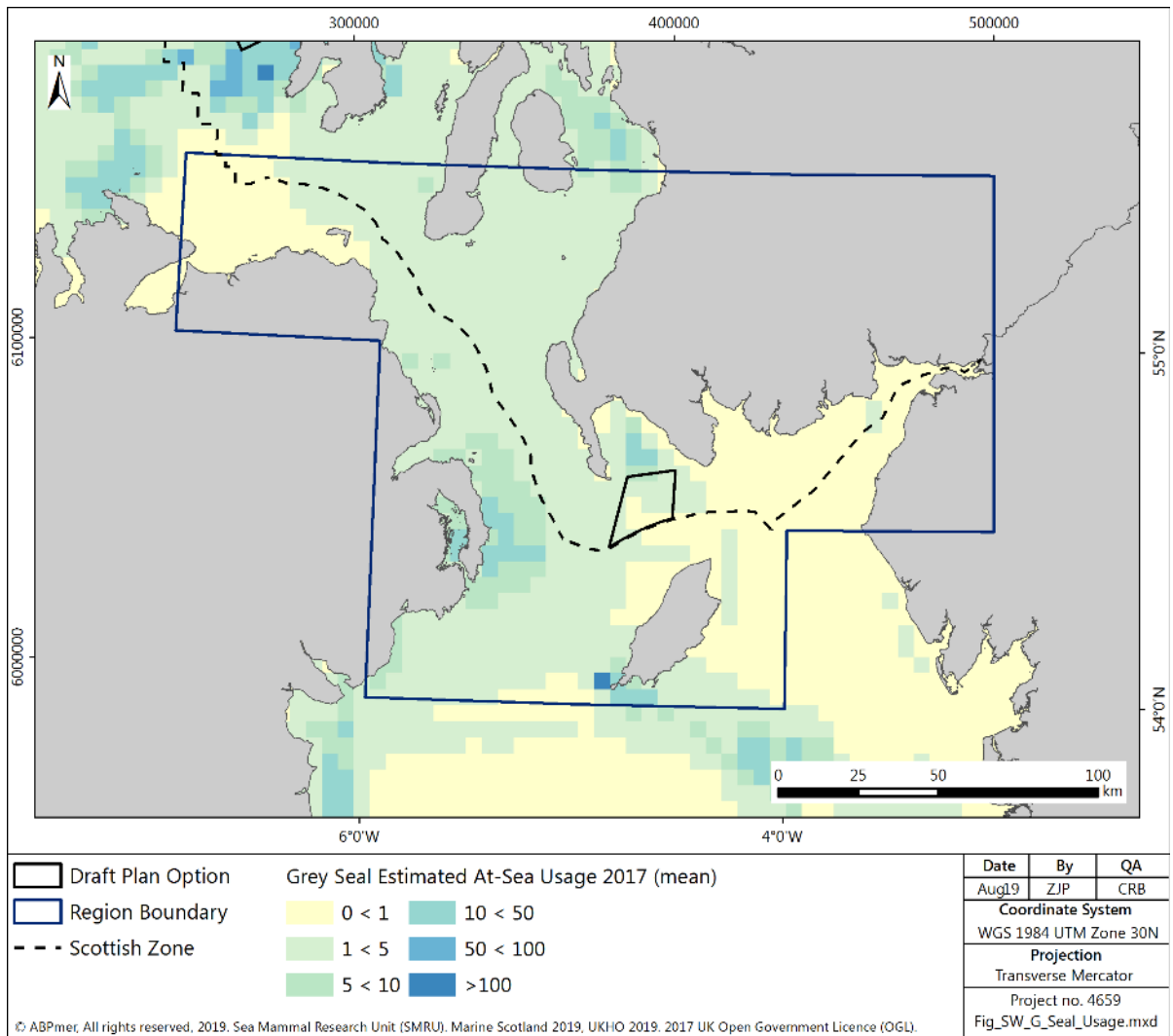


Figure 90 South-west region: grey seal at sea usage

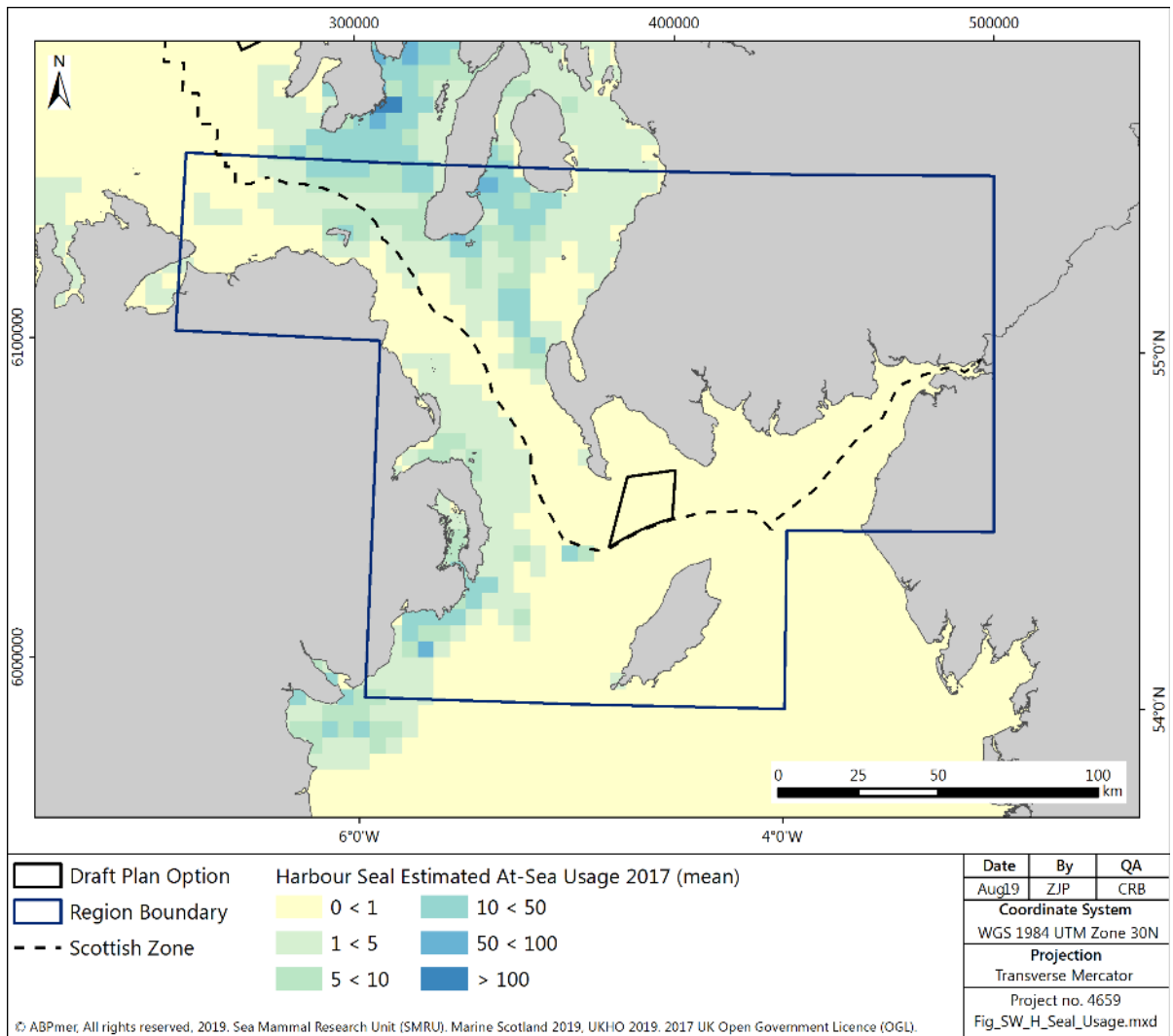


Figure 91 South-west region: harbour seal at sea usage

Birds

- 3.4.15 The importance of the South-west region to birds is demonstrated in the designation of two SPAs, and two further proposed SPAs in the region. There is a large SPA already designated within the Solway Firth, with the pSPA proposed to extend it further. The SPAs are designated for a range of both breeding and non-breeding seabird and waterfowl assemblages. At both of the designated sites the overarching assemblages are assessed as Favourable Maintained, however individual species are identified as unfavourable or declining.
- 3.4.16 Figure 92 maps the total records of seabirds in the marine environment in the South-west region. The data has not been corrected for effort, however it shows that there are areas of moderate usage to the south and south-east of the Mull of Kintyre, with comparatively lower usage in the Solway Firth. There are a number of coastal areas within the South-west region identified as either Important Bird Areas (IBA) or RSPB reserves in the South-west region, particularly in the inner Solway Firth and around Loch Ryan.
- 3.4.17 In addition to the seabird activity discussed above, there are a number of terrestrial birds which are likely to transit through the South-west region, including corncrake which migrate to important population centres on the Outer Hebrides.
- 3.4.18 SW1 currently overlaps with moderately high levels of records of birds per cell (Figure 92). There are no identified bird areas or RSPB reserves overlapping SW1 but there are sites that neighbour the DPO, such as the Mull of Galloway RSPB reserve.

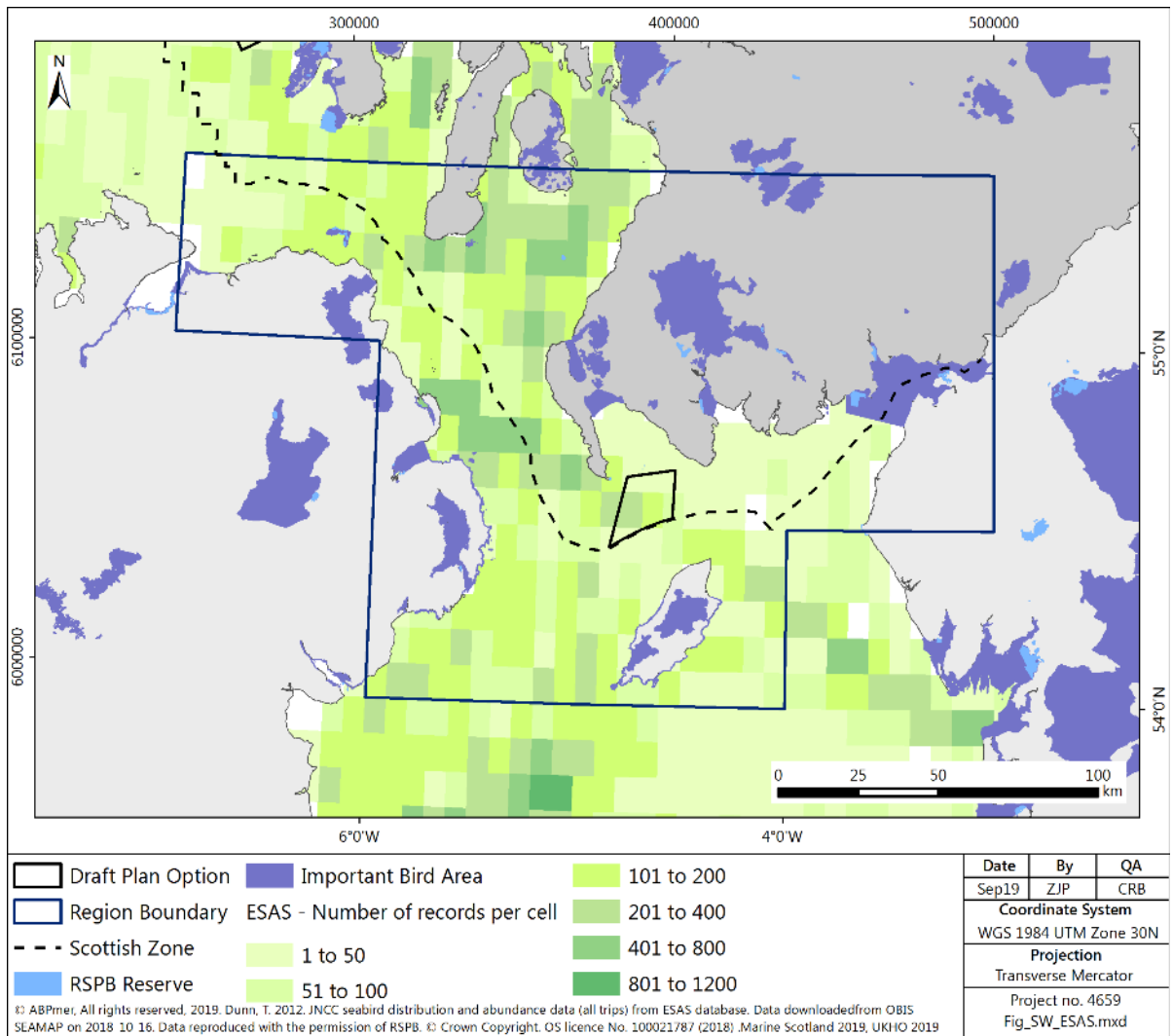


Figure 92 South-west region: ESAS records per 0.1 degree cell

Cultural Heritage

- 3.4.19 There are no Historic MPAs or scheduled monuments designated in the marine environment in the South-west region. However, there are a number of wrecks within the region, of which the remains of one is protected (the surviving elements of a Mulberry harbour).
- 3.4.20 Within the South-west region, there are areas, specifically around the edges of the Solway Firth, which are examples of marine palaeolandscapes (landscapes which have become submerged following occupation by hominids). There is therefore potential for submerged archaeological remains within these areas (Figure 93).

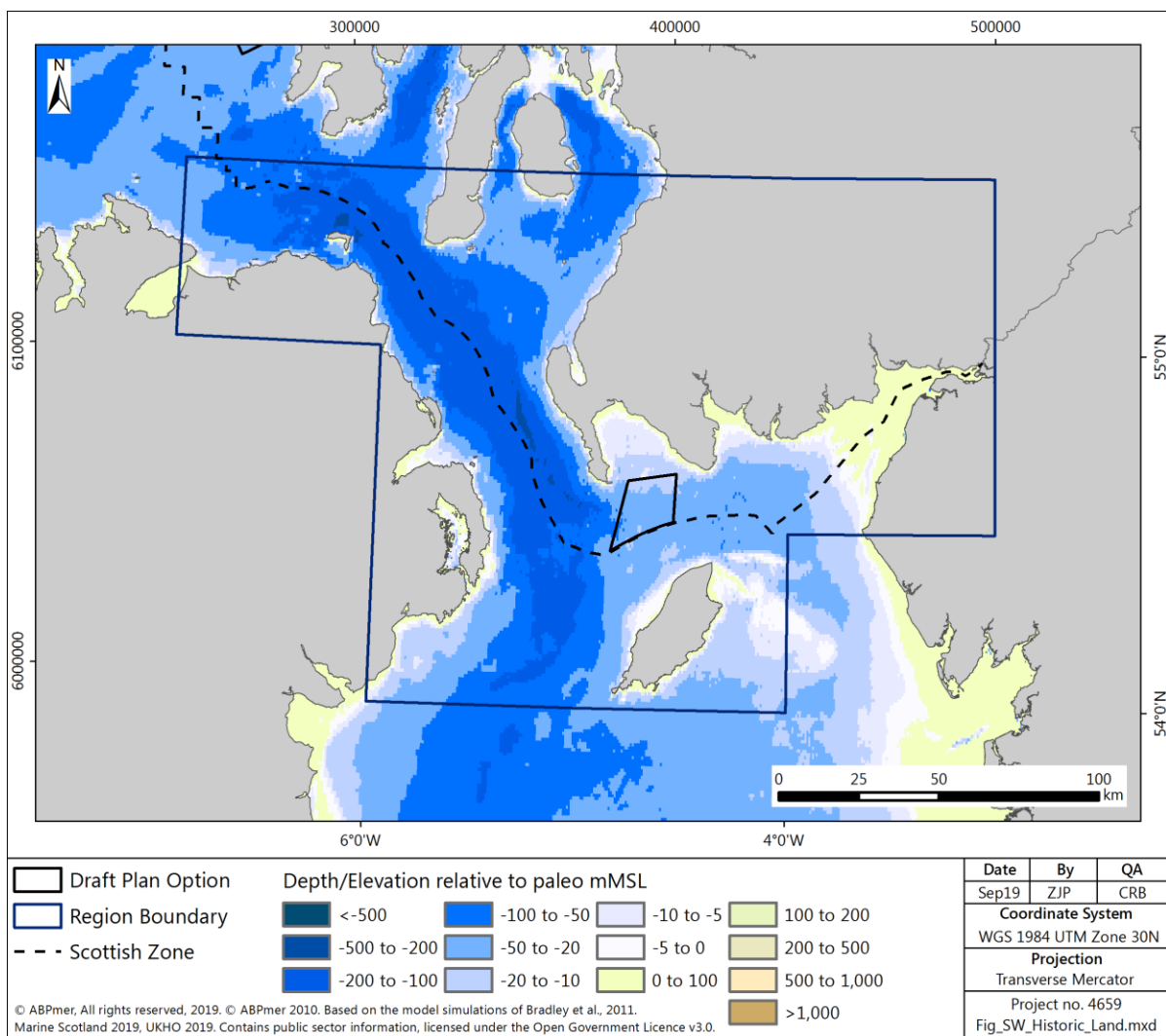


Figure 93 South-west region: historic land area

Landscape / Seascape

- 3.4.21 A character assessment has been undertaken on the Solway Coast Area of Outstanding Natural Beauty (AONB), which identifies the open seas and skies as integral to the experience of the area. It further identifies pressures from offshore wind which may reduce the value of seascapes from the AONB¹⁶⁸.
- 3.4.22 There are three National Scenic Areas in the South-west region, all on the northern edge of the Solway Firth (Figure 94). Key characteristics include the contrast between the small scale intimacy of the landscape with the open character of the sandflats and the meeting of land, sea and sky¹⁶⁹.
- 3.4.23 The low population density on the west coast of Scotland means that the majority of the coastline in the South-west region, with the exception of areas around the port of Stranraer and Girvan, can be considered to be isolated. Scott *et al.*¹⁷⁰ identifies that the seascapes are of medium to large scale, with open sweeping views that would potentially be affected if development were to occur. The coastlines assessed by Scott *et al.* within the South-west region are assessed as of medium (Rhins of Galloway and South Arran / South Ayrshire / South East Kintyre), medium to high (Outer Solway) or high (Inner Solway Firth) sensitivity¹⁷¹.
- 3.4.24 There is no identified overlap between SW1 and National Scenic Areas (Figure 94), however development in SW1 is likely to be visible from the Rhins of Galloway and Outer Solway seascape units.

¹⁶⁸ Land Use Consultants. 2010. The Solway Coast Area of Outstanding Natural Beauty, Landscape and Seascape Character Assessment. Available at <http://www.solwaycoastaonb.org.uk/documents/LSCA-AONB.pdf>

¹⁶⁹ Scottish Natural Heritage (2010). The special qualities of the National Scenic Areas. Scottish Natural Heritage Commissioned Report No.374 (iBids and Project no. 648).

¹⁷⁰ Scott, K.E., Anderson, C., Dunsford, H., Benson, J.F. and MacFarlane, R. 2005. An assessment of the sensitivity and capacity of the Scottish seascape in relation to offshore windfarms. Scottish Natural Heritage Commissioned Report No.103 (ROAME No. F03AA06). Available at <https://www.nature.scot/snh-commissioned-report-103-assessment-sensitivity-and-capacity-scottish-seascape-relation-windfarms>.

¹⁷¹ *ibid*

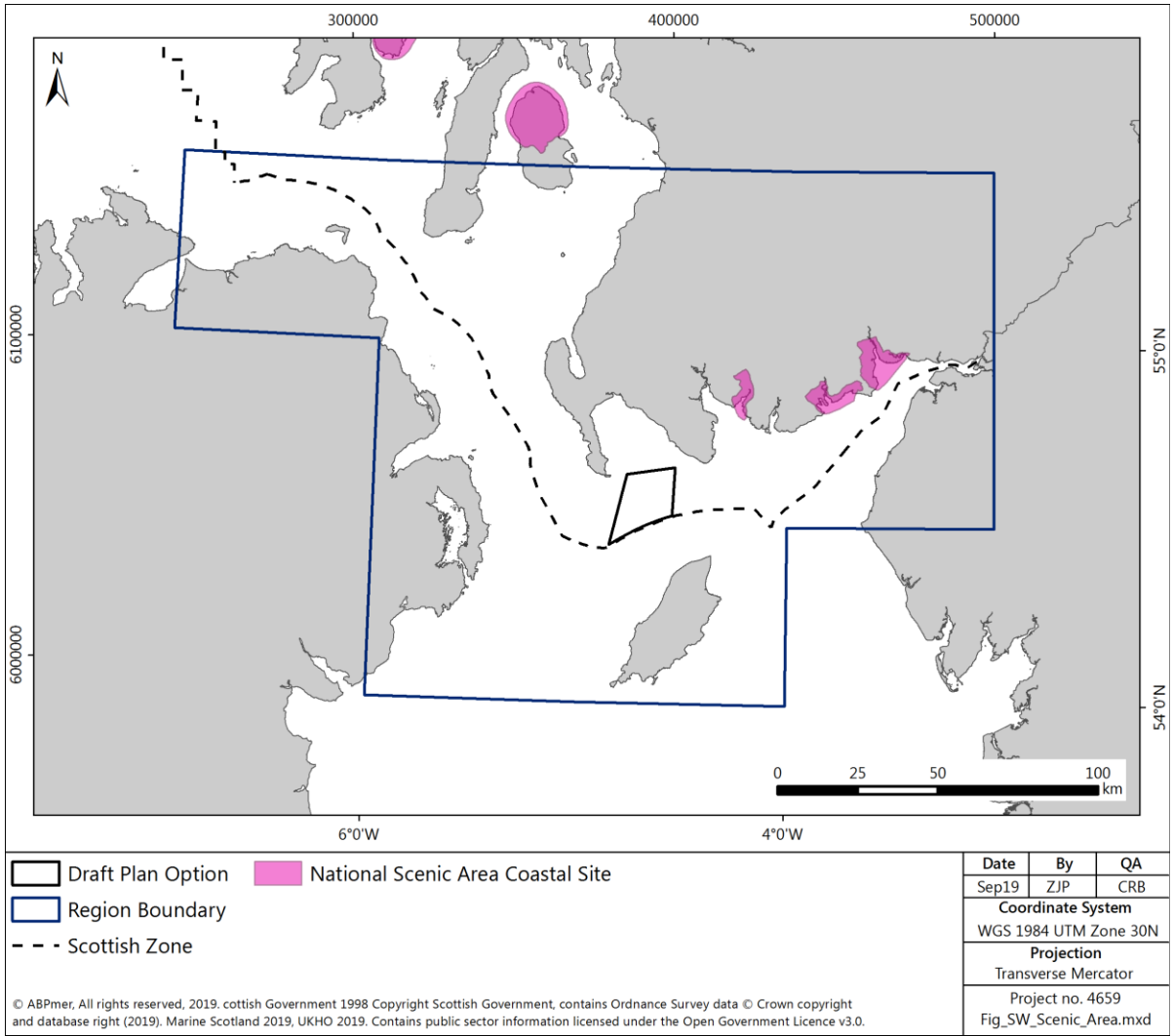


Figure 94 South-west region: National Scenic Areas

3.5 Planning Issues

- 3.5.1 There are three local authorities with coastal interests within the South-west region. These are:
- Argyll and Bute,
 - South Ayrshire, and
 - Dumfries and Galloway.
- 3.5.2 In addition, to the south of the Solway Firth, the English county of Cumbria has coastal interests facing into the Solway Firth and which could be impacted by development in the region.
- 3.5.3 Argyll and Bute Council has identified the potential to develop locations within its area to support offshore development, specifically identifying supporting development in Campbeltown as part of its renewables energy action plan¹⁷². The islands of Coll and Tiree, and Islay, the closest of the Inner Hebrides to the DPOs are all the under the jurisdiction of Argyll and Bute Council.
- 3.5.4 South Ayrshire Council has not stated a position on offshore wind, noting that it is beyond the jurisdiction of the local planning process. However, in comments on marine planning documentation South Ayrshire council has noted the significance of landscape and seascape to the local economy and welcomes the opportunity to comment on any future offshore proposals¹⁷³. However, SW1 does not overlap with the council's remit.
- 3.5.5 Dumfries and Galloway Council has undertaken a Wind-Farm land Capacity Study¹⁷⁴ which identifies the potential for offshore wind development. It notes that any development within 5km of the coastal edge is likely to have significant impacts on coastal character and on views, but that detailed assessment of the impact of wind farm development will be required on a case by case basis. Specifically, The Mull of Galloway, Wigtown Bay and Inner Solway seascape units were concluded to have a high sensitivity to offshore wind farm development and the Council has recommended resisting offshore development within enclosed bays, close to shore or sited within a seascape context with a notably wild, elemental quality where it would result in significant landscape and visual impacts. The northwest corner of SW1 currently lies within 5km of the southerly edge of the Mull of Galloway.

¹⁷² Argyle and Bute Renewable Alliance. 2017. Renewable Energy Action Plan.

¹⁷³ South Ayrshire Council. 2013. Report by Executive Director – Economy, Neighbourhood and Environment to Leadership Panel of 5 November 2013, Subject: Planning Scotland's Seas – South Ayrshire Council's Response to Scottish Government Consultation and Seascape/Landscape Assessment for the Firth of Clyde. Available at <https://ww20.south-ayrshire.gov.uk/ext/committee/CommitteePapers2013/Leadership%20Panel/5%20November/41b.pdf>

¹⁷⁴ Dumfries and Galloway Council. 2017. Local Development Plan Supplementary Guidance, Part 1 Wind Energy Development: Development Management Considerations: Appendix 'C' Dumfries & Galloway Wind Farm Landscape Capacity Study. Adopted 22 June 2017. Available at https://www.dumgal.gov.uk/media/18596/Dumfries-and-Galloway-Wind-Farm-Land-Capacity-Study-Appendix-C/pdf/Wind_Energy_Appendix_C_Landscape_June_2017.pdf

4 West

4.1 Introduction

4.1.1 The West region incorporates the Firth of Clyde, and the Inner Hebrides, extending westwards out beyond the edge of the Outer Hebrides and North to include an area of Skye and approximately half of the Outer Hebrides (Figure 95). There is one DPO identified within the West region, as shown in Figure 95.

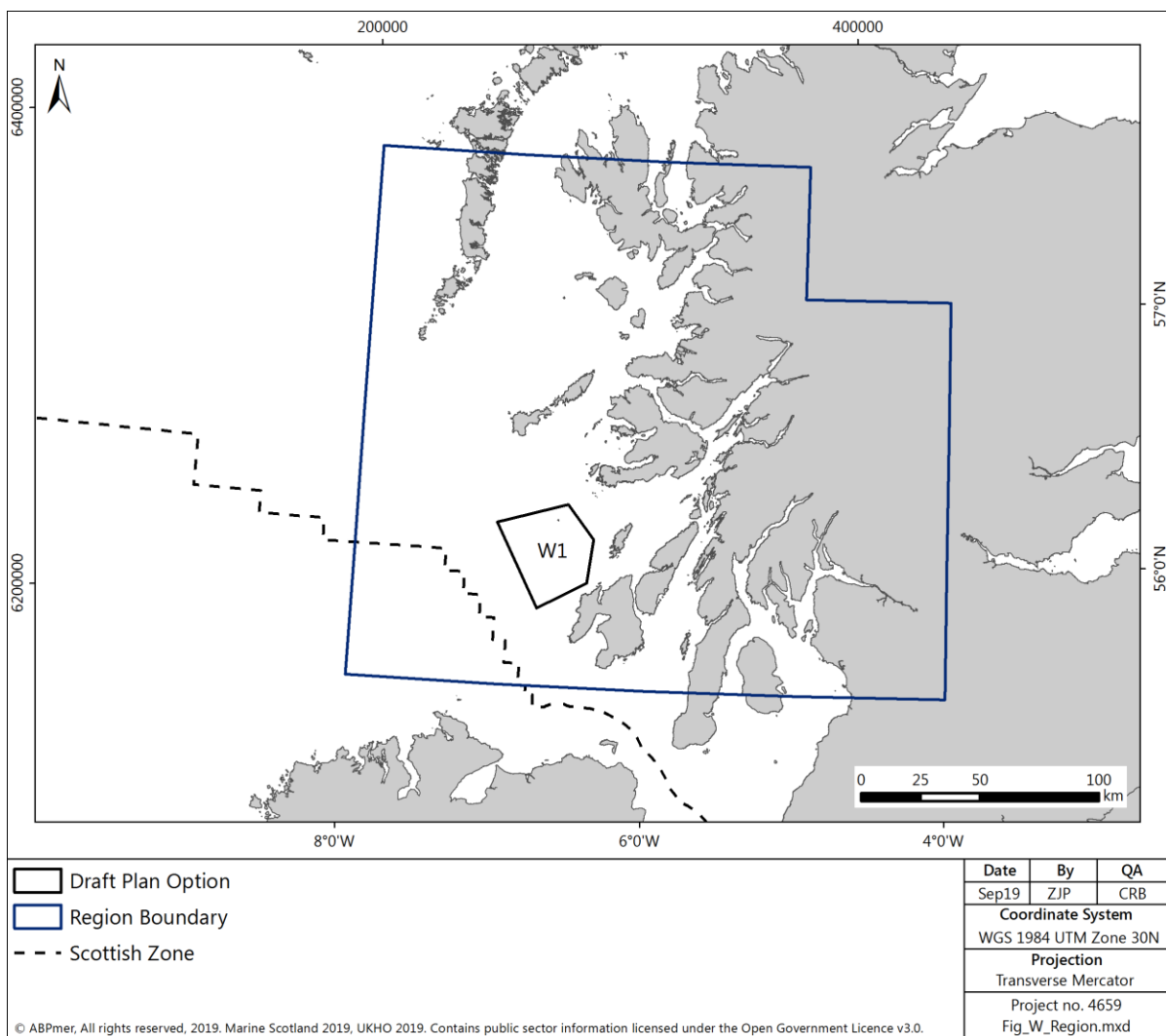


Figure 95 Map of the West region, including DPOs

4.2 Physical Considerations

Offshore Wind Resource

4.2.1 Within the West region, encompassing one DPO (W1) there is considerable available wind resource, as shown in Figure 96 using the mean annual wind speed as a proxy, and shown in Table 3.

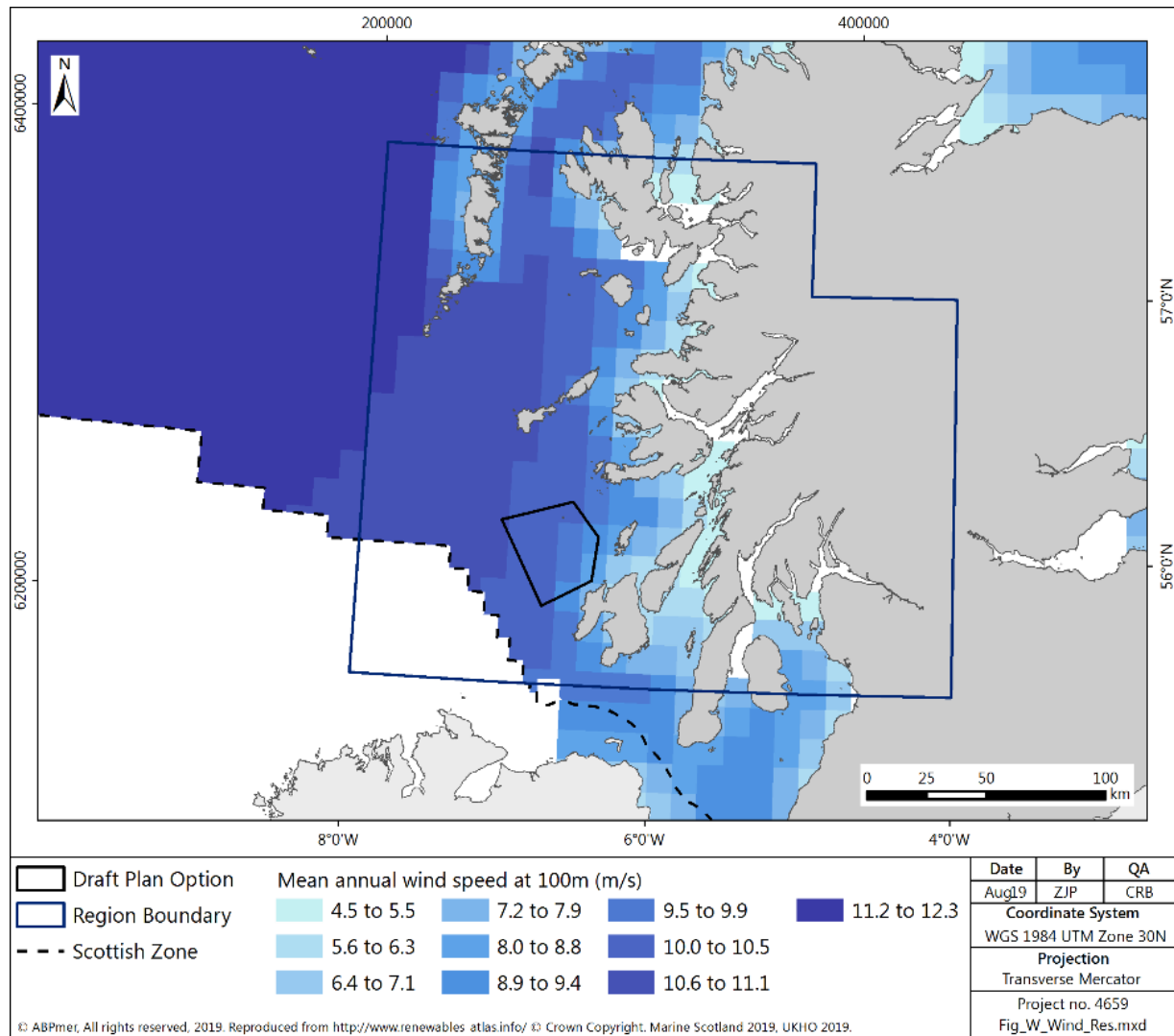


Figure 96 West region: mean annual wind speed

Table 3 West region: Potential installed capacity in the DPO

Area of Search	Region	Area (square km)	Potential Installed capacity (GW) ¹⁷⁵
W1	West	1107	5.5
West Total		1107	5.5

Grid Connection

- 4.2.2 The current grid provision in the West region is principally linked to 132kv substations. Should offshore wind development be undertaken in the West region, it is likely that the electricity grid would need reinforcement to support transmission from the point of generation to the area of demand. From 2023 and following the decommissioning of Hunterston B (discussed below) there is potential for the current transmission grid in the West region to become under-utilised.

¹⁷⁵ The figures within this column, and throughout the subsequent regional discussions are based upon an assumption of 5MW potential installed capacity per km². The source of this assumption is based on available literature as summarised in:

Bormann, R., Rehfeldt, K., Wallasch, A-K., Luers, S. 2018. Capacity Densities of European Offshore Wind Farms.

Bathymetry and Seabed

- 4.2.3 The water depth in the West region ranges from the shallower water around the mainland and Hebridean island coastlines into deeper water, reaching approximately 200 m at the western extent (Figure 97). W1 has relatively shallow water depths, with the majority of the DPO in water depths less than 60m.
- 4.2.4 Seabed sediments in the West region vary from muddy sand in the more inland coastal regions, to areas of rocky reef to the west of the Outer Hebrides and to the north and east of the Coll, Tiree and Mull. Towards the continental shelf edge, the sediments trend to becoming coarser, with sand and subsequently coarse sediment towards the continental shelf edge. Beyond the shelf edge the sediment becomes generally muddier, with fine mud and muddy sand dominating, with exceptions around the seamounts as seen in Figure 98.
- 4.2.5 Within W1 the sediment is principally sand, with gravel and gravel, sand and silt sediments in the southeast.

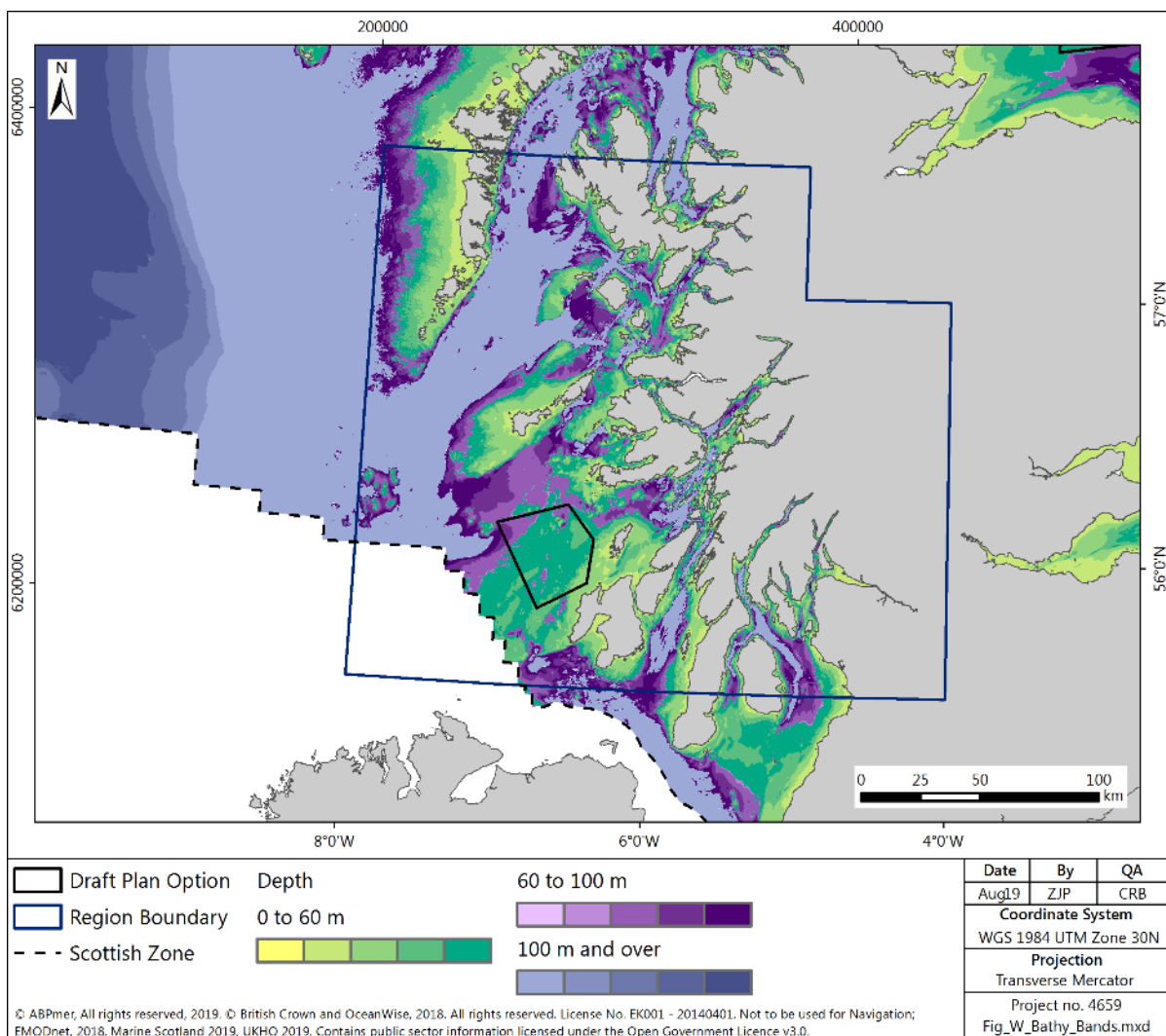


Figure 97 West region: banded water depth

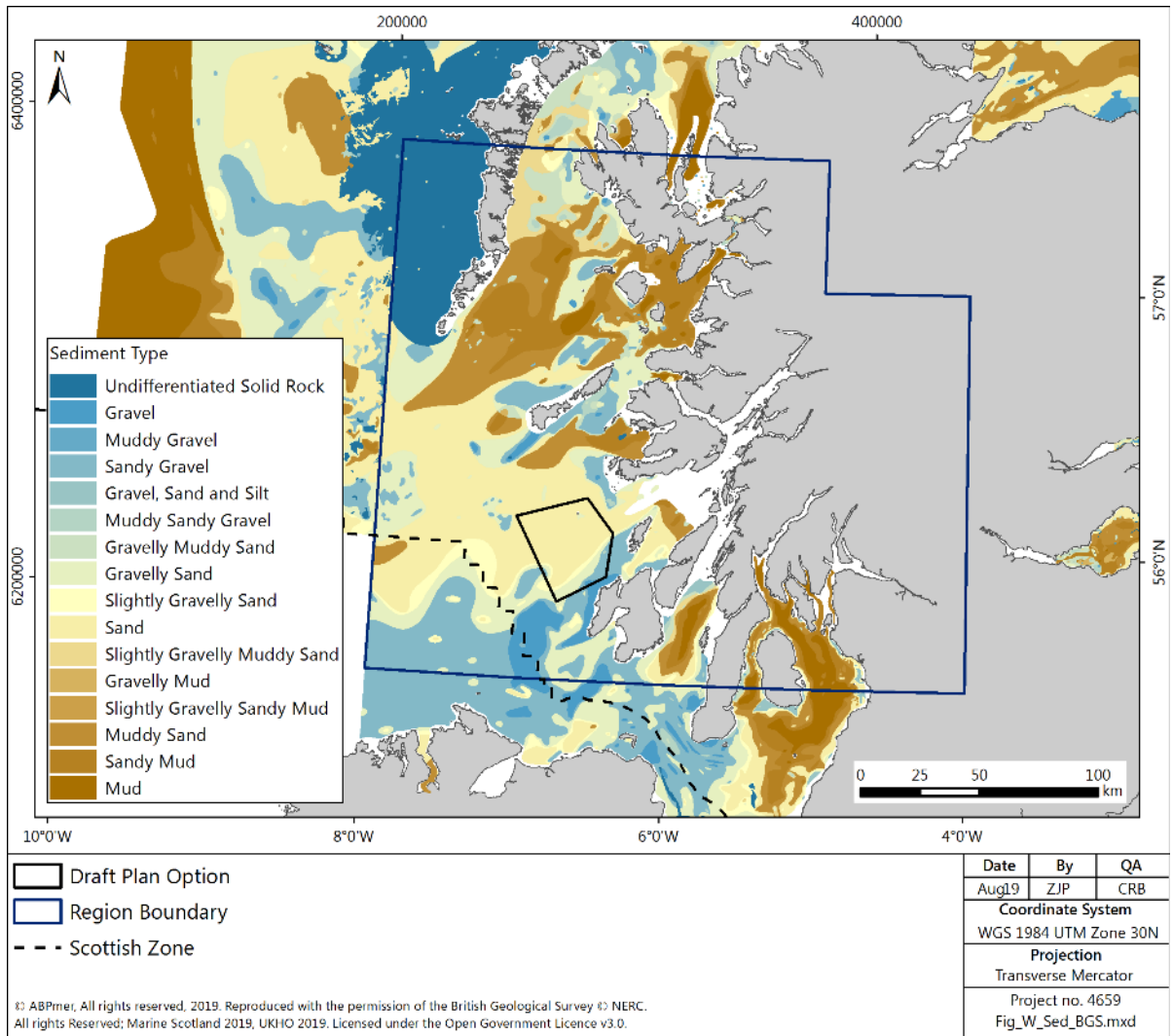


Figure 98 West region: seabed sediments

4.3 Socio Economics

Supply Chain

- 4.3.1 Four locations are identified in the West region¹⁷⁶ which could be developed to support the construction, operation and maintenance of offshore wind in the DPOs. These are:
- Hunterston - integrated manufacturing,
 - Arnish - distributed manufacturing,
 - Campbeltown / Machrihanish - further maintenance and operation / maintenance,
 - Kishorn - distributed manufacturing.
- 4.3.2 Hunterston, in the Firth of Clyde, is identified in the NPF3 as a priority for industrial and employment use, including servicing and support for offshore renewable energy development¹⁷⁷. The Hunterston Port and Resource Centre (PARC) is being developed by its owner, Peel Ports, supported by E.ON to provide infrastructure suited to manufacturing, processing and innovation on a site with a deepwater port and road and rail connections¹⁷⁸.
- 4.3.3 Arnish is on the East coast of the Isle of Lewis, and is currently mothballed as a site, with a small retained skeleton of employees. Previously employing 1400 people at its peak the local workforce retains the skills to restart manufacturing at the site which has supported the renewables industry, including manufacturing processes supporting the Beatrice windfarm¹⁷⁹. The port masterplan for Stornoway identifies that expansion of the port, including the development of a deep-water port facility, has the potential to support expansion of offshore wind farm component manufacturing at Arnish¹⁸⁰.
- 4.3.4 The former MOD site at Machrihanish has been engaged in the manufacture of towers for the Beatrice offshore wind farm, producing up to 200 towers between 2017 and 2019¹⁸¹. The final tower was built in May 2019¹⁸². In coordination with the harbour at Campbeltown there is potential to continue supporting the development of offshore wind in the western DPO.

¹⁷⁶ Scottish Enterprise and Highlights and Islands Enterprise. 2010. National Renewables Infrastructure Plan Stage 2.

¹⁷⁷ Scottish Government. 2014. Scotland's Third National Planning Framework.

¹⁷⁸ Peel Ports Group. 2018. E.ON Backs a bright future at Hunterston. Available at <https://www.peelports.com/news/2017/eon-backs-bright-future-at-hunterston>. Accessed 05/10/2018.

¹⁷⁹ Munro. 2018. Isles MSP hopeful of jobs revival at mothballed fabrication yard in Outer Hebrides, News published in the Press and Journal, 12 September 2018.

¹⁸⁰ Stornoway Port Authority. 2016. Draft Masterplan for Stornoway Port.

¹⁸¹ Offshorewind.biz. 2018. Available at <https://www.offshorewind.biz/2018/06/27/cs-wind-sends-off-second-batch-of-beatrice-turbine-towers/>. Accessed 05/10/2018.

¹⁸² Beatrice Offshore Wind Ltd. 2019. About. Available at: <https://www.beatricewind.com/>. Accessed 16/07/2019.

- 4.3.5 Kishorn has been identified as a key site for the expansion of the renewables industry, including in manufacture of concrete bases for turbine structures. The site has planning permission in place, in line with its port master plan, to expand the quarry and facilities including offices, accommodation and engineering and fabrication sheds, alongside the applicable marine licences for deep water berthing and anchoring of floating structures in Loch Kishorn¹⁸³. Kishorn is well placed to support floating offshore wind, having prepared its infrastructure to potentially support the Kincardine development.
- 4.3.6 In addition to the above, some areas have undertaken scenario mapping to assess the potential socio-economic benefits from developing supply chains to support offshore wind. For example, the Tiree Onshore Scenario Mapping Study considered the potential impact of development of supply chain support for the proposed Argyll array¹⁸⁴. The report considered several scenarios for operations and maintenance support including both onshore and offshore solutions and their potential economic and social impact on Tiree.

Energy Generation

- 4.3.7 There are two power stations located within the West region. Hunterston B is a nuclear power plant located within the Firth of Clyde while Loch Carnan is a diesel power station on South Uist. The nuclear plant at Hunterston B is expected to be decommissioned in 2023. It currently employs approximately 750 employees.
- 4.3.8 There are no current leases for offshore wind development in the West region, and no operational developments. There were areas previously identified as offshore wind Draft Plan Options (DPO) (Figure 99), however these will be superseded by the new offshore wind plan options.
- 4.3.9 There is potential for Tidal stream energy generation development within the West region and there are three leases issued by Crown Estate Scotland proposed for tidal stream installations (Figure 99):
- Isle of Islay;
 - Sound of Islay; and
 - Connel.

¹⁸³ Kishorn Port. 2018. Kishorn Port & Dry Dock – Showcase Day 19th September 2018. Available at <https://www.kishornport.co.uk/2018/09/kishorn-port-dry-dock-showcase-day-19th-september-2018/>. Accessed 05/10/2018.

¹⁸⁴ Tiree Onshore Scenario Mapping Steering Group. 2012. Tiree Onshore Scenario Mapping Study. Available at https://www.argyll-bute.gov.uk/sites/default/files/tiree_scenario_mapping_executive_summary_final.pdf.pdf. Accessed 08/10/2018.

- 4.3.10 None of the three sites are currently operational, although consents have been granted for the Isle of Islay¹⁸⁵ and Sound of Islay¹⁸⁶ sites. Of the two sites the Isle of Islay site is the closer, approximately 20km to the south of W1.
- 4.3.11 In 2013 the Marine Scotland consulted on Draft Plan Options (DPO) for wave and tidal energy^{187, 188}. These draft options were subsequently recognised in Scotland's National Marine Plan¹⁸⁹. The DPOs identify areas of potential for the future development of wave and tidal energy in Scottish waters (Figure 99). The plan options for wave energy overlap with the southern half of W1.

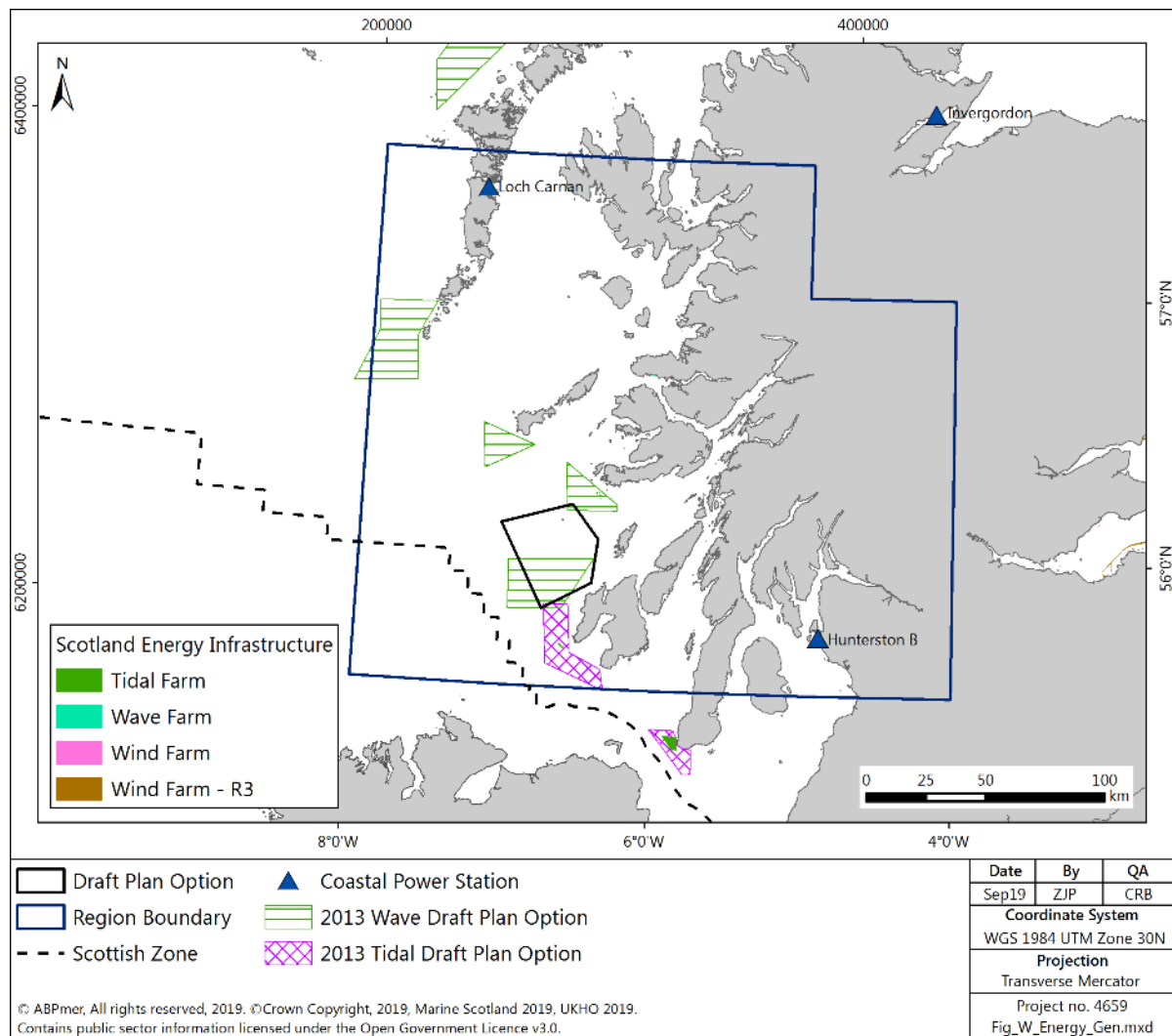


Figure 99 West region: current, planned and potential future offshore energy generation infrastructure

¹⁸⁵ DP Energy. 2018. Available at <http://www.dpenergy.com/projects/tidal/west-islay-tidal-energy-farm/>. Accessed 08/10/2018.

¹⁸⁶ Simec Atlantis. 2017. Islay Project. Available at <https://simecatlantis.com/projects/islay/>. Accessed 08/10/2018

¹⁸⁷ Marine Scotland. 2013. Wave Energy in Scottish Waters- Initial Plan Framework (Draft Plan Options).

¹⁸⁸ Marine Scotland. 2013. Tidal Energy in Scottish Waters- Initial Plan Framework (Draft Plan Options).

¹⁸⁹ Scottish Government. 2015. Scotland's National Marine Plan, A Single Framework for Managing Our Seas.

Power Interconnectors

4.3.12 The majority of power interconnectors in Scottish waters (243km) are located in the West region where they have been created to connect island communities to the mainland national grid infrastructure (Figure 100). A section of the new Western Link HVDC cable is also located in the West region¹⁹⁰. The closest power interconnector is approximately 25km from W1. All the power interconnectors are inshore of the DPO (Figure 100).

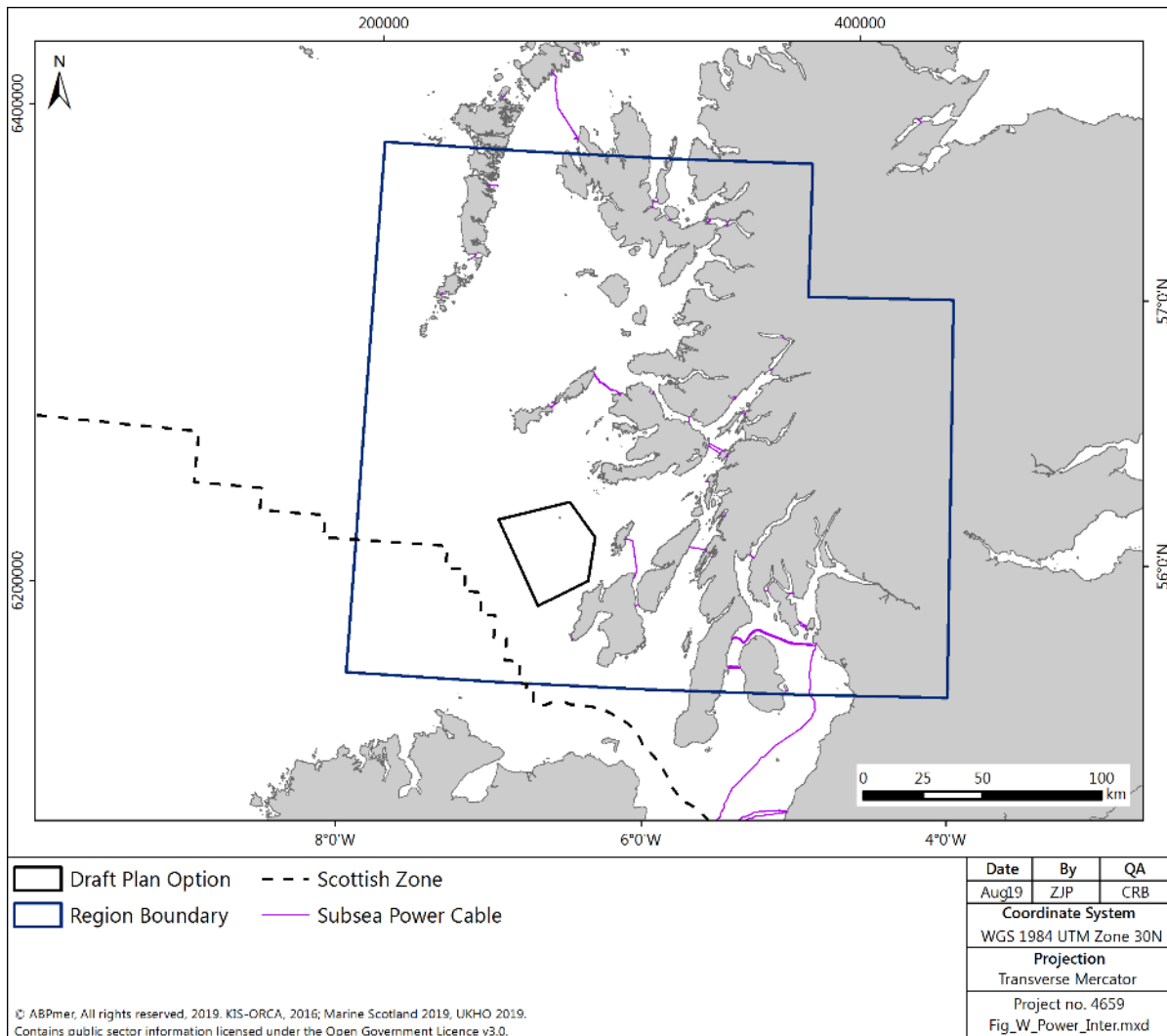


Figure 100 West region: power interconnectors

Telecom Cables

4.3.13 There are 247km of active telecom cables in the West region to help connect the Scottish mainland and island communities. There are no telecom cables

¹⁹⁰Western Link. 2018. Western Link Project. Available at: <http://www.westernhvdclink.co.uk/>. Accessed 10/10/2018

near W1. The closest cables are approximately 25km away and are all positioned inshore of the DPO (Figure 101).

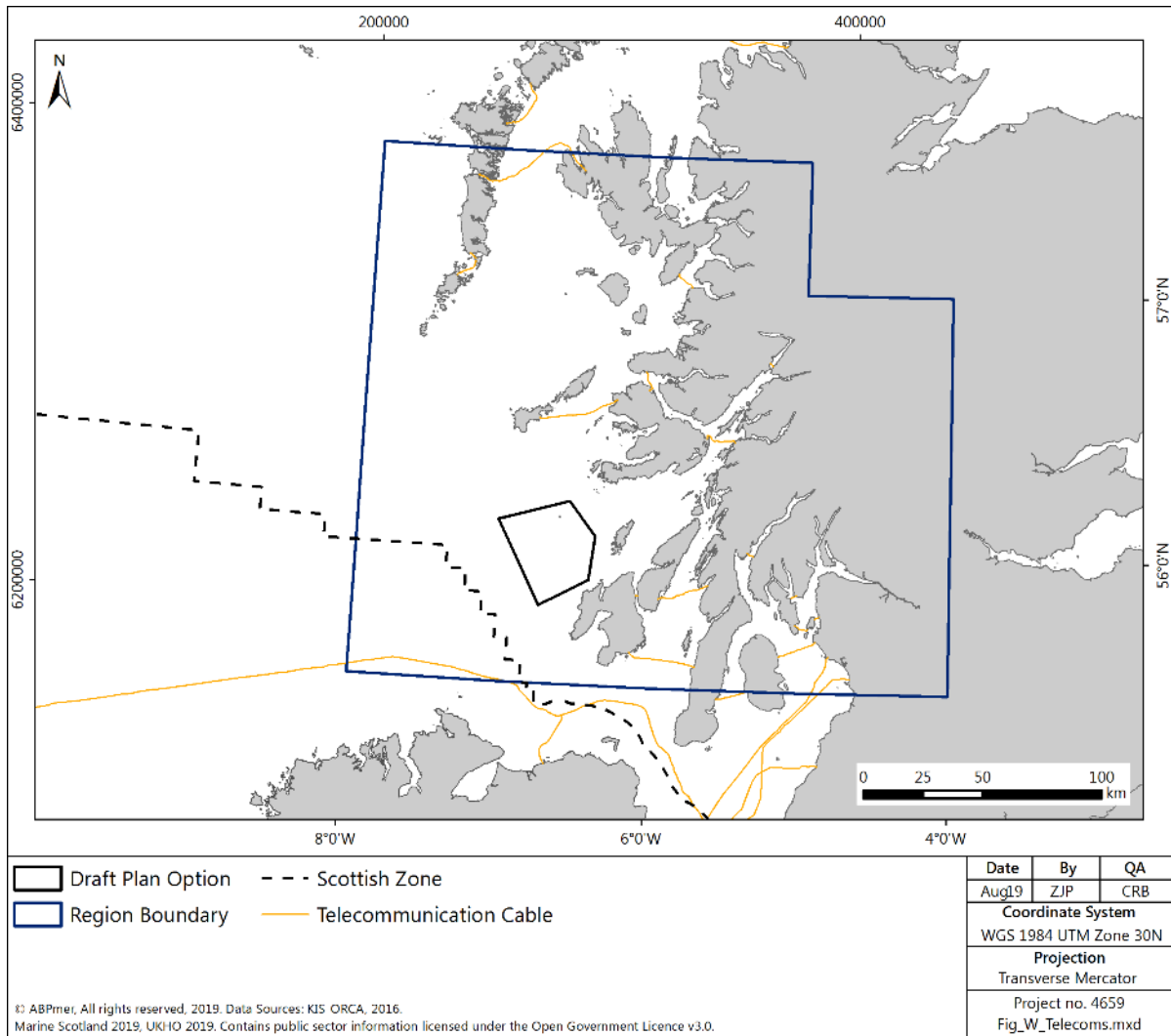


Figure 101 West region: active telecom cables

Carbon Capture and Storage

4.3.14 There are currently no identified potential CCS storage areas on the west coast of Scotland. All potential saline aquifers, and most of the oil and gas infrastructure, are off the East coast.

Oil and Gas

4.3.15 There are very few oil and gas related activities currently taking place within this Region with no recent licence round awards or, licenced blocks or pipelines(Figure 102). The potential for future exploration and development is low.

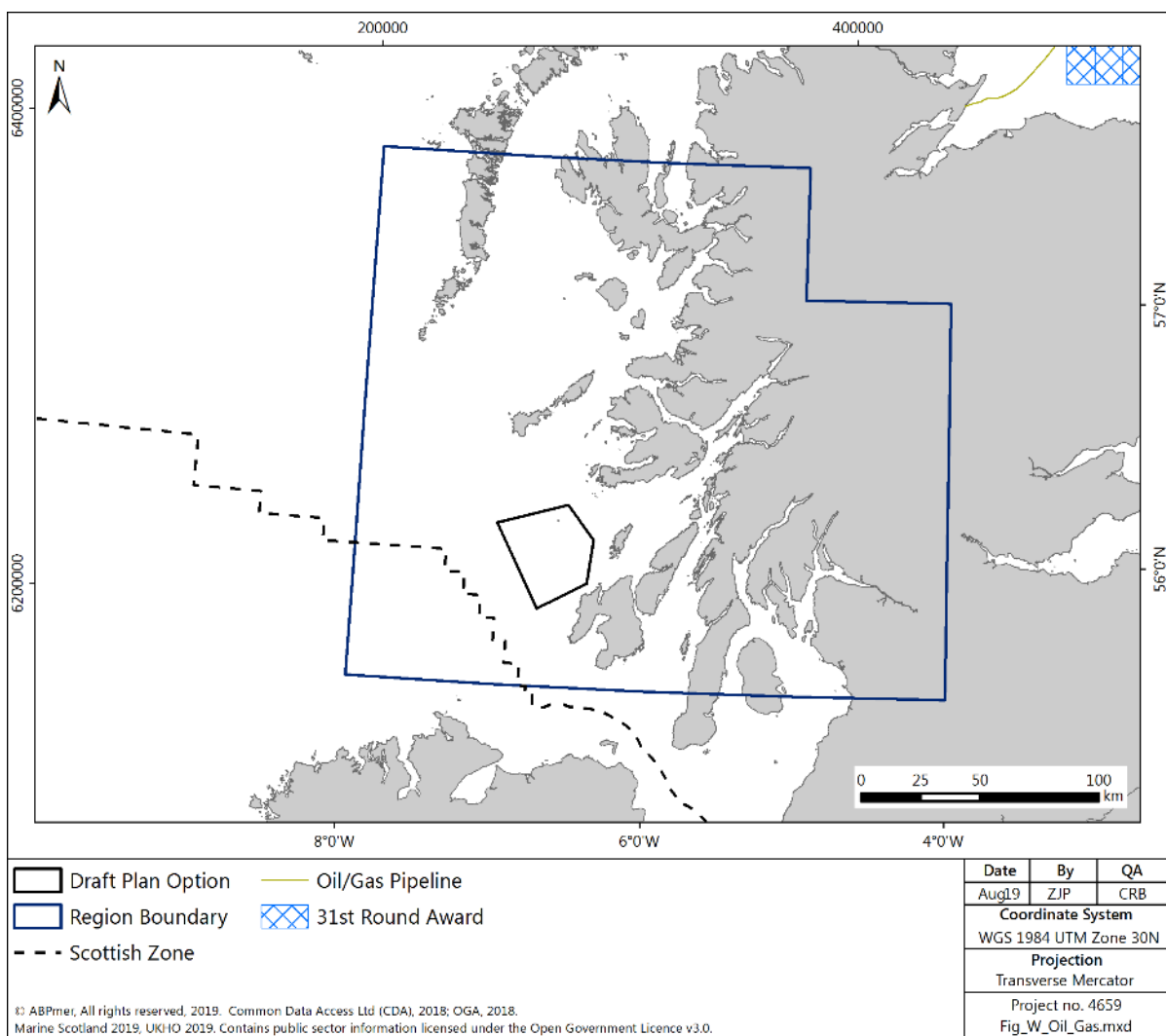


Figure 102 West region: oil and gas infrastructure and licensed blocks

Aviation

- 4.3.16 Airports in this region include the major airports Glasgow and Glasgow Prestwick. In addition, there are minor airports at Campbeltown and on Coll, Colonsay, Tiree and Islay (Figure 103).
- 4.3.17 The principal airport on the West coast is Glasgow International which operates an extensive range of domestic flights as well as international flights to a wide range of European destinations. It also has a few long-haul flights, including to the American Eastern seaboard and Caribbean¹⁹¹. Glasgow Prestwick airport international traffic is limited to European destinations and is Scotland's most significant scheduled freight airport¹⁹². The Highlands and Islands Airports Ltd. (HIAL) Campbeltown offers a twice daily scheduled service to Glasgow airport¹⁹³.
- 4.3.18 There is primary surveillance radar cover around Tiree airport which covers a large majority of the region including W1. There are also areas of primary radar cover around Glasgow and Prestwick airports, but these do not affect W1 (Figure 103 above).
- 4.3.19 Secondary surveillance cover is present around Tiree and Glasgow airports. These do not overlap with W1 (Figure 103 above).
- 4.3.20 Both Glasgow airport and Tiree airport are safeguarded civil aerodromes.

¹⁹¹Glasgow Airport. 2018. Destinations. Available at: <https://www.glasgowairport.com/destinations/>. Accessed 11/10/2018.

¹⁹² Glasgow Prestwick Airport. 2016. Destinations. Available at: <https://www.glasgowprestwick.com/destinations/>. Accessed 11/10/2018.

¹⁹³ Highlands and Islands Airports Limited. 2018. Destinations. Available at: <http://www.hial.co.uk/campbeltown-airport/destinations/>. Accessed 11/10/2018.

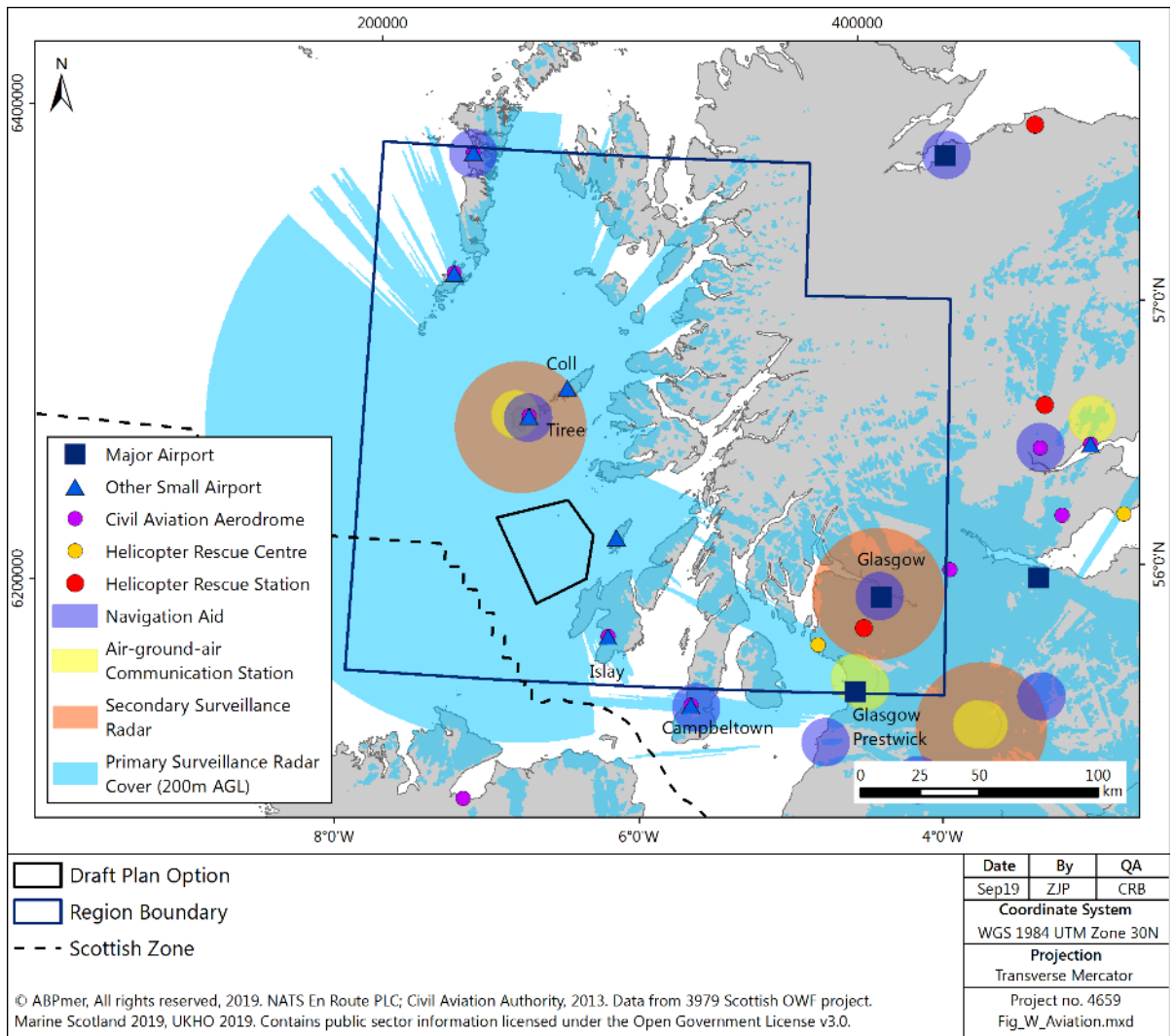


Figure 103 West region: aviation infrastructure, key routes and radar coverage

Defence

- 4.3.21 There is a high concentration of defence assets in the West region. Establishments are concentrated around the Firth of Clyde, with smaller concentrations of facilities located on the Hebridean islands, Skye and on the west coast mainland (Figure 104).
- 4.3.22 W1 is within the West of Scotland naval exercise area, (Figure 104).
- 4.3.23 The MOD supports a large number of jobs in the West region, both directly and indirectly. Employment is largely through shipbuilding based on the Clyde, and around the military base at HMNB Clyde. No regional breakdown of employment figures is available within Scotland, but it is likely that a significant portion of both the direct and indirect employment figures discussed in Section 2.2 above are located in the West region.

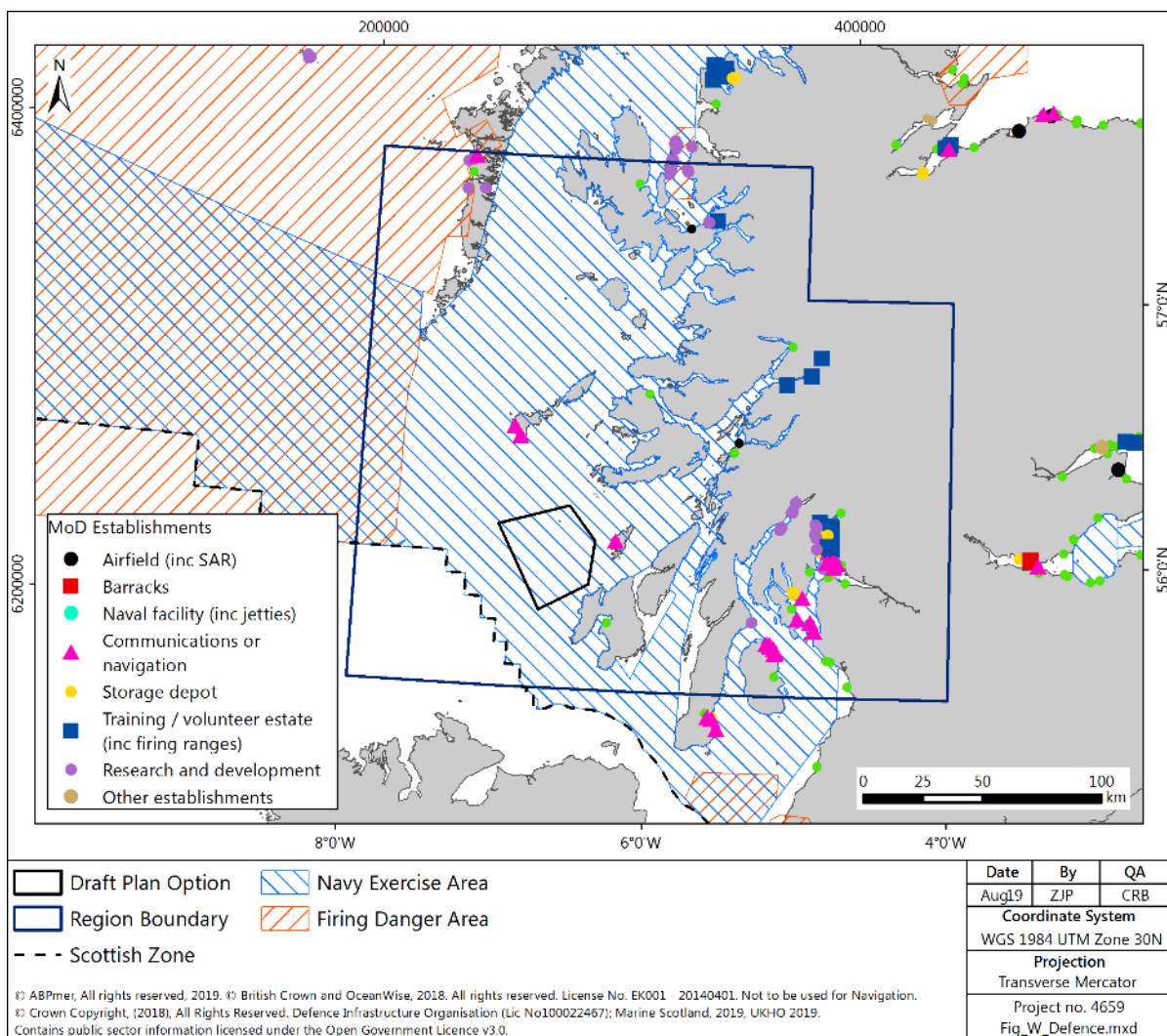


Figure 104 West region: defence infrastructure and exercise areas

Fishing

- 4.3.24 Landings from UK-registered vessels from ICES rectangles in the West region had an average annual value of £176 million and an average live weight of 10,637,711 tonnes for the five-year period 2013-2017.
- 4.3.25 The majority of landings were shellfish (97.5%). Split between inshore and offshore waters.
- 4.3.26 The majority of landings were by the over 12 m fleet (64%), with demersal trawls (28%), mechanical dredges (18%) and pots and traps (14.5%) making up the vast majority of landings.
- 4.3.27 Figure 105 shows over-15m *Nephrops* trawlers work in the Clyde, Sound of Jura, and Sea of the Hebrides, predominantly further inshore than the DPOs. Scallop dredgers work the Sound of Jura, Firth of Lorn and across to the Northern Ireland coast, as well as west of Mull and along the east coast of Barra and North and South Uist. Herring is fished in some inshore areas, but mackerel fishing by over-15m vessels is predominantly further offshore than the West region, along the shelf edge (Figure 106). Over-15m vessels using static gear to target *Nephrops* fish each of South Uist and in the Sea of Hebrides, as well as in the Firth of Clyde. Those targeting lobster and crab fish predominantly east of the Outer Hebrides, with the latter also fishing intensely in the Sea of Hebrides, particularly west of the Firth of Lorn between Tiree and Islay.
- 4.3.28 Areas important for under-15m vessels are predominantly inshore of the DPO. *Nephrops* trawls operate in the Firth of Clyde, around the Small Isles and between Skye and South Uist. Scallop dredgers operate in similar areas to the over-15m scallop dredgers and particularly Laggan Bay on Islay (Figure 108). *Nephrops* pots and crab/lobster potting fleets operate throughout the inshore region, with *Nephrops* pots particularly used in Inner Sound between the mainland and Skye, and crab/lobster pots particularly around Barra.
- 4.3.29 There were 328 fishing vessels with their Home Port registered within the West region in 2016¹⁹⁴. The majority (73%) of these were in the ten metres and under length category. The ports with the most registered vessels were Oban (69), Portree (50), Mallaig (32), Castlebay (19) and South Uist (18). Home ports within the West region are shown in Figure 110.
- 4.3.30 Available data show that the main fisheries interacting with the waters in W1 include by scallops (dredging), *Nephrops* (demersal fishing), crab (potting) and *Nephrop* (creeling).

¹⁹⁴ MMO, 2016. UK Fishing Vessel Numbers by Home Port 2016. Available at: https://www.geostore.com/environment-agency/rest/catalogue/download/mmo_wms_united_kingdom_fishing_vessel_numbers_by_home_port_2016?format=ESRI_Shapefile. Accessed 25/10/2018.

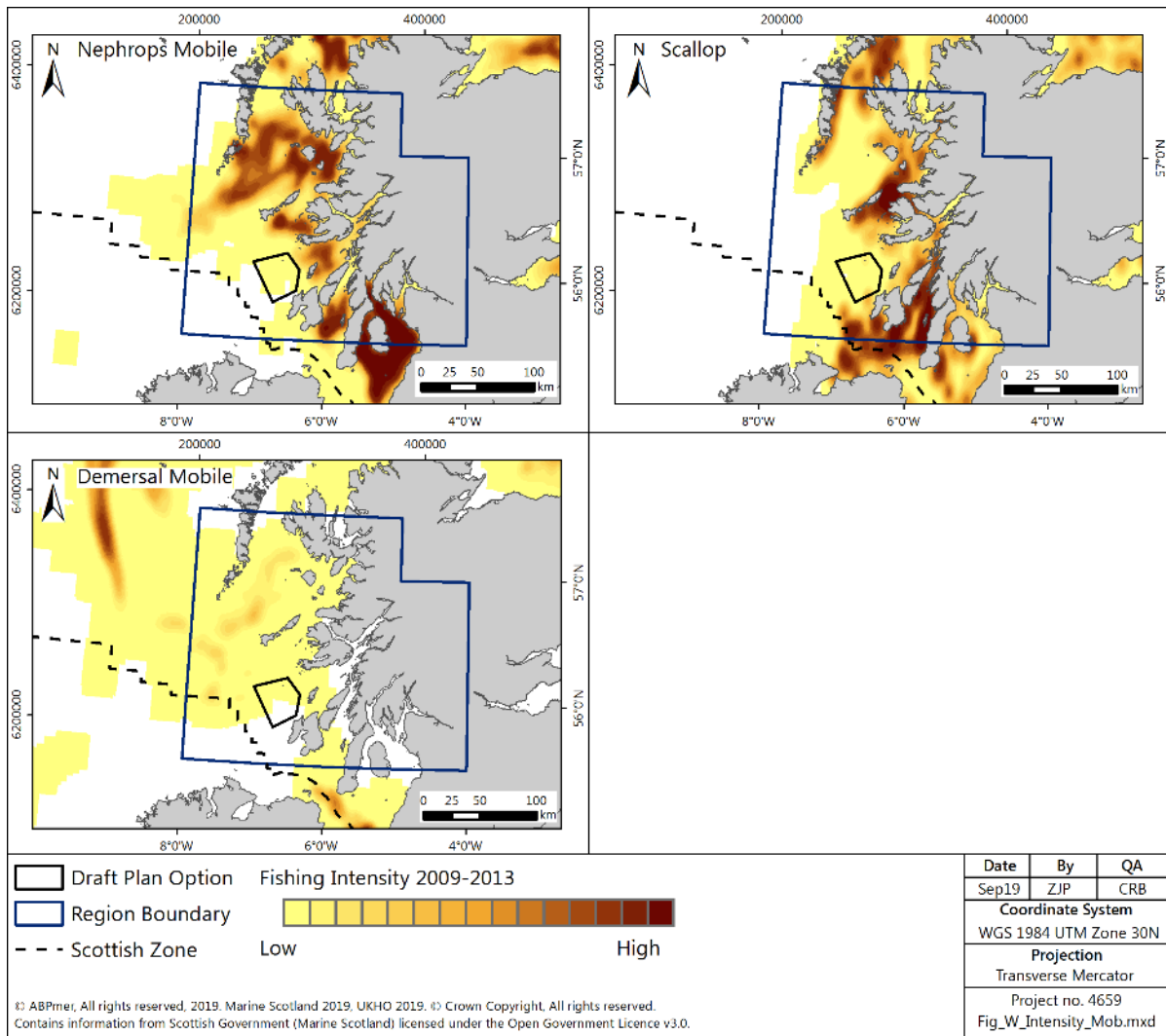


Figure 105 Fishing intensity for over-15m vessels in the West region using demersal mobile gear (2009-2013)

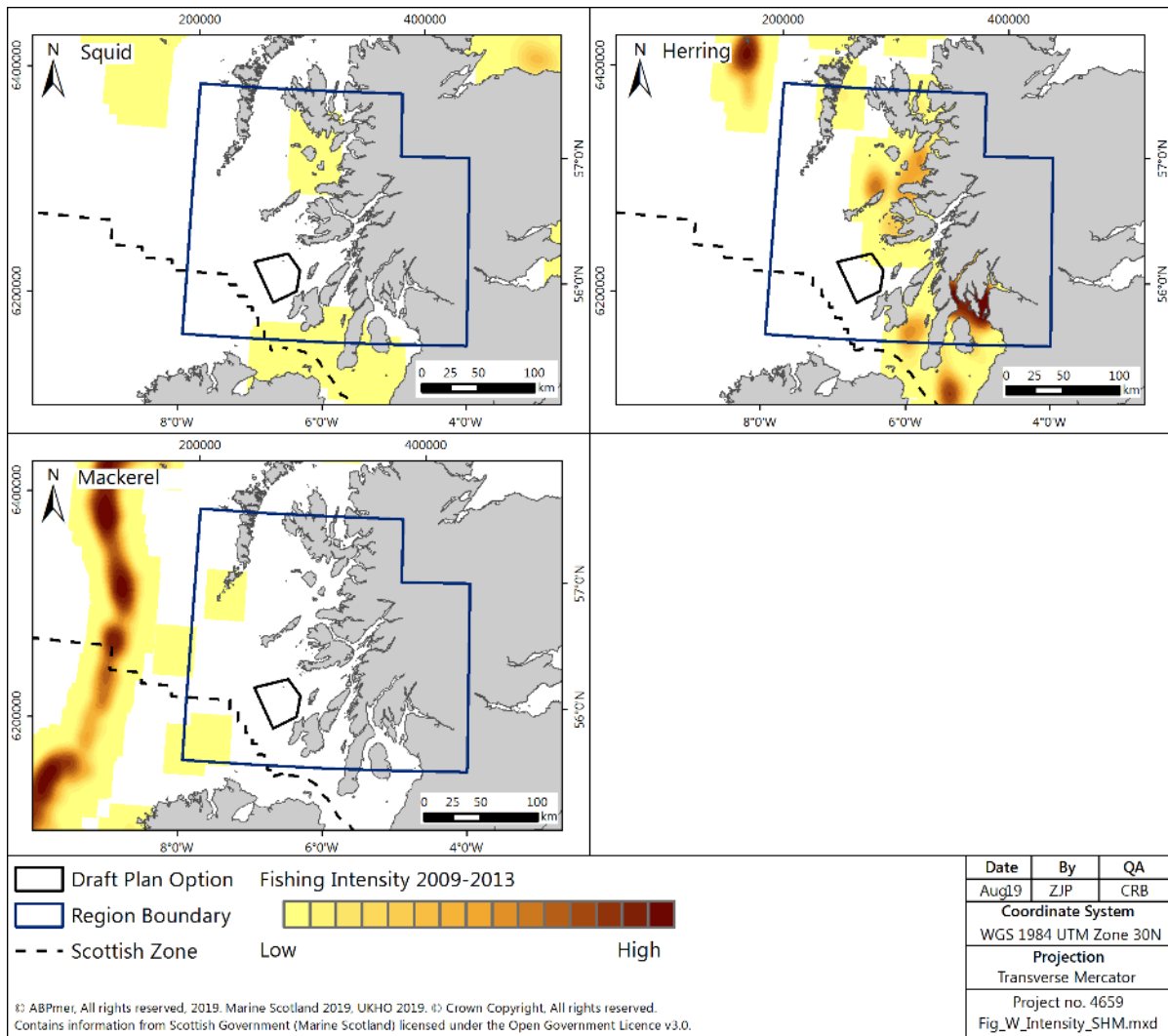


Figure 106 Fishing intensity for over-15m vessels in the West region targeting pelagic species (2009-2013)

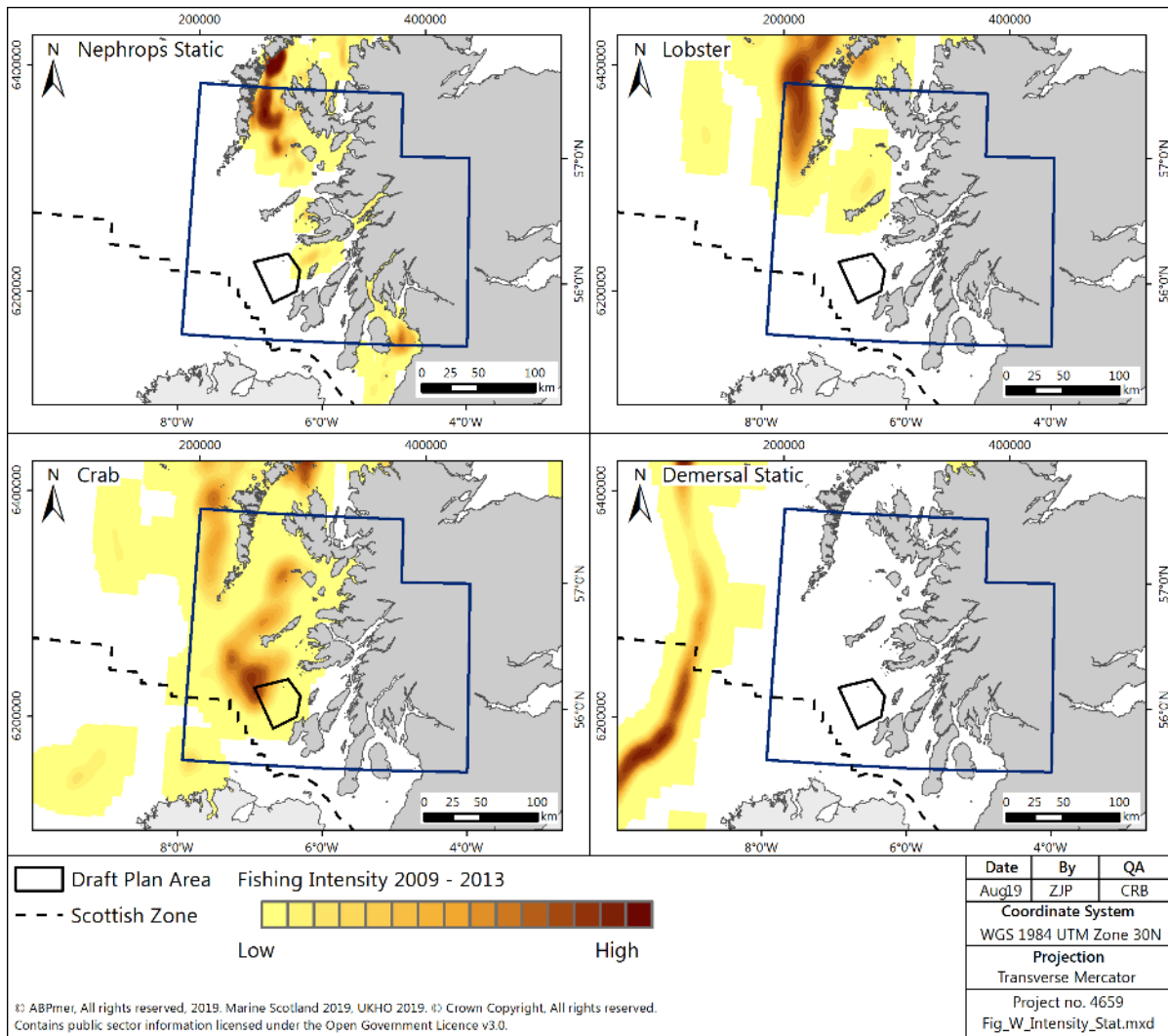


Figure 107 Fishing intensity for over-15m vessels in the West region using static gear (2009-2013)

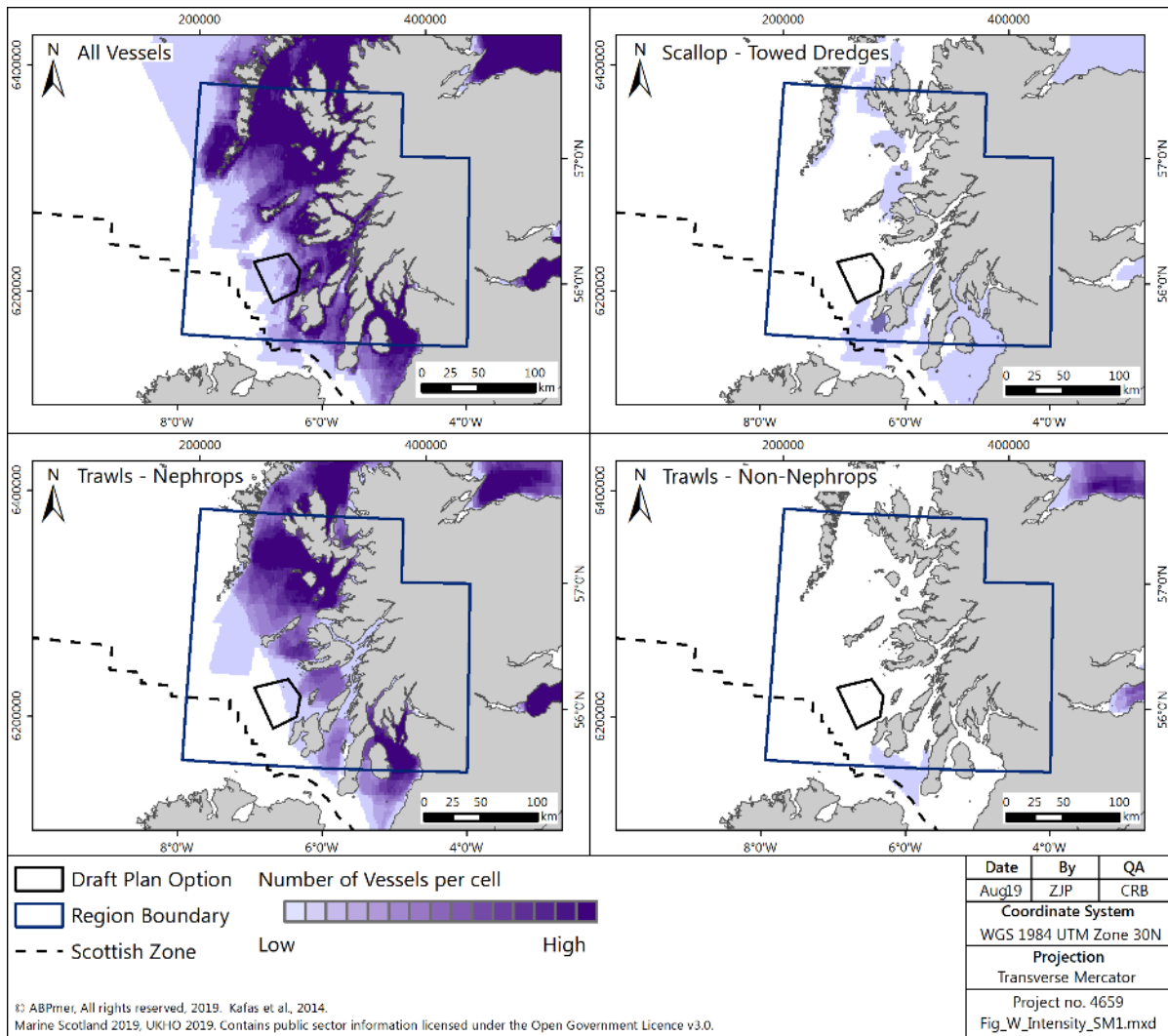


Figure 108 Number of vessels for under-15m vessels in the West region, all gears and mobile demersal gears, from ScotMap

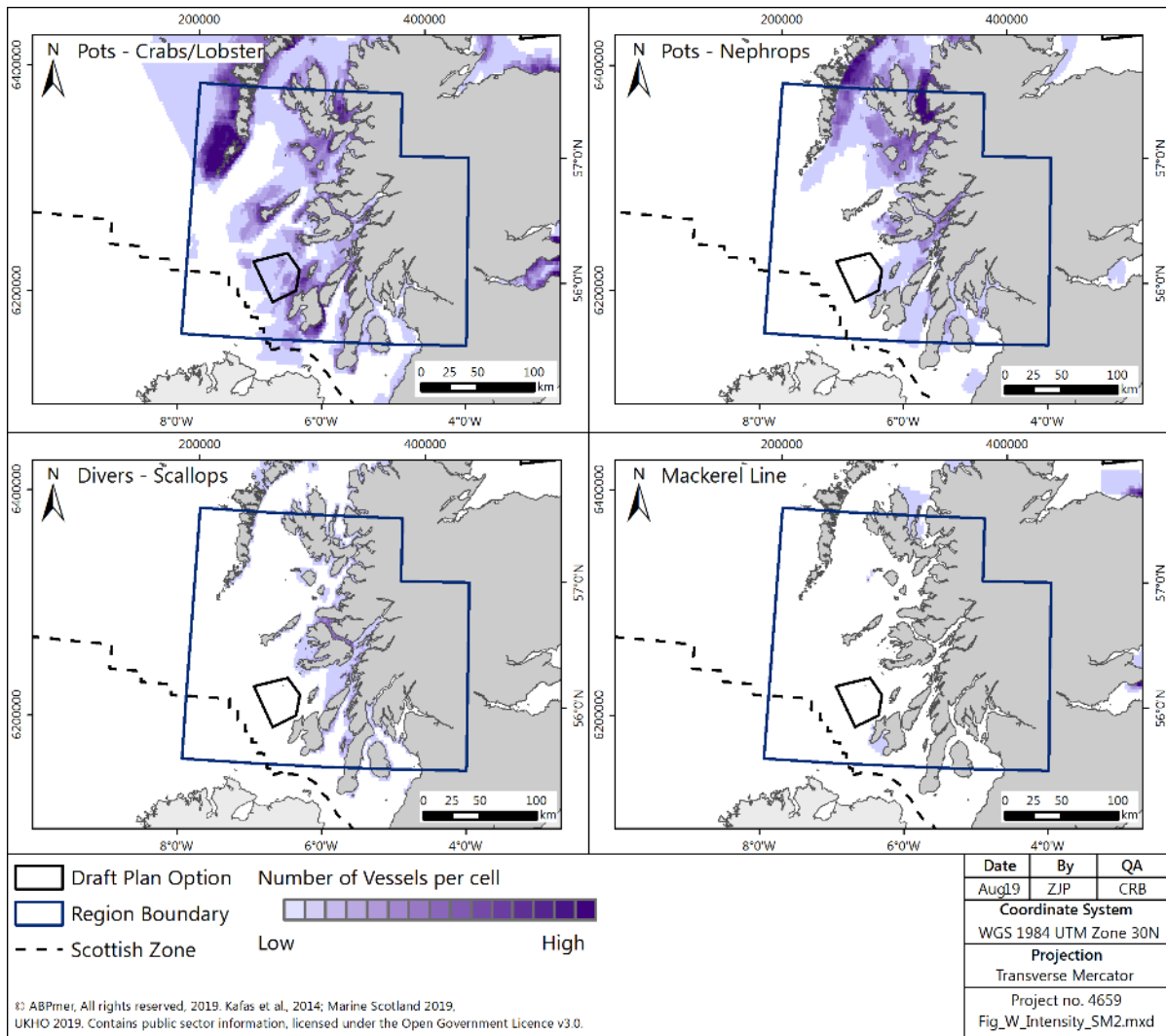


Figure 109 Number of vessels for under-15m vessels in the West region, pots, divers and mackerel lines, from ScotMap

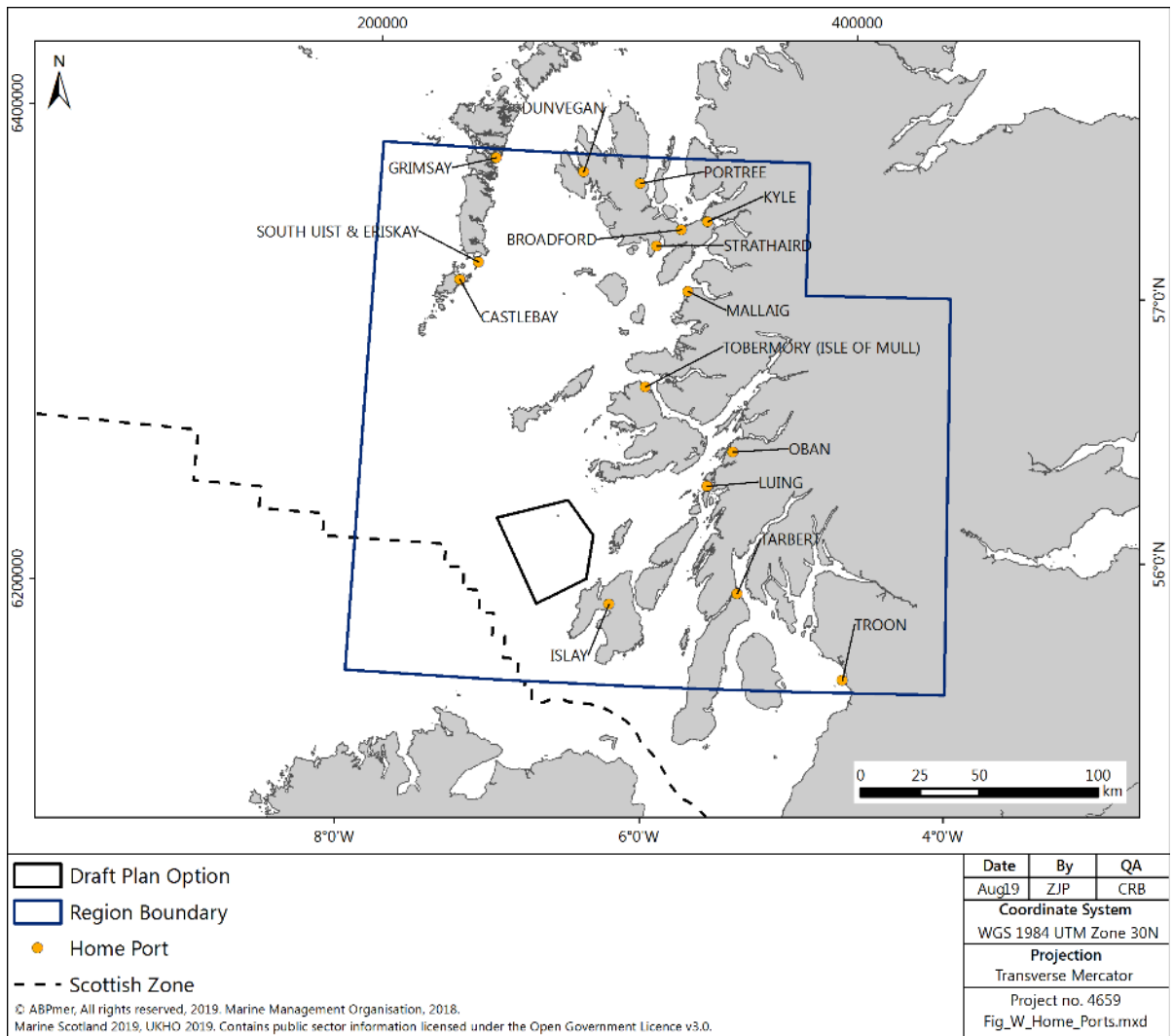


Figure 110 West region: distribution of home ports

- 4.3.31 The main landing ports (in terms of value of landings in 2016) in the West region were Mallaig (£11.1 million), Oban (£4.3 million) and Troon (£3.6 million)¹⁹⁵.
- 4.3.32 There are four fixed engine sites for wild salmon and sea trout in the north of the region, and three net and coble sites (Figure 111).
- 4.3.33 The main rod and line fishing rivers in this region are the Stinchar (salmon), Girvan, Doon (salmon), Ayr (salmon), Irvine, Clyde, Eachaig (sea trout), Add, Fyne, Awe (salmon), Orchy (salmon) and Aline, Lochy (salmon), and Croe (salmon).¹⁹⁶

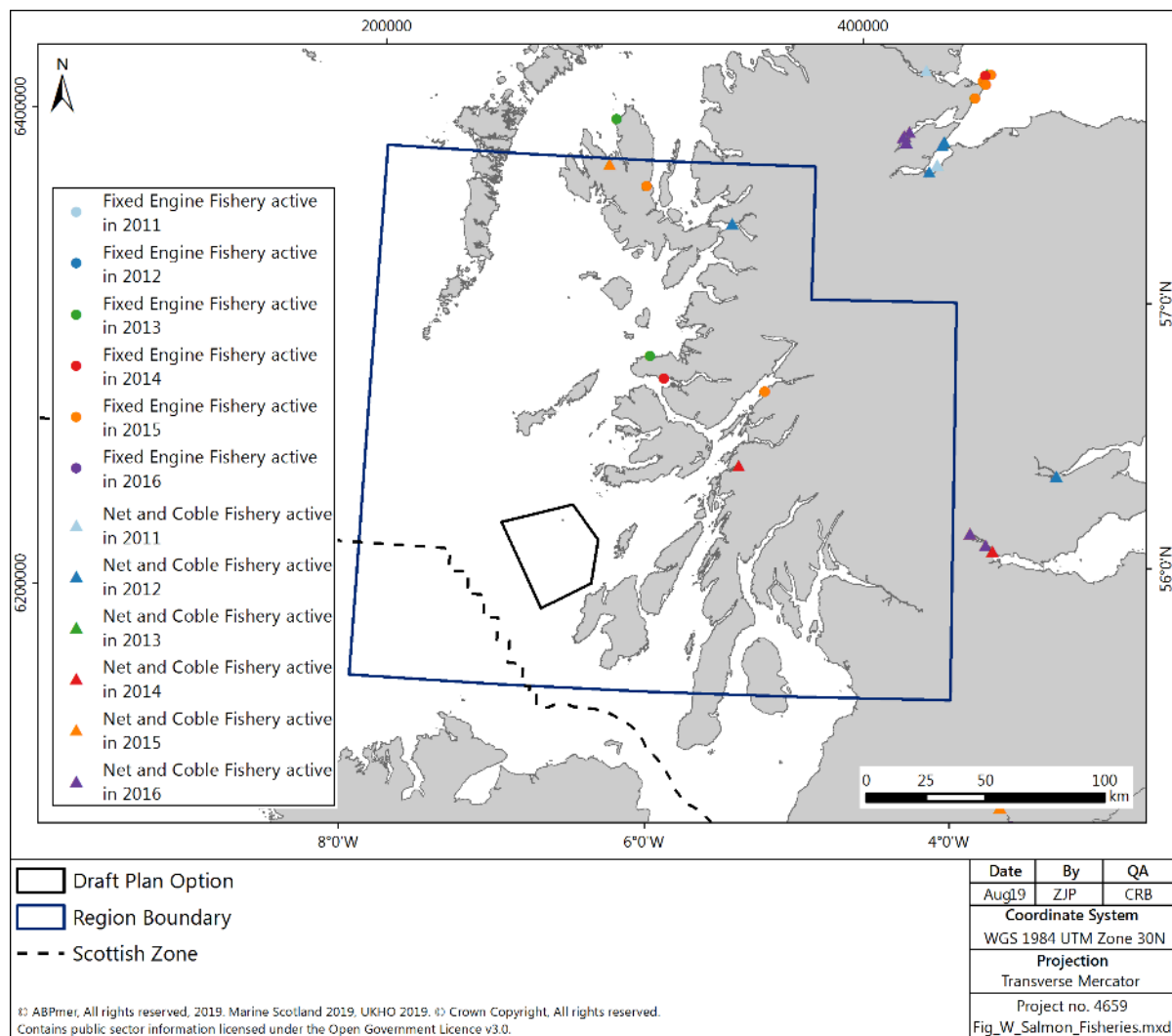


Figure 111 Salmon and sea trout net fisheries reporting catches in 2011–2016 in the West region

¹⁹⁵ MMO, 2016. Fish Landings to UK Ports. Available at: https://www.geostore.com/environment-agency/rest/catalogue/download/mmo_wms_fish_landings_to_united_kingdom_ports_2016?format=ESRI_Shapefile. Accessed 25/10/2018.

¹⁹⁶ Scottish Government. 2012. Offshore Wind Energy in Scottish Waters - Draft Regional Locational Guidance. doi: 10.7489/1686-1.

Aquaculture

- 4.3.34 Marine aquaculture sites within the West region are shown in Figure 112. There are 109 licensed finfish and 121 licensed shellfish sites. Aquaculture sites are widespread along the coastline within the west region, with concentrations in Loch Fyne, the Firth of Lorn and around the Isle of Mull.
- 4.3.35 There are no aquaculture facilities within the DPO and it is considered unlikely that development will be brought forward in these areas unless there is beneficial co-location with offshore wind development.
- 4.3.36 In the West region, shellfish production is dominated by mussel and Pacific oyster, although small quantities of scallop, queen scallop and native oyster are also produced. The West region encompasses parts of the Strathclyde, Highland and Western Isles regions used in the Scottish Government's 2017 Production Survey, therefore, production numbers will be an over estimation. The aquaculture industry farms large quantities of salmon in the West region. In 2016, approximately 111,000 tonnes were produced with a value of £520 million¹⁹⁷.
- 4.3.37 In 2017, 1,585 tonnes of mussels and 5,034 tonnes of Pacific oysters were produced¹⁹⁸.

¹⁹⁷ Scottish Government. 2016. Marine Scotland Science. Scottish Fish Farm Production Survey 2016.

¹⁹⁸ Scottish Government. 2017. Marine Scotland Science. Scottish Shellfish Farm Production Survey 2017.

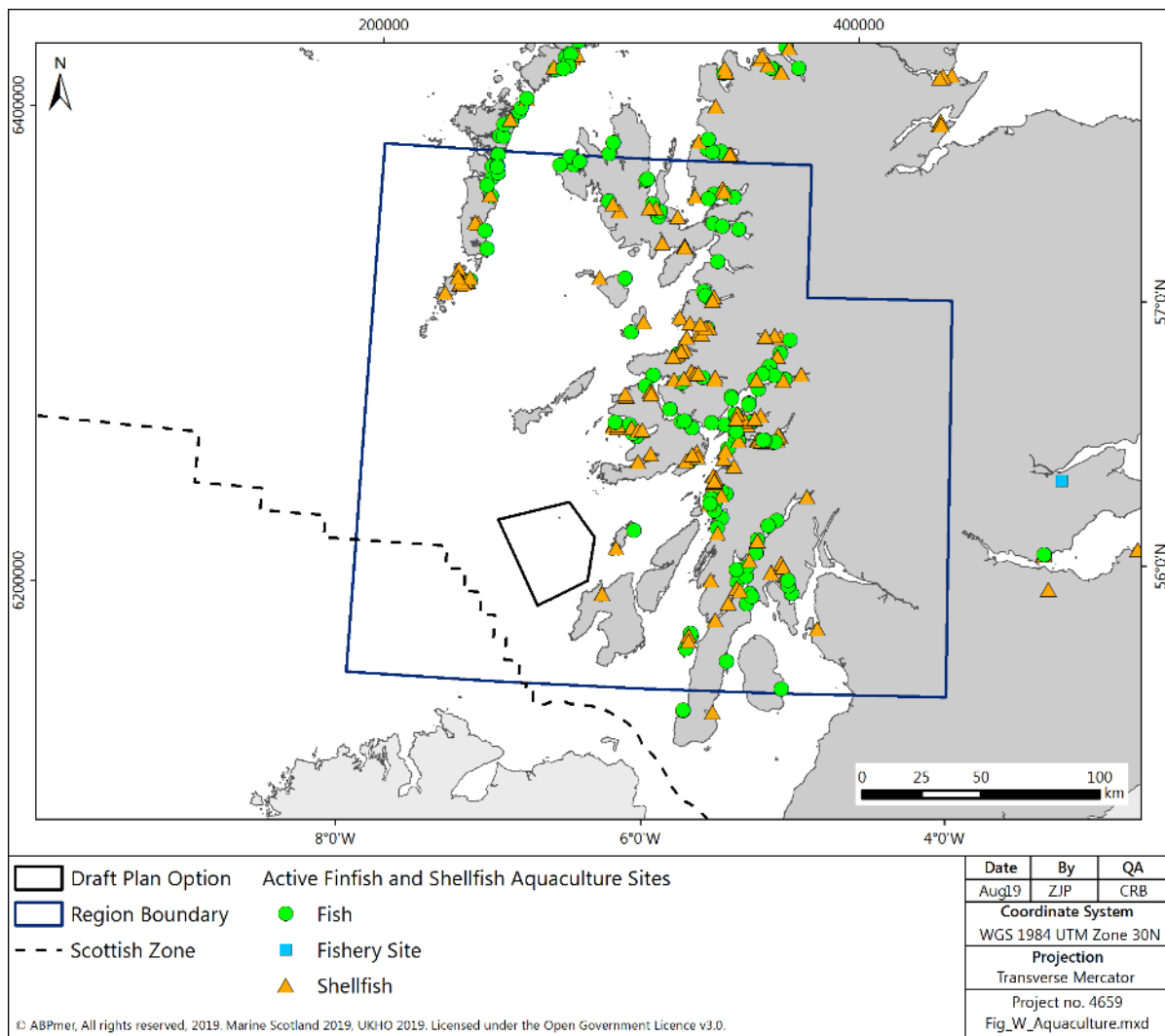


Figure 112 West region: marine aquaculture sites

Ports and Harbours

- 4.3.38 The west of Scotland is a busy region for ports and harbours. Figure 113 shows that there are 3 major ports, 10 minor ports and numerous smaller harbours and marinas supporting commercial and recreational fishing activities, yachting and recreation throughout the region. This includes ports located on the islands across the region which are essential for supporting ferry services.
- 4.3.39 Glensanda port is used for the loading and export of granite aggregate from the Yeoman Glensanda Quarry¹⁹⁹.
- 4.3.40 Greenock is the main container port for Glasgow and a major port of call for large cruise ships.
- 4.3.41 Kishorn, Arnish, Hunterston and Campbeltown ports have been identified as key sites to support the construction, operation and maintenance of offshore wind, discussed in the Supply Chain section above.
- 4.3.42 There is a high concentration of anchorages in the West region, particularly in the Inner Hebrides and the Firth of Clyde, reflecting the high sailing activity in the area. None of the anchorages overlap with the DPO.
- 4.3.43 There are a few dredge disposal sites in the region. They are all close inshore and do not overlay with the DPO.

¹⁹⁹ Aggregate Industries. 2018. Glensanda Port and Terminal Information Booklet. Available at: https://www.aggregate.com/sites/aiuk/files/atoms/files/the_mariners_guide_to_glensanda_2.pdf. Accessed 12/10/2018.

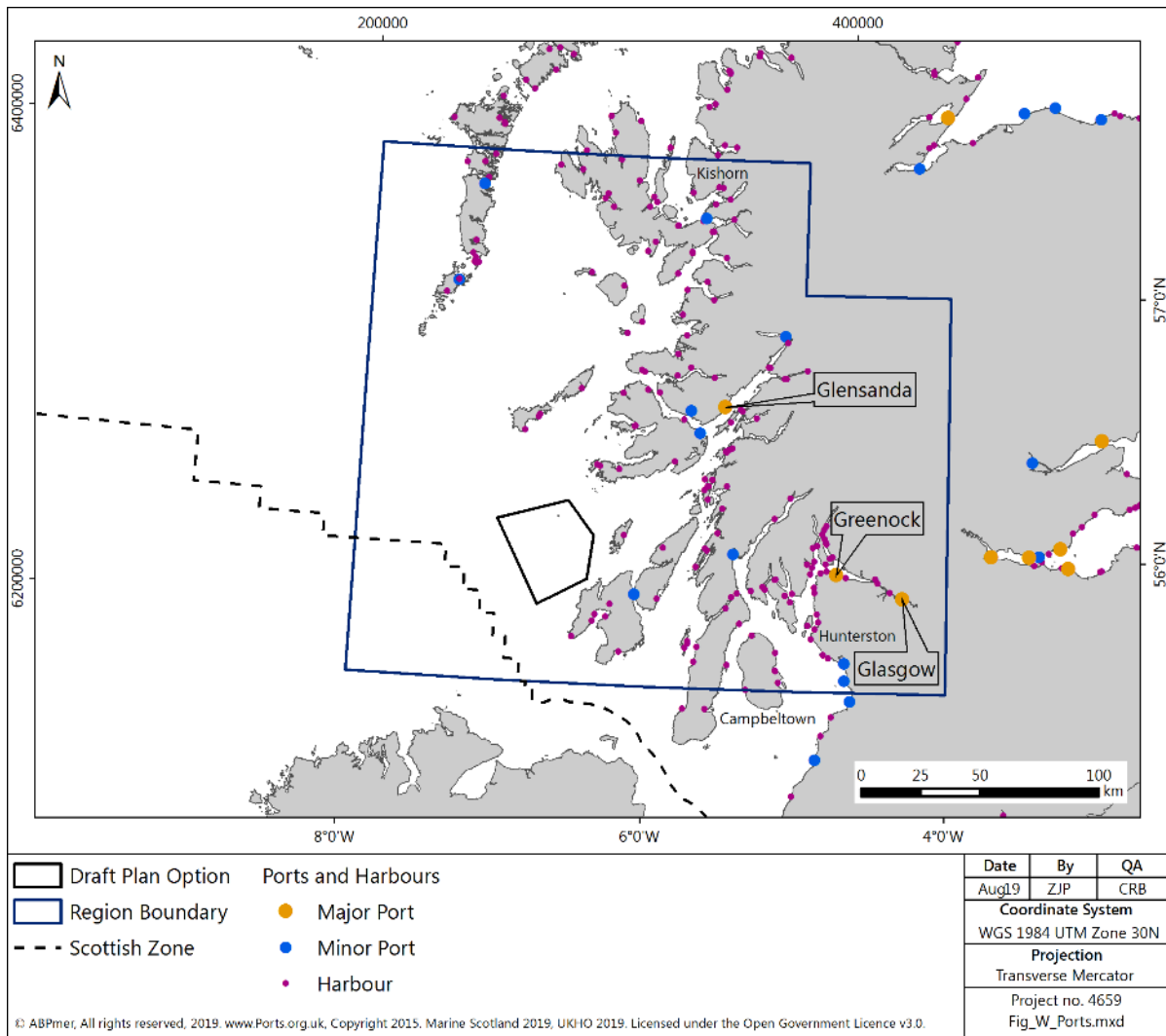


Figure 113 West region: ports and harbours

Shipping

- 4.3.44 There are key shipping routes within the West region, particularly related to the North Channel, the Firth of Clyde, and ferry services related to the Inner and Outer Hebrides.
- 4.3.45 AIS density data (Figure 114) shows areas of high density related to the Firth of Clyde, in some cases up to 100 vessel transits per week, where commodity transport and ferry movements are high, including lifeline connections to Arran, and the Mull of Kintyre.
- 4.3.46 Within the West region Oban forms a hub for ferry traffic (ferry services lines shown in Figure 114) serving the Inner and southern Outer Hebridean Islands, including lifeline services to Mull, Coll and Tiree, Barra, Islay, South Uist, Lismore and Colonsay. The importance of Oban as a hub is highlighted by the particularly high density of marine traffic in the Sound of Mull (Figure 114). There are also key ferry services in the Firth of Clyde, serving Bute, Great Cumbrae and Arran.
- 4.3.47 There is overlap between areas of high shipping density and W1 in the West region. There are moderately used routes (up to 5 vessel transits per week) transiting north-south through the DPO.
- 4.3.48 The Minches TSS is at the northern end of the West region, and the North Channel TSS is outside but just to the south of the West region and is used to ensure safe passage for the high density of traffic through the North Channel linking routes from the Clyde, Wales and England through the Irish Sea to routes in the Atlantic and North through the Minches. The recommended deep water route is also aimed at reducing the volume of traffic passaging through the Minches, therefore reducing navigational and environmental risk in the area.
- 4.3.49 Shipping as an industry is important economically as well as socially to the West region, with high levels of employment linked to shipping, particularly boatbuilding, in the Firth of Clyde.

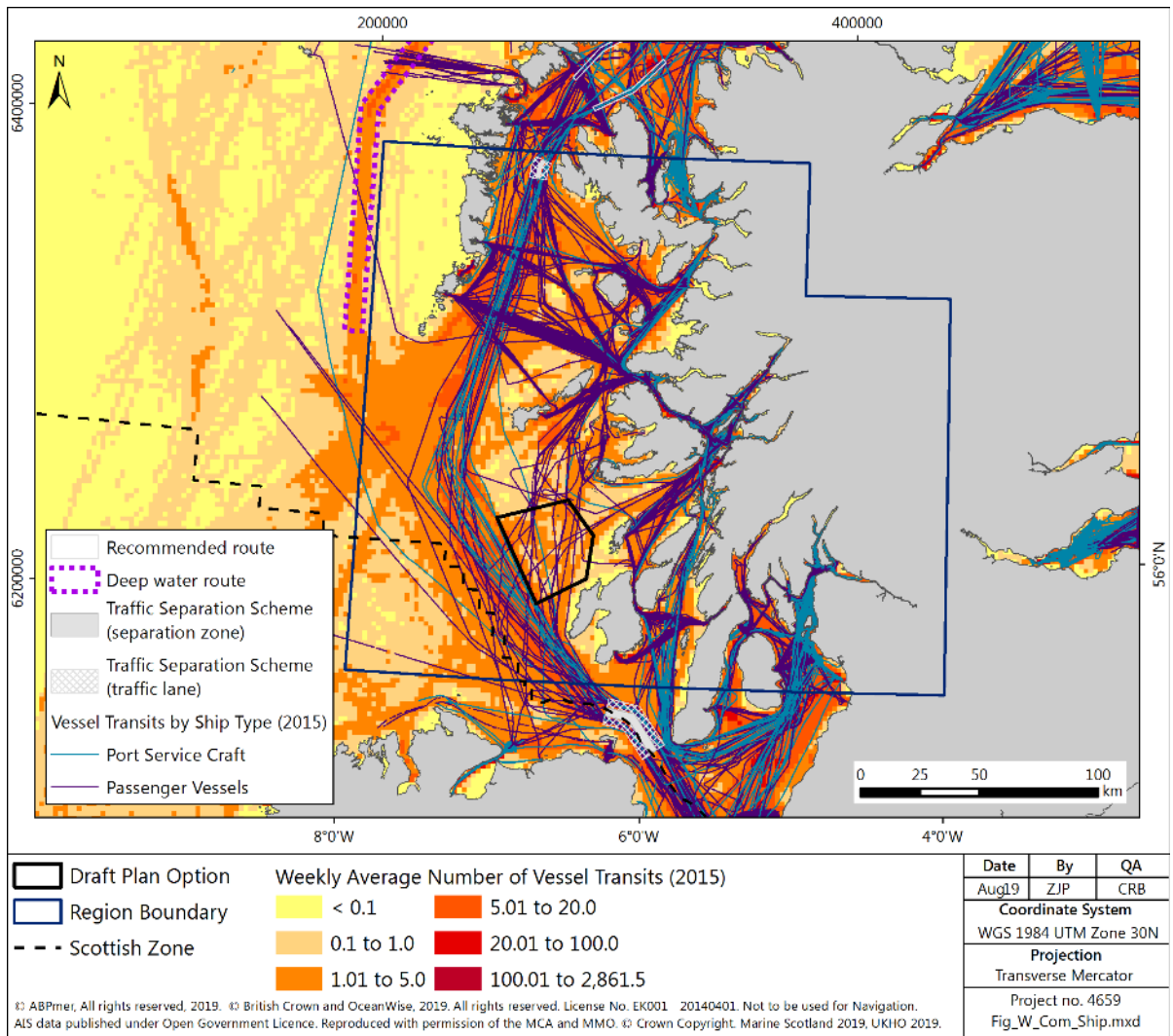


Figure 114 West region: shipping densities and key routes

Coastal and Flood Protection

- 4.3.50 There are few areas of coastal or flood protection in the West region (Figure 115), flood defences are limited to the Firth of Clyde, whilst the only coastal protection schemes identified since 2000²⁰⁰ are on the western coast of the Outer Hebrides.
- 4.3.51 W1 is located close to coast around the Isle of Islay. The main coastlines associated with the planned W1 DPO are characterised by rocks/ hard cliffs (low erosion).

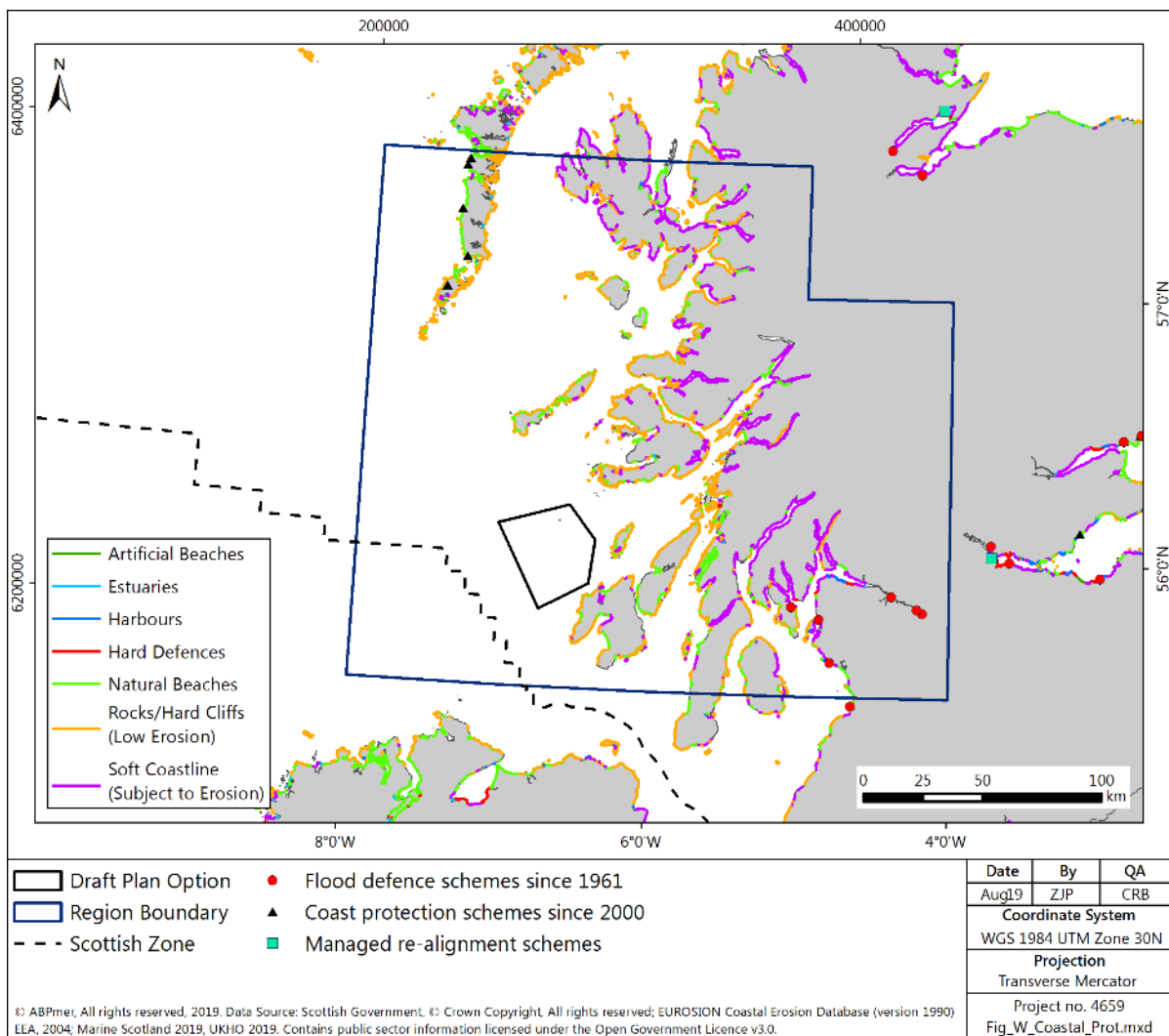


Figure 115 West region: coastal and flood protection schemes

²⁰⁰ Baxter, J.M., Boyd, I.L., Cox, M., Donald, A.E., Malcolm, S.J., Miles, H., Miller, B., Moffat, C.F. 2011. Scotland's Marine Atlas: Information for the national marine plan. Marine Scotland, Edinburgh. Available at <https://www.gov.scot/Publications/2011/03/16182005/0>.

Marine and Coastal Recreation

4.3.52 Overall recreational activity in the West region is shown in Figure 116. Most recreational activity occurs in inshore areas and available data shows that there is a low-level of marine and coastal recreation activities around W1, although there is some potential interaction with sailing and cruising routes in the region.

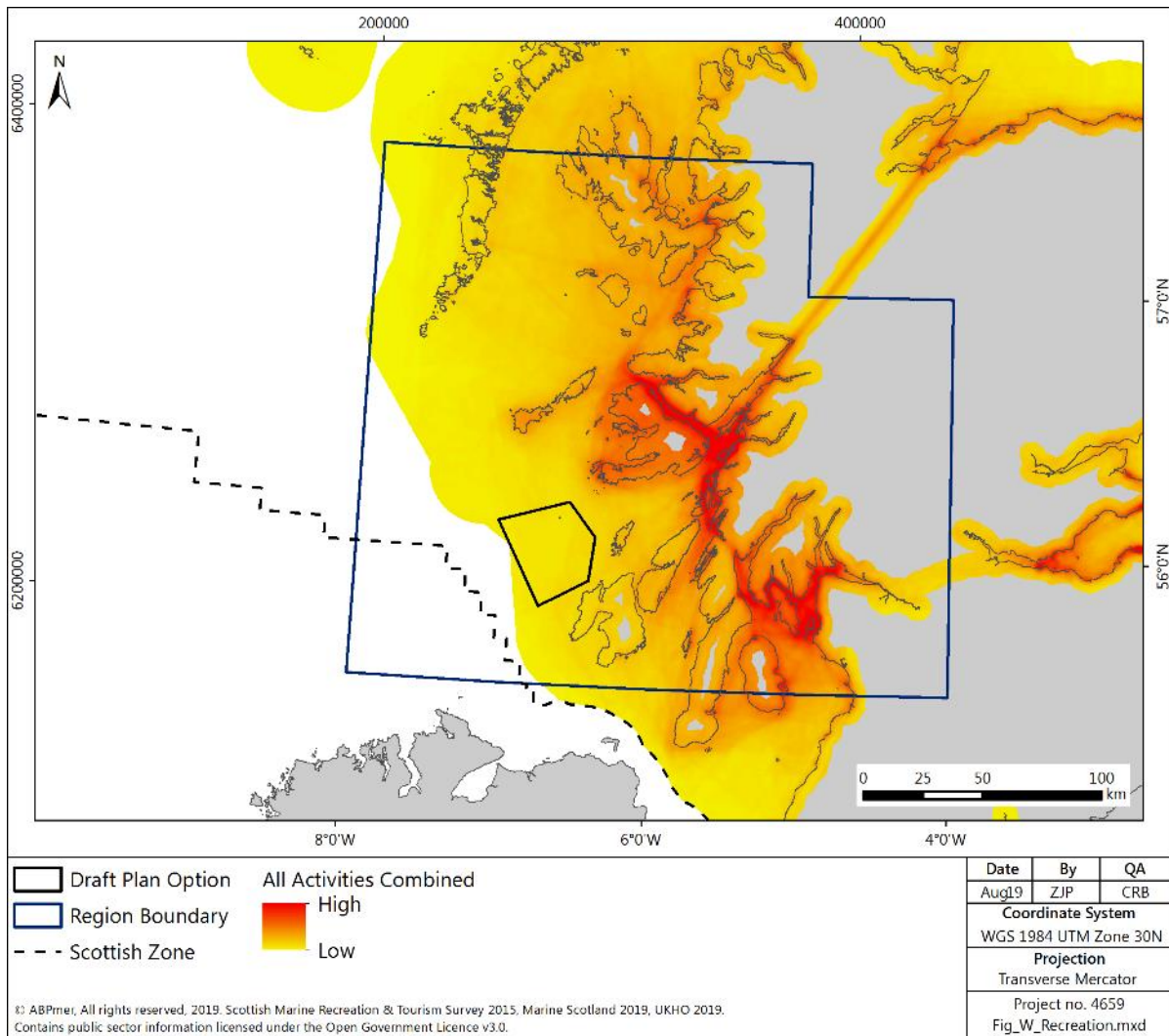


Figure 116 West region: density of recreational activities

Boating

4.3.53 The west coast of Scotland is one of the world's best areas for sailing. The Clyde and Solway Firth are particularly popular destinations. There are also numerous RYA marinas, clubs and training centres along the coast. There is considered to be generally a low level of boating occurring within and in the vicinity of W1 (Figure 117).

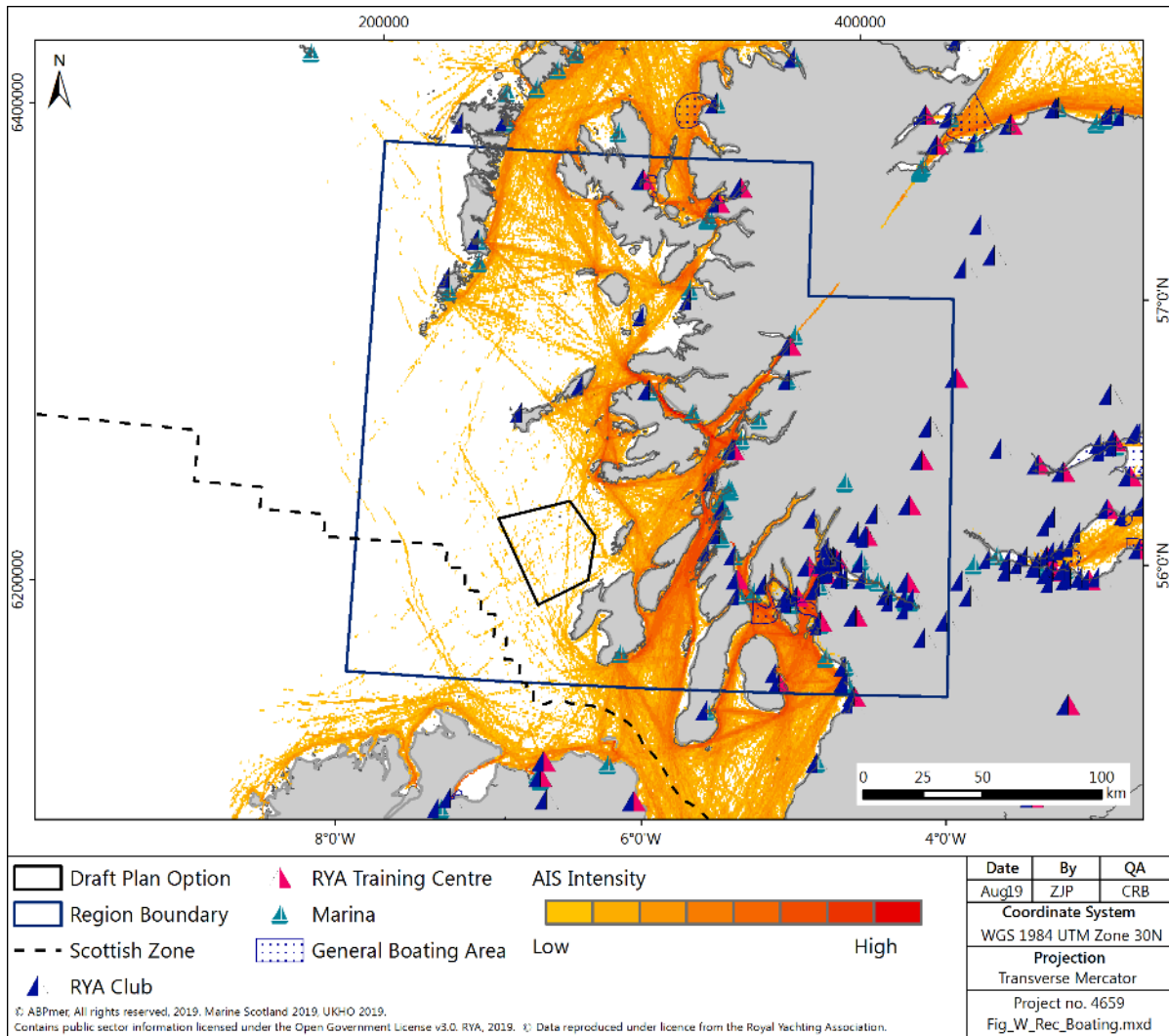


Figure 117 West region: recreational boating facilities and recreational boating density (from 2015 AIS data)

Angling

4.3.54 Glasgow, Clyde, Solway Firth and the Argyll coast have the highest densities of anglers in the West region (Figure 118). The Firth of Clyde has relatively poor fish stocks and is not capable of supporting regular sea angling charter activity, but there are reasonable numbers of local shore anglers who rely heavily on seasonal fish stocks such as mackerel. Own boat and charter boat angling is popular at other locations on the West coast of Scotland where there are excellent sheltered lochs enabling safe and comfortable fishing. However, available data show that there is a low level of overlap between angling activities and W1 (Figure 118).

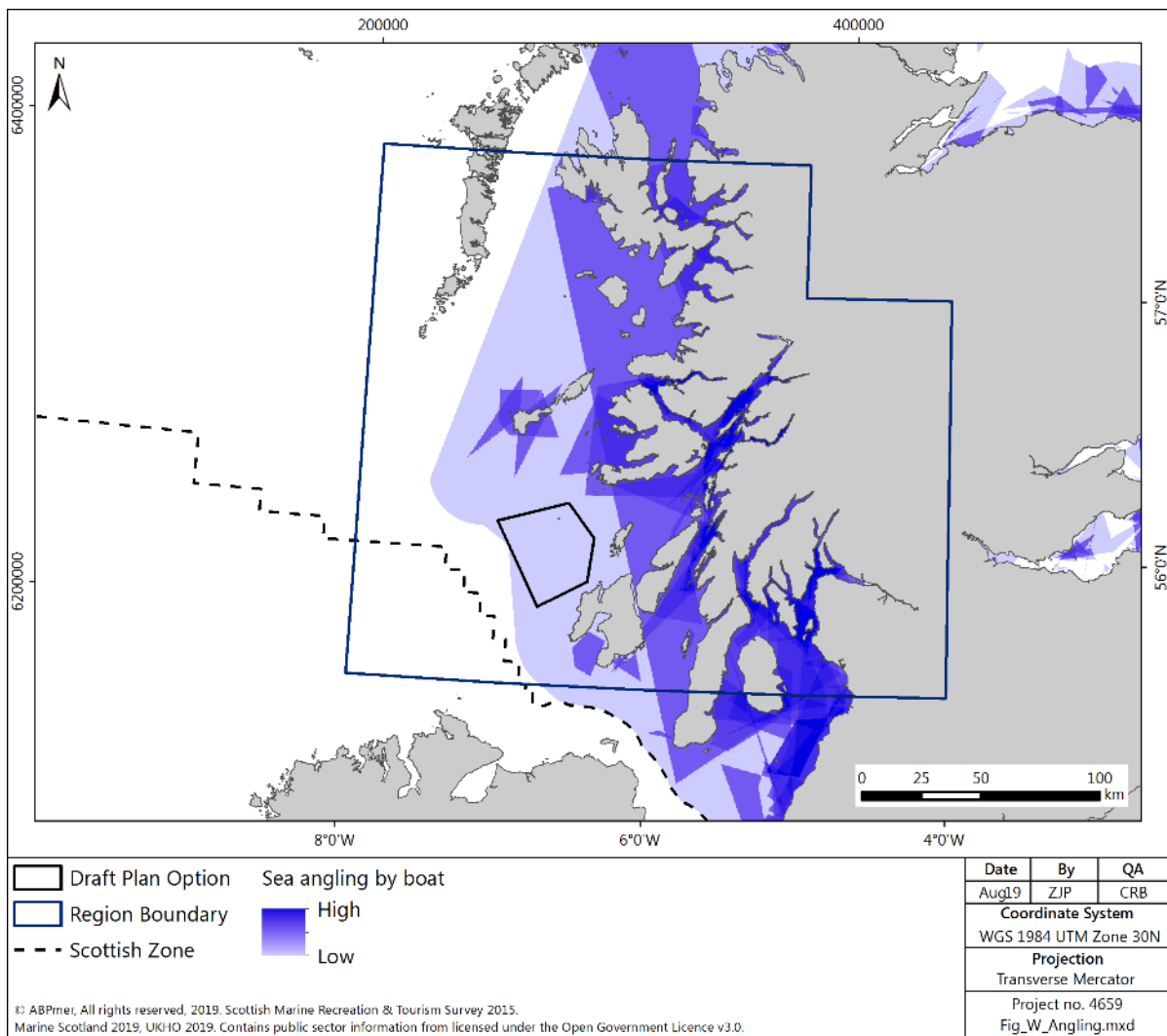


Figure 118 West region: sea angling (by boat) activity density

Scuba Diving

4.3.55 The West region is a popular scuba diving area and there are many dive centres and charter boats operated in the area. Most scuba diving sites are located around the Inner Hebrides, Firth of Clyde and the lochs near Glasgow (Figure 119). Available data indicates that there is no overlap between scuba diving sites and W1 (Figure 119).

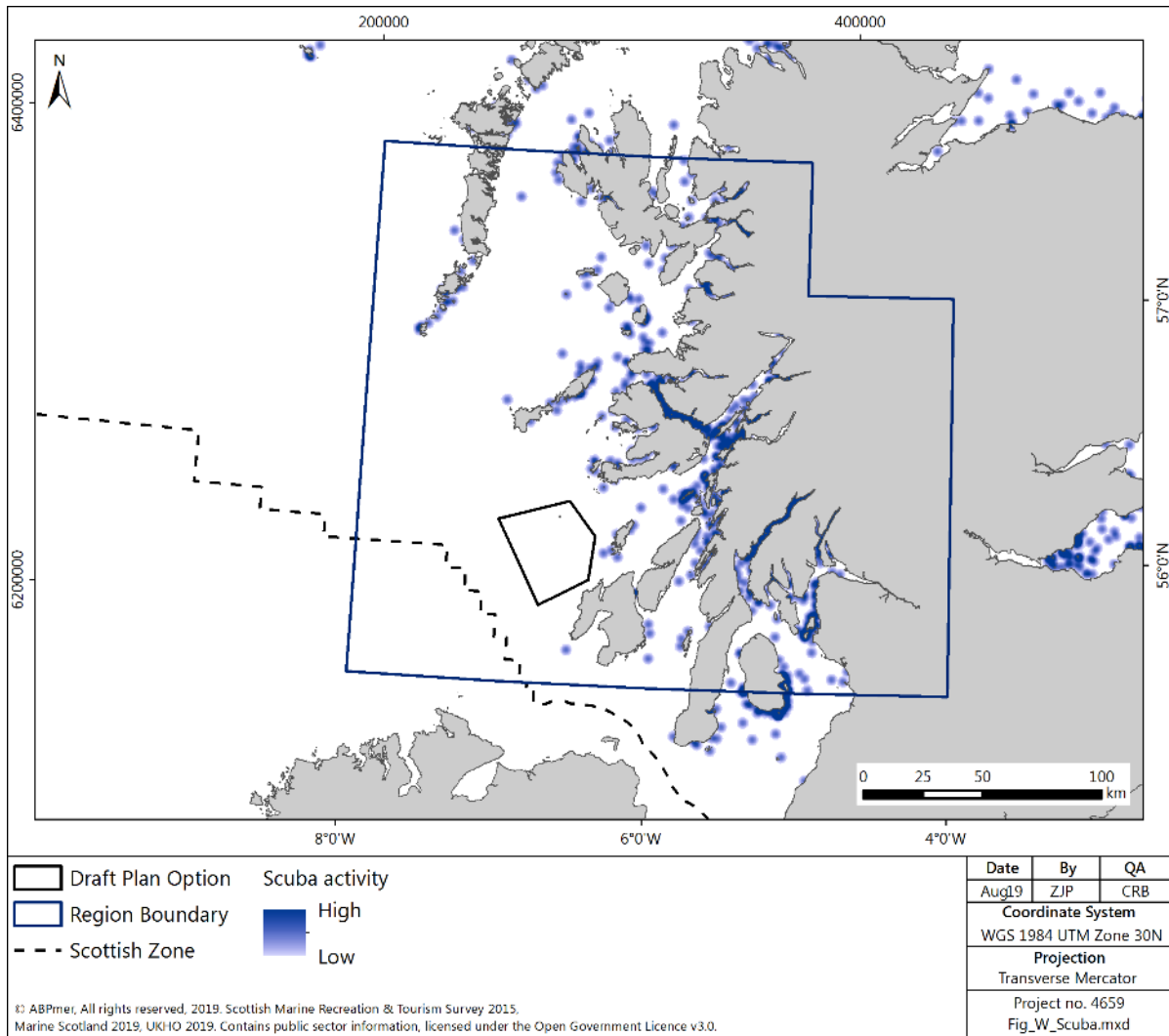


Figure 119 West region: scuba diving activity density

Kayaking and Canoeing

4.3.56 Kayaking and canoeing takes place at most spots along the west coast where there are suitable launching spots such as beaches and slipways. The majority of trips are close inshore or short distances between islands and available data indicate that no activity is conducted within W1 (Figure 120).

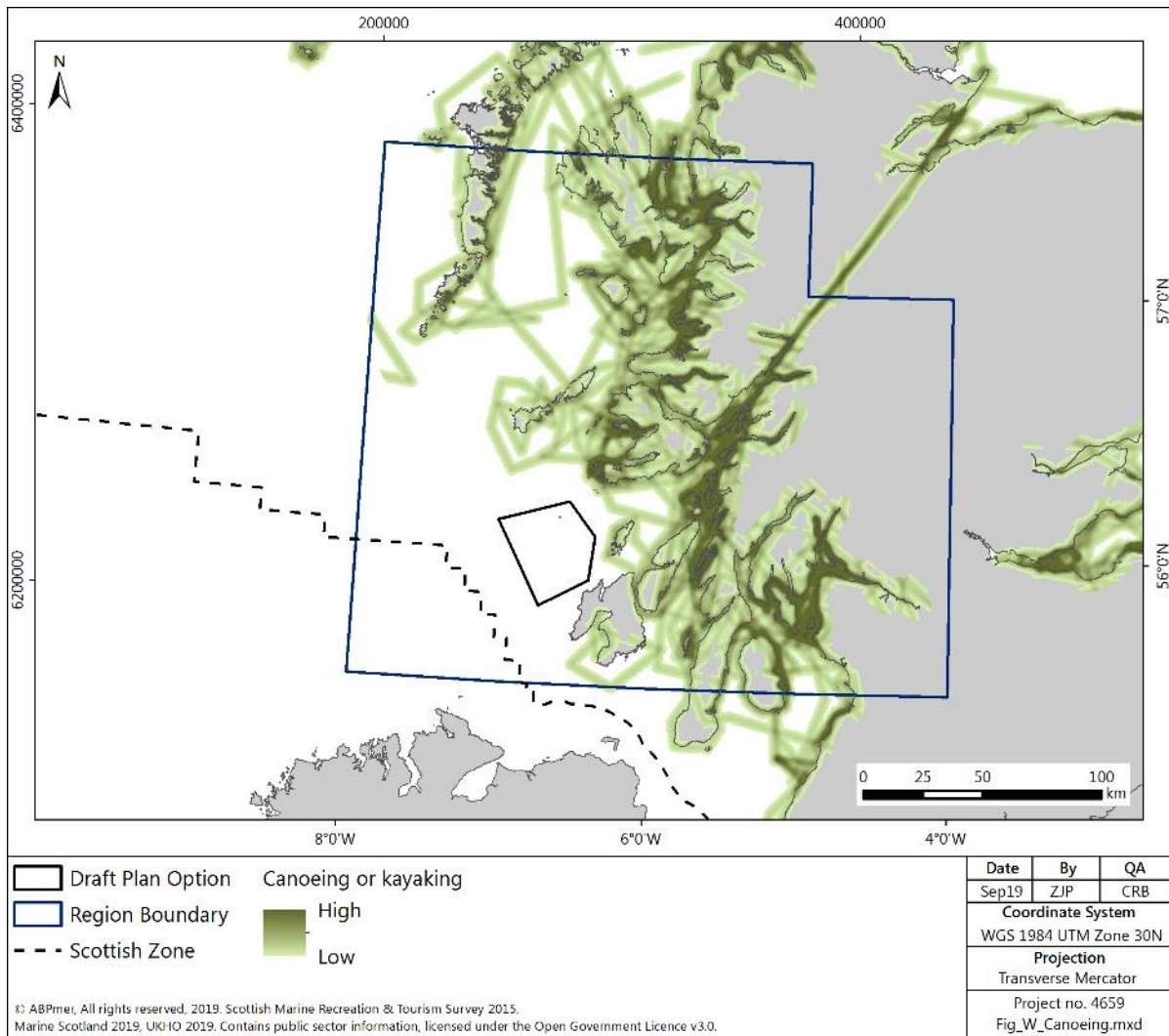


Figure 120 West region: canoeing or kayaking activity density

Surfing and Windsurfing

- 4.3.57 The west coast of Scotland is exposed to swells generated by the Atlantic Ocean and offers a range of west to north facing beach and reef breaks along the coast (Figure 121 and Figure 122). Some of the spots are considered to be of very high quality and their remoteness means that they remain uncrowded most of the time, although the area around Tiree is a popular destination for travelling windsurfers (Figure 122) and competitions such as the Tiree Highland Open are held annually here.
- 4.3.58 In addition, the growth of paddleboarding in Scotland can be clearly seen in the high density of activity in the comparatively flat waters in the sea lochs and Firth of Clyde (Figure 121).
- 4.3.59 Data suggests that no surfing, surf kayaking and paddleboarding activity is conducted within or around the vicinity of W1 (Figure 121). However data indicates that windsurfing and kitesurfing may occur within W1, albeit, at relatively low levels (Figure 122).

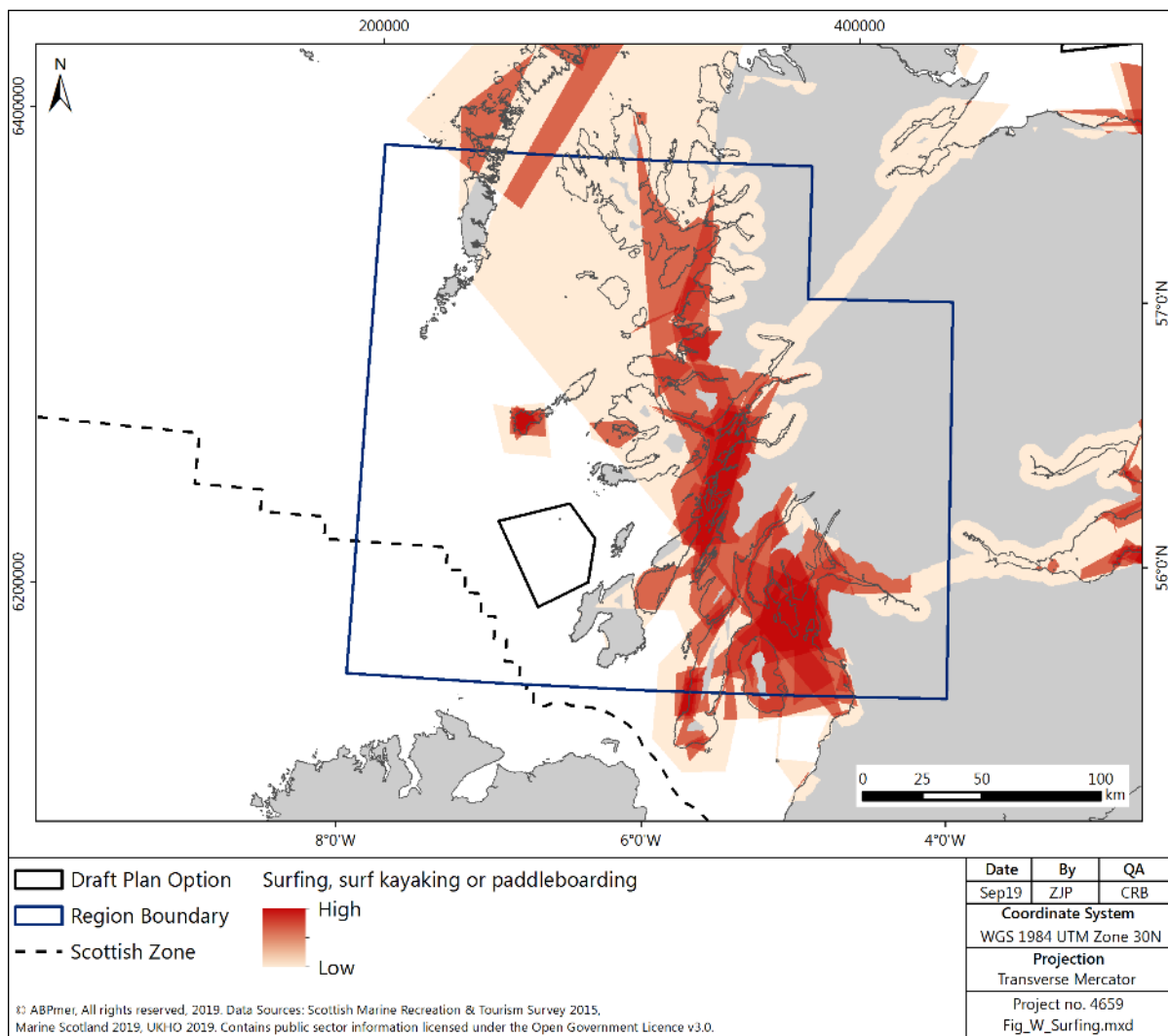


Figure 121 West region: surfing, surf kayaking and paddleboarding activity density

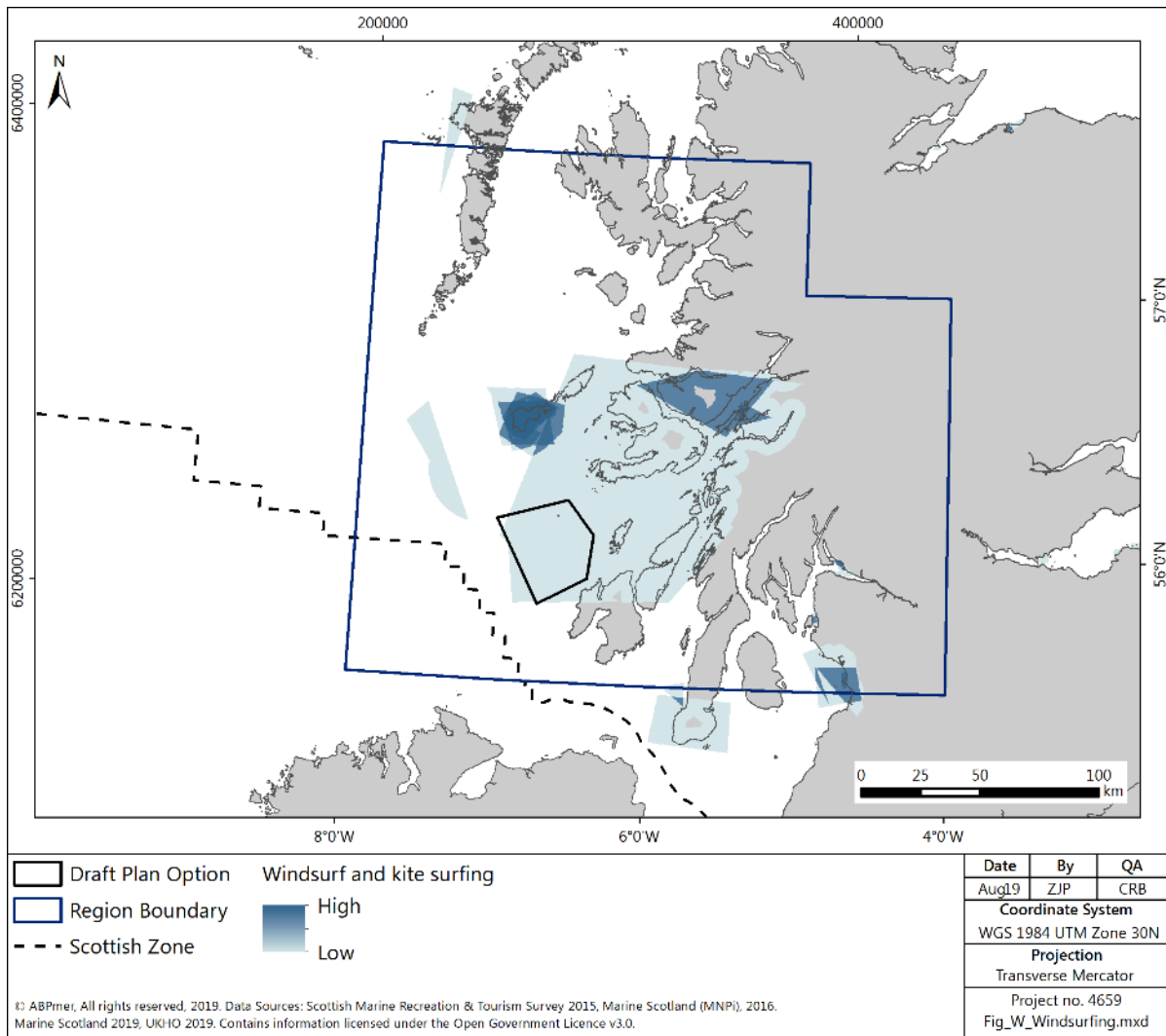


Figure 122 West region: windsurfing and kitesurfing activity density

Tourism

- 4.3.60 The West region has a range of tourist destinations throughout the region. The highest levels of visitors are seen along the coast, however, little activity is recorded on coastlines facing W1 (Figure 123).
- 4.3.61 The Argyll coast and islands of the West region have valuable marine and coastal resources that support tourism activity. A survey found that the main reasons that tourists visit the area were scenery, wildlife and the high quality of the marine and coastal environment. The most popular coastal activities were coastal walks, visiting beaches and wildlife watching boat trips²⁰¹.
- 4.3.62 The islands of Coll and Tiree in the Inner Hebrides are recognised as a basking shark hotspot which is popular with wildlife watchers, divers and underwater photographers. The Isle of Mull is a popular destination for cetacean watching with many trips organised through the Hebridean Whale and Dolphin Trust Visitors Centre which brings tourists to the area²⁰². Other popular areas to visit include; Oban, Tiree, Iona and Staffa.

²⁰¹ Benfield, S., McConnell, S. 2007. Marine and Coastal Visitor Management, Public Engagement and Interpretation in Argyll and the Islands: the way forward. Marine and Coastal Development Unit, Argyll and Bute Council, 2007, 1-145.

²⁰² Hebridean Whale and Dolphin Trust. 2018. About HWDT. Available at: <https://hwdt.org/what-we-do/>. Accessed 12/10/2018.

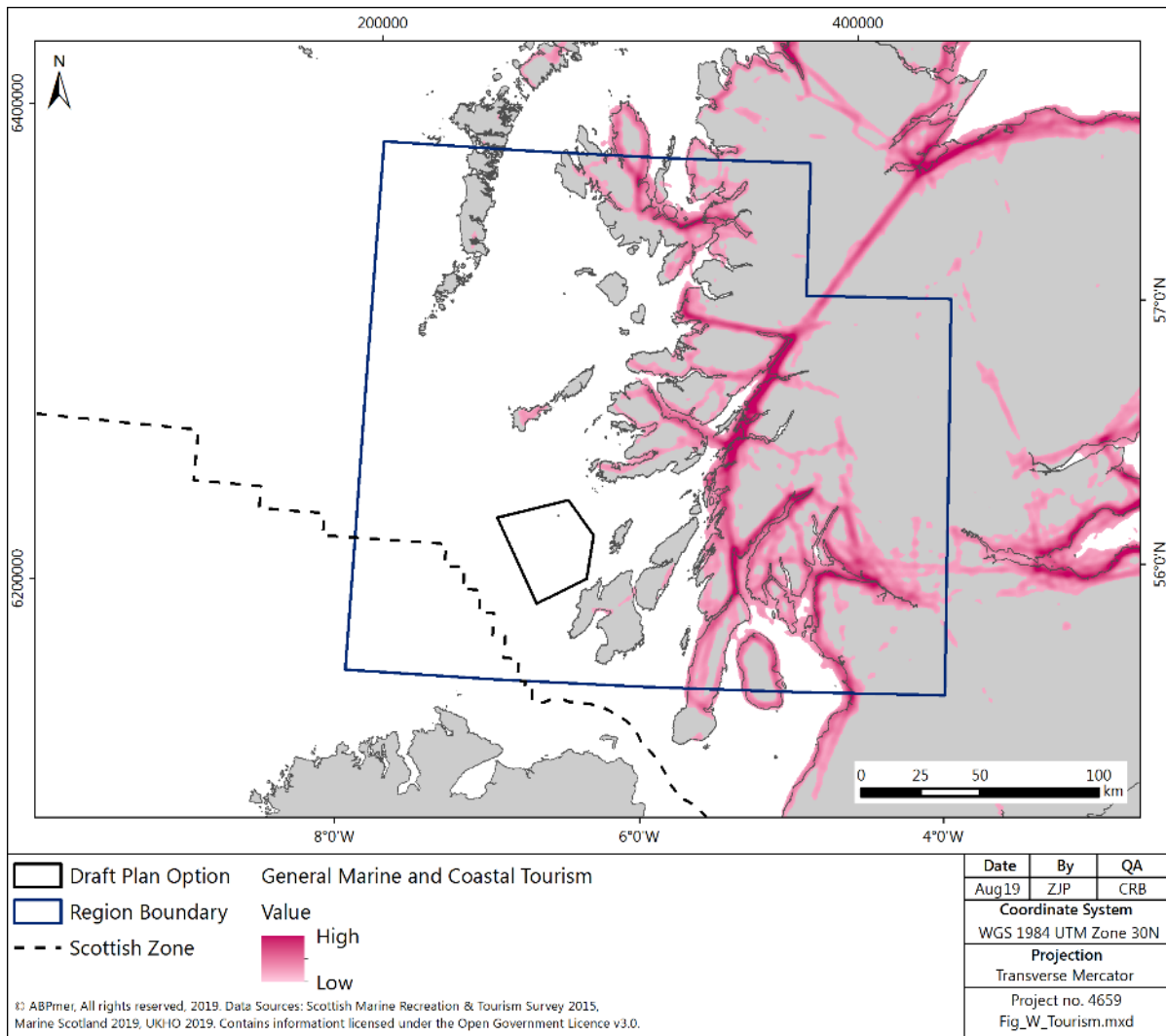


Figure 123 West region: tourism activity density

Social Considerations

- 4.3.63 The total population in the West region is approximately 1.7 million²⁰³. The population is slightly higher than the national average for ages 10-24 and 60-89, but below the national average for the 45-59 age bands. The overall average age in the West Region is 45 years old (the national average is 41). 15% of the population is under 16 years old, 58% is of working age and 27% are pension age.
- 4.3.64 In 2017 the employment rate in the region was 76%²⁰⁴. The greatest number of jobs in West region are associated with public admin, education and health (33%). Other important industry sectors are distribution, hotels and restaurants (19%), and banking and finance (12%).

²⁰³ National Records of Scotland. 2018. Mid-Year Population Estimates, Mid-2017. Available at <https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/population/population-estimates/mid-year-population-estimates>.

²⁰⁴ National Statistics, 2018. Regional Employment Patterns: Statistics from the Annual Population Survey 2017. Available at <https://www.gov.scot/Topics/Statistics/Browse/Labour-Market/Publications/>.

4.4 Environment

Designated Sites

- 4.4.1 Within the West region, there are numerous designated sites and sites proposed for designation in the future, including SPA, SAC, Ramsar, NCMPS, and SSSI. These sites are designated for a range of features considered important on an international or national level.
- 4.4.2 Sites within the region include 15 SPA (including 4 pSPA), 23 SAC, 12 NCMPS (including one proposed NCMPS) and 27 SSSI, shown in Figure 124, Figure 125, Figure 126 and Figure 127.
- 4.4.3 The SPAs and proposed SPAs (pSPA), including coastal, marine and terrestrial sites, support a wide range of bird species which may use the sea within the DPO for feeding or during migration. SPAs within the western region include sites on the Inner and Outer Hebrides, and coastal and terrestrial sites on the mainland. Further detail on bird species distributions is contained within the Birds section below. There is no direct overlap between SPAs and the DPOs in the West region. The closest SPA is Gruinart Flats SPA, designated for Barnacle Goose and Greenland White-fronted Goose, approximately 2km to the east of W1 (Figure 127).
- 4.4.4 The Inner Hebrides and the Minches cSAC borders W1 (See Figure 124) and extends through all the waters inshore from the DPO. The Inner Hebrides and the Minches cSAC is designated for Harbour porpoise. Any export cabling associated with developments in the DPO could cross the cSAC. There are smaller SACs around the sea lochs in the West region designated for a range of features, including seals, marine mammals, intertidal habitat, reef habitats and otters. These include the Firth of Lorn SAC (designated for marine reef features, including marine mammals) and East Mingulay (designated for inshore sublittoral rocky reef) are located wholly inshore of the DPOs and designated for both habitat and mobile features. In the riverine environments, inland from the West region, there are a number of SAC designated for anadromous (migratory) fish (included in Figure 125).
- 4.4.5 A large number of SSSI are located across the West region (Figure 126) and are protected for a range of features, including geology, habitats and species. Some, although not all, SSSI sites overlap with European SPA or SAC designations. The closest SSSI lies around 2km away from the W1 DPO.
- 4.4.6 In addition to the sites identified within the boundaries of the West region, there may be more remote designated sites which may have the potential to be affected by offshore wind developments within the DPOs. This would be considered on a project by project basis.

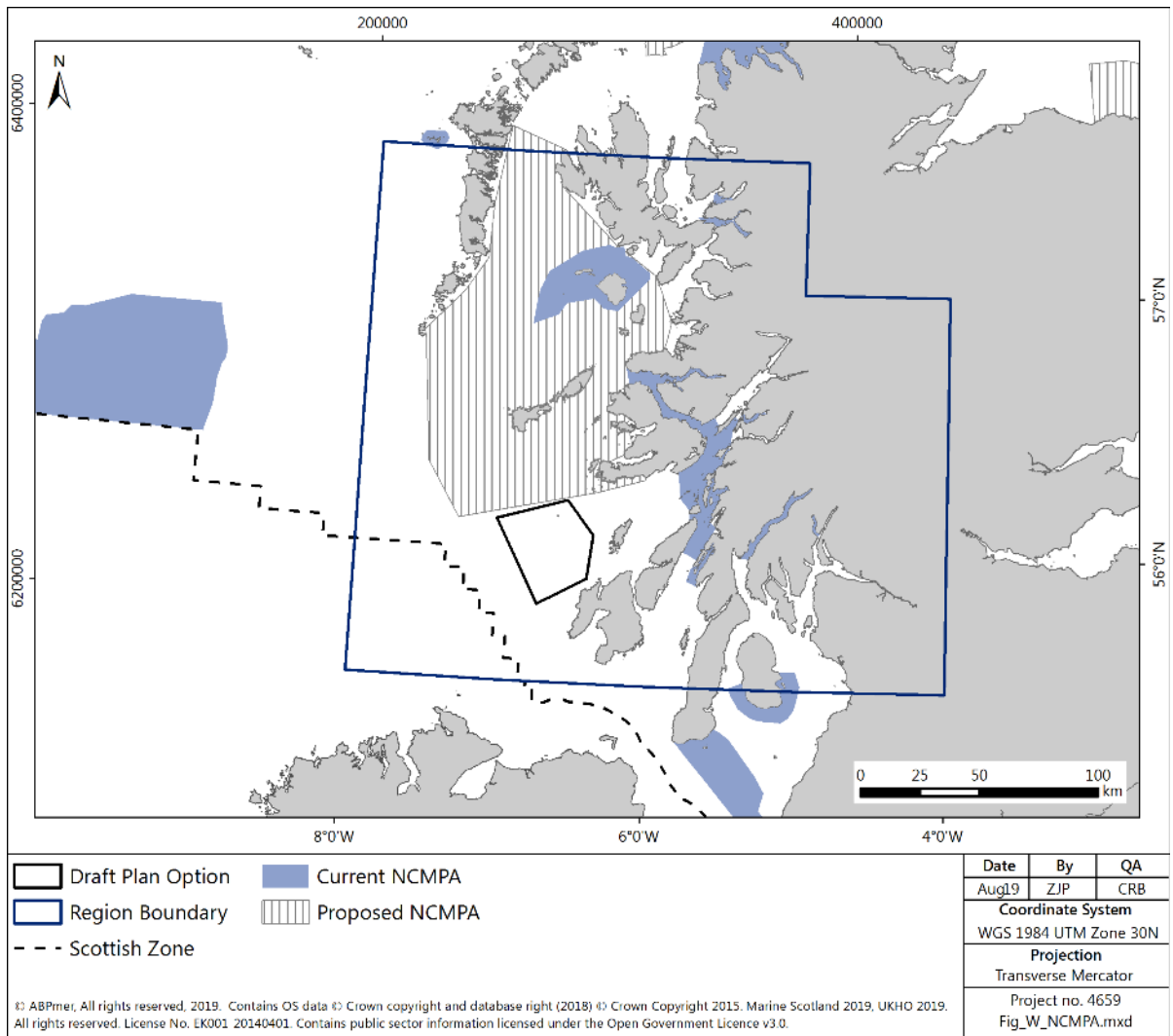


Figure 124 West region: NCMPA sites

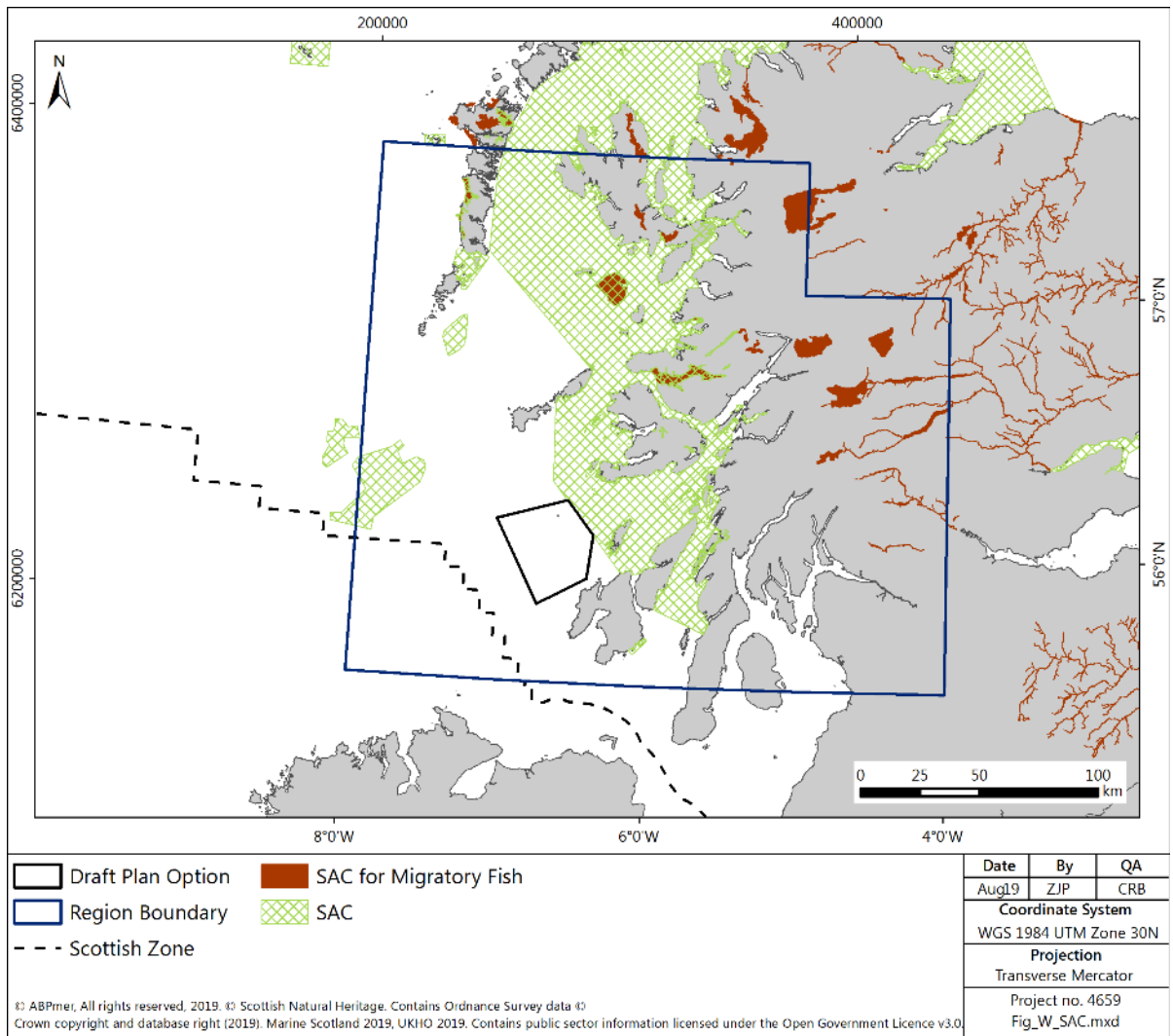


Figure 125 West region: marine and coastal SAC sites

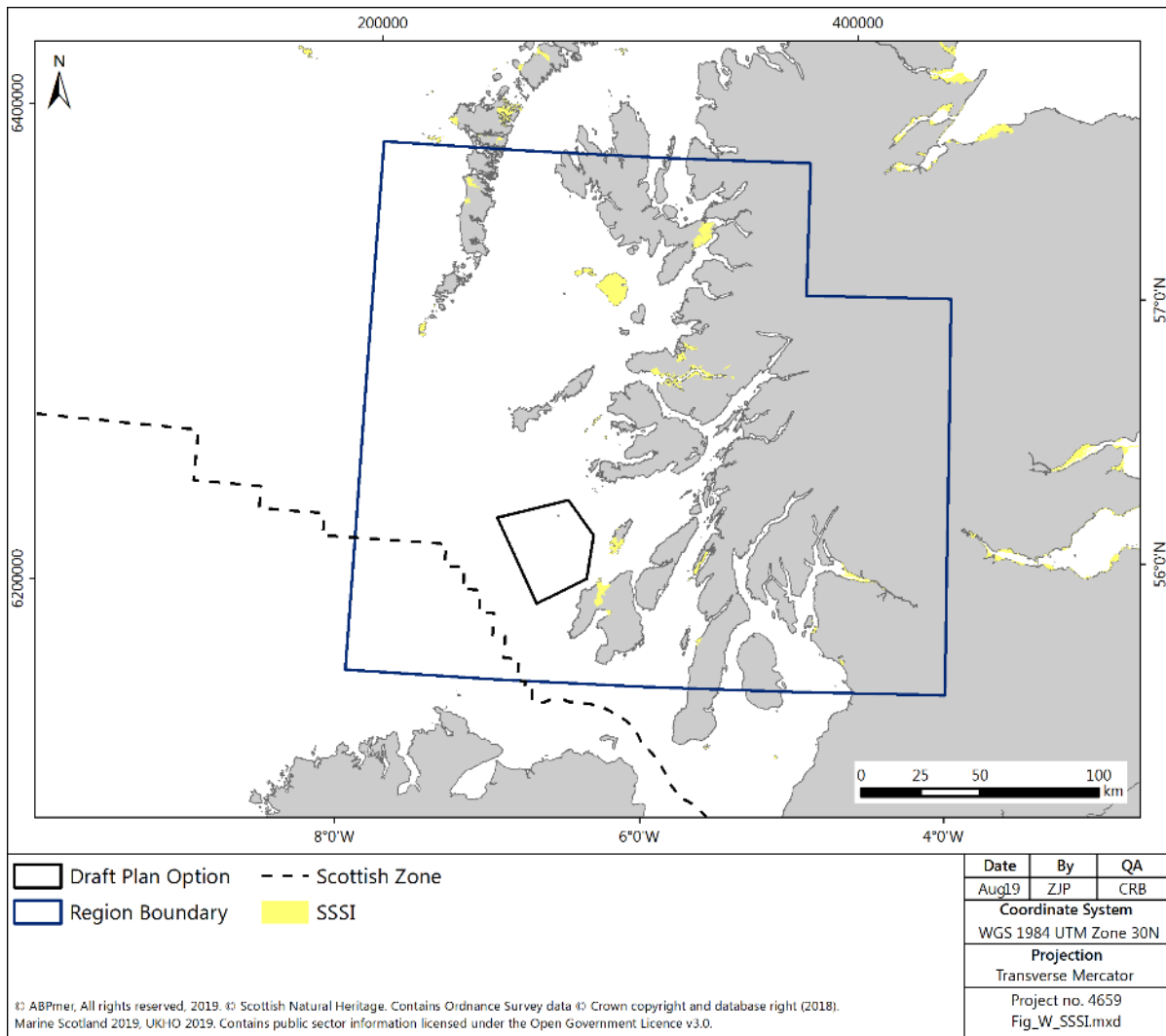


Figure 126 West region: marine and coastal SSSI sites

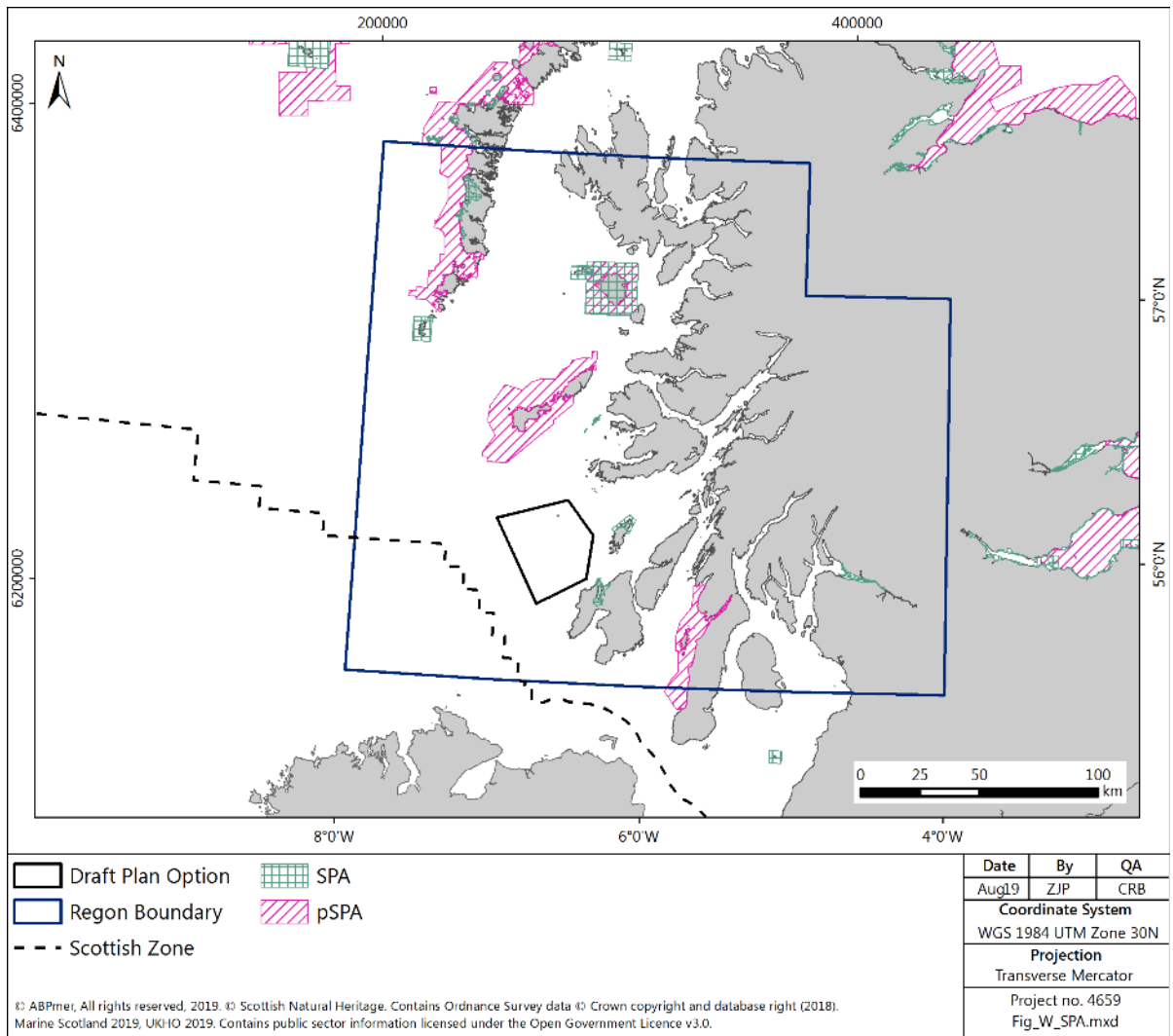


Figure 127 West region: marine and coastal SPA sites

Water Quality

- 4.4.7 WFD monitoring incorporates coastal and transitional waters in the marine environment. This means that there is only a small overlap between the offshore wind farm development site and classified water bodies within the West region as the water bodies are mostly inshore of W1. The eastern half of W1 overlaps into the Atlantic Ocean - SW Mull water body (high status), and the southeastern corner of W1 is within the West Islay water body (good status), shown in Figure 128.. The majority of the water bodies in the West region are classified as either good or high potential, with the exception of Irvine Bay and the Clyde Estuary (Outer) water bodies, which were both classified as of medium status²⁰⁵.
- 4.4.8 There are 43 protected waters for shellfish production in the West region (Figure 129), all within coastal regions associated with either mainland Scotland or the Hebridean islands with no direct interaction with the DPO. The shellfish waters are classified against their target objectives. Of the 43 shellfish waters in the West region, 33 are classified as not at target objective, the remainder are meeting target objectives.
- 4.4.9 There are only 11 classified bathing waters in the West region (Figure 129), almost exclusively within the Firth of Clyde extending southwards except for Machrihanish, just north of the Mull of Kintyre facing towards Ireland and Ganavan, a few miles north of Oban. Both Machrihanish and Ganavan are classified as excellent status, while the sites within the Firth of Clyde are more varied in their water quality.

²⁰⁵ SEPA. 2018. Water Classification Hub, water body condition data for 2017. Available at <https://www.sepa.org.uk/data-visualisation/water-classification-hub/>. Accessed 05/10/2018.

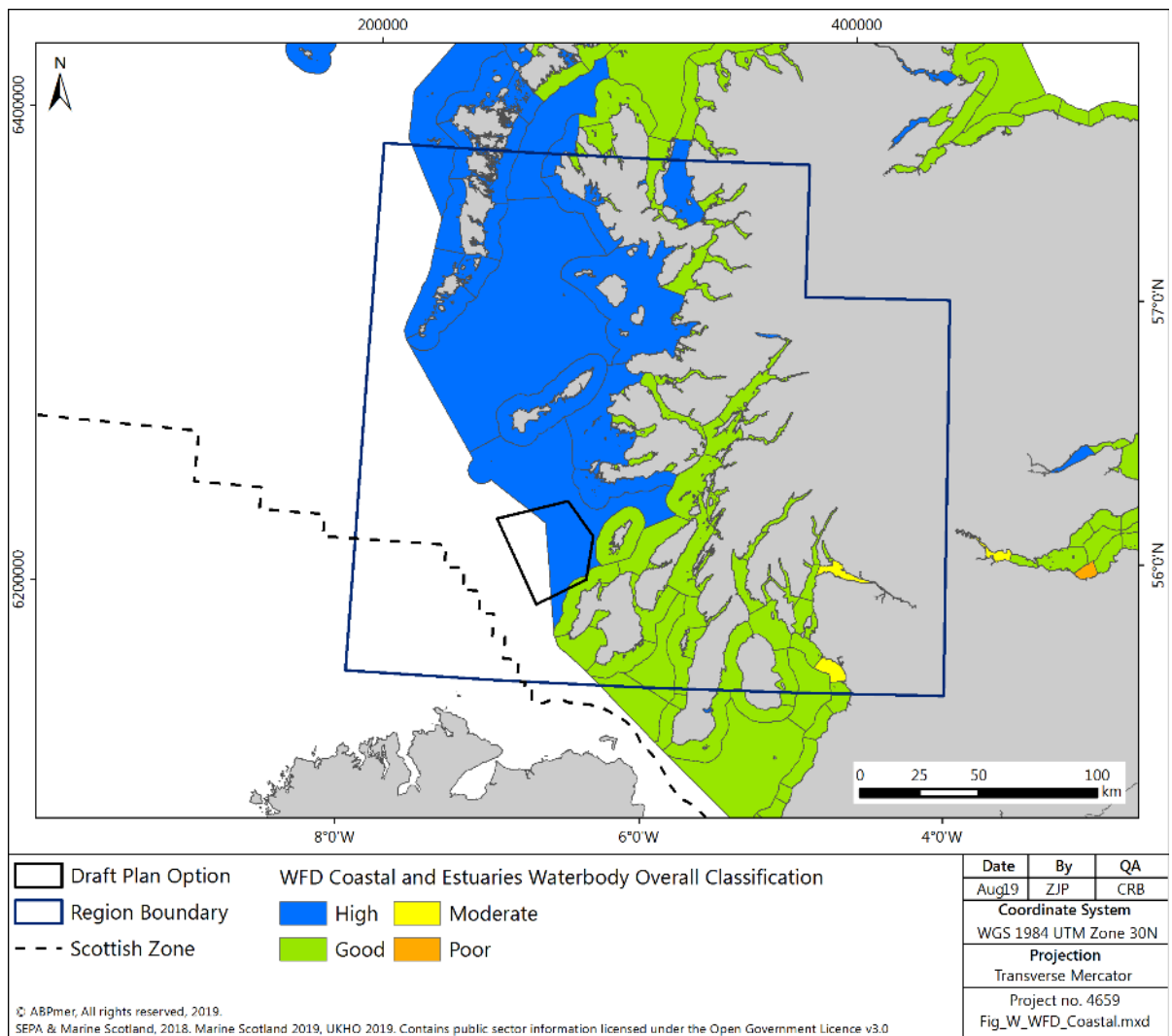


Figure 128 West region: WFD coastal and transitional waterbody classifications

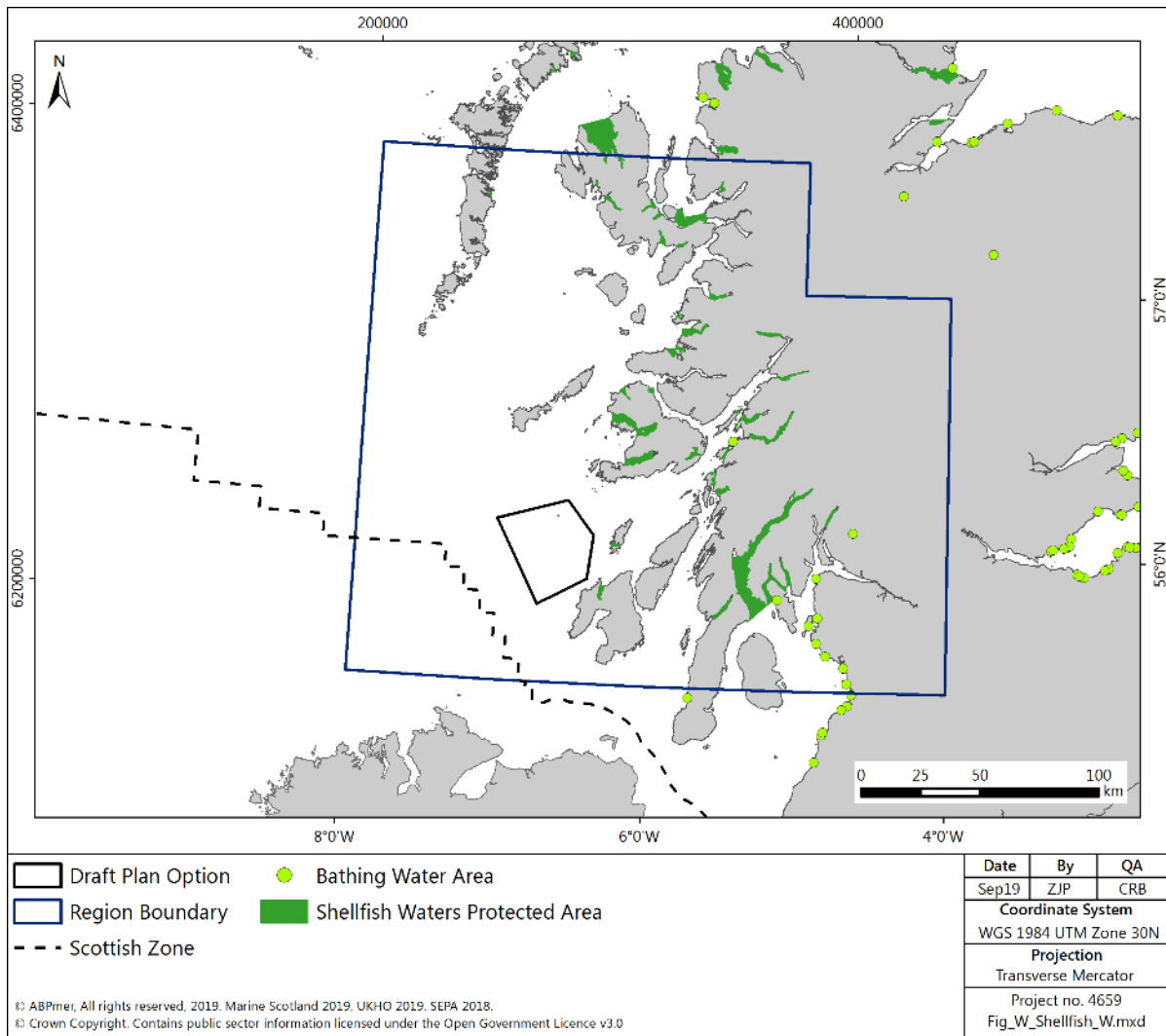


Figure 129 West region: shellfish and bathing water protected areas

Benthic Habitats and Species

- 4.4.10 As identified in Section 4.2 above, the benthic sediment within the DPO is characterised by circalittoral sand with some small areas of circalittoral rock and biogenic reef (Figure 130).
- 4.4.11 In water depths of less than 30 m in the West region, much of the coastline with subtidal rocky substrate is dominated by kelp beds and seaweed. Within the DPO however, the greater water depths limit the potential for plant life.
- 4.4.12 Within the northern half of the region there are records of benthic PMFs (Figure 131) including northern sea fan and sponge communities, including cup coral (*Caryophyllia smithii*) and northern sea fan (*Swiftia pallida*) on circalittoral rock. This habitat supports a species rich community with a range of soft corals, sea fans, sea mats and sea squirts. In addition, there are records of white cluster anemone (*Parazoanthus anguicomus*) and Northern feather star (*Leptometra celtica*)²⁰⁶. There are no records of PMFs present in W1. However, there are a range of PMF supported by benthic habitats landwards of the DPO, including on subtidal rock habitats, inshore and shelf subtidal sediments, intertidal sediments and intertidal rocky shores.

²⁰⁶ Marine Scotland. 2011. Data collated for Marine Atlas, various sources from differing years, presented on NMPI.

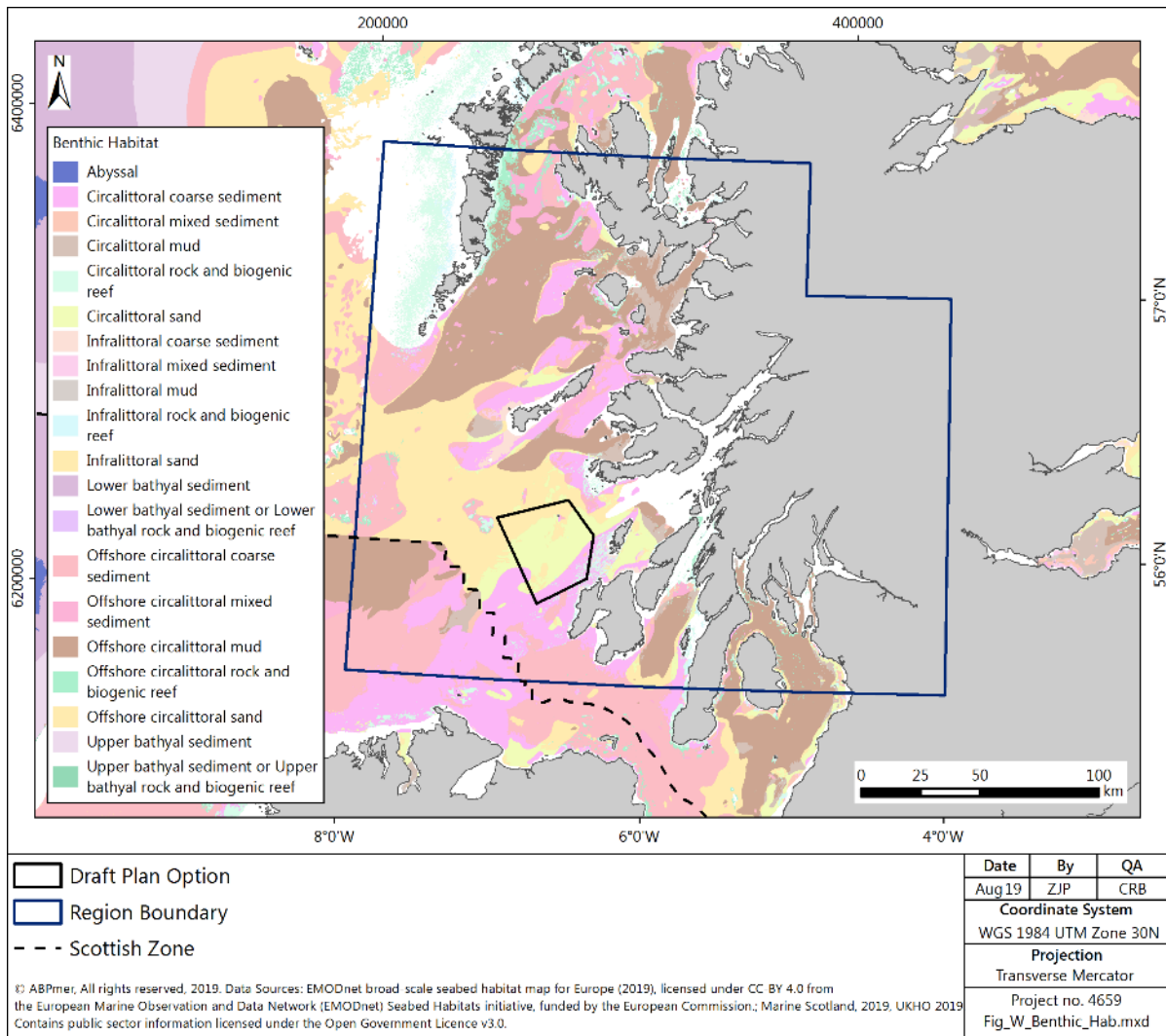


Figure 130 West region: benthic habitats

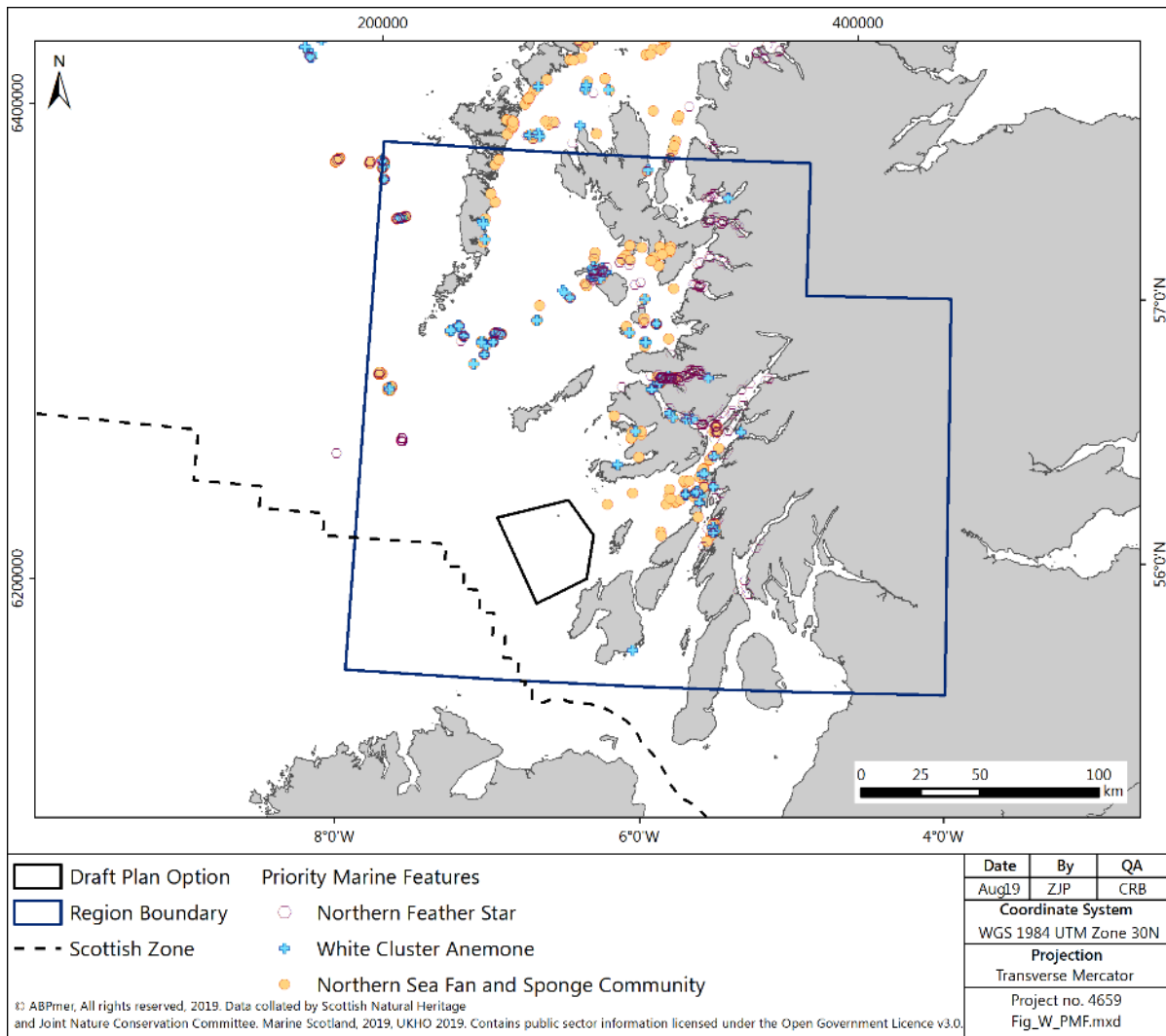


Figure 131 West region: records of benthic PMF

Fish

- 4.4.13 The fish community in the West region is varied, with high species diversity. Several species are commercially-important and are discussed above under Fishing in Section 4.3.
- 4.4.14 The West region is considered to be of high importance to basking sharks, with high numbers of sightings in the region, particularly around Coll and Tiree. It should be noted that whilst the highest density of sightings is in this area, the data reproduced in Figure 132 has not been adjusted for effort, and therefore there may be further areas of high density for basking sharks that have not been identified through this review. The importance of the region for basking sharks is recognised in the proposed designation of the Sea of Hebrides pMPA, identifying the widespread distribution of the sharks varying within the Sea of Hebrides dependent on the location of fronts.
- 4.4.15 In addition, inshore areas within the West region have been identified as important for the common skate, classed as critically endangered on the International Union for the Conservation of Nature (IUCN) red list and a designated feature in the Loch Sunart to the Sound of Jura NCMPA.
- 4.4.16 Within the West region there are known migration routes for anadromous fish (Figure 44 above in Section 2.3 shows the approximate routes, although should not be used to infer “safe” zones). Migratory fish, including Atlantic salmon and sea lamprey are protected through the SAC network in the West region, and the migration routes may intersect with the DPO.
- 4.4.17 . The West region also contains important spawning or nursery grounds for fish species including hake, horse mackerel, sandeel, anglerfish and high-intensity nursery grounds for herring and whiting. Whilst there is a lack of data available to show available spawning sites for elasmobranch species, there are many known nursery ground areas in the area, which overlap the W1 site, including common skate, with high-intensity nursery grounds for spurdog²⁰⁷.

²⁰⁷ Ellis, J.R., Milligan, S.P., Readdy, L., Taylor, N. and Brown, M.J. 2012. Spawning and nursery grounds of selected fish species in UK waters. Sci. Ser. Tech. Rep., Cefas. Lowestoft, 147: 56 pp.

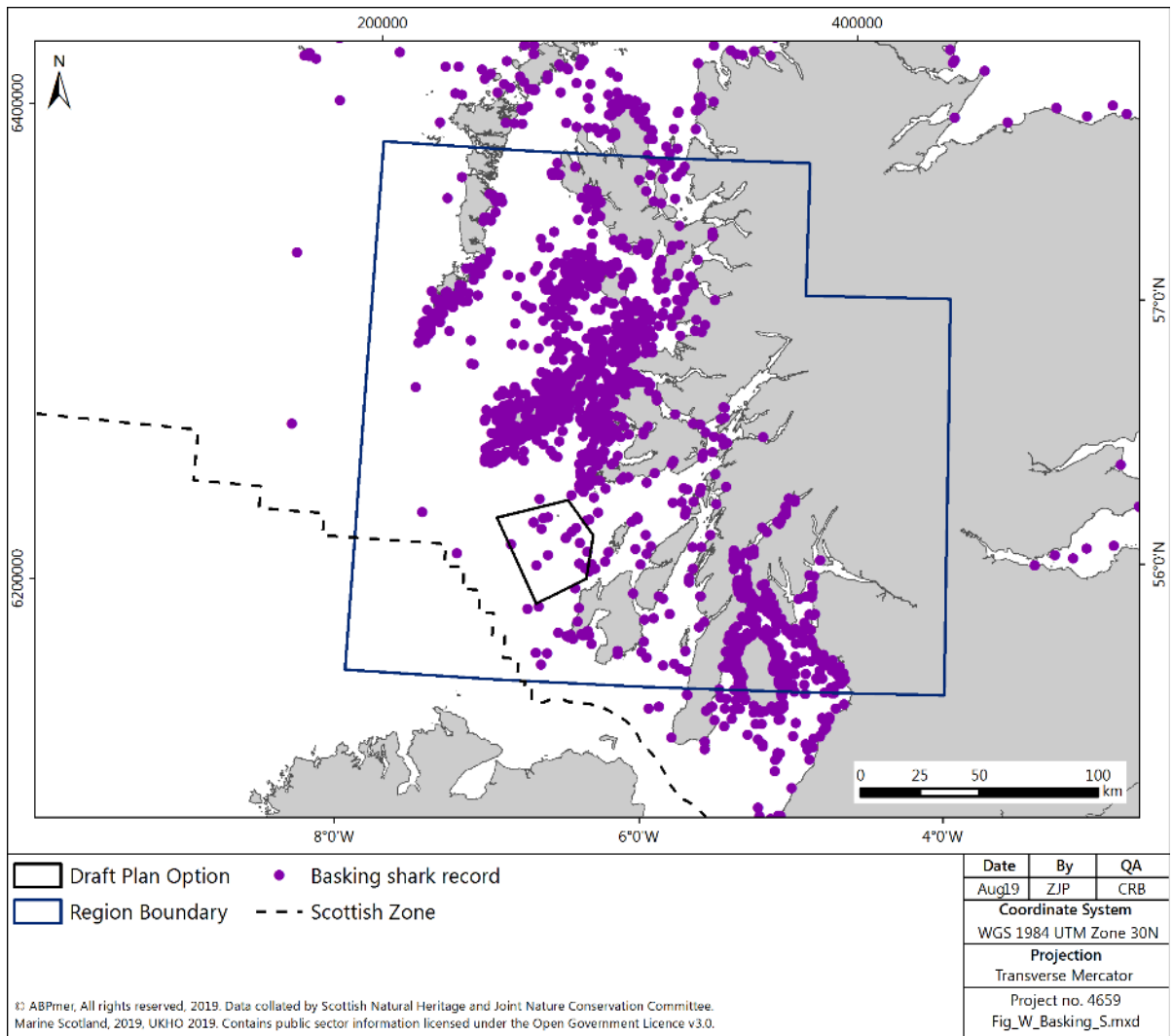


Figure 132 West region: basking shark sightings distribution

Marine Mammals

- 4.4.18 Marine mammals are known to frequent the seas within the West region, including harbour seals, grey seals, harbour porpoise and minke whale.
- 4.4.19 There are areas, discussed above, designated to protect marine mammals within the West region, highlighting the importance of the seas around the Hebrides for marine mammal species.
- 4.4.20 The two species of seal present in Scottish seas are both found in the West region. Grey seal breeding colonies, shown on Figure 133, are found on both the Inner and Outer Hebrides, however the most significant breeding population is found in the Monach Isles, just north of the boundary between the West and North regions, as reflected in the at sea usage of the area by grey seals (Figure 134). In total, approximately 18,000 pups are born annually in the Inner and Outer Hebrides.
- 4.4.21 There is an overlap between high grey seal at-sea usage and W1. This is particularly known to occur around the south-eastern quadrant of W1 (from the grey seal pupping site reported on the northwest coast of the Islay).
- 4.4.22 The West region is generally of higher importance to the harbour seal population in Scotland, having expanded considerably in the west of Scotland and the western isles whilst populations to the east and in the Orkney Islands have suffered considerable declines²⁰⁸. Figure 135 shows the distribution of harbour seals in the West region. This shows that the harbour seals are predominantly found in the Inner Hebrides and coastal lochs. Given that harbour seals are known to predominantly hunt within approximately 40 to 50km of their haul out sites²⁰⁹, it can be inferred that harbour seals are likely to be using the region as foraging grounds, although it is generally considered that there is a depth restriction of approximately 50 m for harbour seal foraging. There is considered to be some level of overlap with W1, albeit data indicates that it is likely to be at relatively low levels.
- 4.4.23 A wide variety of cetaceans are found in the West region, particularly around the Inner Hebridean islands. The Inner Hebrides and the Minches cSAC is designated for harbour porpoise, whilst the Sea of Hebrides proposed MPA is being recommended for designation based partly on the population of minke whale known to frequent the area. In addition, the proposed North East Lewis MPA, discussed further in the North region, is being recommended for designation including for Risso's dolphin, known to be found in high concentrations off the west coast of Scotland. Risso's dolphin adjusted densities in all seasons 1994-2012 reported by SNH²¹⁰. Figure 136 shows

²⁰⁸ SMRU. 2016. Scientific Advice on Matters Related to the Management of Seal Populations.

²⁰⁹ SMRU. 2016. Scientific Advice on Matters Related to the Management of Seal Populations.

²¹⁰ SNH. 2012. Observed adjusted densities of Risso's dolphin (*Grampus griseus*) (all seasons 1994 - 2012) (mapped as graduated symbols) (Priority Marine Feature) (SNH WMS).

areas of relatively low densities of Risso’s dolphins throughout the majority of W1.

4.4.24 The Western Isles and sea lochs in the West region and surrounding seas are known to be used extensively by otter, with SAC within the region designated for their protection. Most of the usage of the seas within the West region by otter will be in coastal regions, with foraging generally considered to be limited to 10 m water depths, considerably shallower than depths within the DPO.

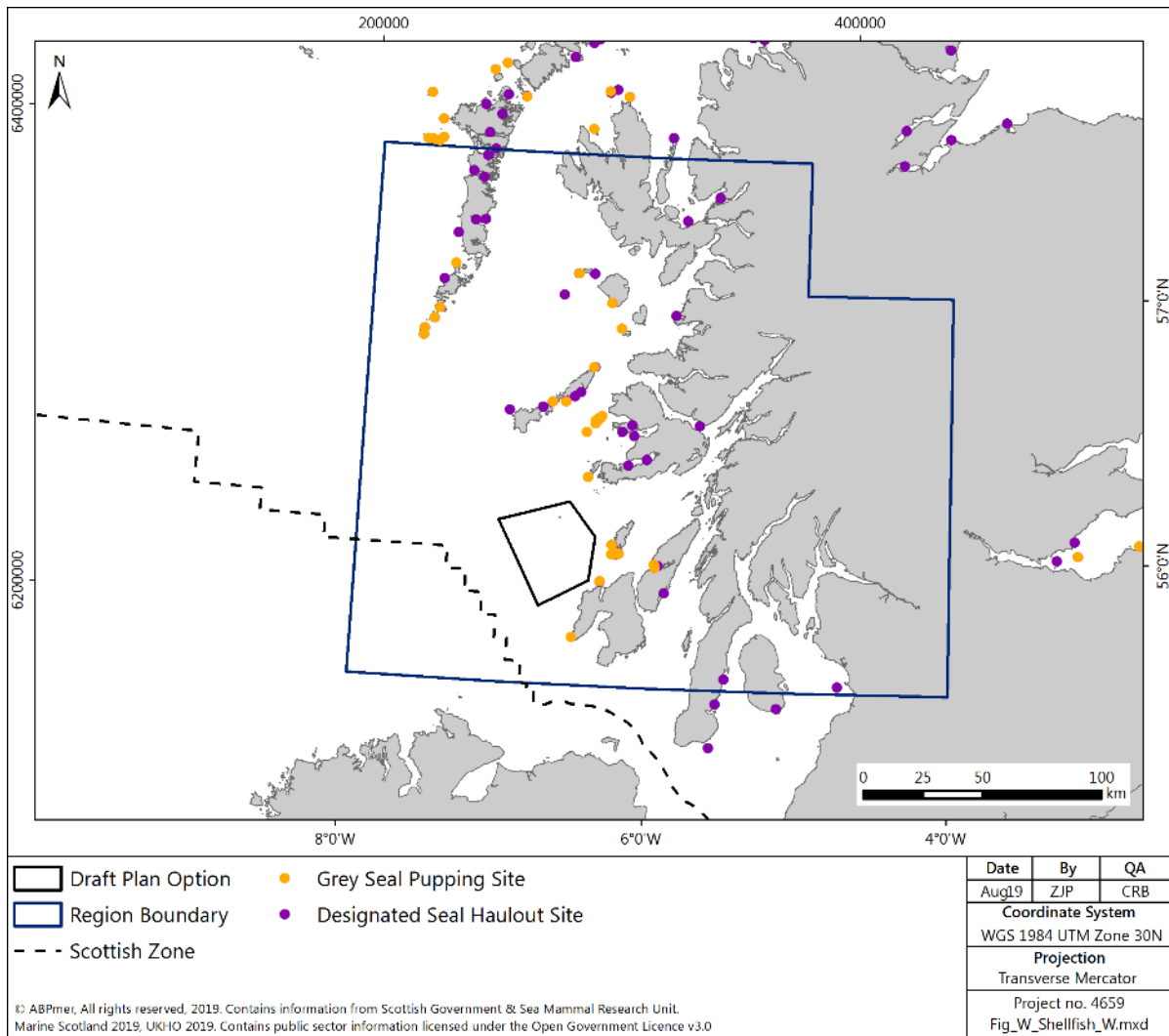


Figure 133 West region: seal haulout sites and grey seal pupping sites

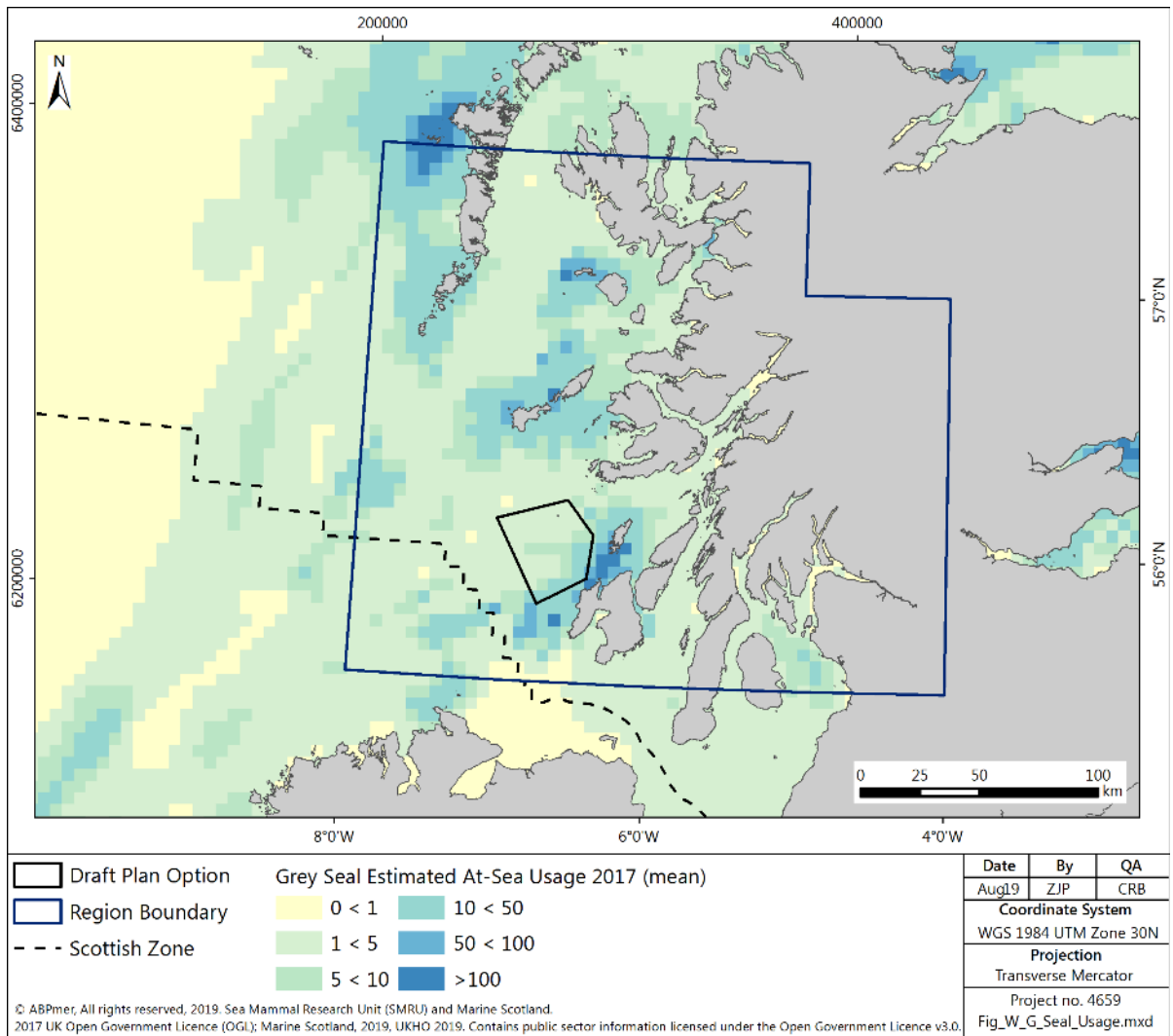


Figure 134 West region: grey seal at sea usage

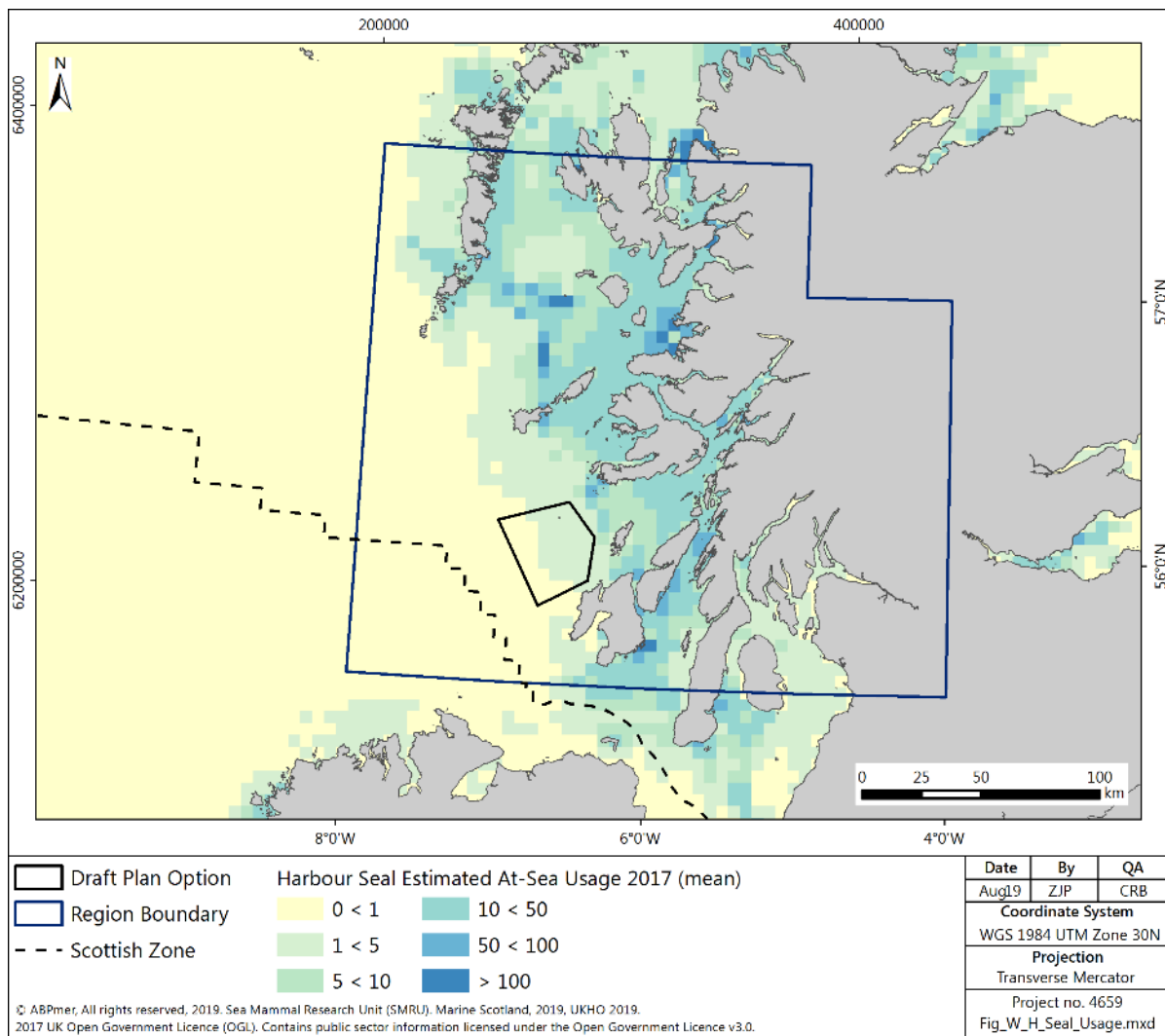


Figure 135 West region: harbour seal at sea usage

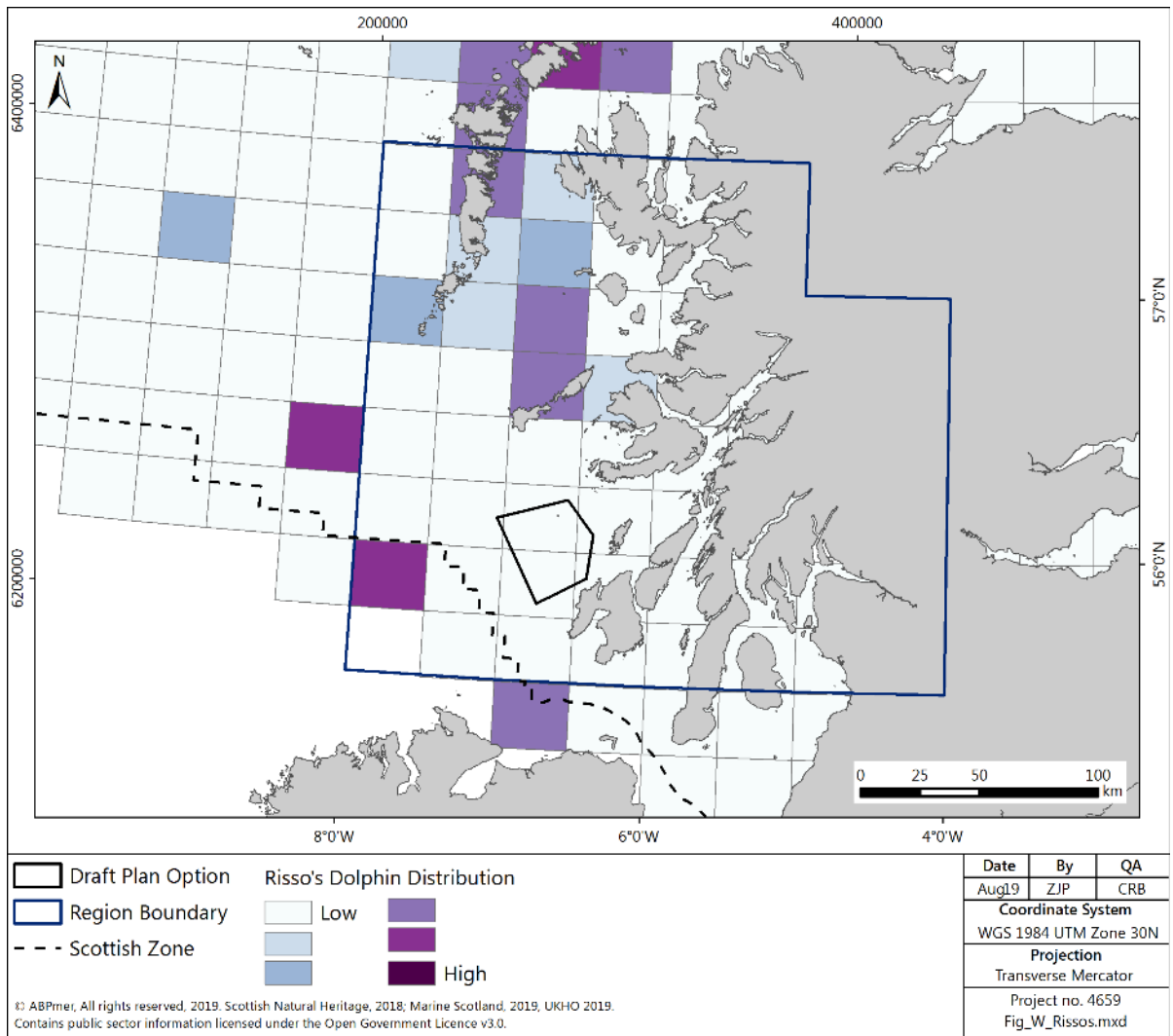


Figure 136 West region: Risso's dolphin adjusted densities

Birds

- 4.4.25 The importance of the West region to birds is demonstrated in the designation of 11 SPAs and further four proposed SPAs with marine elements and additional terrestrial sites, as discussed above.
- 4.4.26 There are both breeding and non-breeding populations of a wide variety of seabirds in the West region. Significant seabird colonies are found either in close proximity to or directly landwards of the DPO. The condition of the species at the colonies are reviewed as part of the SPA management process. The overall condition of the seabird assemblages at the majority of locations is favourable, however at an individual species level several species are identified as being in unfavourable condition, and therefore management measures are in place to reduce pressure on these species. Species of particular importance on the west coast include black guillemots, Manx shearwater, storm petrel, red throated diver, kittiwakes, razorbill, murre and eider. Wakefield *et al*²¹¹ identify that the West region, in particular the area of sea around south of the Outer Hebrides is utilised by considerable numbers of shag, kittiwake and murre.
- 4.4.27 Figure 137 maps the total records of birds recorded in the marine environment in the West region. Whilst the data mapped has not been corrected for survey effort, it highlights areas of high importance, particularly in inshore waters in close proximity to SPAs. The areas of highest concentration within the DPO are within the northern extent, concentrated around the IBA and SPA associated with Mingulay and Berneray. There are also a number of coastal areas identified as either IBA or RSPB reserves in the West region, covering large areas of the Inner Hebrides and are located close to W1 (Figure 137).
- 4.4.28 In addition to seabird activity within the West region, there are a number of terrestrial bird species such as corncrake, which transit the area as migratory species, and white tailed eagles which may transit or forage through or close to the DPO both during day and night time, with important populations in the West region.

²¹¹ Wakefield, E., Owen, E., Baer, J., Carroll, M., Daunt, F., Dodd, S., Green, J., Guilford, T., Mavor, R., Miller, P., Newell, M., Newton, S., Robertson, G., Shoji, A., Soanes, L., Votier, S., Wanless, S., Bolton, M. 2017. Density, fine-scale tracking, and large-scale modeling reveal the regional distribution of four seabird species, *Ecological Applications*, 27(7), 2017, pp. 2074-2091.

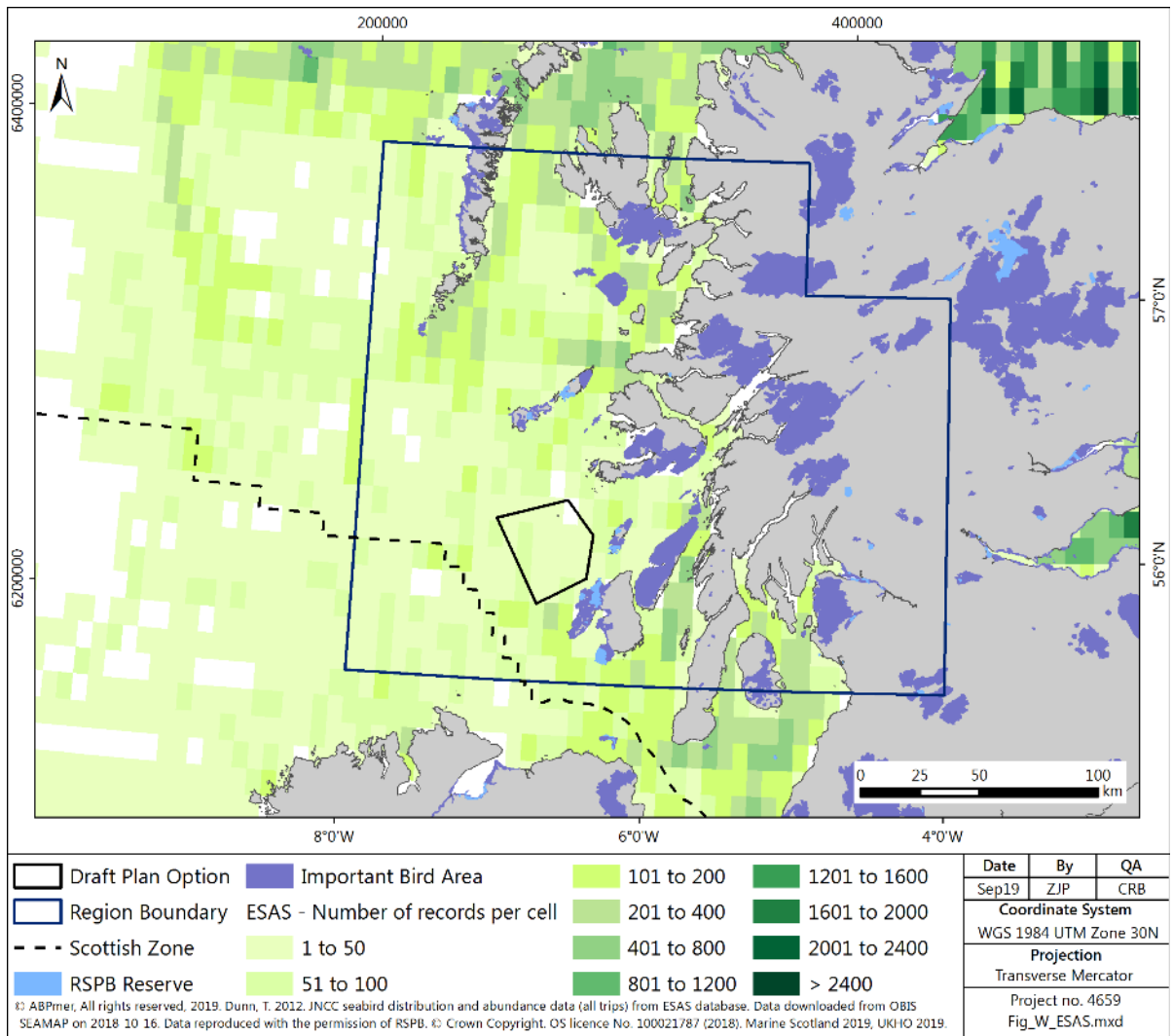


Figure 137 West region: ESAS records per 0.1 degree cell

Cultural Heritage

- 4.4.29 There are four Historic MPAs designated in the West region, all related to shipwrecks dating from 1600-1900 (Figure 138). Three of the wrecks (Duart Point, Dartmouth and Mingary) are in the Sound of Mull, whilst the further wreck is in the Firth of Clyde (Iona I).
- 4.4.30 In addition to the Historic MPAs, there are scheduled monuments (including protected wrecks) within the West region. Those in the marine environment are concentrated around the coast and include a wide range of historically significant buildings, shipwrecks and structures. There is one shipwreck designated for the protection of military remains (HMS / M Vandal). There are multiple non-protected shipwrecks in the West region, two of which are within W1.
- 4.4.31 Within the West region, there are few examples of marine palaeolandscapes (landscapes which have become submerged following occupation by hominids). This is due to the steeply sloping coastlines and high-water depths. Therefore, the potential for there to be submerged archaeological remains is limited to areas very close to the shoreline with only the potential to be impacted by cable landfall.
- 4.4.32 Work undertaken by Project Samphire from 2013 to 2015 has recorded sites of cultural importance in the marine environment off the west coast of Scotland, principally in inshore waters and for the most part associated with vessels or aircraft²¹².

²¹² Wessex Architecture. 2015. Project Samphire, available at <https://www.wessexarch.co.uk/our-work/project-samphire>, accessed 22/10/2018.

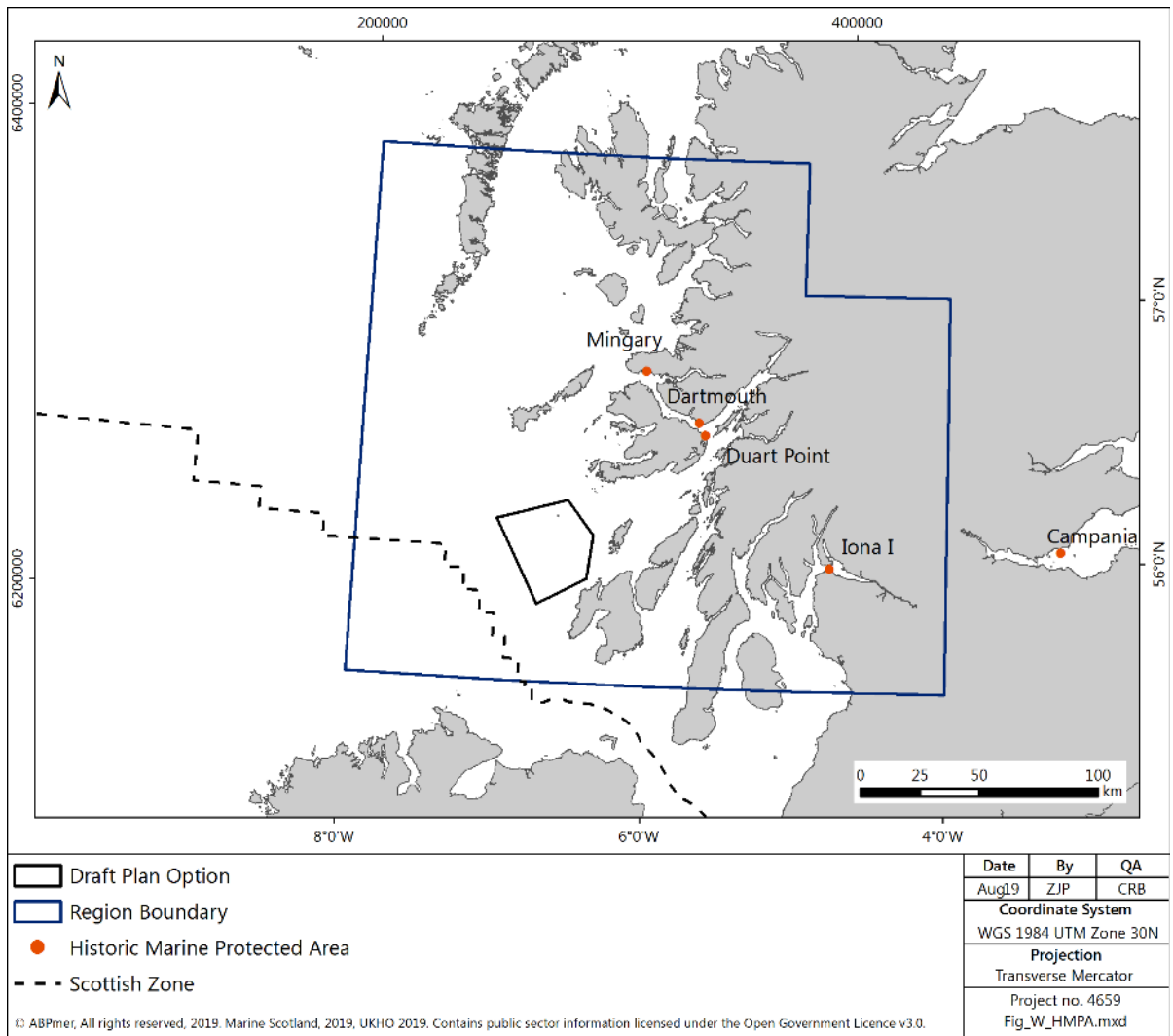


Figure 138 West region: Historic MPA

Landscape / Seascape

- 4.4.33 A landscape / seascape assessment has been undertaken for the Firth of Clyde, defining the nature of the coastlines in the area.
- 4.4.34 No further assessment has been undertaken on the remaining west-facing mainland or island coastline in the West region. There are National Scenic Areas with coastal elements in the west region, shown in Figure 139. The closest NSA considering open seascapes as a feature are South Uist Machair and Loch na Keal, Isle of Mull, approximately 25km from W1.
- 4.4.35 There are a number of Special Landscape Areas (SLA) identified by the Highlands Council in the West region. None of the SLA identified within the West region have direct views to the DPO. In addition, Argyll and Bute Council identify areas of panoramic quality²¹³, including on Mull and areas of Islay approximately 5km from the DPO W1.
- 4.4.36 The low population density on the west coast of Scotland means that the majority of the coastline in the West region can be considered to be isolated, and Scott *et al.*²¹⁴ identifies that there is a varied coastline in the area, with intricacies that would potentially be affected if development were to occur. All coastlines facing towards the W1 are assessed by Scott *et al.* to be of medium to high or high sensitivity²¹⁵.

²¹³ Anderson, C. and Grant, A. 2012. Argyll and Bute Landscape Wind Energy Capacity Study, Main Study Report.

²¹⁴ Scott, K.E., Anderson, C., Dunsford, H., Benson, J.F. and MacFarlane, R. 2005. An assessment of the sensitivity and capacity of the Scottish seascape in relation to offshore windfarms. Scottish Natural Heritage Commissioned Report No.103 (ROAME No. F03AA06). Available at <https://www.nature.scot/snh-commissioned-report-103-assessment-sensitivity-and-capacity-scottish-seascape-relation-windfarms>.

²¹⁵ *ibid*

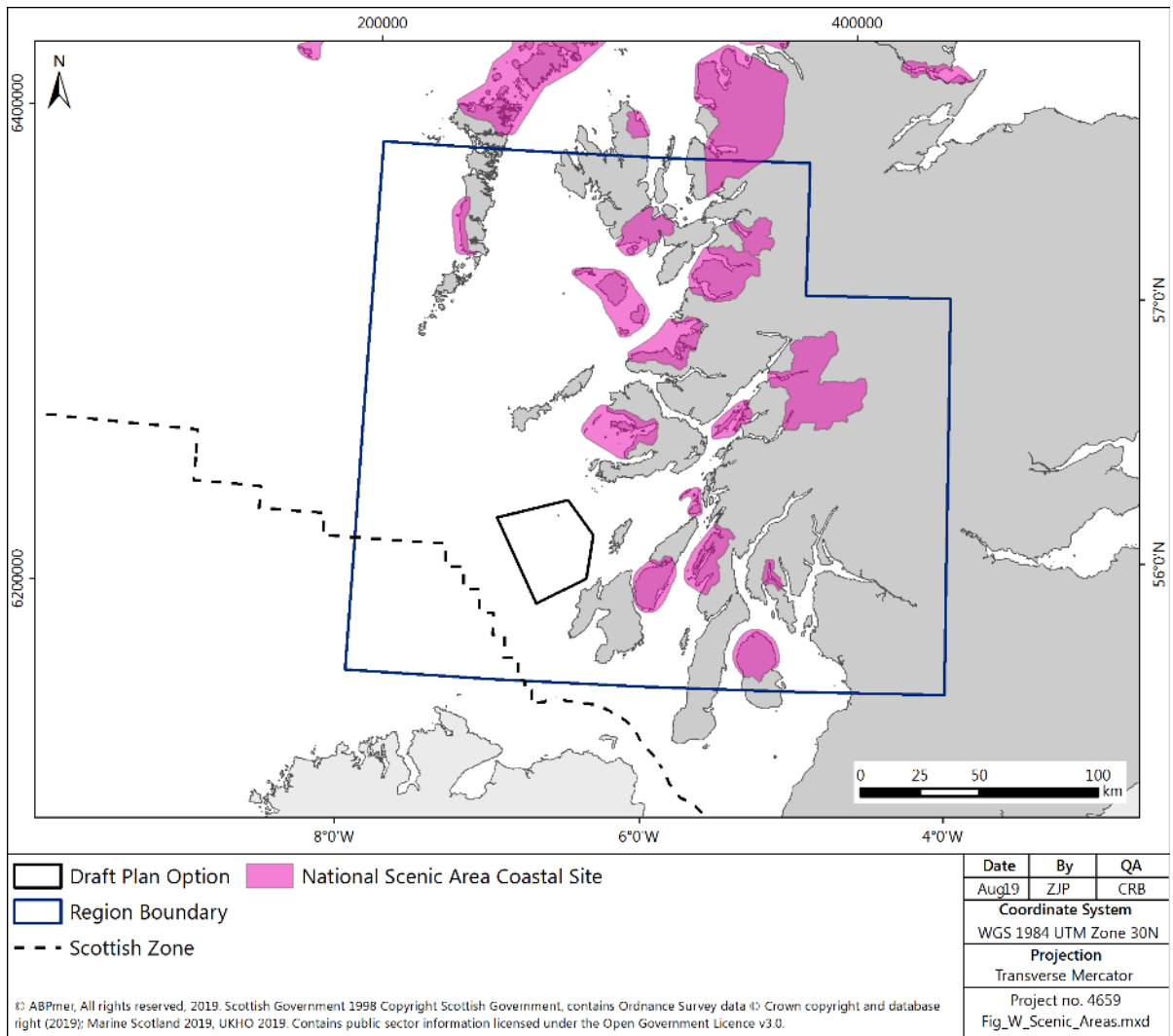


Figure 139 West Region: National Scenic Areas

4.5 Planning Issues

- 4.5.1 There are seven local authorities with coastal interests within the West region. Of these, four are wholly within the Firth of Clyde, and therefore will not have any interactions with the DPO.
- 4.5.2 The further three local authorities are:
- Highlands,
 - Argyll and Bute, and
 - Eilean Siar.
- 4.5.3 The local council responsible for land facing W1 is the Argyll and Bute local authority.
- 4.5.4 Eilean Siar Council has produced a local development plan (LDP)²¹⁶, which incorporates the development of onshore manufacturing bases to support future offshore wind development, with focus on the expansion and development of currently developed land. There are no specific plans included in the LDP regarding the siting of offshore wind in proximity to the islands, although a spatial strategy for wind farms has been developed which identifies likely limitations or constraints in the immediate vicinity and to the east of Mingulay²¹⁷.
- 4.5.5 Argyll and Bute Council has identified the potential to develop locations within its area to support offshore development, specifically identifying supporting development in Campbeltown as part of its renewables energy action plan²¹⁸. The islands of Coll and Tiree, and Islay, the closest of the Inner Hebrides to the DPO are all the under the jurisdiction of Argyll and Bute Council.
- 4.5.6 The Highland Council has considered the potential for offshore wind within its area, identifying moderate potential for offshore wind within the West region in their region of responsibility around Skye.

²¹⁶ CNE-Siar. 2012. Adopted Outer Hebrides Local Development Plan.

²¹⁷ CNE-Siar. 2018. Outer Hebrides Local Development Plan Supplementary Guidance for Wind Energy Development.

²¹⁸ Argyle and Bute Renewable Alliance. 2017. Renewable Energy Action Plan.

5 North

5.1 Introduction

5.1.1 The North region covers the coastal and marine environment extending from the northern extent of the West region (incorporating approximately the northern half of the Outer Hebrides and the northern portion of Skye) around the coastline and including most of the Orkney Islands (Figure 140). There are four DPOs within the North region, all either to the north of the Outer Hebrides or to the north of the mainland coastline to the west of the Orkney Islands (Figure 140).

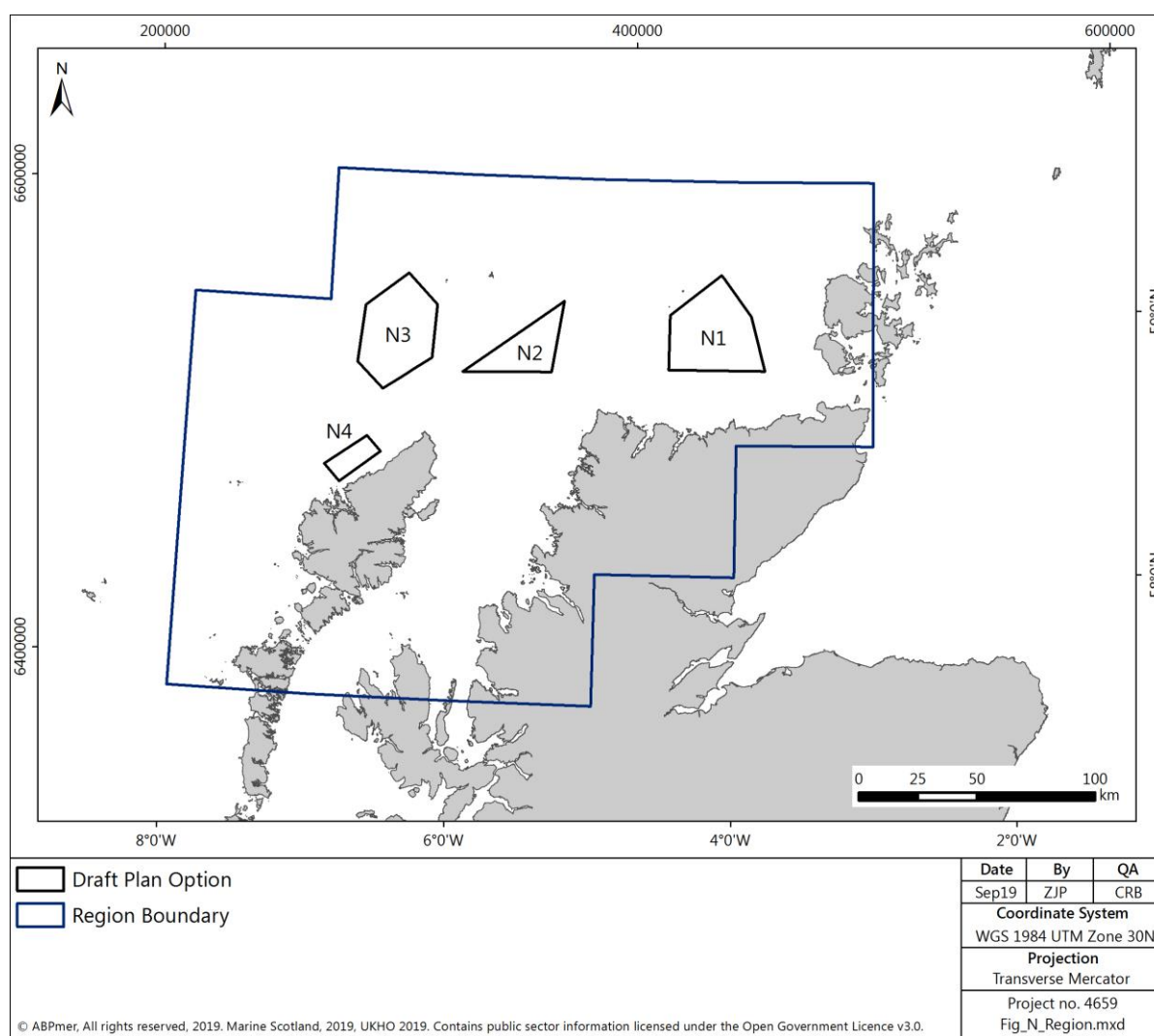


Figure 140 Map of the North region, including DPOs

5.2 Physical Considerations

Offshore Wind Resource

5.2.1 Within the North region, encompassing four DPOs (N1, N2, N3 and N4) there is considerable available wind resource, as shown in Figure 141 using the annual wind speed as a proxy, and calculated in Table 4 for the four DPOs.

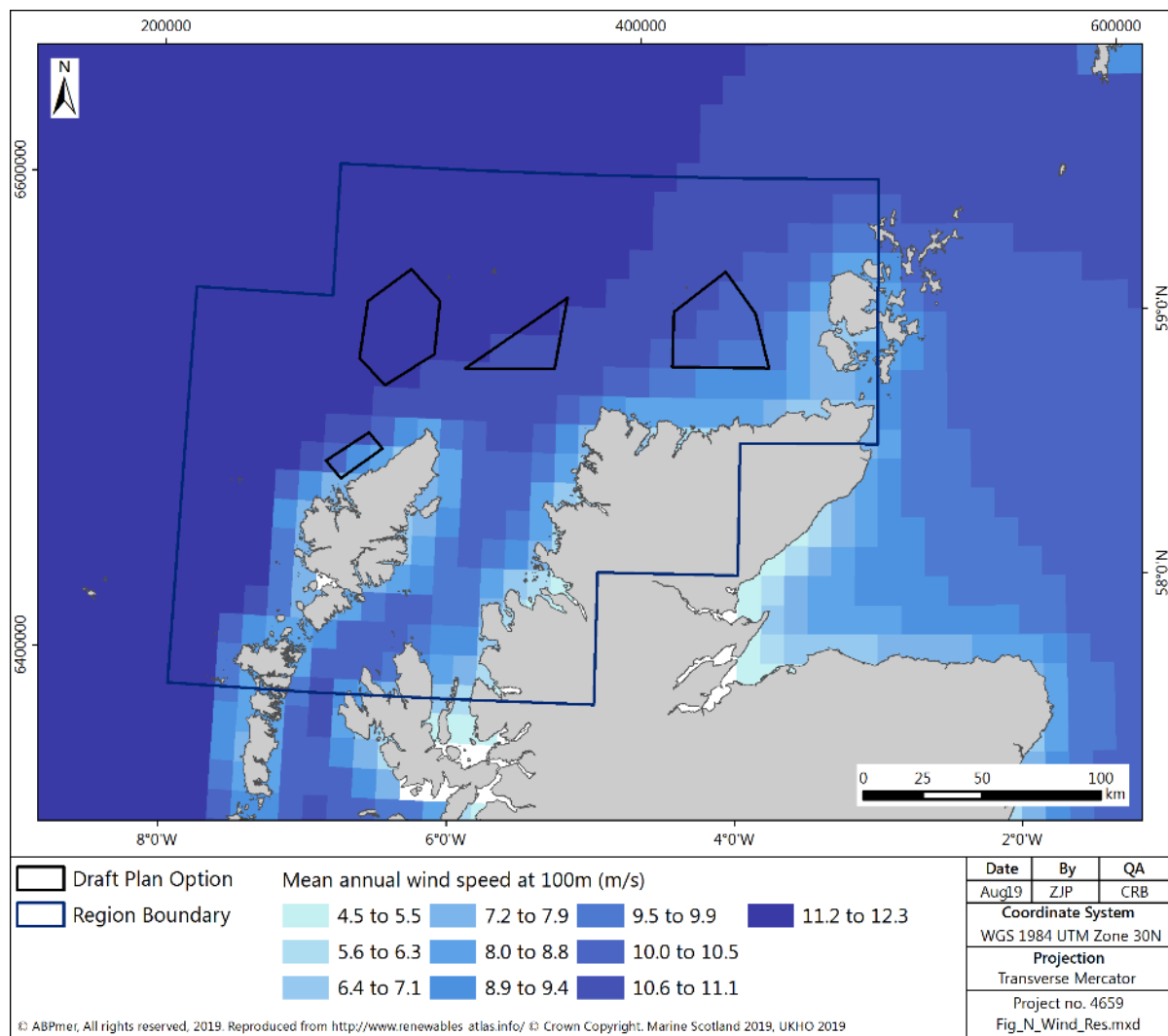


Figure 141 North region: mean annual wind speed

Table 4 North region: Potential installed capacity in the DPOs

Area of Search	Region	Area (square km)	Potential Installed capacity (GW)
N1	North	1163	5.8
N2	North	560	2.8
N3	North	1106	5.5
N4	North	200	1.0
North Total		3030	15.1

Grid Connection

- 5.2.2 The current grid connection provision is limited in the western extent of the North region, with a limited number of 132 kV substations available. In the eastern extent of the region the presence of the Dounreay former nuclear power station means that the infrastructure for large scale grid supply is already present with a 275 kV substation at the coast. In addition, the Caithness-Moray reinforcement project is currently being implemented to increase capacity from the North region, including:
- a 1200MW HVDC link between Spittal in Caithness and Blackhillock in Moray;
 - rebuilding the 132 kV double circuit line between Dounreay and Spittal at 275 kV;
 - a short section of new 132 kV line between Spittal and Mybster;
 - and new 275/132 kV substations at Fyrish (near Aness), Loch Buidhe (to the east of Shin), Spittal (5km north of Mybster) and Thurso.
- 5.2.3 The proposed Western Isles 600MW HVDC interconnector, should it be consented and progress, will increase the potential for connection of renewables on the Isle of Lewis for supply to the mainland. A needs case has been submitted to support the Western Isles HVDC and progress on the project is expected to be reliant on the developments awarded at the next Contracts for Difference issue in 2019. The Western Isles HVDC is discussed in greater detail below in Section 5.3.

Bathymetry and Seabed

- 5.2.4 Within the North region the water depth generally shelves rapidly to greater than 60 m, as shown in Figure 142. This is reflected in the water depths in the DPOs, which are generally greater than 60 m. The exceptions are N4, an area within the western portion of N1 and small areas at the north-eastern extent of N3.
- 5.2.5 Large extents of the DPOs are in water less than 100 m deep, with the majority of N1 and N4 in less than 100 m of water. A proportion of N2 and N3 have water depths greater than 100 m.
- 5.2.6 The seabed sediments, shown in Figure 143, are generally composed of sand and gravel throughout the North region, with some areas of rock to the west of the Hebrides and in a small band approximately 50km offshore of the North Scotland coast. Within the DPOs, the majority of sediment are sand and coarse sediment, with some small areas of subtidal rock or hard substrate in the eastern extents of N3 .

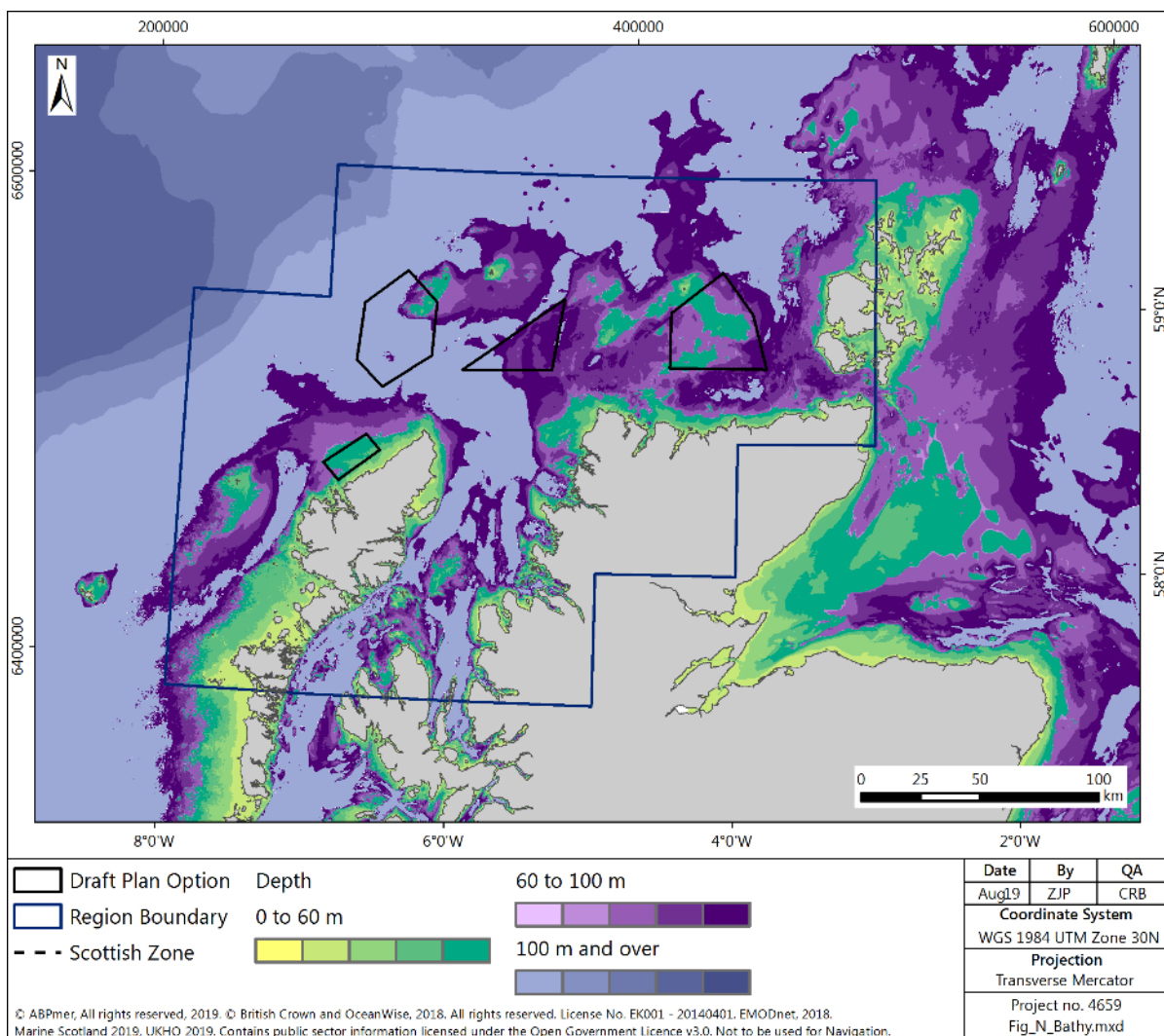


Figure 142 North region: Banded water depth

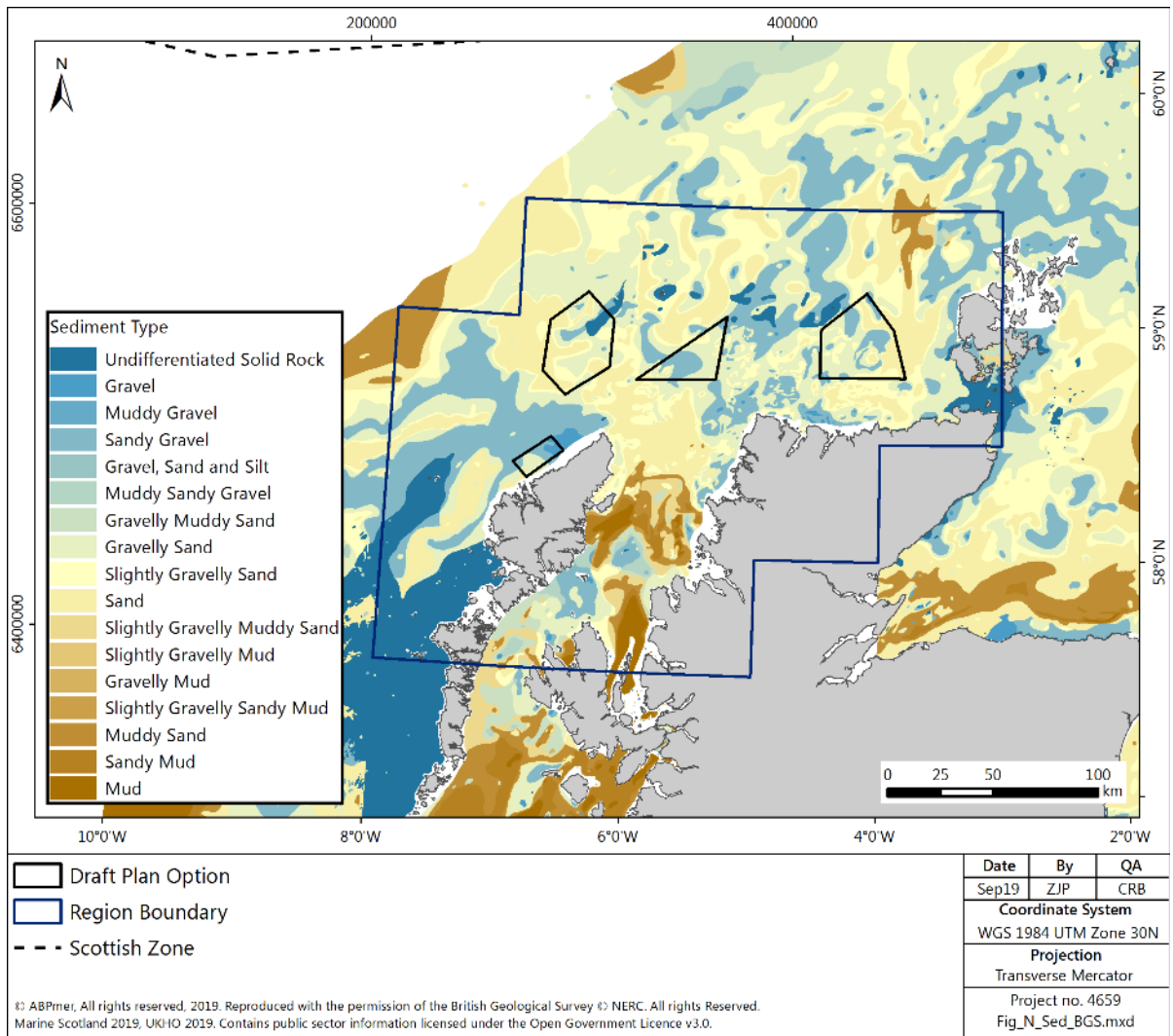


Figure 143 North region: Seabed sediments

5.3 Socio Economics

Supply Chain

- 5.3.1 Two locations are identified in the North region²¹⁹ which could be developed to support the construction, operation and maintenance of offshore wind in the three DPOs. These are:
- Arnish- distributed manufacturing,
 - Kishorn- distributed manufacturing.
- 5.3.2 There are other sites which, although not identified in the NRIP, could support development in the North region, including Scrabster which has previously been used to transfer components for onshore wind.
- 5.3.3 Arnish is on the East coast of the Isle of Lewis, and is currently mothballed as a site, with a small retained skeleton of employees. Previously employing 1400 people at its peak the local workforce retains the skills to restart manufacturing at the site which has supported the renewables industry, including manufacturing processes supporting the Beatrice windfarm²²⁰. As part of the port masterplan for Stornoway, it identifies that the expansion of the port, including the development of a deep-water port facility, has the potential to support expansion of offshore wind farm component manufacturing at Arnish²²¹.
- 5.3.4 Kishorn has been identified as a key site for the expansion of the renewables industry, including in manufacture of the concrete bases for the turbine structures. The site has planning permission in place, in line with its port master plan, to expand the quarry and facilities including offices, accommodation and engineering and fabrication sheds, alongside the applicable marine licences for deep water berthing and anchoring of floating structures in Loch Kishorn²²². Kishorn is well placed to support floating offshore wind, having prepared its infrastructure to potentially support the Kincardine development.
- 5.3.5 In addition to the above, there are potential socio-economic benefits from developing supply chains to support offshore wind, particularly through the development of onshore operations and maintenance support.

²¹⁹ Scottish Enterprise and Highlights and Islands Enterprise. 2010. National renewables infrastructure plan Stage 2. Available at <http://www.hie.co.uk/growth-sectors/energy/n-rip.html>.

²²⁰ Munro. 2018. Isles MSP hopeful of jobs revival at mothballed fabrication yard in Outer Hebrides, News published in the Press and Journal, 12 September 2018. Available at <https://www.pressandjournal.co.uk/fp/news/islands/1560166/bi-fab-hopes/>.

²²¹ Stornoway Port Authority. 2017. Masterplan for Stornoway Port. Available at <http://www.stornowayportauthority.com/wp-content/uploads/2014/12/Stornoway-Port-Authority-Port-Masterplan.pdf>.

²²² Kishorn Port. 2018. Kishorn Port & Dry Dock – Showcase Day 19th September 2018. Available at <https://www.kishornport.co.uk/2018/09/kishorn-port-dry-dock-showcase-day-19th-september-2018/>. Accessed 05/10/2018.

Energy Generation

- 5.3.6 There are two power stations located within the North region. Both are diesel power stations, one in Stornoway on the Isle of Lewis, the other in Kirkwall, Orkney.
- 5.3.7 There is one consented demonstration wind energy development in the North region, the Dounreay Tri development, for two 5MW wind turbine generators. There are additional DPOs for offshore wind (Figure 144) which will be superseded by the DPO as part of the updated offshore wind sectoral marine plan.

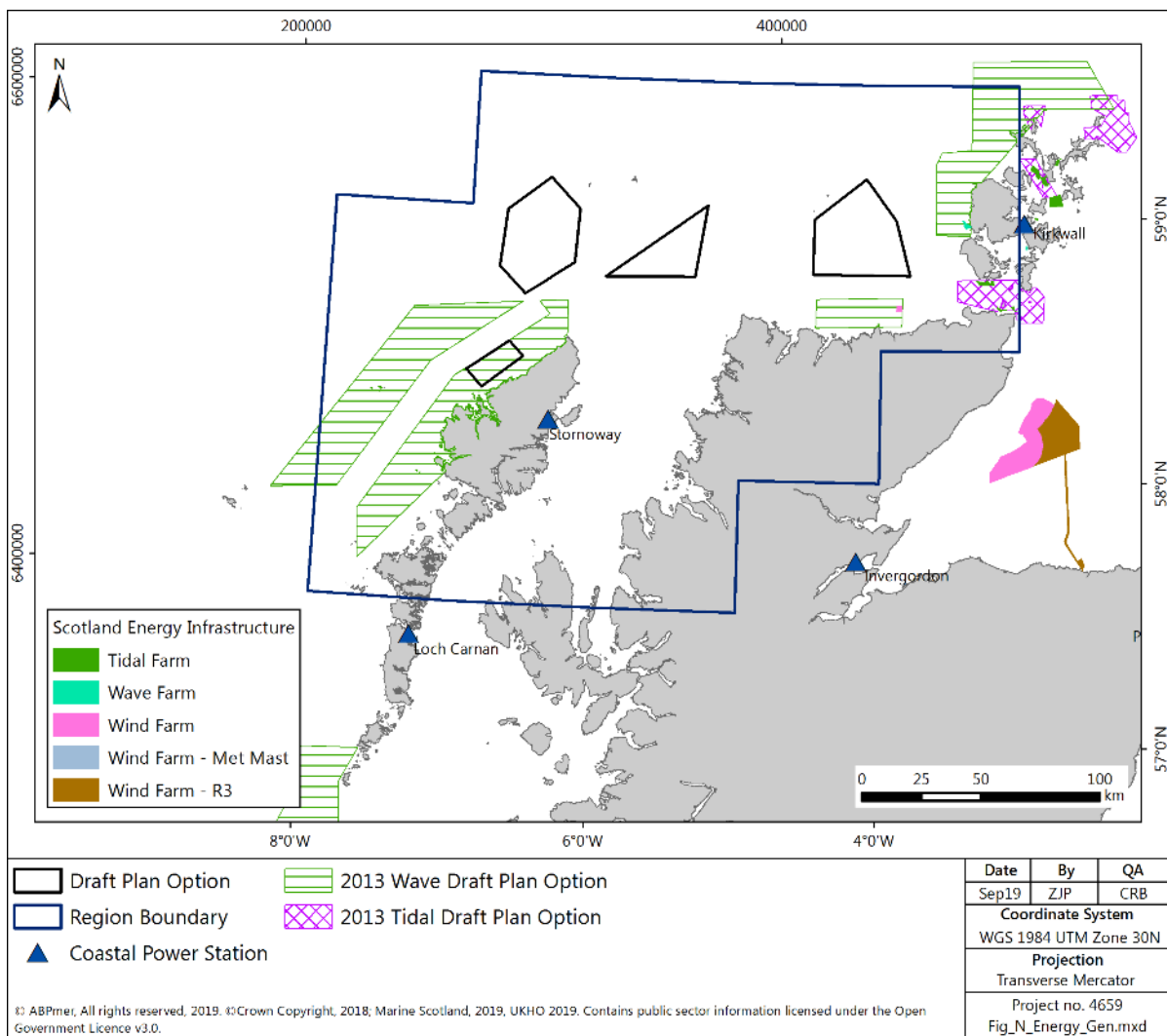


Figure 144 North region: current, planned and potential future offshore energy generation infrastructure

- 5.3.8 Tidal flow energy and wave energy generation is currently being developed within the North region and there are facilities currently operational or under development in the coastal seas around the Orkney Islands (Figure 144). In particular, there is a tidal flow energy array operational and looking to expand within Pentland Firth. None of the current developments, or areas with crown estate licences directly overlap with the DPOs.
- 5.3.9 In 2013 the Marine Scotland consulted on Draft Plan Options (DPO) for wave and tidal energy^{223, 224}. These draft options were subsequently recognised in Scotland's National Marine Plan²²⁵. The DPOs identify areas of potential for the future development of wave and tidal energy in Scottish waters (Figure 144). The plan options for wave energy overlap with the N4.

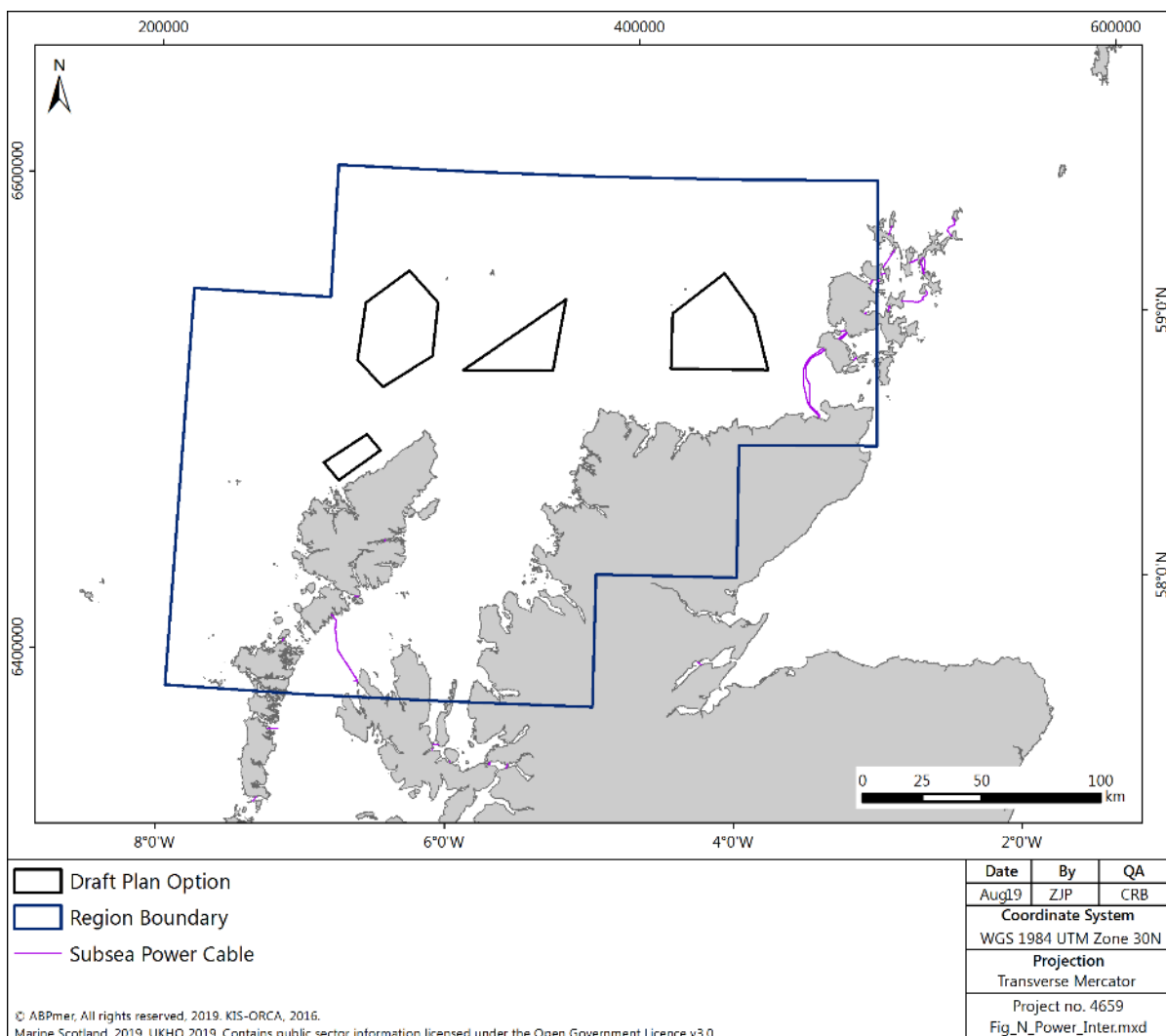
²²³ Marine Scotland. 2013. Wave Energy in Scottish Waters- Initial Plan Framework (Draft Plan Options). Available at <https://www.gov.scot/Topics/marine/marineenergy/Planning>.

²²⁴ Marine Scotland. 2013. Tidal Energy in Scottish Waters- Initial Plan Framework (Draft Plan Options). Available at <https://www.gov.scot/Topics/marine/marineenergy/Planning>.

²²⁵ Scottish Government. 2015. Scotland's National Marine Plan, A Single Framework for Managing Our Seas. Available at <https://www.gov.scot/Topics/marine/marineenergy/Planning>.

Power Interconnectors

- 5.3.10 There are 210km of power interconnectors in the North region connecting the Isle of Skye to the Outer Hebrides and the Orkney Islands and shorter connections to link other small islands in the region. All the power interconnectors are inshore of the DPOs. (Figure 145).
- 5.3.11 There is a High Voltage Direct Current (HVDC) link in the early stages of development between the island of Lewis and the Scottish mainland. The Western Isles Connection will be used to transmit electricity generated by renewable developments on the Western Isles to areas of demand around towns and cities on the mainland. The project requires; a HVDC Converter and substation at Arnish Point, Stornoway, a HVDC Converter and substation within the existing Beaully Substation, a HVDC underground cable between Beaully Substation and Dundonnell, on the west coast and a HVDC subsea cable between Arnish Point and the land fall at Dundonnell²²⁶.



²²⁶Scottish and Southern Electricity Networks. 2018. Western Isles. Available at: <https://www.ssen-transmission.co.uk/projects/western-isles/>. Accessed 12/10/2018.

Figure 145 North region: power interconnectors

Telecom Cables

5.3.12 The North region has 337km of active telecom cables. These mostly travel north and south of Orkney and Shetland connecting Europe to North America, Faroe Islands, Iceland and Greenland, a length of which is close to the eastern boundary of N1. There are a few short sections of cables inshore of the DPOs, connecting the Outer Hebrides and Orkney to the mainland, but the majority are further out to sea (Figure 146).

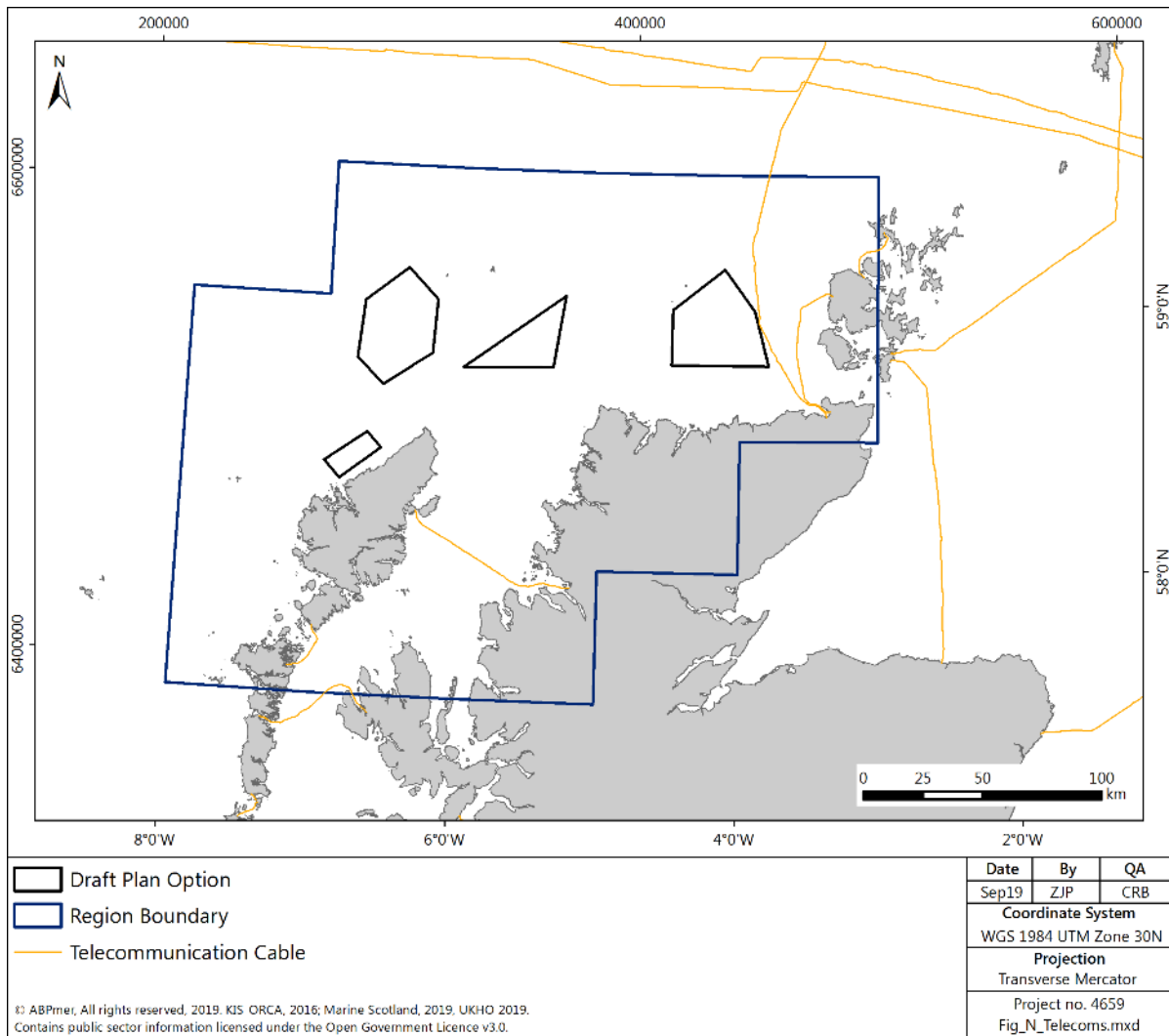


Figure 146 North region: active telecom cables

Carbon Capture and Storage

5.3.13 There are currently no identified potential CCS storage areas within the North region on the west or north coasts of Scotland. All potential saline aquifers, and the majority of oil and gas infrastructure, are off the East coast.

Oil and Gas

5.3.14 There are very few oil and gas related activities currently taking place within this Region. To the west of N3 there is one licensed block (Figure 147). It is not anticipated that there will be any significant exploration or development activity in the region in the foreseeable future.

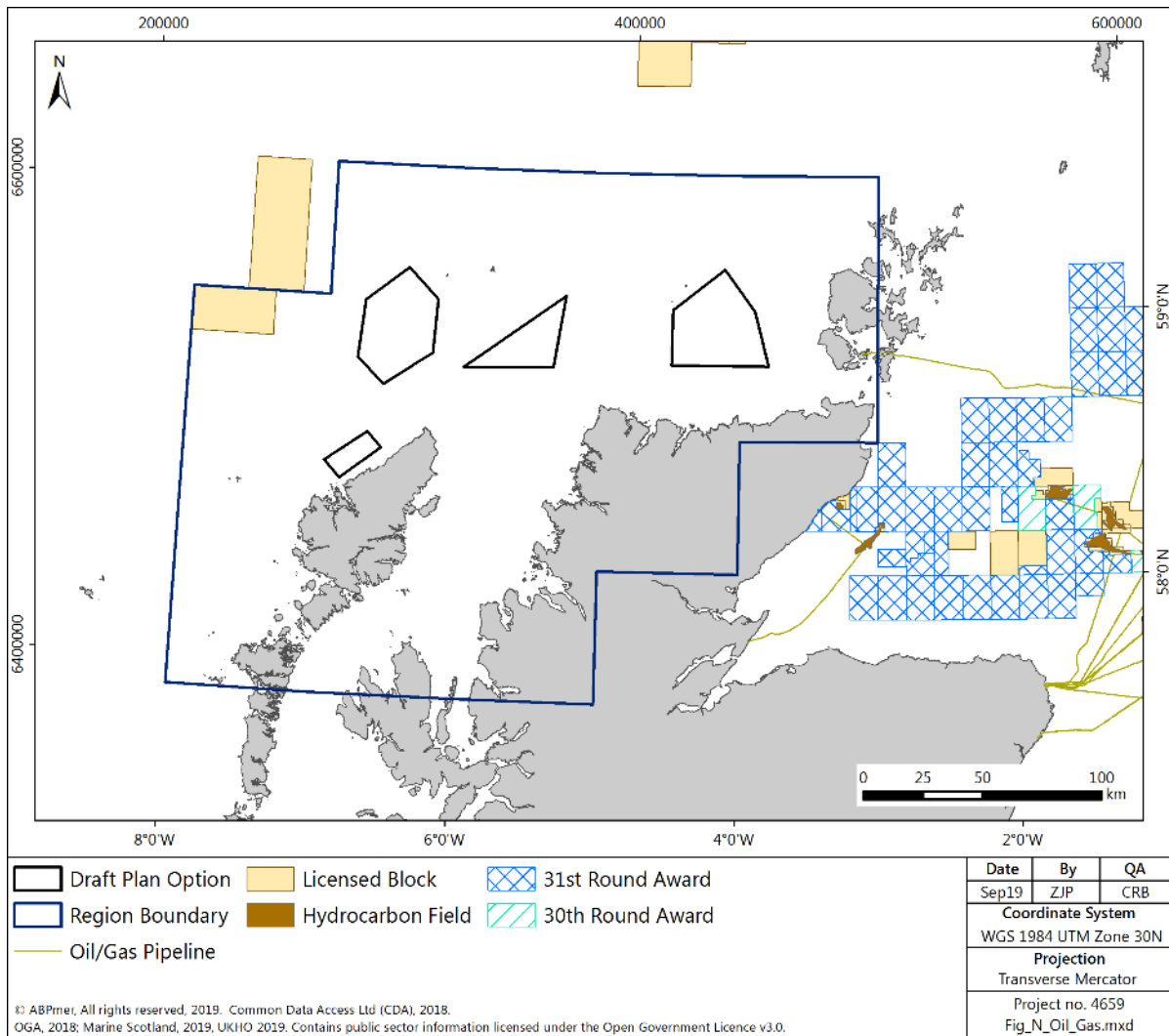


Figure 147 North region: oil and gas infrastructure and licenced blocks

Aviation

- 5.3.15 There are no major airports in the North region of Scotland. Airports in this region include civil aviation aerodromes at Benbecula and Stornoway and a helicopter rescue station (Figure 148).
- 5.3.16 Benbecula is a hub for the Southern Isles and provides flights between North and South Uist²²⁷. Stornoway airport is the main air link to the Isle of Lewis.
- 5.3.17 There is secondary surveillance radar used at Stornoway airport, but it does not overlap with any of the proposed DPOs (albeit it is very close to the boundary of N4).
- 5.3.18 Both Benbecula and Stornoway airport are safeguarded civil aerodromes.

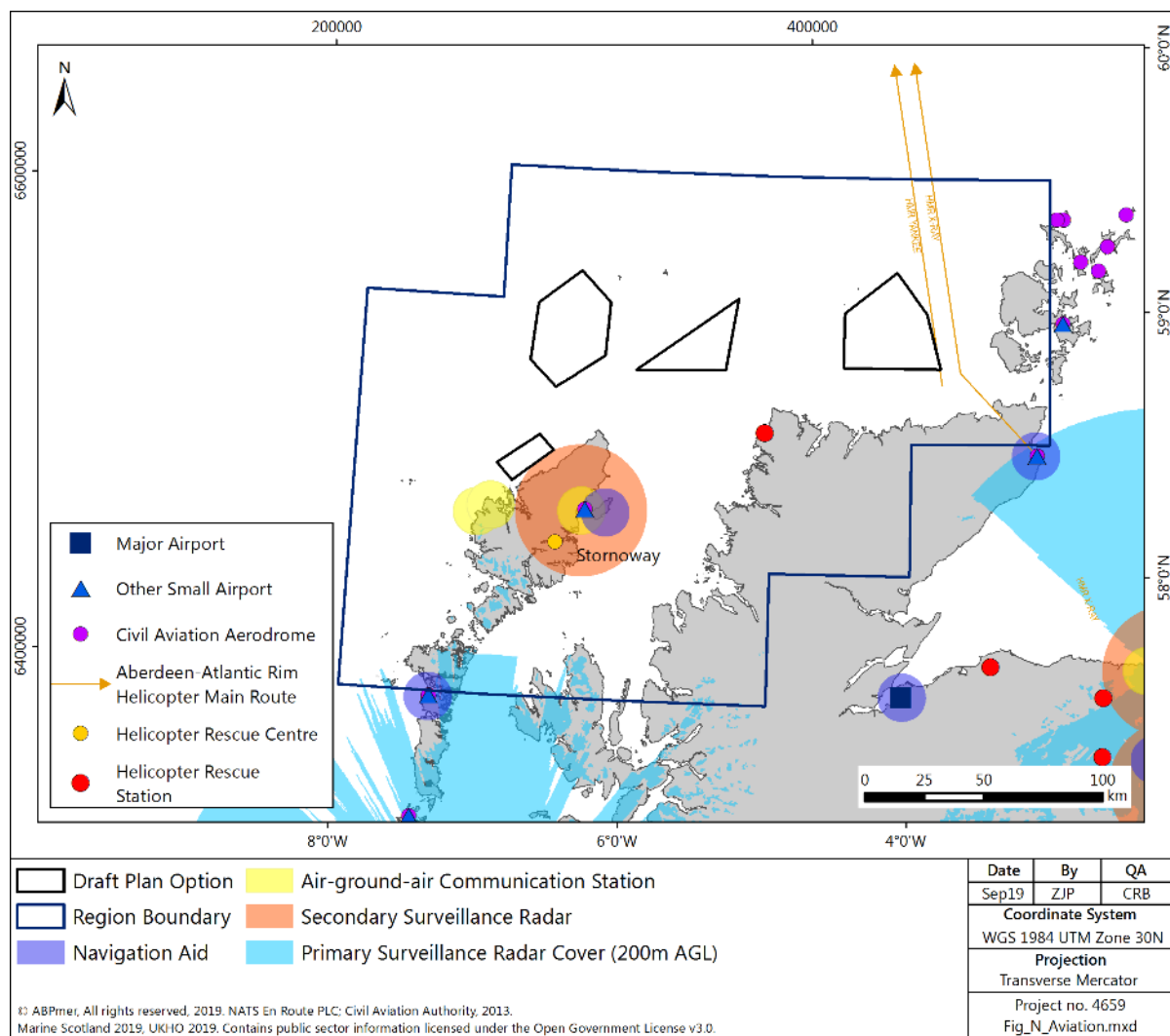


Figure 148 North region: aviation infrastructure, key routes and radar coverage

²²⁷Highlands and Islands Airports Limited. 2018. Benbecula Airport. Available at: <https://www.hial.co.uk/benbecula-airport/airport-information/>. Accessed 05/10/2018

Defence

- 5.3.19 As identified in Figure 149, there is a considerable amount of defence related activity in the North region, particularly in the seas around the Hebrides, where to the east lies a Naval exercise area and to the west a firing danger area. To the north of the north-western corner of Scotland there is an additional firing danger area, which falls between N1 and N2.
- 5.3.20 There is likely to be limited employment associated with defence activities within the North region (regional breakdowns of MOD employment are not available within Scotland) when considered against national scale employment, however it has been identified in the past that even a small change to the level of defence employment has the potential to impact on small island or remote economies where it may be the largest employer²²⁸.

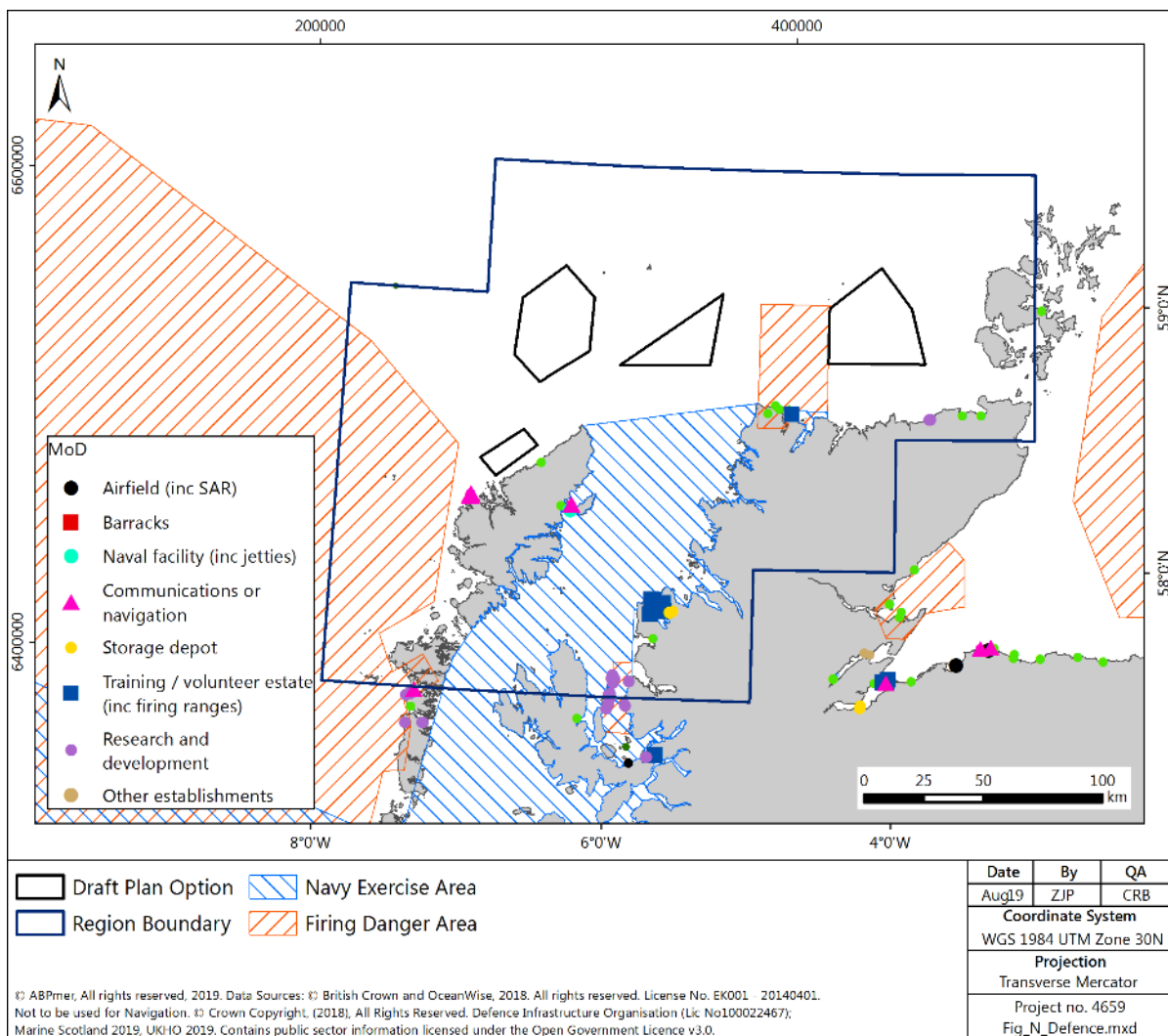


Figure 149 North region: defence infrastructure and exercise areas

²²⁸ BBC, 2017. Job cuts at UK's largest missile range. Available at <https://www.bbc.co.uk/news/uk-scotland-highlands-islands-42394488>. Accessed 05/10/2018

Fishing

- 5.3.21 Landings from UK-registered vessels caught in the North region had an average annual value of £362 million and an average live weight of 64,955,157 tonnes for the five year period 2013-2017. [
- 5.3.22 The majority of landings were pelagic (60%), and the majority of all landings were taken by the over 12 m fleet (93%). The dominant gear type is midwater trawls (57%) although demersal trawls (24%) and creeling (14%) also make significant contributions.
- 5.3.23 Figure 150 shows over-15m *Nephrops* trawls operate predominantly in The Minch, with scallop dredgers operating between Skye and Lewis. Demersal mobile gears targeting demersal fish operate further north and west along the shelf edge, and to the north-west of Orkney. Fishing for herring by over-15m pelagic vessels is patchy across the region, and particularly concentrated around the north coast of Scotland, north-east and north-west of Orkney, whereas fishing for mackerel takes place further offshore along the shelf edge and in the vicinity of DPO N3 (Figure 151). Over-15m vessels operating static gears fish across the region, particularly for crab, whereas *Nephrops* pots are more restricted to The Minch and the east coast of Lewis and North Uist, lobster creels are used particularly around Orkney and west of the Outer Hebrides (Figure 152).
- 5.3.24 Areas important for under-15m vessels are The Minch, Inner Sound and around Orkney (Figure 153). Under-15m vessels fishing in The Minch are predominantly *Nephrops* trawlers (Figure 153), with important creeling areas (for *Nephrops* crabs and lobsters) around Orkney, Dunnet Head on the north coast of the mainland, North Uist, and Inner Sound (Figure 154).
- 5.3.25 There were 385 fishing vessels with their Home Port registered within the North region in 2016²²⁹. The majority (76%) of these were in the ten metres and under length category. The ports with the most registered vessels were Ullapool (86), Stornoway (85), Scrabster (52), Lochinver (26) and Westray (16). The most over-15m vessels were registered in Stornoway (17), Lochinver (16) and Ullapool (10). Home ports within the North region are shown in Figure 155.

²²⁹ MMO, 2016. UK Fishing Vessel Numbers by Home Port 2016. Available at: https://www.geostore.com/environment-agency/rest/catalogue/download/mmo_wms_united_kingdom_fishing_vessel_numbers_by_home_port_2016?format=ESRI_Shapefile. Accessed 25/10/2018.

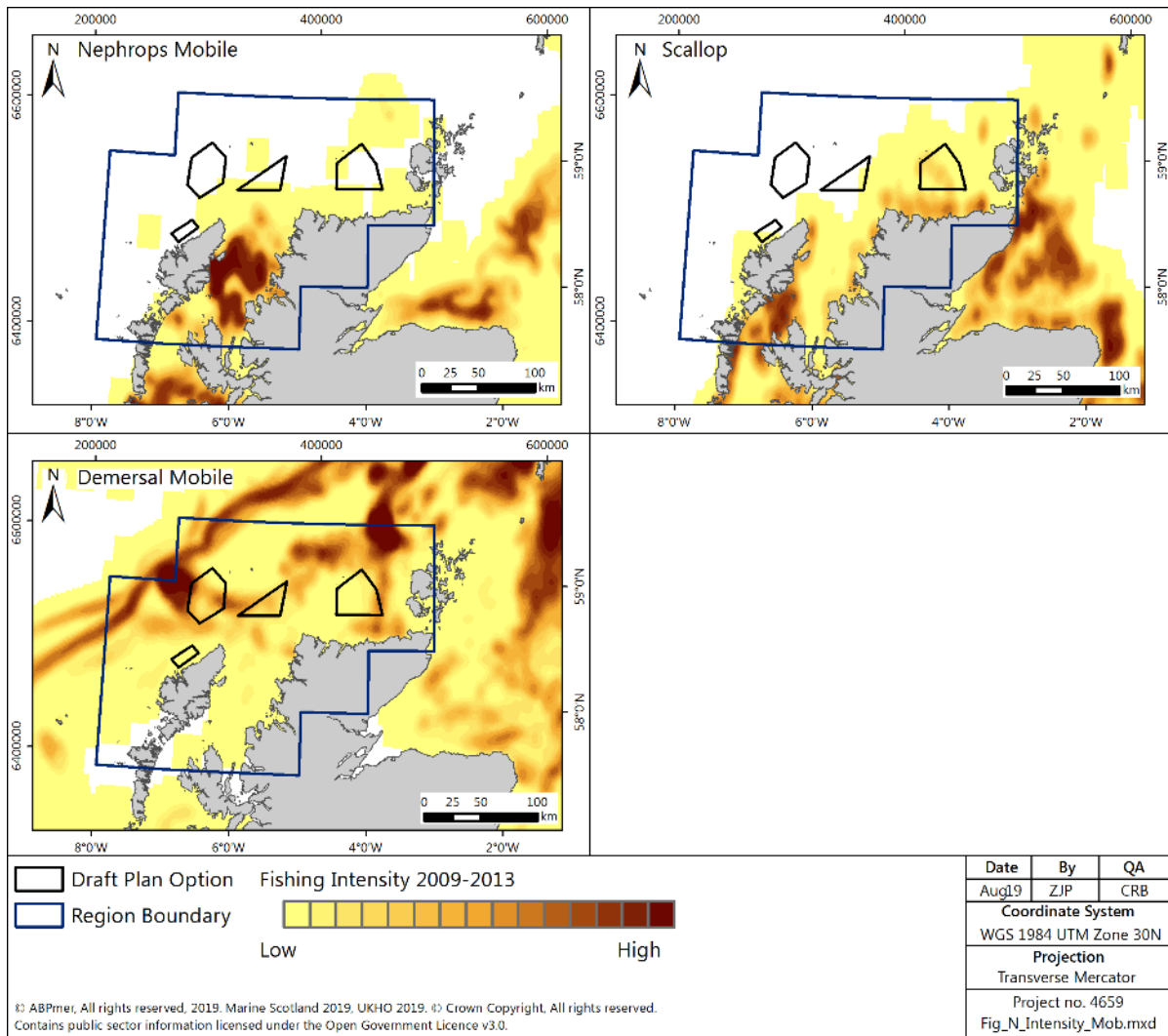


Figure 150 Fishing intensity for over-15m vessels in the North region using demersal mobile gear (2009-2013)

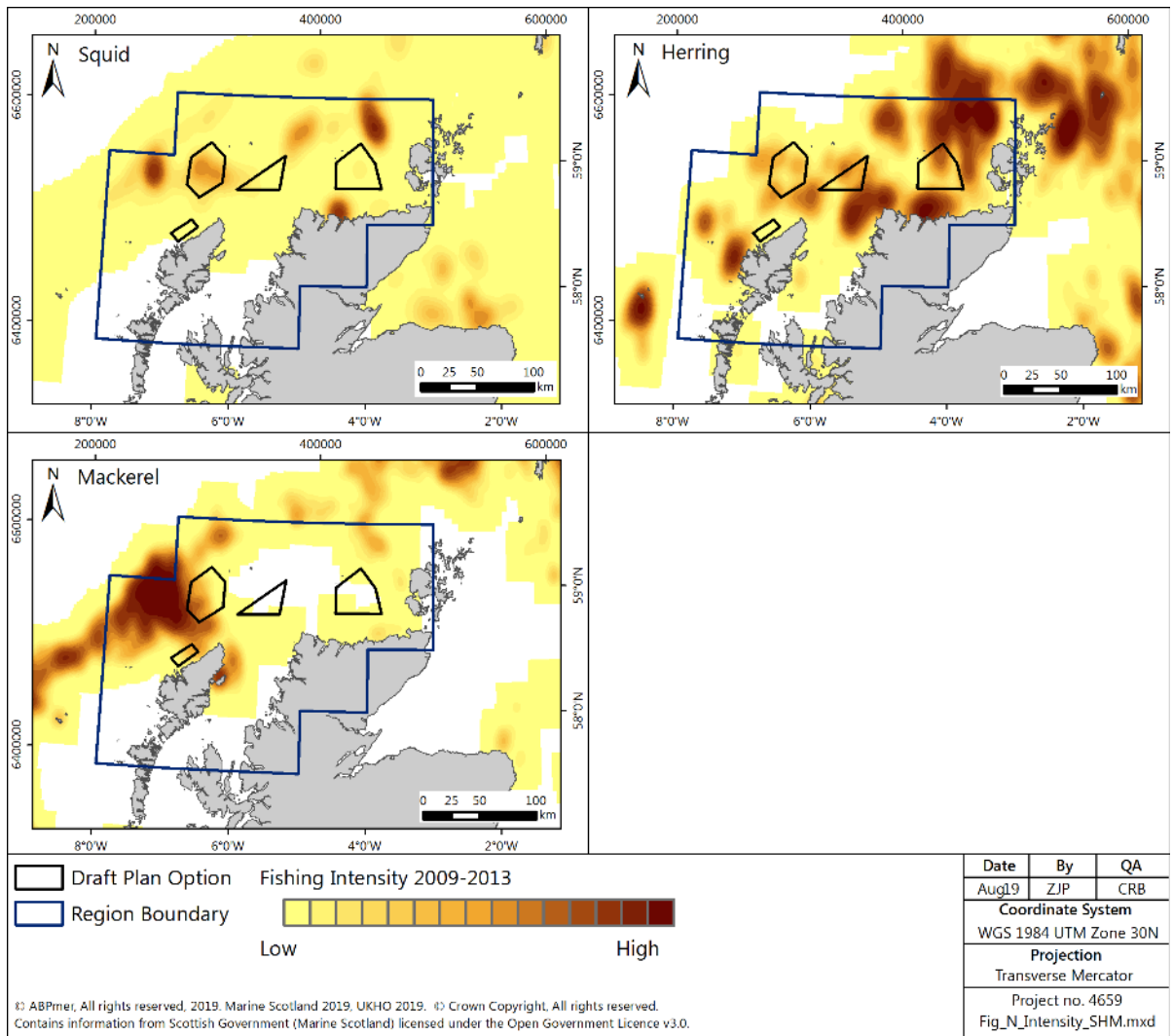


Figure 151 Fishing intensity for over-15m vessels in the North region targeting pelagic species (2009-2013)

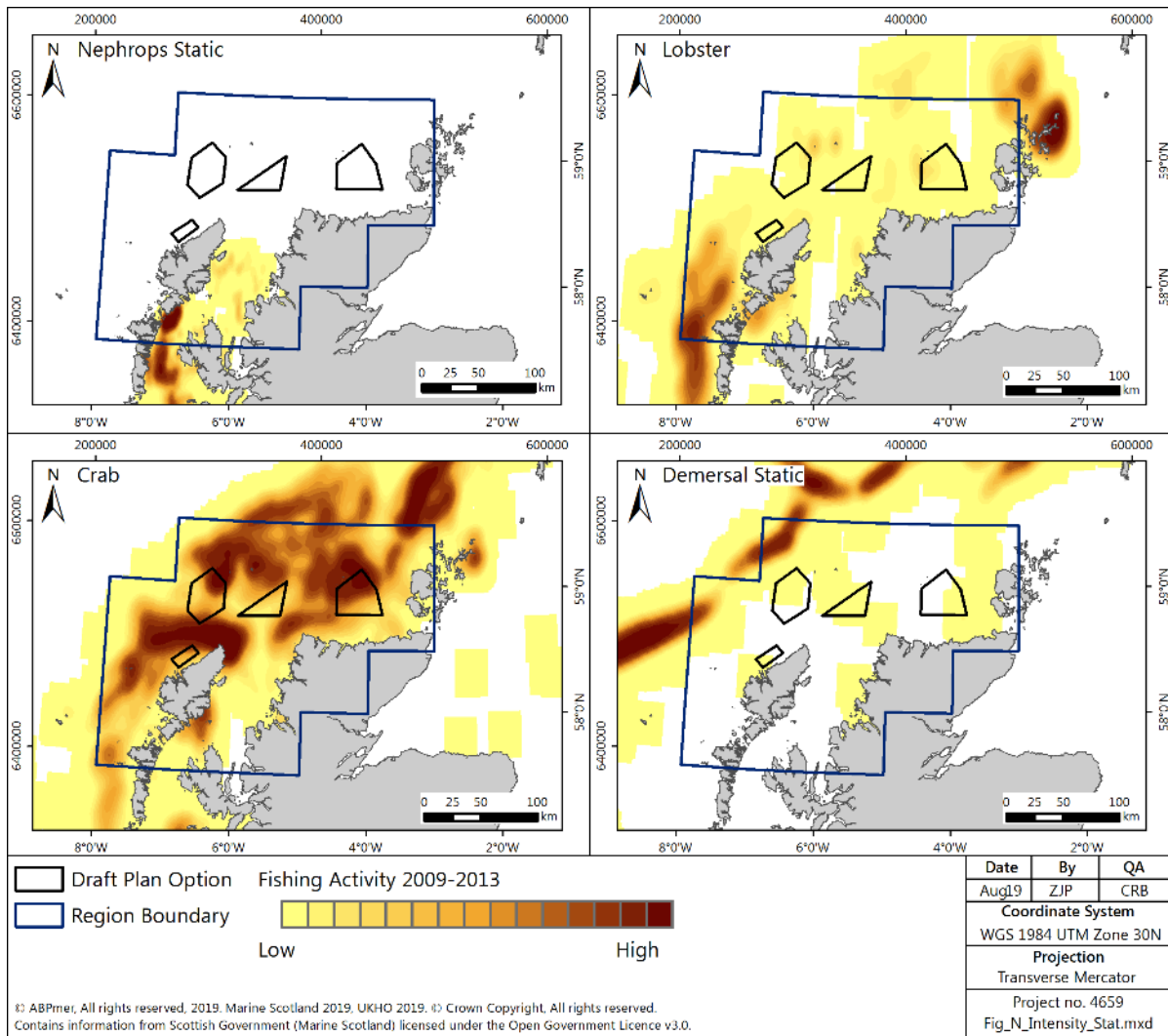


Figure 152 Fishing intensity for over-15m vessels in the North region using static gear (2009-2013)

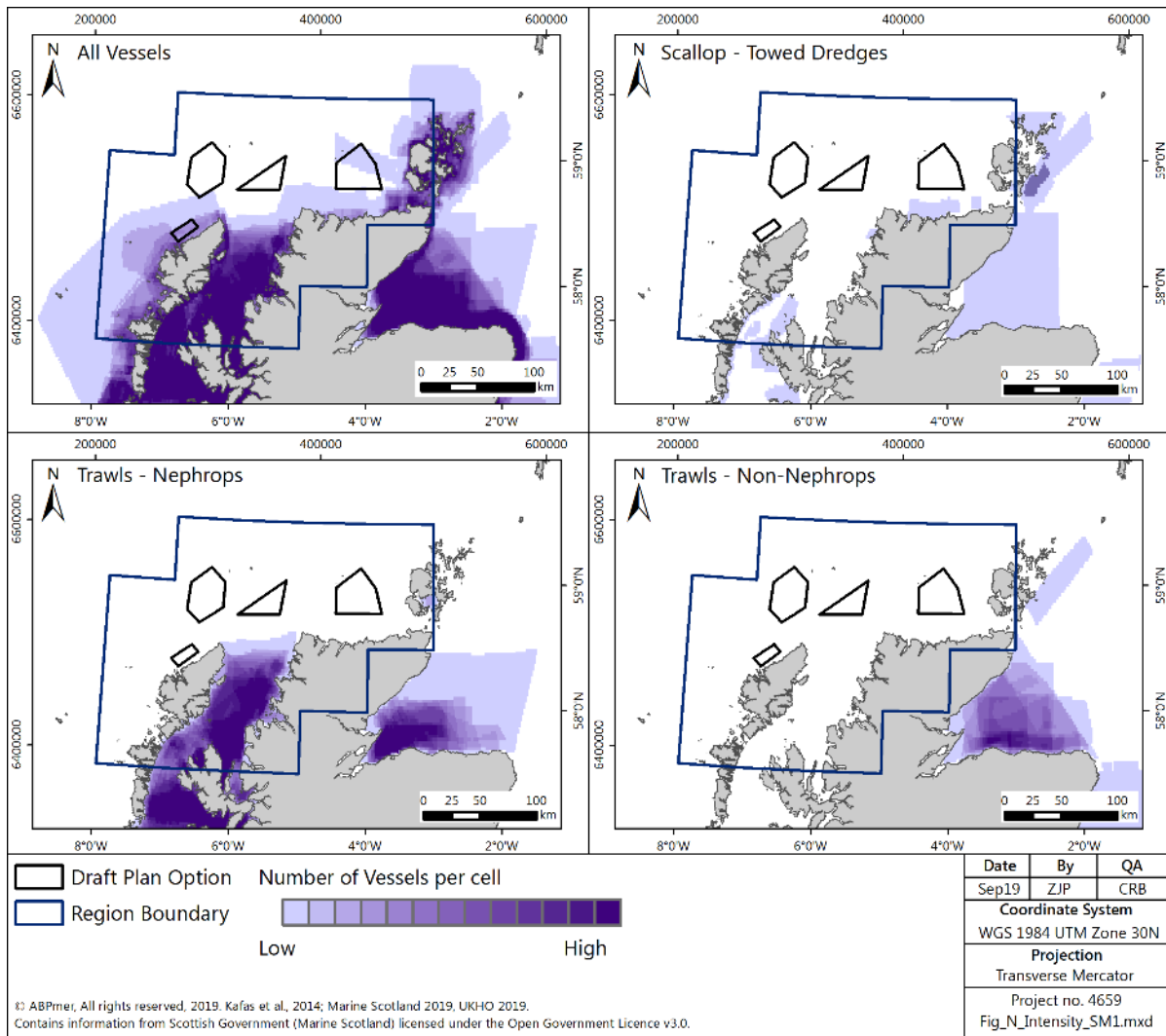


Figure 153 Number of vessels for under-15m vessels in the North region, all gears and mobile demersal gears, from ScotMap

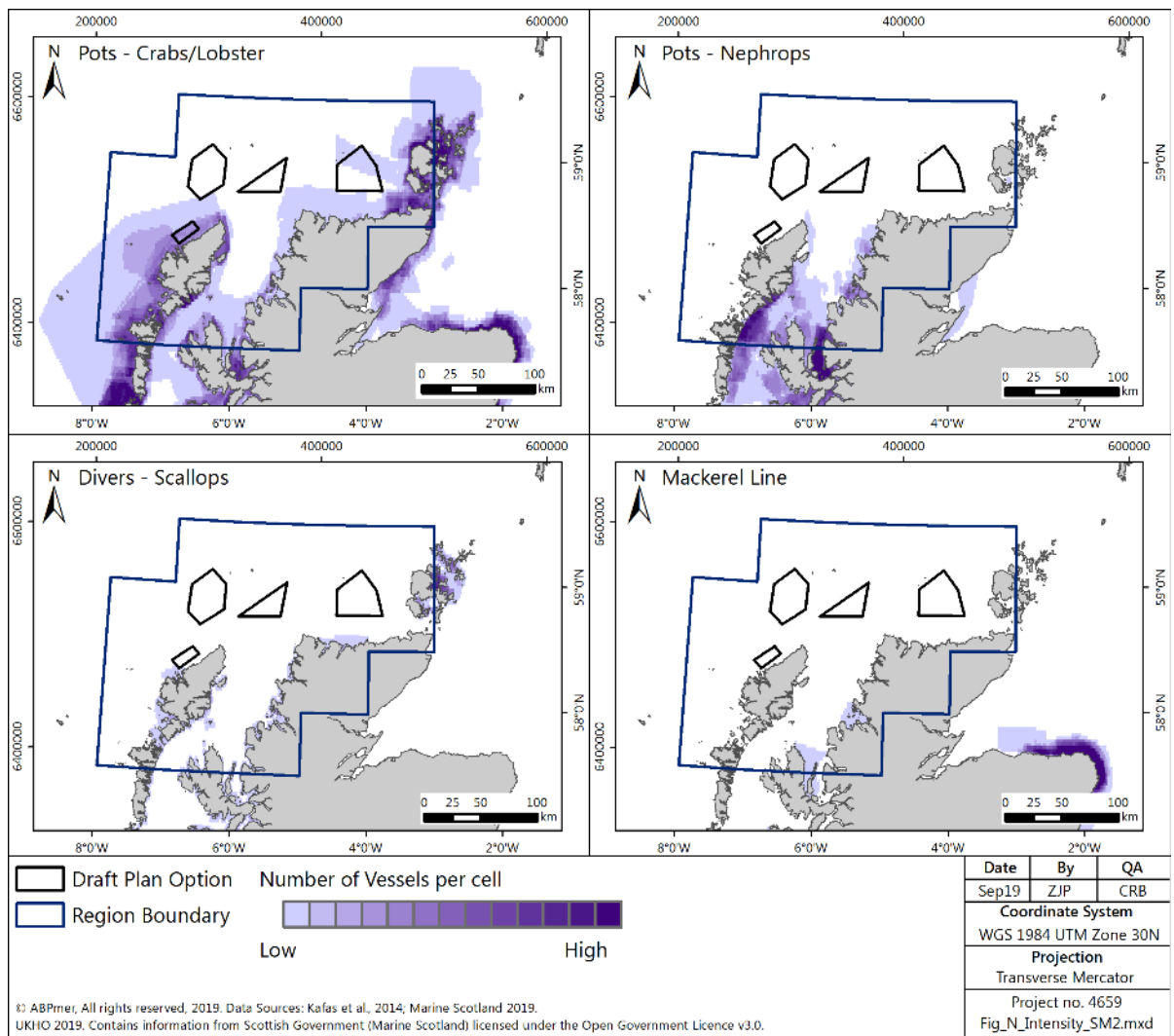


Figure 154 Number of vessels for under-15m vessels in the North region, pots, divers and mackerel lines, from ScotMap

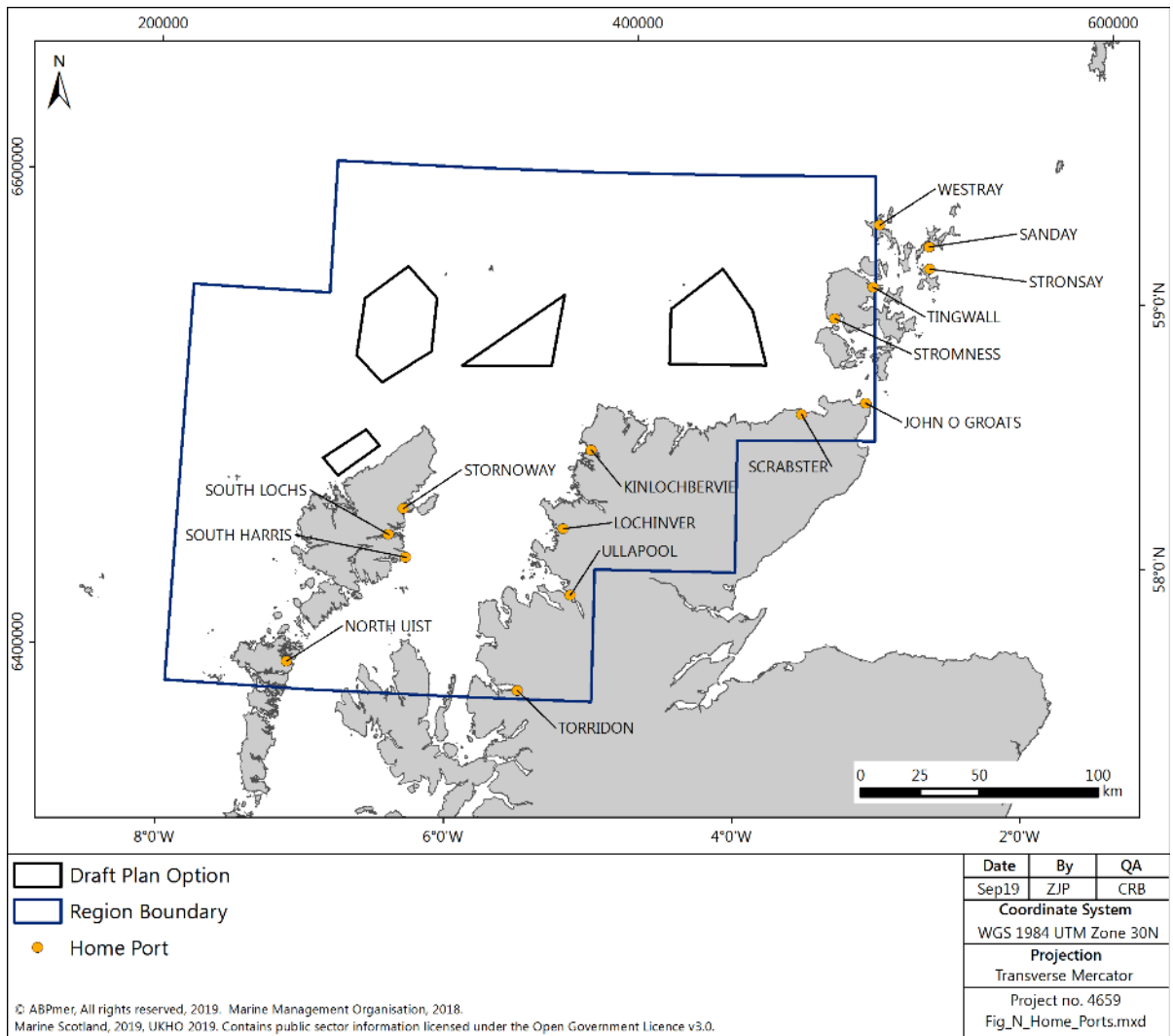


Figure 155 North region: distribution of home ports

- 5.3.26 The main landing ports (in terms of value of landings in 2017) in the North region are Scrabster (£32 million), Ullapool (£15 million) and Kinlochbervie (£15 million)²³⁰.
- 5.3.27 There are five fixed engine sites for wild salmon and sea trout, four along the north coast and one on Skye, and one net and coble site on Stornoway (Figure 156).
- 5.3.28 The main rod and line fishing rivers in this region are the Rivers Torridon (salmon), Ewe (salmon), Gruinard (salmon), Ullapool (salmon), Kirkaig (salmon), Inver (salmon), Thurso (salmon), Halladale (salmon), Naver (salmon and sea trout), Borgie (salmon), Dionard (salmon and sea trout), Laxford (salmon).²³¹

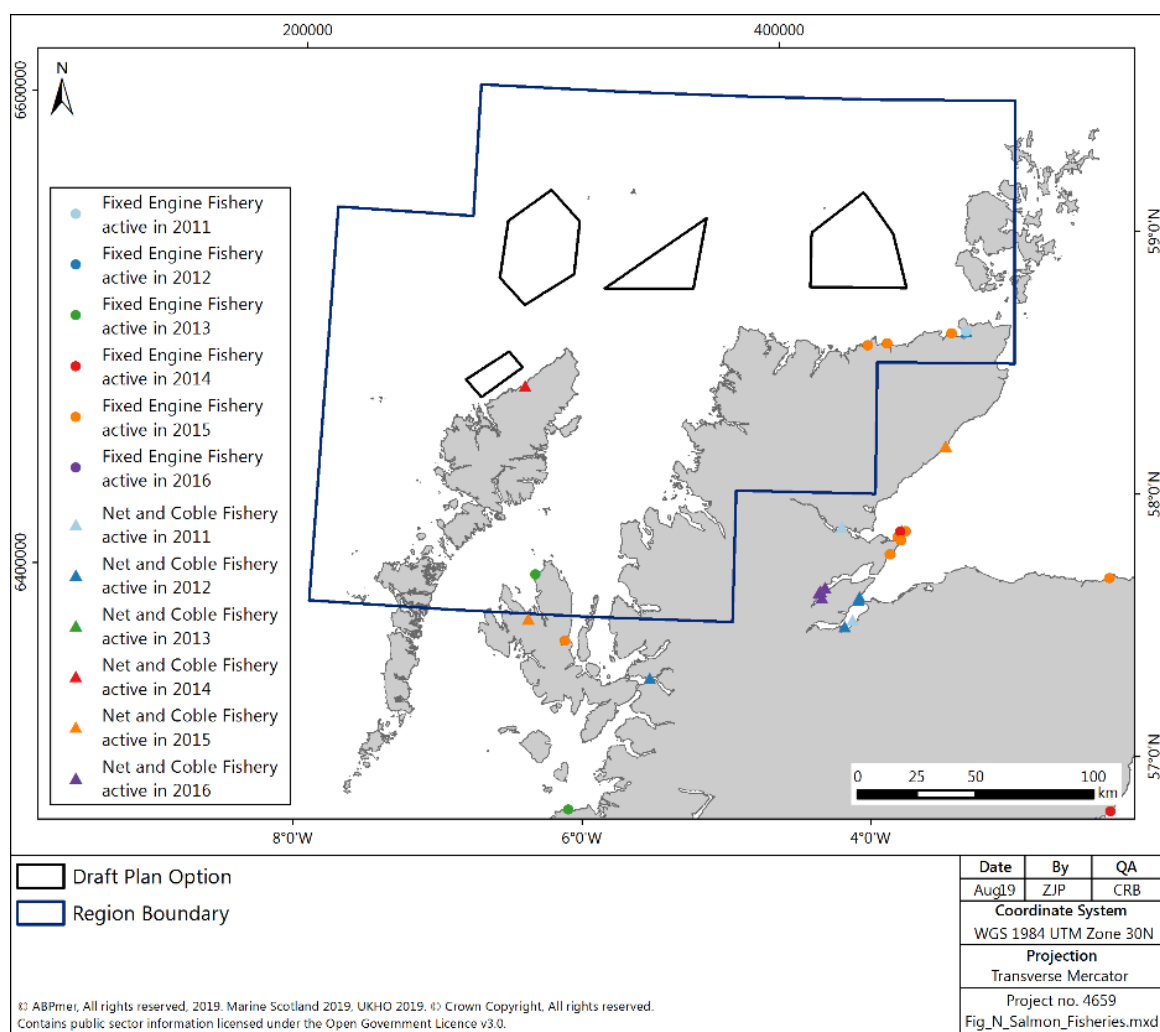


Figure 156 Salmon and sea trout net fisheries reporting catches in 2011–2016 in the North region

²³⁰ Scottish Government, 2018. Scottish Sea Fisheries Statistics 2017. Available at: <https://www.gov.scot/Topics/Statistics/Browse/Agriculture-Fisheries/PubFisheries>. Accessed 22/10/2018.

²³¹ Scottish Government. 2012. Offshore Wind Energy in Scottish Waters - Draft Regional Locational Guidance. doi: 10.7489/1686-1.

Aquaculture

- 5.3.29 Marine aquaculture sites within the North region are shown in Figure 157. There are 71 licensed finfish and 71 licensed shellfish sites. Aquaculture sites are widespread along the coastline within the North region, with concentrations in the Outer Hebrides and around the Summer Isles.
- 5.3.30 There are no aquaculture facilities within the DPOs and it is considered unlikely that development will be brought forward in these areas unless there is beneficial co-location with offshore wind development.
- 5.3.31 In the North region shellfish production is dominated by mussel and Pacific oyster, although small quantities of scallop, queen scallop and native oyster are also produced. The North region encompasses parts of the Highland, Western Isles and Orkney regions used in the Scottish Government's 2017 Production Survey, therefore, production numbers will be an over estimation. The aquaculture industry farms high levels of salmon in the North region. In 2016, approximately 94,000 tonnes were produced with a value of £305 million.
- 5.3.32 In 2017, 954 tonnes of mussels and 1,948 tonnes of Pacific oysters were produced.

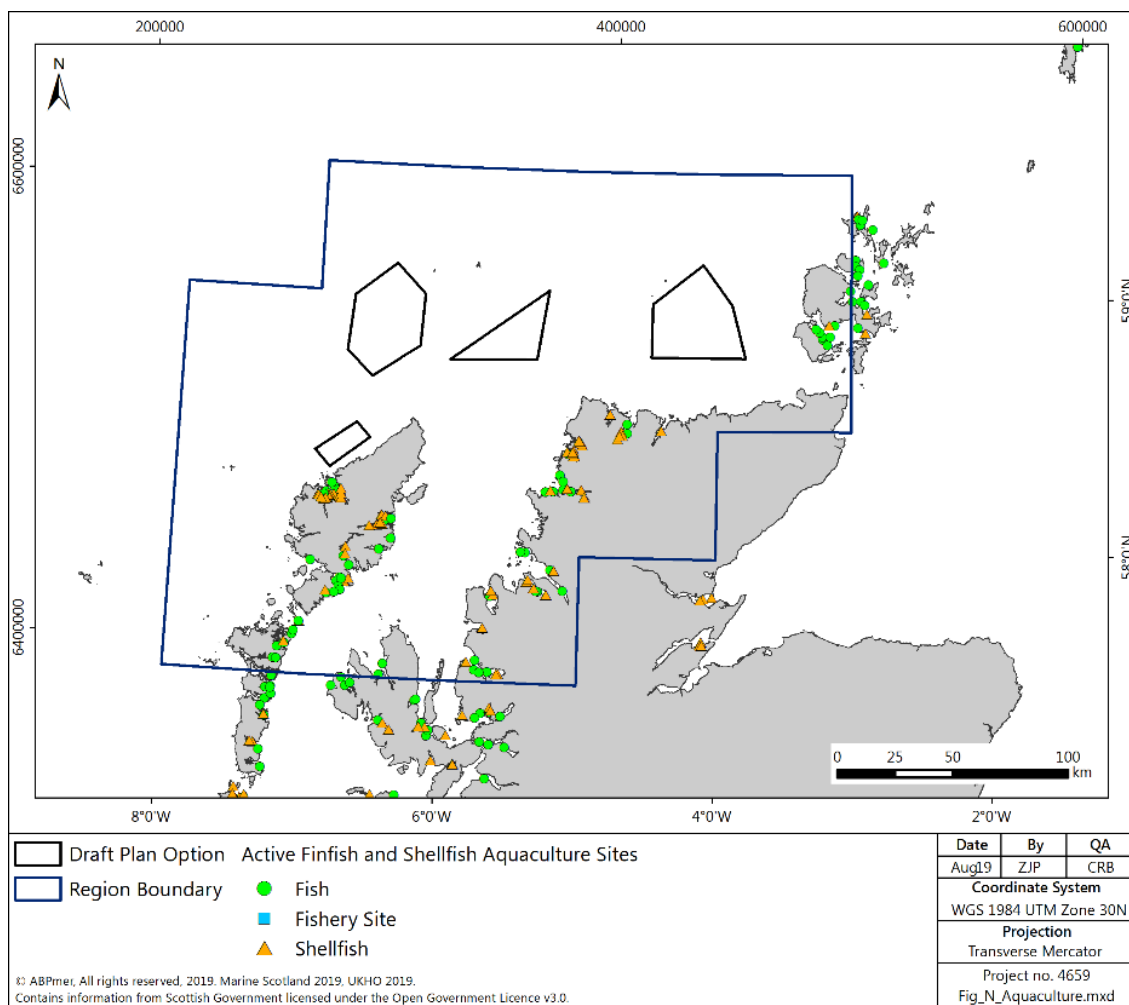


Figure 157 North region: marine aquaculture sites

Ports and Harbours

- 5.3.33 The North region has 1 major port, 3 minor ports and many smaller harbours that provide important facilities, quays and shelter for vessels moving between locations (see Figure 158).
- 5.3.34 Stromness is the only major port in the North region. It is the base for the daily Northlink Ferry to Scrabster, the MV Graemsay ferry to Hoy and Graemsay, the base for the local lifeboat, and is a popular destination for smaller cruise liners²³².
- 5.3.35 Kirkwall port is the main hub for the interisland ferry routes, fishing and dive vessels²³³.
- 5.3.36 Lyness is the port for the ferry from the Mainland to Hoy. It is also a key economic investment area, identified to support assembly, storage and servicing of renewable energy devices. A development brief has been prepared to guide the planning and investment around Lyness Harbour and the wider peninsula. Improvements will be made to the moorings; new buildings are planned, and extensive areas of hard standing will be laid²³⁴.
- 5.3.37 On the mainland Scrabster is a key port and hub of economic activity in the region, catering for sectors including oil and gas, renewables, fishing and cruise ships²³⁵. It has also been identified for further consideration in Phase 2 of the NRIP. Its location on the Pentland Firth is focusing plans for improvement and investment to support the wave and tidal renewables sectors. Redevelopment is ongoing. Wick has also been identified as a key potential location to support wave and tidal related activities in Phase 2 of NRIP.
- 5.3.38 John O'Groats provides a ferry service to and from Orkney (Burwick) and a second service is provided from Gills Bay to and from Orkney (St Margaret's Hope).
- 5.3.39 There is a high concentration of anchorages in the North region, particularly in the Outer Hebrides and Orkney, reflecting the high sailing activity in the area. None of the anchorages overlap with the DPOs.
- 5.3.40 There are a few dredge disposal sites in the region. They are all close inshore and do not overlap with the DPOs.

²³² Orkney island Council Harbour Authority. 2018. Stromness. Available at: <https://www.orkneyharbours.com/port-authority/ports/stromness>. Accessed 09/10/2018.

²³³ Orkney island Council Harbour Authority. 2018. Kirkwall. Available at: <https://www.orkneyharbours.com/port-authority/ports/kirkwall>. Accessed 09/10/2018.

²³⁴ Orkney island Council Harbour Authority. 2018. Lyness. Available at: <https://www.orkneyharbours.com/port-authority/ports/lyness>.

²³⁵ Scrabster Harbour. 2018. Sectors. Available at: <http://www.scrabster.co.uk/about-us/>.

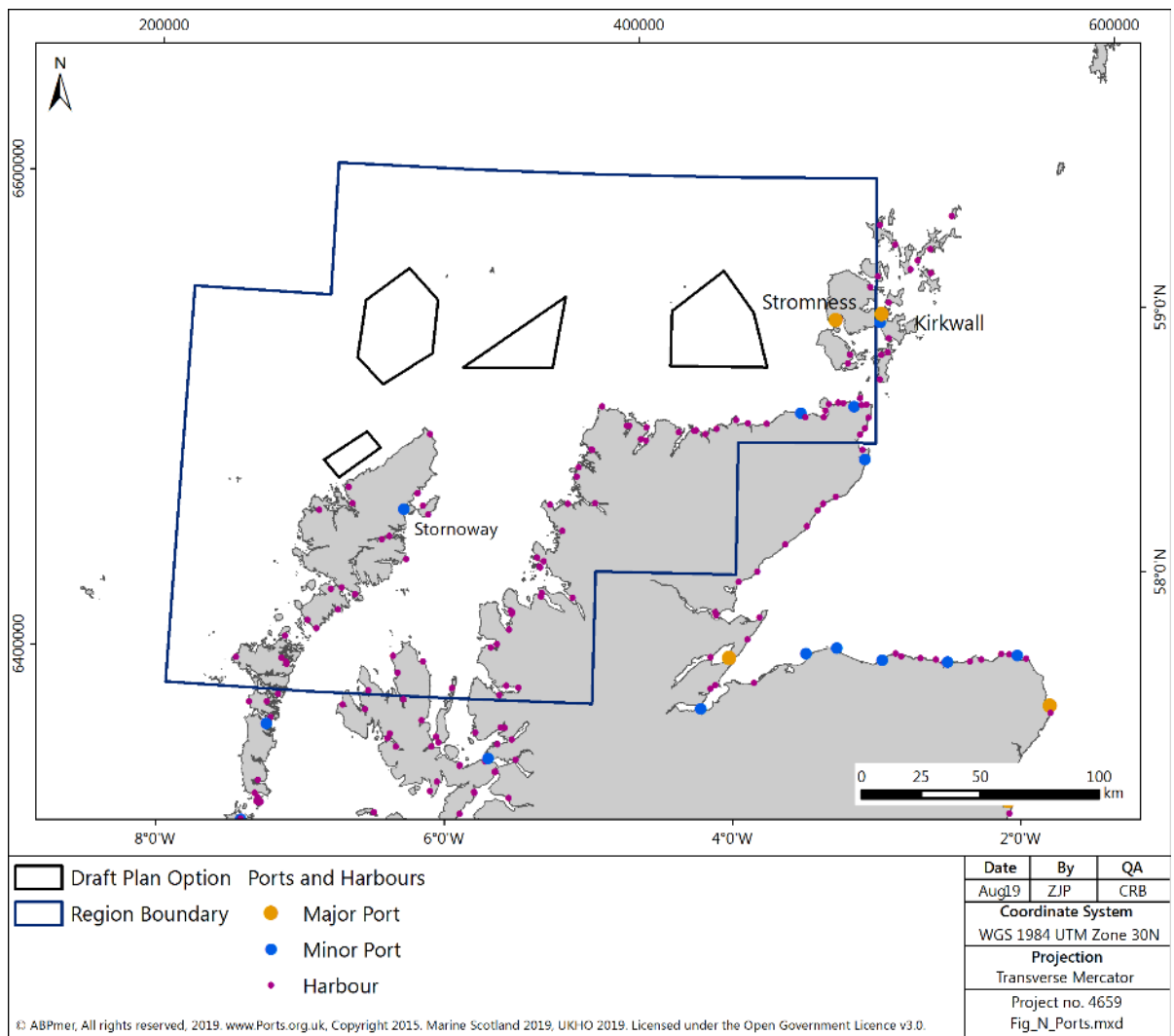


Figure 158 North region: ports and harbours

Shipping

- 5.3.41 Key routes through the North region include passage through the Minches, the recommended deep-water route to the west of the Outer Hebrides, transit routes around the north coast, through Pentland Firth and to the north of the Orkney Islands towards Shetland, and ferry routes between the mainland and the Outer Hebrides, Skye and the mainland.
- 5.3.42 AIS density data (Figure 159) shows areas of high shipping density (up to 100 vessel transits per week) in the Minches, including transit through the area (incorporating the TSS scheme just to the south of the North region) and ferry services.
- 5.3.43 There are two key areas for lifeline ferry services in the North region, one connecting North and South Uist with Skye and the mainland, principally at Ullapool, and the other across Pentland Firth to the Orkney Islands, within the Orkney Islands and further towards Shetland. Both areas are represented by clear lines of high shipping density on Figure 159.
- 5.3.44 The areas of highest density, particularly across the north coast, are inshore of the DPOs, although there is a route which heads towards Shetland from the north-west tip of the mainland which intersects N1..

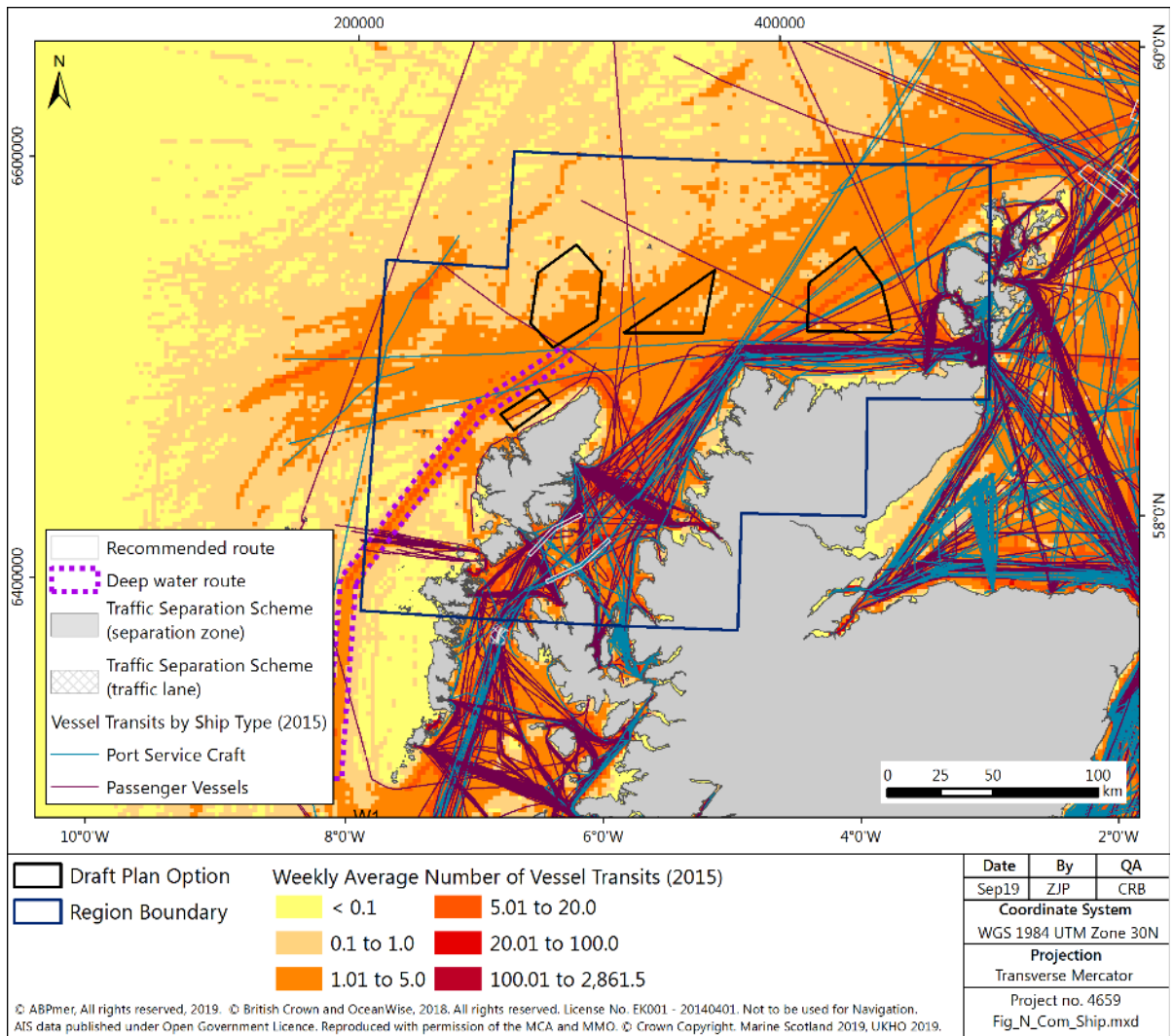


Figure 159 North region: shipping densities and key routes

Coastal and Flood Protection

5.3.45 There are few flood prevention works within the North region, with the only coastal protection schemes constructed since 1961 in the far south-western corner of the region (Figure 160), on the Outer Hebrides, approximately 100km south of the nearest DPO N4. There are also some small areas of hard defences on the on the Orkney Islands associated with Stromness harbour and other harbour areas throughout the region.

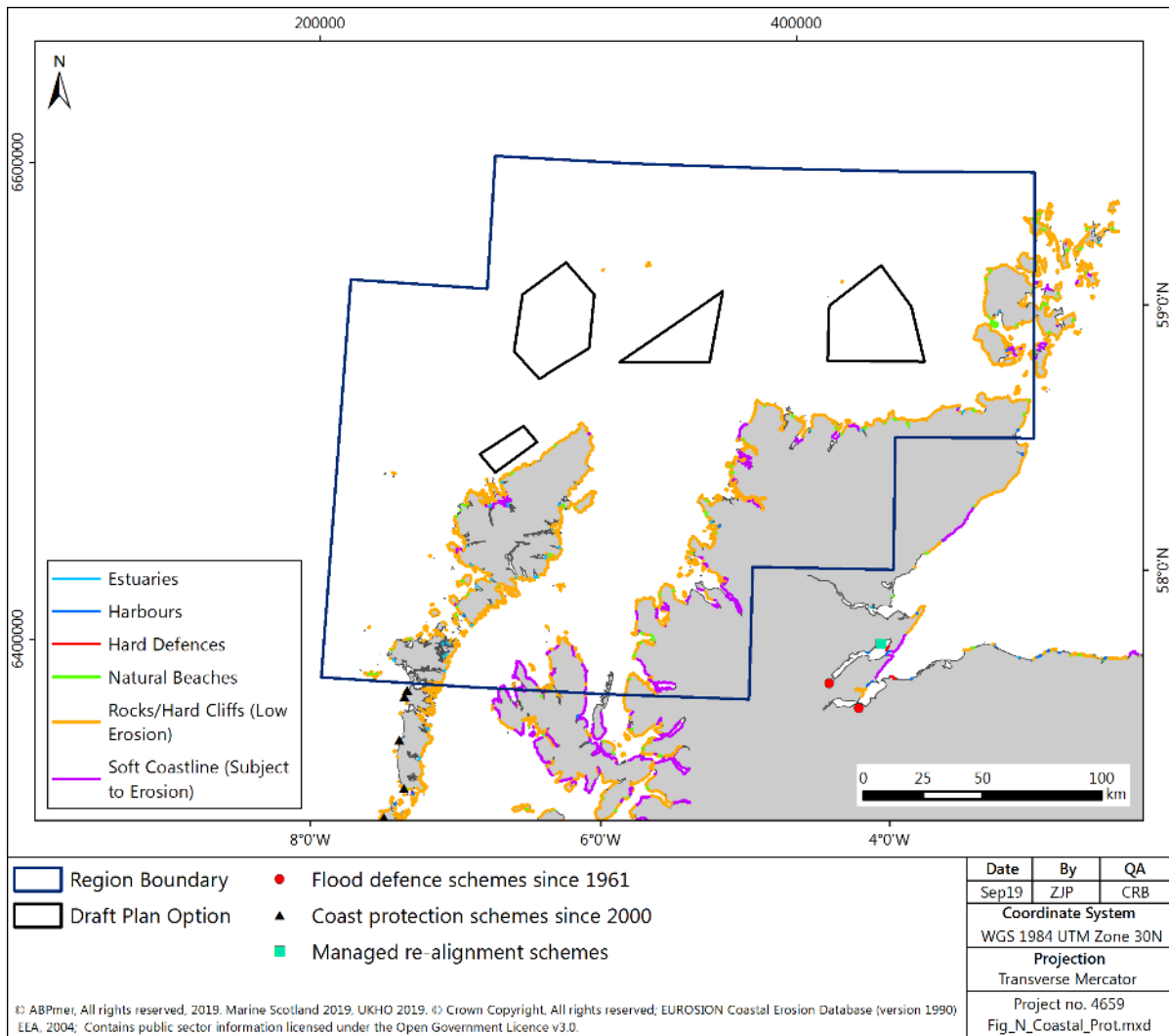


Figure 160 North region: coastal and flood protection schemes

Marine and Coastal Recreation

5.3.46 Most recreational activity occurs inshore of the DPOs (Figure 161), although there is some potential interaction with sailing and cruising routes in the region. Low levels of recreational activity are reported to occur between and overlapping with either all or some parts of each of the DPOs.

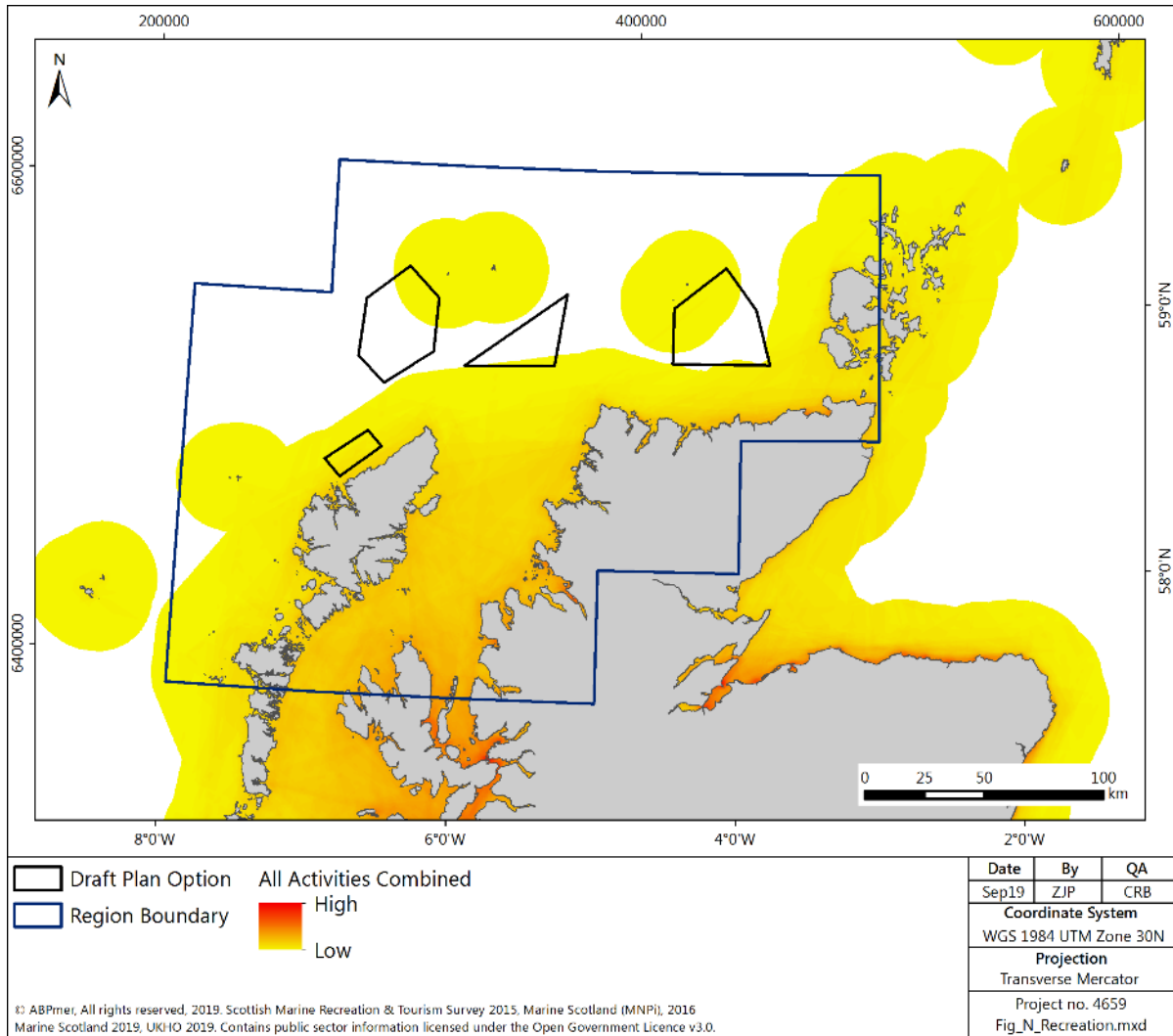


Figure 161 North region: density of recreational activities

Boating

5.3.47 The North region of Scotland offers uncrowded sailing destinations. Sailing activity is mostly concentrated around Orkney and the sea lochs and islets near the mainland. Heavy recreational use is made of the Summer Isles, Enard Bay, Eddrachalis Bay and the sound of Raasay. However, there is a low to medium level density of recreational boating overlapping with N1 from recreational vessels transiting from the Minches towards Orkney; the majority of the other DPOs are characterised by no or low-levels of reported boating activity.

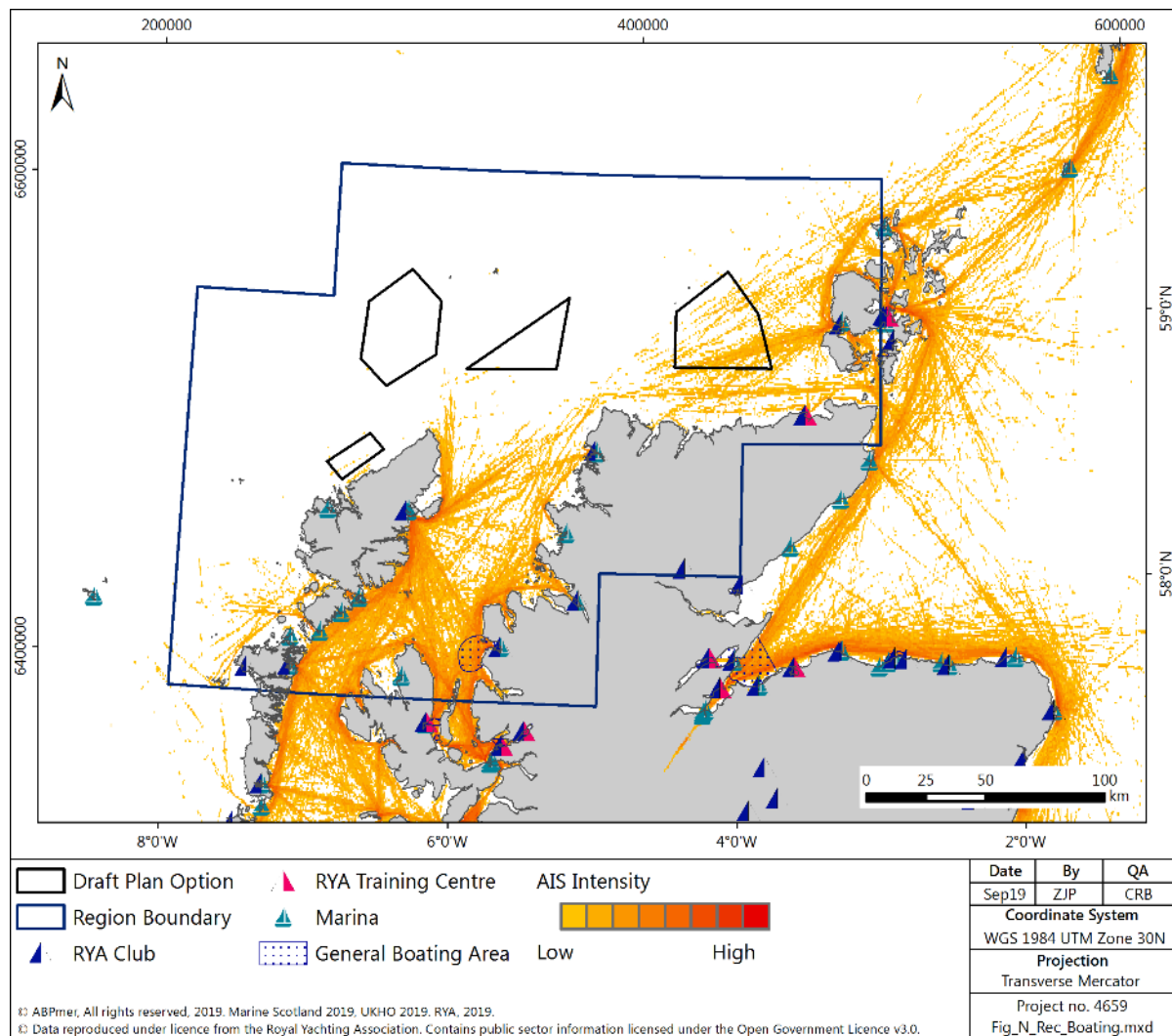


Figure 162 North region: recreational boating facilities and recreational boating density (from 2015 AIS data)

Angling

5.3.48 The North region is an unspoilt area and has a wide range of fishing opportunities including some of the best salmon and trout rivers and lochs in Scotland. It also has a varied coastline which offers lots of good locations for sea anglers. Ullapool is the main sea angling site. It is possible to cast from the shore and catch pollack, haddock, mackerel and skate. Boat fishing trips are also popular (Figure 163). Caithness offers the best fishing where bass and flounders are commonly caught from the beach and skate, halibut are sought by boat anglers²³⁶. Overall, there is little interaction between angling activities and the DPOs, with the exception of N4, which is considered to overlap with low-levels of reported angling activities.

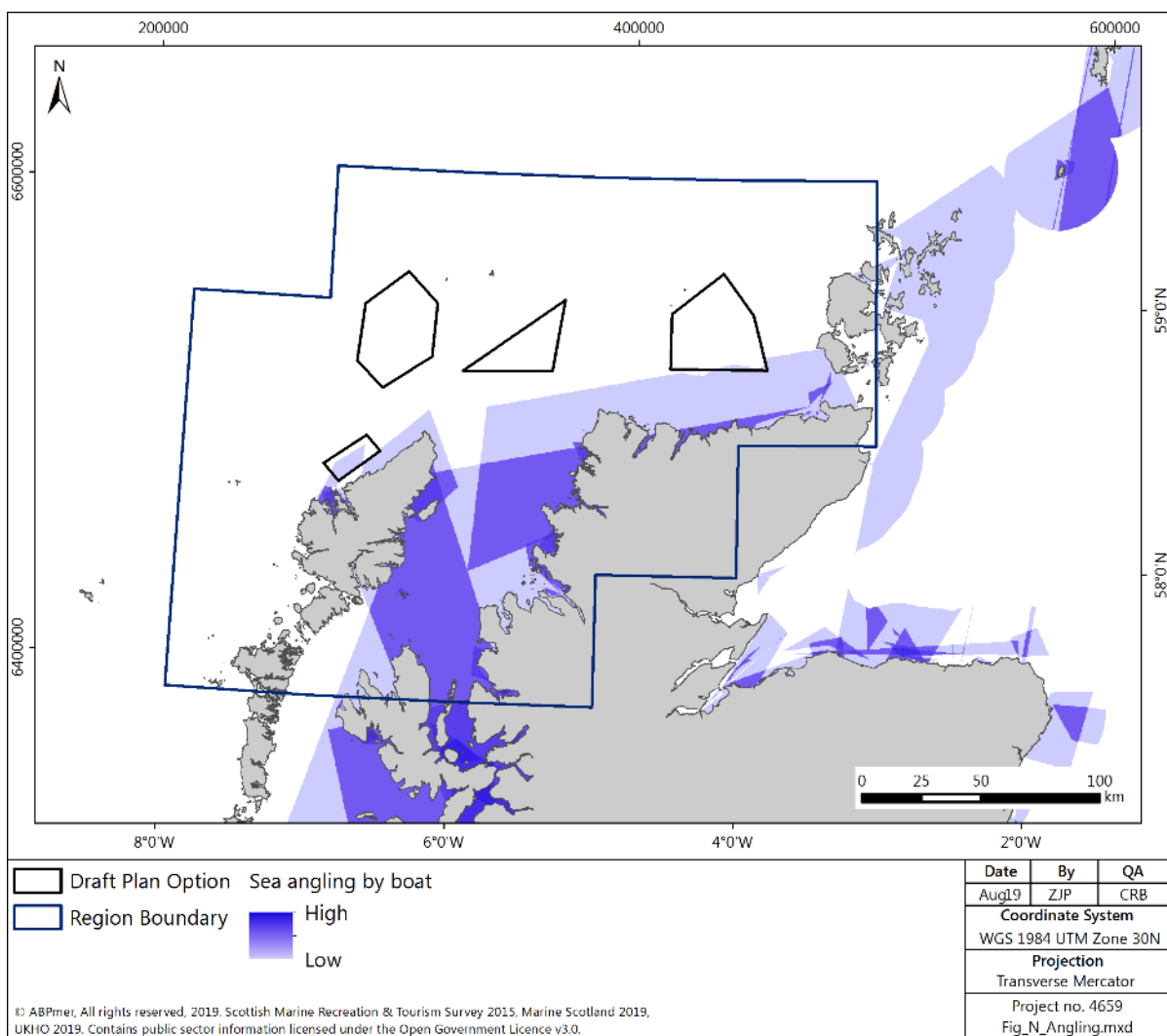


Figure 163 North region: sea angling (by boat) activity density

²³⁶ Welcome to Scotland. 2018. Northern Highlands of Scotland- Fishing, Angling. Available at: <http://www.welcometoscotland.com/regions/north-highland/fishing-in-the-northern-highland>. Accessed 09/10/2018.

Diving

5.3.49 Diving is a popular recreational activity in the North region, with a variety of dive locations. The most popular area for scuba diving in the region is around Scapa Flow in Orkney (Figure 164). This body of water is considered one of the finest wreck diving sites in Europe and has ranked among the top ten wreck diving areas of the world²³⁷. While scuba diving has predominantly been based in Scapa Flow it is increasingly spreading to other parts of Orkney. Recreational diving is predominantly charter boat based. The only DPO that overlaps with reported diving sites is N1, whereby low intensity dive sites are located within but towards the edge of the DPO.

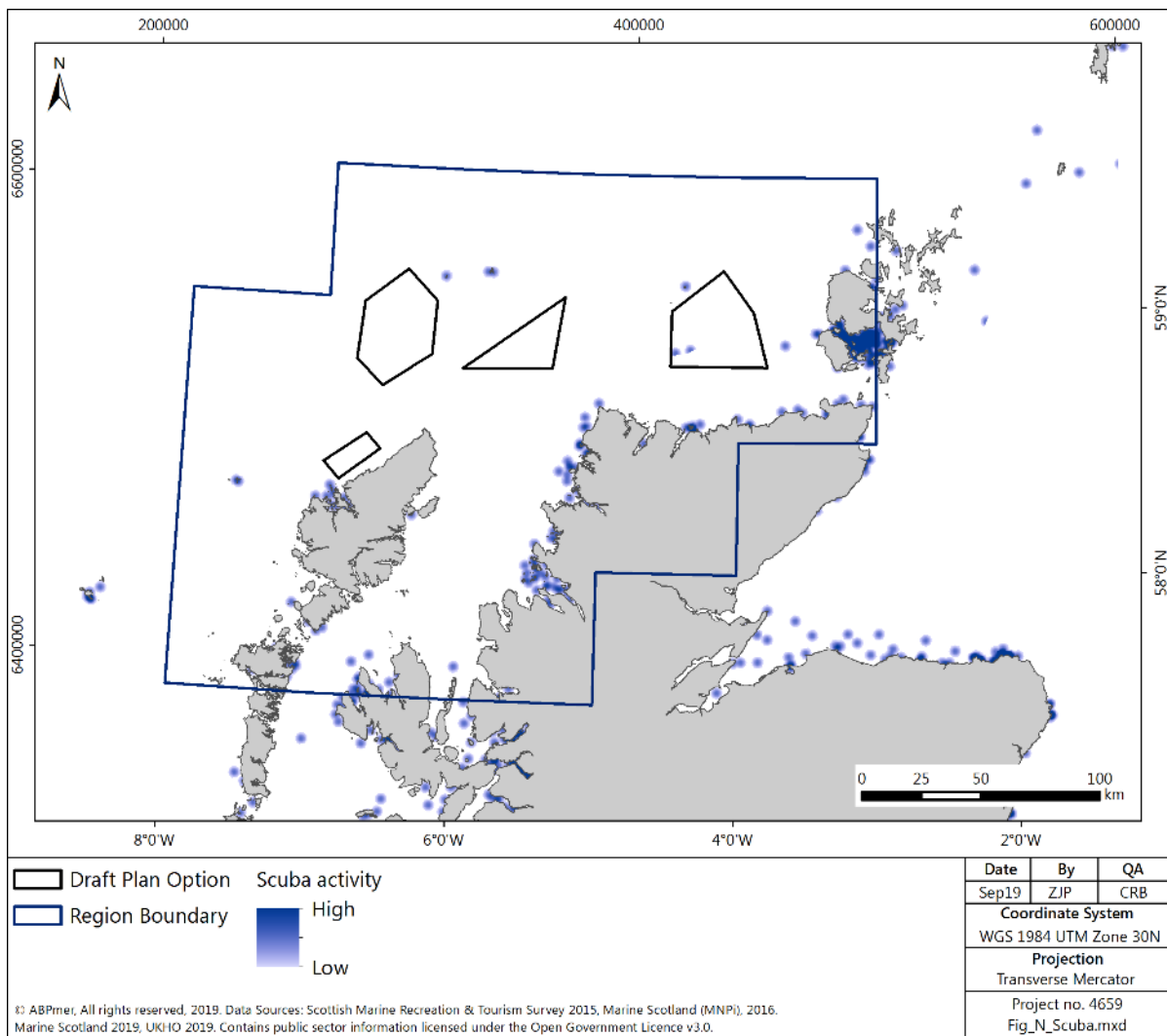


Figure 164 North region: scuba diving activity density

²³⁷Scuba Travel. 2018. World's Best Wreck Dives: the Top 10. Available at: <https://www.scubatravel.co.uk/best-wreck-dives.html>. Accessed 09/10/2018

Sea Kayaking and Canoeing

5.3.50 The majority of trips are close inshore (Figure 165). Kayaking and canoeing takes place at most spots along the north coast where there are suitable launching spots such as beaches and slipways. Overall, there is little interaction between sea kayaking and canoeing activities and the DPOs, with the exception of N4, which is considered to overlap with low-levels of reported sea kayaking and canoeing activities.

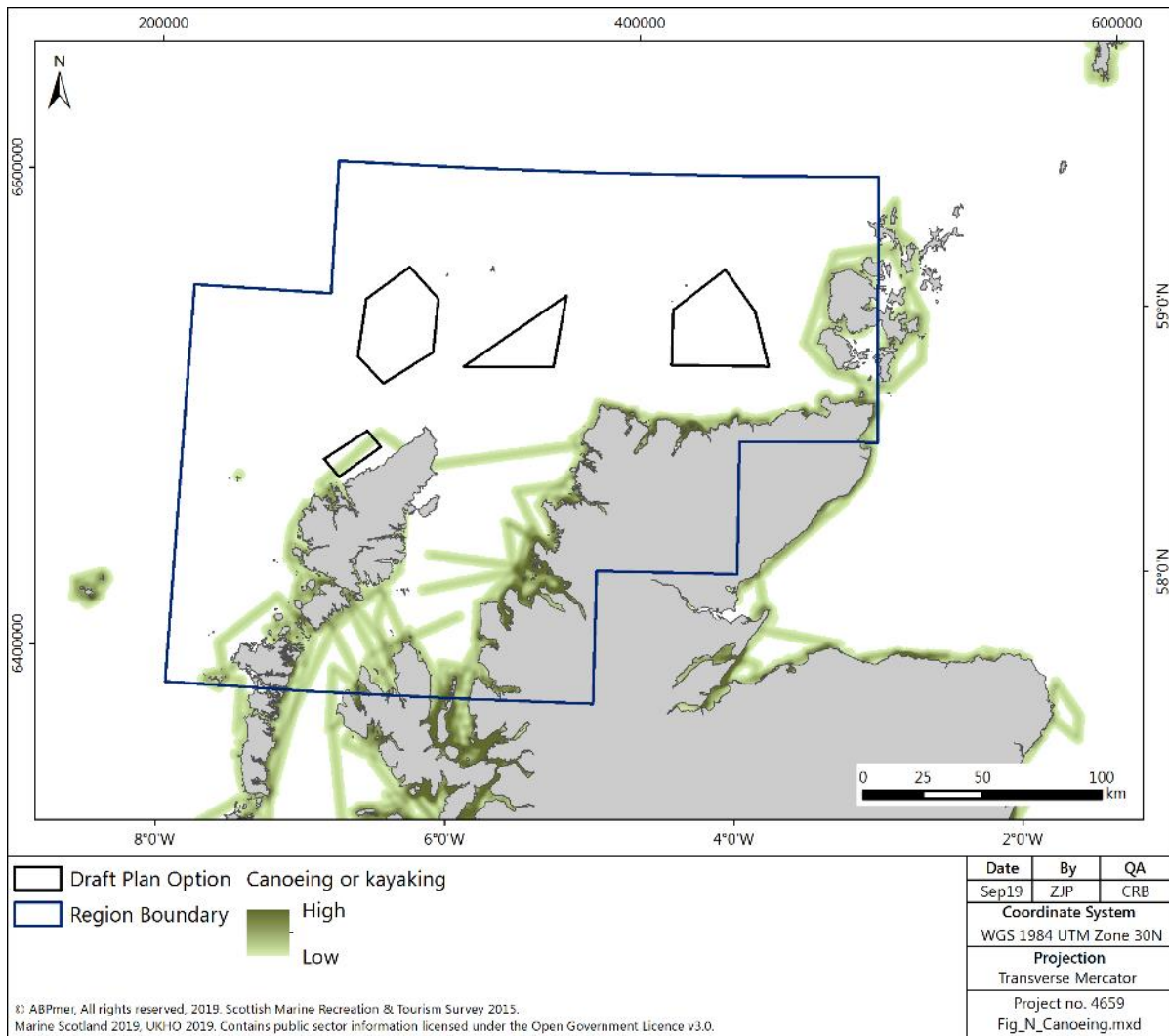


Figure 165 North region: canoeing and kayaking activity density

Surfing and Windsurfing

- 5.3.51 The North region provides high quality surf opportunities, of medium consistency and mostly uncrowded. It receives long-period swell from the North Atlantic and North Sea. The best locations are mainly reef breaks, some of which are world class, however there are a wide variety of surfing locations along the north coast (Figure 166). The prevailing winds in the region are south-westerlies, so offshore at most spots²³⁸. Overall, there is little interaction between surfing activities and the DPOs, with the exception of N4, which is associated with moderate to high levels of reported surfing inland of the DPO.
- 5.3.52 There is very little windsurfing activity in the North region, with small amounts of activity of the Isle of Lewis (Figure 167). Available data show that no windsurfing activity is conducted in any of the DPOs in the North Region.

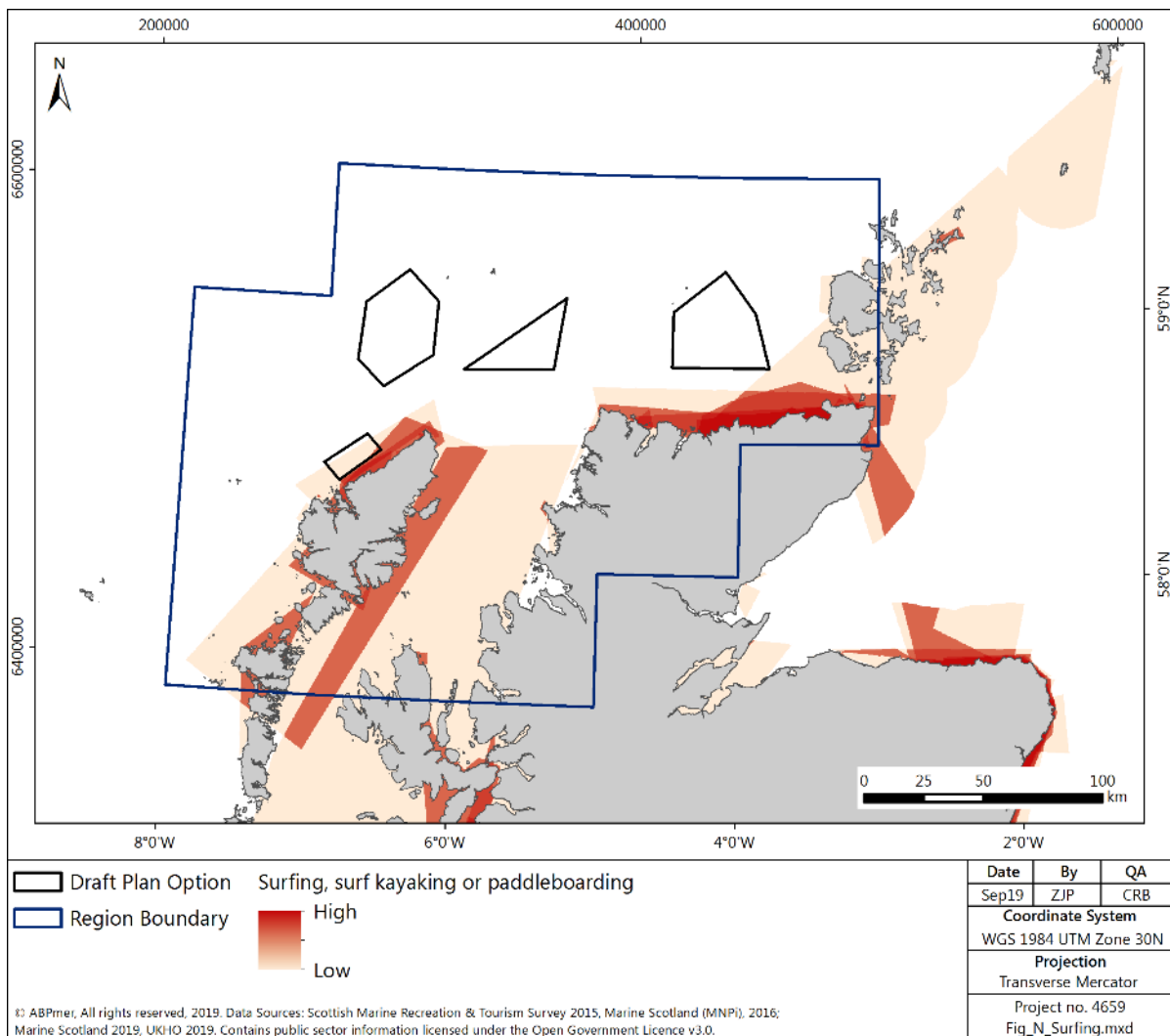


Figure 166 North region: surfing, surf kayaking and paddleboarding activity density

²³⁸ Surfers Against Sewage. 2018. Waves Are Resources. St Agnes.

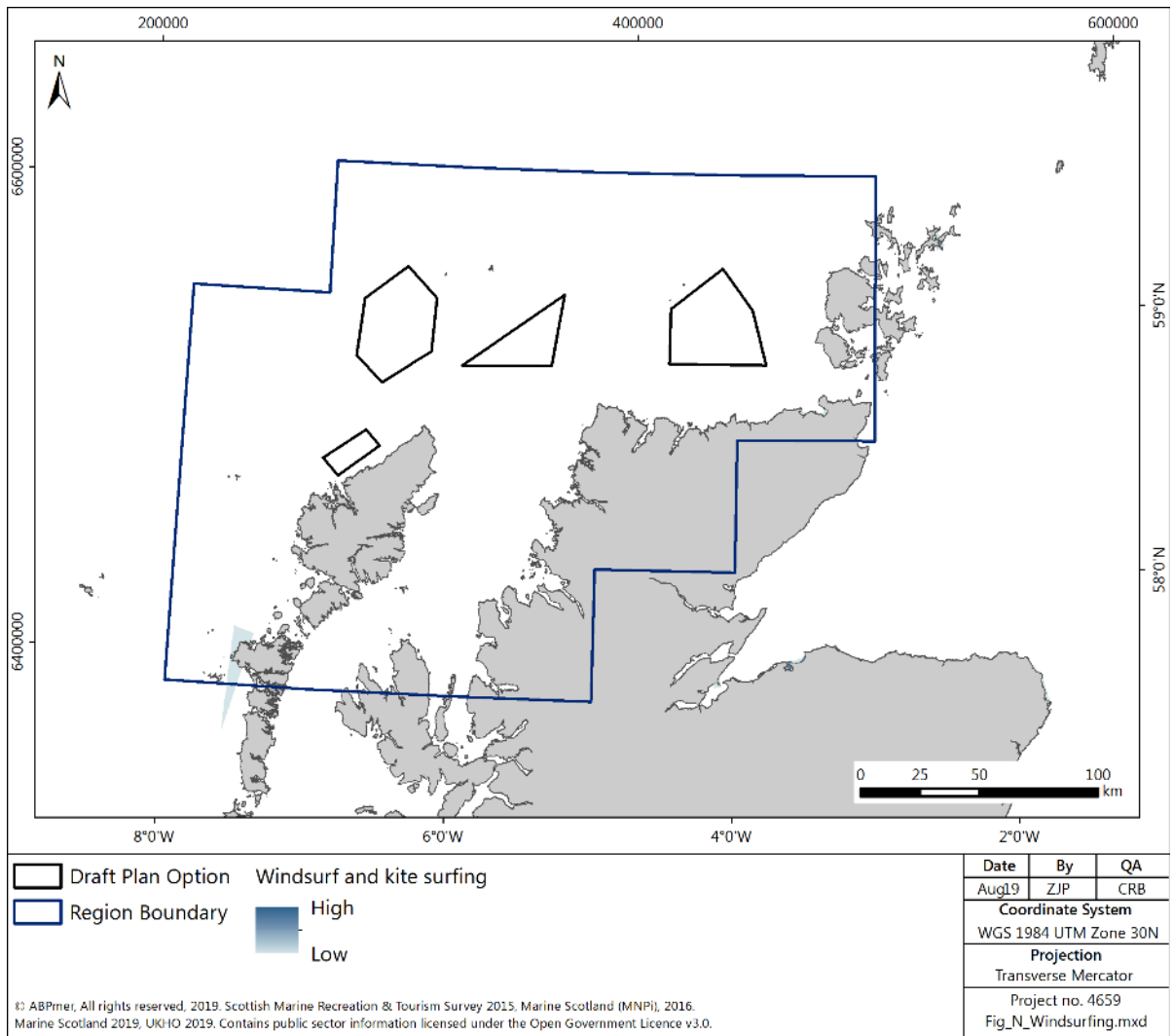


Figure 167 North region: windsurfing and kitesurfing activity density

Tourism

- 5.3.53 Tourist sites in the North region of Scotland include a range of attractions, with a considerable concentration on Orkney (Figure 168).
- 5.3.54 The Orkney Islands have a rich history, beautiful scenery and abundant wildlife that attract large amounts of tourists every year. Tourism is a major contributor to local economies in the Orkney Islands and the top attractions are St Magnus Cathedral, Skara Brae and Skail House²³⁹.
- 5.3.55 In 2017, 65% of visitors went to Orkney for leisure and 19% for business. The profile of visitors was skewed to males (61%) and those over the age of 45 (68%). The number one reason that people chose to visit the area was due to its scenery and landscape (64%), closely followed by its history and culture (62%). The majority of visitors to Orkney were overnight visitors (89%)²⁴⁰.
- 5.3.56 The Outer Hebrides are another popular tourist destination in the North region. They offer an assortment of attractions and entertainment alongside a rich history to explore.
- 5.3.57 In 2017, just over two thirds of visitors went to the Outer Hebrides for leisure and 19% for business. The profile of visitors was skewed to males (58%) and those over the age of 45 (64%). The number one reason that people chose to visit the area was due to its scenery and landscape (71%), closely followed by having always wanted to visit (49%) and to get away from it all (36%)²⁴¹.

²³⁹ Visit Scotland. 2017. Tourism in Scotland's Regions 2016. Edinburgh. Available at https://www.visitscotland.org/binaries/content/assets/dot-org/pdf/research-papers-2/insights---tourism-in-scotlands-regions-2016_update-may-18.pdf.

²⁴⁰ Visit Scotland. 2018. Orkney Islands Visitors Survey 2017. Available at <https://www.visitscotland.org/binaries/content/assets/dot-org/pdf/research-papers/orkney-report---may-18.pdf>.

²⁴¹ Visit Scotland. 2018. The Outer Hebrides Visitor Survey 2017. Available at: <https://www.visitscotland.org/binaries/content/assets/dot-org/pdf/research-papers/outer-hebrides-report---may-18.pdf>. Accessed 09/10/2018.

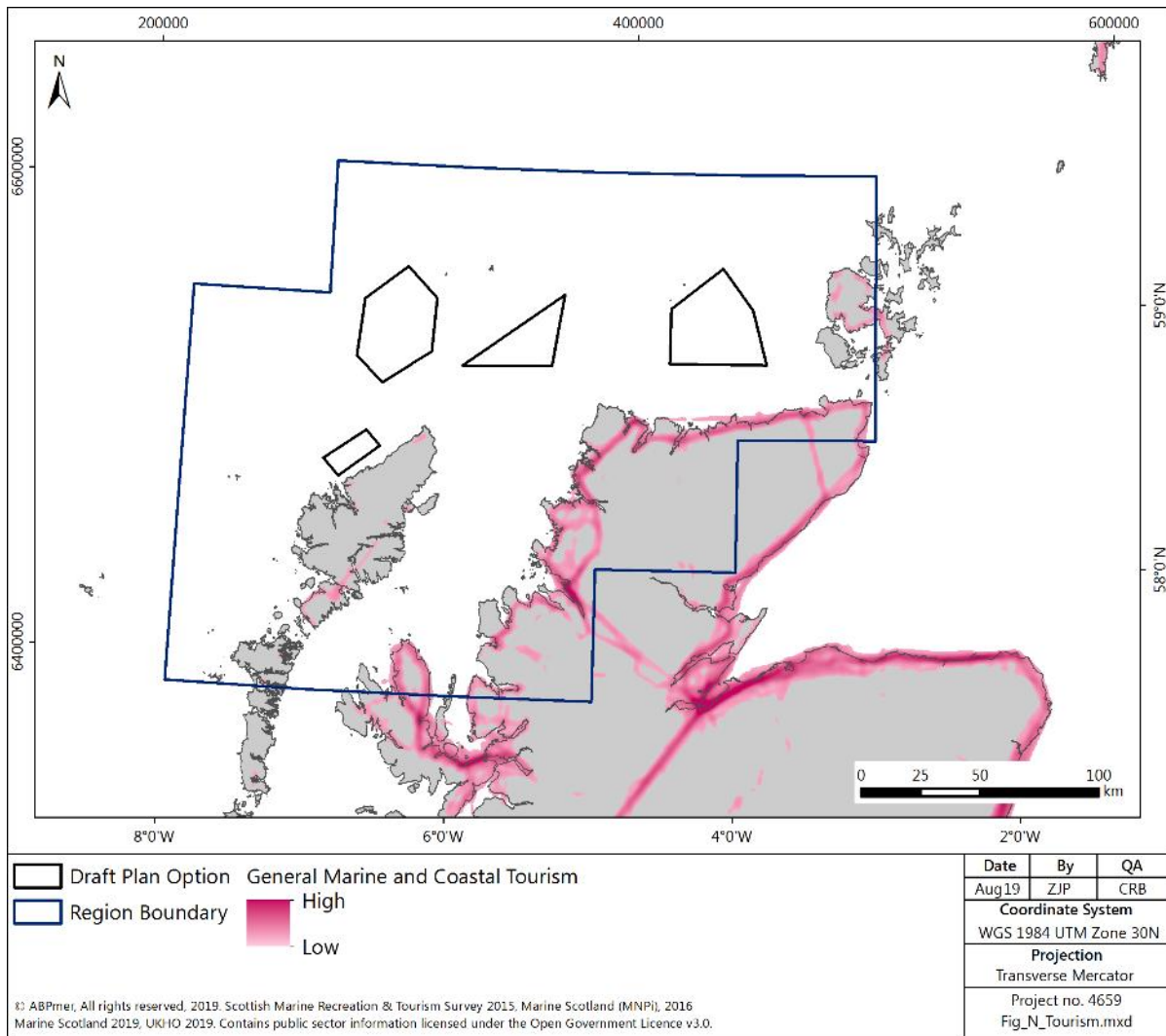


Figure 168 North region: tourism activity density

Social Considerations

- 5.3.58 The Highland, Eilean Siar (Western Isles) and Orkney Scotland Council areas have been used to obtain approximate values for the North region. The total population of the North region is approximately 359,000. The average age in the region is 47, which is 6 years greater than the national average of 41 years old. Roughly 17% of the population is under 16 years old, 60% are of working age and 23% of pension age²⁴².
- 5.3.59 In 2017 the employment rate in Orkney was 88.3%, it was lower at 81% in both Eilean Siar and Highlands Council Areas.
- 5.3.60 The greatest number of jobs in the North region are associated with public admin, education and health (31%). Other important industry sectors are distribution, hotels and restaurants (22%), manufacturing (6%), banking, finance and insurance (6%) and agriculture and fishing (5%)²⁴³.
- 5.3.61 The Scottish Index of Multiple Deprivation (SIMD) shows that Orkney is in the 5% most access deprived areas in Scotland²⁴⁴.

²⁴² National Records of Scotland. 2018. Mid-Year Population Estimates, Mid-2017. Available at <https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/population/population-estimates/mid-year-population-estimates>.

²⁴³ National Statistics, 2018. Regional Employment Patterns: Statistics from the Annual Population Survey 2017. Available at <https://www.gov.scot/Topics/Statistics/Browse/Labour-Market/Publications/>.

²⁴⁴ Scottish Government. 2016. SIMD16 Analysis Orkney Islands. Available at: <https://www.gov.scot/Resource/0051/00510731.pdf>. Accessed 09/10/2018.

5.4 Environment

Designated Sites

- 5.4.1 There are a significant number of designated sites, both coastal and further offshore, within the North region. The sites, including 9 NCMPA (including 3 pNCMPA), 24 SPA (including 5 pSPA), 15 SAC and 38 SSSI are designated for a variety of features, including habitat and more mobile features.
- 5.4.2 There is no overlap between any designated site and the DPOs (Figure 169).
- 5.4.3 There are, however, areas where the DPOs share a boundary with a designated site. N2 shares part of the eastern boundary with the Solan Bank Reef SAC (Figure 170), designated for reef features and including marine mammals. The Inner Hebrides and the Minches cSAC, designated for harbour porpoise encompasses the area between the Isle of Lewis and mainland Scotland (Figure 170). Any export cabling associated with development in the DPOs (such as from N2 or N3), depending on routing and likely points of landfall, may intersect the cSAC. There are additional smaller SAC around the sea lochs and within riverine environments in the North region designated for a range of features, including seals, marine mammals, intertidal habitat, reef habitat and migratory fish species.
- 5.4.4 SPAs and pSPA within the North region support a wide range of birds, both seabird and terrestrial species, some of which may use the sea within the DPOs for feeding or during migration. There is a high concentration of current and proposed SPA around the Orkney islands in the east of the region. Further detail on seabird species distributions is contained within the Birds section below. There is no direct overlap between the DPOs and SPA, however, Sule Skerry and Sule Stack SPA is situated on the north-west border of N1. In addition, N3 is located close to, but not neighbouring North Rona and Sula Sgeir SPA and may be used for foraging. The Cape Wrath SPA is approximately 15km from the south-eastern corner of N2 (Figure 172).
- 5.4.5 The proposed NCMPA North East Lewis, proposed for designation for Risso's dolphin, sandeels, marine geomorphology of the Scottish shelf seabed and quaternary of Scotland, falls between N2 and the Isle of Lewis. There is therefore potential for cable routes to intersect the designated area if the connection to grid is routed via the Isle of Lewis for OWF development in the DPO.
- 5.4.6 The 16 SSSI (Figure 171) are located across the North region and are protected for a range of features, including geology, habitats and species. Some, although not all, SSSI overlap with European SPA or SAC designations. Although none of the DPOs overlap with the SSSIs, N1, N2 and N3 are situated close to two SSSIs, including North Rona and Sula Sgeir (close to N2 and N3) and Hoy (close to N1).

5.4.7 In addition to the sites identified within the boundaries of the North region, there may be more remote designated sites which may have the potential to be affected by offshore wind development within the DPOs. This would be considered on a project by project basis.

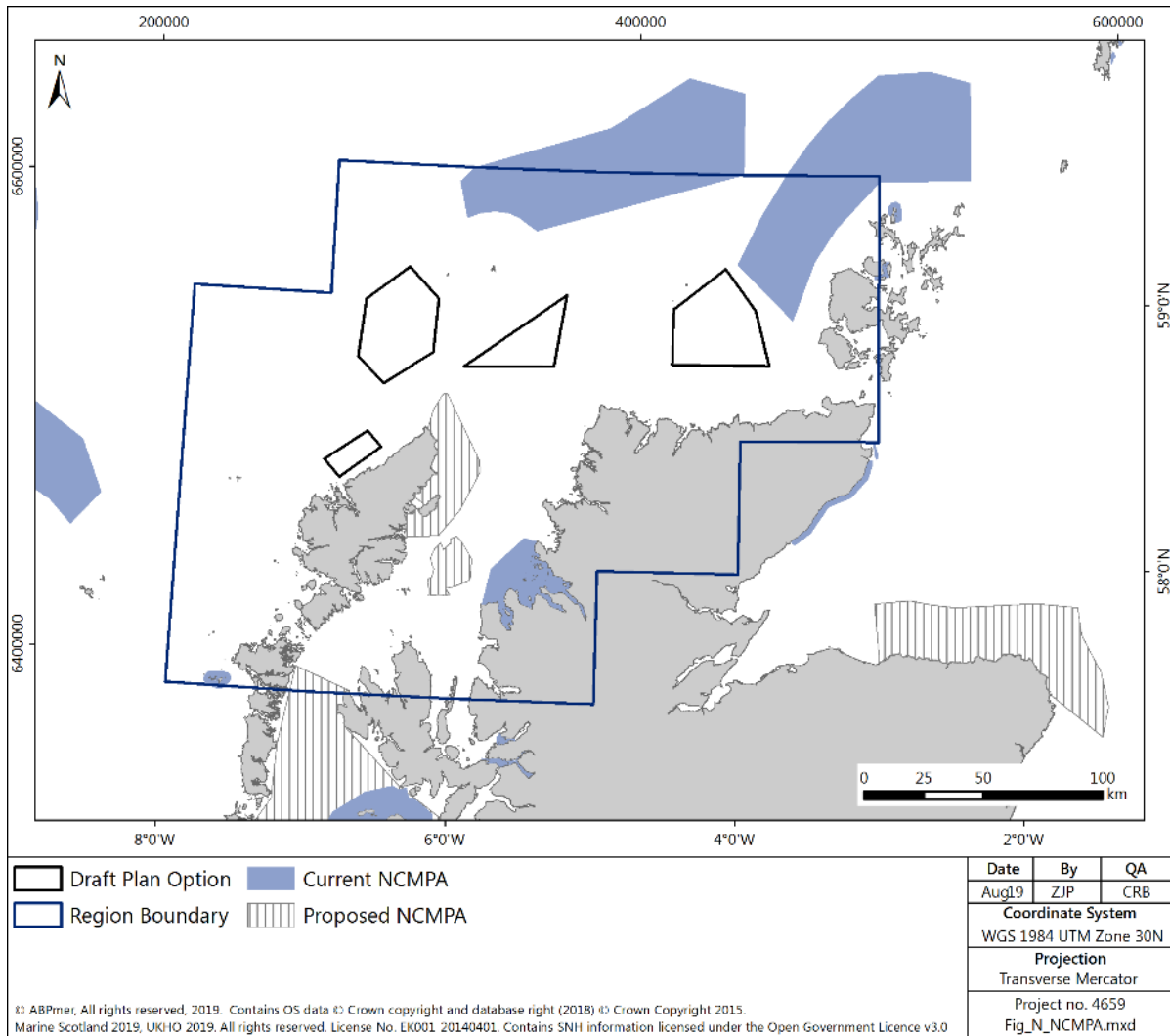


Figure 169 North region: NCMPA sites

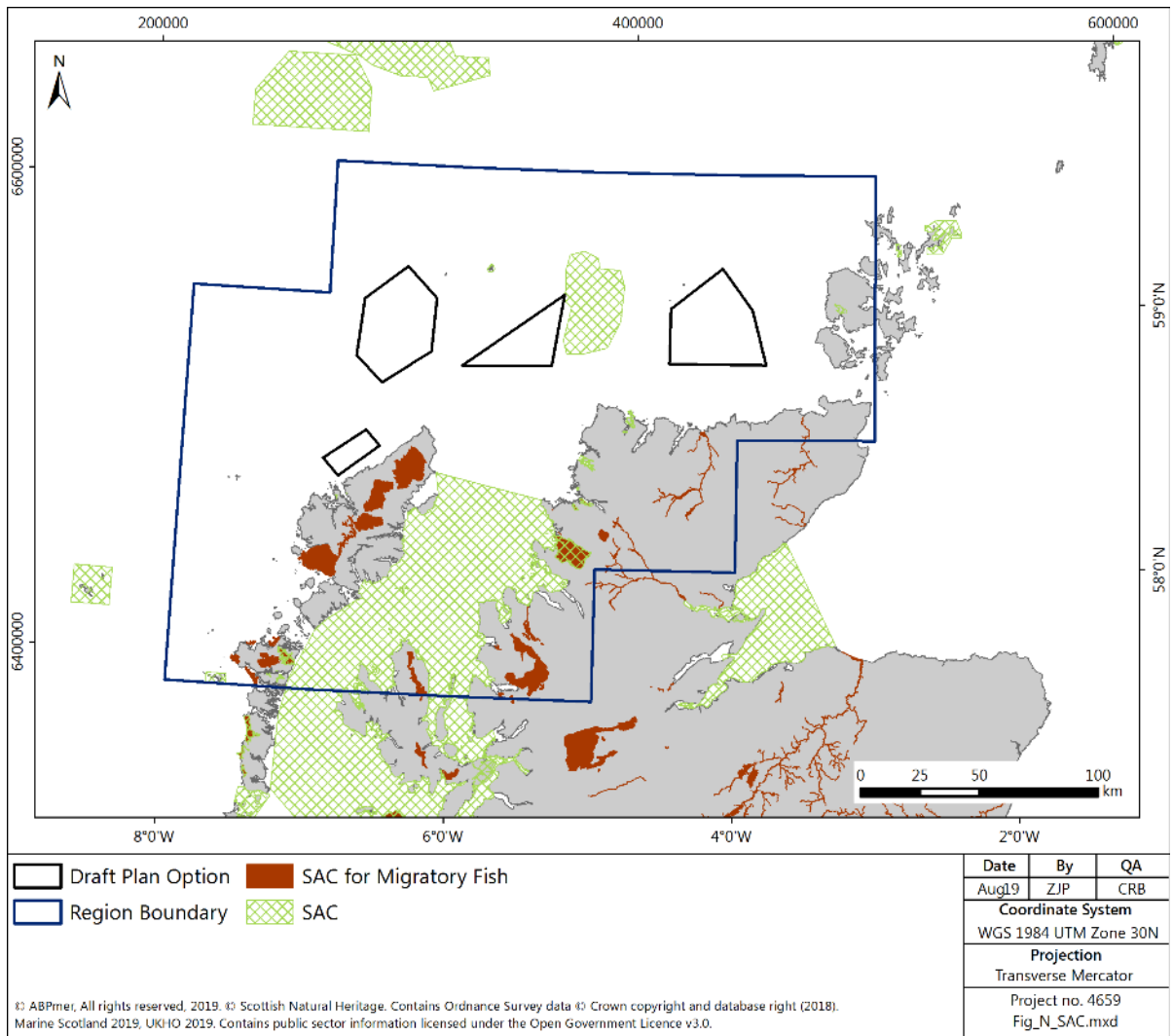


Figure 170 North region: marine and coastal SAC sites

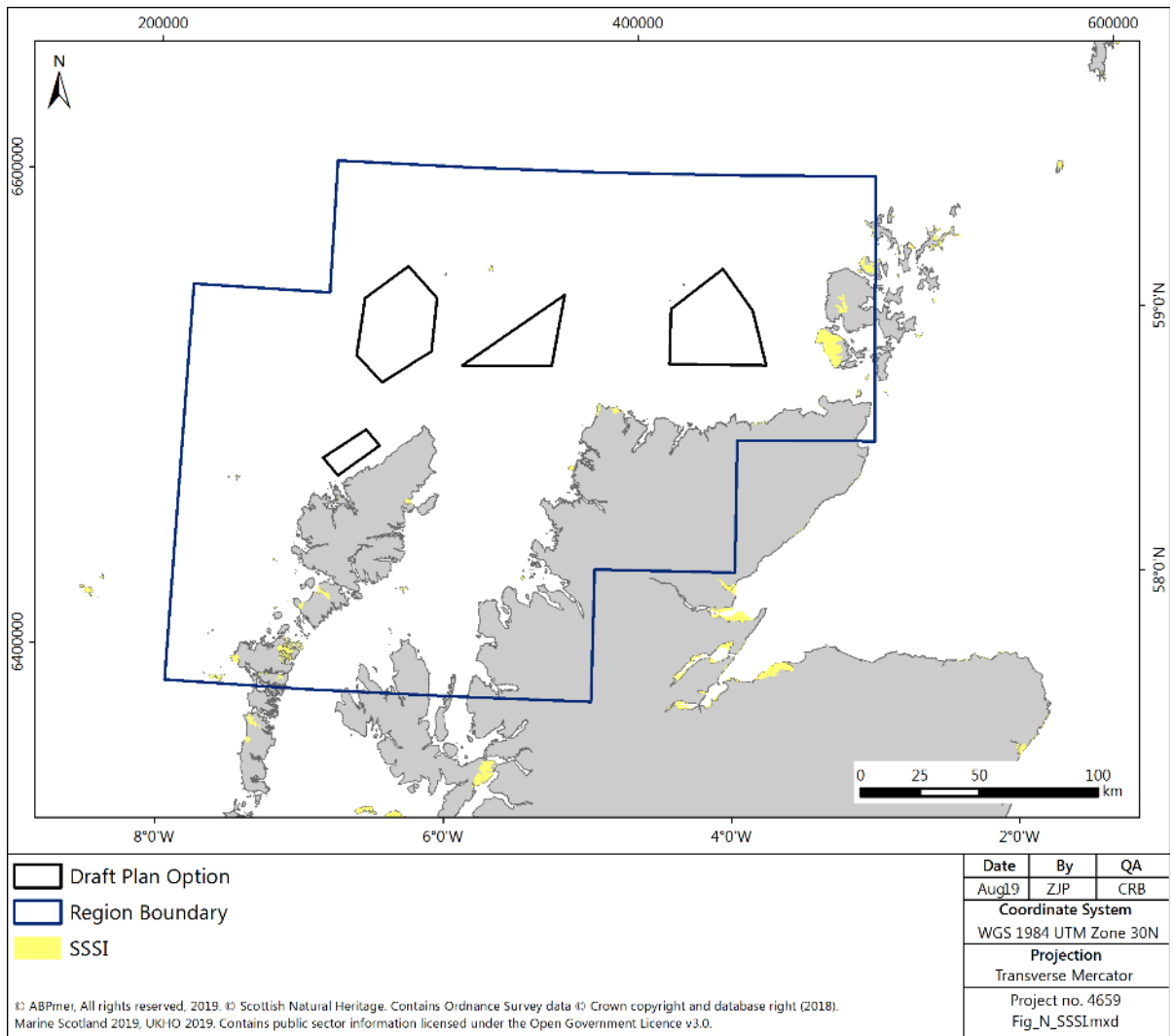


Figure 171 North region: marine and coastal SSSI sites

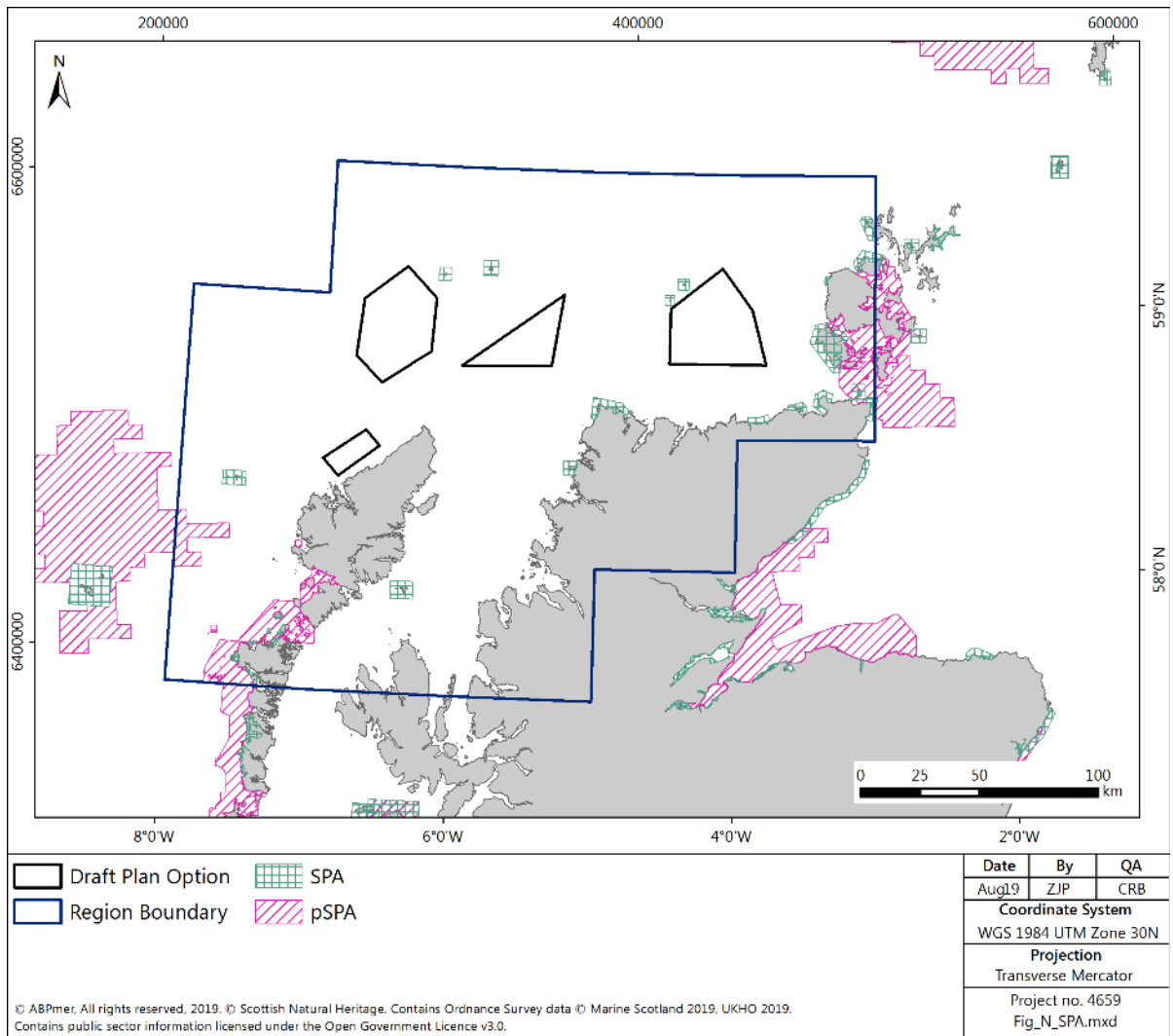


Figure 172 North region: marine and coastal SPA sites

Water Quality

- 5.4.8 WFD monitoring incorporates coastal and transitional waters in the marine environment. This means that there is only two DPOs that overlap with classified water bodies in the North region, N4, which overlaps with the Gallan Head to Butt of Lewis water body (high quality status in 2017) and N1 which overlaps with the Sule Skerry and Sule Stack water body (high quality status in 2017). (Figure 173). All the coastal water bodies in the North region are classified as either good or high status²⁴⁵.
- 5.4.9 There are areas of protected waters for shellfish production in the North region (Figure 174), all within coastal regions associated with either mainland Scotland or the Hebridean islands with no direct interaction with the DPOs. The shellfish waters are classified against their target objectives, of the 18 shellfish waters in the North region, 10 are classified as not at target objective, the remainder are at target objectives.
- 5.4.10 There are few classified bathing waters in the North region (five in total) (Figure 174), with three on the west coast (all at excellent status) and two on the north coast of the Scottish mainland. Of the two designated bathing waters on the north coast, one (Dunnet) is at excellent status, whilst the other (Thurso) is currently classed as at target objective.

²⁴⁵ SEPA, 2018. Water Classification Hub, water body condition data for 2017. Available at <https://www.sepa.org.uk/data-visualisation/water-classification-hub/>. Accessed 05/10/2018.

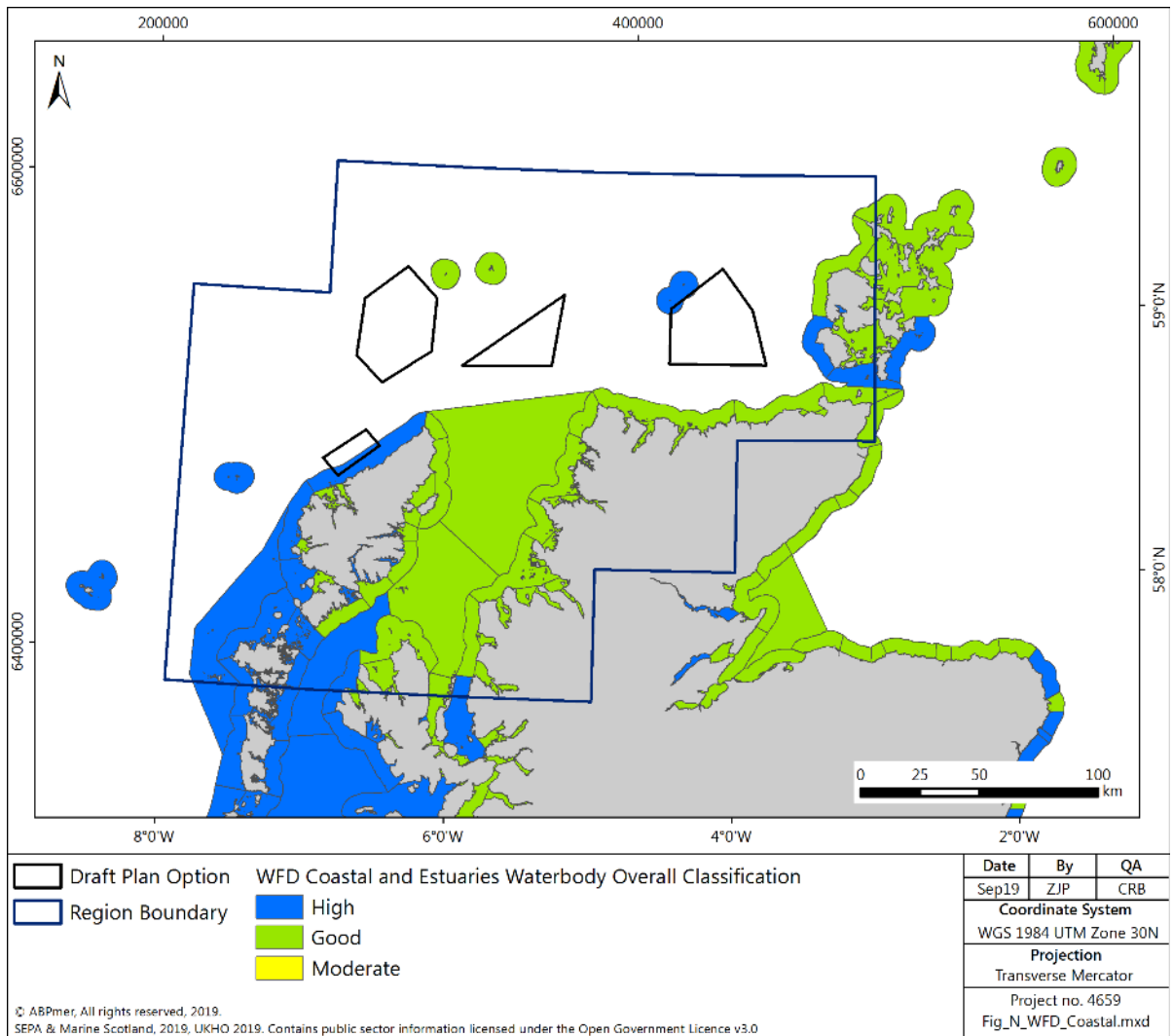


Figure 173 North region: WFD coastal and transitional waterbody classifications

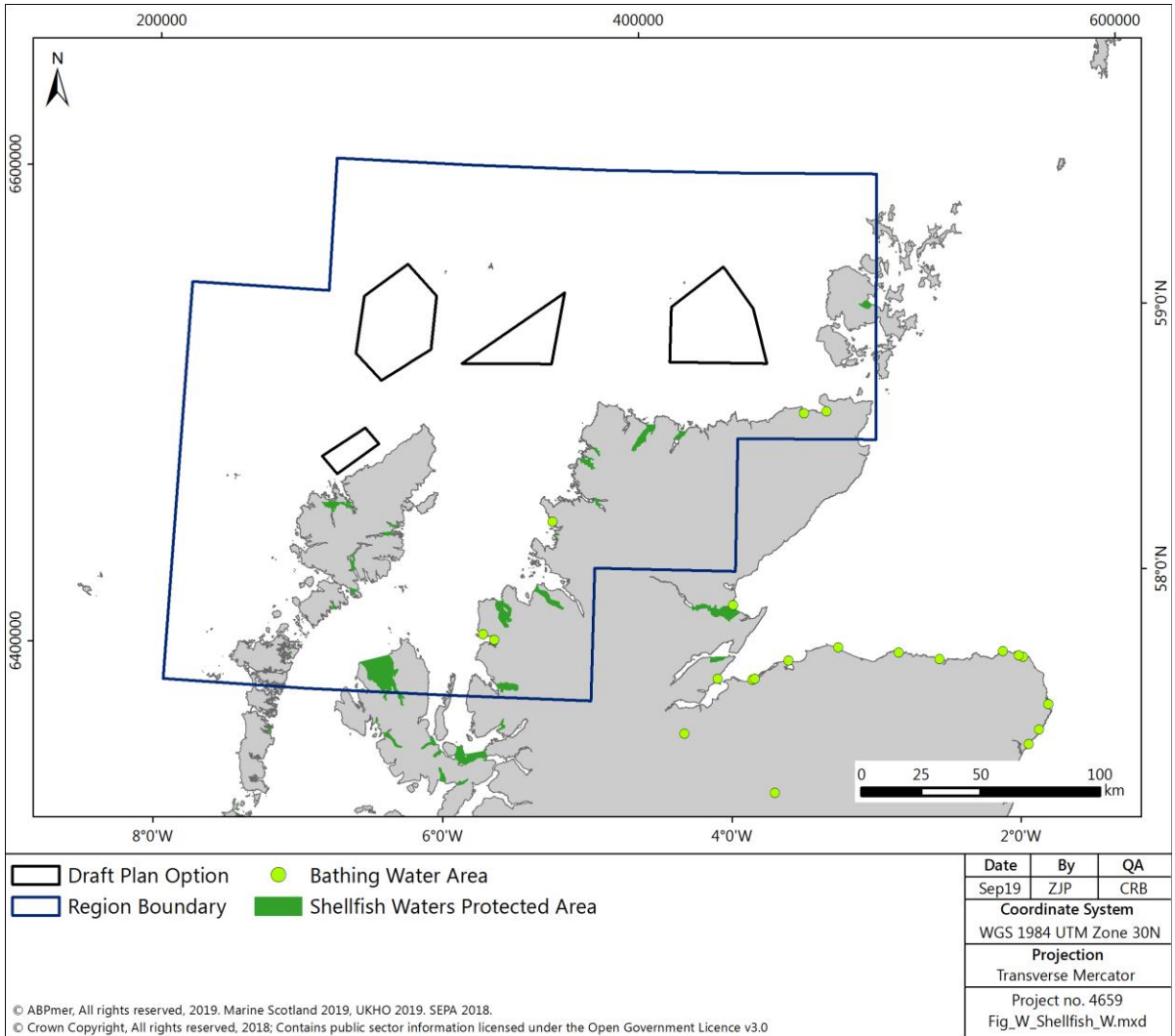


Figure 174 North region: shellfish and bathing water protected areas

Benthic Habitats and Species

- 5.4.11 Benthic habitats within the North region compose areas of sand and gravel, with some areas of rocky substrate to the west of the Hebrides, in a small band approximately 50km offshore of the north Scotland coastline and to the south of the Orkney Islands (discussed above in Section 5.2). As for the overall region, the majority of the benthic habitat within the DPO is composed of a sandy or gravelly sediment, with small areas of rocky habitat at the north eastern extent of N3 (Figure 175).
- 5.4.12 The majority of benthic biodiversity within the North region is concentrated around the Hebrides and Orkney Islands and the Sea of Hebrides. Around the small areas of rocky habitat in N3 there are records of benthic PMFs, including cold-water coral (identified within the area of DPO N3²⁴⁶), white cluster anemone (*Parazoanthus anguicomus*) and European spiny lobster (*Palinurus elephas*). There are also records of ocean quahog (*Arctica islandica*) within N1²⁴⁷ (Figure 176).
- 5.4.13 In addition to the PMFs present within the DPOs there are a range of PMF supported by benthic habitats landward of the DPOs, including on subtidal rock habitats, inshore and shelf subtidal sediments, intertidal sediments and intertidal rocky shores.

²⁴⁶ Baxter, J.M., Boyd, I.L., Cox, M., Donald, A.E., Malcolm, S.J., Miles, H., Miller, B., Moffat, C.F. 2011. Scotland's Marine Atlas: Information for the national marine plan. Marine Scotland, Edinburgh. Available at <https://www.gov.scot/Publications/2011/03/16182005/0>.

²⁴⁷ Scottish Natural Heritage. undated. Ocean quahog (*Arctica islandica*) (Priority Marine Feature) (SNH WMS). Data held on Marine Scotland NMPi. Available at <https://marinescotland.atkinsgeospatial.com/nmpi/>.

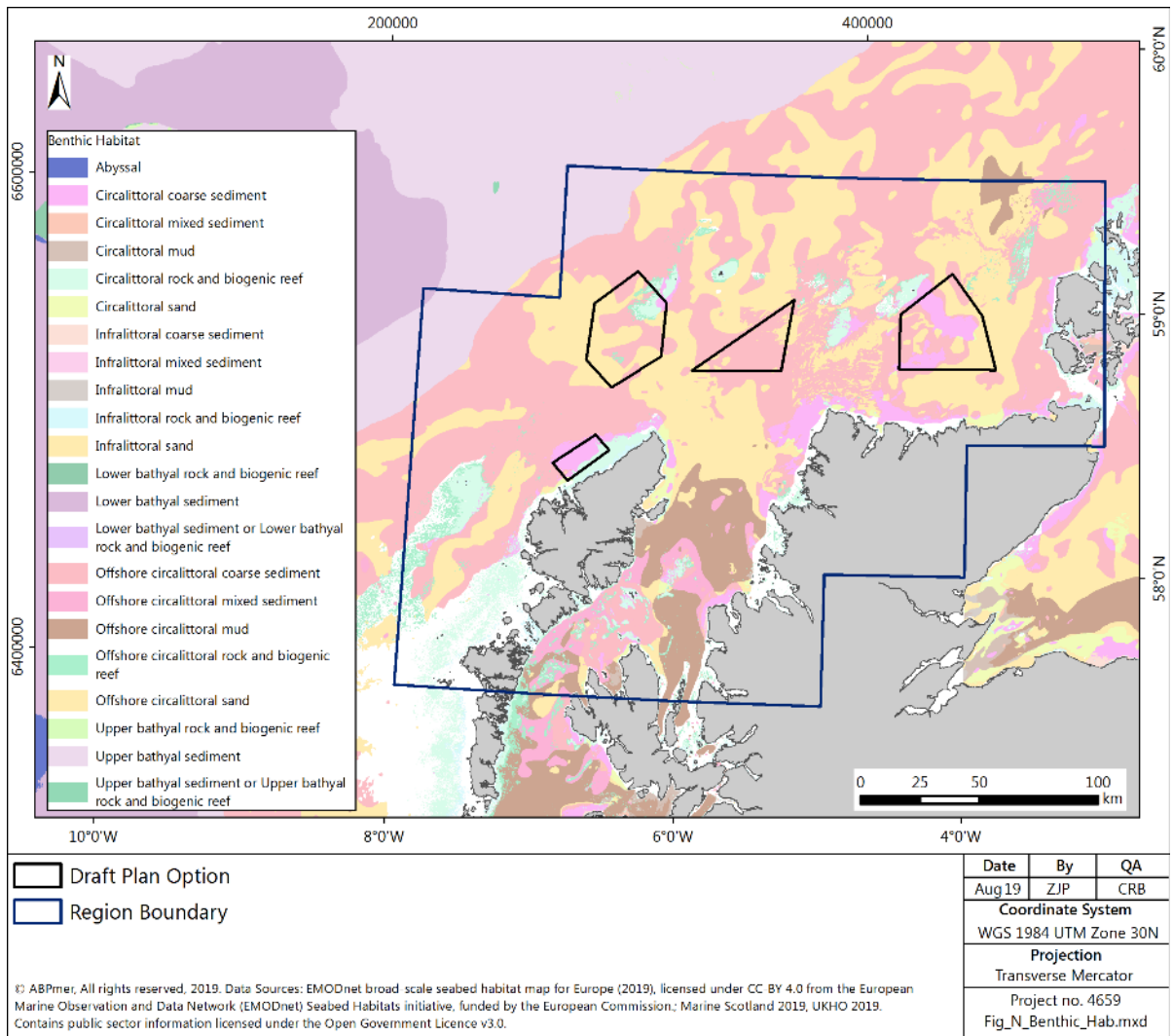


Figure 175 North region: benthic habitats

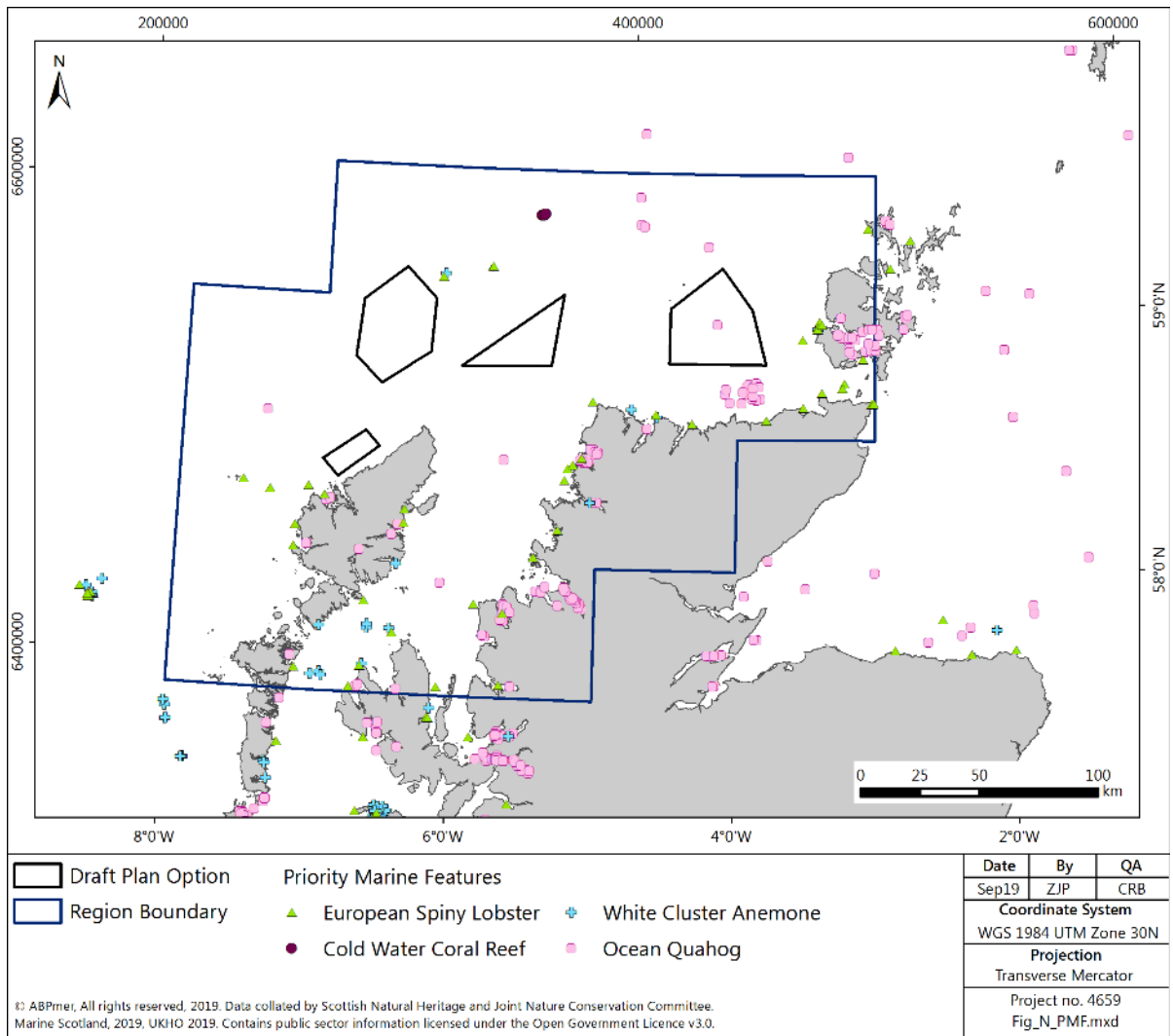


Figure 176 North region: records of benthic PMF

Fish

- 5.4.14 The fish community in the North has high species diversity. A number of species are commercially-important and are discussed above in Section 5.3.
- 5.4.15 The region is known to be used by a number of PMFs, particularly sharks. Basking shark sightings are common in the areas around the Hebridean Islands (Figure 177), and they are known to use the seas throughout the North region. There are particular areas of high density of spiny dogfish (*Squalus acanthias*) on the north coast of the Scottish mainland, with the highest densities in the region west of the Orkney Islands.
- 5.4.16 There are a number of likely migration routes for anadromous fish through the North region (Figure 44 above in Section 2.3 shows the approximate routes, although should not be used to infer “safe” zones). These migration routes have the potential to intersect the DPOs.
- 5.4.17 The North region also has important spawning grounds for sandeel, herring, cod and whiting. There is likely to be spawning ground for herring, mackerel and sandeel; low or high-intensity nursery grounds for ling, sandeel, hake, herring, whiting, mackerel, cod, tope, common skate, thornback ray, spotted ray and high-intensity nursery grounds for blue whiting, anglerfish and spurdogs.

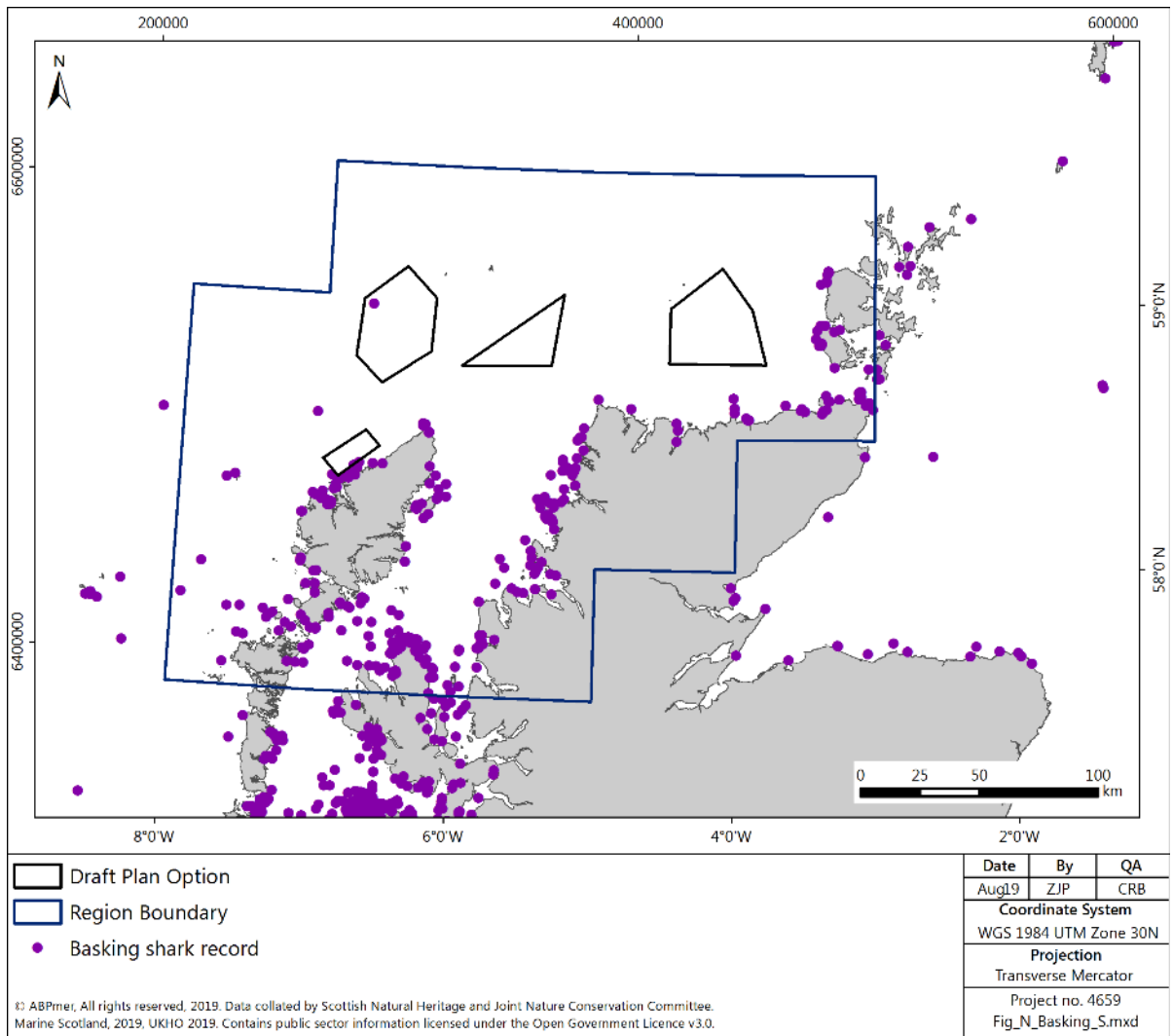


Figure 177 North region: basking shark sightings distribution

Marine Mammals

- 5.4.18 Marine Mammals occur widely within the North region, including harbour seals, grey seals, harbour porpoise, Risso's dolphin, short beaked common dolphin, Atlantic white-sided dolphin, bottlenose dolphin and minke whale.
- 5.4.19 Both of the two species of seal found in Scottish seas have significant populations in the North region. Concentrations of seal populations are highest around the Hebrides (including a significant colony in the Monach Isles) and Orkney Islands. Grey seal breeding sites, shown on Figure 178, occur both on the outer Hebridean islands and Orkney Islands, with pup production in the Outer Hebrides and Orkney of approximately 14,000 and 24,000 respectively in 2014, contributing approximately 75 % of total Scottish grey seal production. There is no overlap with the DPOs, however, there is one grey seal pupping site that borders the north-west of N1 (Figure 118).
- 5.4.20 Grey seal at-sea usage is generally low within the DPOs, except from part of N4 and a small proportion of N1, where there are medium levels of at-sea usage (Figure 179). Similarly harbour seal at-sea usage is low, except from a small swathe within N3 (Figure 180).
- 5.4.21 Population dynamics within Harbour seal populations are considerably different between the Orkney Islands, where populations have reduced considerably (reduction of 85 % between 1997- 2016) and West coast where populations are estimated to have increased by approximately 50% 2007 to 2016²⁴⁸. Harbour seal distribution is shown in Figure 180.
- 5.4.22 Given that most seal foraging occurs within approximately 40 to 50km of their haul out sites²⁴⁹, it could be inferred that seals are likely to be using the DPOs as foraging grounds, however the majority of seal foraging also tends to be in water depths less than 50 m²⁵⁰, shallower than the majority of water depths within the DPOs.
- 5.4.23 A wide variety of cetaceans are known to frequent the seas within the North region, particularly around the Hebrides, and areas to the north of the Sea of Hebrides. The Inner Hebrides and the Minches cSAC is designated for Harbour porpoise, whilst the Sea of Hebrides proposed MPA is proposed for designation based partly on the population of minke whale known to frequent the area. In addition, the proposed North East Lewis MPA is proposed for designation, including for Risso's dolphin, known to be found in high concentrations off the west and north coast of Scotland. Cetacean species densities in the North region, including harbour porpoise, bottlenose dolphin, white beaked dolphin,

²⁴⁸ SMRU. 2016. Scientific Advice on Matters Related to the Management of Seal Populations. Available at <http://www.smru.st-andrews.ac.uk/files/2018/01/SCOS-2017.pdf>.

²⁴⁹ *ibid*

²⁵⁰ Tollit, D., Black, A., Thompson, P. Mackay, A., Corpe, H., Wilson, B., Van Parijs, S., Grellier, K., Parlane, S. 1998. Variations in harbour seal *Phoca vitulina* diet and dive-depths in relation to foraging habitat, Journal of the Zoological Society of London, 1998, 244. Available at <https://old-homepages.abdn.ac.uk/lighthouse/pages/lighthouse/documents/tollit98.pdf>.

minke whale, short beaked common dolphin, Atlantic white-sided dolphin, Risso's dolphin, and killer whale, when reviewed against the DPOs, show areas of high density overlap, particularly within DPOs N2 and N3 and N4.

5.4.24 The western isles and sea lochs on the north-west mainland and surrounding seas are known to be used extensively by otter. The majority of the usage of the seas within the North region by otter will be in coastal regions, with foraging of otters generally considered to be limited to 10 m water depths, shallower than those within the DPOs. However, due to the inshore nature of N4, there is some potential for interaction between otters and the DPO.

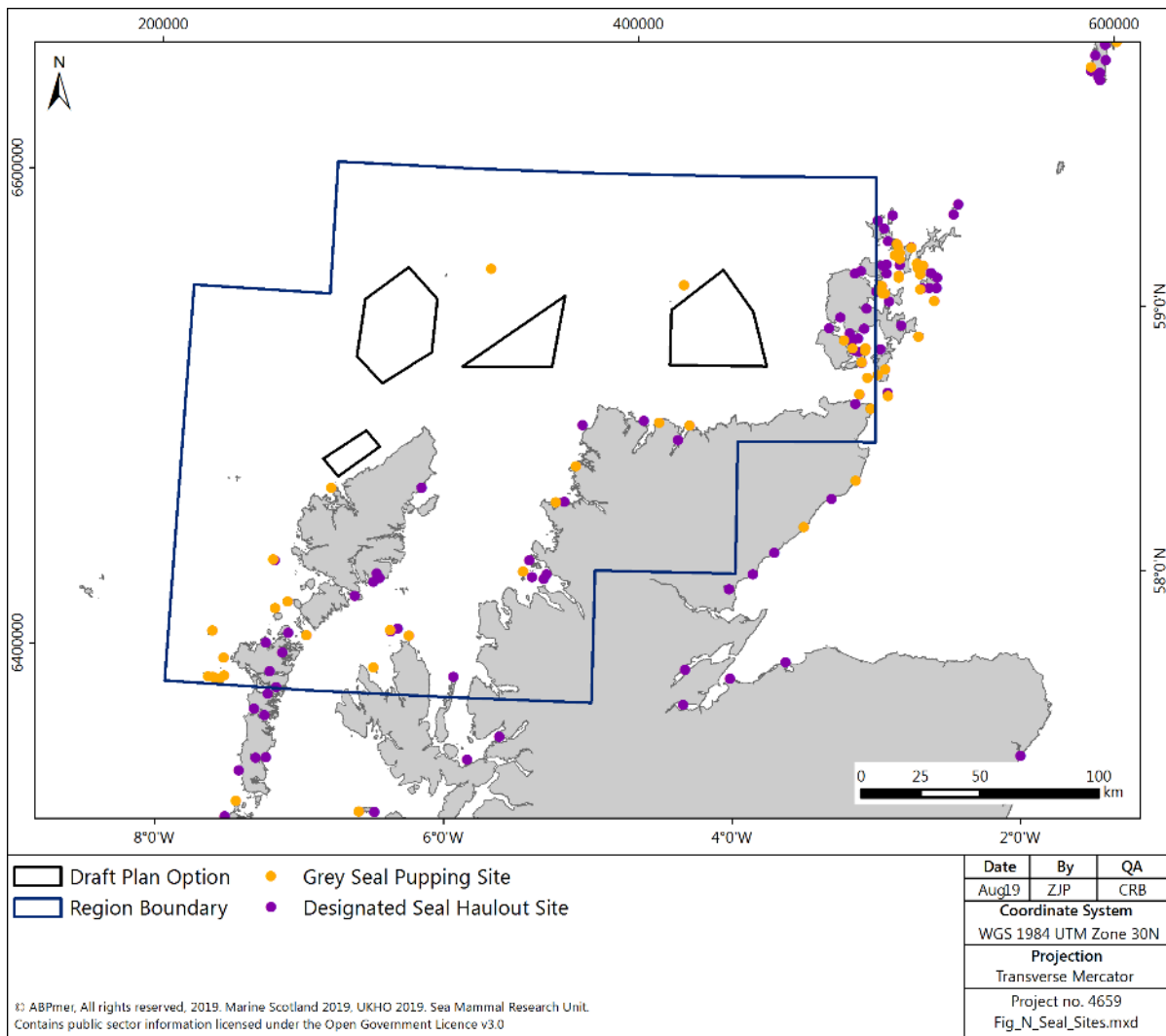


Figure 178 North region: seal haulout sites and grey seal pupping sites

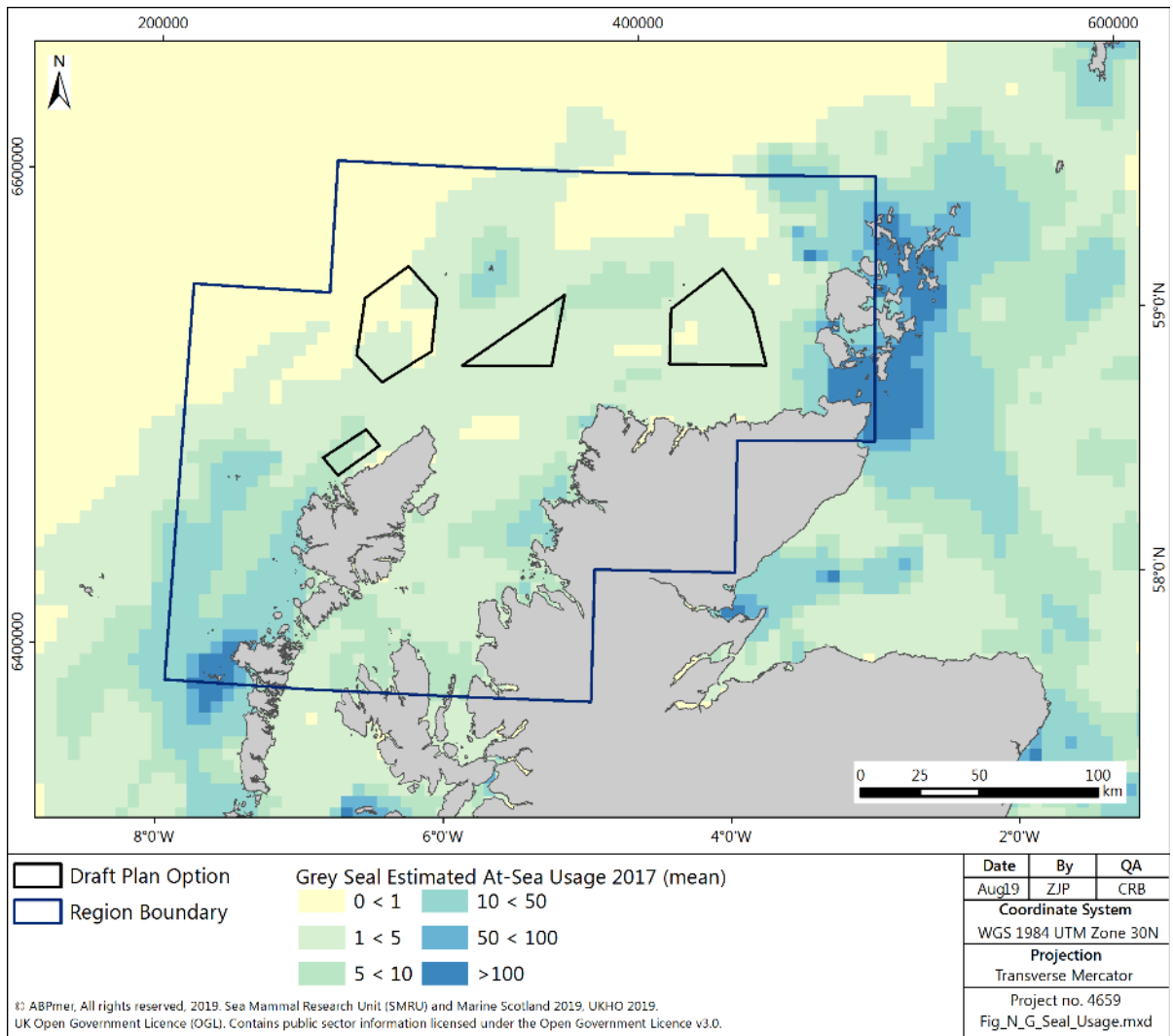


Figure 179 North region: grey seal at sea usage

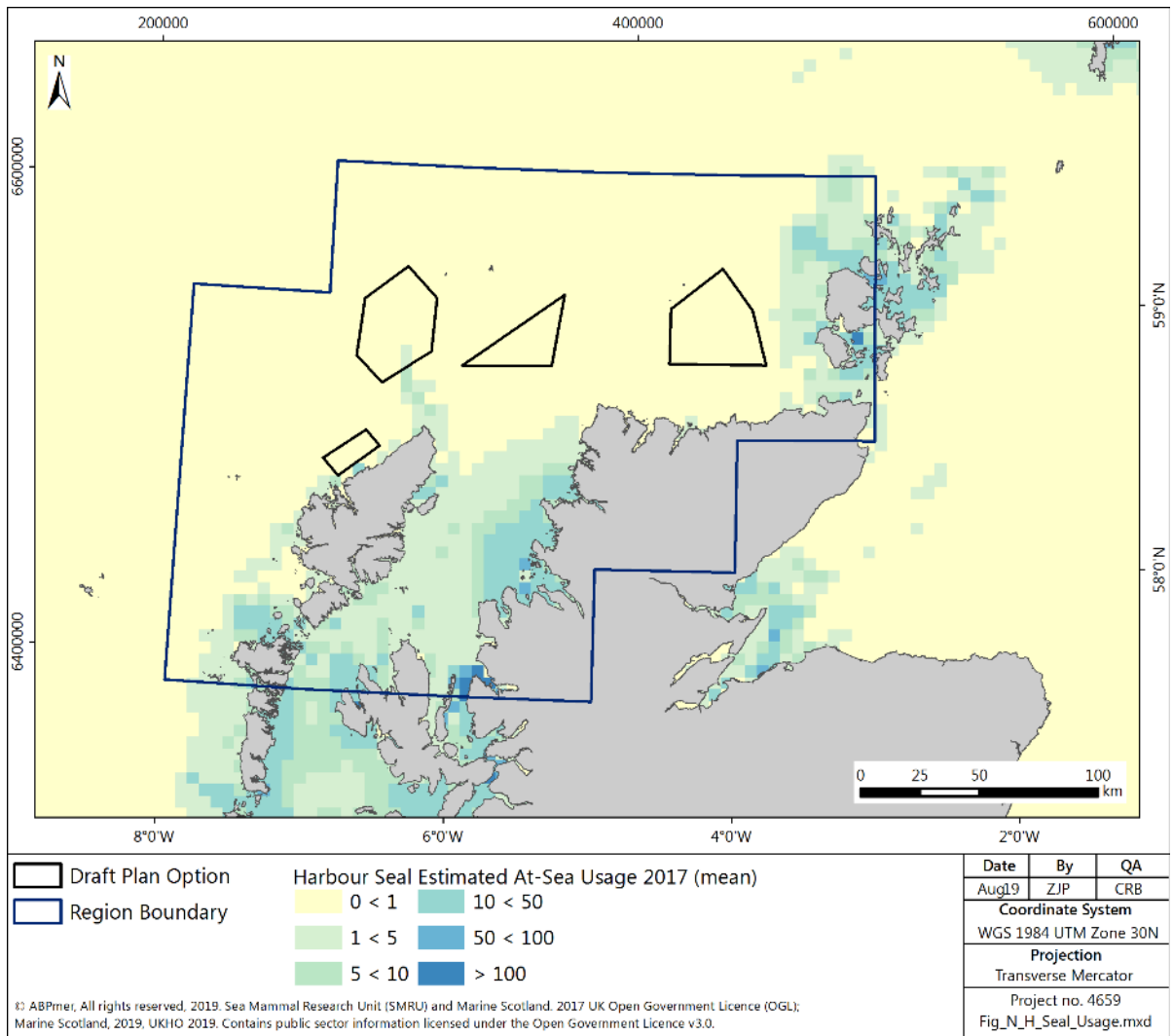


Figure 180 North region: harbour seal at sea usage

Birds

- 5.4.25 The importance of the North region to birds is demonstrated in the designation of 19 of SPAs and the further 5 proposed SPA with marine elements, and additional terrestrial sites, as discussed above.
- 5.4.26 There are both breeding and non-breeding populations of a wide variety of seabirds in the North region. A number of significant seabird colonies are found either in close proximity to or directly landwards of the DPOs. The colony at Sula Sgeir, slightly north of the area between DPO N2 and N3 is a particularly large breeding colony with greater than 20,000 birds. The assemblage in the North Rona and Sula Sgeir SPA, encompassing the Sula Sgeir colony, is assessed as being in Favourable Maintained condition, however the condition of the majority of the protected species within the SPA are assessed as unfavourable and declining at the last assessment in 2012 (more recent than the last assessment of the overall assemblage in 1999).
- 5.4.27 Sule Skerry and Sule Stack SPA is located very close to the boundary of N1. The site is designated for gannet, guillemots, Leach's petrel, puffin, shag and storm petrel²⁵¹. The overall condition of seabird assemblages at the site is favourable.
- 5.4.28 The condition of the species at the majority of major colonies in the North region are reviewed as part of the SPA management process. The overall condition of the seabird assemblages at the majority of locations, with notable exceptions of Handa and Shiant Isles, is favourable. However, at an individual species level a number of species are identified as being in unfavourable condition, and therefore management measures are in place to reduce pressure on these species. Species of particular importance on the west and north coasts include black guillemots, manx shearwater, storm petrel, red throated diver, kittiwakes, razorbill, murre and eider. Wakefield *et al*²⁵² identify that the North region, in particular the area of sea inshore of the Isle of Lewis, across the North coast and to the west of the Orkney Islands are utilised by considerable numbers of seabirds, with the multi-species analysis within the study corresponding with the areas of high recording shown in Figure 181.
- 5.4.29 Figure 181 maps the total records of birds recorded in the marine environment in the North region. Whilst the data mapped has not been corrected for survey effort, it highlights areas of high importance, particularly in inshore waters in close proximity to SPA. The areas of highest concentration in the North Region are to the east and north-east of the Isle of Lewis, although recordings are high

²⁵¹ Scottish Natural Heritage. 2019. Sule Skerry and Sule Stack SPA. Available at: <https://sitelink.nature.scot/site/8581>. Accessed 17/07/2019.

²⁵² Wakefield, E., Owen, E., Baer, J., Carroll, M., Daunt, F., Dodd, S., Green, J., Guilford, T., Mavor, R., Miller, P., Newell, M., Newton, S., Robertson, G., Shoji, A., Soanes, L., Votier, S., Wanless, S., Bolton, M. 2017. Density, fine-scale tracking, and large-scale modeling reveal the regional distribution of four seabird species, *Ecological Applications*, 27(7), 2017, pp. 2074-2091. Available at https://www.researchgate.net/publication/317959907_Breeding_density_fine-scale_tracking_and_large-scale_modeling_reveal_the_regional_distribution_of_four_seabird_species.

in coastal areas across the North region. There are hotspots associated with the North Rona and Sula Sgeir SPA and the IBA on the Isle of Lewis. All of the DPOs can be characterised by having generally medium levels of abundance interspersed with areas of higher abundance. There are also a number of coastal areas identified as either IBA or RSPB reserves in the North region, covering large areas of the Outer Hebrides, the Orkney Islands and the north coast of mainland Scotland (Figure 181). In addition to seabird activity within the North region, some terrestrial bird species e.g. corncrake, may transit the area as migratory species, both during day and night time, with important summer populations on the western isles.

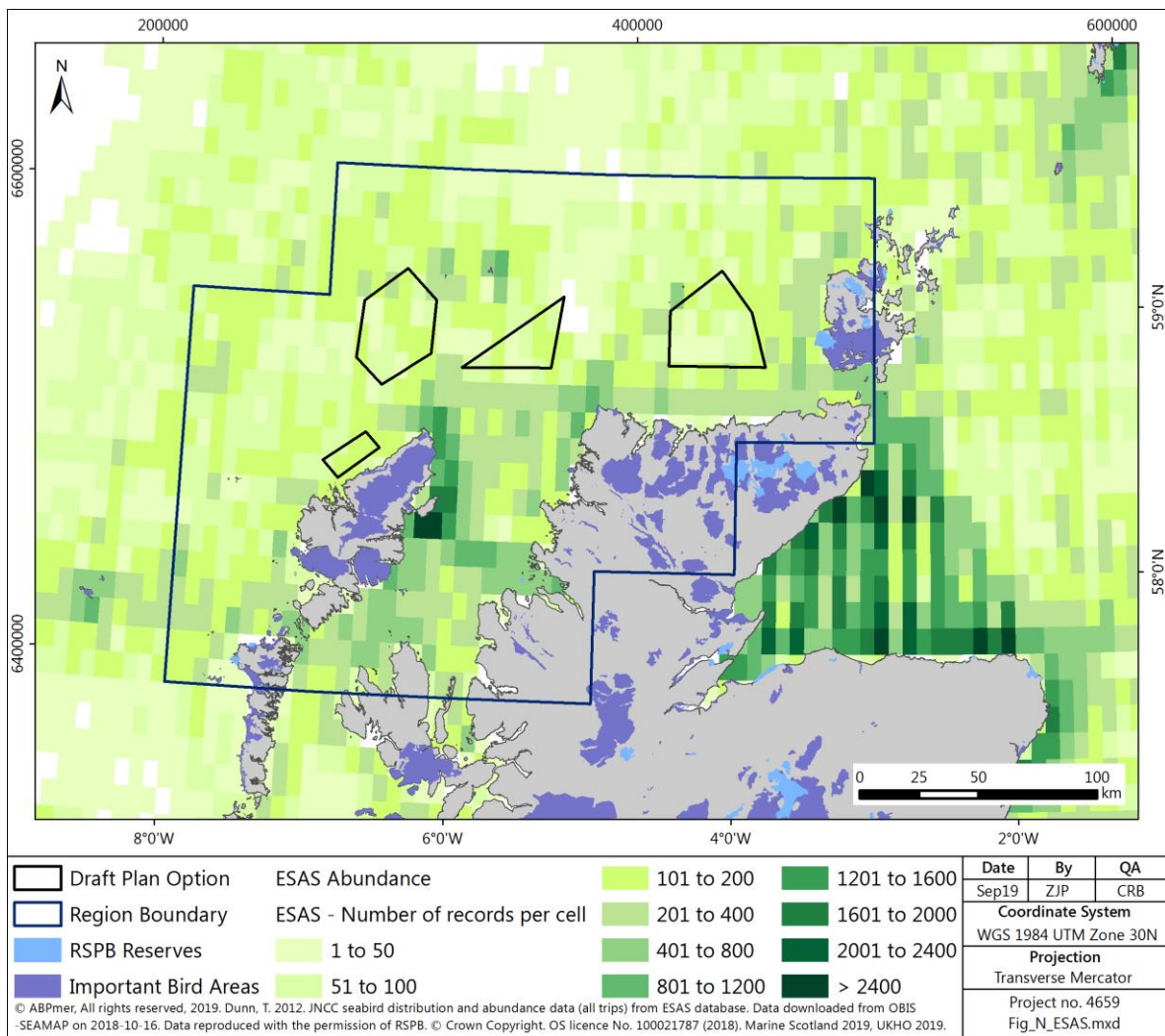


Figure 181 North region: ESAS records per 0.1 degree cell

Cultural Heritage

- 5.4.30 There are two Historic MPAs, shown on Figure 182, designated in the North region, both on the western coast of mainland Scotland, both associated with historic shipwrecks.
- 5.4.31 In addition to the Historic MPAs, there are a number of scheduled monuments (included protected wrecks) within the North region. Those in the marine environment are concentrated around the coast and include a wide range of historically significant buildings, shipwrecks and structures. There are seven shipwrecks designated for the protection of military remains, four near the Orkney Islands, one near the north mainland coastline near Thurso and two just North of the north-west corner of mainland Scotland. There is no overlap between protected sites and the DPOs. There are numerous other shipwrecks distributed throughout the North region, both within and outwith the DPOs.
- 5.4.32 Like the West region, within the North region there are few examples of marine palaeolandscapes (landscapes which have become submerged following occupation by hominids). This is due to the steeply sloping coastlines and high water depths. There is therefore limited opportunity for submerged archaeological remains, and all potential sites are located within inshore coastal waters. No further detail is available on potential submerged settlements within the North region, and therefore any potential impacts on the palaeolandscapes by cable landfalls would be considered on a project by project basis.
- 5.4.33 Work undertaken by Project Samphire from 2013 to 2015 has recorded sites of cultural importance in the Marine environment off the west coast of Scotland, principally in inshore waters and for the most part associated with vessels or aircraft²⁵³.

²⁵³ Wessex Architecture. 2015. Project Samphire, available at <https://www.wessexarch.co.uk/our-work/project-samphire>. Accessed 22/10/2018.

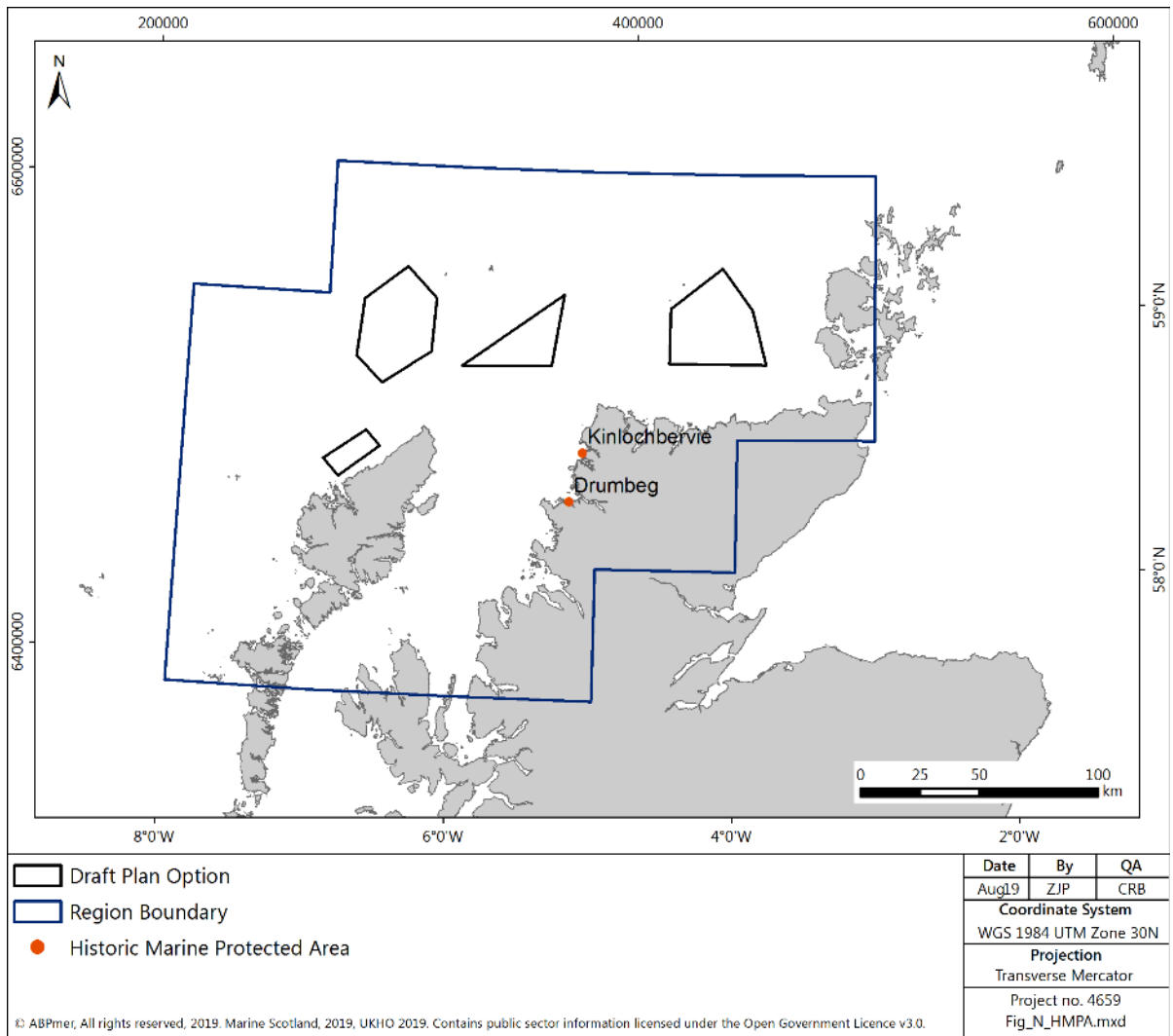


Figure 182 North region: Historic MPA

Landscape / Seascape

- 5.4.34 No specific assessment of landscape or seascape character has been undertaken on the mainland or island coastline in the North region. There are several National Scenic Areas with coastal elements in the North region, shown in Figure 183. The closest NSA considering open seascapes as a feature are South Lewis, Harris and North Uist.
- 5.4.35 Highlands Council identify SLA within the North Region. These include areas of coastline on the north coast, including the north coast approximately 20km south of the DPO N1.
- 5.4.36 The low population density on the west and north coasts of Scotland means that the majority of the coastline in the North region can be considered to be isolated, and Scott *et al.*²⁵⁴ identifies that there is a varied coastline in the area, with intricacies that would potentially be affected if development were to occur. All coastlines facing towards the DPOs are assessed by Scott *et al.* to be of mostly medium to high or high sensitivity²⁵⁵. The exceptions to this are the north-west coast of the Hebrides and the eastern half of the north mainland coastline which are of medium sensitivity.

²⁵⁴ Scott, K.E., Anderson, C., Dunsford, H., Benson, J.F. and MacFarlane, R. 2005. An assessment of the sensitivity and capacity of the Scottish seascape in relation to offshore windfarms. Scottish Natural Heritage Commissioned Report No.103 (ROAME No. F03AA06). Available at <https://www.nature.scot/snh-commissioned-report-103-assessment-sensitivity-and-capacity-scottish-seascape-relation-windfarms>.

²⁵⁵ *ibid*

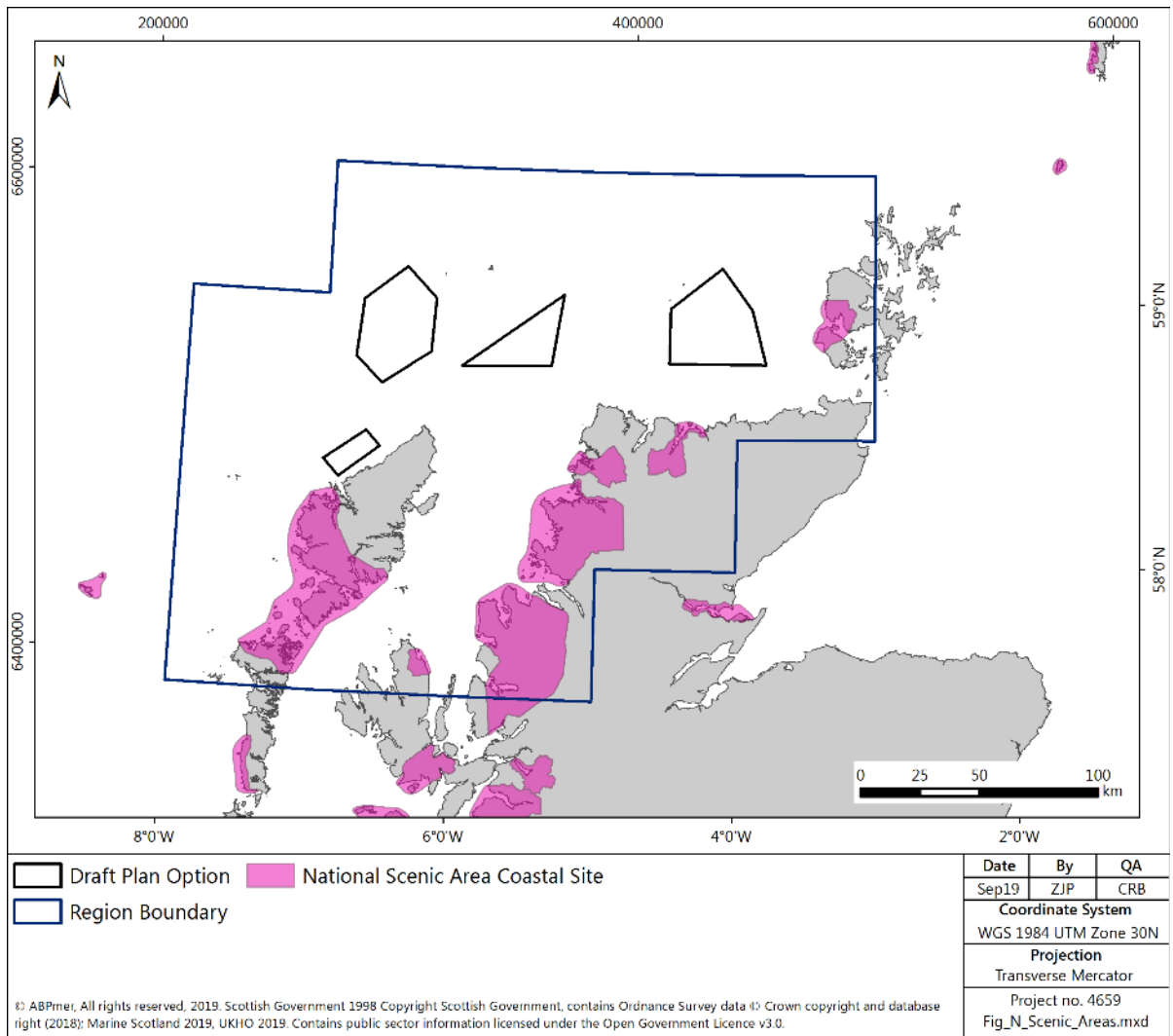


Figure 183 North region: national scenic areas

5.5 Planning Issues

- 5.5.1 There are three local authorities with coastal interests within the North region:
- Highlands,
 - Orkney Islands, and
 - Eilean Siar.
- 5.5.2 Eilean Siar Council has produced a local development plan (LDP)²⁵⁶, which incorporates the development of onshore manufacturing bases to support future offshore wind development, with focus on the expansion and development of currently developed land. There are no specific plans included in the LDP regarding the siting of offshore wind in proximity to the islands, although a spatial strategy for wind farms has been developed which identifies likely limitations or constraints around the islands²⁵⁷.
- 5.5.3 Orkney Council has developed a sustainable energy strategy²⁵⁸ and LDP²⁵⁹ for the islands, both of which consider the potential for renewable energy generation. This includes the development of supply chains to support industry, particularly considering wave and tidal stream energy projects and onshore wind, although it notes that onshore infrastructure required for offshore marine renewable energy developments will be supported where it is demonstrated will not result in significant adverse effects. There is no stated position on the potential for offshore wind development around the islands, with current focus on onshore wind.
- 5.5.4 The Highland Council has considered the potential for offshore wind within its area, identifying moderate potential for offshore wind within the West region in their region of responsibility around Skye.

²⁵⁶ CNE-Siar. 2012. Adopted Outer Hebrides Local Development Plan. Available at <https://www.cne-siar.gov.uk/planning-and-building/planning-service/development-planning/development-plan/local-development-plan/>.

²⁵⁷ CNE-Siar. 2018. Outer Hebrides Local Development Plan Supplementary Guidance for Wind Energy Development. Available at <https://www.cne-siar.gov.uk/media/3434/sq-wind-energy-dev-2016-reduced-for-web.pdf>.

²⁵⁸ Orkney Islands Council. 2009. A Sustainable Energy Strategy for Orkney. Available at <http://www.orkney.gov.uk/Council/C/soes-2017-2025.htm>.

²⁵⁹ Orkney Islands Council. 2017. Orkney Local Development Plan. Available at <http://www.orkney.gov.uk/Service-Directory/O/Orkney-Local-Development-Plan.htm>.

6 North-East

6.1 Introduction

6.1.1 The North-east region includes the Shetland Islands, the north-eastern extent of the Orkney islands, and covers the east mainland coastline, including the Moray Firth area, as far south as Peterhead (Figure 184). There are eight DPOs identified in the North-east region, as shown in Figure 184.

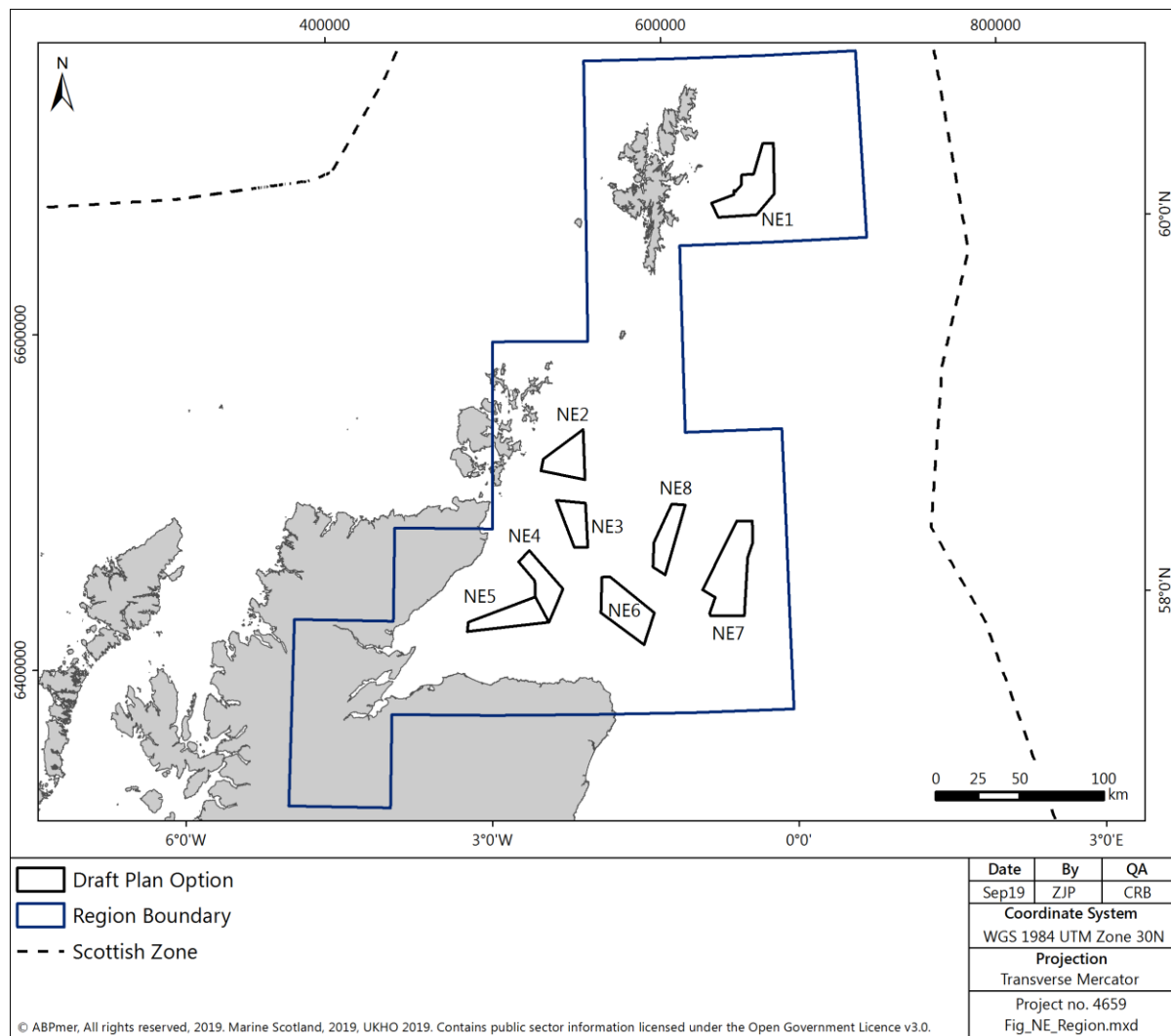


Figure 184 Map of the North-east region, including DPOs

6.2 Physical Considerations

Offshore Wind Resource

6.2.1 Within the North-east region, encompassing eight DPOs (NE1, NE2, NE3, NE4, NE5, NE6, NE7, and NE8) there is considerable available resource as shown in Figure 185 using the annual wind speed as a proxy, and calculated in Table 5 for the eight DPOs.

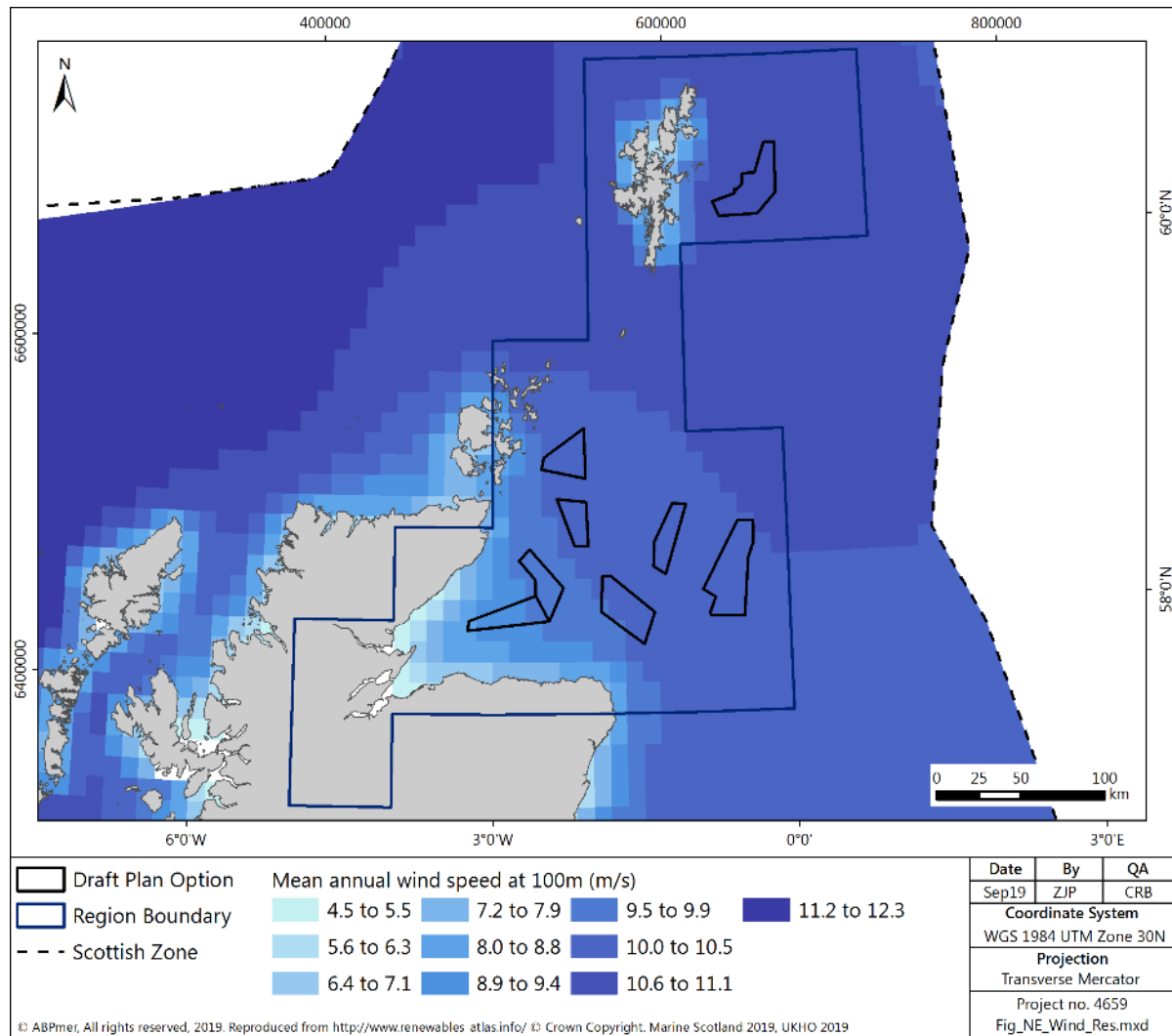


Figure 185 North-east region: mean annual wind speed

Table 5 North-east region: Potential installed capacity in the DPOs

Area of Search	Region	Area (square km)	Potential Installed capacity (GW)
NE1	North-east	776	3.9
NE2	North-east	464	2.3
NE3	North-east	339	1.7
NE4	North-east	440	2.2
NE5	North-east	496	2.5
NE6	North-east	699	3.5
NE7	North-east	1027	5.1
NE8	North-east	401	2.0
North-east Total		4641	23.2

Grid Connection

- 6.2.2 Within the North-east region, there is currently infrastructure being developed to accommodate the Beatrice windfarm and the Caithness-Moray HVDC, capable of transmitting 1200MW, with HVDC converters, a 400kV substation and associated infrastructure²⁶⁰. The reinforcement of the grid in this area will support additional offshore wind development in the North-east region, including the Beatrice windfarm, and the Moray Firth windfarms. Beatrice windfarm entered operation in summer 2019²⁶¹. Moray East windfarm is currently undergoing construction²⁶², whilst Moray West has been consented. Depending on remaining capacity it may also support potential development in the DPOs. However, further reinforcement of the grid in this area is expected to be required, in order to support the growth of renewable energy generation in the area²⁶³.
- 6.2.3 There is currently no transmission link between the Shetland Islands and mainland Scotland. Scottish and Southern Electricity Networks have submitted a needs case, based on the potential for onshore wind development on Shetland, to deliver a 600MW subsea HVDC circuit from Shetland to Caithness, which is currently undergoing its planning phase²⁶⁴.
- 6.2.4 Should the Shetland HVDC link proceed, there may be potential for the link to support grid connections from offshore wind development in the Shetland region, but this will depend on the level of onshore wind development as current proposals for greater than 600MW of generation would potentially exceed the proposed transmission circuit.

²⁶⁰ National Grid. 2017. Electricity Ten Year Statement, November 2017. Available at <https://www.nationalgrideso.com/insights/electricity-ten-year-statement-etys..>

²⁶¹ Beatrice Offshore Wind Ltd. 2019. About. Available at: <https://www.beatricewind.com/>. Accessed 17/07/2019.

²⁶² Moray Offshore Renewable Power. 2019. Moray East Commences Offshore Construction Works of 950MW Windfarm Available at: <http://www.morayoffshore.com/2019/06/03/moray-east-commences-offshore-construction-works-of-950mw-windfarm/>. Accessed 17/07/2019.

²⁶³ *ibid*

²⁶⁴ 4COffshore. 2019. Shetland HVDC link interconnector. Available at: <https://www.4coffshore.com/windfarms/interconnector-shetland-hvdc-link-icid4.html>. Accessed 17/07/2019.

Bathymetry and Seabed

- 6.2.5 Water depths in the North-east region are more gently shelving than in the North or the West regions, as can be seen on Figure 186, with much of the Moray Firth area, including parts of NE4 and NE5 and the areas encompassing the Beatrice and Moray Firth OWF, with water depths under 60 m. Beyond the 60 m contour the slope shelves gradually, with water depth less than the 100 m contour encompassing NE2, NE3 and most of NE6. The remaining DPOs (NE7 and NE8) have water depths predominantly greater than 100 m.
- 6.2.6 The water depth around the Shetland Islands shelves quickly to depths greater than 100 m, with only a small area of shallower water to the south of the islands and a bank, just offshore, to the east. NE1 is in water over 100m deep.
- 6.2.7 The seabed sediments in the North-east region can be roughly broken down into four sediment types. The sediments in the north-west of the area, around the Orkney Islands, are mostly rock and gravelly sediment; sediments around the Shetland islands are predominately sand and coarse sediment, with areas of muddy sediment to the east; sediments in the Moray Firth are muddy sediment to the south with sand and sandy gravel to the north; and further offshore to the east the sand gradates to muddy sediments (Figure 187). As a result, the sediments within the DPOs are also varied, sediments within the shallower DPOs (NE4 NE5 and part of NE6) are predominantly sand, with small regions of coarse sediment. In the deeper regions (encompassing NE7 and NE8), the sand gradates to sandy mud and muddy sand. The sediment within DPOs NE1 is almost entirely sand, with small areas of coarse sediment.

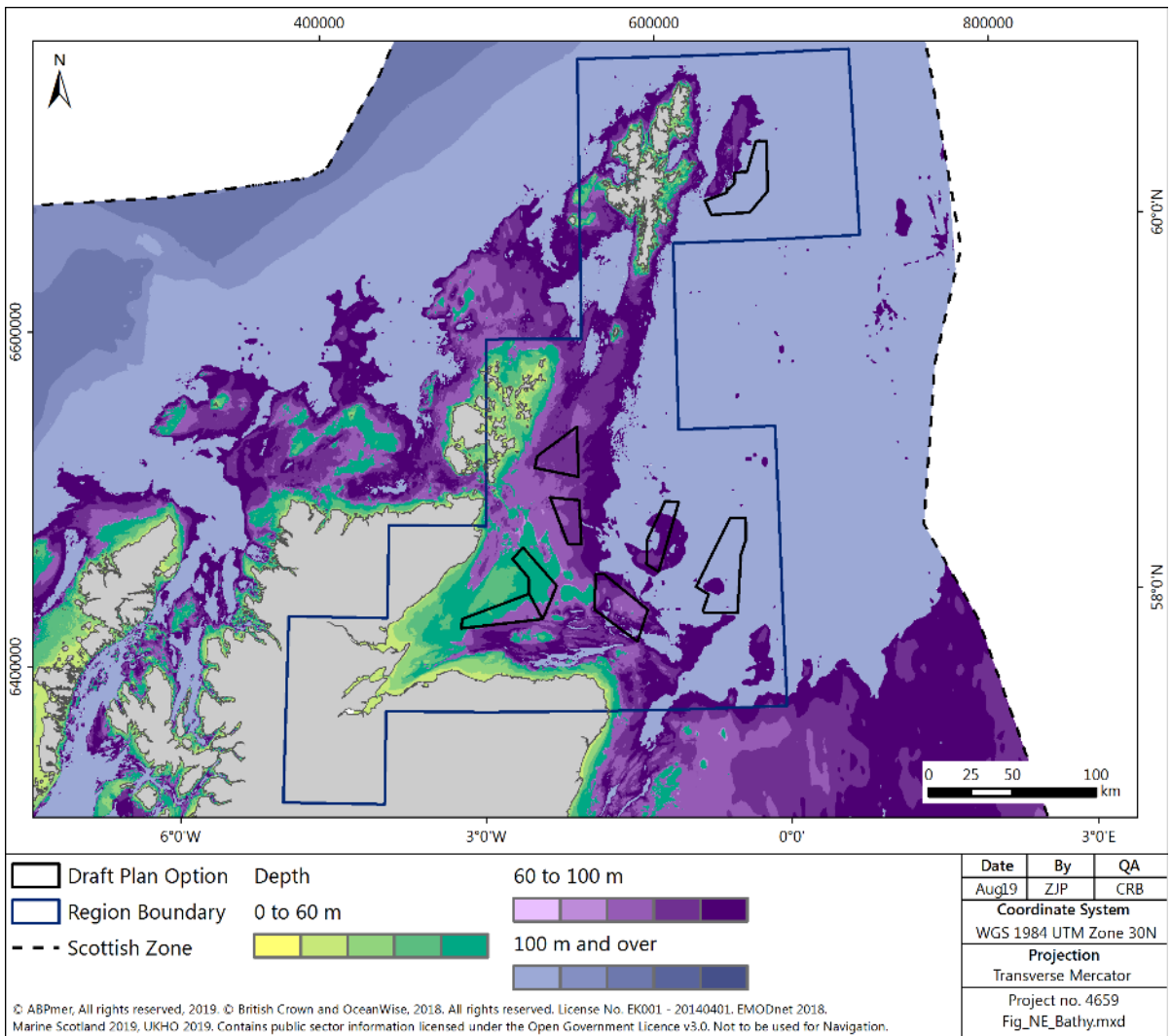


Figure 186 North-east region: banded water depth

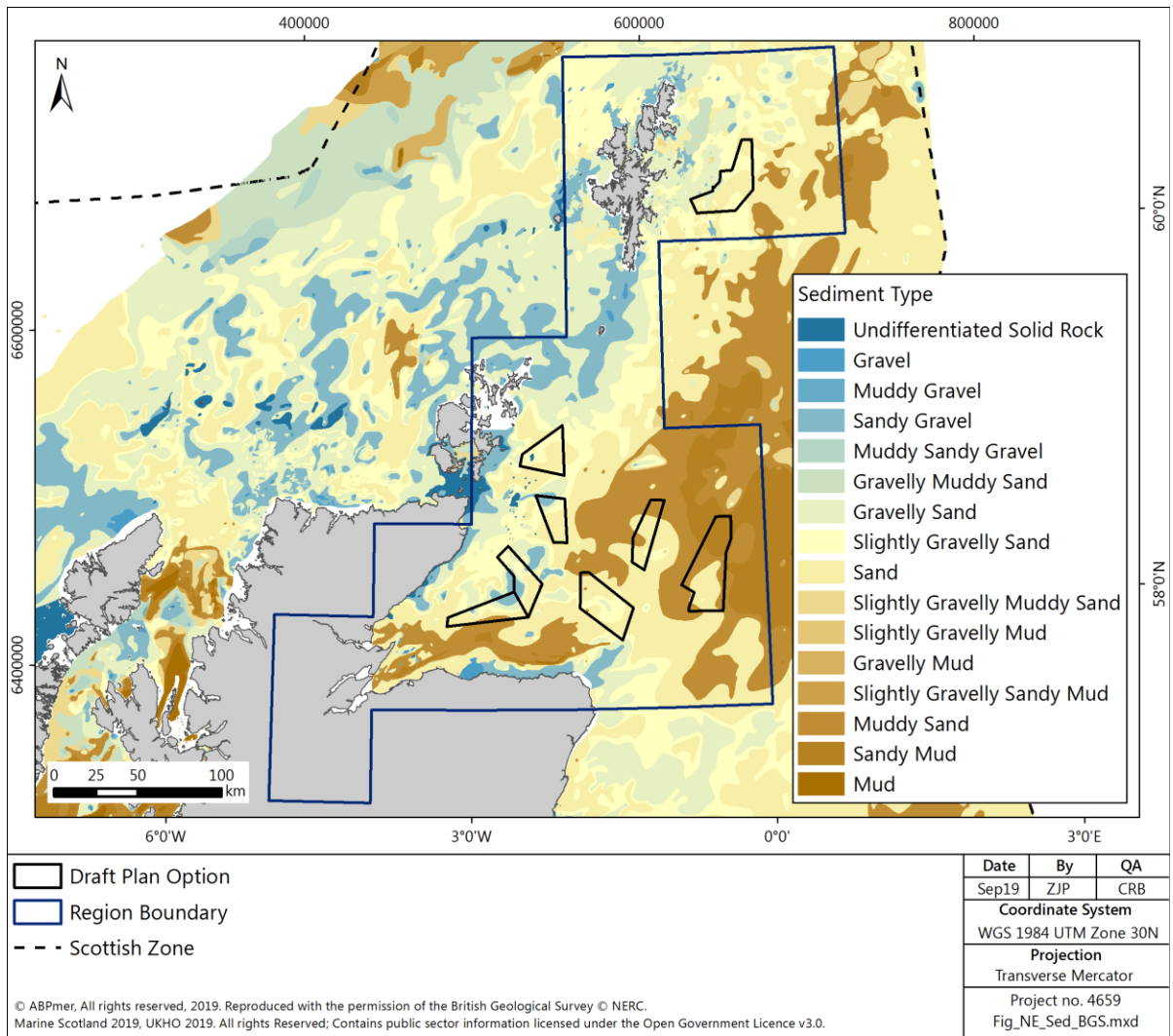


Figure 187 North-east region: seabed sediments

6.3 Socio Economics

Supply Chain

- 6.3.1 Three locations are identified in the North-east region²⁶⁵ which could be developed to support the construction, operation and maintenance of offshore wind in the DPOs. These are:
- Nigg- integrated manufacturing,
 - Ardersier- integrated manufacturing, and
 - Peterhead- distributed manufacturing and operation / maintenance.
- 6.3.2 In addition, Wick harbour is currently supporting engineering activities for the Beatrice development, and as such would be well placed to support further developments in the North-east region. Furthermore, there are sites in other regions discussed within the specific regional text, particularly the North and East regions, that have the potential to support the development of offshore wind in the North-east region.
- 6.3.3 Nigg fabrication yard is currently being used by Siemens to support the construction of the Beatrice Wind farm development, estimated to support approximately 100 direct and indirect jobs in the local area²⁶⁶. It is therefore well placed to support further expansion of offshore wind in the North-east region following completion of the Beatrice wind farm in 2019.
- 6.3.4 Ardersier is identified in the NRIP²⁶⁷ as having the potential to be developed to support large scale manufacturing for offshore renewables, given its history of supply jackets to oil and gas rigs. The current owners, Ardersier Port Ltd, have submitted planning permission to establish a port and port related services to support the energy industry²⁶⁸.
- 6.3.5 Infrastructure at Peterhead is currently used to support the oil and gas industry, particularly within the Operation and Maintenance. It is therefore well placed to transfer the skills within the current workforce, as oil and gas within the North Sea is decommissioned, to support the offshore renewable industry.
- 6.3.6 There are not currently any sites on the Shetland islands identified to support the supply chain for offshore wind. However, there may be the possibility for socio-economic benefits from the development of onshore operations and

²⁶⁵ Scottish Enterprise and Highlights and Islands Enterprise. 2010. National renewables infrastructure plan Stage 2. Available at <http://www.hie.co.uk/growth-sectors/energy/n-rip.html>.

²⁶⁶ Offshorewind.biz. 2016. Siemens Books Nigg Energy Park for Beatrice Project. Available at <https://www.offshorewind.biz/2016/06/15/siemens-books-nigg-energy-park-for-beatrice-project/>.

²⁶⁷ Scottish Enterprise and Highlights and Islands Enterprise. 2010. National renewables infrastructure plan Stage 2. Available at <http://www.hie.co.uk/growth-sectors/energy/n-rip.html>.

²⁶⁸ Highland Council. 2018. Planning Application Summary 18/04552/PIP. Available at <https://wam.highland.gov.uk/wam/applicationDetails.do?keyVal=PFR7NSIHIUF00&activeTab=summary>. Accessed 15/10/2018.

maintenance support, should it be considered as part of the development of NE1 DPOs to the east of Shetland.

Energy Generation

- 6.3.7 There are a number of power stations located within the North-east region:
- Kirkwall (Diesel);
 - Invergordon (Biomass);
 - Peterhead (Combined Cycle Gas Turbine), located on the border between the North-east and East regions;
 - Sullum Voe (Gas Turbine) in the north of the Shetland Islands; and
 - Lerwick (Diesel)
- 6.3.8 Potential for wave and tidal energy generation is limited to the seas around the Orkney Islands (as considered above under the North region) and the Shetland Islands. There are a number of facilities currently operational or under development around the Orkney Islands and one tidal energy array at Bluemull Sound in Shetland. None of the currently proposed, consented or operational facilities overlap with the DPOs in the North-East region. There are no currently proposed or consented developments in the Shetland region.
- 6.3.9 In 2013 Marine Scotland consulted on Draft Plan Options (DPO) for wave and tidal energy^{269, 270}. These draft options were subsequently recognised in Scotland's National Marine Plan²⁷¹. The DPOs identify areas of potential for the future development of wave and tidal energy in Scottish waters (Figure 188). The plan options for wave and tidal are either within or to the west of the Orkney and Shetland Islands and as such do not overlap with the proposed DPOs.
- 6.3.10 Offshore wind is currently being developed in the North-east region, with three major developments, and associated landside infrastructure identified for development in the Moray Firth, to the north of DPOs NE5, as shown in Figure 188. The Beatrice Wind Farm (588MW) is currently under construction, with likely completion date expected in 2019. The two phases of the Moray Firth windfarm are at different stages, Moray East (950MW) is expected to be developed in the early 2020s, while Moray West has gained consent and is awaiting funding through the Contracts for Difference process²⁷²(potential generation capacity up to 750MW).

²⁶⁹ Marine Scotland. 2013. Wave Energy in Scottish Waters- Initial Plan Framework (Draft Plan Options). Available at <https://www.gov.scot/Topics/marine/marineenergy/Planning>.

²⁷⁰ Marine Scotland. 2013. Tidal Energy in Scottish Waters- Initial Plan Framework (Draft Plan Options). Available at <https://www.gov.scot/Topics/marine/marineenergy/Planning>.

²⁷¹ Scottish Government. 2015. Scotland's National Marine Plan, A Single Framework for Managing Our Seas. Available at <https://beta.gov.scot/publications/scotlands-national-marine-plan/>.

²⁷² 4COffshore. 2019. Events on Moray West: Project Dates. Available at: <https://www.4coffshore.com/windfarms/project-dates-for-moray-west-uk77.html>. Accessed 17/07/2019.

- 6.3.11 In addition to development in the Moray Firth the Hywind array (30MW) is currently operational, just on the southern border of the region (Figure 188) with connection into Peterhead.
- 6.3.12 Following the UK Government’s decision to consider island onshore wind as a less developed technology, there is potential for onshore wind energy in Shetland to undergo development, as identified in the potential for the expansion of the mainland to Shetland energy grid above under Grid Connection in Section 6.2.

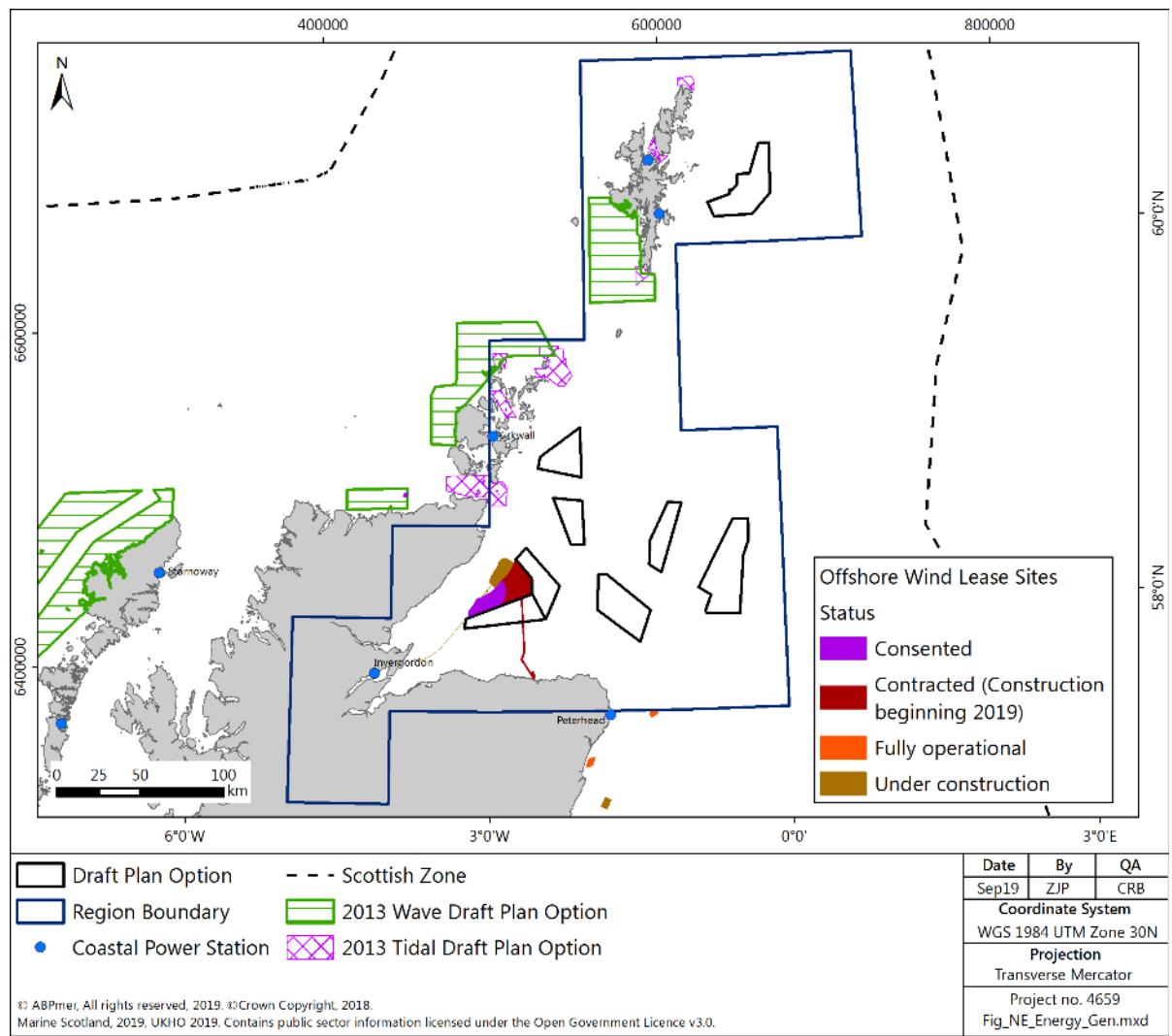


Figure 188 North-east region: current, planned and potential future offshore energy generation infrastructure

Power Interconnectors

6.3.13 There are 114km of interconnectors in the North-east region, with most of the infrastructure on the east side of Orkney and Shetland to connect the small islands together (Figure 189).

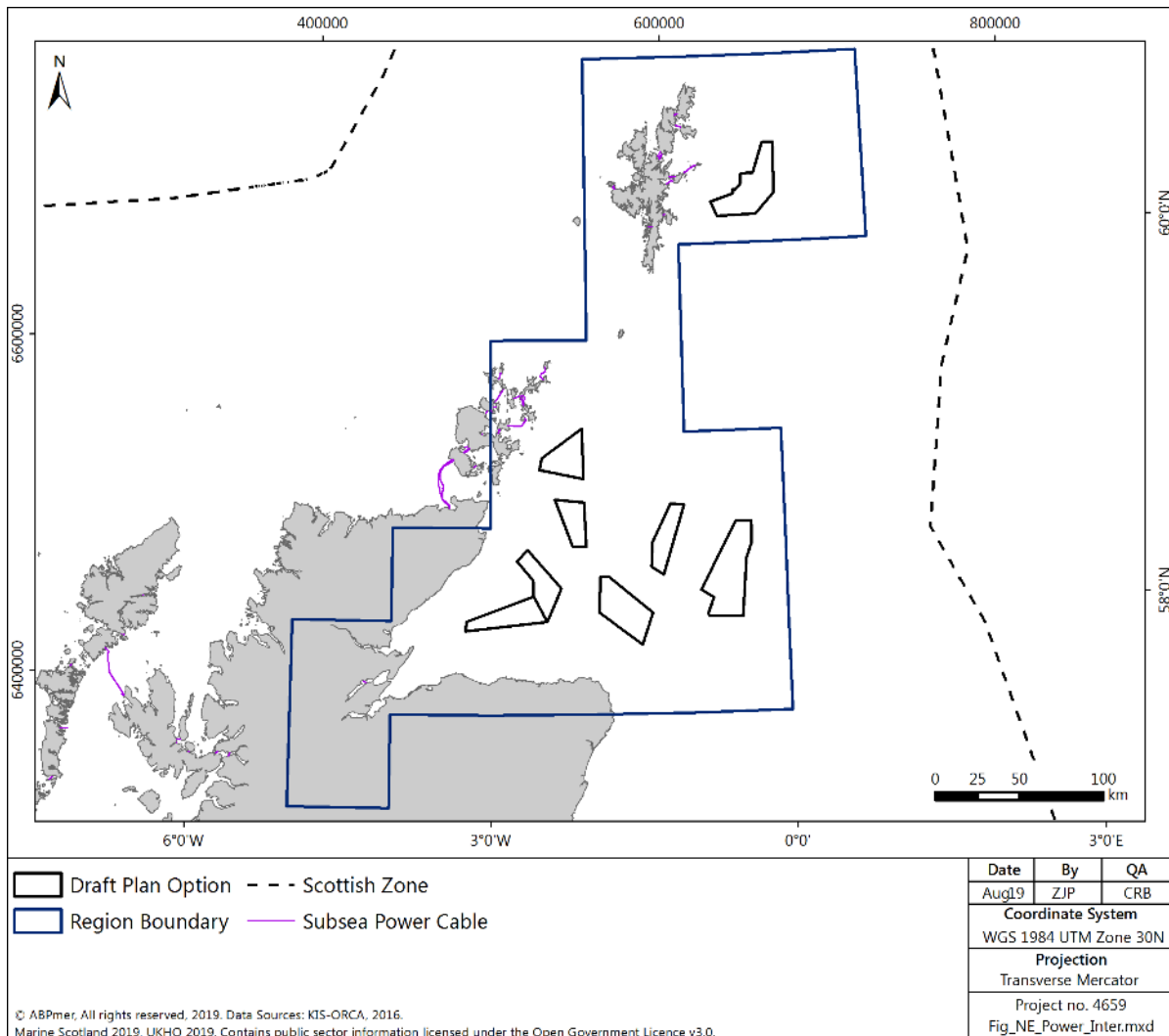


Figure 189 North-east region: power interconnectors

6.3.14 There is a High Voltage Direct Current (HVDC) link which was completed in January 2019 between Caithness and Moray. Routing the cables across the Moray Firth rather than over land will greatly reduce visual impact, but it intersects the NE4 and NE5 DPOs²⁷³.

6.3.15 The North Connect project proposes to develop a 665km, 1400MW HVDC interconnector between Peterhead in Scotland and Simadalen in Norway. It will

²⁷³Scottish and Southern Electricity Networks. 2018. Caithness- Moray. Available at: <https://www.ssen-transmission.co.uk/projects/caithness-moray/>. Accessed 17/10/2018.

provide an electricity transmission link between the two nations to exchange power and increase the use of renewable energy. The intention is for the HVDC interconnector to be operational by 2023²⁷⁴. It could potentially intersect NE7.

- 6.3.16 There is a high voltage direct current (HVDC) link in the early stages of development being built to connect Shetland to the Nation's Electricity Transmission system for the first time. It will be comprised of about 250km of cabling in the sea, require a 320/132kV substation and HVDC convertor station at Upper Kergord on Shetland and a HVDC switching station at Noss Head in Caithness²⁷⁵. This interconnector may intersect the DPO NE2.
- 6.3.17 An interconnector has been proposed to connect Shetland with Norway. The Maali interconnector would offer the opportunity for energy produced in Shetland (currently identified as being likely to be onshore wind) to be exported, and energy imported when supply on the Shetland Islands is unable to meet demand²⁷⁶. There is some potential for the Maali interconnector to intersect NE1, however it is currently in the early planning stages and no detailed route is available to be reviewed.

²⁷⁴North Connect. 2018. HVDC Cable Infrastructure- UK Construction Method Statement. Available at: <http://northconnect.no/file/hvdc-cable-infrastructure-uk-construction-method-statement.pdf>. Accessed 17/10/2018.

²⁷⁵ Scottish and Southern Electricity Networks. 2018. Shetland. Available at: <https://www.ssen-transmission.co.uk/projects/shetland/>.

²⁷⁶ European Network of Transmission Systems. Undated. Project 294- Maali. Available at <https://docstore.entsoe.eu/Documents/TYNDP%20documents/TYNDP%202016/projects/P0294.pdf>. Accessed 24/10/2018

Telecom Cables

6.3.18 The North-east region has 568km of active telecom cables, a stretch of which goes through the NE4 and NE2 DPOs (Figure 190). The cables are to the south of Shetland and connect it to Orkney and the mainland (Figure 189).

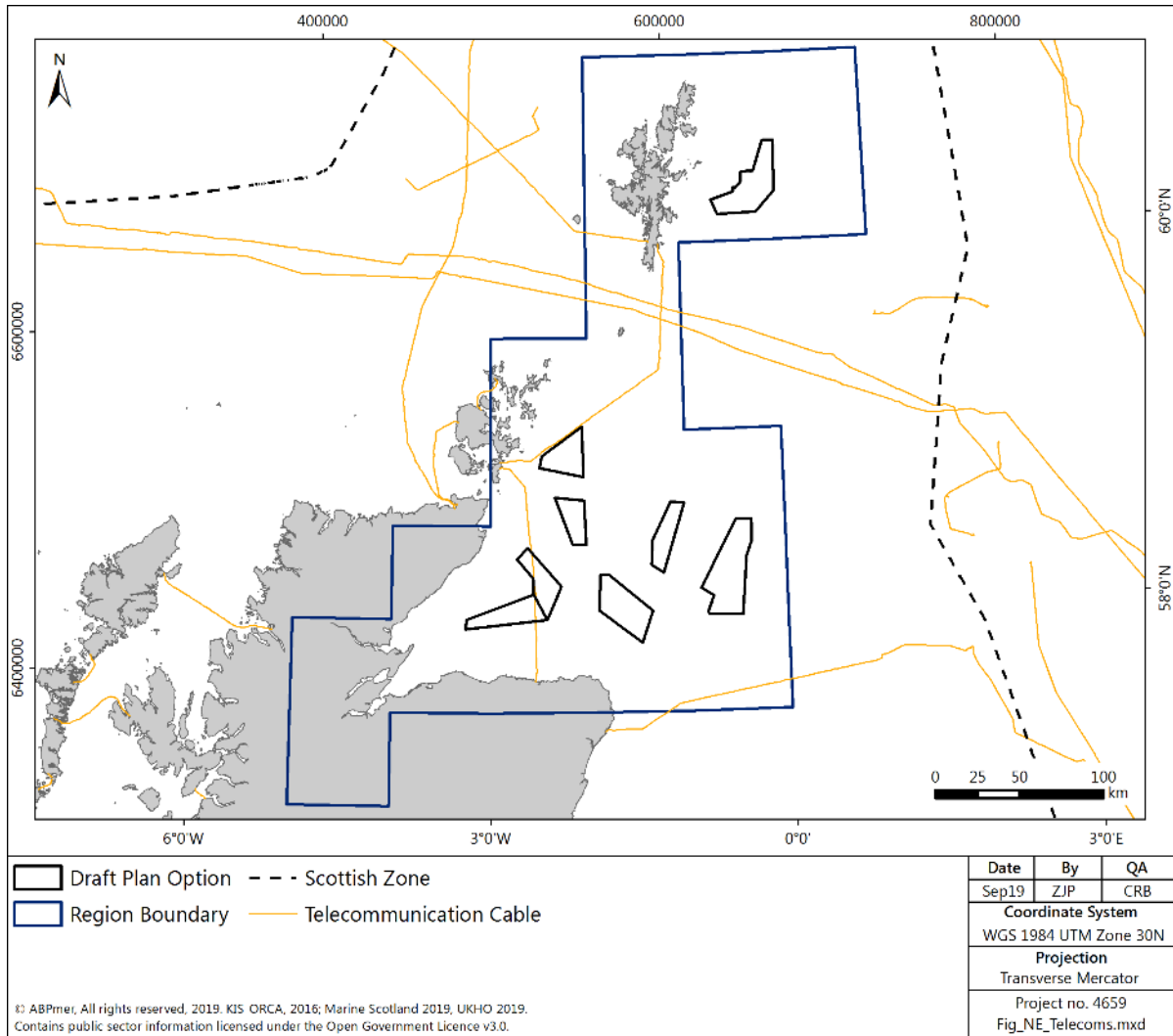


Figure 190 North-east region: active telecom cables

Carbon Capture and Storage

- 6.3.19 The current development of the potential carbon and capture industry in Scotland is centred around the North-east and East regions with the sole proposed development (ACT Acorn) proposing to use existing Oil and Gas infrastructure to transport CO₂ from St Fergus, near Peterhead (approximately on the boundary between the two regions) north-east to the Captain Sandstone saline aquifer (Figure 191).
- 6.3.20 It is therefore likely that the majority of the potential economic benefits associated with the development of a CCS industry will be realised within the North-east and East regions.
- 6.3.21 The Captain aquifer currently identified for development overlaps with the DPO NE3, NE6 and NE8 however the portion of the captain aquifer identified for the ACT Acorn project (Captain X storage site) lies to the south of the DPO NE7 with no direct overlap.
- 6.3.22 The Mains aquifer is sited in the region of NE5, however it has not been considered as a potential site to support CCS to date. In addition, there are further saline aquifers in the seas further offshore to the east of the DPOs, which in future may have the potential to support CCS development, therefore development of offshore wind in the DPO may impact potential pipeline routing.

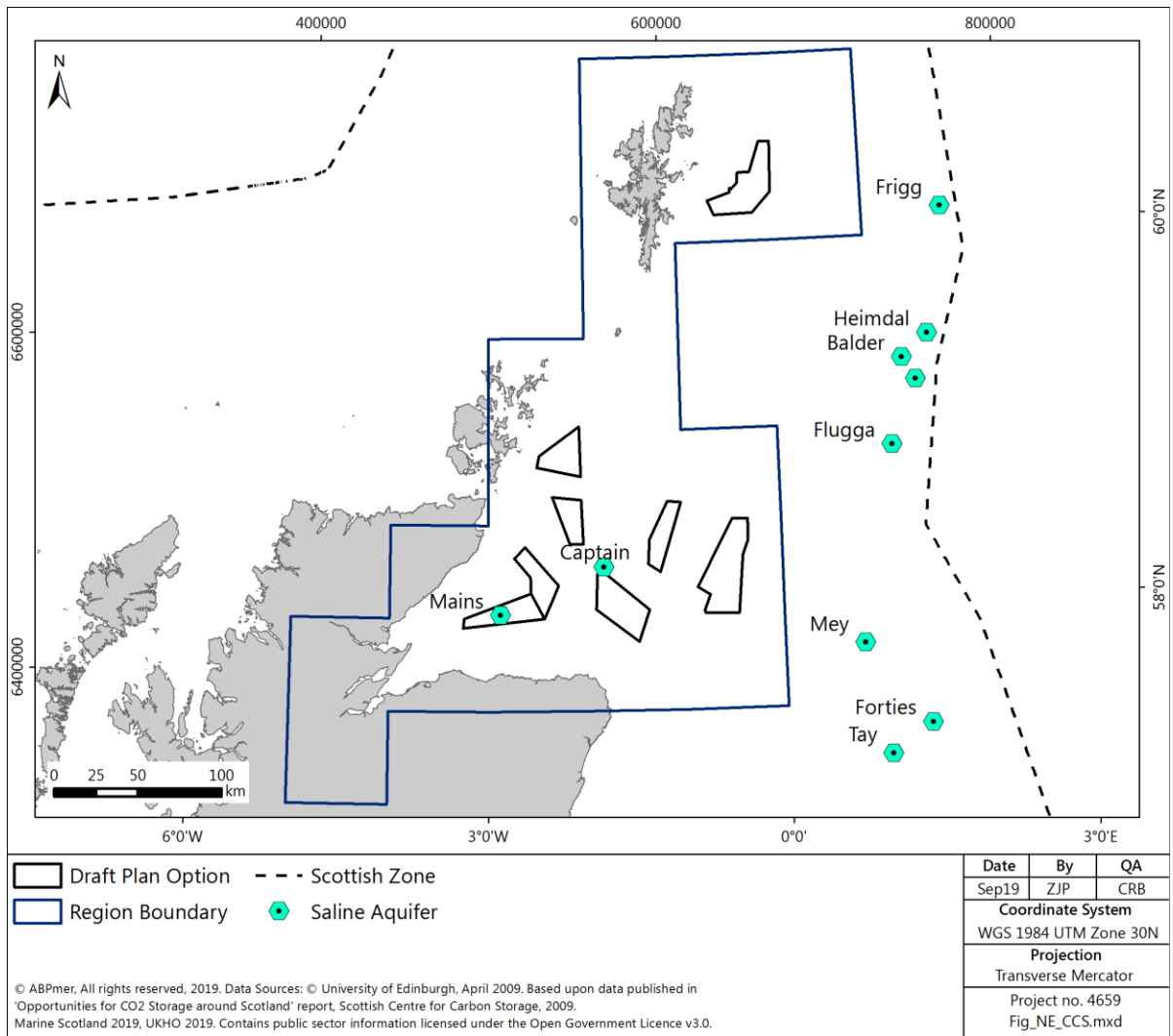


Figure 191 North-east region: saline aquifers

Oil and Gas

6.3.23 In the North-east region oil and gas activity occurs throughout much of the offshore waters (Figure 192). There are 14 producing hydrocarbon fields in this region (13 producing oil and 1 gas). Many of the provisional awards that have been granted through the 31st provisional awards, overlap with the DPOs in the North-east region. In addition, there is some overlap between blocks offered in the 32nd round and the DPOs in deeper waters. Several licence blocks have already been selected; some of which overlap with the DPOs.

6.3.24 NE4, NE6 and NE7 overlap licensed blocks and 30th round awarded areas.

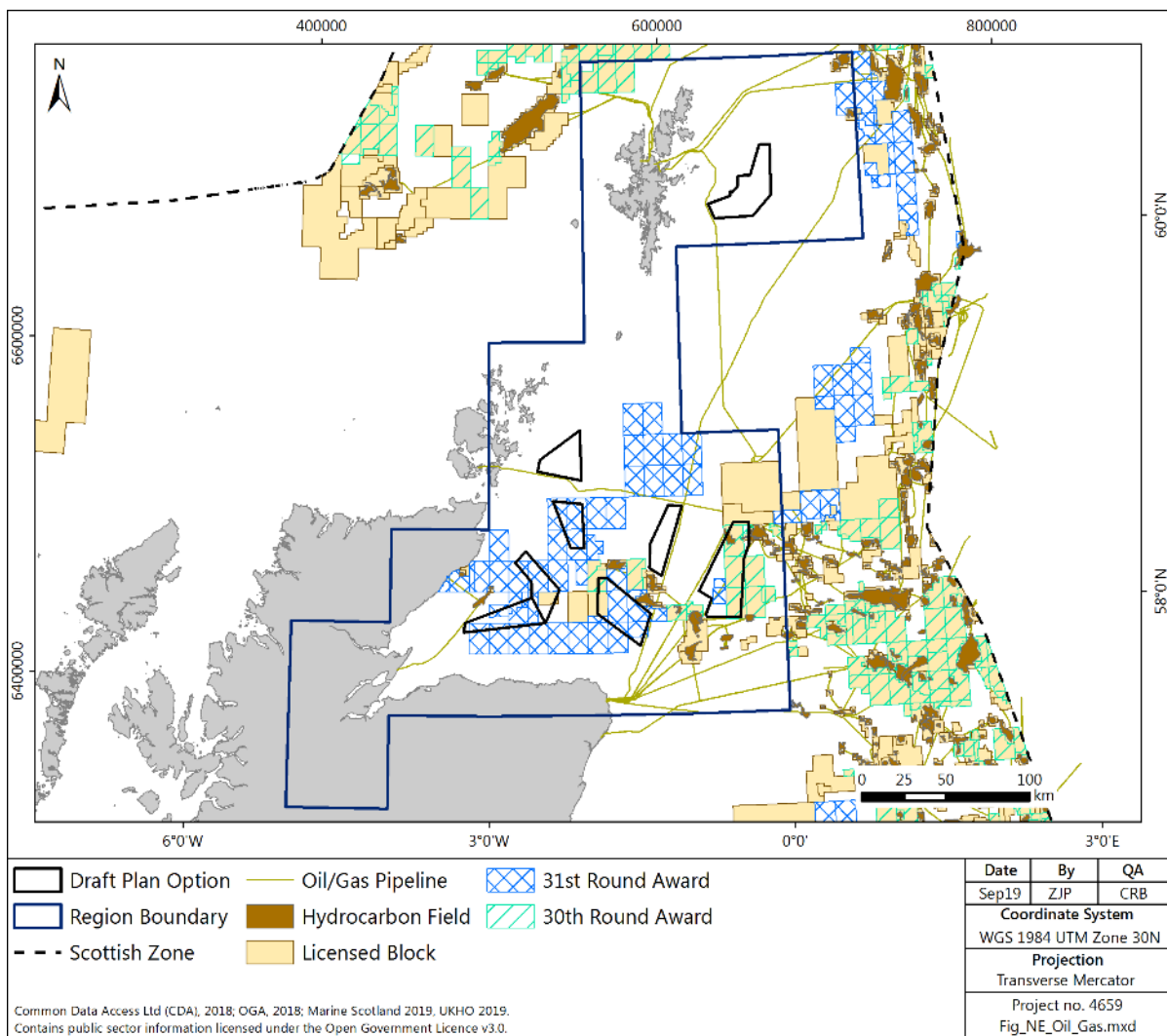


Figure 192 North-east region: oil and gas infrastructure and licenced blocks

Aviation

- 6.3.25 The North-east region has one major airport in Inverness, eight civil aviation aerodromes and two helicopter rescue stations (Figure 193).
- 6.3.26 Inverness is the only major airport in the North-east region of Scotland. It offers a range of daily flights to and from key destinations including; London, Bristol, Manchester, Birmingham, Dublin, Amsterdam, Orkney and Shetland²⁷⁷.
- 6.3.27 Kirkwall airport provides easy access to the Orkney Islands from Scotland's major cities, Shetland and Norway²⁷⁸.
- 6.3.28 Wick John O'Groats airport has flights to and from Aberdeen and Edinburgh²⁷⁹.
- 6.3.29 Sumburgh airport is the main airport serving Shetland and provides links to Scotland's major cities, Orkney and Norway²⁸⁰. Tingwall and Scasta are smaller.
- 6.3.30 The North-east region is also partly covered by the primary surveillance radar from Aberdeen airport, covering or partially covering DPOs NE3, NE4, NE5 and NE6, NE7 and NE8.
- 6.3.31 Inverness, Kirkwall, Wick and Sumburgh airports are safeguarded civil aerodromes.
- 6.3.32 In addition, the North-east region is intersected by multiple Helicopter Main Routes (HMR). The current recommendation is that offshore wind development should allow a 2 nautical mile buffer either side of a HMR.
- 6.3.33 HMRs in the North-east region intersect DPOs NE1, NE6, NE7 and NE8.

²⁷⁷Inverness Airport. 2018. Your Journey with Inverness Airport. Available at: <https://www.invernessairport.co.uk/>. Accessed 17/10/2018.

²⁷⁸Highlands and Islands Airports Limited. 2018. Kirkwall Airport. Available at: <https://www.hial.co.uk/kirkwall-airport/airport-information/>. Accessed 17/10/2018.

²⁷⁹Highlands and Islands Airports limited. 2018. Wick John O'Groats Airport. Available at: <https://www.hial.co.uk/wick-airport/destinations/>. Accessed 17/10/2018.

²⁸⁰Highlands and Islands Airports Limited. 2018. Sumburgh Airport. Available at <https://www.hial.co.uk/sumburgh-airport/airport-information/>. Accessed 16/10/2018.

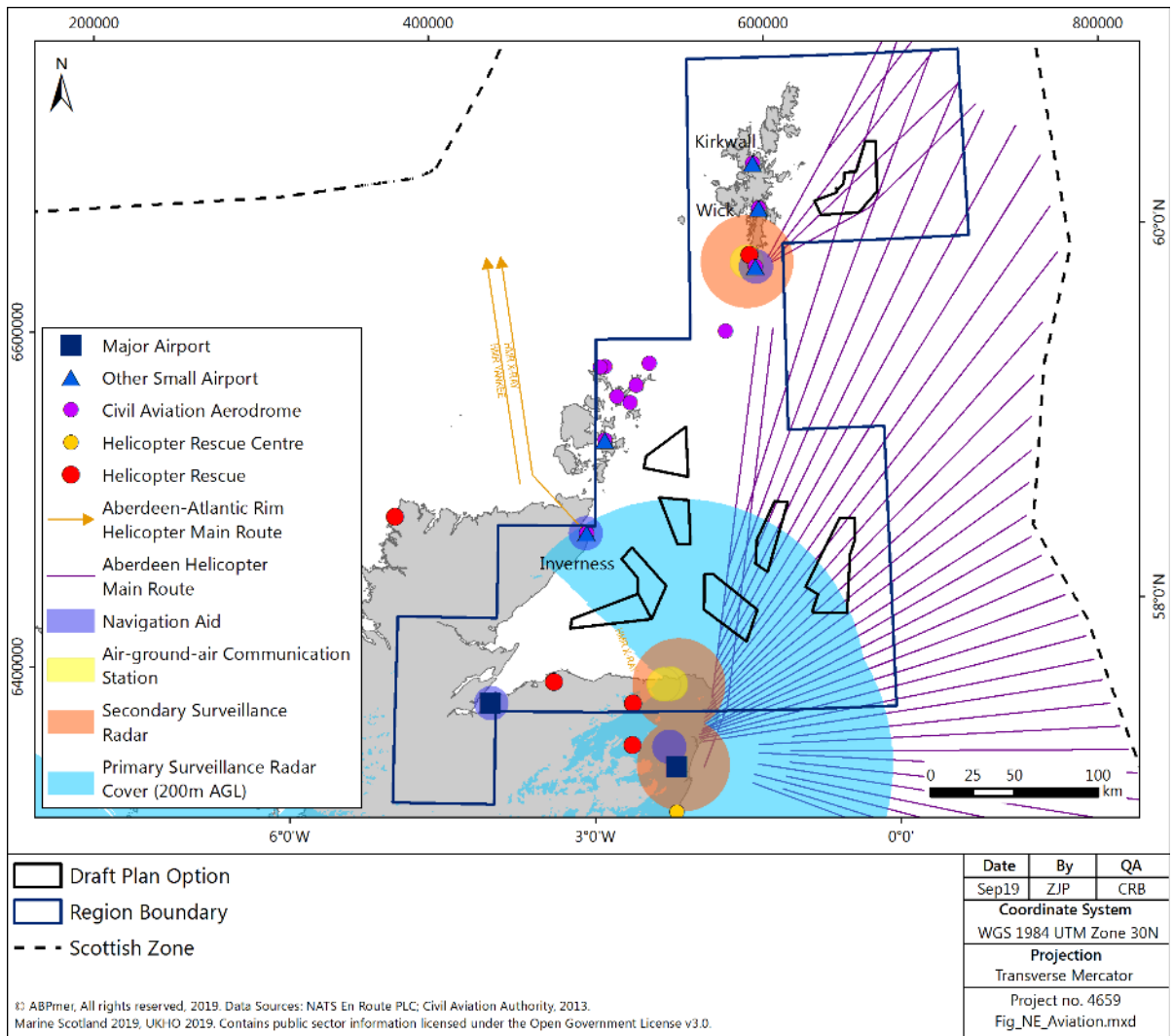


Figure 193 North-east region: aviation infrastructure, key routes and radar coverage

Defence

- 6.3.34 There is a high concentration of defence assets in the North-east region used for free navigation for surface and subsurface naval vessels for national defence; safeguarding of navigational routes and nationally critical infrastructure; safeguard the usage of designated Danger Areas and Exercise Areas for military training and defence test & evaluation purposes; retain strategic maritime infra-structure, installations and coastal MOD facilities.
- 6.3.35 The RAF facilities at Lossiemouth and Kinloss, and the garrison at Fort George are large facilities in rural locations, and therefore support a large proportion of the jobs, both directly and indirectly in that rural community. The economic impact of RAF Kinloss and RAF Lossiemouth was assessed in 2010 and found to support 5771 jobs (16 % of all FTE employment in Moray) and a gross income of £158.3 million to the local economy²⁸¹. The Fort George garrison is due to close in 2032, and it has been estimated that the closure of the garrison would result in the loss of 732 jobs and £16.3 million from the local economy²⁸².
- 6.3.36 Three of the DPOs in the North-east region (NE2, NE3 and NE4) are entirely within a firing danger area and some have partial overlaps (NE5) (Figure 194). In addition to military establishments in the public domain, it is recognised that further military assets may be present in the region. Any concerns regarding assets of this type will be identified in consultation with the MOD at a project level.
- 6.3.37 The MOD support a number of jobs in the North-east region, both directly and indirectly. Employment is largely through the two key bases on the coastline in the Moray Firth discussed above. No regional breakdown of employment figures are available within Scotland, however it is likely that an appreciable portion of the direct and indirect employment figures discussed in the national overview above are located in the North-east region.
- 6.3.38 There is a limited defence activity in and around the Shetland islands with the only assets identified as communications and training or volunteer estate on the islands themselves. The largest asset is the radar facility at Saxa Vord, which is remotely operated by the RAF.
- 6.3.39 There is likely to be limited employment associated with defence activities within the Shetland region (regional breakdowns of MOD employment are not available within Scotland), although the defence radar may at Saxa Vord ²⁸³

²⁸¹ Reference economic consultants. 2010. Economic Impact of RAF Kinloss and RAF Lossiemouth, Final Report to Highlands and Islands Enterprise. Available at <http://www.hie.co.uk/common/handlers/download-document.ashx?id=b54c1a27-0085-43a5-8651-87fe6b41d0f5>.

²⁸² The Highland Council. 2016. Fort George Military Barracks, Report by the Director of Development and Infrastructure. Available at https://highland.gov.uk/download/meetings/id/70849/item_22_additional_item_fort_george_military_barracks.

²⁸³ BBC, 2018. Shetland radar base 'nearing completion'. Available at <https://www.bbc.co.uk/news/uk-scotland-42831910>.

may support a small number of jobs on the island indirectly through support to visiting maintenance contractors.

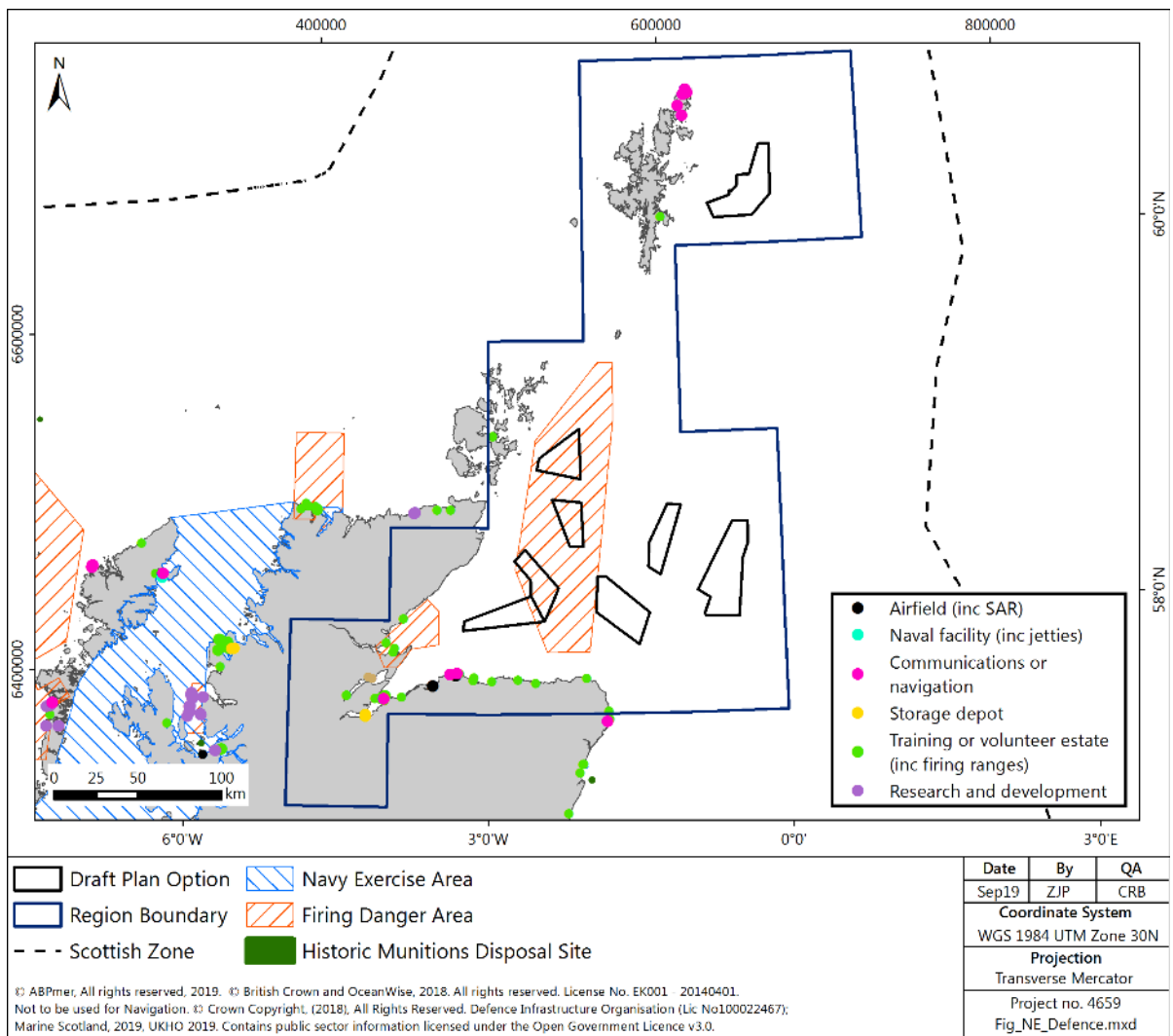


Figure 194 North-east region: defence infrastructure and exercise areas

Fishing

- 6.3.40 Landings from UK-registered vessels caught in the North-east region had an average annual value of £645 million and an average live weight of 121,069,869 tonnes for the five-year period 2013-2017.
- 6.3.41 The majority of landings were demersal (37%) and pelagic (38%) with the vast majority landed by the over 12 m fleet (92%). The most significant gear types were demersal trawls (43%) and midwater trawls (34%) while mechanical dredges (6%) and creels (6%) also make a significant contribution.
- 6.3.42 Figure 195 shows over-15m vessels using mobile demersal gear fish throughout the region. *Nephrops* trawlers operate in the southern part of the Moray Firth, mostly south of NE5, and further offshore between NE7 and NE7 and on the Fladen Grounds. Scallop dredgers operate in the Moray Firth, along the Sutherland coast from John O’Groats to Borgue and off Fraserburgh and Peterhead. Gears targeting demersal fish operate across the region and predominantly in the north-eastern part. Over-15m pelagic vessels operate at a lower intensity in the region, although there is some patchy herring fishing east of Orkney and in the north-east part of the region (Figure 196). Pelagic vessels also target herring east and west of the Shetland islands, and mackerel fishing occurs around Shetland. Over-15m vessels using static gear operate at a low level in the region, the most important area being in the north of the region around Orkney and west of Shetland, targeting crab and lobster (Figure 197).
- 6.3.43 ScotMap data do not cover the Shetland region, but the Shetland marine spatial plan²⁸⁴ identifies important shellfish dredging grounds and shellfish creeling grounds for scallops, crabs, lobsters and whelks.
- 6.3.44 The Moray Firth is a particularly important area for under-15m vessels, as well as around the Orkney Islands. Demersal trawls for *Nephrops* and other species (‘non-*Nephrops*’) operate in the Moray Firth and scallop dredgers operate east of Orkney (Figure 198). Creels for crabs and lobster operate along the Buckie and Fraserburgh coasts and around Orkney, with mackerel lines also used along the coast from Buckie to Peterhead (Figure 199).
- 6.3.45 There were 611 fishing vessels with their Home Port registered within the North-east region in 2016²⁸⁵. Whilst 62% of these were in the ten metres and under length category, this region has the highest percentage of larger vessels of all the regions (30% of registered vessels are over 15m in length). The ports with the most registered vessels were Fraserburgh (141), Peterhead (86), Lerwick (86), Kirkwall (68), Buckie (56), Whalsay (25), Scalloway and Isles (20)

²⁸⁴ Shetland Islands Council & NAFC Marine Centre, 2015. Shetland Islands’ Marine Spatial Plan, Supplementary Guidance, Fourth Edition 2015. Available at <https://www.nafc.uhi.ac.uk/research/marine-spatial-planning/shetland-islands-marine-spatial-plan-simsp/>. Accessed 25/10/2018.

²⁸⁵ MMO, 2016. UK Fishing Vessel Numbers by Home Port 2016. Available at: https://www.geostore.com/environment-agency/rest/catalogue/download/mmo_wms_united_kingdom_fishing_vessel_numbers_by_home_port_2016?format=ESRI_Shapefile. Accessed 25/10/2018.

Macduff (16) and Westray (16). Home ports within the North-east region are shown in Figure 200.

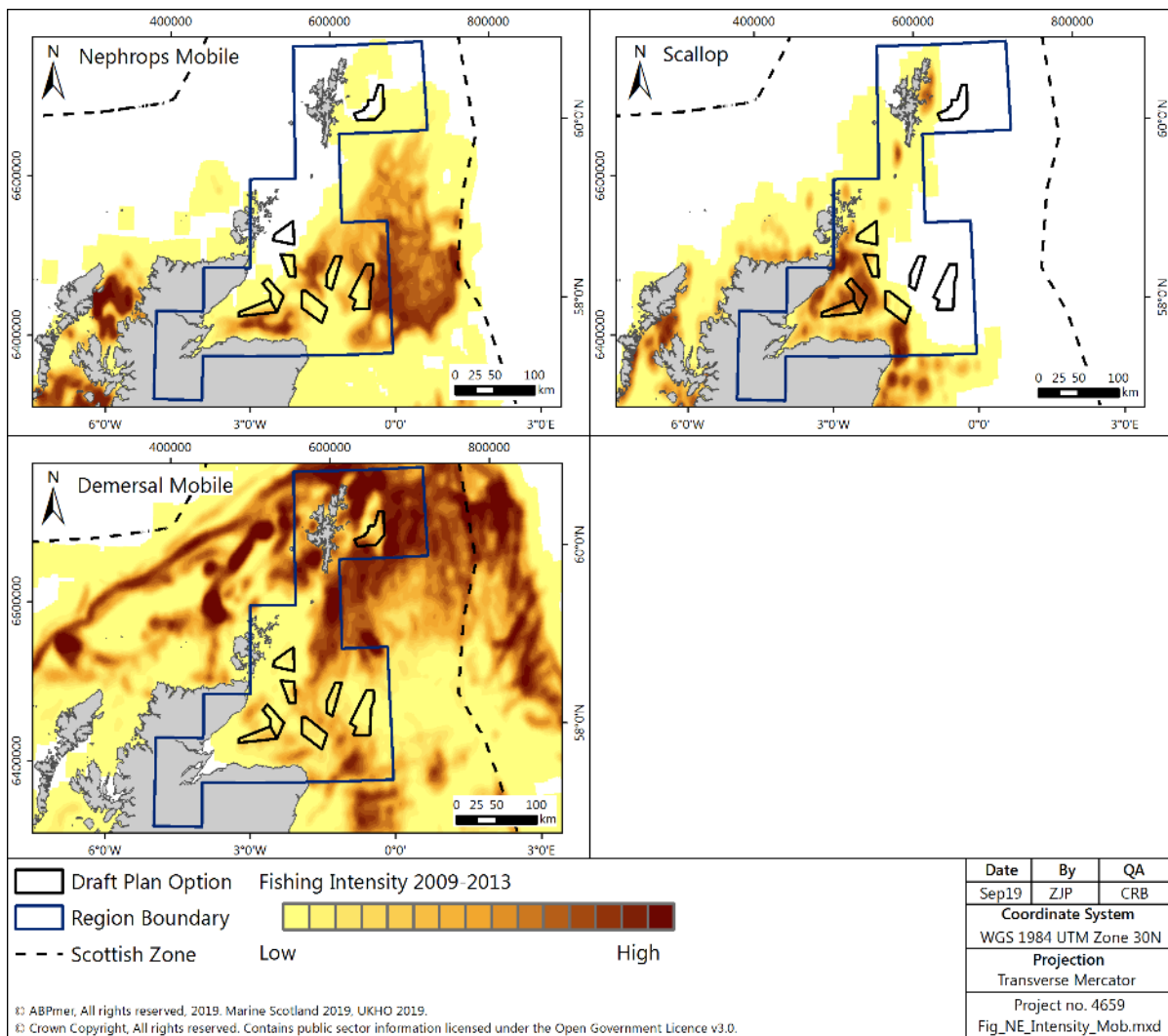


Figure 195 Fishing intensity for over-15m vessels in the North-east region using demersal mobile gear (2009-2013)

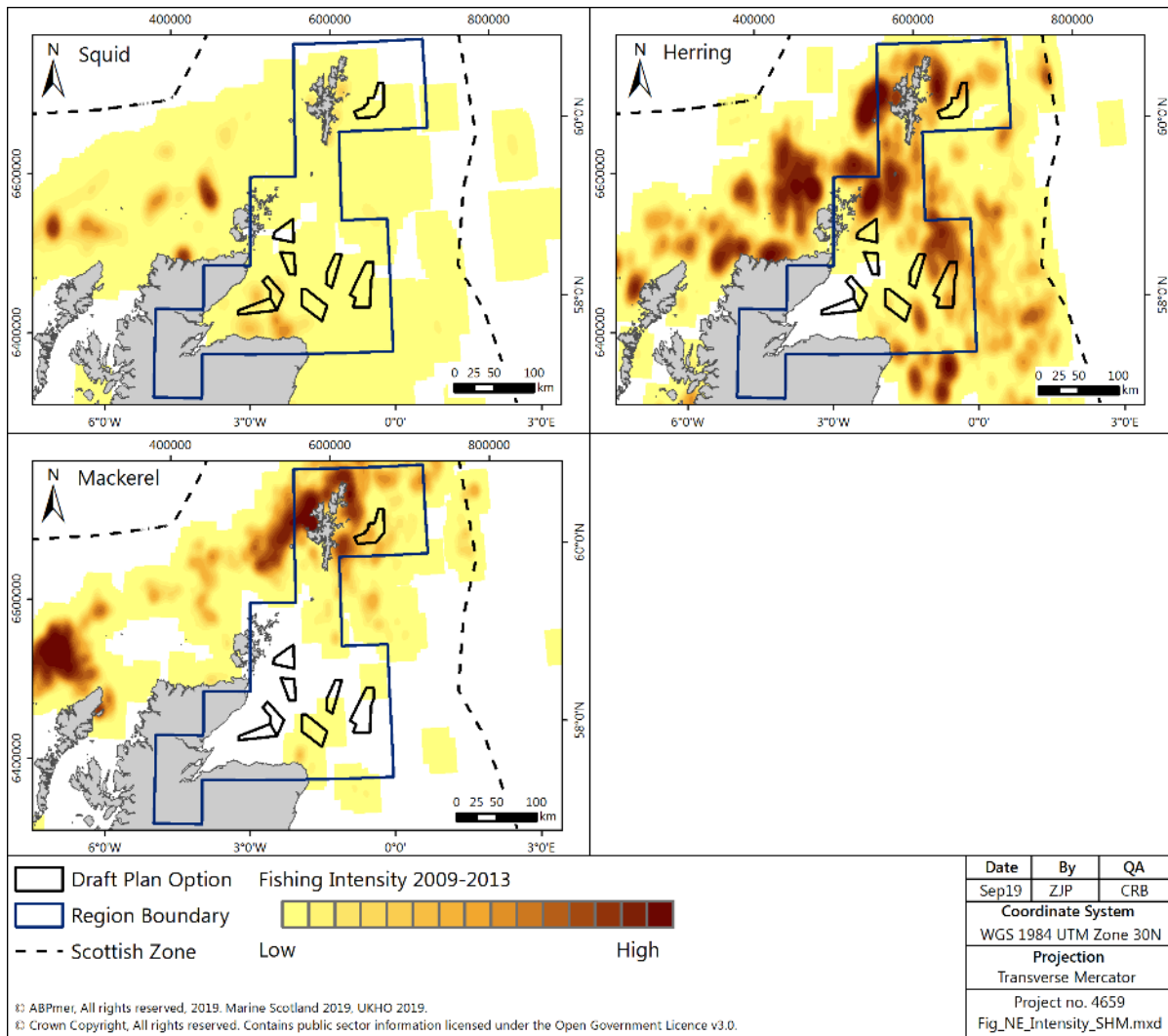


Figure 196 Fishing intensity for over-15m vessels in the North-east region targeting pelagic species (2009-2013)

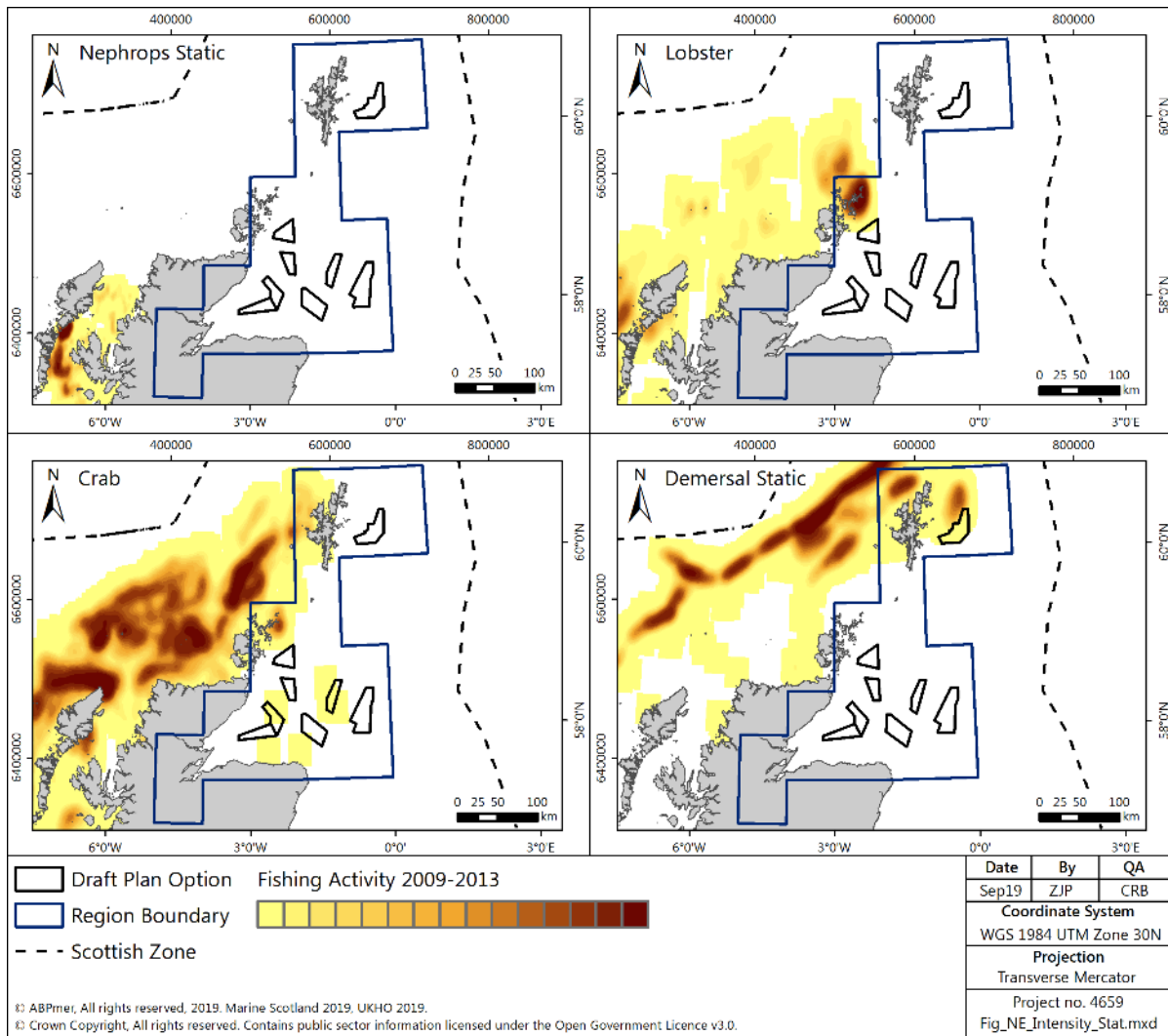


Figure 197 Fishing intensity for over-15m vessels in the North-east region using static gear (2009-2013)

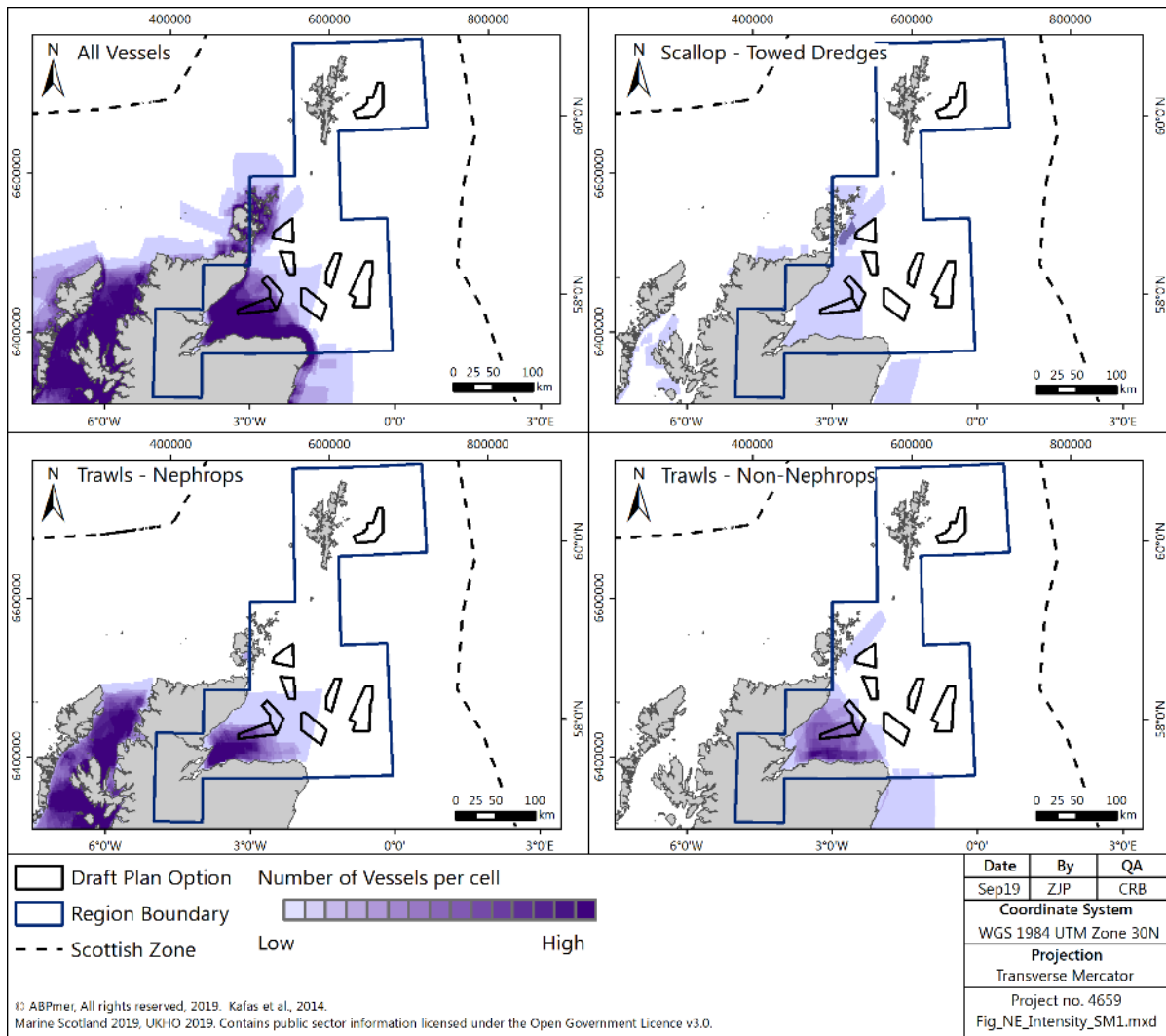


Figure 198 Number of vessels for under-15m vessels in the North-east region, all gears and mobile demersal gears, from ScotMap

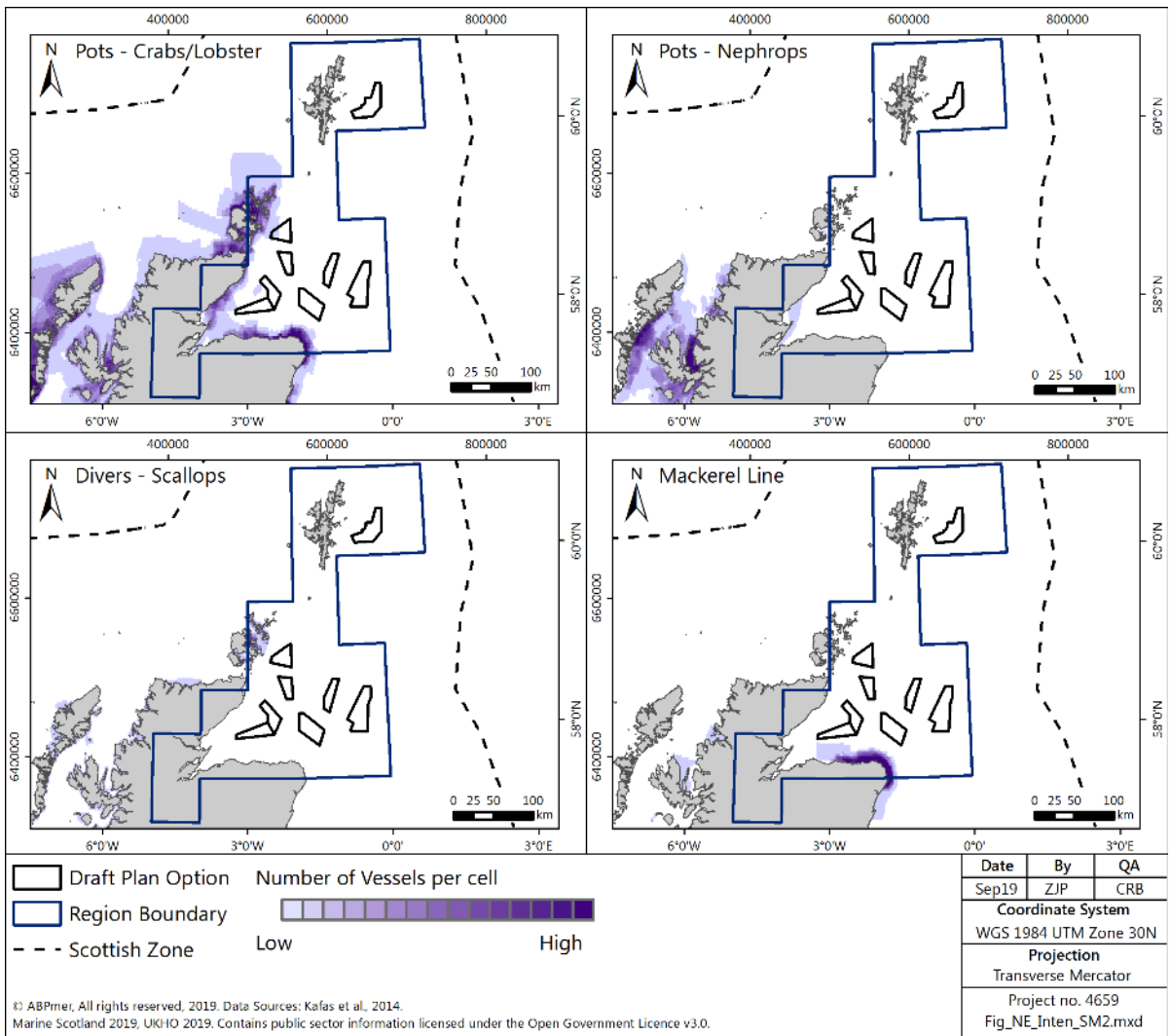


Figure 199 Number of vessels for under-15m vessels in the North-east region, pots, divers and mackerel lines, from ScotMap

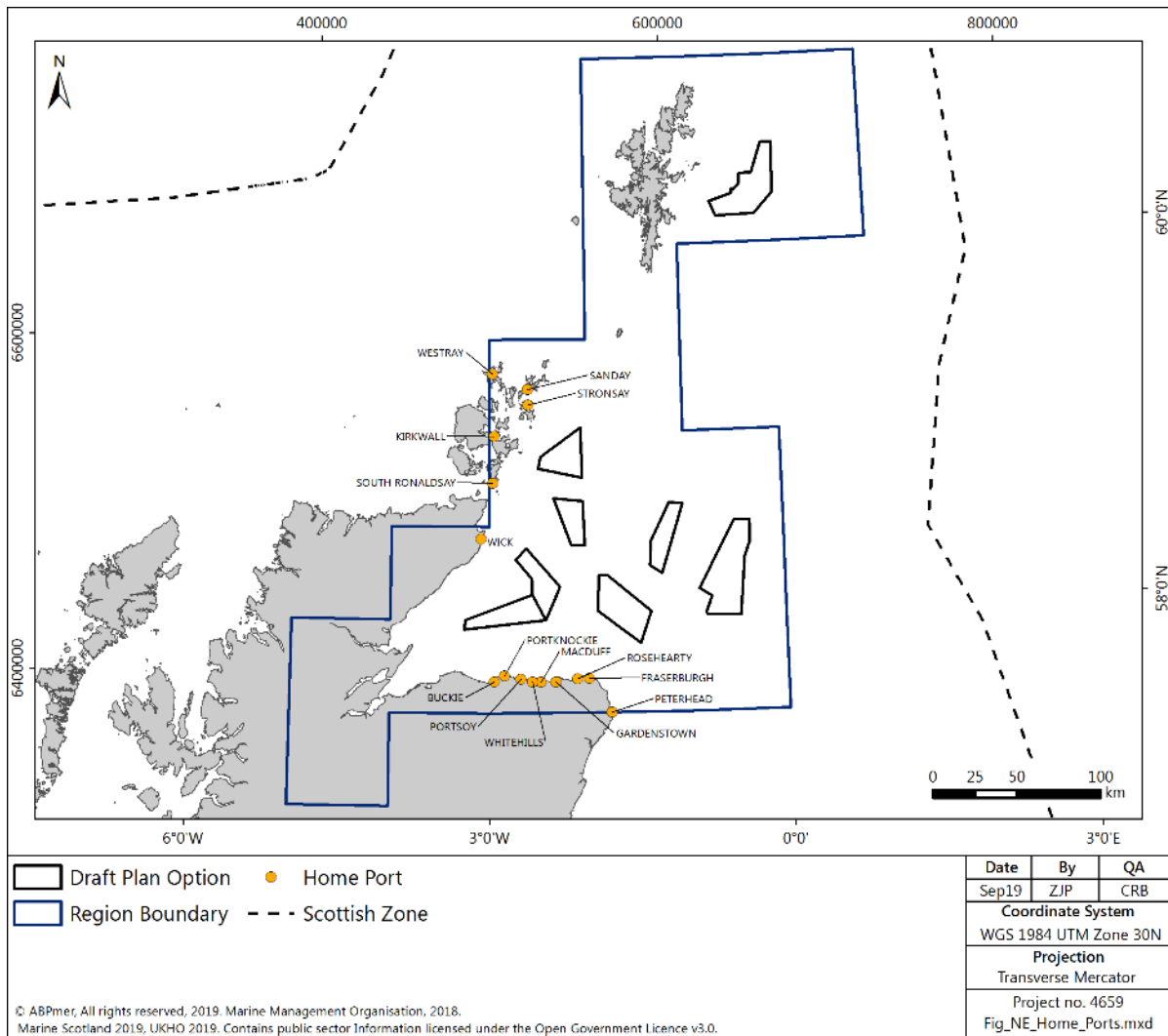


Figure 200 North-east region: distribution of home ports

- 6.3.46 The main landing ports (in terms of value of landings in 2017) in the North-east region are Peterhead (£158 million), Lerwick (£52 million), Fraserburgh (£36 million), Scalloway and Isles (£13 million), Cullivoe (£4 million) and Buckie (£3.9 million)²⁸⁶.
- 6.3.47 There are six fixed engine sites for wild salmon and sea trout, around the Dornoch and Cromarty Firths and near Banff, and 13 net and coble sites around the Dornoch, Cromarty and Moray Firths and around Fraserburgh (Figure 201).
- 6.3.48 The main rod and line fishing rivers in this region are the Wick (salmon), Helmsdale (salmon and some sea trout fishing in summer months), Shin (salmon), Oykel (salmon), Alness (salmon and some sea trout), Conon (salmon and some sea trout), Beaulie (salmon and some sea trout), Ness (salmon),

²⁸⁶ Scottish Government, 2018. Scottish Sea Fisheries Statistics 2017. Available at: <https://www.gov.scot/Topics/Statistics/Browse/Agriculture-Fisheries/PubFisheries>. Accessed 22/10/2018.

Nairn (salmon and some sea trout), Findhorn (salmon and some sea trout), Lossie (salmon and sea trout), Spey (salmon and sea trout), Deveron (salmon and sea trout).²⁸⁷

6.3.49 Fishing is one of Shetland’s most important industries. There are 179 active commercial fishing vessels, virtually all owned by local shareholders, and 386 people directly employed in fish catching.²⁸⁸

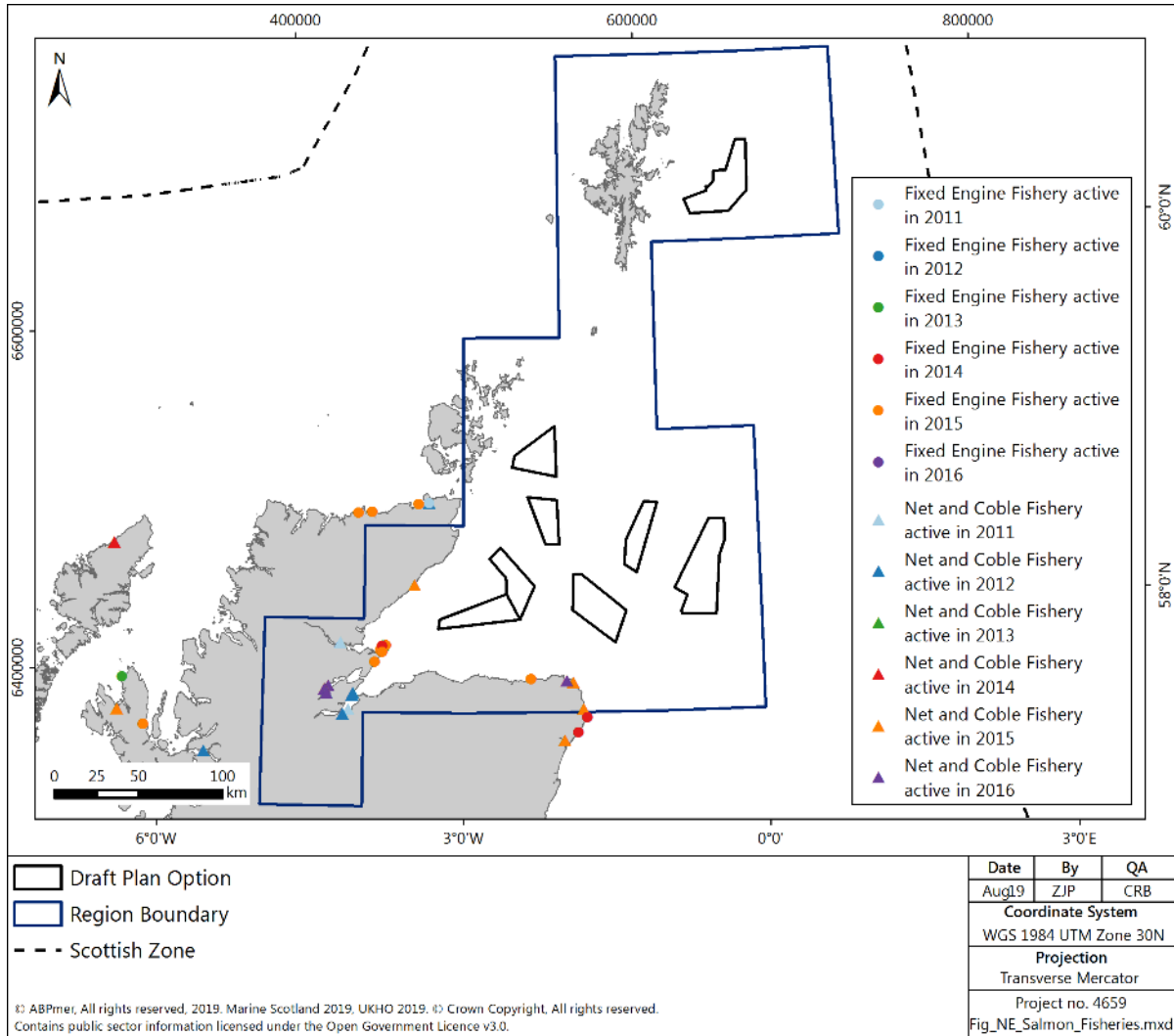


Figure 201 Salmon and sea trout net fisheries reporting catches in 2011–2016 in the North-east region

²⁸⁷ Scottish Government. 2012. Offshore Wind Energy in Scottish Waters - Draft Regional Locational Guidance. doi: 10.7489/1686-1.

²⁸⁸ So Much To Sea, no date. http://www.somuchtosea.co.uk/our_industry. Accessed 25/10/2018.

Aquaculture

6.3.50 Marine aquaculture sites within the North-east region are shown in Figure 202. There are 82 licensed finfish and 146 licensed shellfish sites in the region, the majority of which are around the Shetland islands (67 and 136 respectively).

6.3.51 There are no aquaculture facilities within the DPOs.

6.3.52 In the Shetland region shellfish production is dominated by mussels. In 2017, 6,647 tonnes of mussels were produced. In addition, the aquaculture industry farms high volumes of salmon in the Shetland region. In 2016, approximately 37,000 tonnes were produced with a value of £176 million.

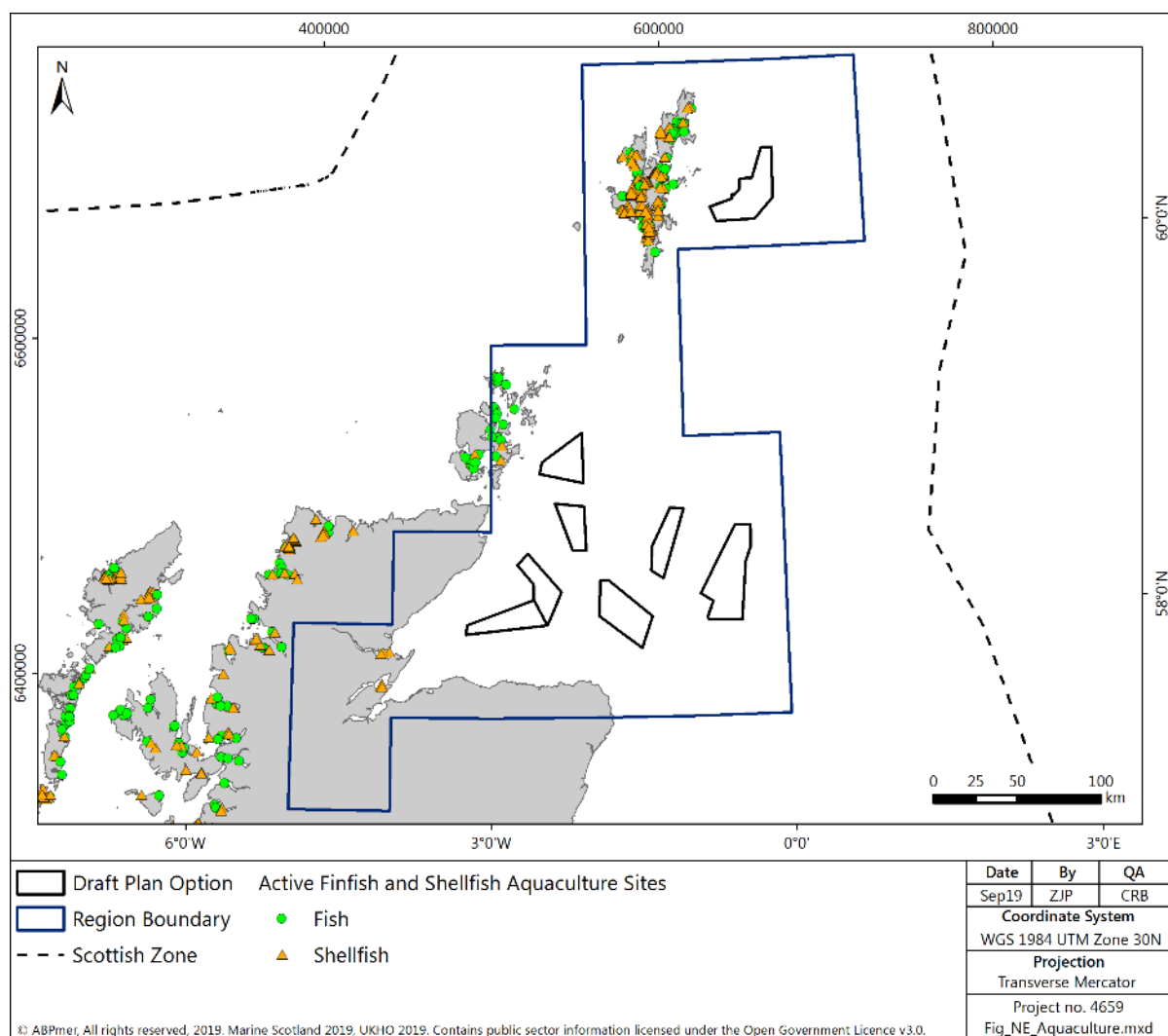


Figure 202 North-east region: marine aquaculture sites

Ports and Harbours

- 6.3.53 The North-east region of Scotland has a significant number of ports and harbours which are essential to the economy. Figure 203 shows that there are 3 major ports, 8 minor ports and many small harbours distributed along the north east coast, Orkney and Shetland.
- 6.3.54 Peterhead is the largest port for white and pelagic fish landings in the UK, and a key base for the oil and gas sector and leisure activities. It is a versatile port, suitable in all weather conditions and has deep-water berthing facilities at depths of up to 14 metres. Extensive improvements to the port facilities are currently being undertaken, including the addition of easily accessible berths to accommodate vessels up to 160 metres²⁸⁹.
- 6.3.55 Cromarty port, in the Cromarty Firth, is a key site for economic development as it plays an important role in the oil and gas sector. It has deep water access and is already established as a key facility supporting offshore energy developments in the Moray Firth. In 2017, Cromarty was awarded the busiest cruise port in Scotland; welcoming over 150,000 passengers throughout the year. The cruise sector is predicted to grow further and to meet the demands the port is planning a £23 million capital investment to build an additional quayside for larger cruise ships²⁹⁰.
- 6.3.56 Inverness port is a natural, sheltered deep-water port. It is a vital gateway for companies to export and import a range of goods including oil and timber. It has a marina and is also used for recreational activities to maximise its economic benefits. Access to the port has been significantly improved in recent years to facilitate the transportation of large freight and the handling of wind turbine components. Recent developments have made Inverness port one of the most modern in the north with large areas of undercover storage and laydown facilities²⁹¹.
- 6.3.57 Fraserburgh harbour provides important services to the fishing and oil and gas industries.
- 6.3.58 Sullom Voe is a major deep-water harbour servicing the oil sector and can accommodate large vessels and freight.
- 6.3.59 Lerwick is the principal commercial port for Shetland and a key component in the islands economy. It is a deep-water port which is open to shipping in all weathers and supports the oil and gas industry, large cargo ships and fishing and leisure activities²⁹².

²⁸⁹ Peterhead Port Authority. Undated. <http://www.peterheadport.co.uk/>. Accessed 17/10/2018.

²⁹⁰ Port of Cromarty Firth. 2018. <http://www.pocf.co.uk/home-page-3/doing-business-at-the-port/development-plans/>. Accessed 17/10/2018.

²⁹¹ Inverness Harbour Trust. 2018. <http://www.portofinverness.co.uk/>. Accessed 17/10/2018.

²⁹² Lerwick Port Authority. 2018. Britain's Top Port. Available at <https://www.lerwick-harbour.co.uk/>. Accessed 16/10/2018.

- 6.3.60 Scalloway port is located for servicing oil related shipping in the west of Shetland oil fields and accommodates freight and commercial fishing activities²⁹³. It is only 50 miles from the Clair oil and gas field, 85 miles from the Schiehallion and Foinhaven oil fields and 180 miles from Aberdeen.
- 6.3.61 There is a high concentration of anchorages in the Moray Firth and Shetland in the North-east region reflecting the high sailing activity in the area. None of the anchorages overlap with the DPOs.
- 6.3.62 There are a few dredge disposal sites in the region. They are all close inshore and do not overlay the DPOs.

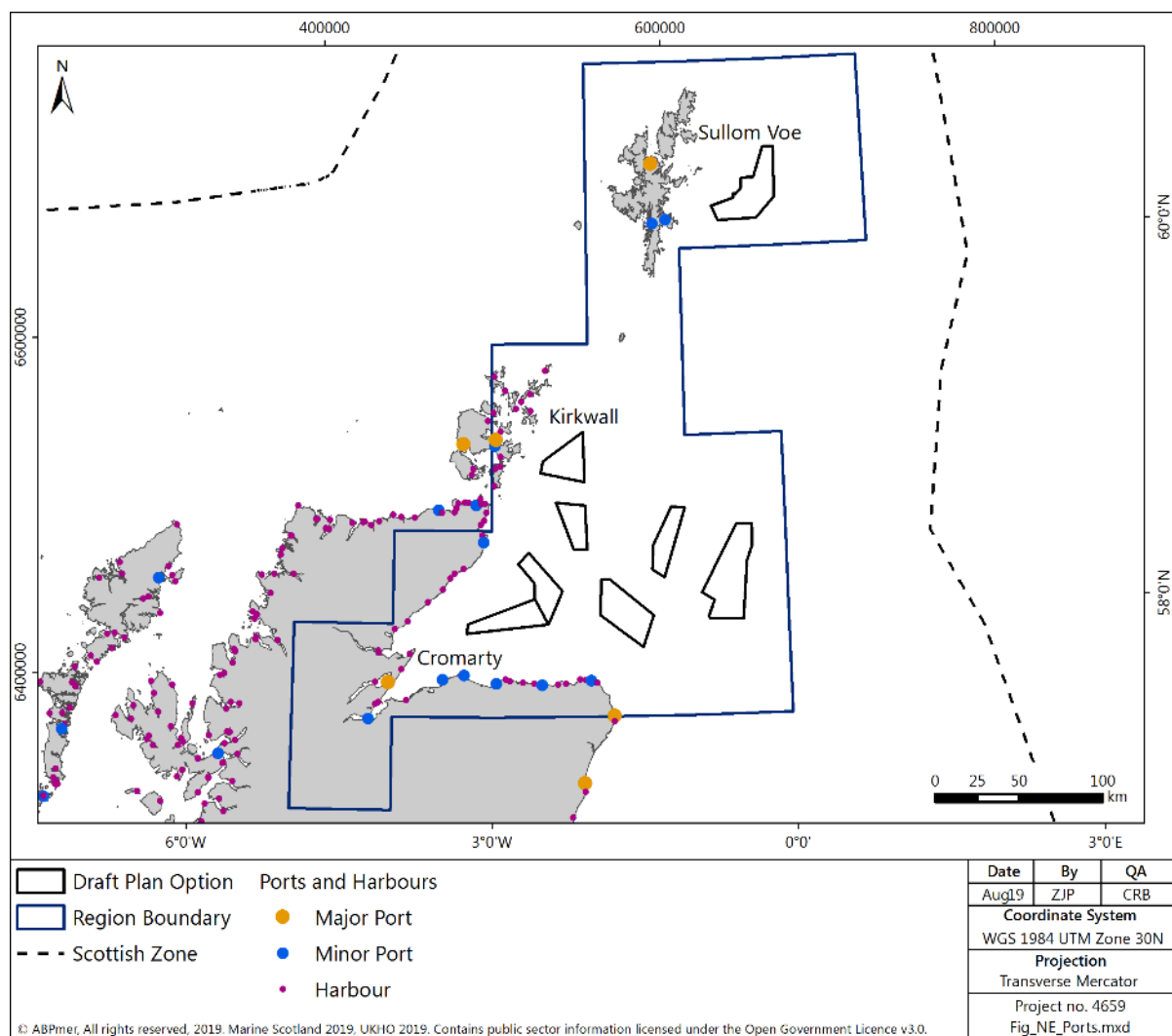


Figure 203 North-east region: ports and harbours

²⁹³Sullom Voe Harbour Authority. 2018. Scalloway Harbour. Available at <https://www.shetland.gov.uk/ports/scalloway/>. Accessed 16/10/2018.

Shipping

- 6.3.63 There is a high level of shipping throughout the North-east region (Figure 204), particularly in the southern extent, where shipping movements servicing the oil and gas industry and the offshore wind industry, including vessel movements to offshore platforms, are concentrated around Peterhead, Fraserburgh and moving north into the North-east region from Aberdeen. In some areas the density of shipping is up to 100 vessel transits per week, particularly in those areas of high transit to offshore oil and gas platforms to the north east of Peterhead. The port services transit lines are a proxy for support to oil and gas platforms and show the importance of the area to the industry.
- 6.3.64 It is noted that there is also movement of large oil and gas platforms through the Moray Firth, particularly to Nigg where they are decommissioned. Any barrier effects caused by offshore wind development therefore have the potential to impact these large scale but low density movements.
- 6.3.65 In addition to shipping supporting the oil and gas industry there are high densities of shipping, up to 100 vessel transits per week, in the Moray Firth (Figure 204), including concentrations around Inverness and Cromarty Firth, and movements around the north coast related to cargo transport, with transit routes around the coastline and across Moray Firth from the Firth of Forth and ports to the south of the border in England.
- 6.3.66 The main Shetland ferry route from Aberdeen transits through the North-east region, intersecting NE6. This route corresponds with areas of high density (with up to 100 vessel transits per week) in Figure 204. There is a further ferry route linking Aberdeen to Orkney, transiting just to the west of NE2 and NE3.
- 6.3.67 The key routes around Shetland are mostly to the south of the islands, with ferry routes linking the islands with the mainland and Orkneys, and transport of key commodities to the islands, alongside passage routes east-west through the recommended routes to the north and south of Fair Isle. In addition, there is an area of high density transiting just to the north of the islands, connecting Denmark with the Faroe Islands and further onwards to Iceland.
- 6.3.68 There is a large ATBA in the area surrounding the Shetland Islands, including a significant portion of overlap with DPO NE1, indicating that this region should be less important for commercial shipping.
- 6.3.69 AIS density data shows that the areas of highest density are close to the Islands, centred on the ports of Lerwick and Sullum Voe, and correlating with lifeline ferry services from the mainland (Aberdeen) and the Orkney Islands (Kirkwall). Ferry services and maritime transport are of high importance to the Shetland Islands, allowing for the import and export of key commodities, including importing the majority of the fruit and vegetables consumed on the islands.

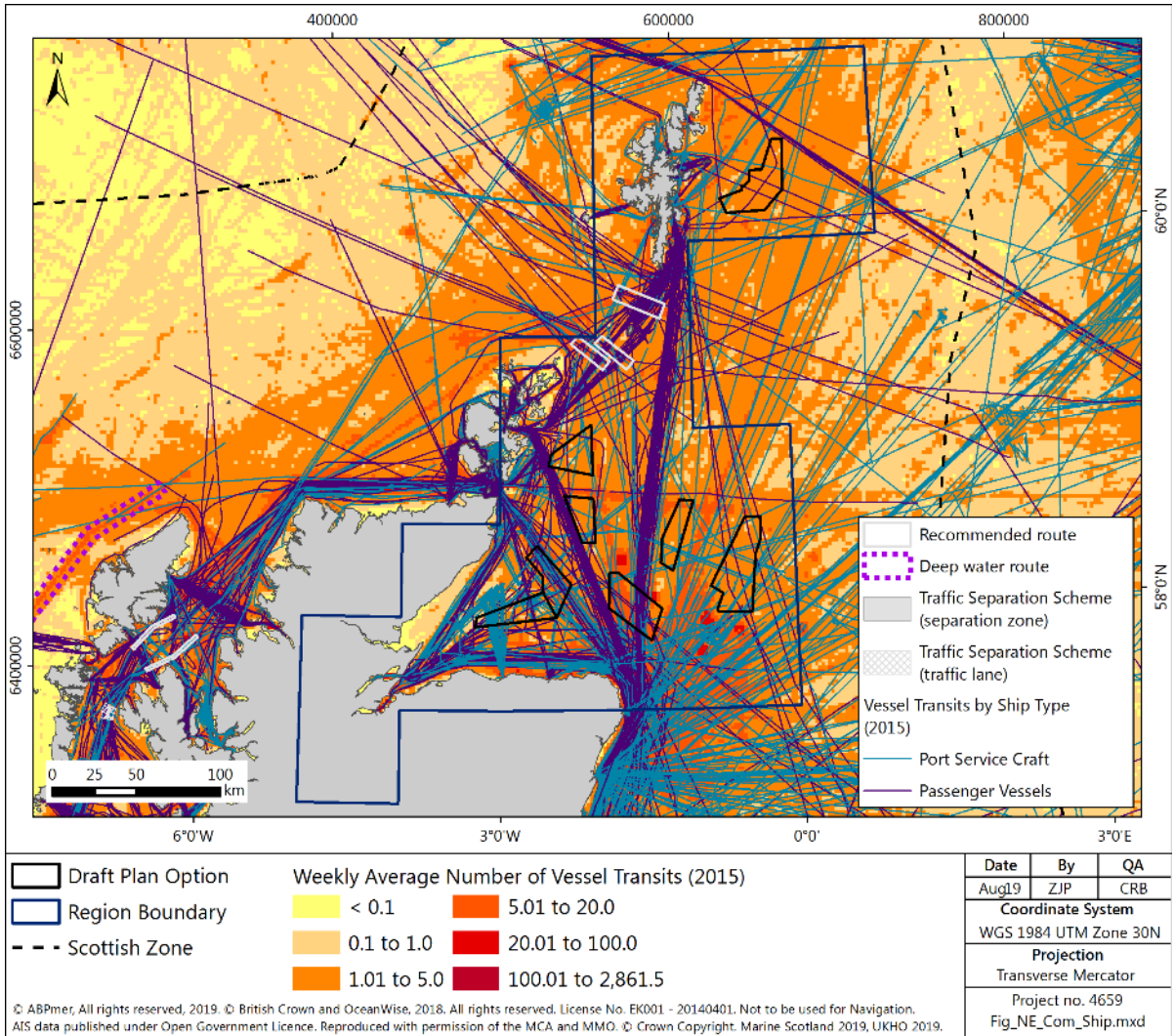


Figure 204 North-east region: shipping densities and key routes

Coastal and Flood Protection

- 6.3.70 There are very few areas of coastal or flood protection within the North-east region, with two flood defence schemes constructed since 1961, one within the Moray Firth around Inverness and the other within Cromarty Firth (Figure 205).
- 6.3.71 There are a number of further areas of hard defence around the coastline of the Moray Firth, the largest is well to the west of likely cable landfalls on the southern edge of Moray Firth, and the majority of the additional infrastructure is associated with ports and harbours throughout the coast in the North-east region.
- 6.3.72 There are no coastal or flood protection schemes constructed since 1961 for the Shetland islands, with some limited hard defences associated with harbour facilities on the east coast of the Shetland Islands.

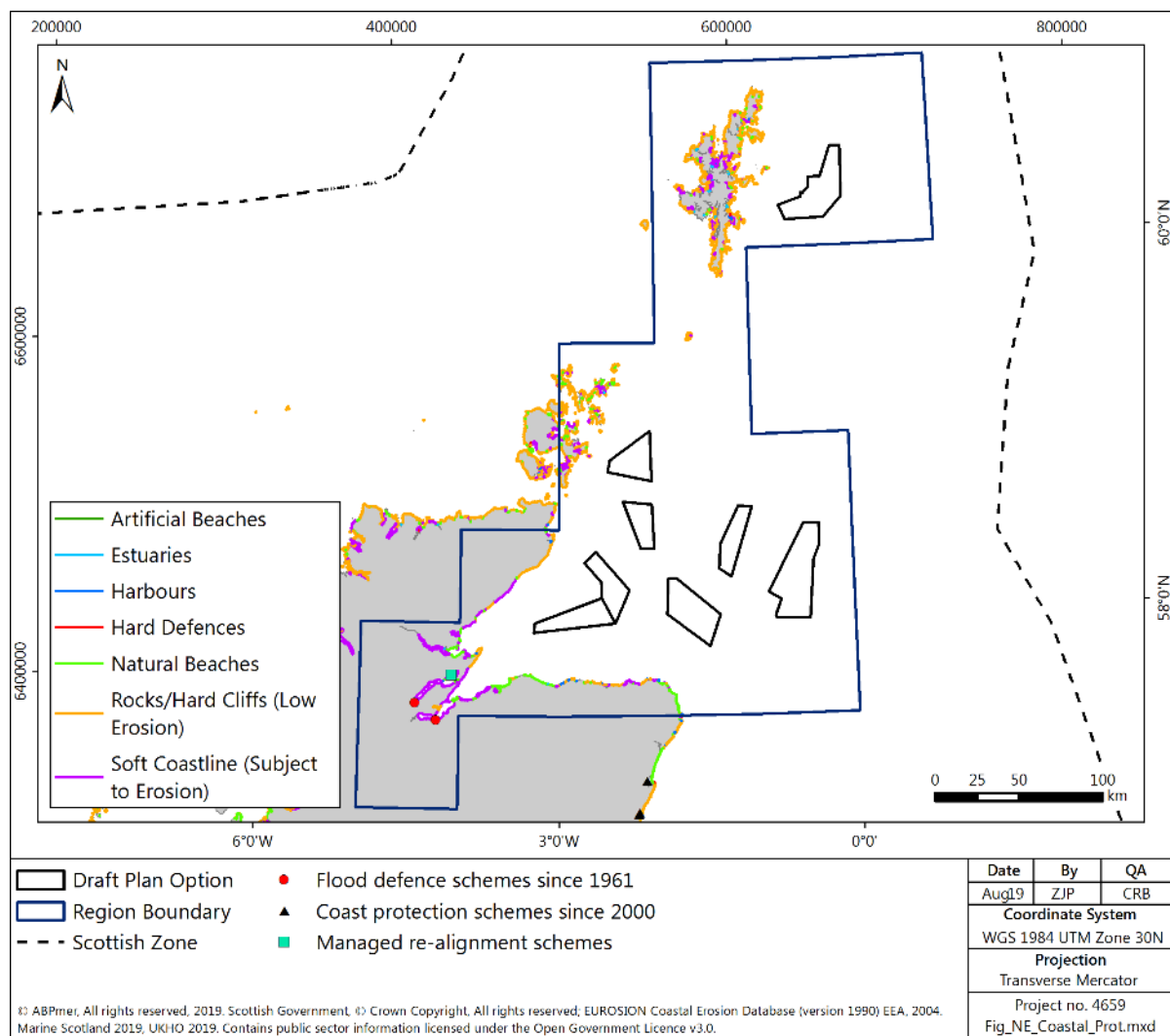


Figure 205 North-east region: coastal and flood protection schemes

Marine and Coastal Recreation

6.3.73 Overall recreational activity in the North-east region is shown in Figure 206. Most recreational activity occurs inshore of the DPOs, although there is some potential interaction with sailing and cruising routes in the region. There is very little overlap between DPOs and marine and coastal activities, however, there may be some overlap with low-level scale of activity, particularly in NE2 and NE5.

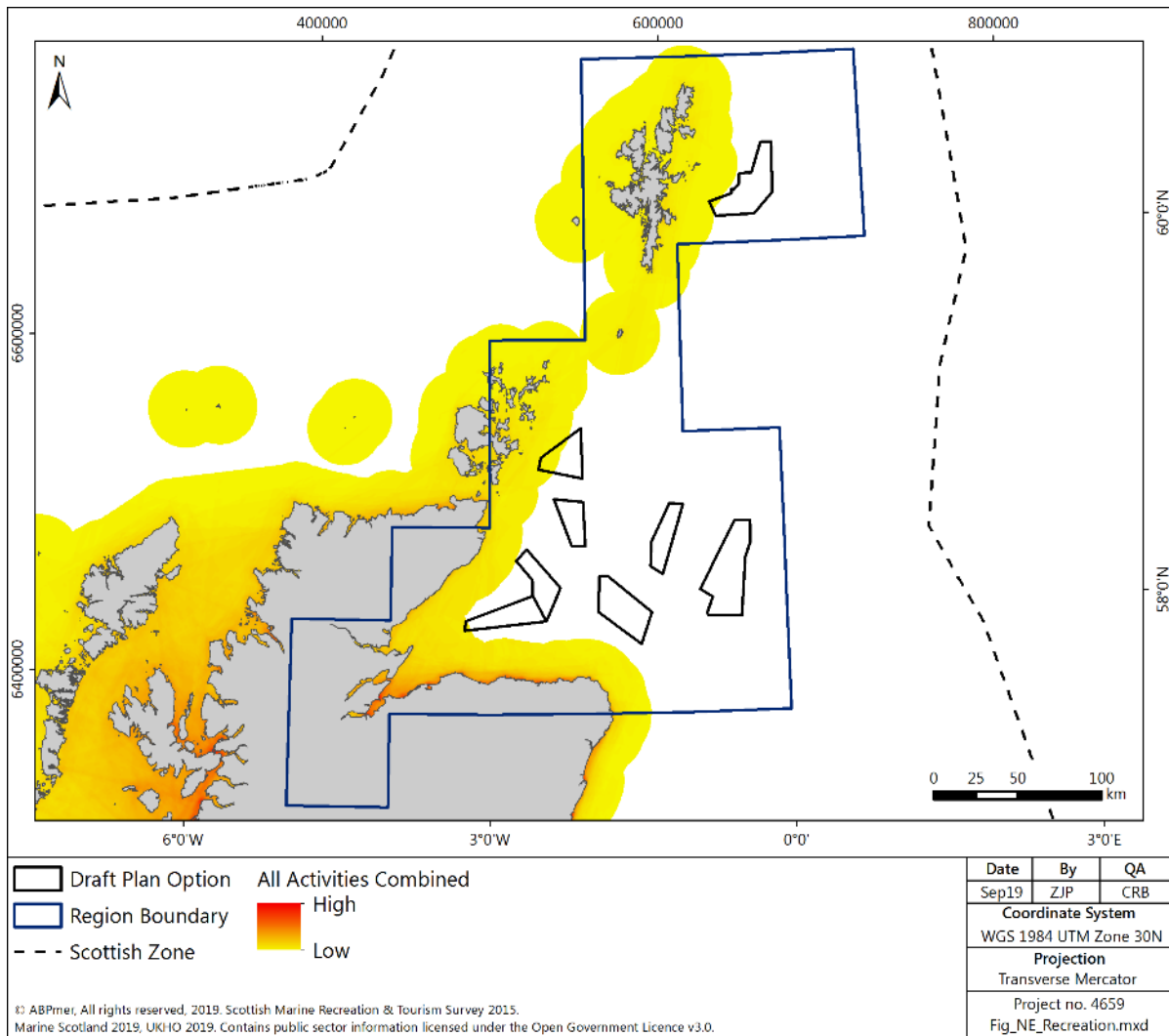


Figure 206 North-east region: density of recreational activities

Boating

- 6.3.74 Recreational boating in the North-east region is centred in the inner Moray Firth and the Shetland Islands which are important areas for sailing. Popular cruising routes connect the busy sailing areas of Moray Firth and Shetland with marinas in the northern part of the region such as Wick and Helmsdale. There are many marinas, clubs and training centres along the coast (Figure 207). There is some overlap between DPO and boating activities including NE1, NE2, and greater numbers of transits around the boundary between NE4 and NE5.
- 6.3.75 The Shetland region has over 100 small islands and 900 miles of coastline making it the perfect sailing destination. There are marinas at Lerwick, Bressay, Scalloway and Skeld with other smaller pontoon facilities around the islands. Yachting is important for the Shetland's economy. It holds numerous regattas as well as the Round Foula Race, the Lerwick to Skeries Race and the Shetland Race²⁹⁴.

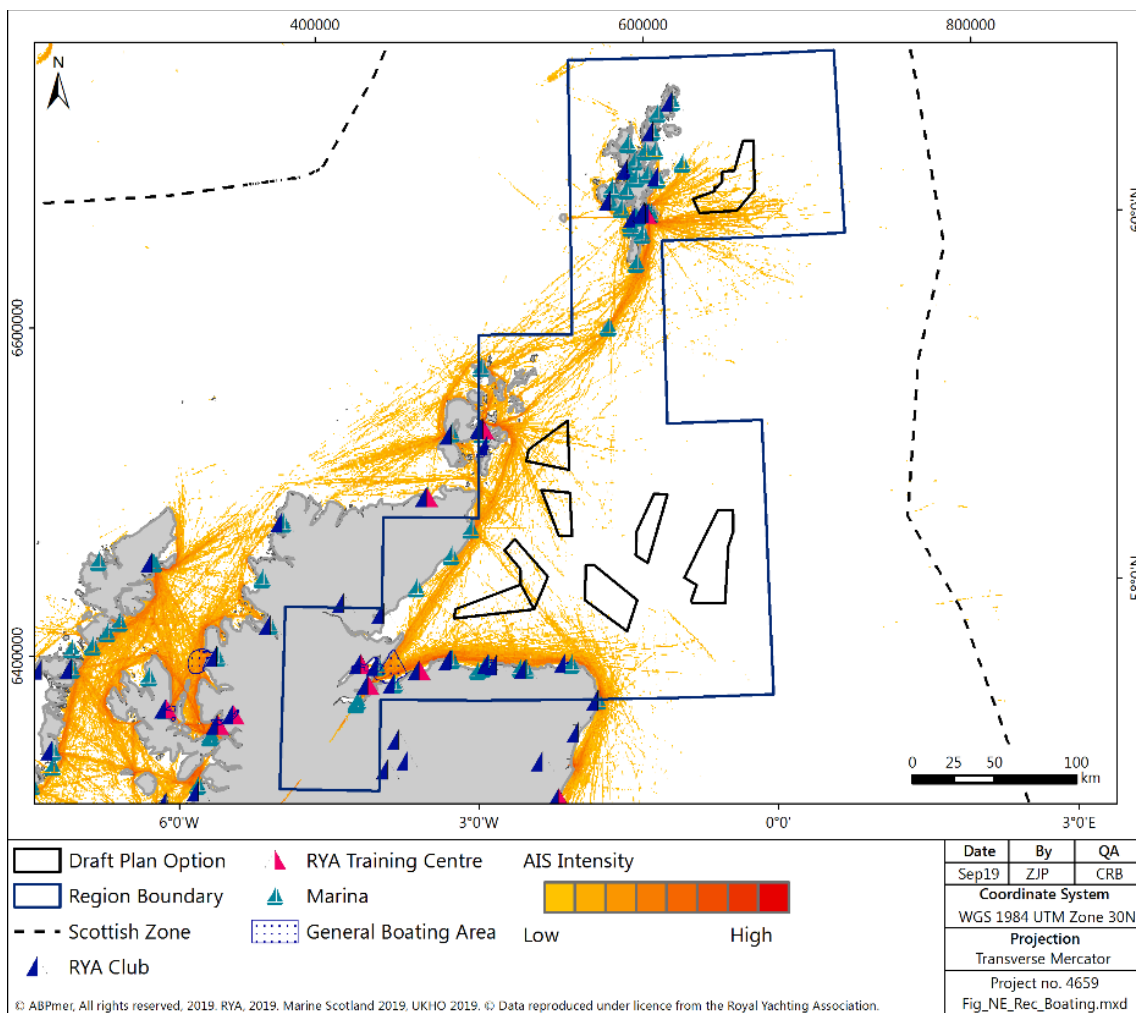


Figure 207 North-east region: recreational boating facilities and recreational boating density (from 2015 AIS data)

²⁹⁴ Sail Scotland. 2018. Shetland Islands. Available at: <https://www.sailscotland.co.uk/explore/orkneysthetland>. Accessed 18/10/2018.

Angling

6.3.76 The North-east region offers a variety of locations for successful boat and shore angling (Figure 208). The most common catches include mackerel, coley, haddock and ling²⁹⁵. There are a number of charter boat companies on the islands operating in mostly inshore areas, with higher densities of activity around Fair Isle and to the north of the islands. Fraserburgh is also a popular location with good local beaches and Kinnaird head for shore fishing. The most common species to be caught from shore include cod, mackerel, plaice, pollock and trout. Haddock and conger are more likely to be caught off a boat. Banff has some prime shore fishing locations including; Banff harbour, Maccluff Pier, Boyne Bay and Garness. Whiting and bass are two other common species caught here. Cromarty is another popular location. There is some overlap between angling and NE2.

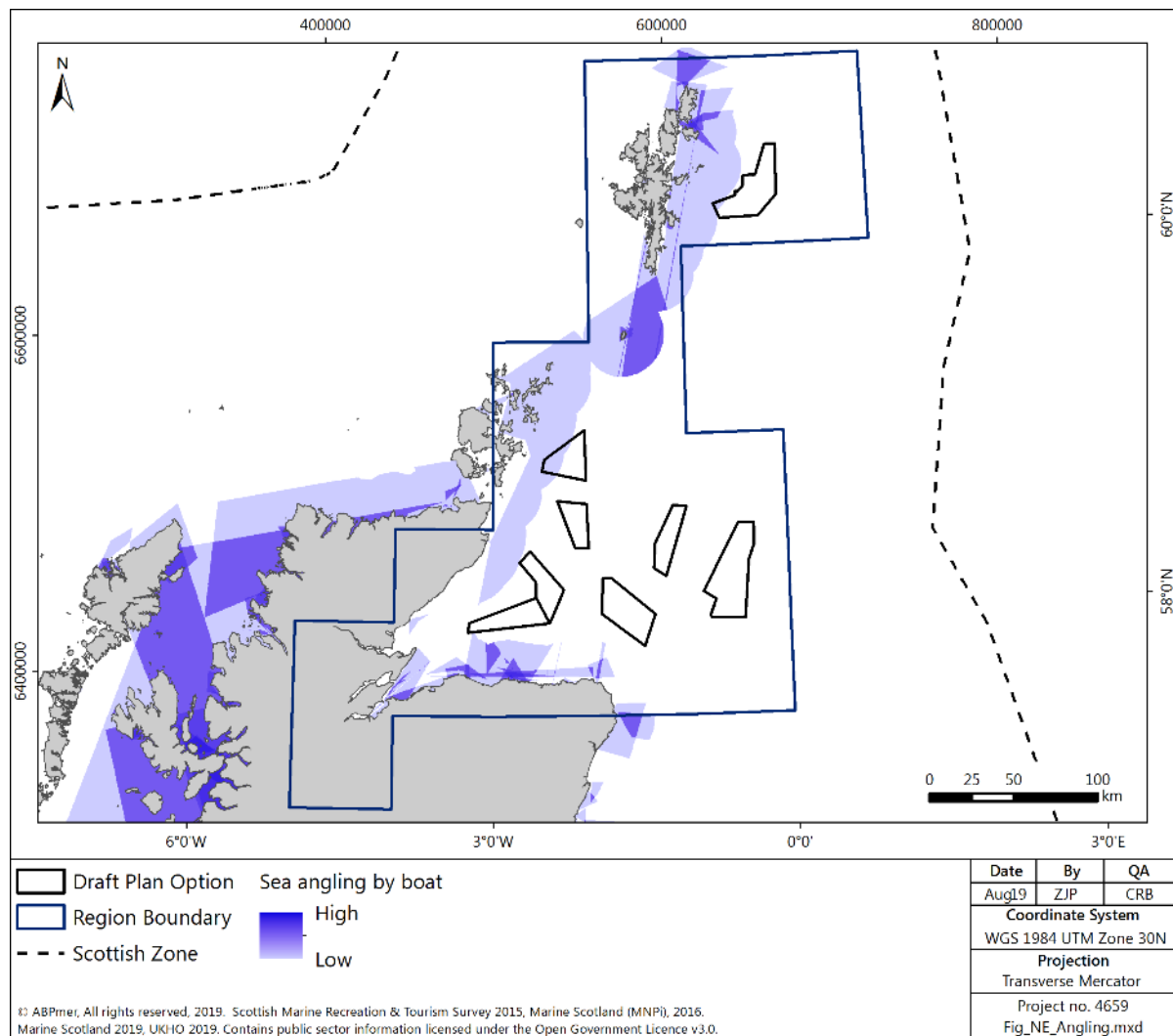


Figure 208 North-east region: sea angling (by boat) activity density

²⁹⁵ Shetland Island Council. 2018. Angling. Available at <https://www.shetland.org/things/outdoor/angling>. Accessed 18/10/2018.

Scuba Diving

6.3.77 The North-east region of Scotland offers a variety of diving from shipwrecks to cold water corals. There are several dive centres and charter boats operating in the area which run regular boat and shore dives throughout the year. The underwater scenery and wildlife attract both underwater photographers and sports divers. The Orkney Islands (Scapa Flow) is one of the most popular diving locations in the UK, while the Shetland Islands, Moray Firth and populated areas like Fraserburgh and Peterhead are also popular locations (Figure 209). The Shetland region offers a range of exciting dive sites with wrecks (e.g. 18th century Swedish East Indiaman and WW1 Steamship Gwladmena), caves, stacks and submerged cliffs. The only DPO that may overlap with reported diving sites is NE2, within which is the HMS Nessus. It is unlikely to be a regularly dived site, lying offshore in 67 m of water depth.

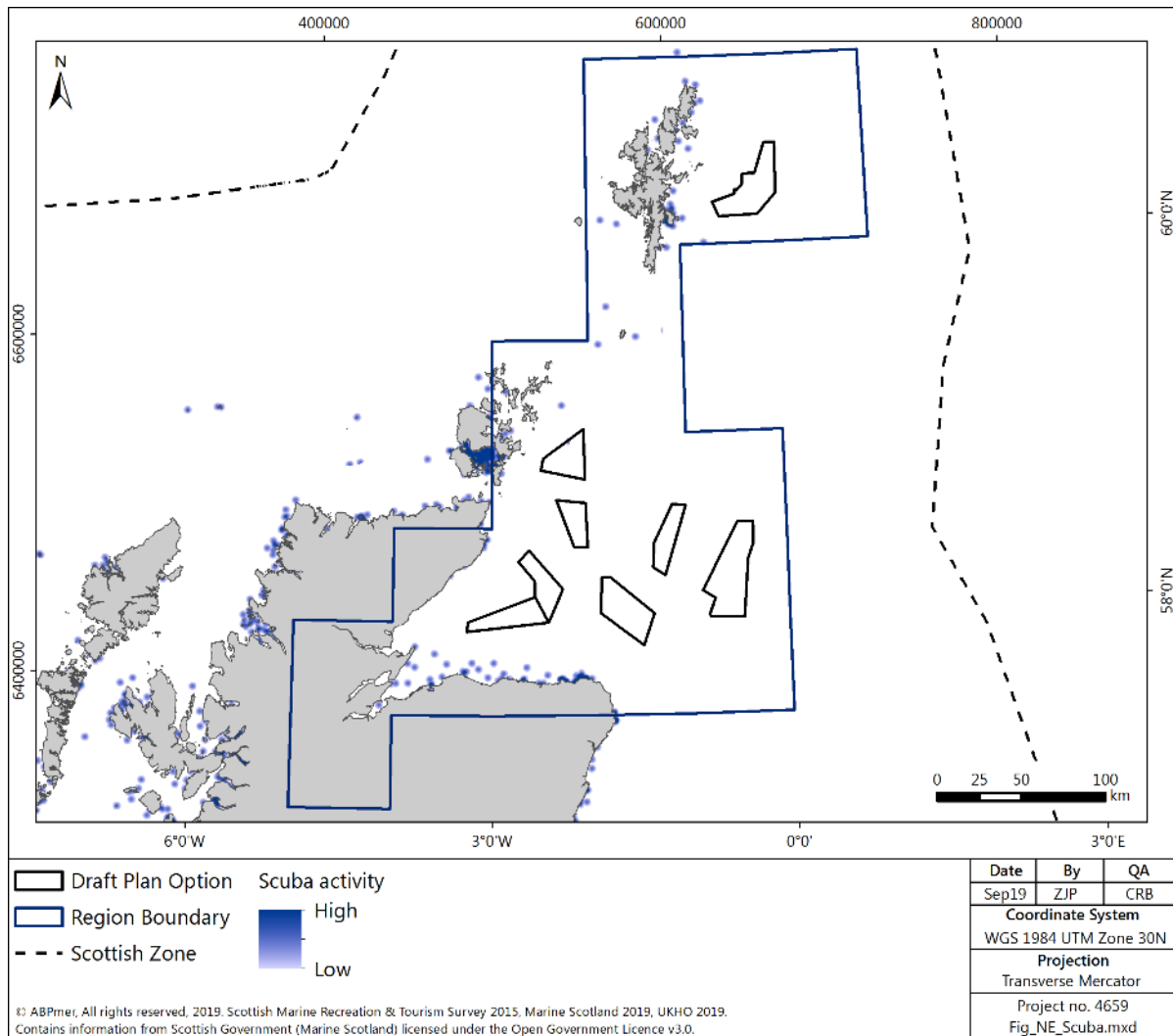


Figure 209 North-east region: scuba diving activity density

Kayaking and Canoeing

6.3.78 The majority of trips are close inshore. Kayaking and canoeing takes place at most spots along the west coast where there are suitable launching spots such as beaches and slipways (Figure 210). Available data indicate that no kayaking or canoeing activity occurs within any of the DPOs in the North-east region.

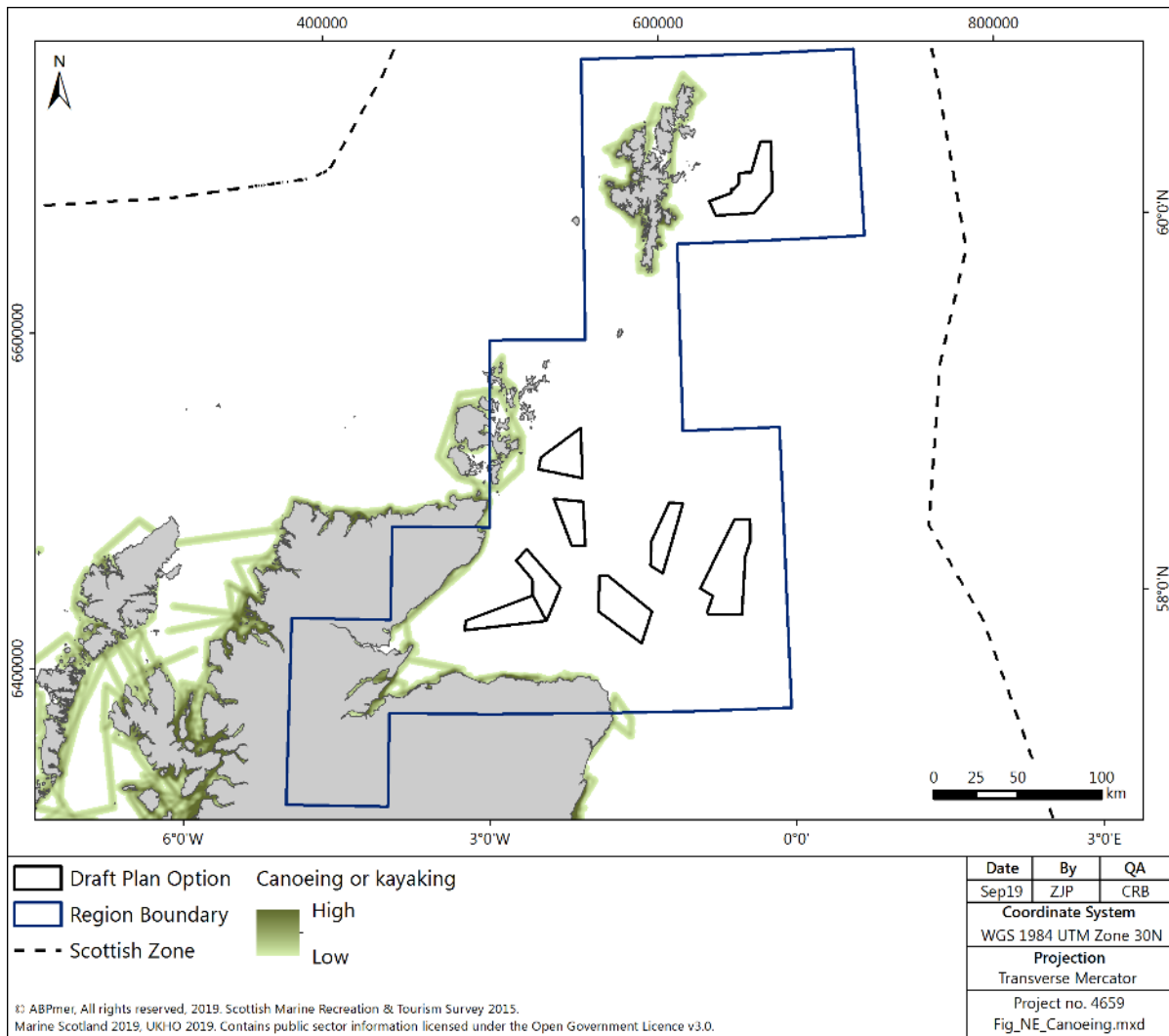


Figure 210 North-east region: canoeing and kayaking activity density

Surfing

6.3.79 Fraserburgh is one of the most popular surfing locations in the North-east region and regularly holds surf competitions and events such as the Scottish National Surfing Championships. Other popular locations include Banff, Sandend, Lossiemouth, Brora, Sinclairs Bay, Keiss and Bu Sands on the east coast of Orkney²⁹⁶. Shetland is exposed to swells from the Atlantic and North Sea meaning that it offers enjoyable surfing when conditions are right. Popular locations include Melby, Breckon, Gulberwick and Quendale Bay²⁹⁷, although activity is low due to the remote nature of the islands (Figure 211). There is little windsurfing activity within the North-east region (Figure 212).

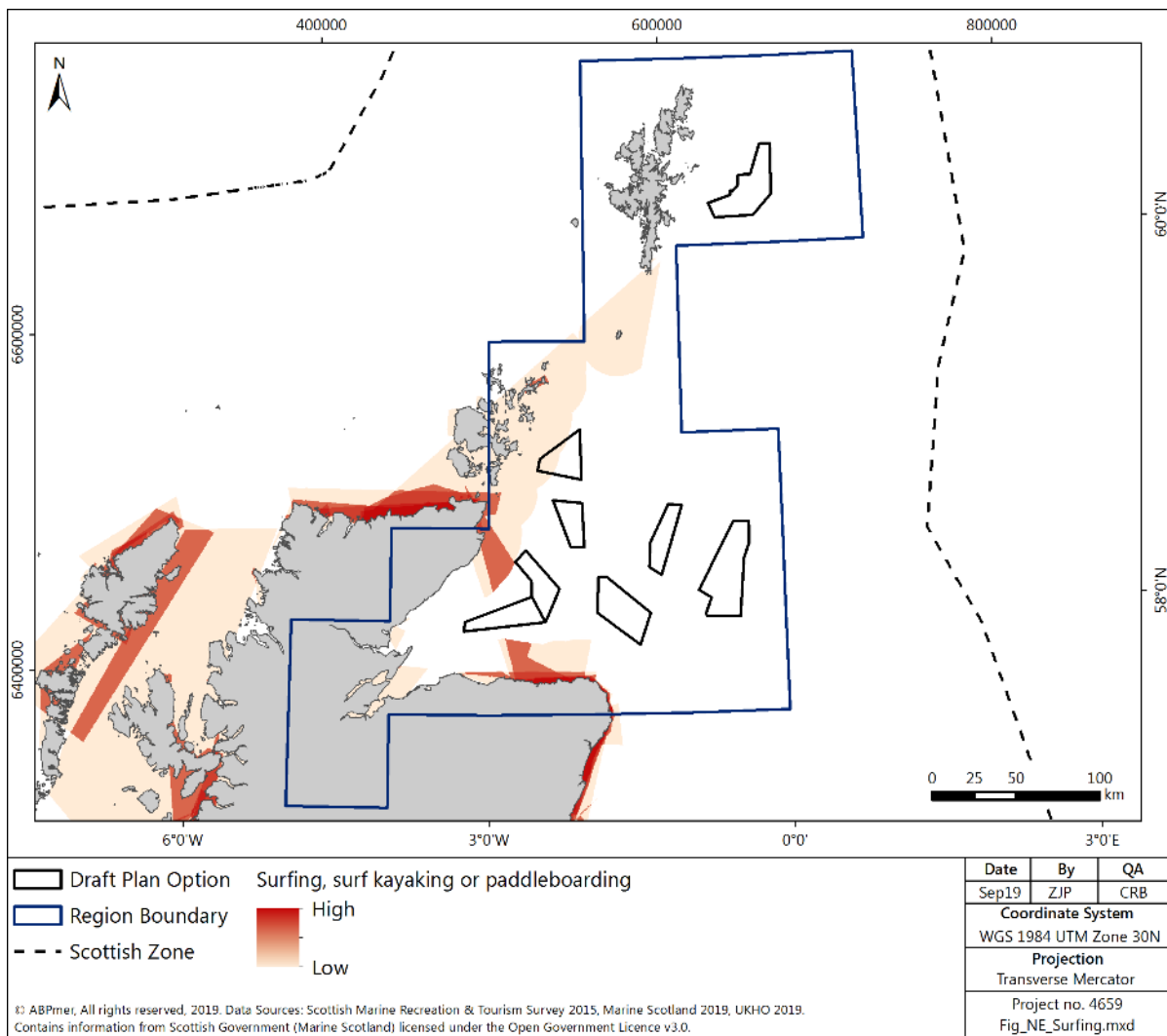


Figure 211 North-east region: surfing, surf kayaking and paddleboarding activity density

²⁹⁶ Magicseaweed. 2018. Scotland Surfing. Available at: <https://magicseaweed.com/Southeast-Scotland-Surfing/95/>. Accessed 15/10/2018.

²⁹⁷ Magicseaweed. 2018. Orkney and Shetland Islands surfing. Available at: <https://magicseaweed.com/Orkney-Shetland-Islands-Surfing/99/>. Accessed 16/10/2018.

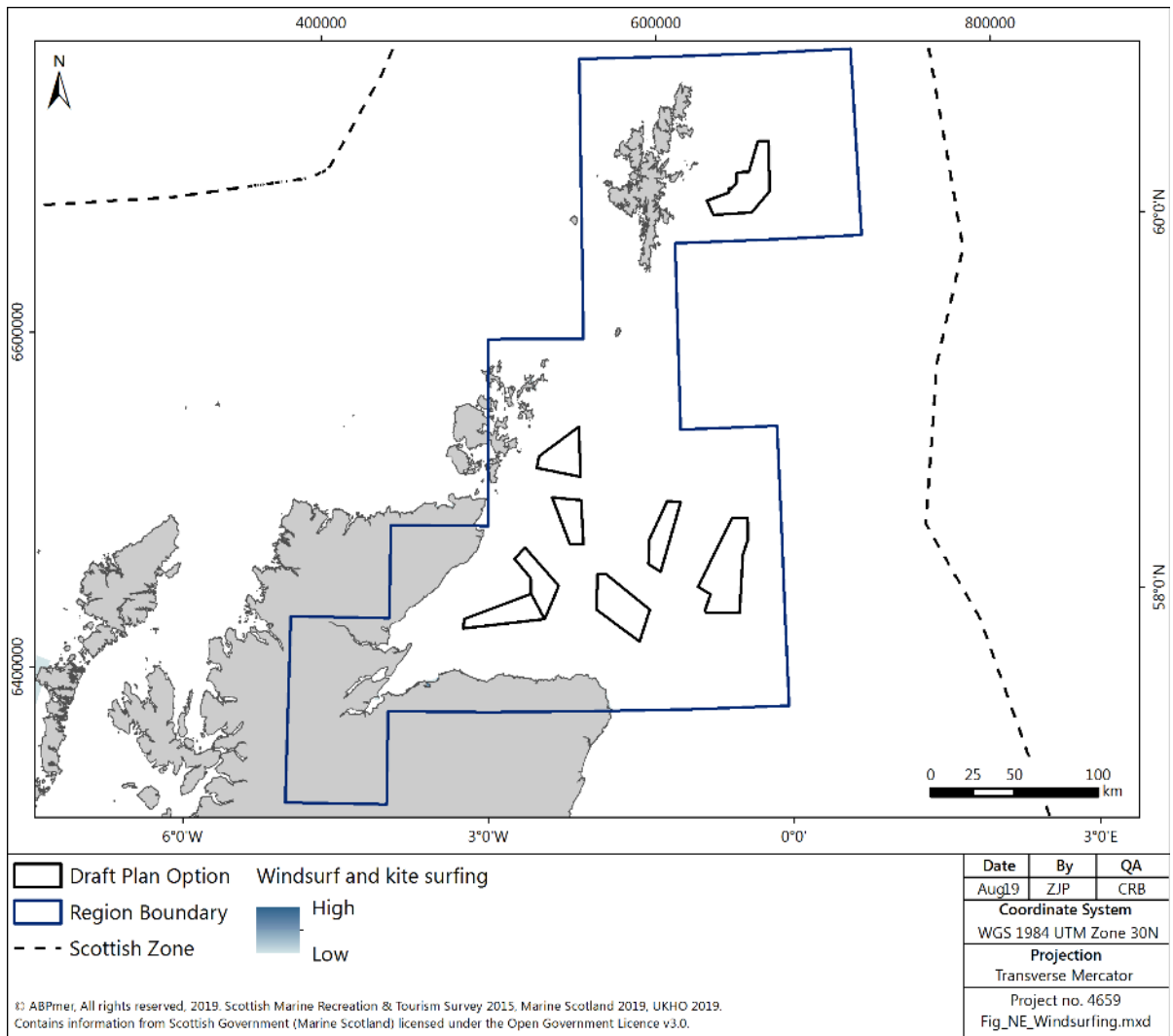


Figure 212 North-east region: windsurfing and kitesurfing activity density

Tourism

- 6.3.80 Tourist sites in North-east region of Scotland are concentrated along main routes (e.g. A9, A95, etc.), geographic features (e.g. Loch Ness) and the coast (Figure 213).
- 6.3.81 There are a considerable number of natural, historic and coastal/maritime heritage attractions. They are reasonably evenly spread along the coast and include several coastal heritage museums, a historic ship and a couple of accessible heritage sites.
- 6.3.82 The Shetland region is famous for its scenic landscape and interesting history with lots of activities that draw tourists to the islands.
- 6.3.83 Tourism is important to the local economy on Shetland, particularly for small businesses on the islands. In 2017, around half of visitors went to Shetland for leisure and 35% for business. The profile of visitors was skewed to males (61%) and those over the age of 45 (66%). The number one reason that people chose to visit the area was due to its scenery and landscape (57%), followed by its history and culture (33%). The majority of visitors to Shetland were overnight visitors (93%)²⁹⁸.
- 6.3.84 North east Scotland additionally has a significant number of designated bathing waters and seaside awards which are likely to be relevant when considering offshore renewables. There are also two designated Marine SACs: The Moray Firth and an offshore area at Scanner Pockmark. Both of these will need to be taken into account by the offshore renewables industry.

²⁹⁸ Shetlands Islands Council and Visit Scotland. 2018. Shetland Islands Visitors Survey 2017. Available at <https://www.visitscotland.org/binaries/content/assets/dot-org/pdf/research-papers/shetland-report-may-18.pdf>.

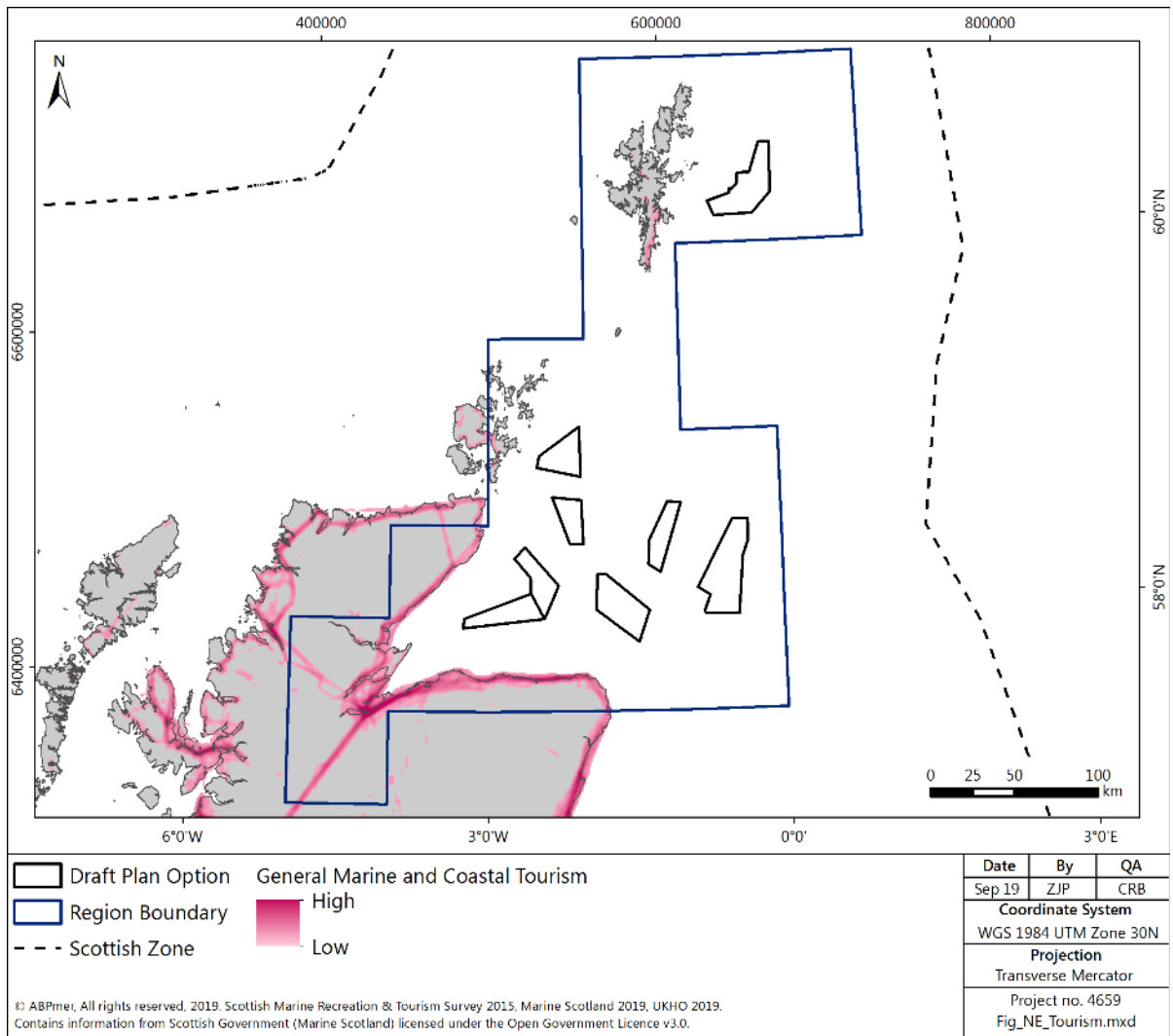


Figure 213 North-east region: tourism activity density

Social Considerations

- 6.3.85 The total population of the North-east region is approximately 693,100 using data for Aberdeenshire, Moray, Highland and Shetland Scottish council areas. The overall age is 44 in the North-east region. 18% of the population is under 16 years old, 60% of the population is of working age and 22% of the population is pension age²⁹⁹.
- 6.3.86 In 2017 the employment rate for the mainland and Orkney part of the region was approximately 79%. The greatest number of jobs in the North-east region are associated with public admin, education and health (28%). Other important industry sectors are distribution, hotels and restaurants (20%), and manufacturing (14%)³⁰⁰.
- 6.3.87 The Shetland region experiences many issues that often hinder island development including; employment, transport links and availability of affordable housing. Access in the Shetland region can be an issue for residents. If people are unable to run a private vehicle most opportunities to them are severely restricted (e.g. Employment and leisure). The Scottish Index of Multiple Deprivation (SIMD) shows that most of the Shetland region is in the 5% most access deprived areas in Scotland³⁰¹.
- 6.3.88 In 2017 the employment rate in Shetland was 82.7%, down from the previous year at 86.6%³⁰². Average income in 2016 was £650 per week³⁰³. The greatest number of jobs in the Shetlands are associated with public admin, education and health (30%). Other important industry sectors are distribution, hotels and restaurants (19%), and agriculture and fishing (10%).

²⁹⁹ National Records of Scotland. 2018. Mid-Year Population Estimates, Mid-2017. Available at <https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/population/population-estimates/mid-year-population-estimates>.

³⁰⁰ National Statistics, 2018. Regional Employment Patterns: Statistics from the Annual Population Survey 2017. Available at <https://www.gov.scot/Topics/Statistics/Browse/Labour-Market/Publications/>.

³⁰¹ Scottish Government. 2016. SIMD16 Analysis Shetland Islands. Available at: <https://www.gov.scot/Resource/0051/00510776.pdf>. Accessed 16/10/2018.

³⁰² Scottish Government. 2017. Regional Employment Patterns in Scotland: Statistics from the Annual Population Survey 2017. Available at <https://www.gov.scot/Topics/Statistics/Browse/Labour-Market/Publications/>.

³⁰³ Shetland Islands Council. 2016. Shetland in Statistics. Available at: https://www.shetland.gov.uk/economic_development/documents/ShetlandinStatistics_2017_241117.pdf.

6.4 Environment

Designated Sites

- 6.4.1 Within the North-east region the majority of designated sites are in coastal areas, with a small number of sites offshore or with offshore elements. As shown in Figure 214, Figure 215, Figure 216 and Figure 217 there are 11 NCMPA, 33 SPA (including 7 pSPA), 11 SAC and 41 SSSI in the North-east region.
- 6.4.2 There are no designations within the North-east region which overlap directly with the DPOs.
- 6.4.3 SPAs are designated and proposed for designation around a considerable portion of the coastline landwards of the DPOs in the North-east region and are designated for a range of seabird features and assemblages. There are further SPA designated within the North-east region in the terrestrial environment. Some of the species designated within the terrestrial environment may have migration pathways which overlap the DPOs. The Pentland Firth pSPA, proposed for designation for Arctic skua, Arctic tern, guillemot and breeding seabird assemblages, extends out from the coastline and is within approximately 5km of NE3. The Copinsay SPA, designated for fulmar, great black-backed gull, guillemot, kittiwake and breeding seabird assemblages, is to the west of the DPO NE2, within approximately 8km. Within the SPA and pSPA in Shetland there are both breeding and non-breeding seabird aggregations as well as SPA designated for terrestrial species, which have the potential to use the seas within the DPO for feeding and / or during migration. They are all concentrated around the islands, and as such there is no overlap between the SPA and the DPO. The closest SPA to the DPO is Noss SPA, 12km to the west of DPO NE7. Further detail on seabird species distribution is contained within the Birds section below.
- 6.4.4 The majority of the NCMPAs are coastal, two around the Orkney Islands (Papa Westray, designated for black guillemot and marine geomorphology features; and Wyre and Rousay Sounds, designated for kelp and seaweed communities, maerl beds and marine geomorphology features) and two on the east Caithness coast (Noss Head, designated for horse mussel beds; and East Caithness cliffs, designated for black guillemot). There is one proposed NCMPA (Southern Trench) which covers much of the north and west facing coastline from Buckie to Peterhead approximately 7 to 10km south of DPOs NE5 and NE6. It is proposed for designation for burrowed mud, fronts, minke whale, shelf deeps, quaternary of Scotland and submarine mass movement features. In addition, there is one research and development MPA designated at the northern extent of the region around Fair Isle.
- 6.4.5 There are relatively few marine SAC designated within the North-east region with three in the area of the Orkney Islands (Sanday, designated for harbour seal, intertidal mudflats and sandflats, reefs and subtidal sandbanks; Faray and

Holm of Faray, designated for grey seal; and Loch of Stenness, designated for marine lagoons including marine mammals) and two in the Moray Firth inland from the NE5 DPO (Moray Firth, designated for bottlenose dolphin and subtidal sandbanks; and Dornoch Firth and Morrich More, designated for Atlantic salt meadows and coastal dune heathland). There are a number of SAC designated for migratory fish in riverine environments. There is therefore potential for the migration routes of the anadromous fish to intersect the DPO.

- 6.4.6 The Pobie Bank Reef SAC, designated for Reef Habitat, is directly adjacent to the west of DPO NE1, between the DPO and the coast of the Shetland Islands. There are additional smaller SAC in coastal areas within the Shetland region designated for a range of features, including seals, marine mammals, lagoons, reef habitats and otters. There are no SAC for migratory fish within the Shetland region, however it is identified that there are migration routes (Figure 44 above in Section 2.3 shows the approximate routes, although should not be used to infer “safe” zones) which are likely to pass to both the east and west of the islands, and as such may pass through the DPOs.
- 6.4.7 The 41 SSSI are located across the North-east region and are protected for a range of features, including geology, habitats and species. Some, although not all, SSSI sites overlap with European SPA or SAC designations.
- 6.4.8 In addition to the sites identified within the boundaries of the North-east region, there may be more remote designated sites which may have the potential to be affected by offshore wind developments within the DPOs. This would be considered on a project by project basis.

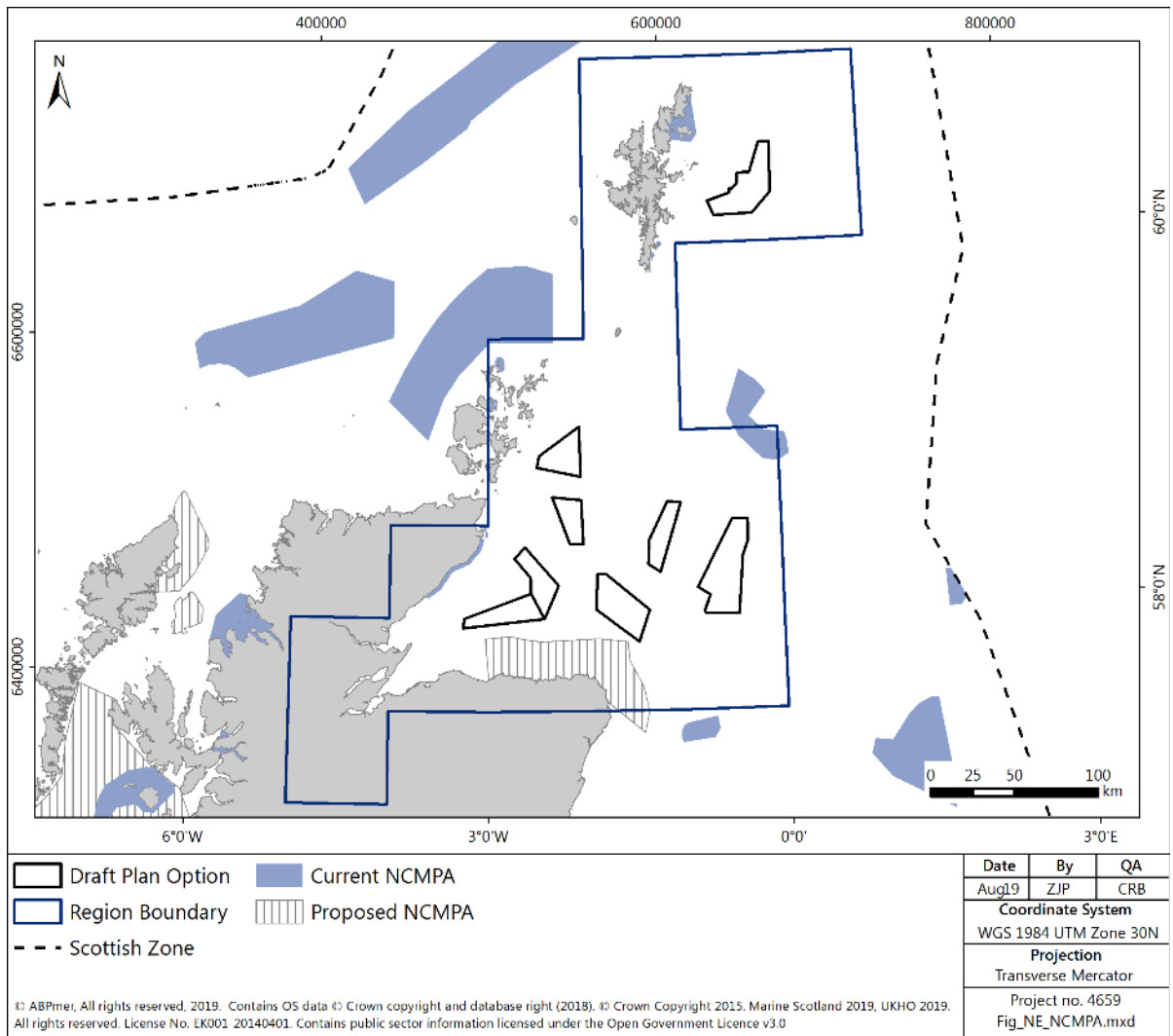


Figure 214 North-east region: NCMPA sites

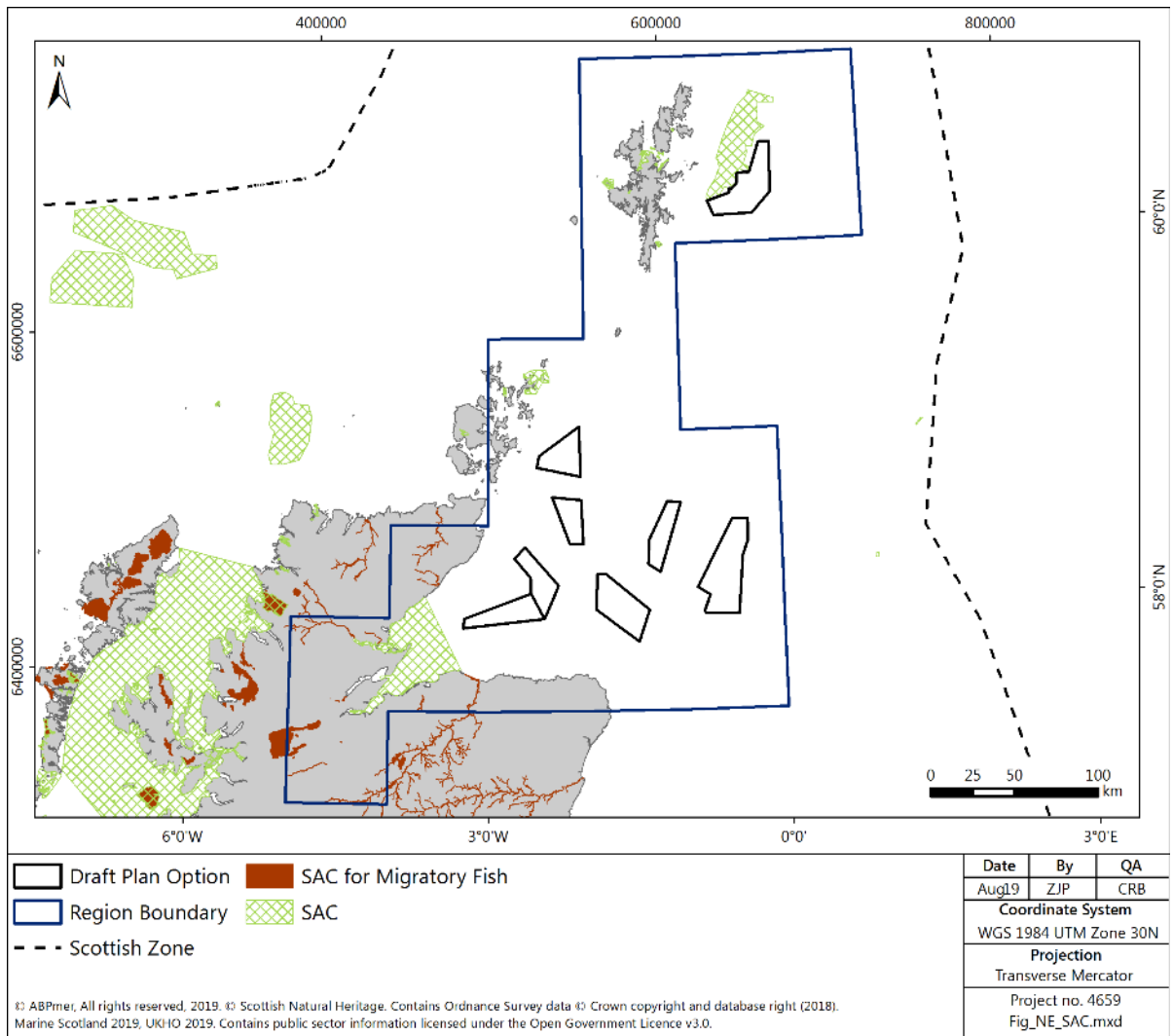


Figure 215 North-east region: marine and coastal SAC sites

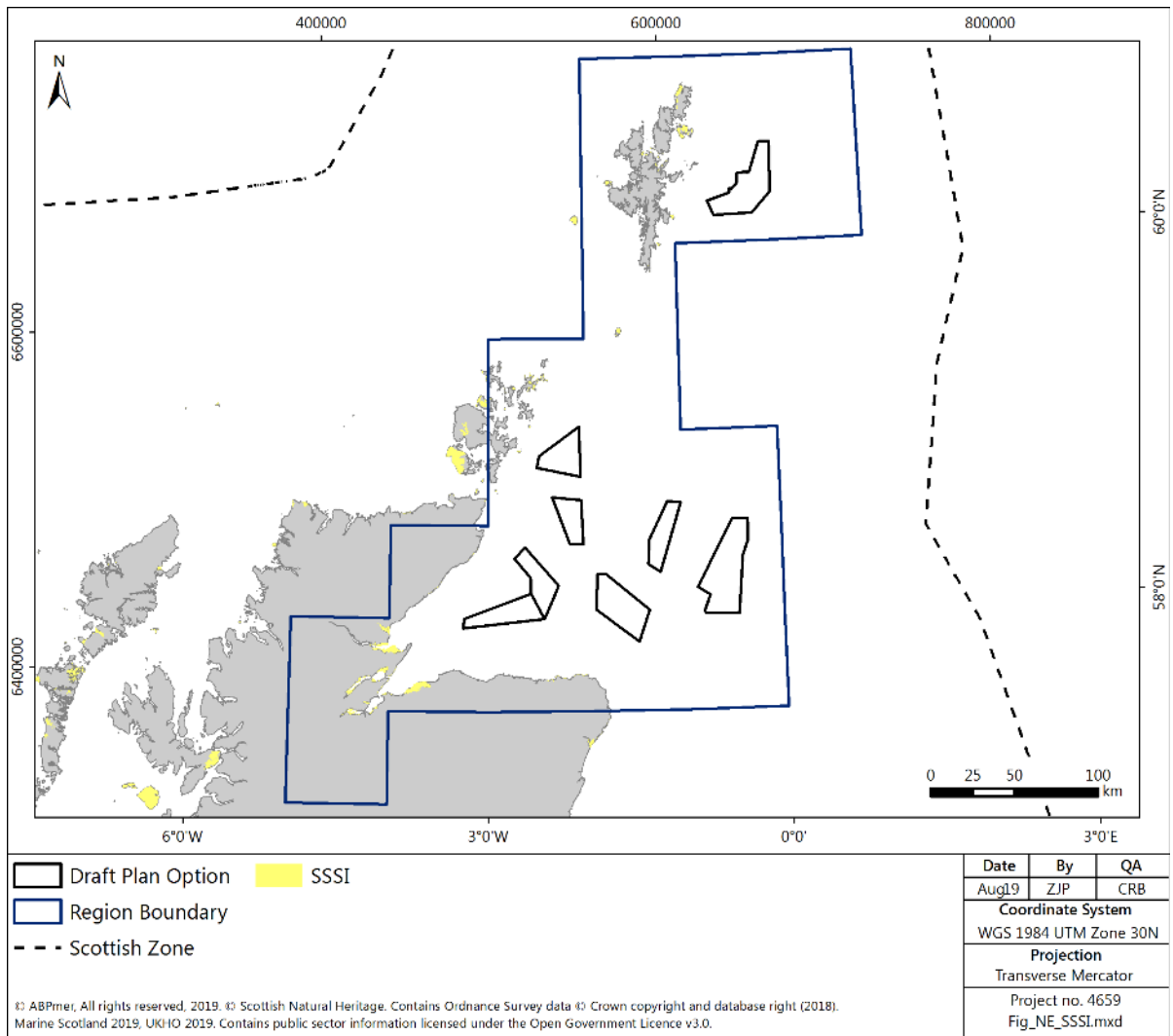


Figure 216 North-east region: marine and coastal SSSI sites

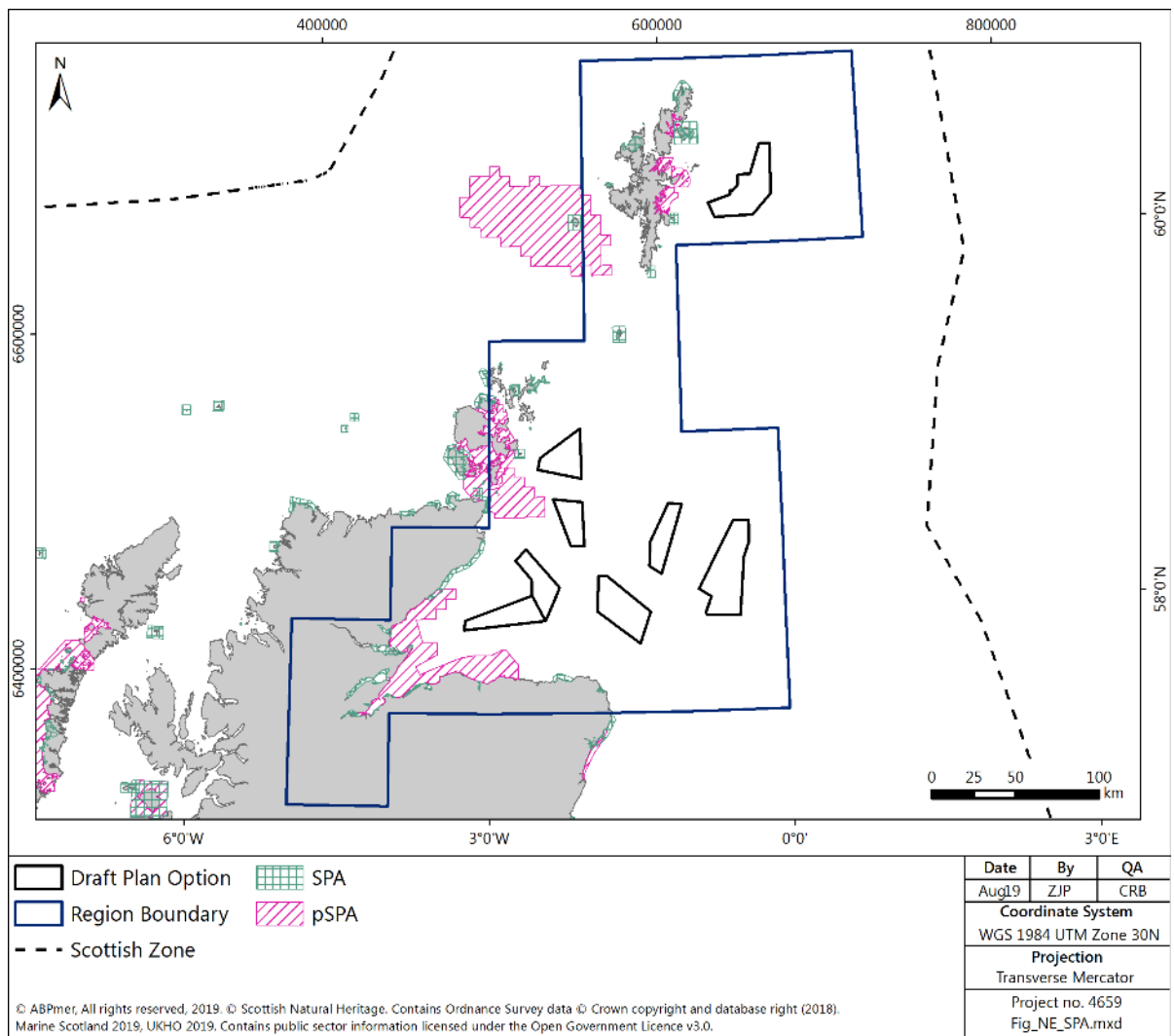


Figure 217 North-east region: marine and coastal SPA sites

Water Quality

- 6.4.9 WFD monitoring incorporates coastal and transitional waters in the marine environment. There are no overlaps between the DPOs and classified water bodies within the North-east region. Water bodies in the North-east region are shown in Figure 218. All the coastal water bodies in the North-east region were classified as either good or high status³⁰⁴ at the last assessment in 2017.
- 6.4.10 There are areas of protected waters for shellfish production in the North region (Figure 219), all within coastal regions with no direct interaction with the DPOs. The shellfish waters are classified against their target objectives, of the 24 shellfish waters, 15 are classified as not at target objective, the remainder are meeting target objectives.
- 6.4.11 There are 12 classified bathing waters protected in the North-east region (Figure 219), all on the east coast of the Scottish mainland. Of the 12 designated bathing waters, two are at excellent status, whilst the remainder are currently classified as either good or at target objective.

³⁰⁴ SEPA. 2018. Water Classification Hub, water body condition data for 2017. Available at <https://www.sepa.org.uk/data-visualisation/water-classification-hub/>. Accessed 05/10/2018.

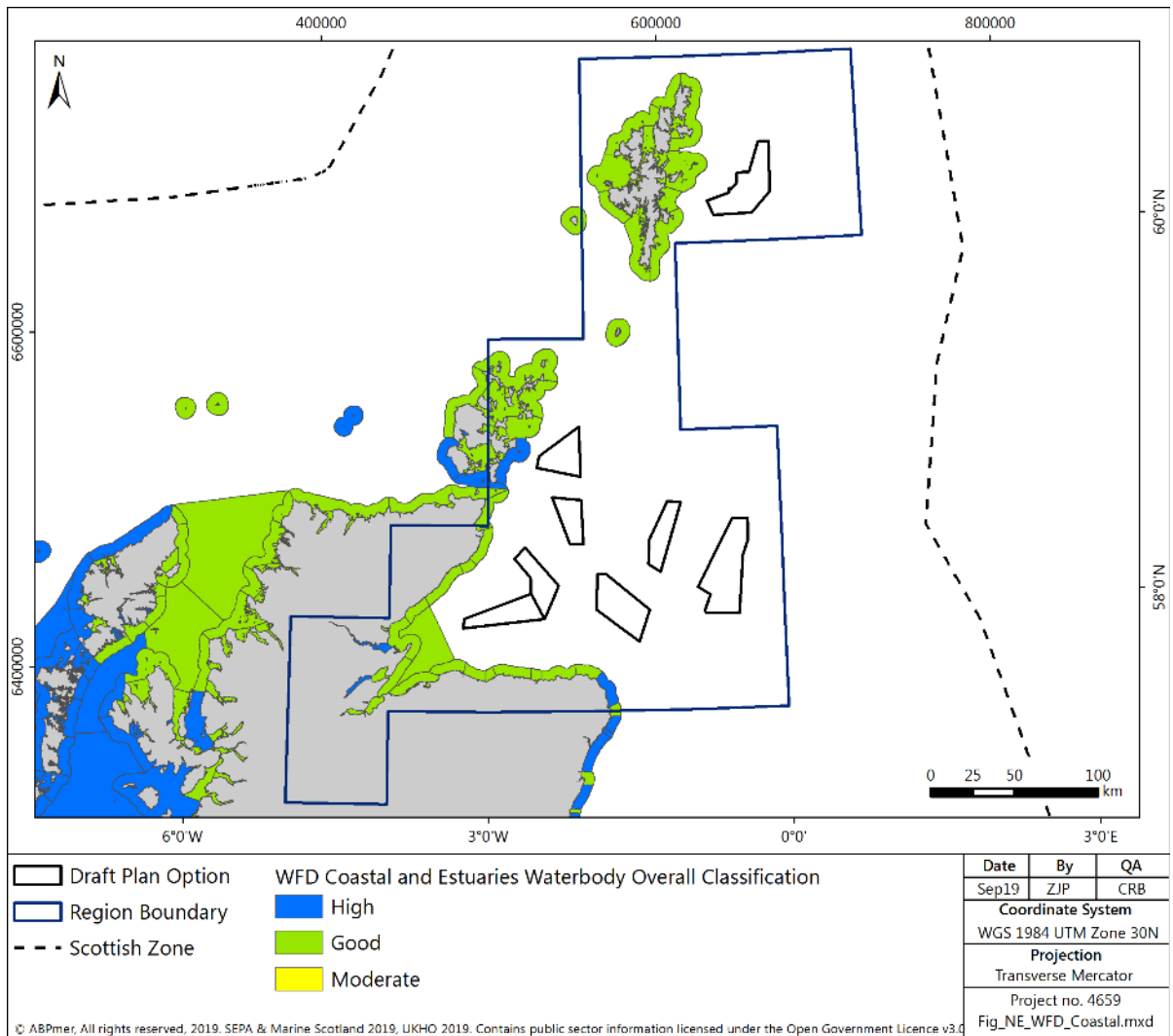


Figure 218 North-east region: WFD coastal and transitional waterbody classifications

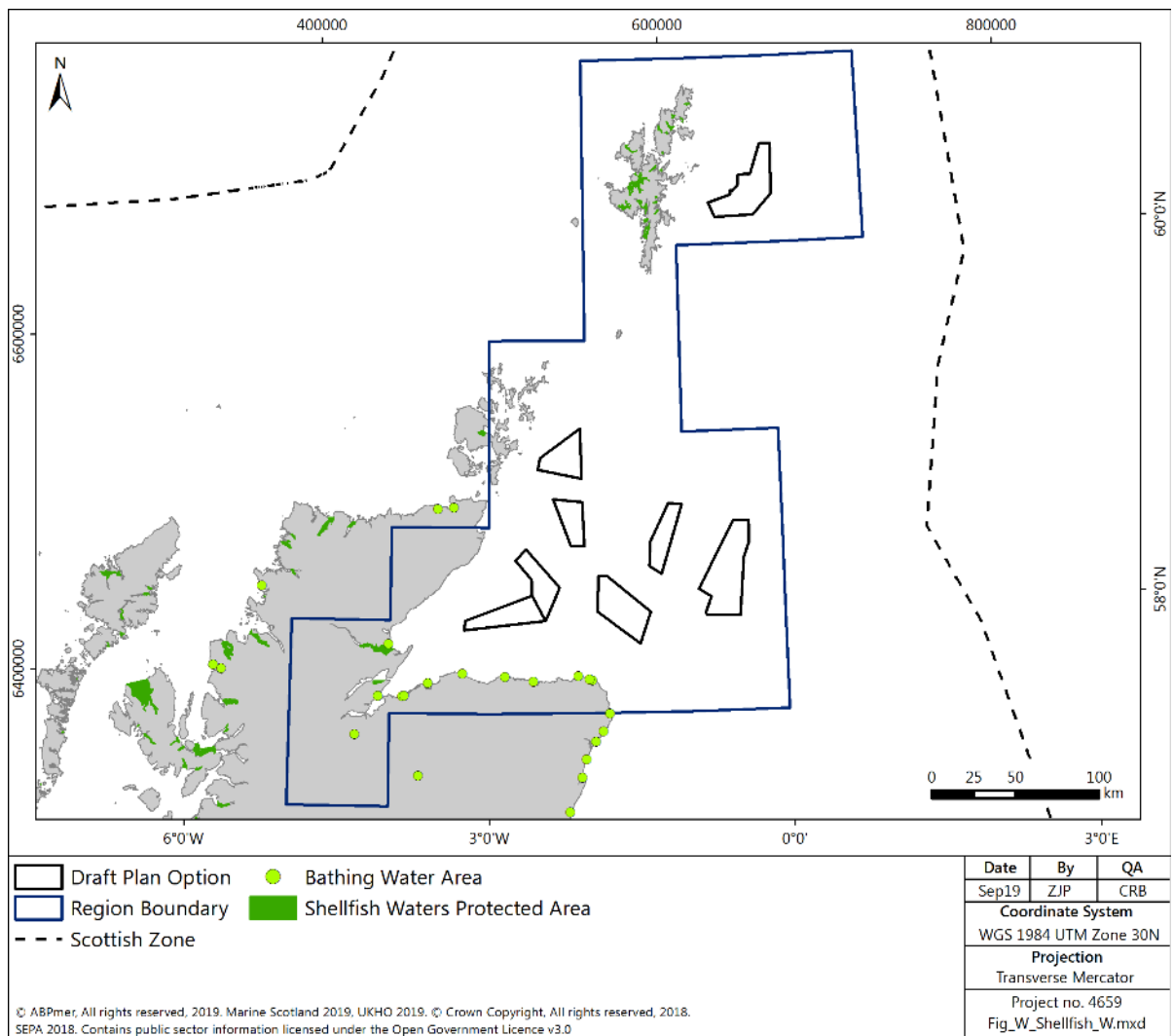


Figure 219 North-east region: shellfish and bathing water protected areas

Benthic Habitats and Species

- 6.4.12 Benthic habitats in the North-east region are highly varied with gravelly sediments to the south of the Shetland islands, and sandier sediments to the east and north, rocky substrate in the North-west around the Orkney Islands, sand and sandy gravel in the northern Moray Firth and muddy sediments within the southern Moray Firth and further offshore (Figure 220). The sediments within the DPOs are roughly a function of distance from the coast, with the DPOs closer to shore (NE2, NE3, NE4, N5 and N6) characterised by sandy sediments with some more gravelly elements, whereas those further offshore (NE7 and NE8) have more muddy elements alongside some sandy areas.
- 6.4.13 Areas of high biodiversity within the North-east region are concentrated around the Orkney Islands, around the presence of sub-tidal rock habitats. Extending east from the Orkney Islands towards NE2 DPO there are records of the PMF fan mussels (*Atrina fragilis*). In addition, there are a number of records of ocean quahog around the North-east region and directly overlapping DPOs, including a high concentration of records to the North of and overlapping into DPO NE7 and NE8. There is additionally an area with numerous records of ocean quahog in the muddy sediments between the DPOs further offshore in the North-east region, as shown in Figure 221.
- 6.4.14 In addition to the PMFs present within the DPOs there are PMF supported by benthic habitats landwards of the DPOs, including further ocean quahog, fan mussel and European spiny lobster.
- 6.4.15 The main biodiversity interest tends to be concentrated around the island formations. Within the Pobie Bank Reef SAC, discussed above, there are high concentrations of PMFs, specifically northern seafan, deep sea sponge communities, and white cluster anemone, some of which may overlap into the western extent of NE1.
- 6.4.16 There are currently no records of PMFs in the NE1, with deep sea sponge aggregations associated with the Faroe-Shetland Channel to the north and west of the DPOs and records of spiny lobster to the west of NE1.

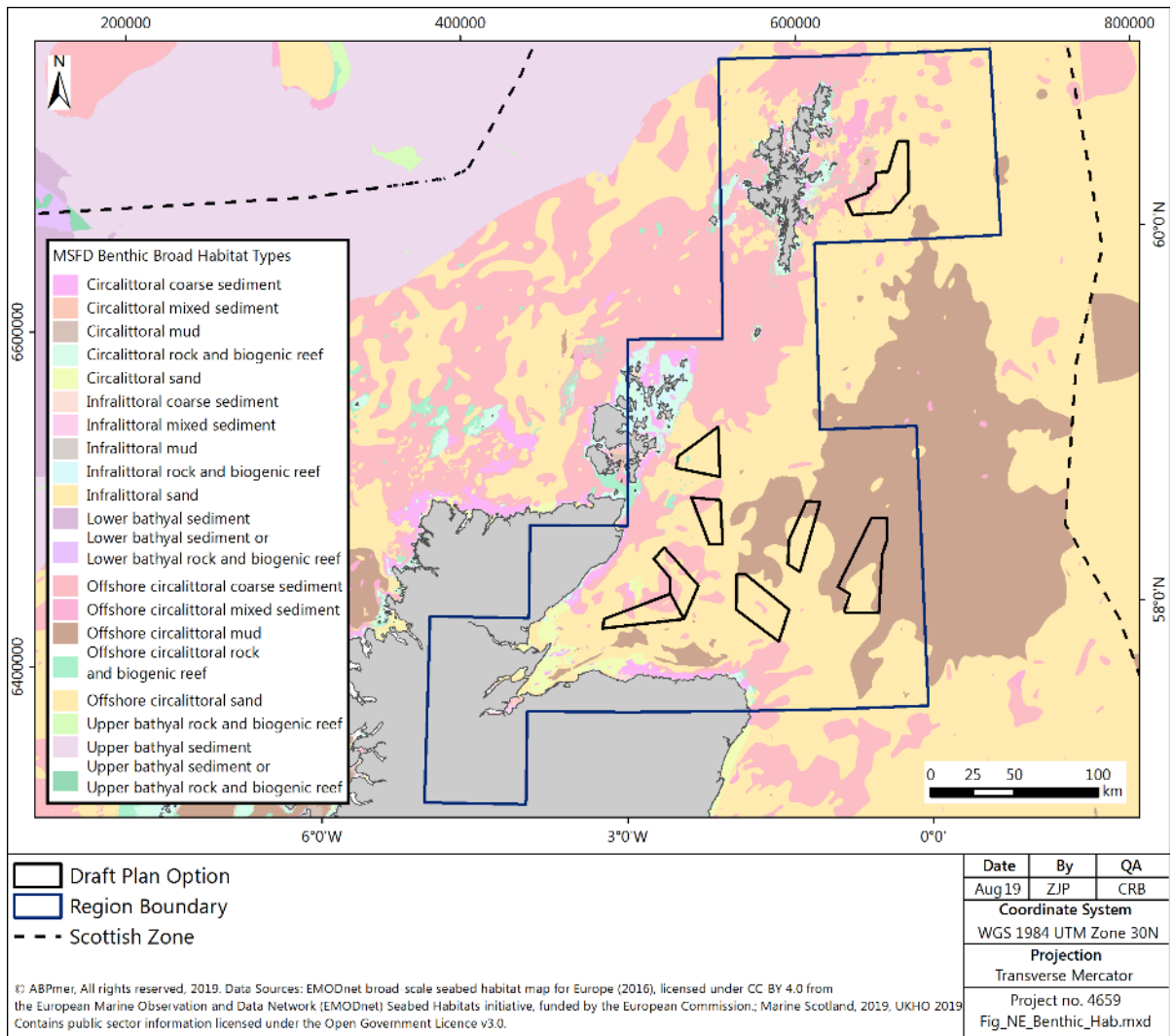


Figure 220 North-east region: Benthic habitats

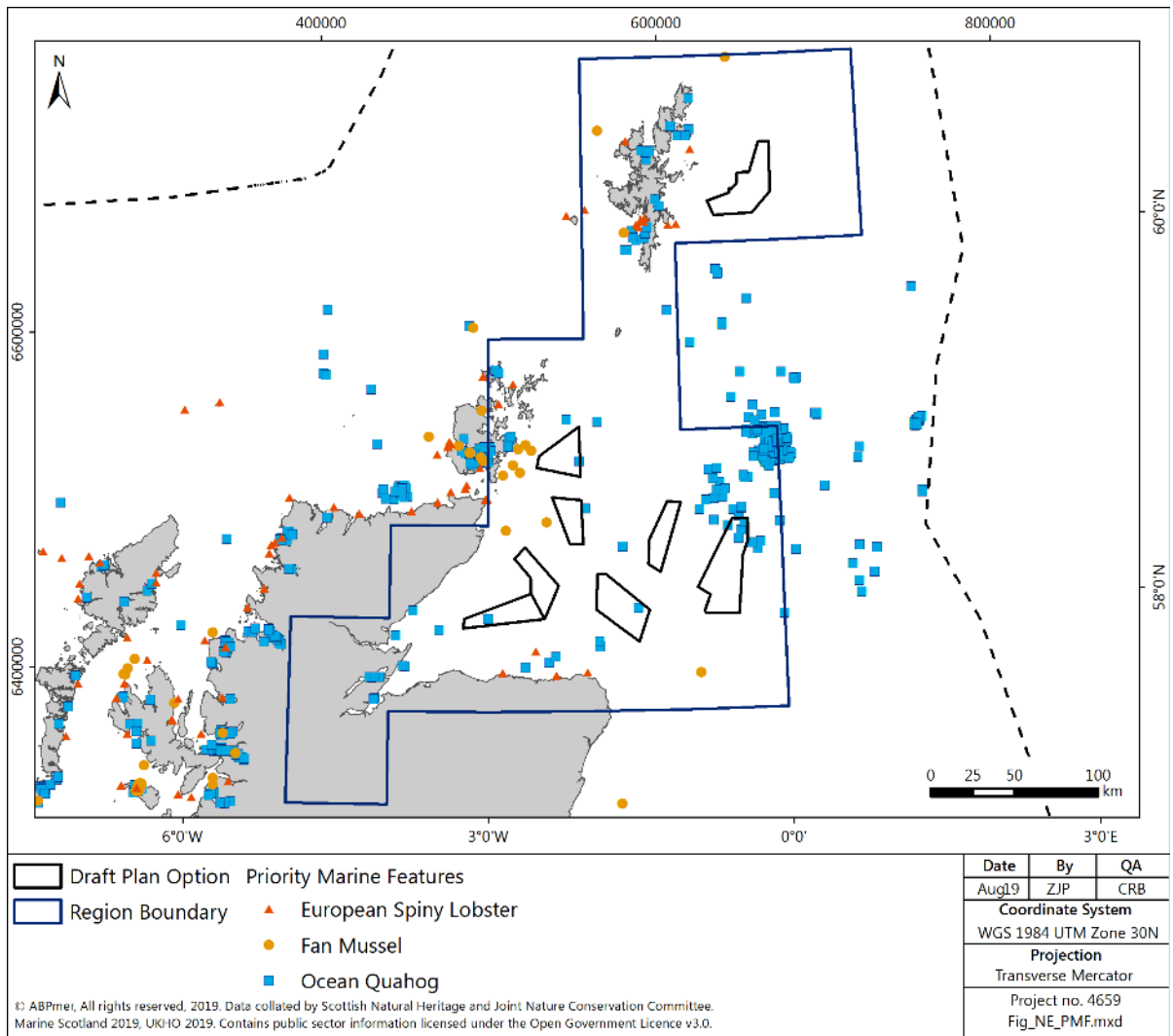


Figure 221 North-east region: records of benthic PMF

Fish

- 6.4.17 There is generally lower species richness and diversity amongst the fish population in the North-east region, except for areas around the Shetland and Orkney Islands, in comparison to that found in the North and West regions. There are however, several species within the region that are commercially important, as discussed in Section 6.3 above.
- 6.4.18 There are migratory fish that migrate through the seas within the North-east region into the estuary and riverine environments, including Atlantic salmon. These migration routes for these species (Figure 44 above in Section 2.3 shows the approximate routes, although should not be used to infer “safe” zones) indicate there is potential for the routes to intersect with the DPOs.
- 6.4.19 The seas around the Shetland islands are widely used by shark species, with specifically identified high usage by porbeagle shark to the east and north of the islands and sightings of Basking shark near the islands. The rest of the seas in the North-east region generally have a lower usage by sharks than the West and North regions, again with some exceptions around the Orkney Islands, notably by porbeagle sharks. In addition, a number of species, including small numbers of basking sharks, rays and other shark species are known to frequent the region.
- 6.4.20 There are commercially-important fish populations in Shetland. The Shetland islands, encompassing a number of different habitats, from coastal habitats through to the deep sea in the north-west of the region, has a high number of fish species, their distribution largely related to water depth in the region.
- 6.4.21 There are expected to be migration routes for anadromous fish to both the east and west of the Shetland Islands which may intersect the DPO NE1 (Figure 44 shows the approximate routes, although should not be used to infer “safe” zones).
- 6.4.22 The North-east region also has important spawning grounds for cod, whiting, ling, plaice and sandeels and important nursery grounds for spurdog, tope, common skate, thornback ray, spotted ray, herring, cod, whiting, blue whiting, hake, anglerfish, sandeels, mackerel and plaice³⁰⁵.

Marine Mammals

- 6.4.23 Seas within the North-east region are used by a variety of marine mammal species, including grey and harbour seal, harbour porpoise, bottlenose dolphin, white-beaked dolphin and minke whale.

³⁰⁵ Ellis, J.R., Milligan, S.P., Readdy, L., Taylor, N. and Brown, M.J. 2012. Spawning and nursery grounds of selected fish species in UK waters. Sci. Ser. Tech. Rep., Cefas. Lowestoft, 147: 56 pp.

- 6.4.24 Grey seal usage within the North-east region is generally offshore, and is concentrated towards the significant breeding populations in the Orkney islands, as shown in Figure 222. The proximity of the DPOs to the populations in the Orkney Islands suggests that there is likely to be considerable overlap between the DPOs, particularly NE2, NE3, NE5 and NE6 and areas of high usage density, shown as modelled by the Sea Mammal Research Unit on Figure 223³⁰⁶. The Shetland islands are of less importance to grey seals, with considerably lower breeding populations compared to colonies in the Orkney Islands and the Outer Hebrides. However, there are still hotspots of grey seal at sea usage, shown in figure 262, around the islands with some low-level usage likely in DPO NE1
- 6.4.25 Harbour seal usage, generally lower than for grey seals in the North-east region, is concentrated around the breeding colonies within the Moray Firth and the Shetland and Orkney Islands, with foraging activity modelled to be further inshore than that for the grey seals and therefore little or no interaction with the DPO further offshore.
- 6.4.26 Harbour seal colonies on Shetland underwent a period of decline from 2000-2009, with populations decreasing by approximately 30 % over that period. The most recent counts, however indicate a slight recovery, with an increase of approximately 10 % between 2009 and 2015. The 2015 population count in 2015 was 3,369³⁰⁷. Figure 224 shows that there is some low-level at-sea usage overlapping with NE1.
- 6.4.27 Fewer cetacean species use the seas in the North-east region compared with the species diversity on the west coast. However, the North-east region is considered to be important for minke whale, as demonstrated by the inclusion of minke whale as a feature in the proposed designation of the Southern Trench MPA. There are also high encounter rates for harbour porpoise throughout the North-east region, including throughout the DPO; and bottlenose dolphin concentrated in the southern extent of the Moray Firth.
- 6.4.28 Cetacean usage of the seas around the Shetland Islands is generally concentrated to the west of the islands, with the exception of harbour porpoise populations, for which high encounter rates are observed throughout the islands. Other cetaceans known to extensively use the seas around the Shetland Islands include minke whale, white beaked dolphin, Atlantic white-sided dolphin, Risso's dolphin, killer whale and sperm whale³⁰⁸.
- 6.4.29 There are areas within the North-east region which are known to be used by otters (Yell Sound, Dornoch Firth and River Spey). Neither of these areas

³⁰⁶ Sea Mammal Research Unit (SMRU) and Marine Scotland. 2017. Estimated at-sea Distribution of Grey and Harbour Seals - updated maps 2017. doi: 10.7489/2029-1. Available at <https://data.marine.gov.scot/dataset/estimated-sea-distribution-grey-and-harbour-seals-updated-maps-2017>.

³⁰⁷ SMRU, 2016. Scientific Advice on Matters Related to the Management of Seal Populations.

³⁰⁸ Baxter, J.M., Boyd, I.L., Cox, M., Donald, A.E., Malcolm, S.J., Miles, H., Miller, B., Moffat, C.F. 2011. Scotland's Marine Atlas: Information for the national marine plan. Marine Scotland, Edinburgh. Available at <https://www.gov.scot/Publications/2011/03/16182005/0..>

overlap with DPOs, however, there is potential for landfall of cables in the vicinity of the River Spey.

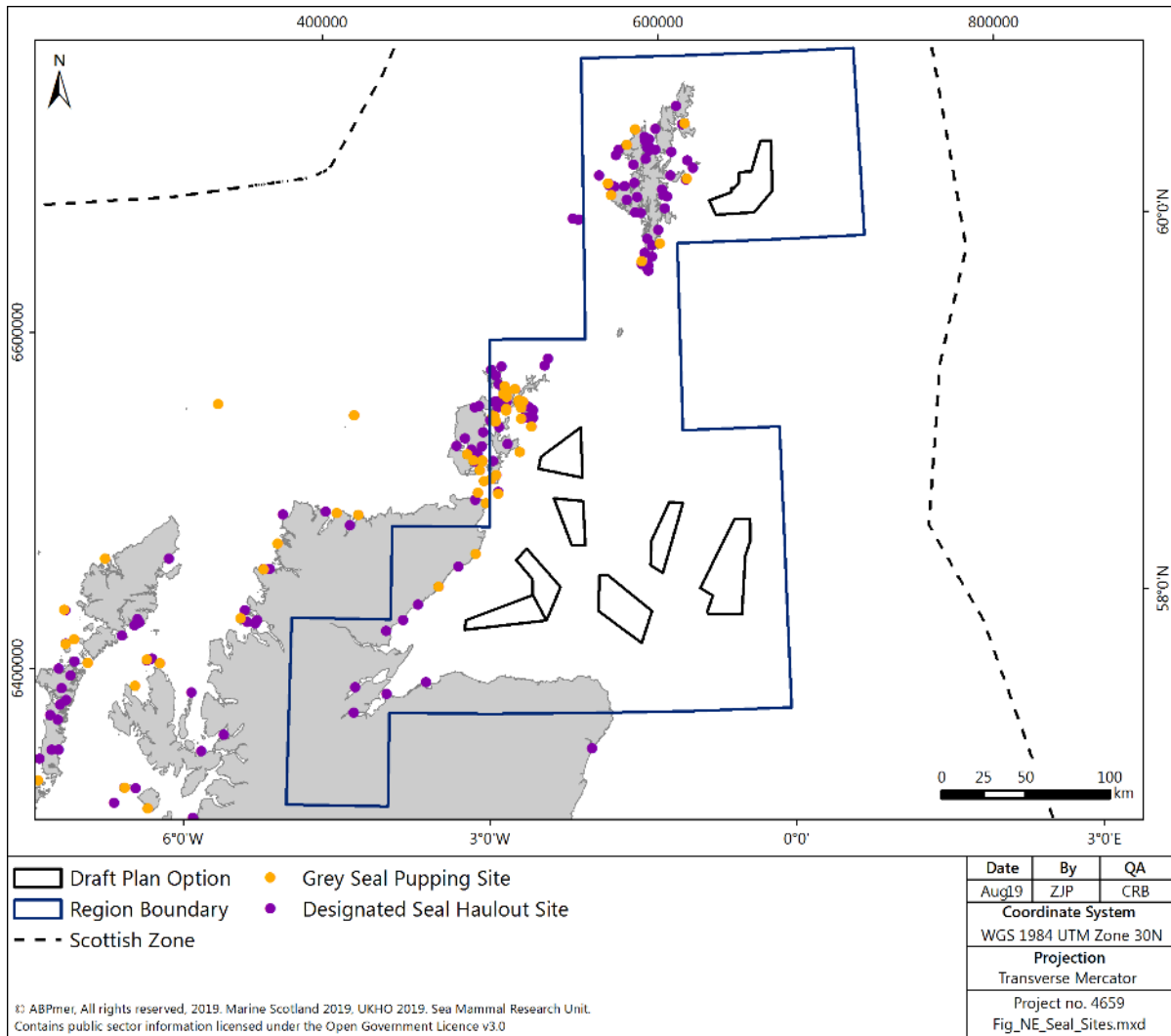


Figure 222 North-east region: seal haulout sites and grey seal pupping sites

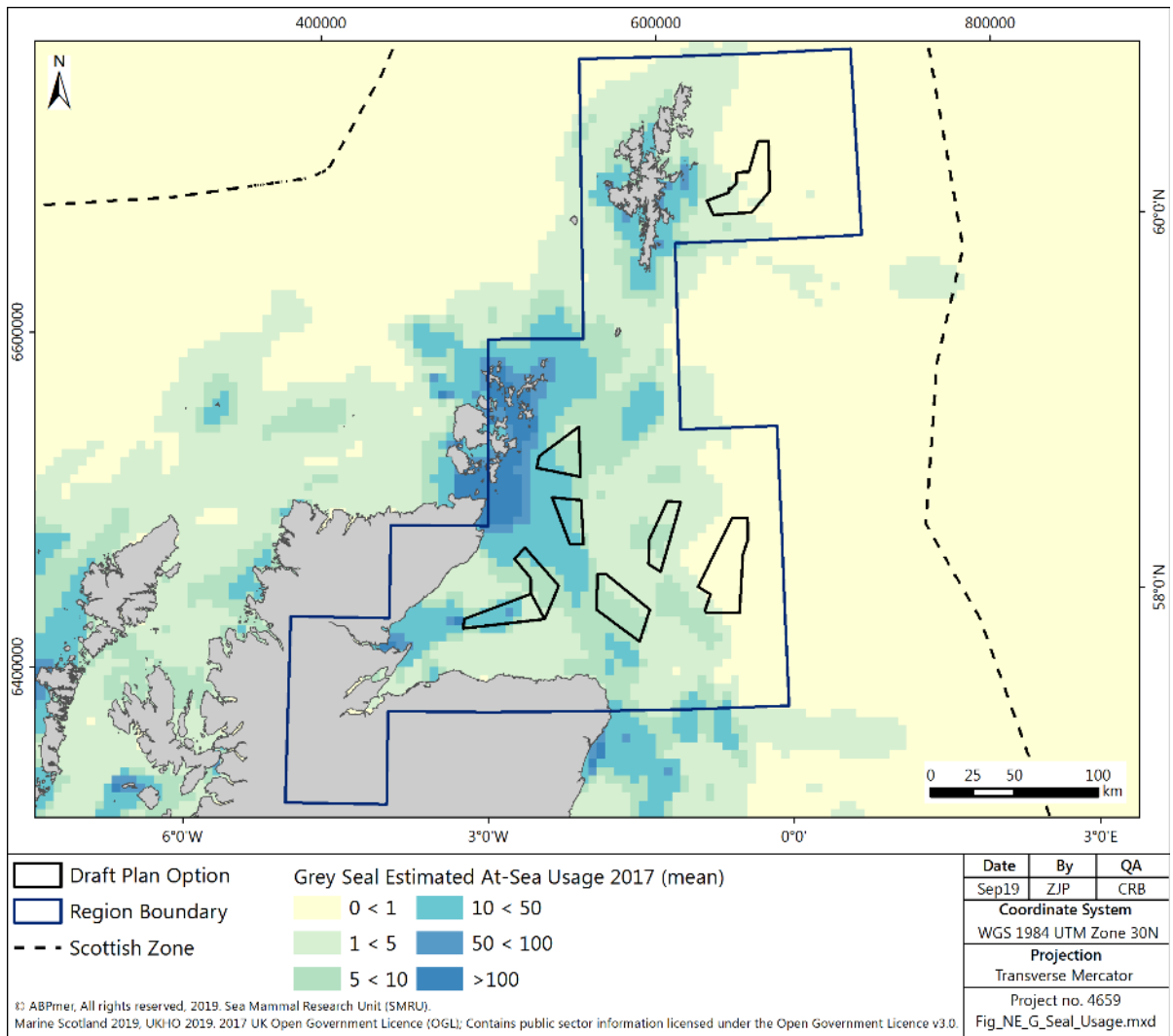


Figure 223 North-east region: grey seal at sea usage

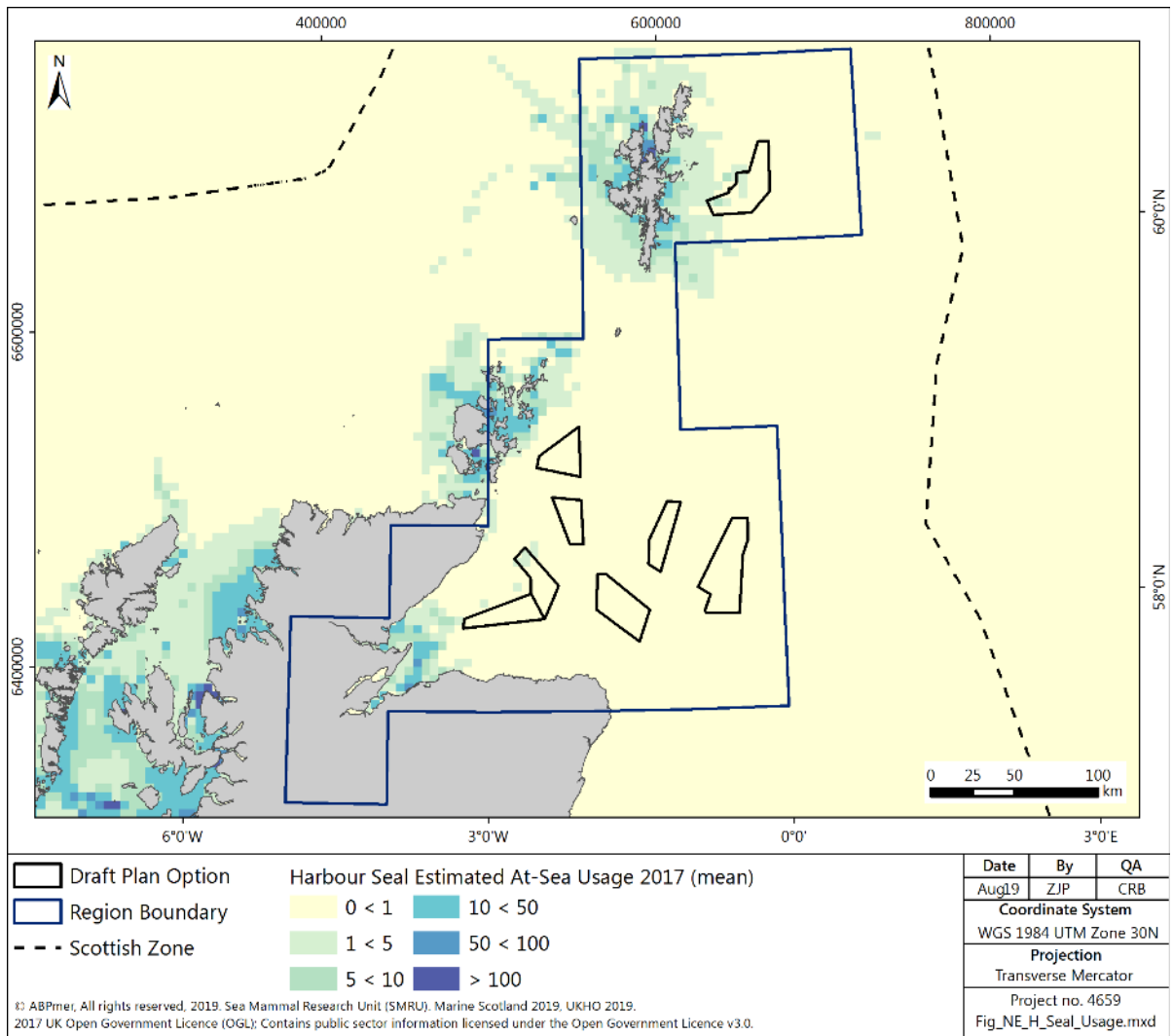


Figure 224 North-east region: harbour seal at sea usage

Birds

- 6.4.30 The importance of the North-east region to birds is demonstrated in the designation of 26 of SPAs and the further 7 proposed SPAs with marine elements with additional terrestrial sites, as discussed above.
- 6.4.31 There are both breeding and non-breeding populations of a wide variety of seabirds in the North-east region. A number of significant seabird colonies are found around the coastlines, particularly on the Shetland and Orkney Islands and in the north-east Caithness cliffs.
- 6.4.32 The majority of the seabird colonies within the North-east region are reviewed as part of the SPA management process, and in the majority of SPA the overall condition of the seabird or waterbird assemblages, with the exception of the Shetland SPA and Troup, Pennan and Lion's Heads SPA, are assessed as favourable. However, at an individual species level a number of species are identified as being in unfavourable condition, and therefore management measures are in place to reduce pressure on these species. Species of importance in the North-east region include herring gull, razorbill, kittiwake, puffin, fulmar, guillemot, shag, cormorant, great black-backed gull, peregrine falcon and osprey, in addition to a number of terrestrial or waterbird species. Wakefield *et al*³⁰⁹ identify that the North-east region, in particular the area of sea to the south and east of the Orkney Islands and the Moray Firth are utilised by considerable numbers of seabirds, although usage is high throughout the coastal areas throughout the region. The areas of high usage identified in the multi-species analysis within the study correspond with the areas of high recording shown in Figure 225. Seabird usage of the seas to the east, further offshore is assessed as being lower.
- 6.4.33 Species of importance on the Shetland Islands include Arctic skua, Arctic tern, dunlin, fulmar, great skua, red-necked phalarope, whimbrel, red throated diver, kittiwake, puffin, guillemot and gannets. Wakefield *et al*³¹⁰ identify that the Shetland region, in particular the area of sea immediately adjacent to the Shetland Islands are utilised by considerable numbers of seabirds. Seabird usage of the seas to the north of the islands is assessed as being lower.
- 6.4.34 Figure 225 maps the total records of birds recorded in the marine environment in the North-east region. Whilst the data mapped has not been corrected for

³⁰⁹ Wakefield, E., Owen, E., Baer, J., Carroll, M., Daunt, F., Dodd, S., Green, J., Guilford, T., Mavor, R., Miller, P., Newell, M., Newton, S., Robertson, G., Shoji, A., Soanes, L., Votier, S., Wanless, S., Bolton, M. 2017. Density, fine-scale tracking, and large-scale modeling reveal the regional distribution of four seabird species, *Ecological Applications*, 27(7), 2017, pp. 2074-2091. Available at https://www.researchgate.net/publication/317959907_Breeding_density_fine-scale_tracking_and_large-scale_modeling_reveal_the_regional_distribution_of_four_seabird_species.

³¹⁰ Wakefield, E., Owen, E., Baer, J., Carroll, M., Daunt, F., Dodd, S., Green, J., Guilford, T., Mavor, R., Miller, P., Newell, M., Newton, S., Robertson, G., Shoji, A., Soanes, L., Votier, S., Wanless, S., Bolton, M. 2017. Density, fine-scale tracking, and large-scale modeling reveal the regional distribution of four seabird species, *Ecological Applications*, 27(7), 2017, pp. 2074-2091. Available at https://www.researchgate.net/publication/317959907_Breeding_density_fine-scale_tracking_and_large-scale_modeling_reveal_the_regional_distribution_of_four_seabird_species.

survey effort, it highlights areas of high importance, particularly in the Moray Firth and inshore waters to the east of the Shetland Islands, although recordings are high in coastal areas across the North-east region. Within the Moray Firth areas of high recordings overlap with DPO NE4 and NE5, with scattered areas of medium to high usage in NE2, NE3 and NE6. There are hotspots associated with the colonies in the south of the Shetland Islands, and the Sumburgh Head SPA site, and areas of high recordings overlap into the south-eastern extent of DPO NE1.

- 6.4.35 Bias within the data presented on Figure 225 from survey effort is evident in the higher concentrations of seabirds observed near key shipping routes, therefore the apparent areas of lower concentration around the remaining DPO may be artificially lower due to comparatively lower survey effort.
- 6.4.36 In addition, there are also a number of coastal areas identified as either IBA or RSPB reserves in the North-east region, concentrated around the Shetlands, Firths of Dornoch, Cromarty and Moray (Figure 225).
- 6.4.37 In addition to breeding populations within the North-east region, terrestrial and seabird species are known transit the area as migratory species, both during day and night time.

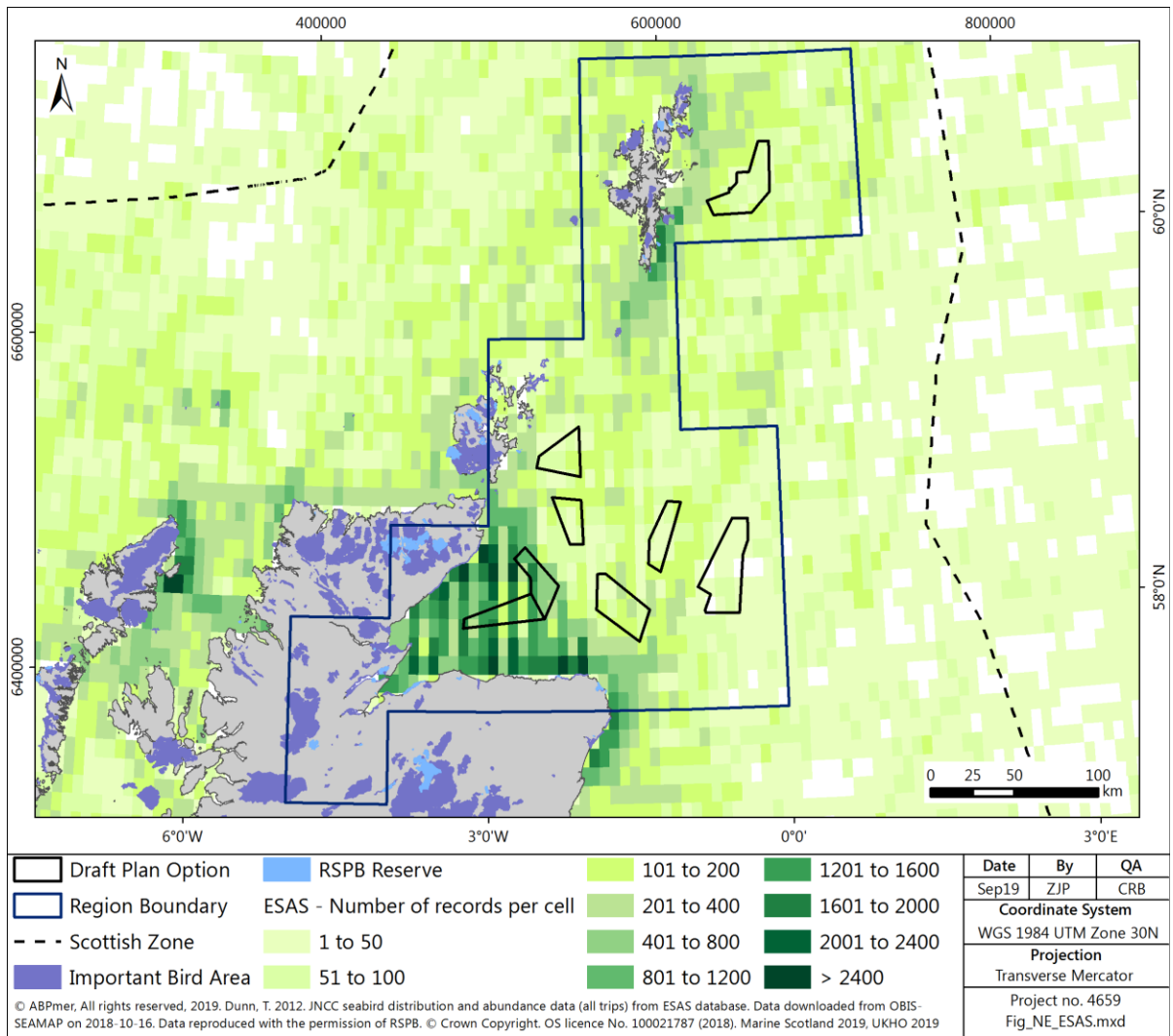


Figure 225 North-east region: ESAS records per 0.1 degree cell

Cultural Heritage

- 6.4.38 There is one Historic MPA designated in the North-east region. It is in Shetland and is associated with two historic shipwrecks around the Out Skerries archipelago. There are also several scheduled monuments (included protected wrecks) around the Shetland islands. Those in the marine environment are concentrated around the coast and include a wide range of historically significant buildings, shipwreck and structures.
- 6.4.39 There are eight shipwrecks designated for the protection of military remains. These shipwrecks are distributed throughout the North-east region both in inshore and offshore areas. There is one protected site within NE4 (HMS Lynx) and one protected site just to the northeast of the boundary of NE4 (HMS Exmouth). In addition, although the HMS Duke of Albany lies within 1km of the south-western corner of DPOs NE2. There are numerous other shipwrecks distributed throughout the North region, both within and outwith the DPOs.
- 6.4.40 Within the North-east region there are areas within the Moray Firth, particularly off the North Aberdeenshire coast which have the potential to be examples of palaeolandscapes (landscapes which have become submerged following occupation by hominids), There is therefore potential that there may be culturally significant archaeological remains in these areas. Further assessment on a smaller scale would be required on a project by project basis.
- 6.4.41 In addition to the Historic MPA, there are a number of scheduled monuments (included protected wrecks) within the Shetland region. Those in the marine environment are concentrated around the coast and include a wide range of historically significant buildings, shipwrecks and structures. There is one shipwreck designated for the protection of military remains, close to land off the coast of Unst. There is no overlap of protected sites and the DPOs. There are numerous other shipwrecks distributed throughout the North region, both within and outwith the DPOs.

Landscape / Seascape

- 6.4.42 Within the North-east region, landscapes and seascapes are considered to be less sensitive in comparison to the North and West regions. There is a NSA, in Dornoch Firth, which considers expansive sea views to the east. It is approximately 40km from the eastern edge of the NSA to the westernmost extent of the nearest DPO, NE5. There is another NSA in Shetland, broken into a number of specific areas with coastal elements. The coastlines within the Shetland NSA are predominantly west facing, and therefore seascapes are away from NE1.
- 6.4.43 Highlands Council has identified SLA within the North-east region, identifying coastline within the Moray Firth facing towards the DPOs, however these are to the north-west of the DPOs and therefore views of the DPOs would likely be blocked by the currently planned Moray West and Moray East windfarms. Aberdeenshire Council produced a Landscape Capacity Assessment for Wind Energy³¹¹ for its area of responsibility, identifying several areas with no capacity for additional development, however this only considered future onshore wind development.
- 6.4.44 When considering the sensitivity of the coastline Scott *et al*³¹² identified that the coastline within the North-east region associated with mainland Scotland is all medium or low to medium sensitivity, due to the simple landform and general absence of focal features. This contrasts with the assessment associated with the sensitivity of the coastline in the north of the region around the Orkney Islands which is classed as medium to high sensitivity due to the relatively low lying land and complex patterns of land and sea.
- 6.4.45 No specific assessment of landscape or seascape character has been undertaken on the coastline within the Shetland region. However, the low population density in the Shetland region means that most of the coastline can be considered to be isolated, and Scott *et al*.³¹³ identifies that there is a varied coastline in the area, with intricacies that would potentially be affected from if development were to occur. All coastlines facing towards the DPOs are assessed by Scott *et al*. to be of medium to high sensitivity.

³¹¹ Aberdeenshire Council. 2014. Strategic Landscape Capacity Assessment for Wind Energy in Aberdeenshire. Available at <https://www.aberdeenshire.gov.uk/planning/plans-and-policies/the-strategic-landscape-capacity-for-windfarms>.

³¹² Scott, K.E., Anderson, C., Dunsford, H., Benson, J.F. and MacFarlane, R. 2005. An assessment of the sensitivity and capacity of the Scottish seascape in relation to offshore windfarms. Scottish Natural Heritage Commissioned Report No.103 (ROAME No. F03AA06). Available at <https://www.nature.scot/snh-commissioned-report-103-assessment-sensitivity-and-capacity-scottish-seascape-relation-windfarms>.

³¹³ Scott, K.E., Anderson, C., Dunsford, H., Benson, J.F. and MacFarlane, R. 2005. An assessment of the sensitivity and capacity of the Scottish seascape in relation to offshore windfarms. Scottish Natural Heritage Commissioned Report No.103 (ROAME No. F03AA06). Available at <https://www.nature.scot/snh-commissioned-report-103-assessment-sensitivity-and-capacity-scottish-seascape-relation-windfarms>.

6.5 Planning Issues

6.5.1 There are five local authorities with coastal interests within the North-east region:

- Highland,
- Orkney Islands,
- Moray,
- Aberdeenshire, and
- Shetland.

6.5.2 Orkney Islands Council has developed a sustainable energy strategy³¹⁴ and LDP³¹⁵ for the islands, both of which consider the potential for renewable energy generation. This includes the development of supply chains to support industry, particularly considering wave and tidal stream energy projects and onshore wind, although it notes that onshore infrastructure required for offshore marine renewable energy developments will be supported where it is demonstrated will not result in significant adverse effects. There is no stated position on the potential for offshore wind development around the islands, with current focus on onshore wind.

6.5.3 The Highland Council has considered the potential for offshore wind within its area, identifying moderate potential for offshore wind within the West region in their region of responsibility around Skye.

6.5.4 Moray Council has considered the potential for the development of supply chain within its area of responsibility, specifically identifying Buckie Harbour as having the potential to accommodate an onshore operations and maintenance base to support offshore wind development³¹⁶.

6.5.5 Aberdeenshire Council in 2004³¹⁷ identified that the 250km coastline in the region offered unexplored potential for offshore wind, however there is no further guidance or consideration of offshore wind in documentation with the exception of considering siting for sub-stations.

³¹⁴ Orkney Islands Council. 2009. A Sustainable Energy Strategy for Orkney. Available at <http://www.orkney.gov.uk/Council/C/soes-2017-2025.htm>.

³¹⁵ Orkney Islands Council. 2017. Orkney Local Development Plan. Available at <http://www.orkney.gov.uk/Service-Directory/O/Orkney-Local-Development-Plan.htm>.

³¹⁶ Moray Council. undated. Make it Buckie for Offshore Renewables. Available at <http://www.moray.gov.uk/downloads/file106026.pdf>.

³¹⁷ Aberdeenshire Council. 2004. The Renewable Energy Strategy, A strategy to promote the generation of energy from renewable sources. Available at https://www.aberdeenshire.gov.uk/media/6391/renewable_energy2.pdf.

6.5.6 Shetland Council has produced a Renewable Energy Development Plan, which identifies the potential for, and the potential impacts of the future offshore wind development³¹⁸, with focus on the expansion and development of currently developed land. There are no specific plans included in the Shetland LDP³¹⁹ regarding the siting of offshore wind in proximity to the islands.

³¹⁸ Shetland Council and Shetland Renewables. 2009. Renewable Energy Development in Shetland: Strategy and Action Plan. Available at https://www.shetland.gov.uk/economic_development/documents/ShetlandRenewableEnergyStrategy-approved27August2009.pdf.

³¹⁹ Shetland Islands Council. 2014. Shetland Local Development Plan. Available at <https://www.shetland.gov.uk/planning/LocalDevelopmentPlan.asp>.

7 East

7.1 Introduction

7.1.1 The East region incorporates the area from the southern edge of the North-east region at Peterhead, to the border with England, including the Firths of Forth and Tay (Figure 226). The region extends seawards to the east to include the three DPOs in the region, as shown in Figure 226.

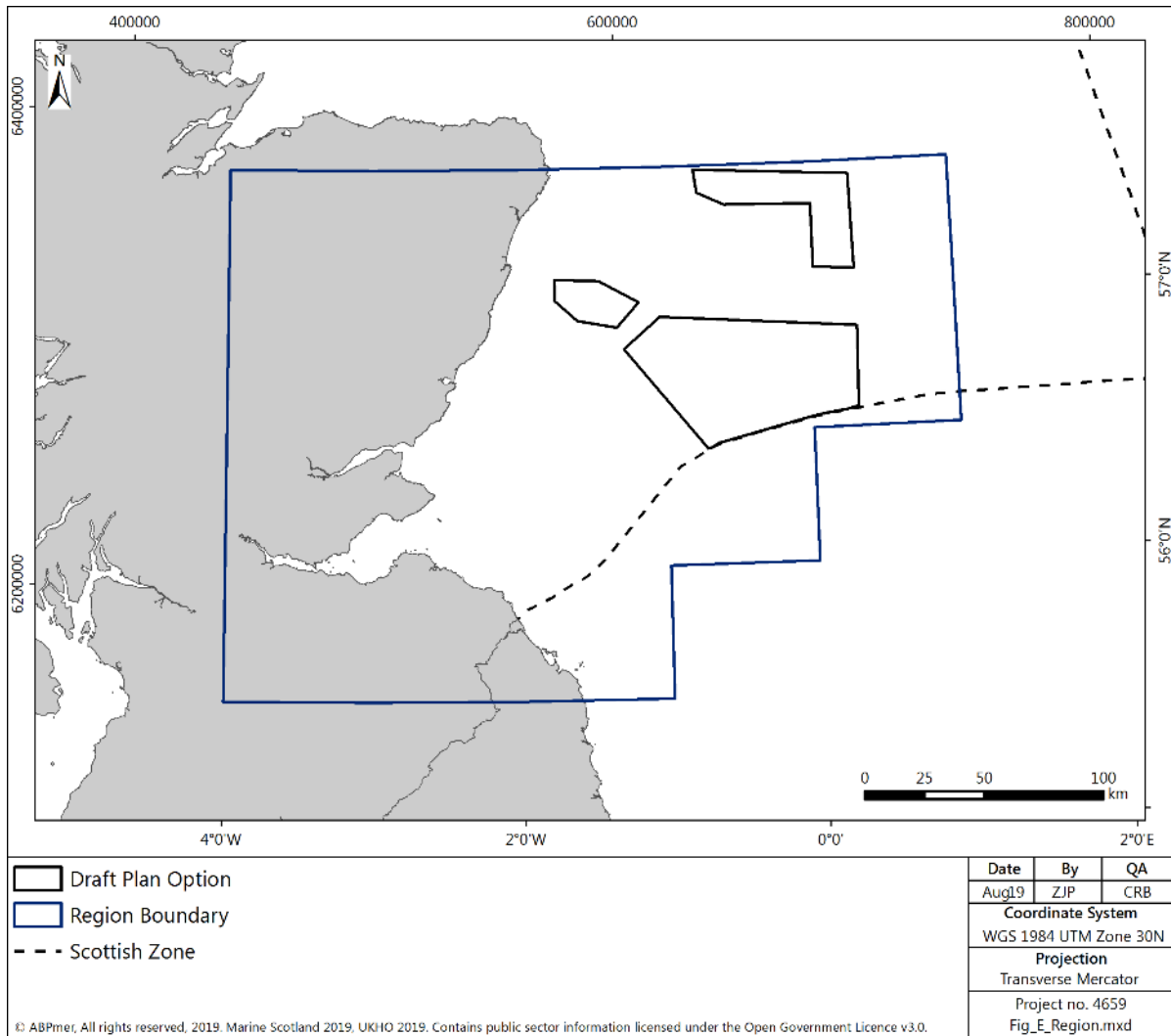


Figure 226 Map of the East region, including DPOs

7.2 Physical Considerations

Offshore Wind Resource

7.2.1 Within the East region, encompassing three DPOs (E1, E2 and E3) there is considerable available resource as shown in Figure 227 using the annual wind speed as a proxy, and calculated in Table 6 for the three DPOs.

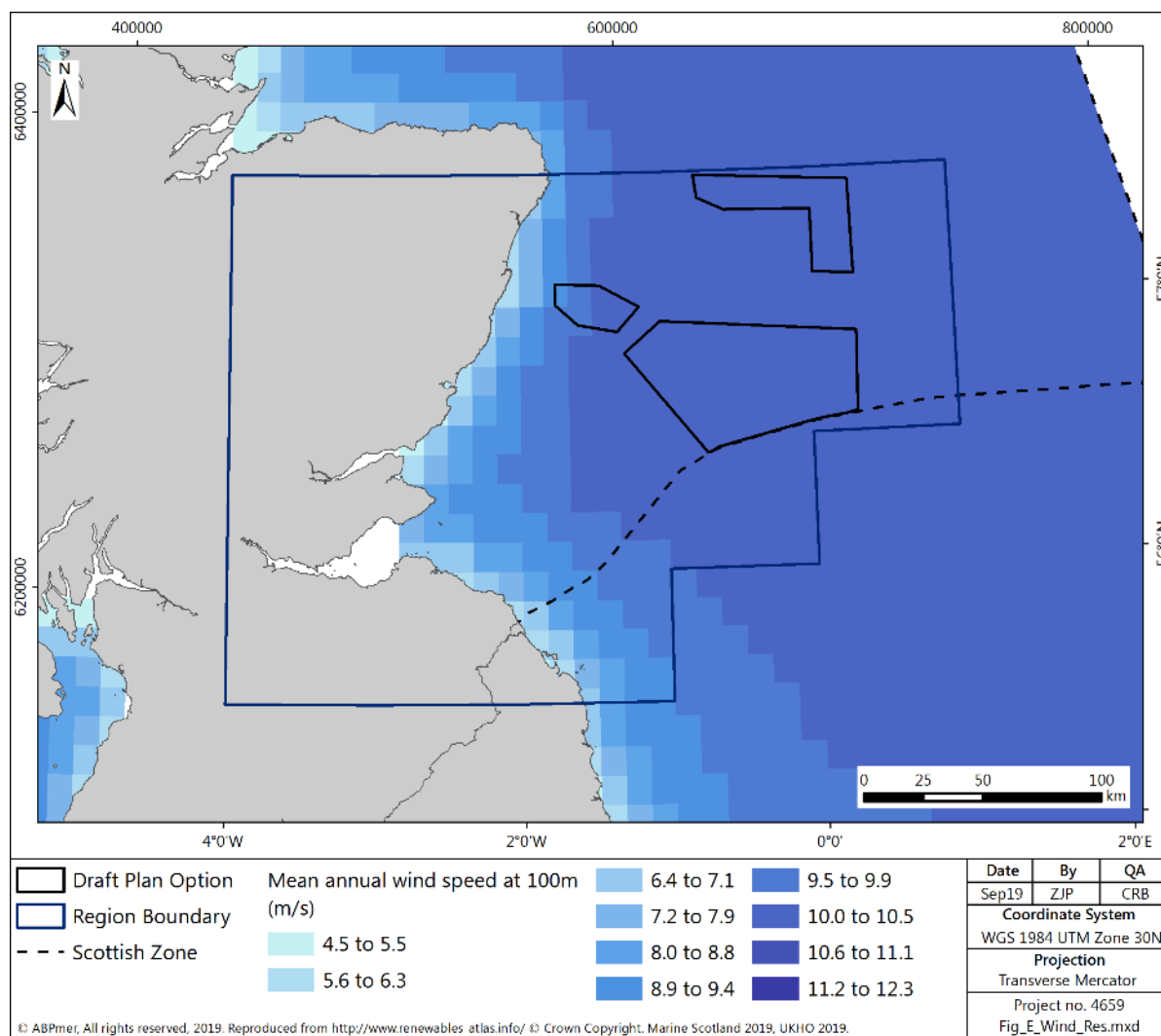


Figure 227 East region: mean annual wind speed

Table 6 East region: Potential installed capacity in the DPOs

Area of Search	Region	Area (square km)	Potential Installed capacity (GW)
E1	East	3816	19.1
E2	East	1287	6.4
E3	East	474	2.4
East Total		5577	27.9

Grid Connection

- 7.2.2 Within the East region there is good capability to support current offshore wind development with 275 kV and 400 kV networks developed in the region to support current offshore wind and Torness power station. However, National Grid identify the strong potential for future requirements to further reinforce the grid in the area as future offshore wind developments reach fruition³²⁰, particularly given the likely transmission through the region required to support renewable energy developments in the North and North-east regions.
- 7.2.3 It is noted that with the future decommissioning of the Torness nuclear plant (2030) there may be future potential for excess capacity on the Grid within the East region which could support development of offshore wind in the region.

³²⁰ National Grid. 2017. Electricity Ten Year Statement, November 2017. Available at <https://www.nationalgrideso.com/insights/electricity-ten-year-statement-etys..>

Bathymetry and Seabed

- 7.2.4 Within the East region the water depths are almost entirely less than 100 m, shown in Figure 228, with an area of shallower water less than 60 m extending out from the Firth of Forth. The water depths within the DPOs are mostly between 60 and 100 m with a small area of E3 over 100 m deep.
- 7.2.5 Sediment within the region, as shown in Figure 229, is, similarly to the North-East, dominated by sand, with some smaller areas of coarser sediment towards the coastline and muddy sediment within and extending out of the Firth of Forth. Similarly, the sediment within the DPOs is generally sand, with some small areas of coarser sediment within E2 and E3.

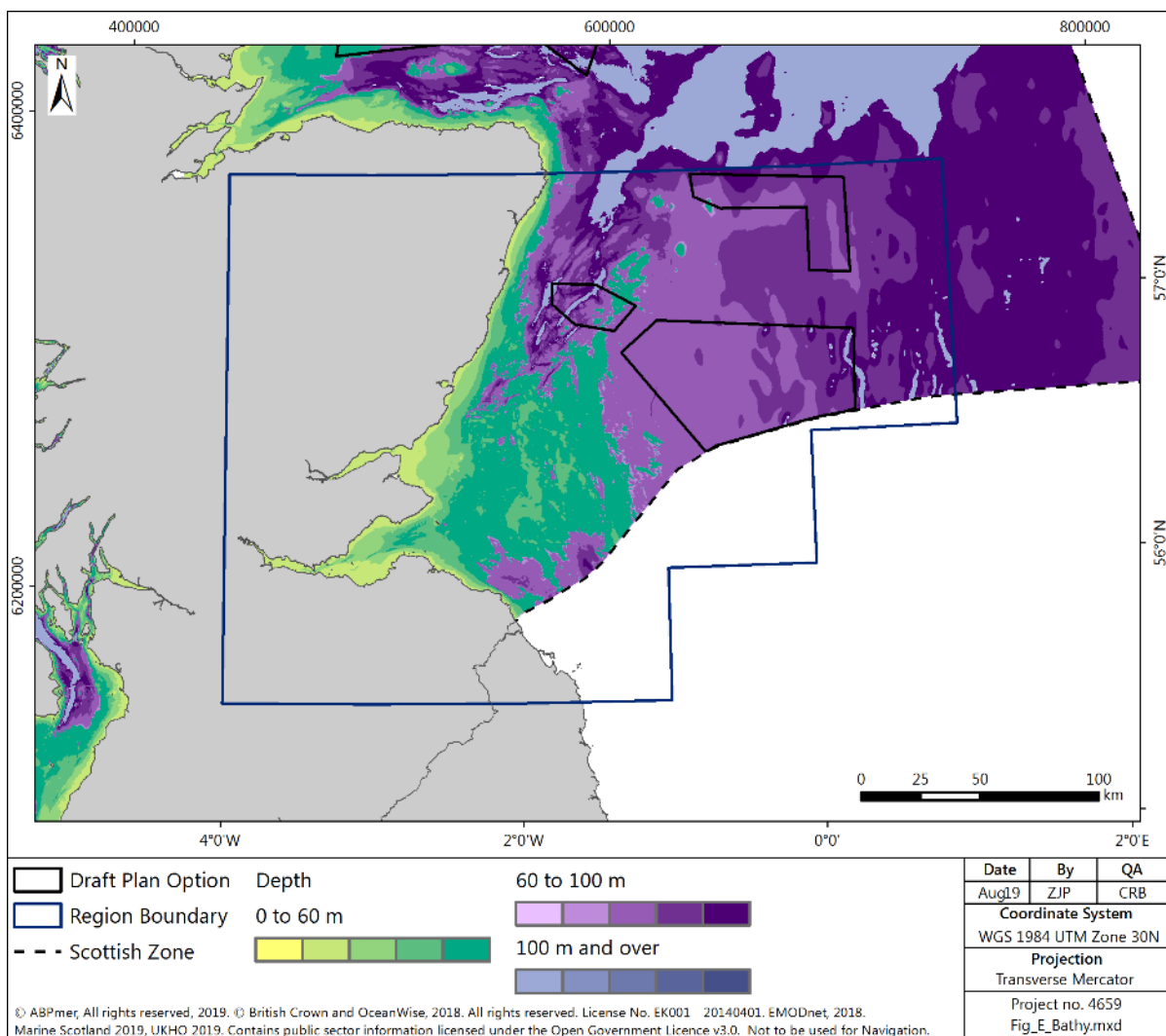


Figure 228 East region: banded water depth

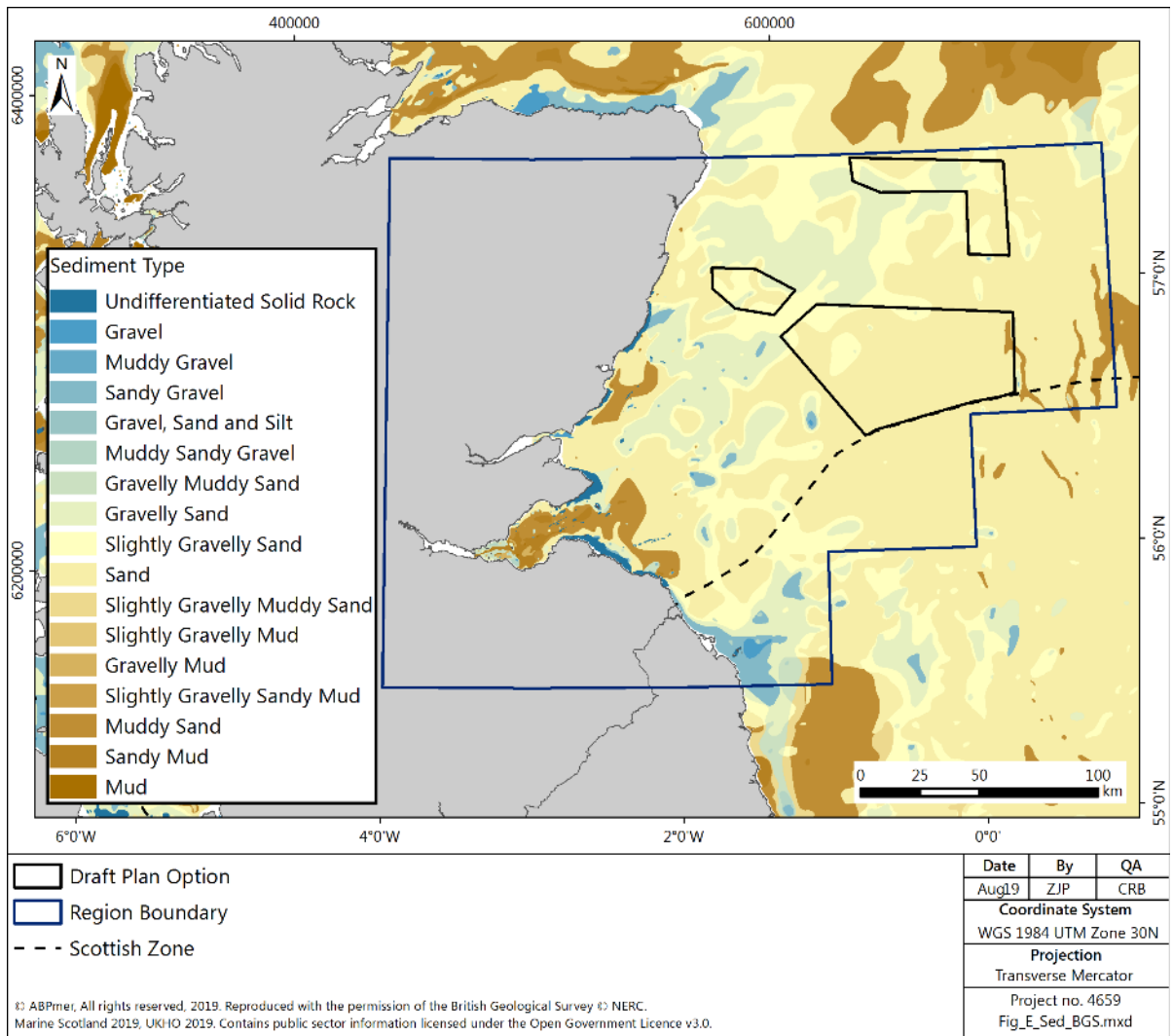


Figure 229 East region: seabed sediments

7.3 Socio Economics

Supply Chain

- 7.3.1 Five locations are identified in the East region³²¹ which could be developed to support the construction, operation and maintenance of offshore wind in the DPOs. These are:
- Peterhead- distributed manufacturing and operation / maintenance;
 - Aberdeen- distributed manufacturing and operation / maintenance;
 - Dundee- distributed manufacturing and operation / maintenance;
 - Energy Park Fife at Methil- further manufacturing; and
 - Leith- integrated manufacturing.
- 7.3.2 In addition, there are a number of sites in other regions discussed within the specific regional text, particularly the North-east region, that have the potential to support the development of offshore wind in the East region.
- 7.3.3 Infrastructure at Peterhead is currently used to support the oil and gas industry, particularly Operation and Maintenance. It is therefore well placed to transfer the skills within the current workforce, as oil and gas within the North Sea is decommissioned, to support the offshore renewable industry.
- 7.3.4 As for Peterhead, infrastructure at Aberdeen is currently principally used to support the oil and gas industry, particularly Operation and Maintenance, and as a result is well placed to transfer the skills within the current workforce to support the offshore renewable industry. Vattenfall, an energy developer, has established an operations and maintenance base within Aberdeen to support the European Offshore Wind Deployment Centre.
- 7.3.5 Dundee has been identified by the NRIP as having the potential to support offshore wind manufacturing, through the development of land suitable for a manufacturing facility, however no development has been undertaken to date.
- 7.3.6 Energy Park Fife at Methil currently supports the offshore wind industry, with companies located on the site undertaking manufacture of components for offshore wind sites currently under development, including the Beatrice wind farm in the North-east region. There is therefore significant potential for the manufacturing facilities on the site to support future development of offshore wind both in the North Sea and further afield.
- 7.3.7 Leith was identified in the NRIP as having the potential to support large scale manufacturing, installation activities and operation and maintenance activities within the offshore renewables industry.

³²¹ Scottish Enterprise and Highlands and Islands Enterprise. 2010. National renewables infrastructure plan Stage 2. Available at <http://www.hie.co.uk/growth-sectors/energy/n-rip.html>.

Energy Generation

- 7.3.8 There are two power stations located within the East region. Peterhead (Combined Cycle Gas Turbine), located on the border between the North-east and East regions, and Torness nuclear power plant on the coast to the south of the Firth of Forth. The Torness nuclear plant is currently proposed to finish generation in 2030.
- 7.3.9 There is currently no proposed or identified potential for wave or tidal energy generation in the East region. In 2013 the Marine Scotland consulted on DPOs for wave and tidal energy^{322, 323}. These DPOs were subsequently recognised in Scotland's National Marine Plan³²⁴. The DPOs identify areas of potential for the future development of wave and tidal energy in Scottish waters (Figure 230). There are no wave or tidal DPO areas identified within the East region.
- 7.3.10 Offshore wind is currently being developed in the East region, with three major developments (Seagreen (1500MW), Inch Cape (600MW), Neart na Gaoithe (450MW)) identified in the outer Firth of Forth and Firth of Tay, inshore of the proposed DPOs, as shown in Figure 230. The Firth of Forth windfarm is consented for Phase 1, however it is currently applying for a variation of consent to update the proposed technology. The progression of the three Firth of Forth windfarms are dependent on the success of bids in the next Contracts for Difference auction in 2019.
- 7.3.11 There are additional small sites offshore of Aberdeen (European Offshore Wind Farm (93.2MW), fully commissioned; and Kincardine (50MW), under construction), Peterhead (Hywind (30MW) fully commissioned) and Methil (12MW) on hold).

³²² Marine Scotland. 2013. Wave Energy in Scottish Waters- Initial Plan Framework (Draft Plan Options). Available at <https://www.gov.scot/Topics/marine/marineenergy/Planning>.

³²³ Marine Scotland. 2013. Tidal Energy in Scottish Waters- Initial Plan Framework (Draft Plan Options). Available at <https://www.gov.scot/Topics/marine/marineenergy/Planning>.

³²⁴ Scottish Government. 2015. Scotland's National Marine Plan, A Single Framework for Managing Our Seas. <https://beta.gov.scot/publications/scotlands-national-marine-plan/>.

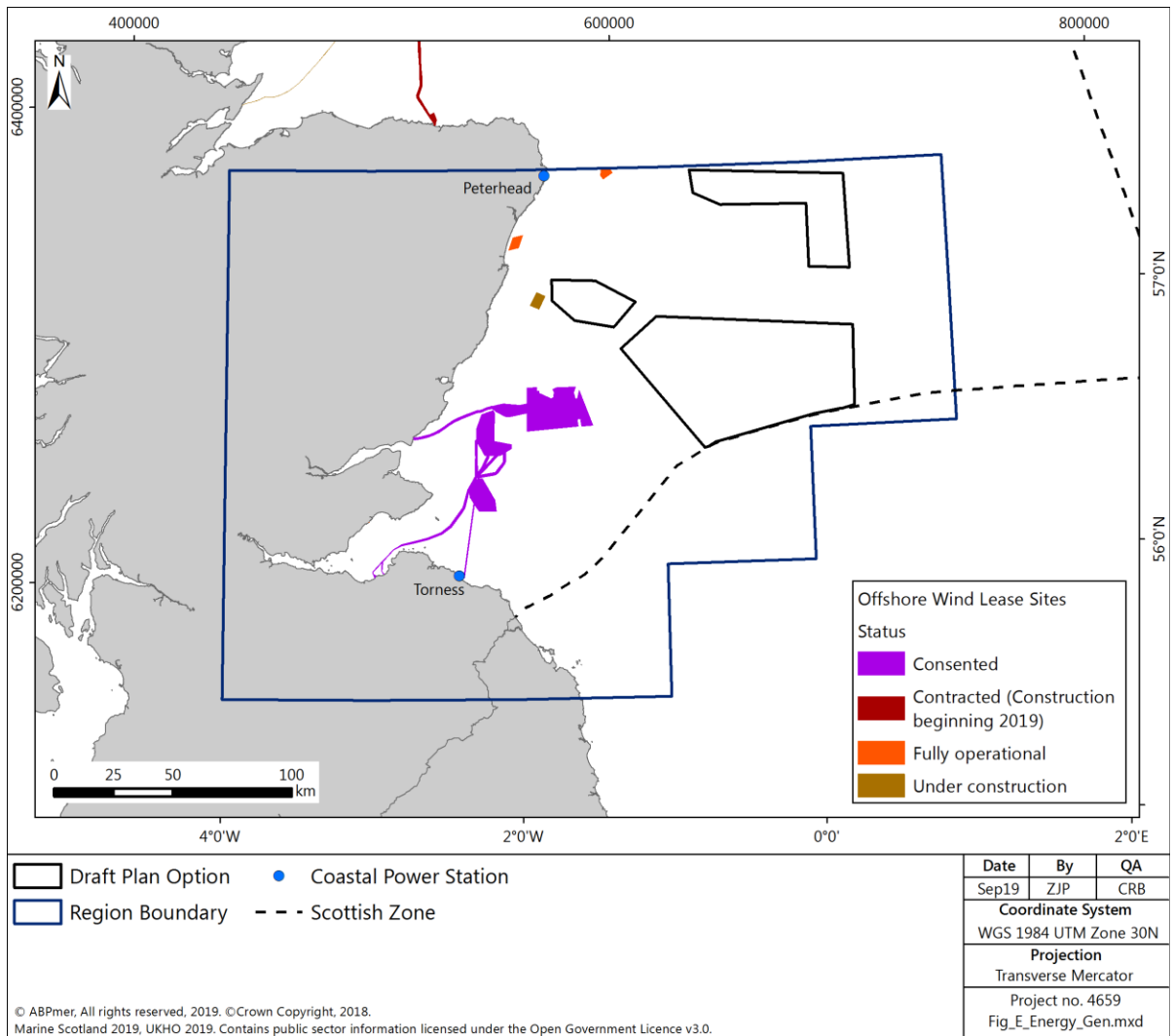


Figure 230 East region: current, planned and potential future offshore energy generation infrastructure

Power Interconnectors

7.3.12 There are no power interconnectors in the East region of Scotland, however there is a proposed Eastern HVDC which may, in future (around 2028), connect Peterhead on the northern border of the region with North-east England, but this project is currently classed as dormant³²⁵.

Telecom Cables

7.3.13 The East region has few active telecom cables (41km), with just a short stretch coming off the coast from Aberdeen. None of the DPOs are near telecom cables (see Figure 231).

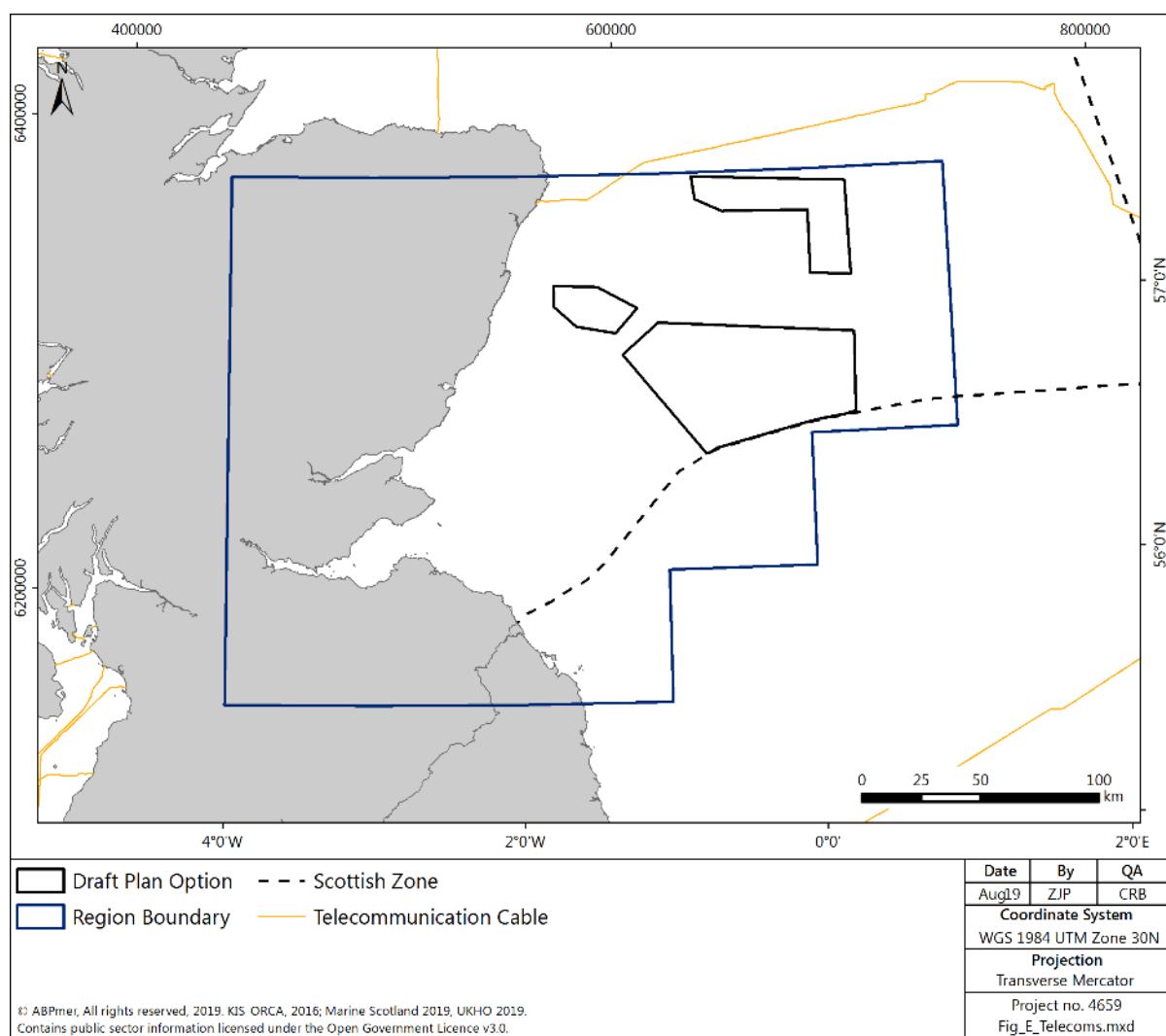


Figure 231 East region: active telecom cables

³²⁵ 4COffshore. 2019. Eastern HVDC Link (E4DC Peterhead – Hawthorn Pit) Interconnector: Events. Available at: [https://www.4coffshore.com/transmission/interconnector-eastern-hvdc-link-\(e4dc-peterhead--hawthorn-pit\)-icid9.html](https://www.4coffshore.com/transmission/interconnector-eastern-hvdc-link-(e4dc-peterhead--hawthorn-pit)-icid9.html)

Carbon Capture and Storage

- 7.3.14 The current development of the potential carbon and capture industry in Scotland is centred around the North-east and East regions with the sole proposed development by ACT Acorn using existing Oil and Gas infrastructure to transport CO₂ from St Fergus, near Peterhead (approximately on the boundary between the two regions) north-east to the Captain Sandstone saline aquifer (Figure 232).
- 7.3.15 It is therefore likely that the majority of the potential economic benefits associated with the development of a CCS industry will be realised within the North-east and East regions.
- 7.3.16 The Captain aquifer currently identified for development does not directly overlap with any of the DPOs identified in the East region, although there are further saline aquifers in the seas further offshore to the east of E2, which in future may have the potential to support CCS development.

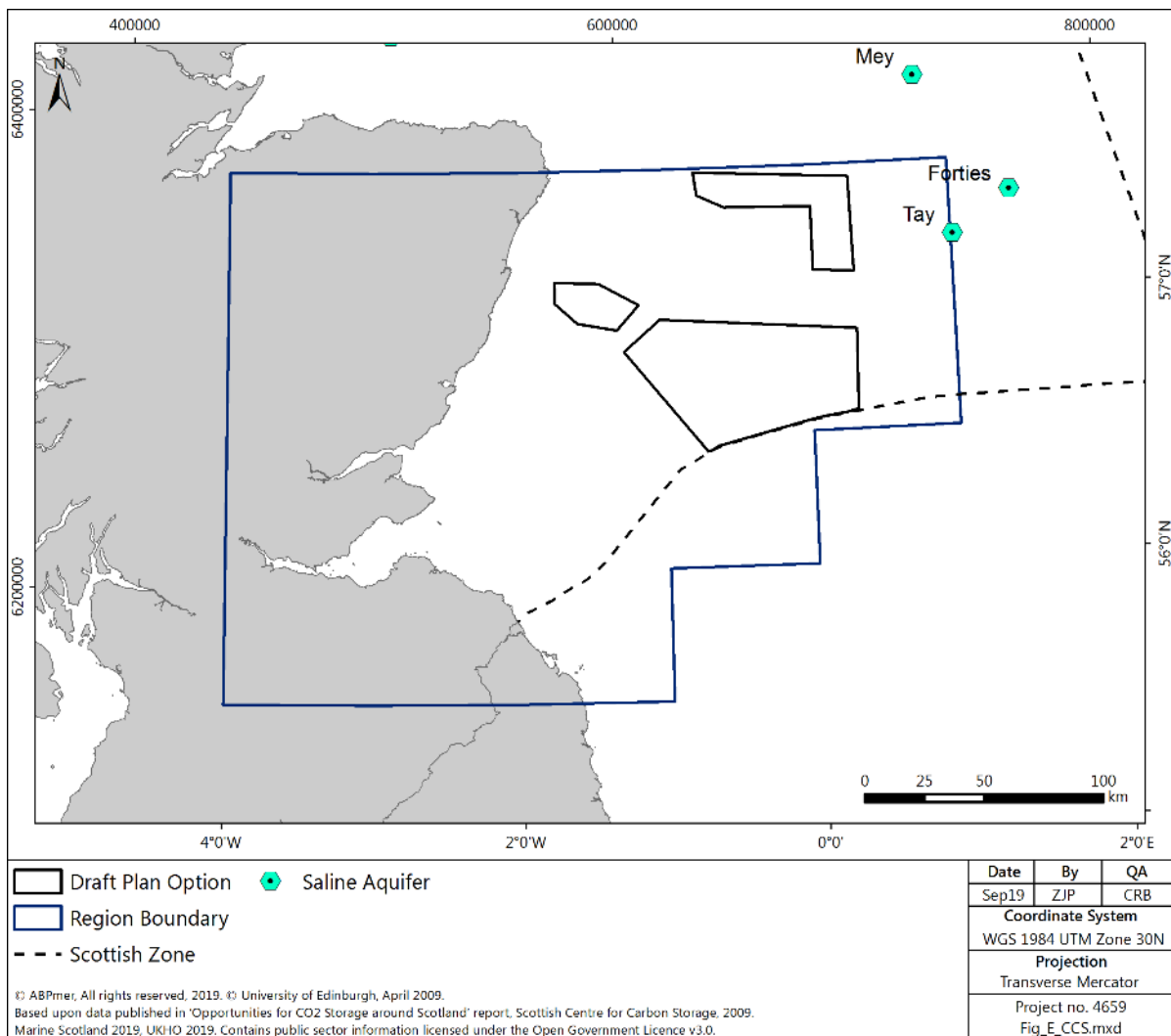


Figure 232 East region: saline aquifers

Oil and Gas

7.3.17 In the East region oil and gas activity is concentrated in offshore waters (see Figure 233). There are 17 producing hydrocarbon fields in the region (all producing oil).

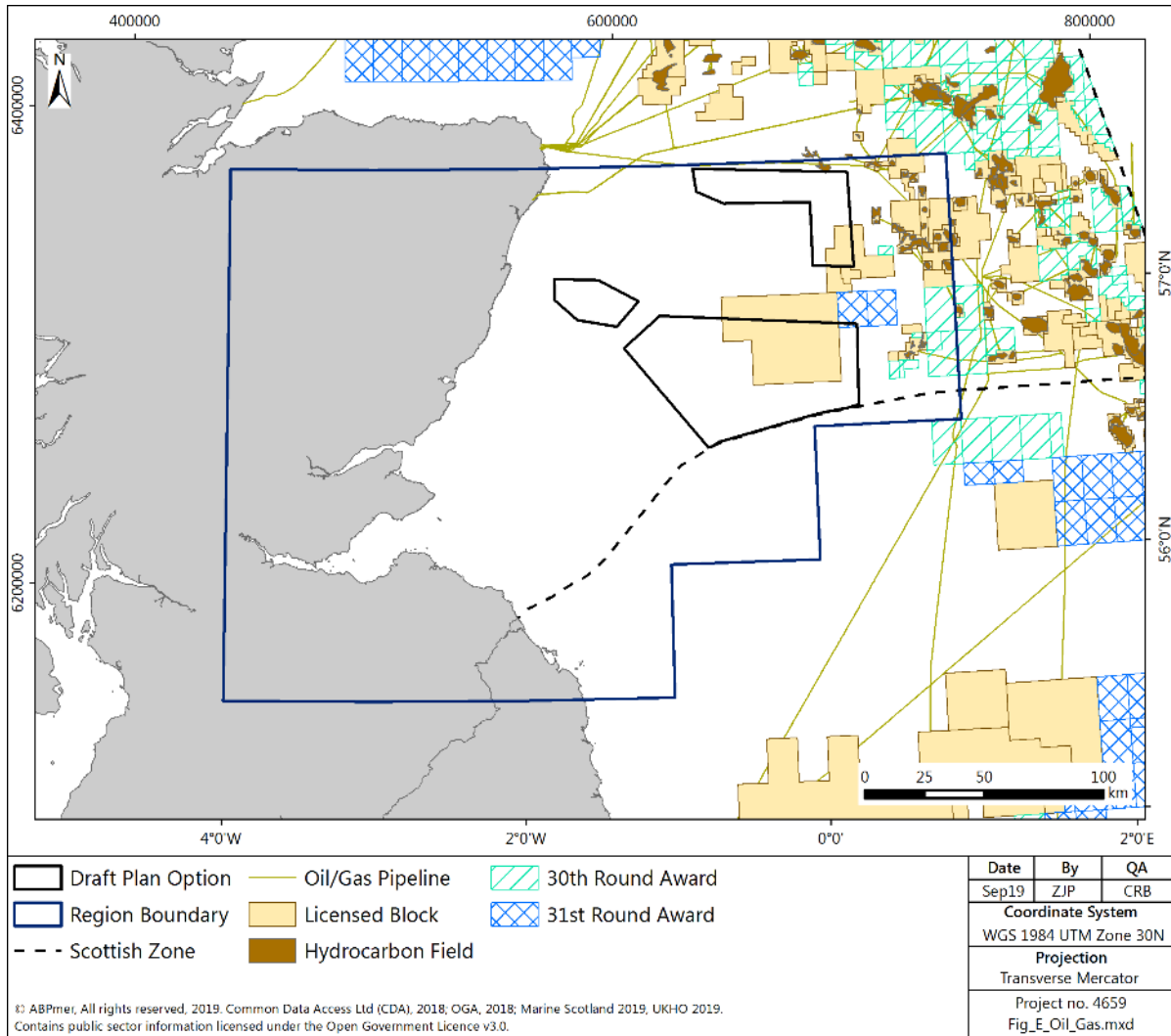


Figure 233 East region: oil and gas infrastructure and licensed blocks

7.3.18 E1 and E2 both overlap with licensed blocks³²⁶.

³²⁶ Oil and Gas Authority (OGA). 2019. Offshore interactive map. Available at: <https://ogauthority.maps.arcgis.com/apps/webappviewer/index.html?id=adbe5a796f5c41c68fc762ea137a682e>
Accessed on 17/07/2019.

Aviation

- 7.3.19 The East region has two major airports, three civil aviation aerodromes and three helicopter rescue stations (see Figure 234).
- 7.3.20 Aberdeen is an international airport which offers a wide variety of destinations to fly to. The airport also serves the offshore industry which means it has frequent helicopter flights³²⁷, the routes of which go directly through E1 and E3 proposed areas for development. A large portion of the East region (including E1 and the western corner of E2 and E3) is covered by the primary surveillance radar used by Aberdeen airport.
- 7.3.21 Edinburgh is Scotland's busiest airport and had over 9.4 million passengers passing through its terminal in 2016.
- 7.3.22 Dundee is also an important airport for the East region of Scotland and is used for scheduled, private and chartered flights.
- 7.3.23 Aberdeen and Edinburgh airports are safeguarded civil aerodromes.

³²⁷Aberdeen International Airport. 2018. Offshore Working. Available at <https://www.aberdeenairport.com/flight-information/offshore-working/>. Accessed 17/10/2018.

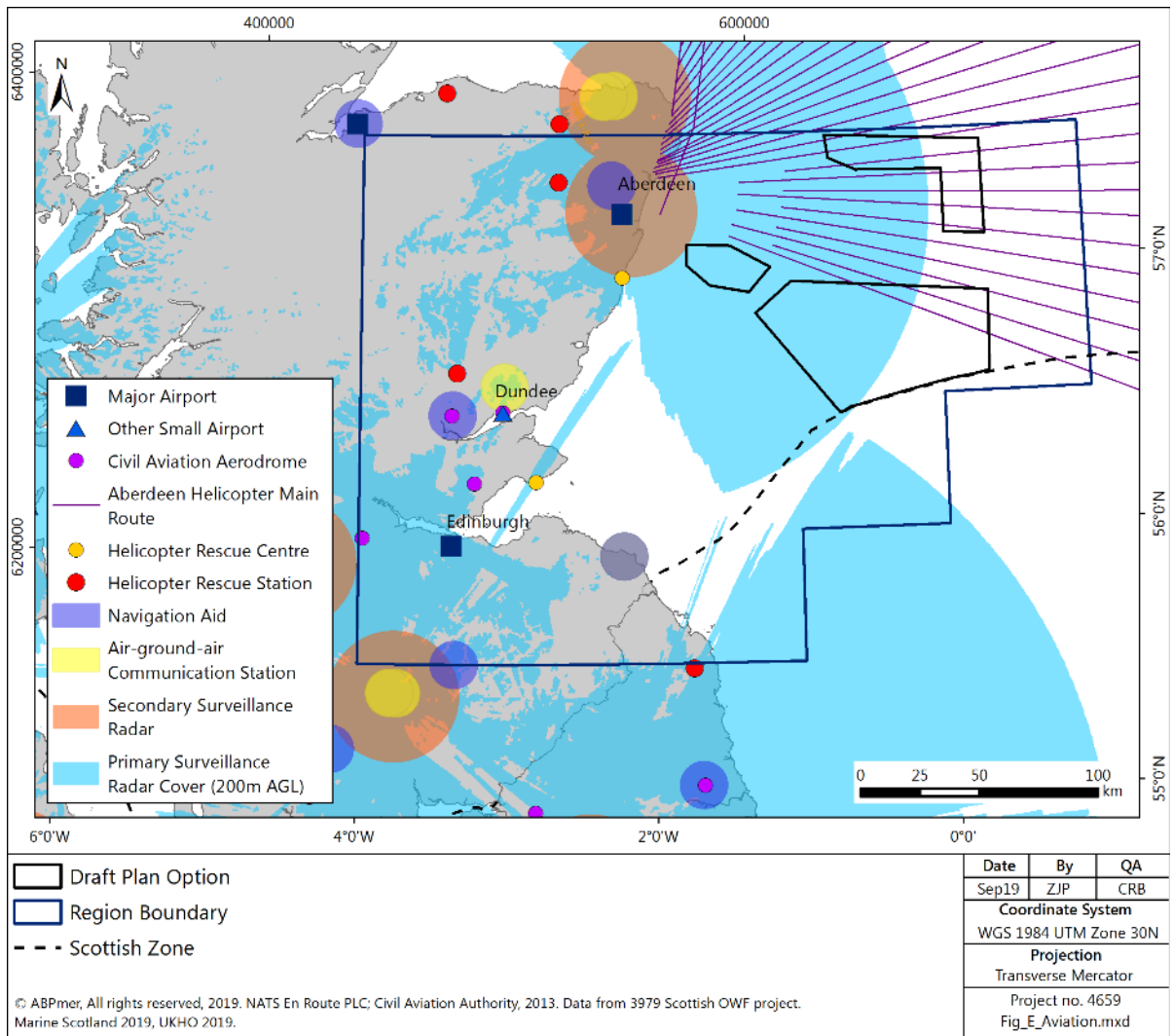


Figure 234 East region: aviation infrastructure, key routes and radar coverage

Defence

- 7.3.24 There is a high concentration of defence assets in the East region used for free navigation for surface and subsurface naval vessels for national defence; safeguarding of navigational routes and nationally critical infrastructure; designated Danger Areas and Exercise Areas for military training and defence test & evaluation purposes; retain strategic maritime infra-structure, installations and coastal MOD facilities.
- 7.3.25 None of the DPOs in the East region are within or overlap with firing danger areas or Navy exercise areas (Figure 235). In addition to military establishments in the public domain, it is recognised that further military assets may be present in the region. Any concerns regarding assets of this type will be identified in consultation with the MOD at a project level.
- 7.3.26 The MOD support a number of jobs in the East region, both directly and indirectly. Employment is largely through the Leuchars Station army facility and through ship-building facilities in the Firth of Forth related to the construction of the Queen Elizabeth class aircraft carriers. No regional breakdown of employment figures are available within Scotland, however it is likely that an appreciable portion of the direct and indirect employment figures discussed in the national overview above are located in the East region.

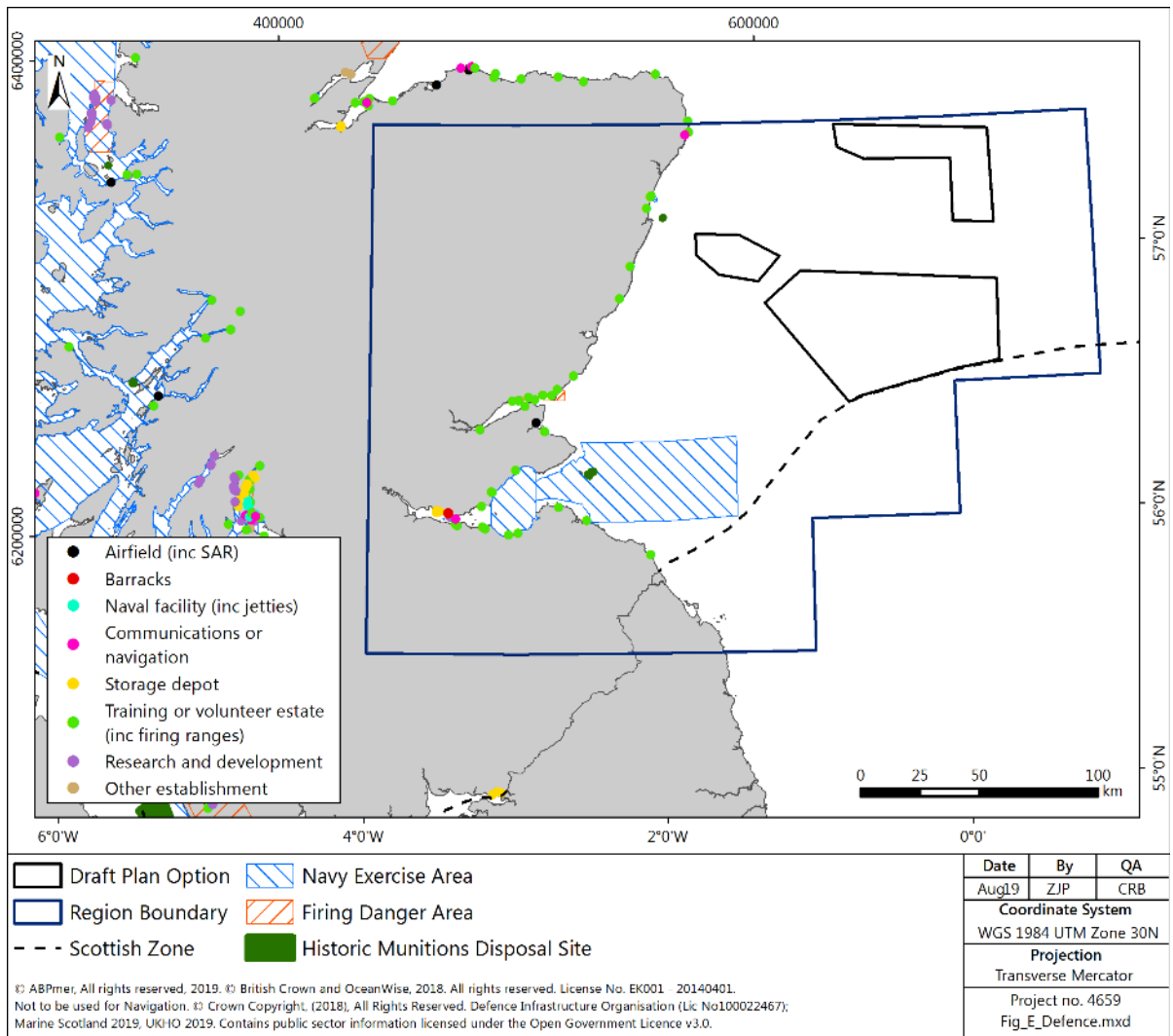


Figure 235 East region: defence infrastructure and exercise areas

Fishing

- 7.3.27 Landings from UK-registered vessels caught in the East region had an average annual value of £113 million and an average live weight of 9,966,151 tonnes for the five year period 2013-2017. [
- 7.3.28 The majority of landings were shellfish (46%) and demersal (34%) with the vast majority of landings by the over 12 m fleet (95%). The main gear types are demersal trawls (41%), mechanical dredges (35%) and midwater trawls (15%).
- 7.3.29 Figure 236 shows over-15m fishing intensity by mobile demersal gears, which operate across the region. *Nephrops* trawls operate outside the Firth of Forth, particularly between Eyemouth and Anstruther, while scallop dredgers operate from Arbroath to Peterhead. Over-15m pelagic vessels operate at a lower intensity in the region, although there is some patchy herring fishing in the northern, eastern and southern parts of the region (Figure 237). Fishing by over-15m vessels using static gear is minimal or absent from the region (Figure 238).
- 7.3.30 Areas important for under-15m vessels are the Firth of Forth (mostly *Nephrops* trawls), and from Pittenweem to St Andrew's Bay and along the coast from Arbroath to Stonehaven (crab/lobster creels) (Figure 239, Figure 240).
- 7.3.31 There were 266 fishing vessels with their Home Port registered within the East region in 2016³²⁸. This region had this highest proportion of under-10 m vessels of all the regions (85%), and only 3% of vessels were over-15m in length. The ports with the most registered vessels were Eyemouth (60), Pittenweem (56), Aberdeen (40), Gourdon (10) and Seahouses (10). Home ports within the East region are shown in Figure 241.

³²⁸ MMO, 2016. UK Fishing Vessel Numbers by Home Port 2016. Available at: https://www.geostore.com/environment-agency/rest/catalogue/download/mmo_wms_united_kingdom_fishing_vessel_numbers_by_home_port_2016?format=ESRI_Shapefile. Accessed 25/10/2018.

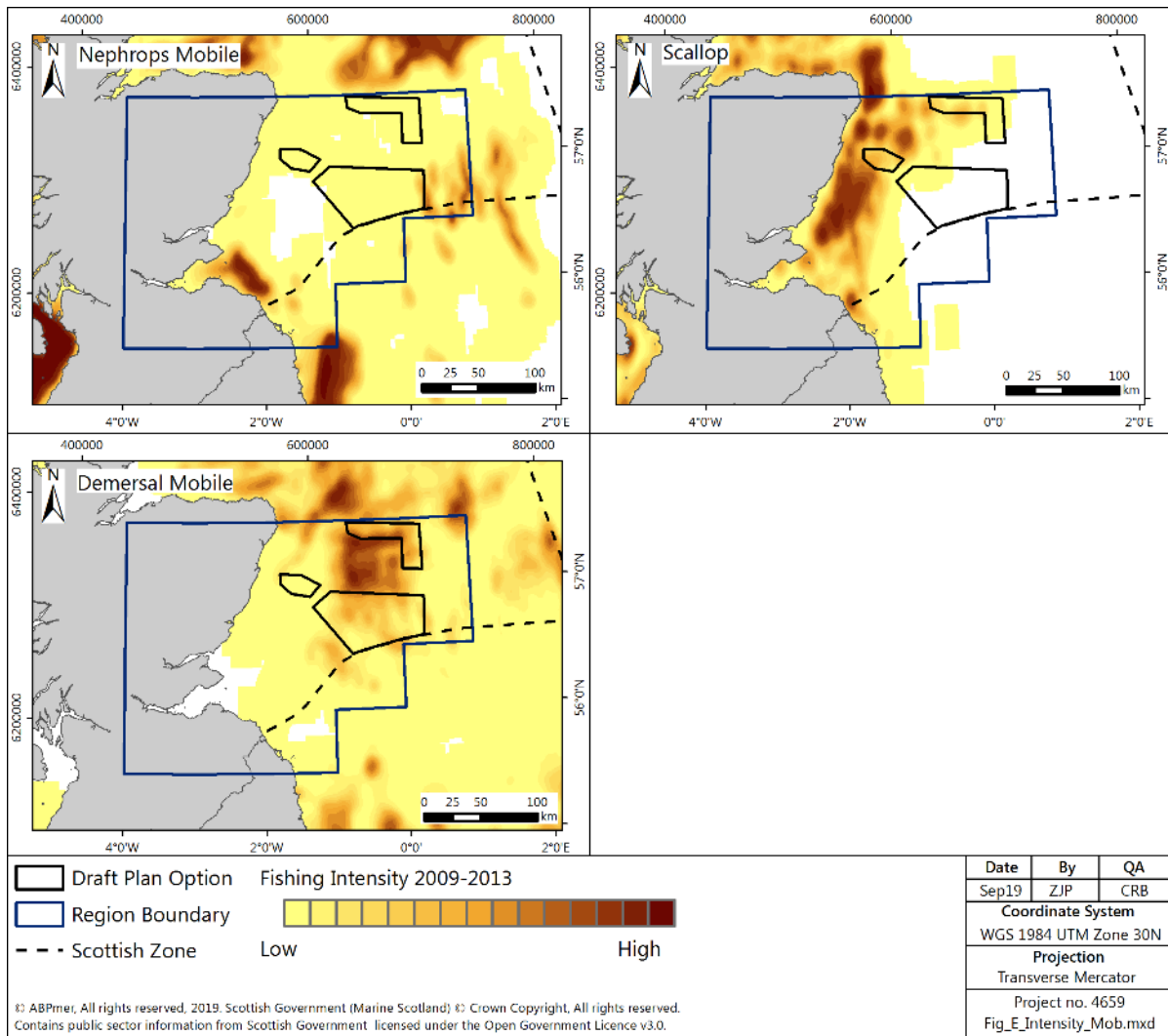


Figure 236 Fishing intensity for over-15m vessels in the East region using demersal mobile gear (2009-2013)

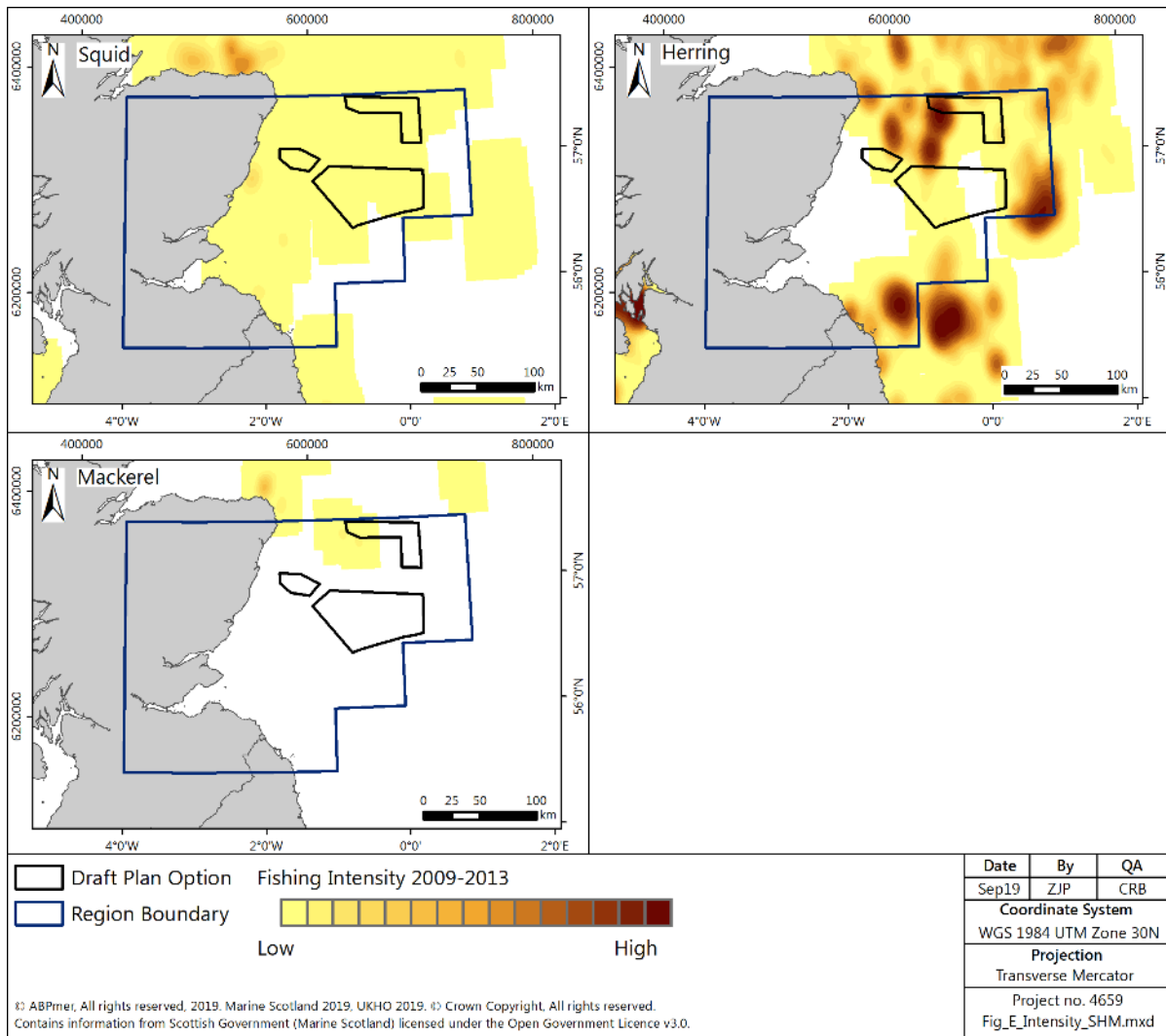


Figure 237 Fishing intensity for over-15m vessels in the East region targeting pelagic species (2009-2013)

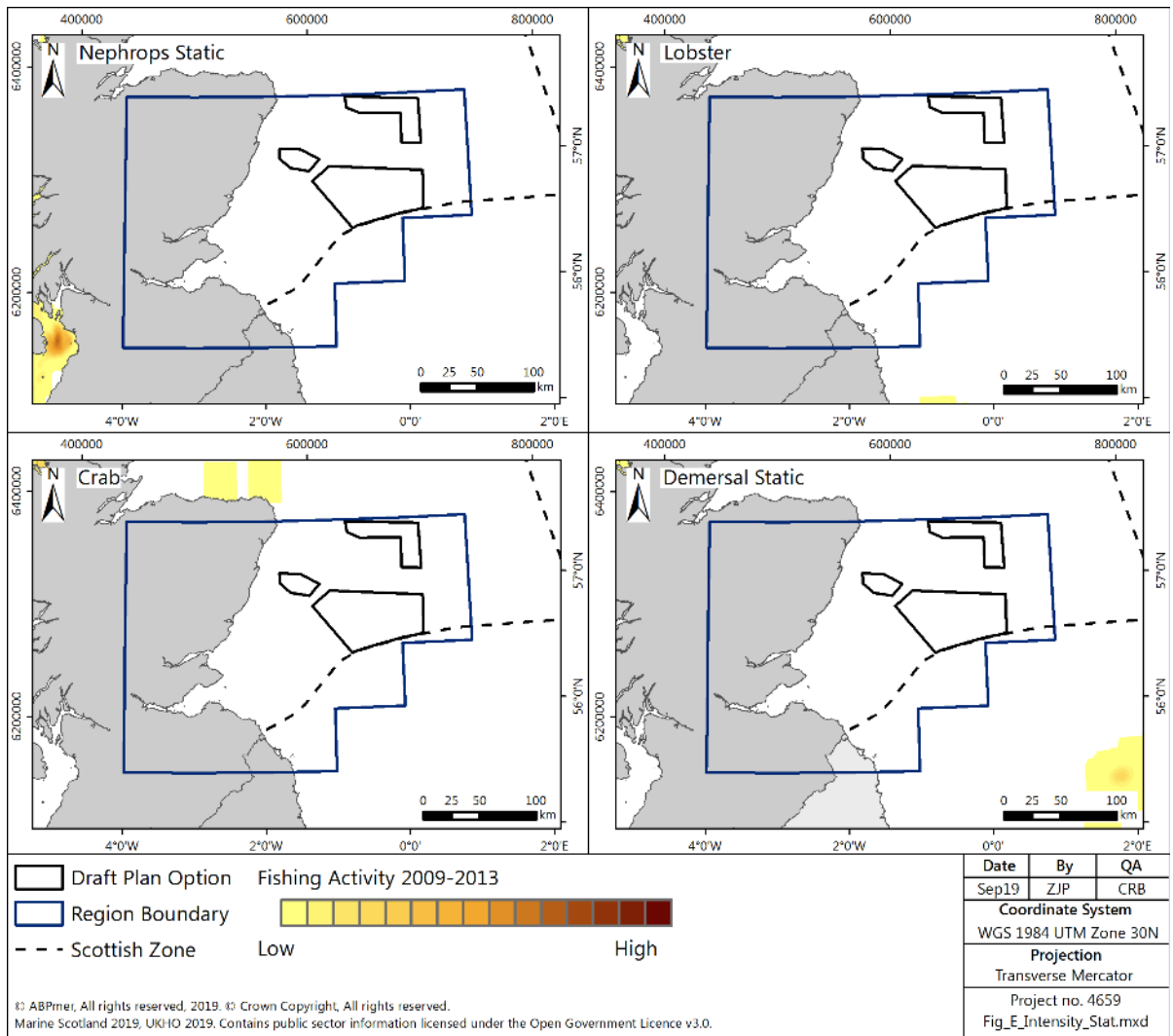


Figure 238 Fishing intensity for over-15m vessels in the East region using static gear (2009-2013)

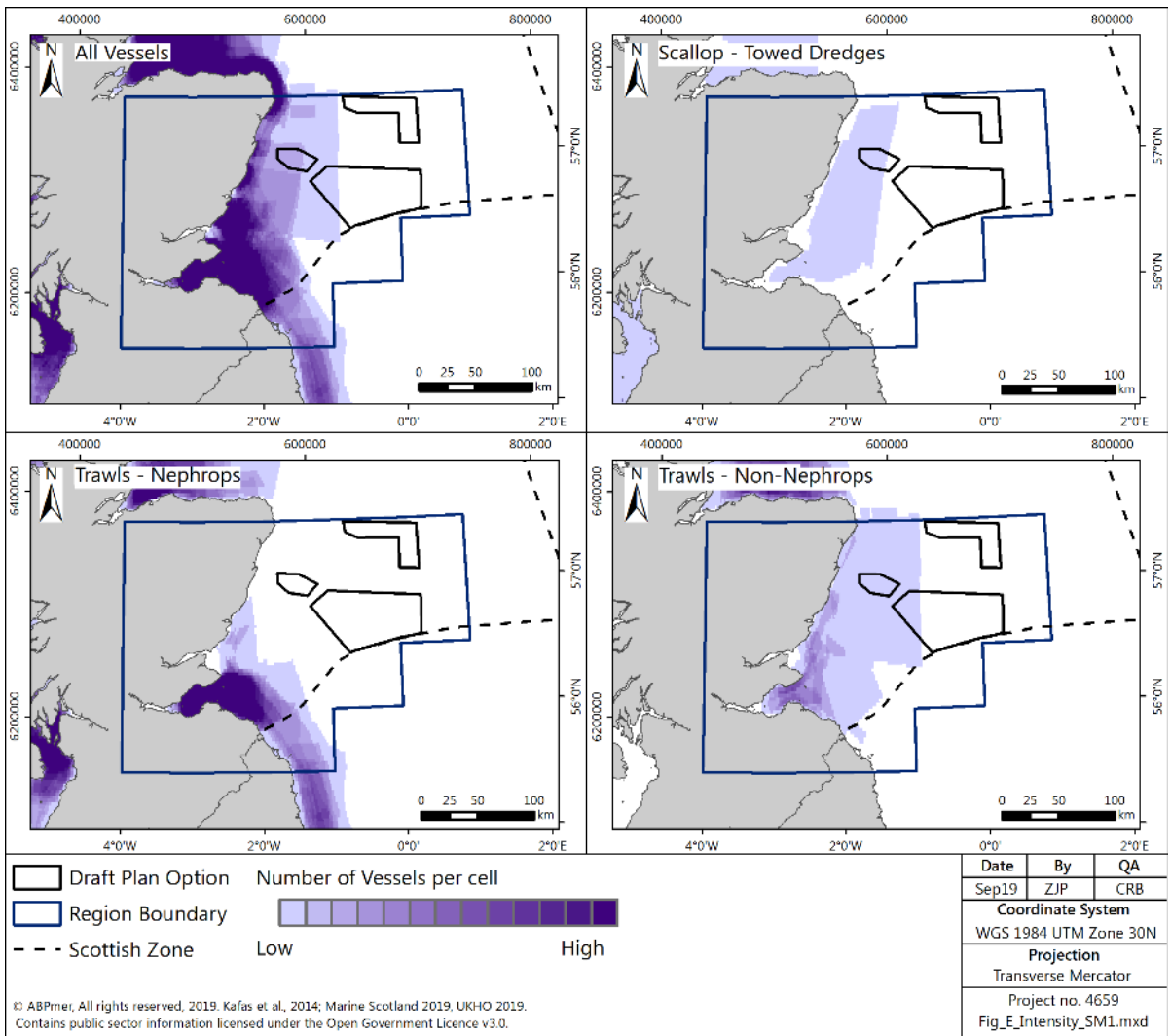


Figure 239 Number of vessels for under-15m vessels in the East region, all gears and mobile demersal gears, from ScotMap

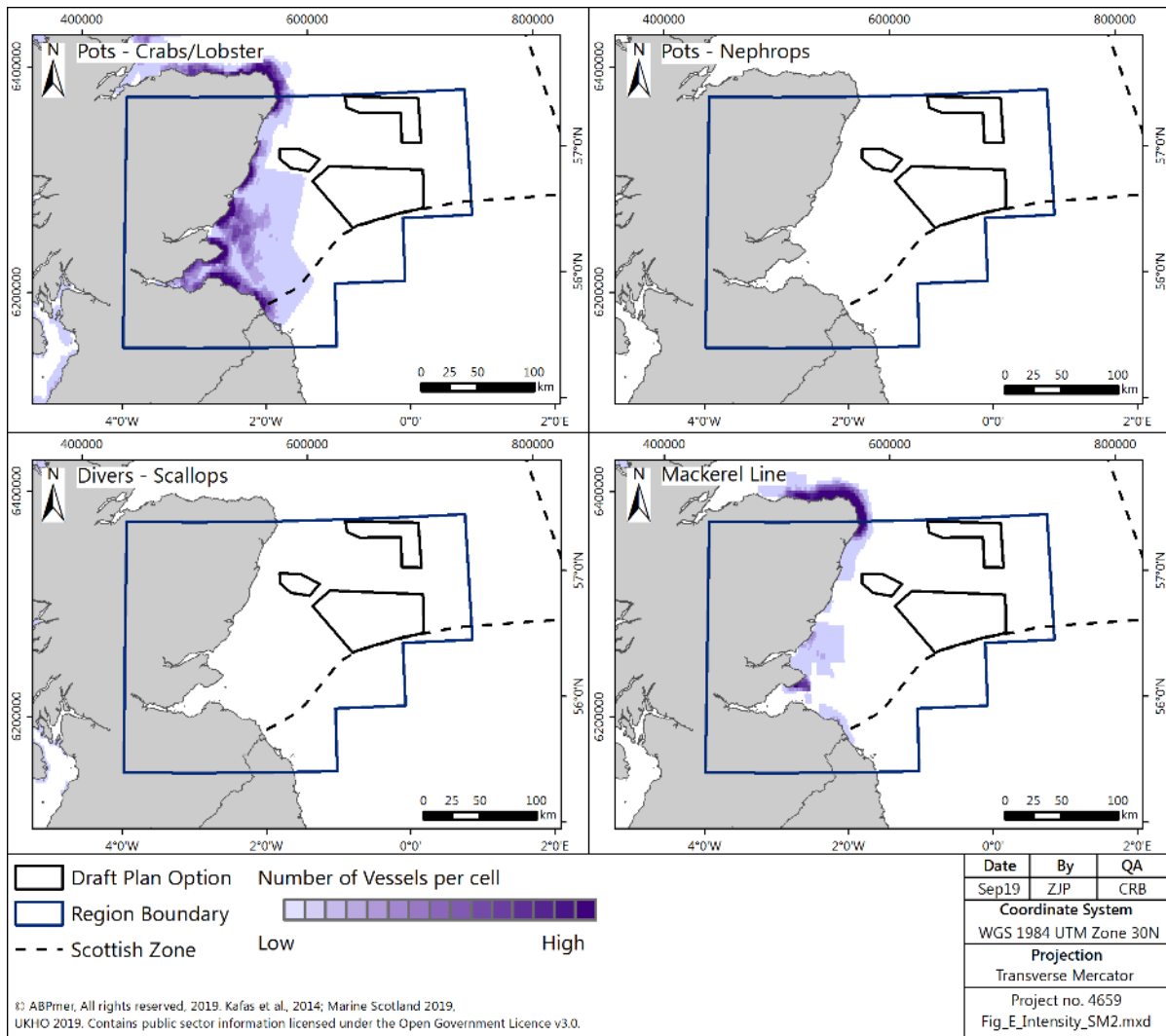


Figure 240 Number of vessels for under-15m vessels in the East region, pots, divers and mackerel lines, from ScotMap

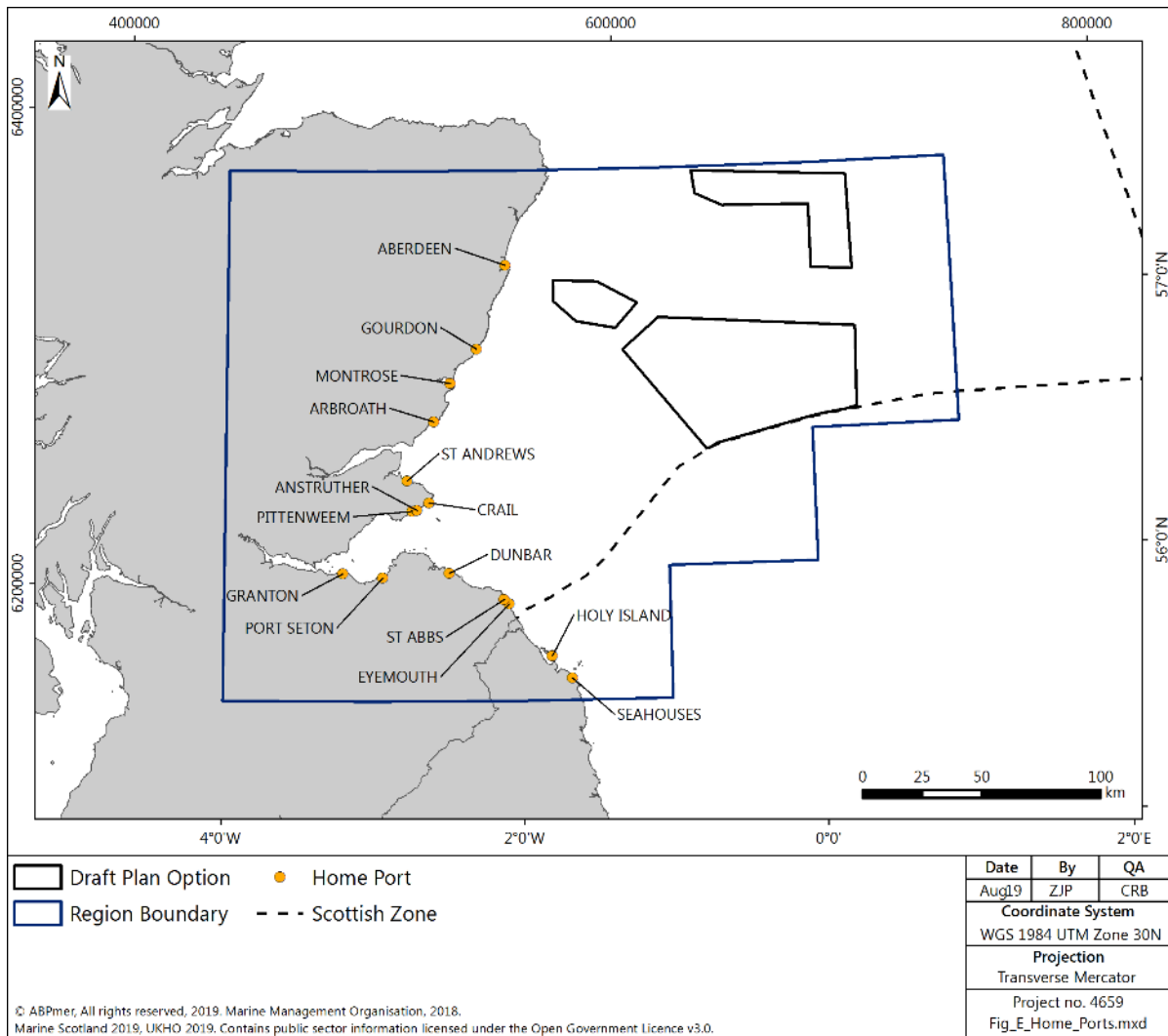


Figure 241 East region: distribution of home ports

- 7.3.32 The main landing ports (in terms of value of landings in 2017) in the East region are Pittenweem (£3.5 million), Eyemouth (£2.7 million) and Arbroath (£1.9 million)³²⁹.
- 7.3.33 There are five fixed engine sites for wild salmon and sea trout, around Peterhead, Montrose and Eyemouth, and six net and coble sites near Peterhead, Montrose, Firth of Tay and Firth of Forth (Figure 242).
- 7.3.34 The main rod and line fishing rivers in this region are the Rivers Carron (salmon), Don (salmon and sea trout), Dee (salmon and sea trout), North Esk (salmon), South Esk (salmon and sea trout), Tummel (salmon), Tay (the largest of Scotland's salmon rivers), Earn (salmon and sea trout), Alan (salmon and sea trout), Teith and Forth (one of the best salmon rivers in Central Scotland), Tyne

³²⁹ Scottish Government, 2018. Scottish Sea Fisheries Statistics 2017. Available at: <https://www.gov.scot/Topics/Statistics/Browse/Agriculture-Fisheries/PubFisheries>. Accessed 22/10/2018.

- East Lothian (sea trout), Whiteadder (salmon and sea trout), Tweed (salmon and sea trout) Teviot (salmon and sea trout), Ettrick and Yarrow (salmon) ³³⁰.

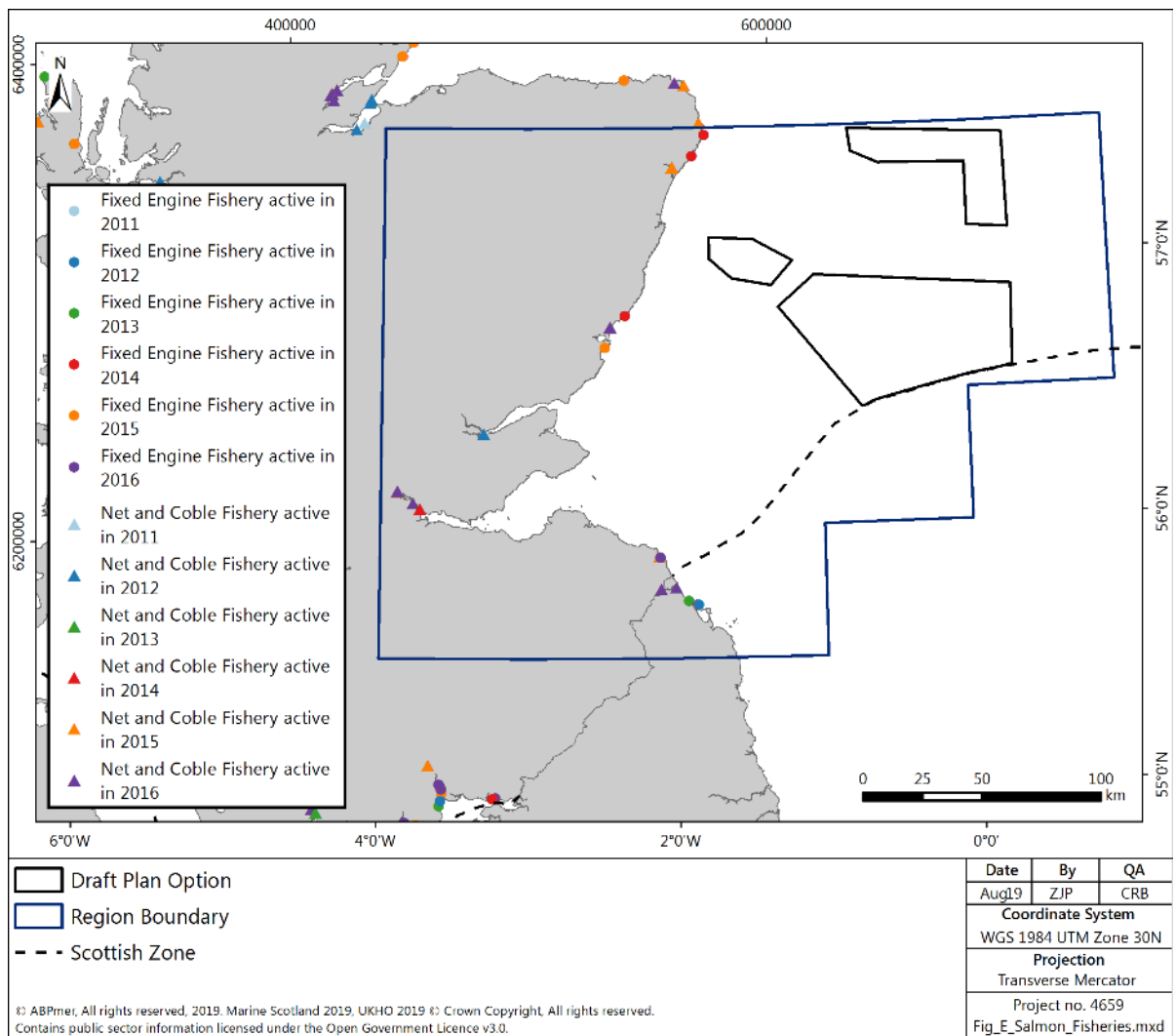


Figure 242 Salmon and sea trout net fisheries reporting catches in 2011–2016 in the East region

³³⁰ Scottish Government. 2012. Offshore Wind Energy in Scottish Waters - Draft Regional Locational Guidance. doi: 10.7489/1686-1.

Aquaculture

7.3.35 There are very few aquaculture facilities in the East region (3 licensed finfish and 4 shellfish installations) and none in or close to the DPO sites (see Figure 243).

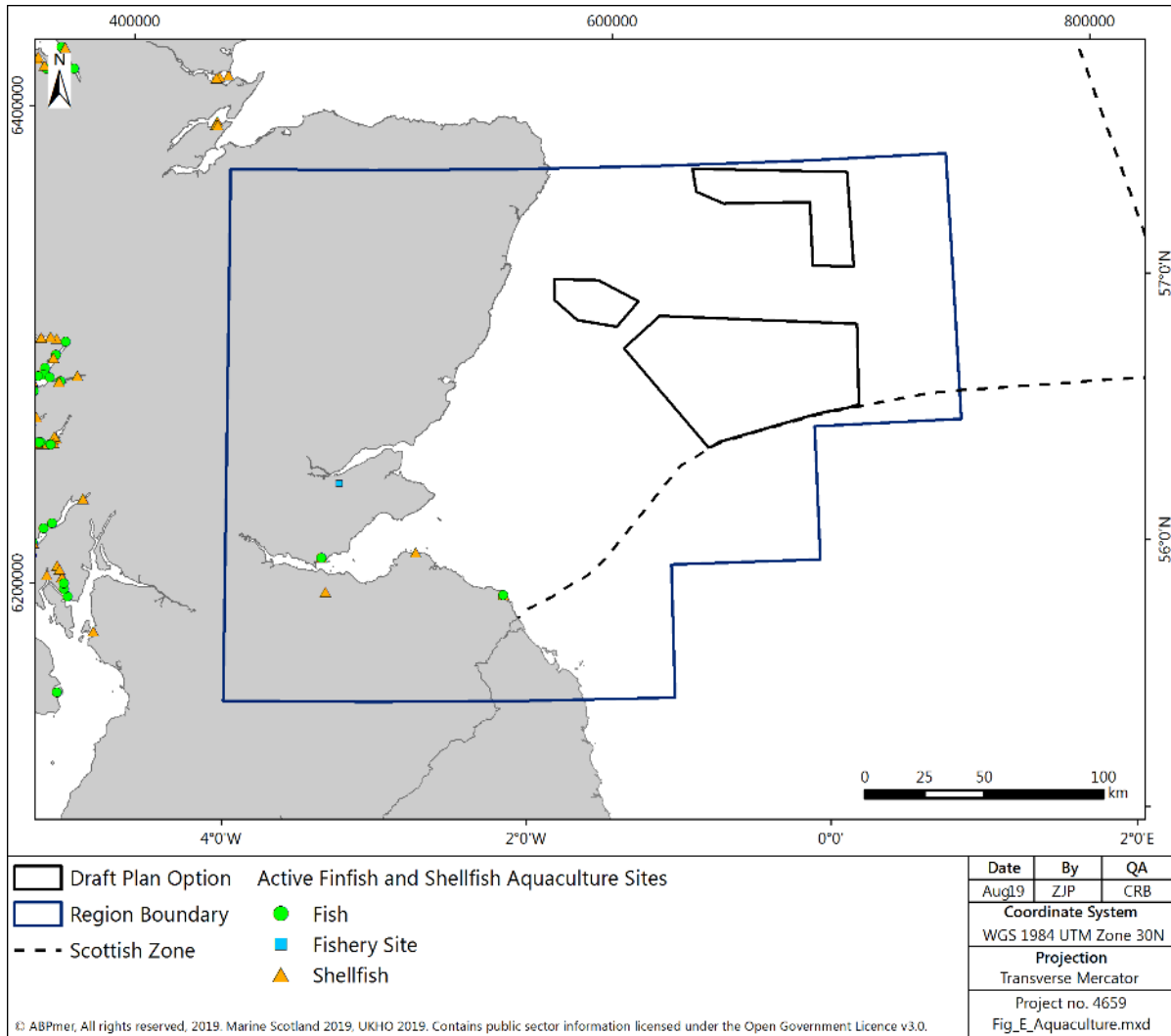


Figure 243 East region: marine aquaculture sites

Ports and Harbours

- 7.3.36 In the East region there are 6 major ports, 2 minor ports and many smaller harbours (see Figure 244).
- 7.3.37 Aberdeen is a large commercial port, supporting the oil and gas industry and cargo transport. The NRIP explored scope for using sites at the port for further development to allow for wider vessels and construction of facilities onshore. It was included in phase one sites for distributed manufacturing and operation/maintenance.
- 7.3.38 Dundee port was identified in the NRIP for distributed manufacturing, operation and maintenance related activities. It expects that the port will play a significant role in supporting renewable energy development and investment, given the suitability of its facilities.
- 7.3.39 Leith port is the largest enclosed deep-water port in Scotland. It handles general cargo and cruise liners. The NRIP stage 2 report identifies Leith as a strong location for large-scale manufacturing, installation activities and operations and maintenance for the renewables industry.
- 7.3.40 Grangemouth is Scotland's largest container port, located towards the westernmost extent of the Firth of Forth and handles approximately 150,000 containers per annum.
- 7.3.41 Rosyth is located on the north bank of the River Forth and provides support for freight ferry services and cargo transport, including timber, bulk salt, rapeseed meal and animal feed.
- 7.3.42 There is a high concentration of anchorages in the Firth of Forth and the Firth of Tay reflecting the high level of sailing activity in the area. None of the anchorages overlap with the DPOs.
- 7.3.43 There are a few dredge disposal sites in the region. They are all close inshore and do not overlay with the DPOs.

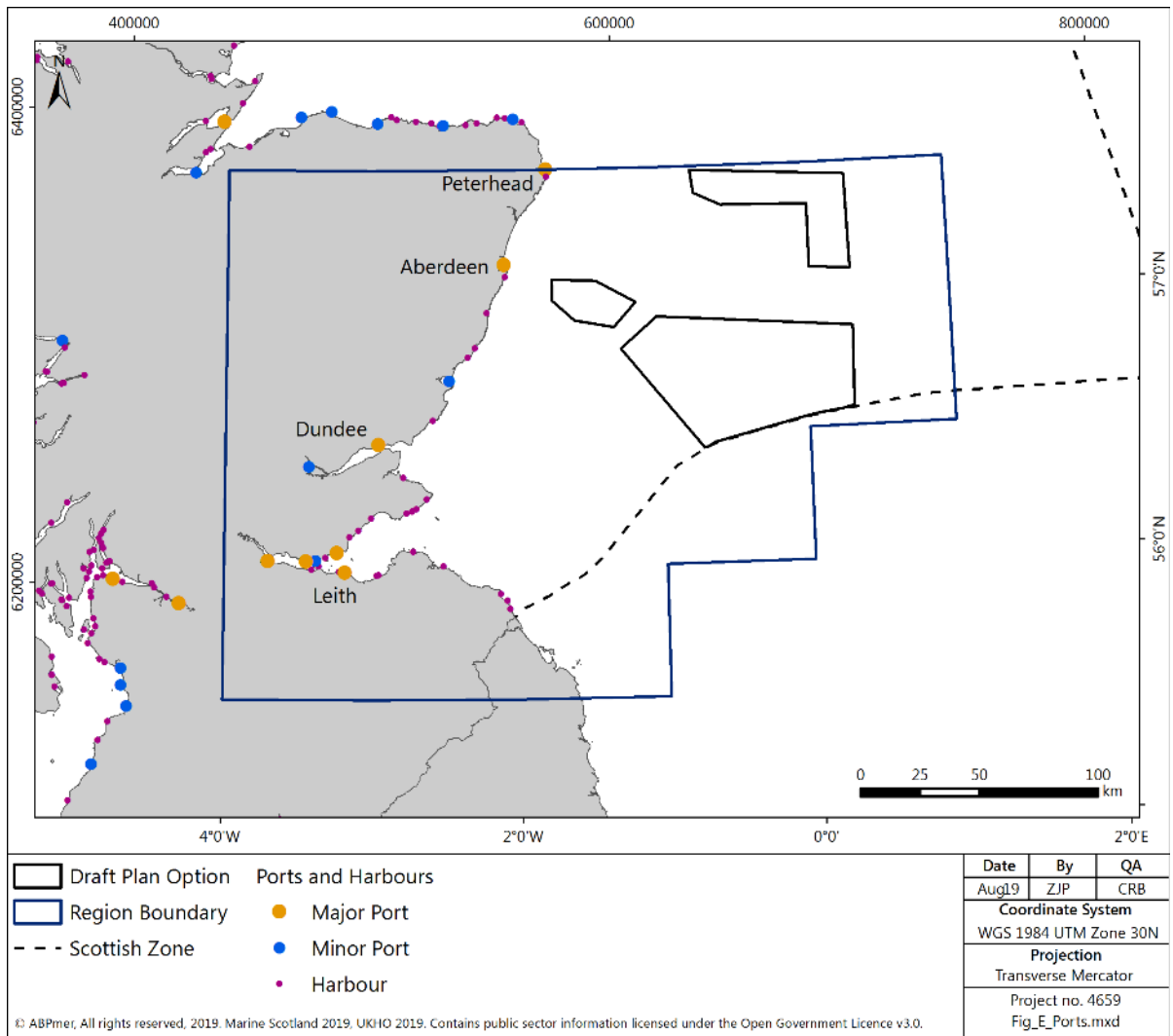


Figure 244 East region: ports and harbours

Shipping

- 7.3.44 Areas of high shipping density, up to 100 vessels per week, (Figure 245) in the East region are generally concentrated around the Firth of Forth and the Firth of Tay (with a smaller hotspot around Montrose) in the southern half, and around Aberdeen and Peterhead in the north. Much of the traffic offshore from Peterhead and Aberdeen is linked to the oil and gas industry, with the port service craft transit lines emphasising these movements. In addition, there is a line of high density offshore from the Firth of Forth but inshore from E3 with up to 20 vessel transits per week linking ports in England to Aberdeen and areas further north. The majority of the traffic tends to be relatively close inshore around the Firth of Forth and is associated with the East coast route from England linking to Edinburgh.
- 7.3.45 As identified in the North-east region above, ferry services from Aberdeen link to the Orkney Islands and the Shetland Islands, providing lifeline services. The majority of these movements within the East region is close to shore to the north of Aberdeen with no interaction with the DPOs.
- 7.3.46 The DPOs further offshore are generally in areas of lower shipping density, however DPO E3, closer to Aberdeen, has the potential to interact with a wide range of shipping, including oil and gas related activity and routes across the North Sea to Europe, some of which may also interact with DPOs E2 and E1.

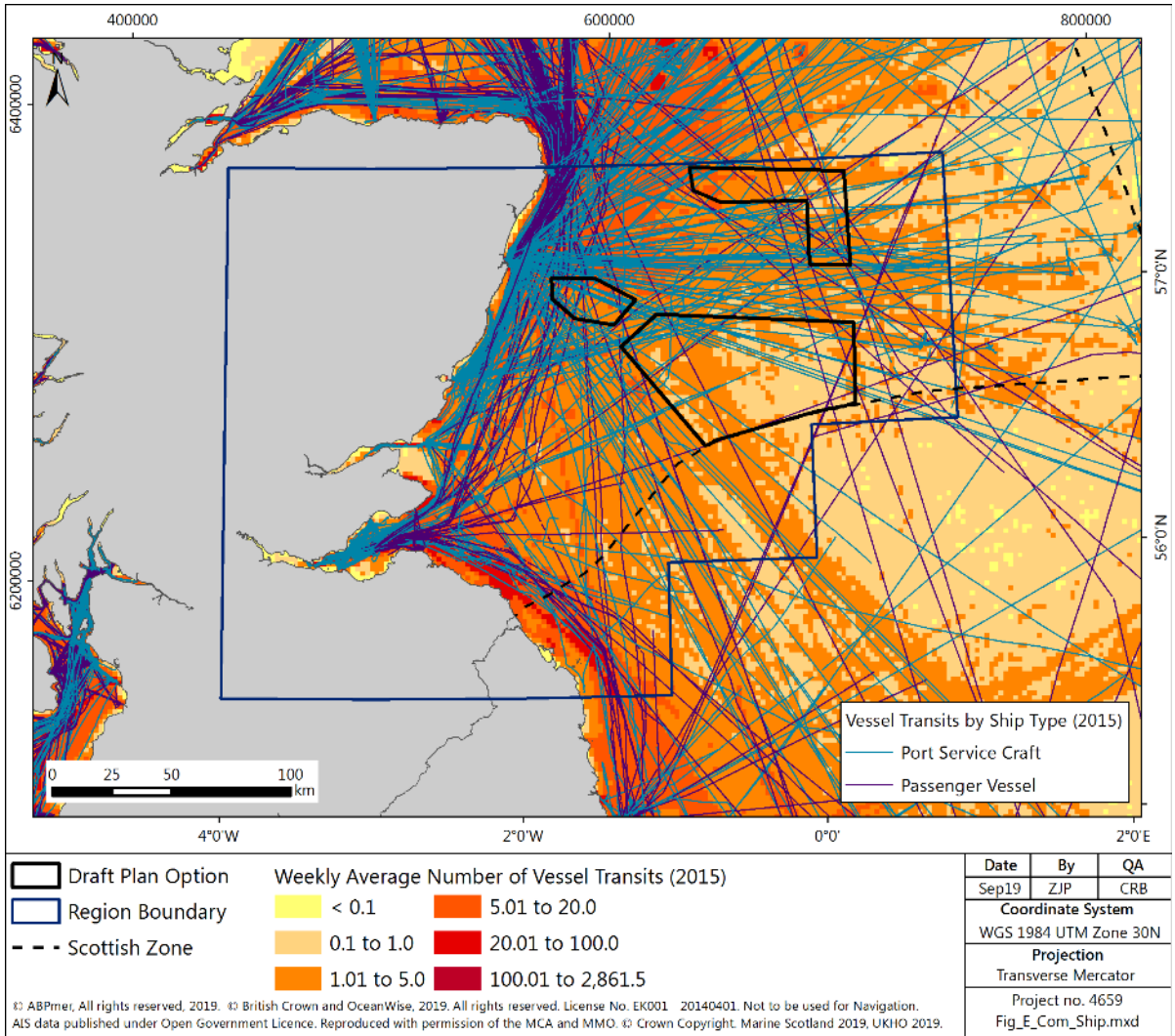


Figure 245 East region: shipping densities and key routes

Coastal and Flood Protection

7.3.47 There are a few areas of Coastal and Flood protection in the East region that have been developed since 1961, shown on Figure 246, although extensive sections of the Firth of Forth and Firth and Tay estuaries have protection works. The more recent developments are mostly concentrated around the Firth of Forth and the River Tay estuary with two further areas of coastal protection to the west, directly inshore of, DPO E3. There are some further areas of hard defence within the East region, generally associated with harbour infrastructure.

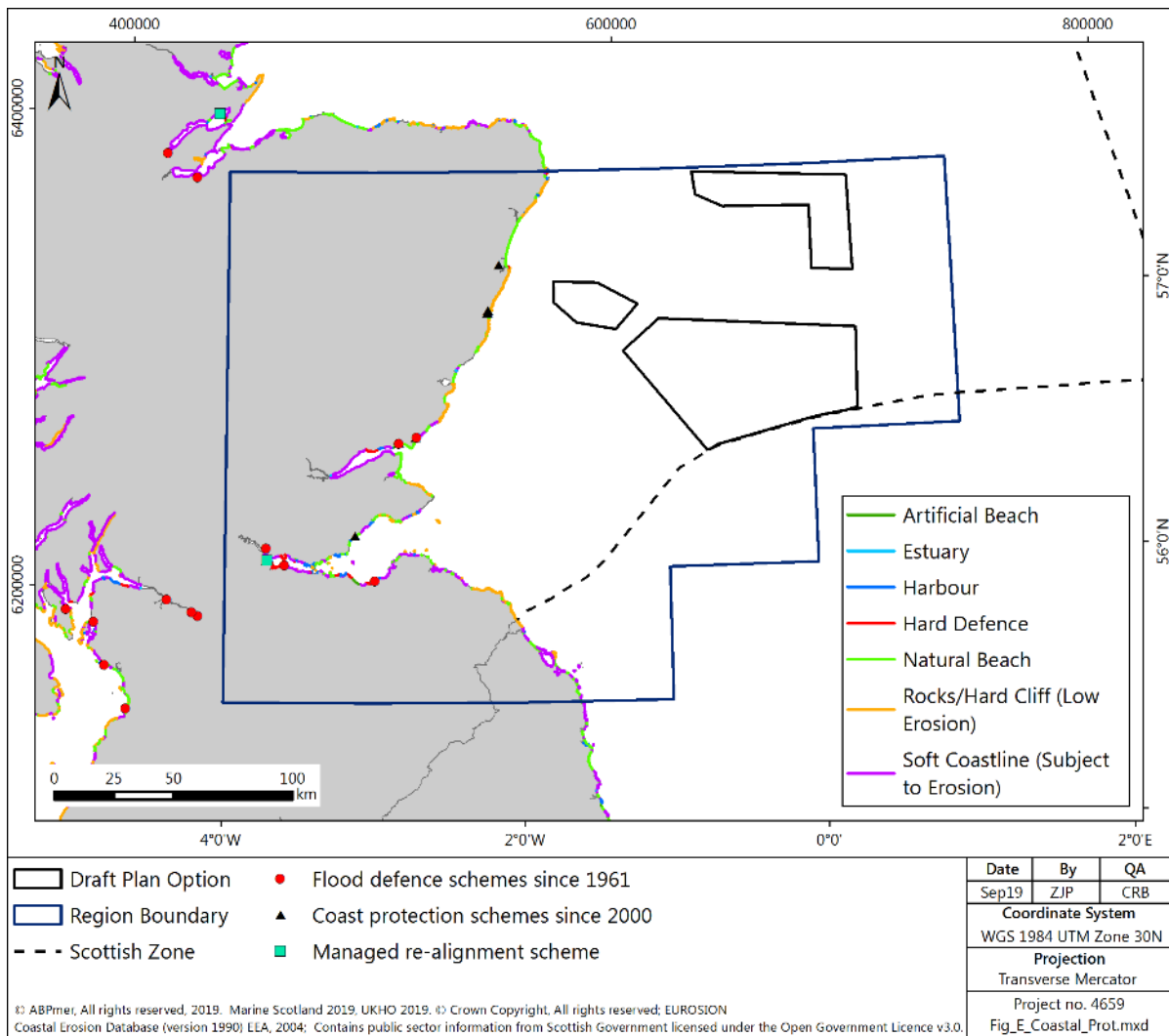


Figure 246 East region: coastal and flood protection schemes

Marine and Coastal Recreation

7.3.48 Overall recreational activity in the East region is shown in Figure 247. Most recreational activity occurs inshore of the DPOs, although there is some potential interaction with sailing and cruising routes in the region. There is some overlap between E3 and low-levels of recreational activity. However, the data show that there is no known overlap with E2 and E1.

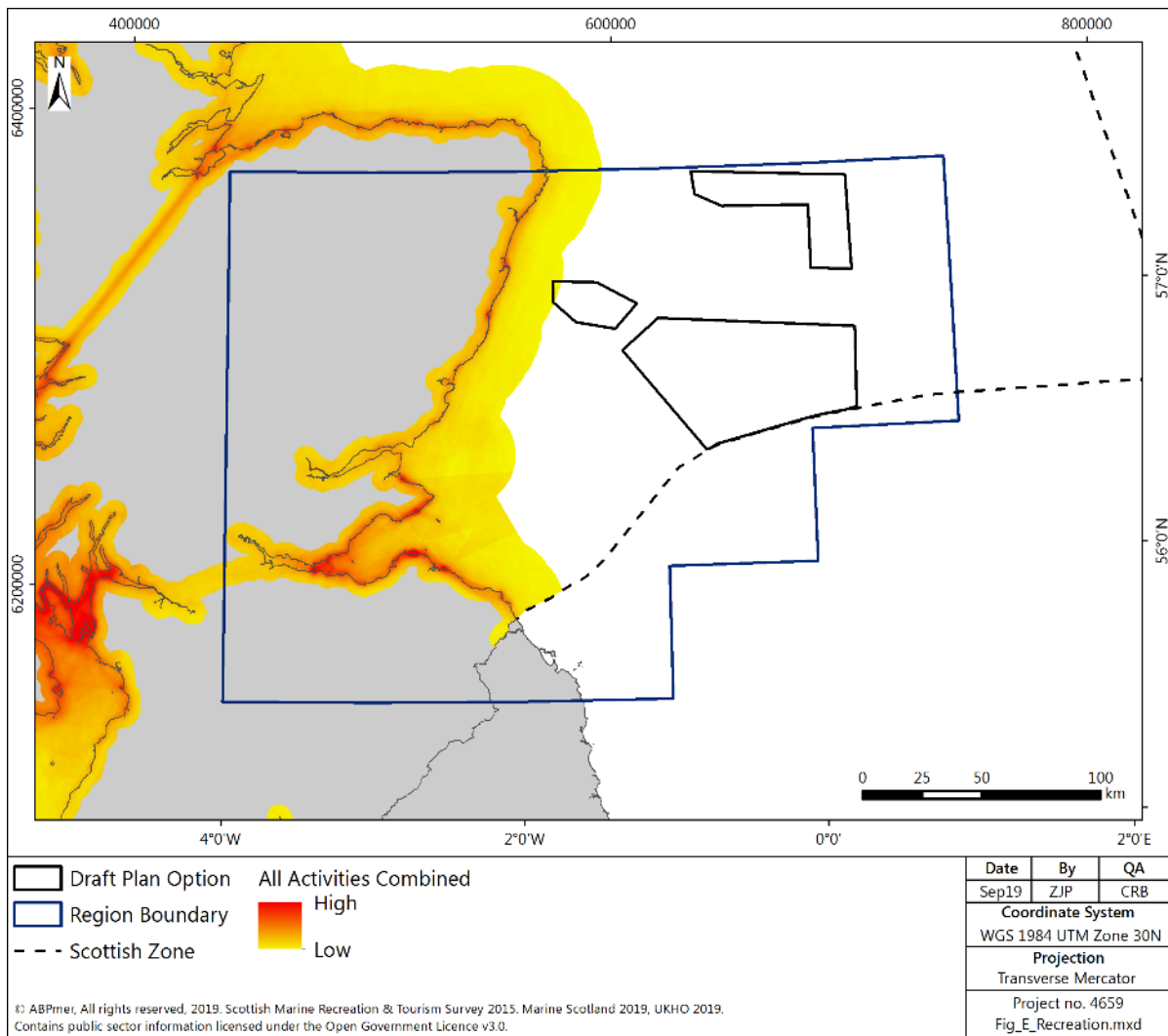


Figure 247 East region: density of recreational activities

Boating

7.3.49 Sailing and racing are popular in the East region and occur in the Firth of Tay, Firth of Forth and along the Southern section of coastline (Figure 248). Recreational use is centred on the Firth of Forth, Firth of Tay and St Andrew's Bay, with moderate use cruising routes extending up and down the coastline from these areas. There many marinas, clubs and training centres along the coast, including at Port Edgar and Arbroath. Whilst there is no or very low interaction between boating with DPOs E1 and E2, there is likely to be some, albeit low-medium-scale overlap with E3 and boating.

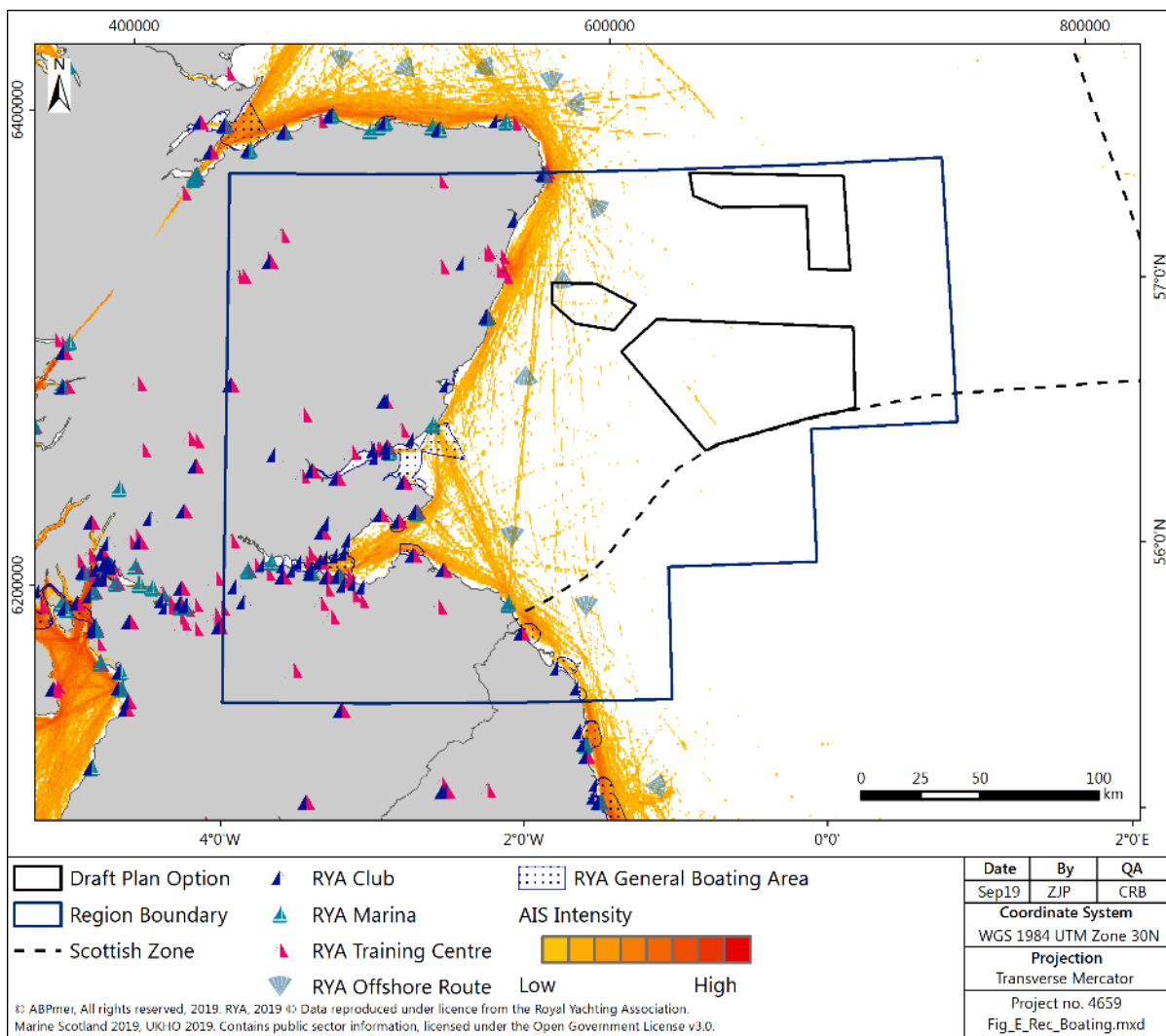


Figure 248 East region: recreational boating facilities and recreational boating density (from 2015 AIS data)

Angling

7.3.50 Sea Angling is undertaken along much of the coast of the East Region such as the Firth of Tay and East Lothian coast (Figure 249). The available data show that this is not occurring throughout the DPOs, however, some there is some activity inshore of E3, and therefore angling may occur in this area.

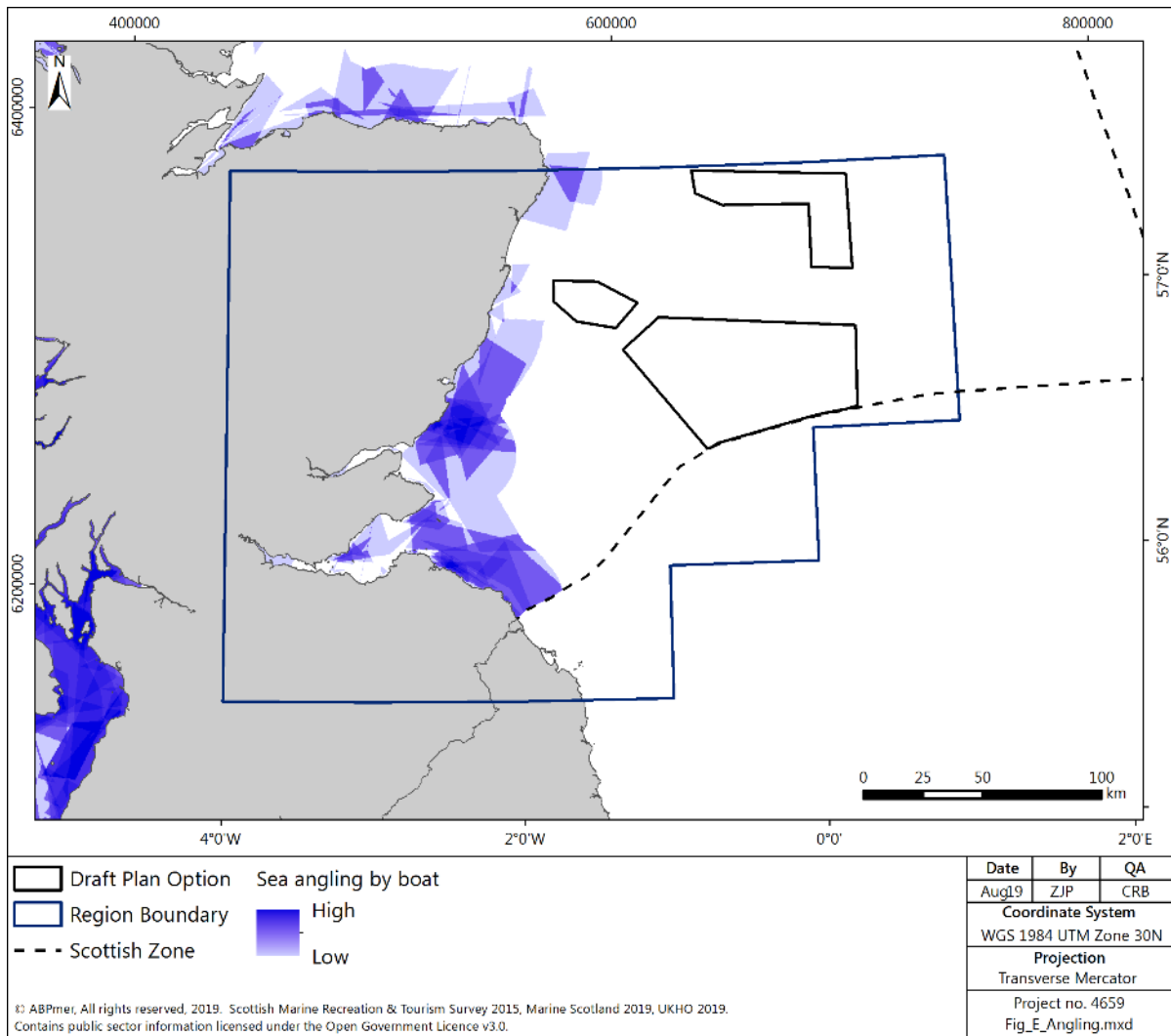


Figure 249 East region: sea angling (by boat) activity density

Diving

7.3.51 Many dive sites are found in the East region with particularly high densities of sites near St Andrews, Firth of Forth and the Berwickshire coast (Figure 250). In particular, the voluntary Marine Reserve of St. Abbs Head and Eyemouth is one of Scotland's most popular dive locations attracting thousands of people each year. This area of Scotland is highly populated, and this is reflected in a large number of clubs and dive centres operating. There is no recorded activity occurring within the DPOs.

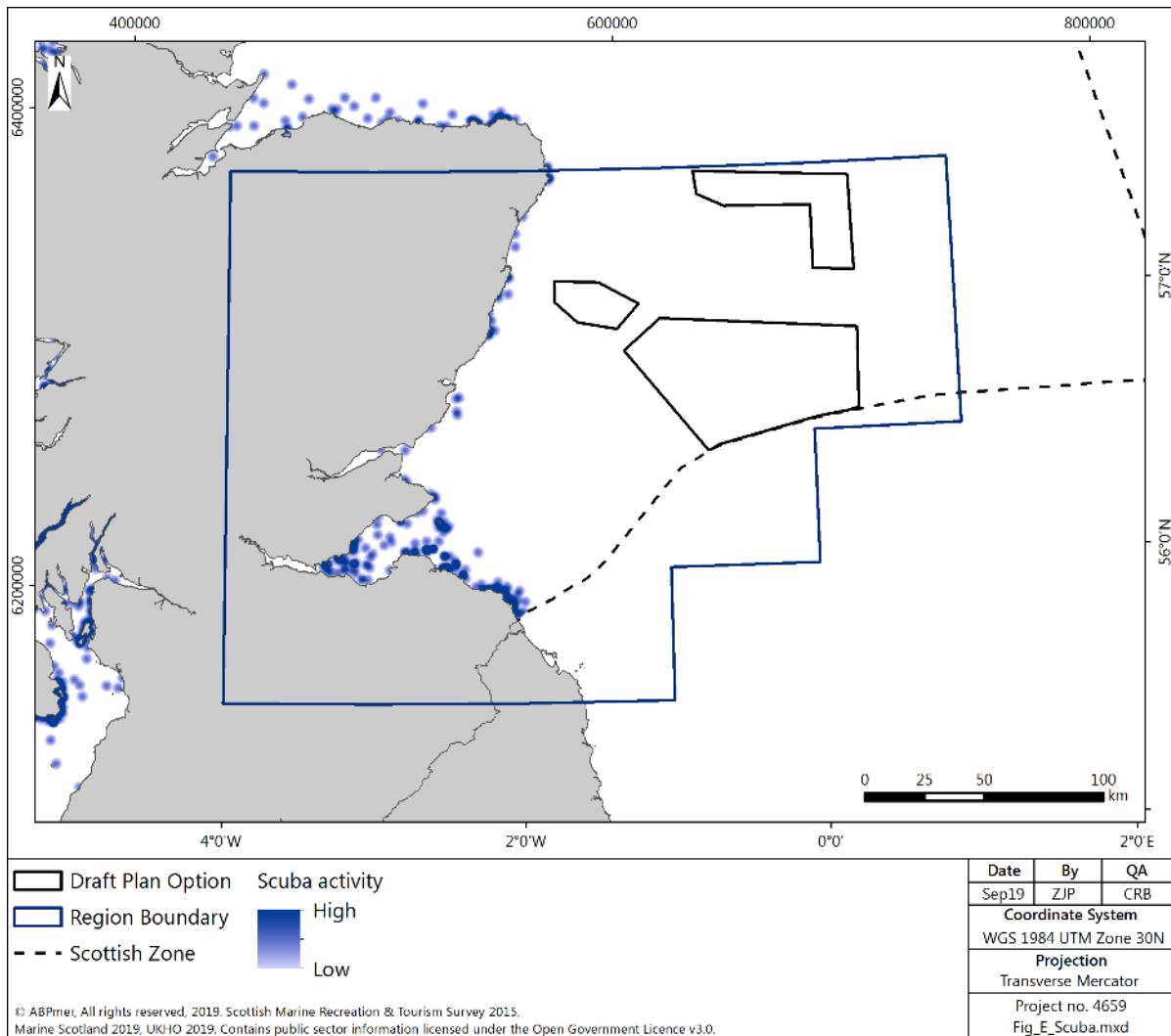


Figure 250 East region: scuba diving activity density

Sea Kayaking and Canoeing

7.3.52 The majority of trips are close inshore. Kayaking and canoeing takes place at most spots along the east coast where there are suitable launching spots such as beaches and slipways. Areas of high activity density include regions around Aberdeen, Edinburgh, the East Lothian and Borders coastlines (Figure 251). There is no recorded sea kayaking or canoeing activity occurring within the DPOs.

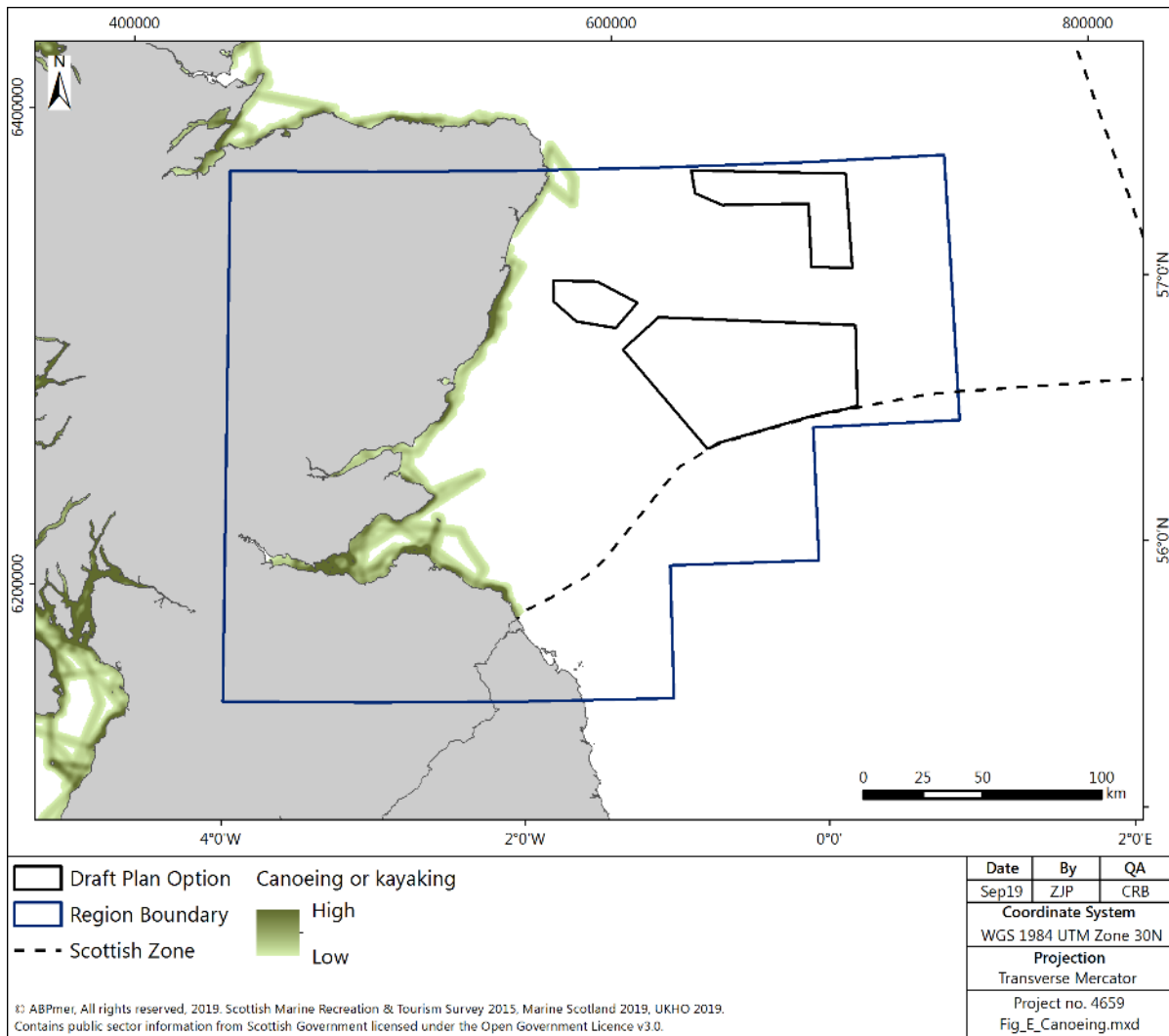


Figure 251 East region: canoeing and kayaking activity density

Surfing and Windsurfing

7.3.53 The East region is the least consistent area for surf, with medium quality waves of medium popularity. It receives long-swell from the North Sea and most of the breaks are beach breaks³³¹. The most popular locations include; Arbroath, Belhaven Bay, Coldingham Bay, Cruden Bay, Kingsbarns, Lunan Bay, Nigg Bay, Pease Bay, Peterhead, Seacliff and St Andrews³³² (Figure 252). The available data show that there is no recorded surfing or windsurfing activity occurring within the DPOs. However, some activity has been recorded inshore of E3. There is limited windsurfing activity in the North-east region, with the area of highest density within the Firth of Forth (Figure 253).

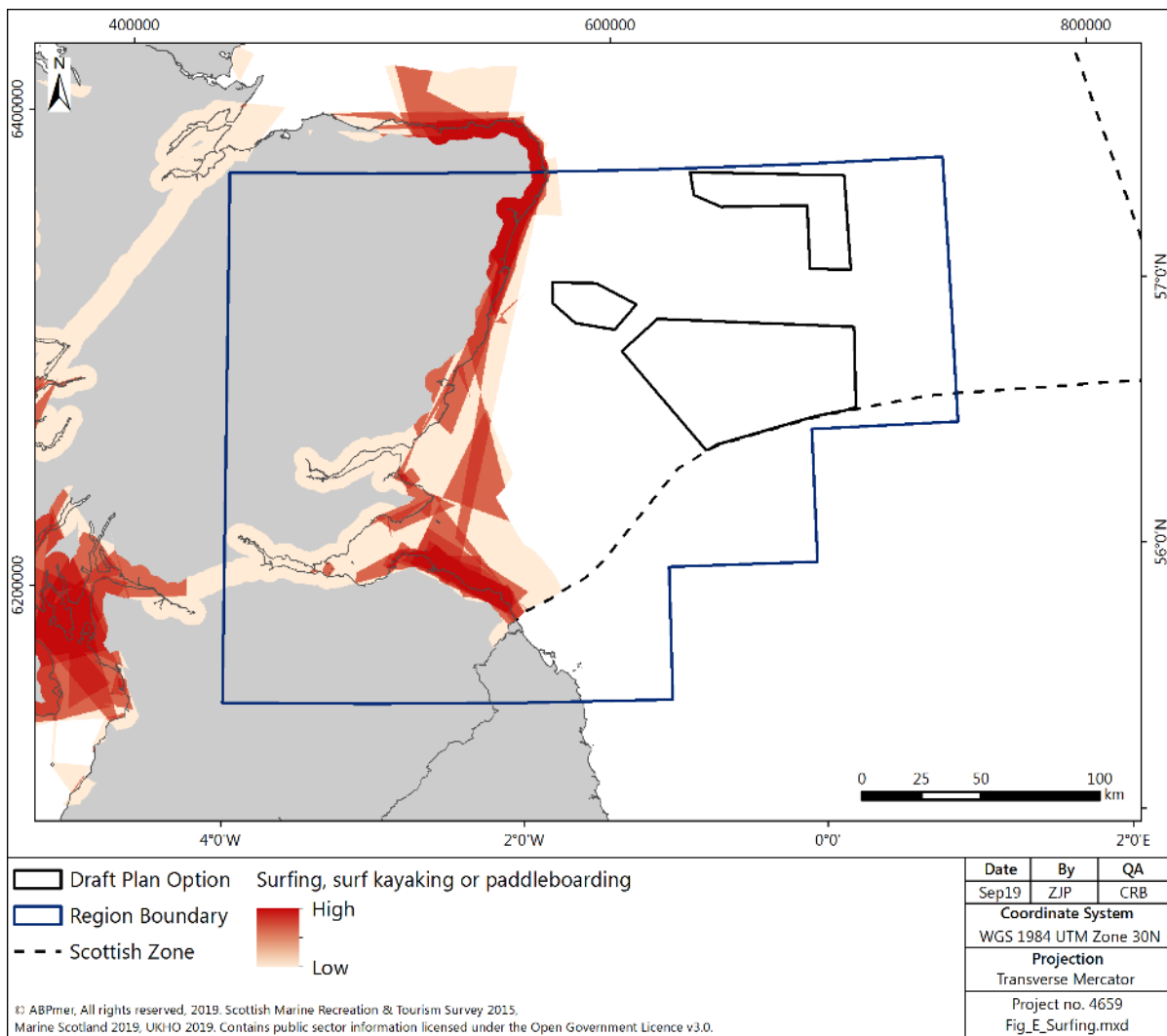


Figure 252 East region: surfing, surf kayaking and paddleboarding activity density

³³¹ Surfers Against Sewage. 2010. Waves Are Resources. St Agnes. Available at <https://www.sas.org.uk/our-work/protect-our-waves/waves-are-resources-report/>.

³³² Magicseaweed. 2018. Southeast Scotland Surfing. Available at: <https://magicseaweed.com/Southeast-Scotland-Surfing/95/>. Accessed 17/10/2018.

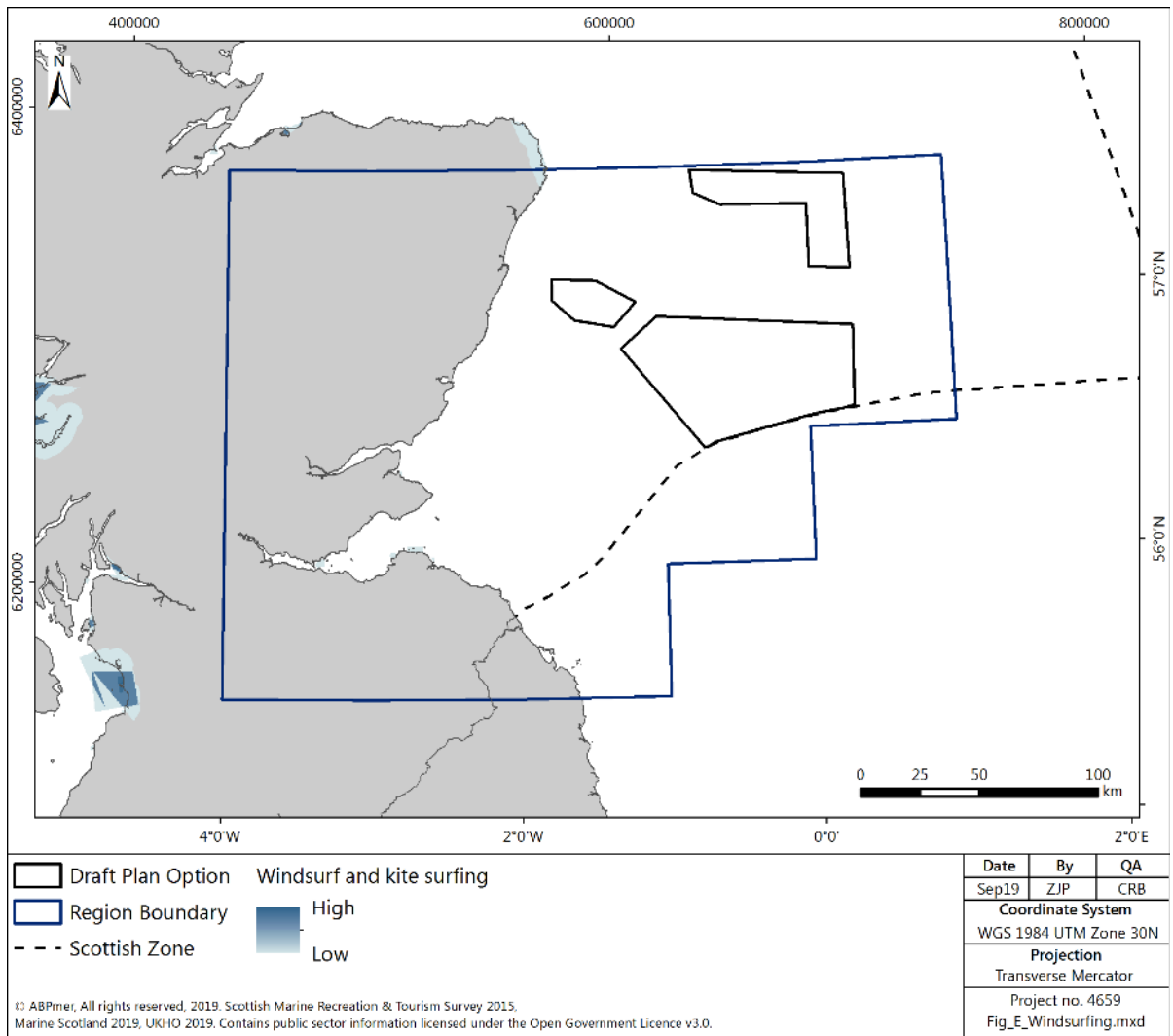


Figure 253 East region: windsurfing and kitesurfing activity density

Tourism

- 7.3.54 Tourist sites in the East region include accommodation and camping facilities, general tourist attractions, historic/heritage attractions, natural heritage attractions, transport and travel related facilities. Although sites are scattered throughout the region, there is a high density of sites along the coast, particularly in the Firth of Forth. This would be expected, given the proximity to Edinburgh. The Firth of Forth also has several cultural and maritime heritage assets, including a historic ship, sites designated under the Protection of Wrecks Act, a maritime museum and several listed buildings.
- 7.3.55 The East region has three big cities situated along the coast; Edinburgh, Aberdeen and Dundee. These are popular tourist destinations, but also important travel hubs and tourism activity is therefore centred in these locations (Figure 254).
- 7.3.56 The presence of Blue Flag Beaches, designated bathing waters also encourages tourists to visit the East region's beaches. Beach users are likely to be an essential group to remember when considering the development of offshore renewables.
- 7.3.57 The East region has three areas designated as Marine Special Areas of Conservation, namely: Firth of Tay and Eden Estuary, Isle of May and part of Berwickshire, and Northumberland SAC. These SACs attract visitors for marine and coastal wildlife tourism.

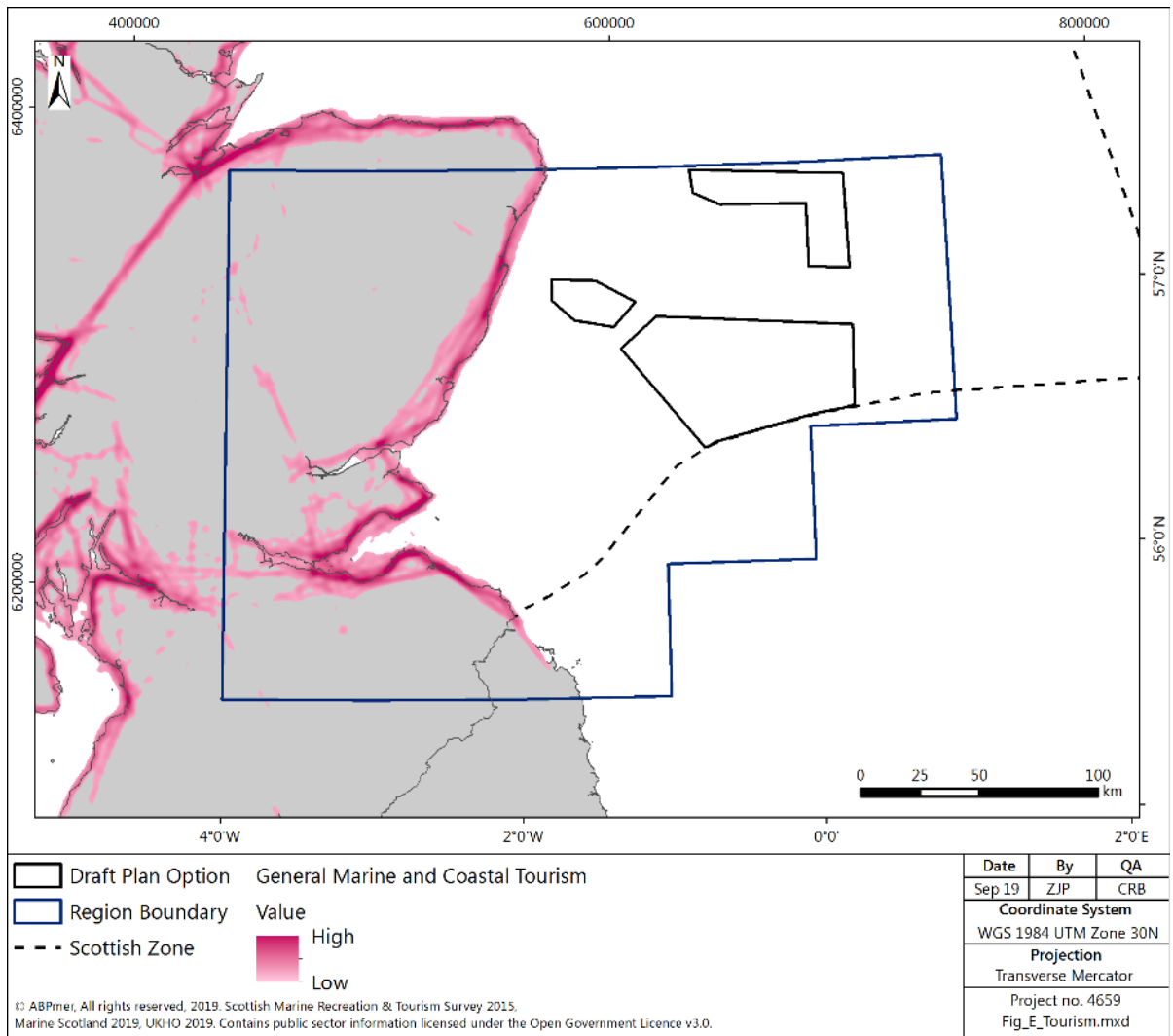


Figure 254 East region: tourism activity density

Social Considerations

- 7.3.58 The total population of the East region is approximately 1,860,000 using data for Aberdeen City, Aberdeenshire, Angus, City of Edinburgh, Dundee City, East Lothian, Fife and Scottish Borders Scottish council areas. The overall average age is 41 for the East region. Under 16's make up 17% of the population (, 65% of the population is of working age and 18% of the population in the East region is pension age³³³.
- 7.3.59 In 2017 there was an 75.1% employment rate in the East region. The greatest number of jobs in the East region are associated with public admin, education and health (30%). Other important industry sectors are distribution, hotels and restaurants (19%), and banking and finance (16%). Aberdeen City and Aberdeenshire also have a high number of jobs (16%) in the energy and water sector³³⁴.
- 7.3.60 The Scottish Index of Multiple Deprivation (SIMD) shows that most of Aberdeenshire, which makes up a large portion of the East region, is in the 5% most access deprived areas in Scotland³³⁵.

³³³ National Records of Scotland. 2018. Mid-Year Population Estimates, Mid-2017. Available at <https://www.nrscotland.gov.uk/statistics-and-data/statistics/statistics-by-theme/population/population-estimates/mid-year-population-estimates>.

³³⁴ National Statistics, 2018. Regional Employment Patterns: Statistics from the Annual Population Survey 2017. Available at <https://www.gov.scot/Topics/Statistics/Browse/Labour-Market/Publications/>.

³³⁵ Scottish Government. 2016. SIMD16 Analysis Aberdeenshire. Available at: <https://www.gov.scot/Resource/0051/00510710.pdf>. Accessed 17/10/2018.

7.4 Environment

Designated Sites

- 7.4.1 Within the East region there are a range of designated sites, shown in Figure 255, Figure 256, Figure 257 and Figure 258 including 4 NCMPA (including one pNCMPA), 11 SPA (including 2 pSPA), 3 SAC and 18 SSSI.
- 7.4.2 There are two areas of overlap between designated sites and the proposed DPOs in the East region. Areas within the Firth of Forth Banks complex NCMPA, designated for ocean quahog aggregations and offshore subtidal sands and gravels, overlaps with E1. The Turbot Bank NCMPA, and the proposed Southern Trench MPA designated for Sandeels, also overlaps with the western extent of E2.
- 7.4.3 There is one SAC within the East region, the Berwickshire and North Northumberland Coast SAC, designated for grey seal, intertidal mudflats and sandflats, reefs, sea caves and shallow inlets and bays. The SAC is approximately 65km to the south and southwest of DPO E1.
- 7.4.4 There are several SPAs currently designated within the East region, located near the coastline and onshore and designated for a range of seabird and terrestrial species features and assemblages which may use the sea within the DPOs for feeding and / or during migration. There is a large pSPA proposed to cover the Firth of Forth and areas of sea and coastline to the north and south of the Firth, proposed for designation for a wide range of breeding and non-breeding seabird and waterfowl populations. Further detail on seabird species distributions is contained within the Birds section below.
- 7.4.5 The 18 SSSI are located across the East region and are protected for a range of features, including geology, habitats and species. Some, although not all, SSSI sites overlap with European SPA or SAC designations.
- 7.4.6 In addition to the sites identified within the boundaries of the East region, there may be more remote designated sites which may have the potential to be affected by offshore wind developments within the DPO. This would be considered on a project by project basis.

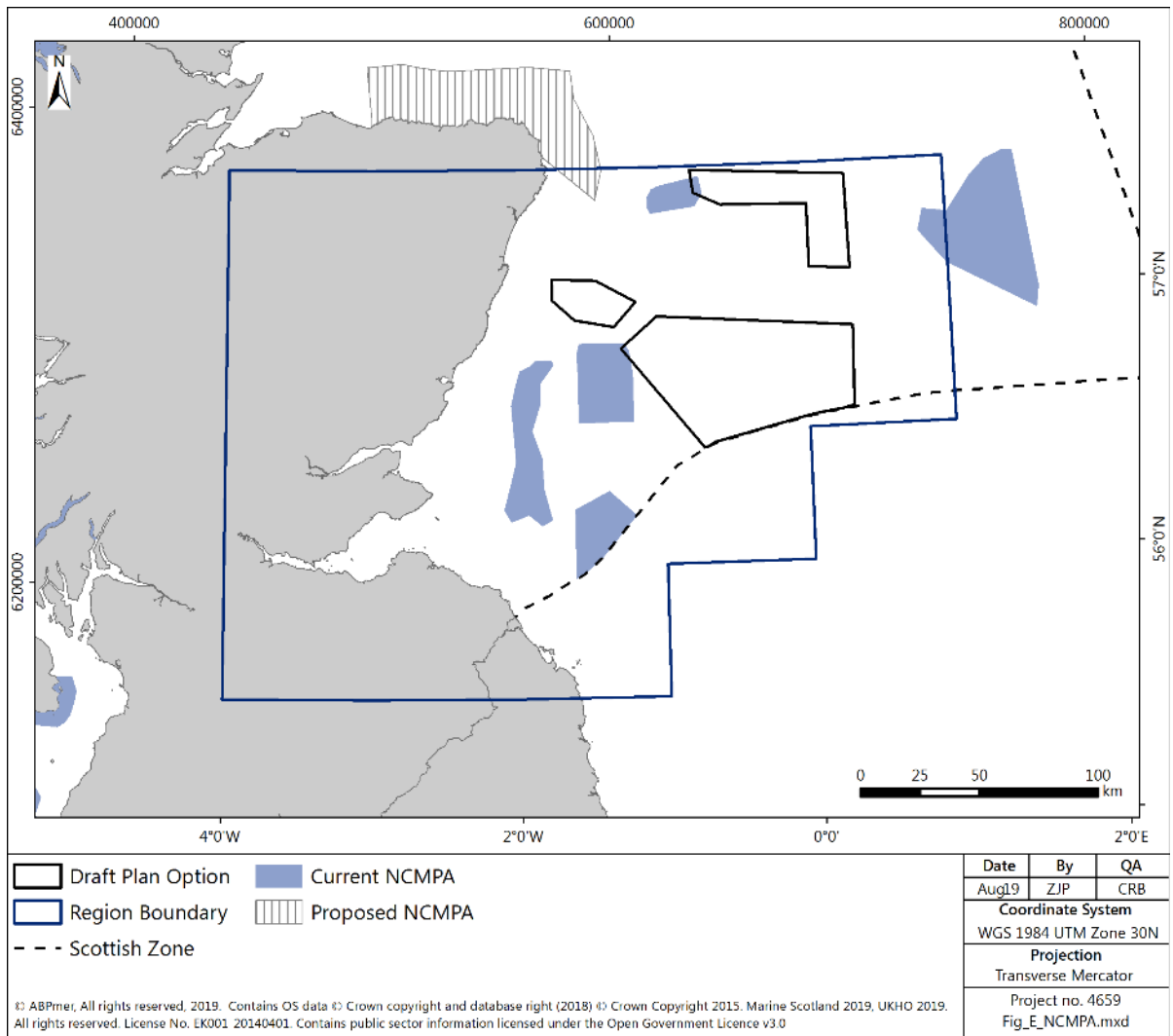


Figure 255 East region: NCMPA sites

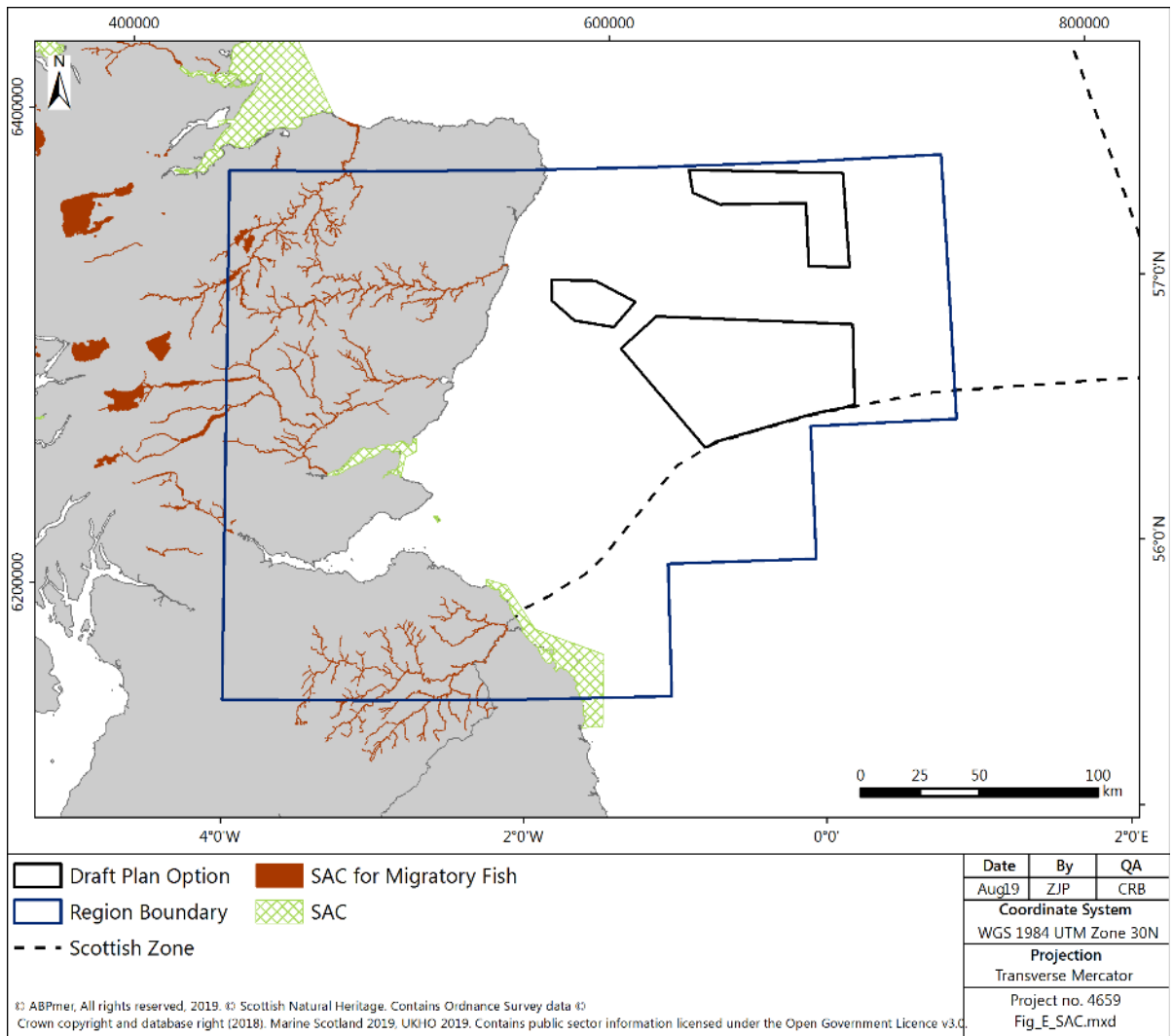


Figure 256 East region: marine and coastal SAC sites

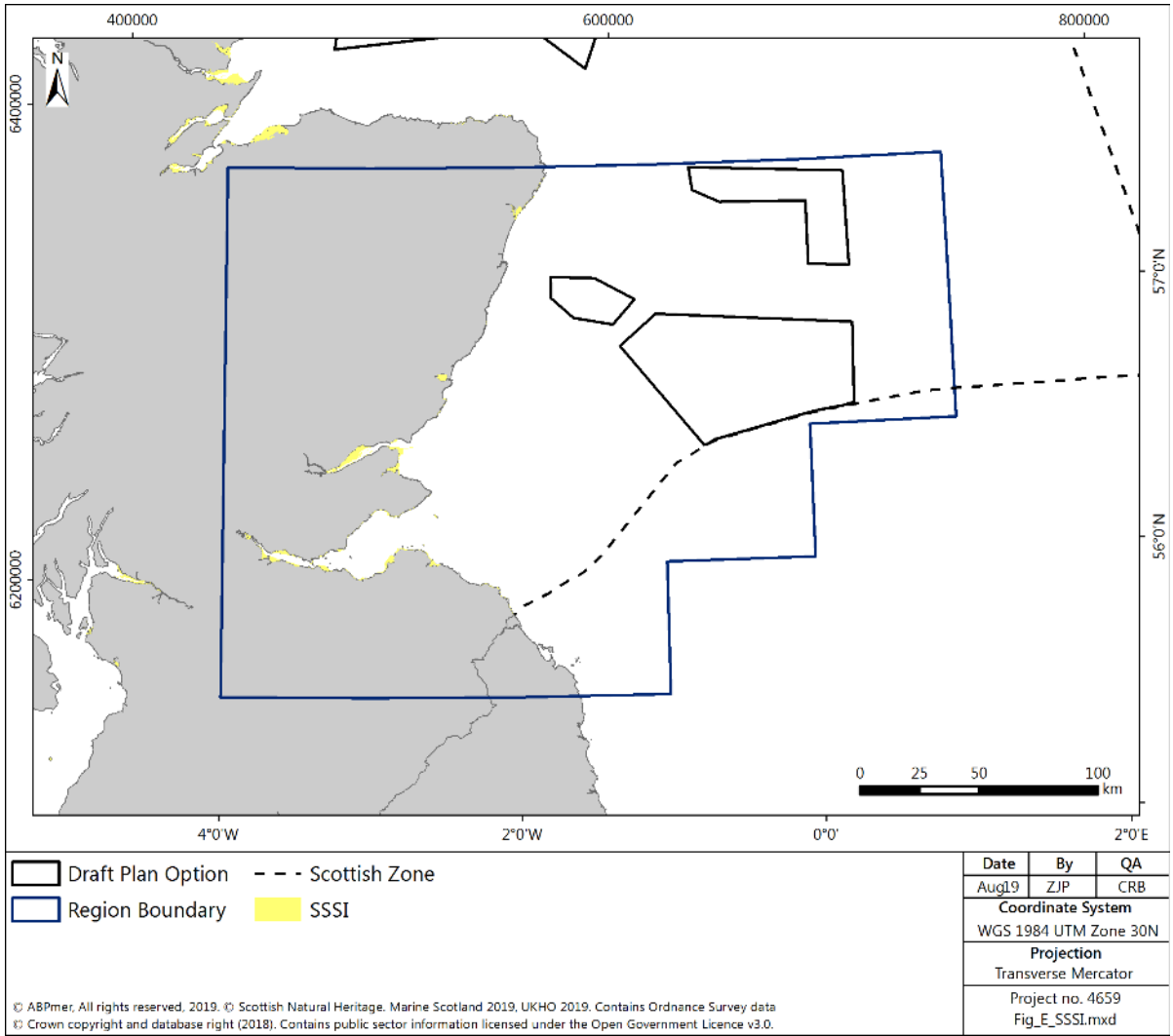


Figure 257 East region: marine and coastal SSSI sites

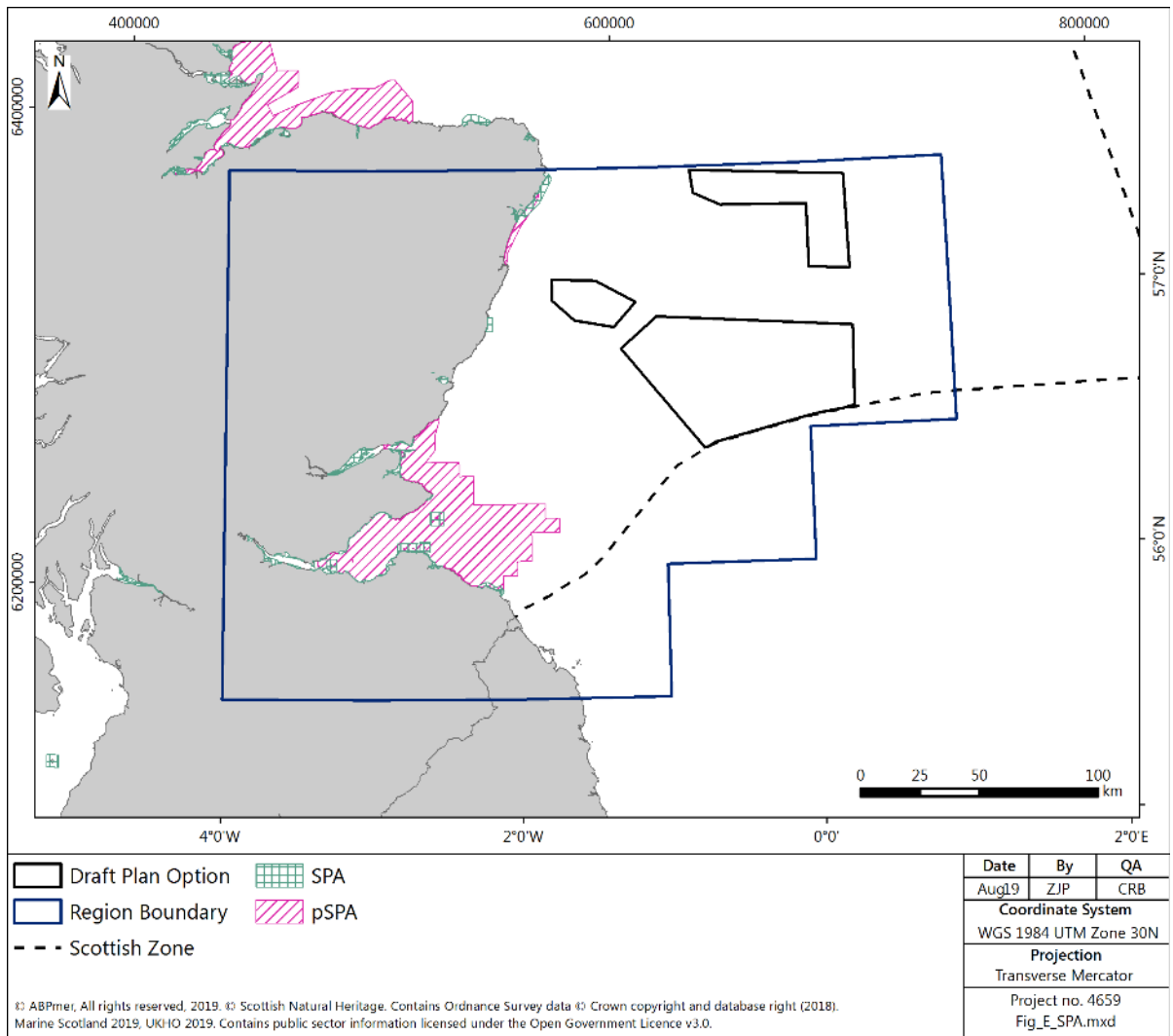


Figure 258 East region: marine and coastal SPA sites

Water and Sediment Quality

- 7.4.7 WFD monitoring incorporates coastal and transitional waters in the marine environment. There are no overlaps between the DPOs and classified water bodies within the East region. The water bodies in the East region are shown in Figure 259. The majority of the coastal water bodies in the northern extent of the East region are classified as high status³³⁶, with the majority of the water bodies in the southern extent classified as good. There are two water bodies in the East region below good status, one (Middle Forth Estuary) at moderate condition, the other (Leith Docks to Port Seton) is currently classified as poor due to poor ecological potential and morphology.
- 7.4.8 There are no areas of protected waters for shellfish production in the East region.
- 7.4.9 There are a large number of classified bathing waters in the East region (Figure 260). Of the 45 designated bathing waters in the East region, 15 are at excellent status, 25 are at good status or at target objective and 5 are currently classified as poor.

³³⁶ SEPA. 2018. Water Classification Hub, water body condition data for 2017. Available at <https://www.sepa.org.uk/data-visualisation/water-classification-hub/>. Accessed 05/10/2018.

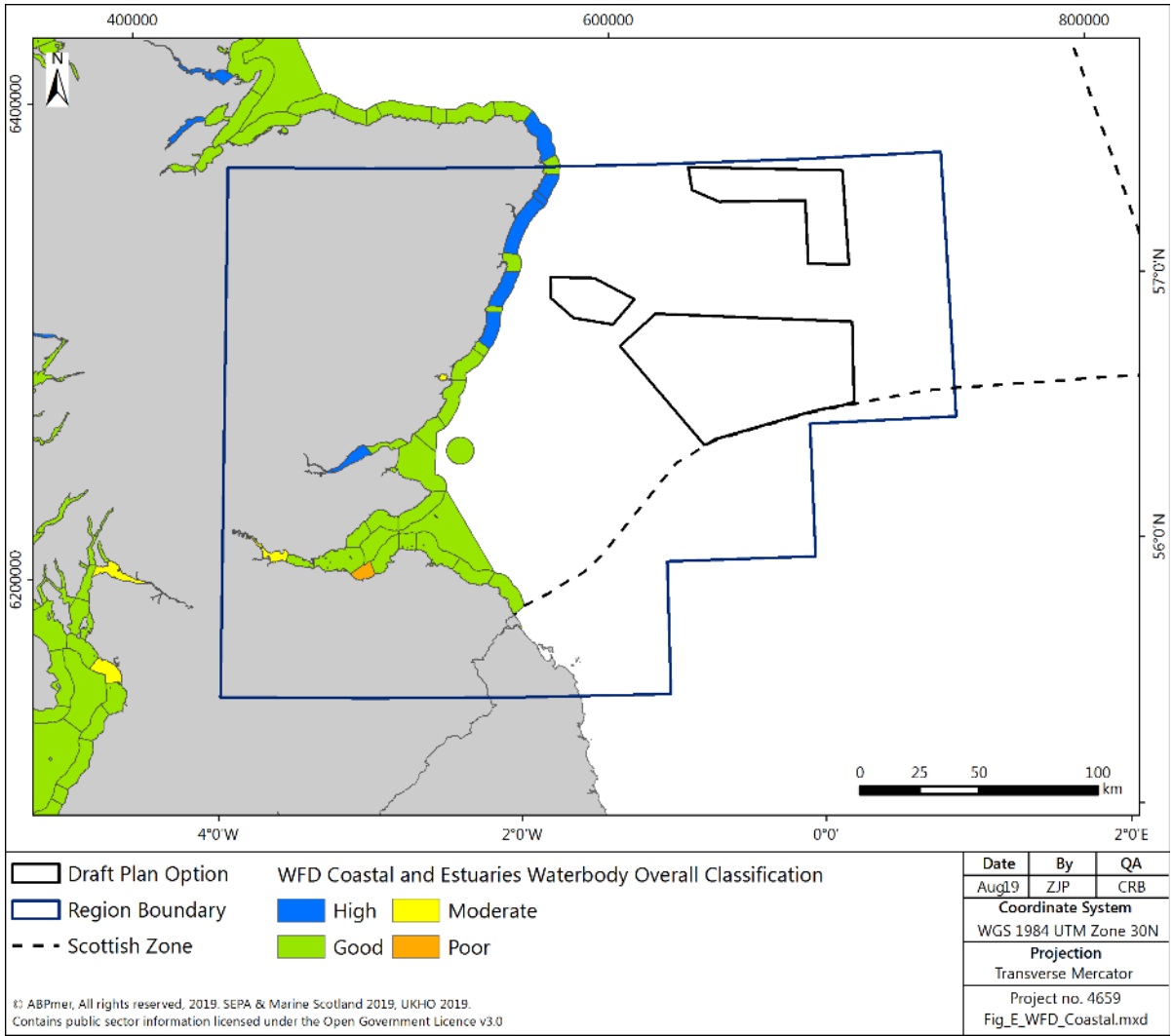


Figure 259 East region: WFD coastal and transitional waterbody classifications

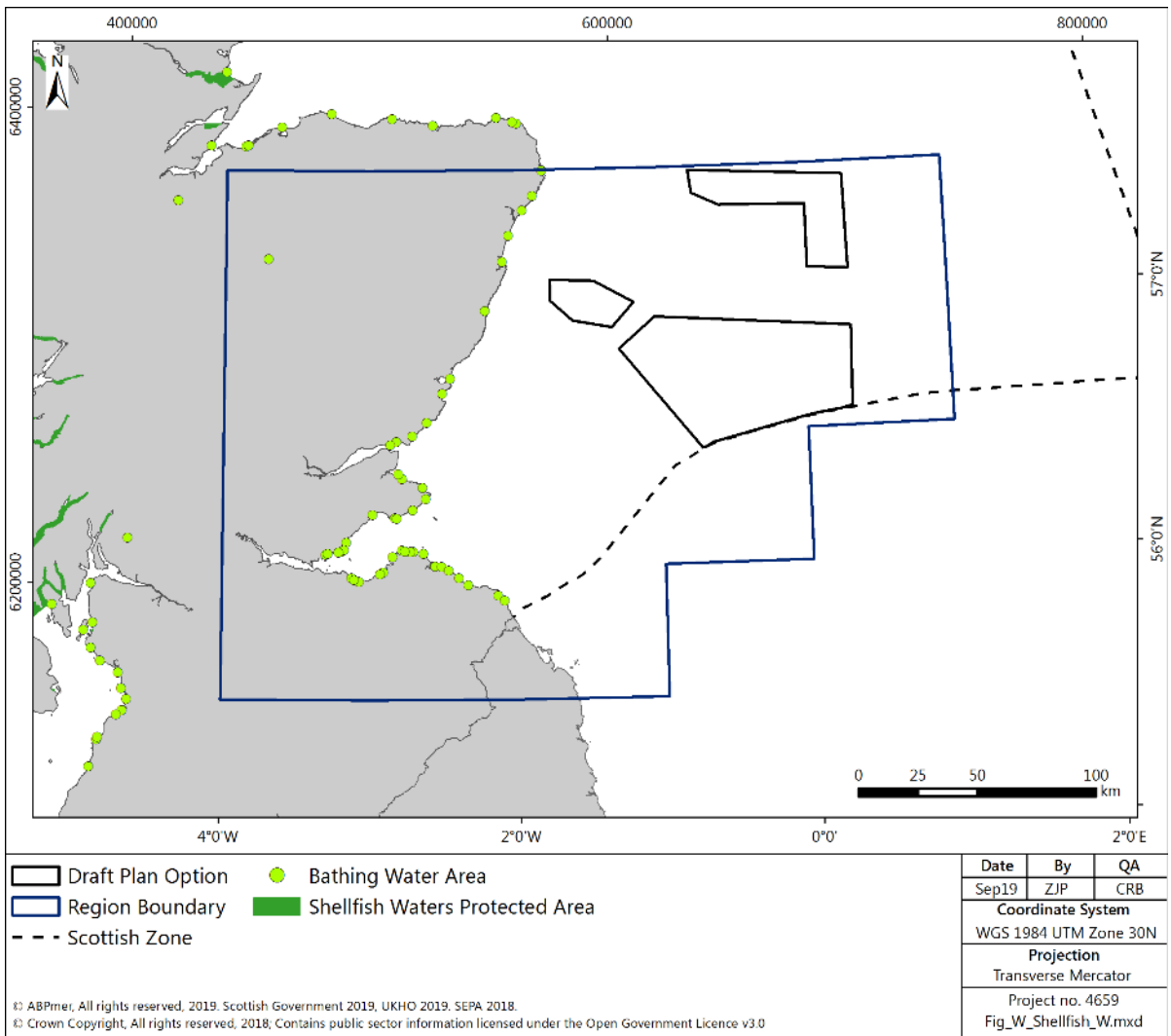


Figure 260 East region: bathing water protected areas

Benthic Habitats and Species

- 7.4.10 As identified in Section 7.2 above and on Figure 261, the benthic habitats in the East region are characterised by muddy sediments within the Firth of Forth, with gravelly sediment beyond before graduating through sand generally within the region of the DPO to muddier sediments further offshore. The DPO within the East region are all characterised by sandy sediments with some small areas of mixed sediments.
- 7.4.11 There is limited diversity in the benthic species present in the East region. The key PMF species present within the East region are ocean quahog, with some records of fan mussel. The ocean quahog records, shown in Figure 262, are principally inshore of the DPO to the east of the Firth of Forth (E1). The one record of fan mussel within the East region falls within E3, as shown on Figure 262.
- 7.4.12 In addition to the PMFs present within the DPOs there are PMF supported by benthic habitats landwards of the DPOs, including further seagrass, sea pens, fireworks anemone, maerl and ocean quahog.

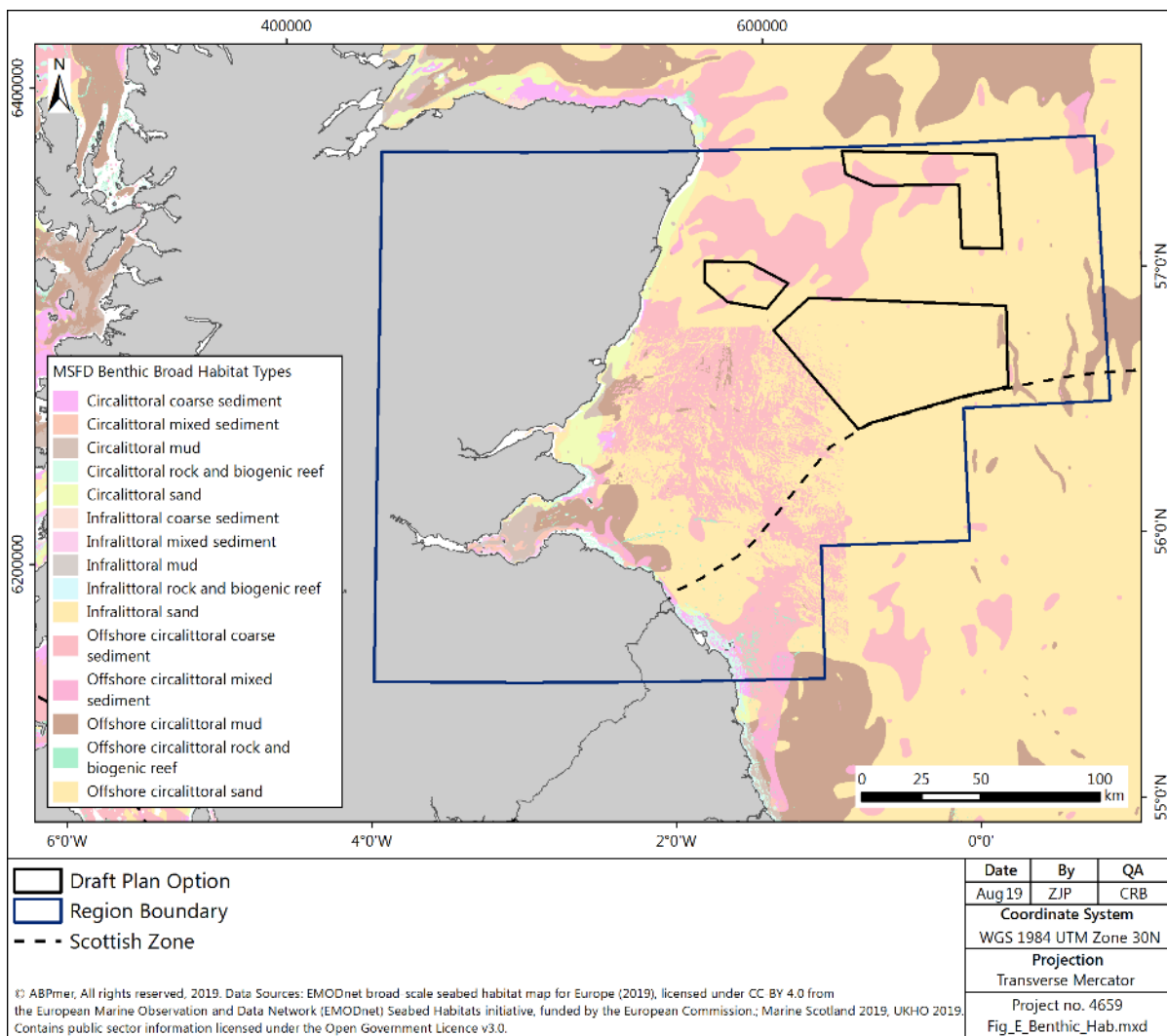


Figure 261 East region: benthic habitats

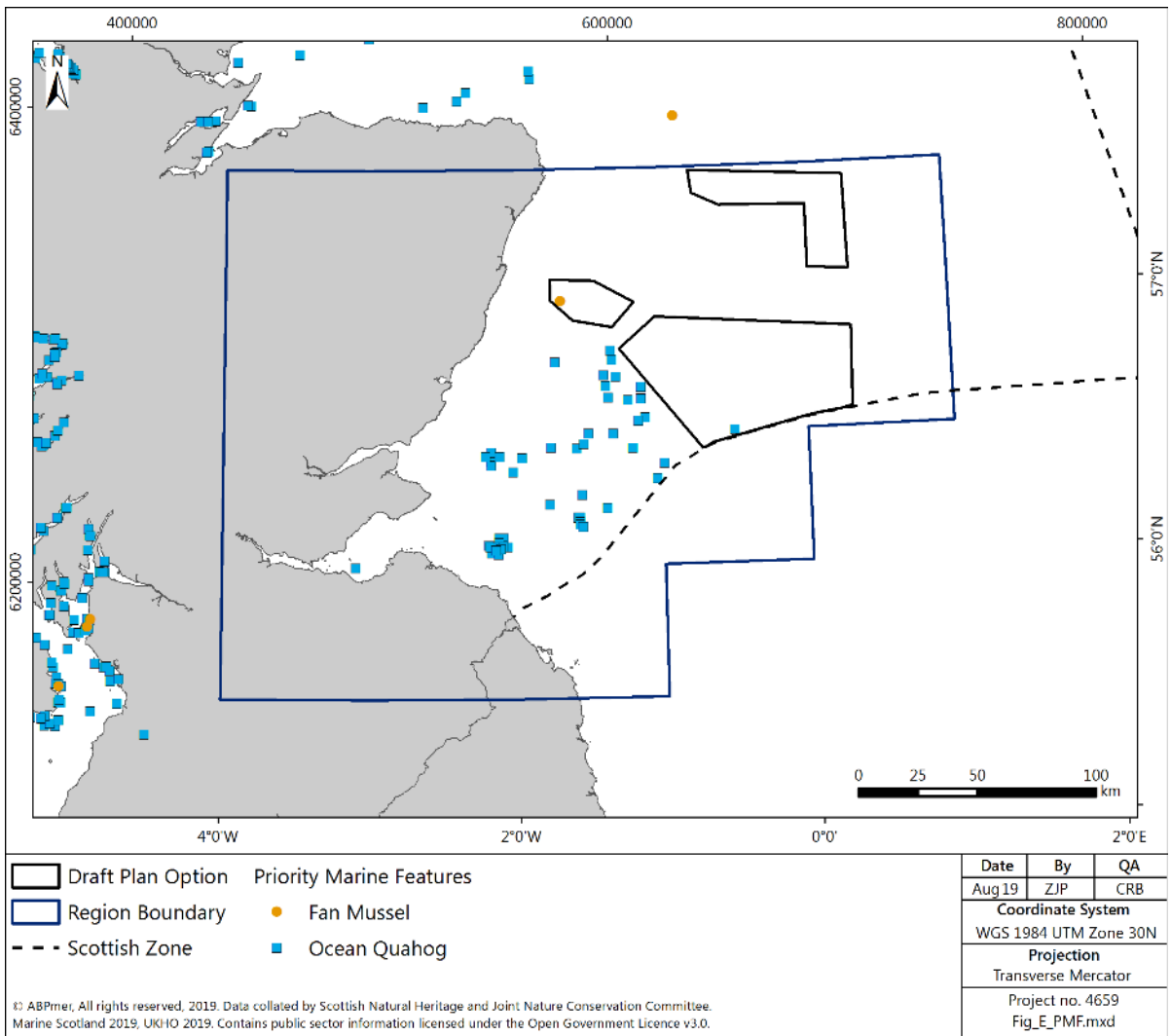


Figure 262 East region: records of benthic PMF

Fish

- 7.4.13 There is generally lower species richness and diversity amongst the fish population in the East region in comparison to that found in the North and West regions. There are, however, a number of species within the region that are important commercially, as discussed in Section 7.3 above.
- 7.4.14 There are a number of migratory fish which migrate through the seas within the East region into the estuary and riverine environments, including Atlantic salmon and sea lamprey. The migration routes for these species (Figure 44 above in Section 2.3 shows the approximate routes, although should not be used to infer “safe” zones) indicate there is potential for the routes to intersect with the DPOs, particularly when transiting from the North Sea into the Firth of Forth.
- 7.4.15 Usage of the seas within the East region by shark species is also generally lower than for the West and North regions, although a number of elasmobranch species, including small numbers of basking sharks, rays and other shark species, are known to frequent the region with small numbers of sightings in the Firth of Forth.
- 7.4.16 The East region also is an important spawning ground for fish species including herring, cod, whiting and plaice with some high-intensity spawning grounds for sandeels; high-intensity nursery grounds for herring, whiting, cod and low-intensity nursery grounds for ling, mackerel, plaice, anglerfish, sandeels and hake. Whilst there is a lack of data available to show available spawning sites for elasmobranch species, there are many known nursery ground areas in the area, which overlap the DPOs, including spurdog, tope, common skate, spotted rays, with high-intensity nursery grounds for spurdog and neighbouring common skate nursery grounds³³⁷.

³³⁷ Ellis, J.R., Milligan, S.P., Readdy, L., Taylor, N. and Brown, M.J. 2012. Spawning and nursery grounds of selected fish species in UK waters. Sci. Ser. Tech. Rep., Cefas. Lowestoft, 147: 56 pp.

Marine Mammals

- 7.4.17 The distribution and species richness of the East region marine mammal population is similar to that described for the North-east above in Section 6.4.
- 7.4.18 Both grey and harbour seals are present in the area, concentrated around breeding populations in the Firth of Forth (Figure 263 for breeding and haulout sites and Figure 264 and Figure 265 for grey and harbour seal distributions respectively). The grey seal populations are known to forage further offshore than harbour seals, the sea usage of which is generally limited in the East region to the Firth of Forth. As a result, the grey seal is considerably more likely to interact with the DPOs, and there is some overlap of medium sea usage within E1, with higher sea usage in E3 and the western end of E2.
- 7.4.19 Cetacean usage of the seas in the East region is similar to that of the North-east with high encounter rates of harbour porpoise, bottlenose dolphin, white beaked dolphin and minke whale³³⁸. In addition, there are wider areas in the east region where encounters with Atlantic white-sided dolphin are recorded.
- 7.4.20 The Firth of Tay has been identified as an area of high concentration of bottlenose dolphin³³⁹, although survey effort was concentrated close to the coastline and therefore does not overlap with the DPOs.
- 7.4.21 There are two riverine environments within the East region identified as important for otter populations (River Dee), The mouth of the river in Aberdeen is approximately 15km inshore of DPO E3, with all other DPOs further in distance from any areas identified for otter usage. The nature of the DPO offshore and in deeper water suggests that there is unlikely to be any direct interaction between otter populations and offshore wind developments, however siting of cable landfalls have the potential to intersect otter habitat.

³³⁸ Baxter, J.M., Boyd, I.L., Cox, M., Donald, A.E., Malcolm, S.J., Miles, H., Miller, B., Moffat, C.F. 2011. Scotland's Marine Atlas: Information for the national marine plan. Marine Scotland, Edinburgh. Available at <https://www.gov.scot/Publications/2011/03/16182005/0>.

³³⁹ Quick, N., Arso, M., Cheney, B., Islas, V., Janik, V., Thompson, P., Hammond, P. 2014. The east coast of Scotland bottlenose dolphin population: Improving understanding of ecology outside the Moray Firth SAC, 14D/086. Available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/346326/OESEA_2_east_coast_of_Scotland_bottlenose_dolphin_population.pdf.

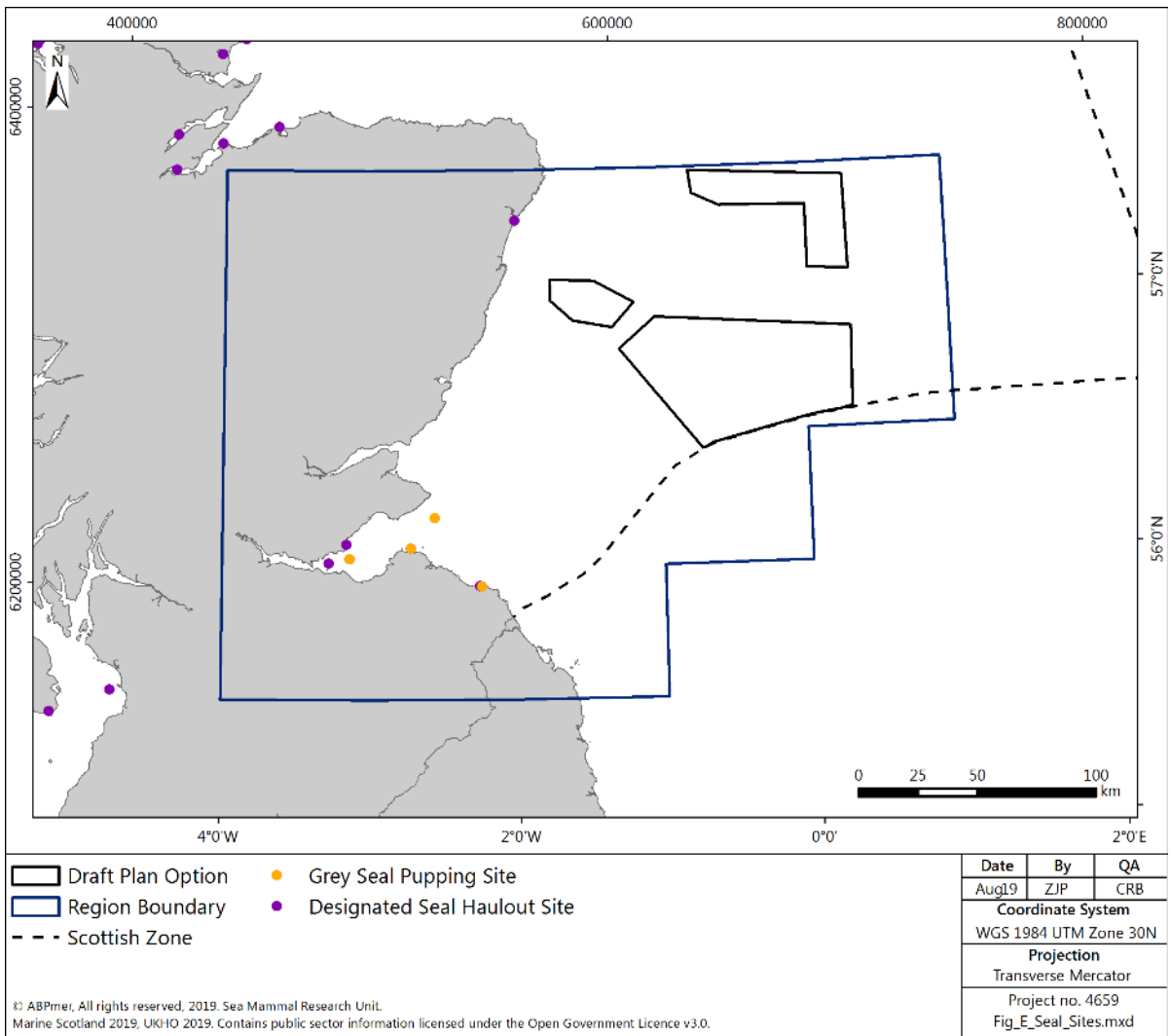


Figure 263 East region: seal haulout sites and grey seal pupping sites

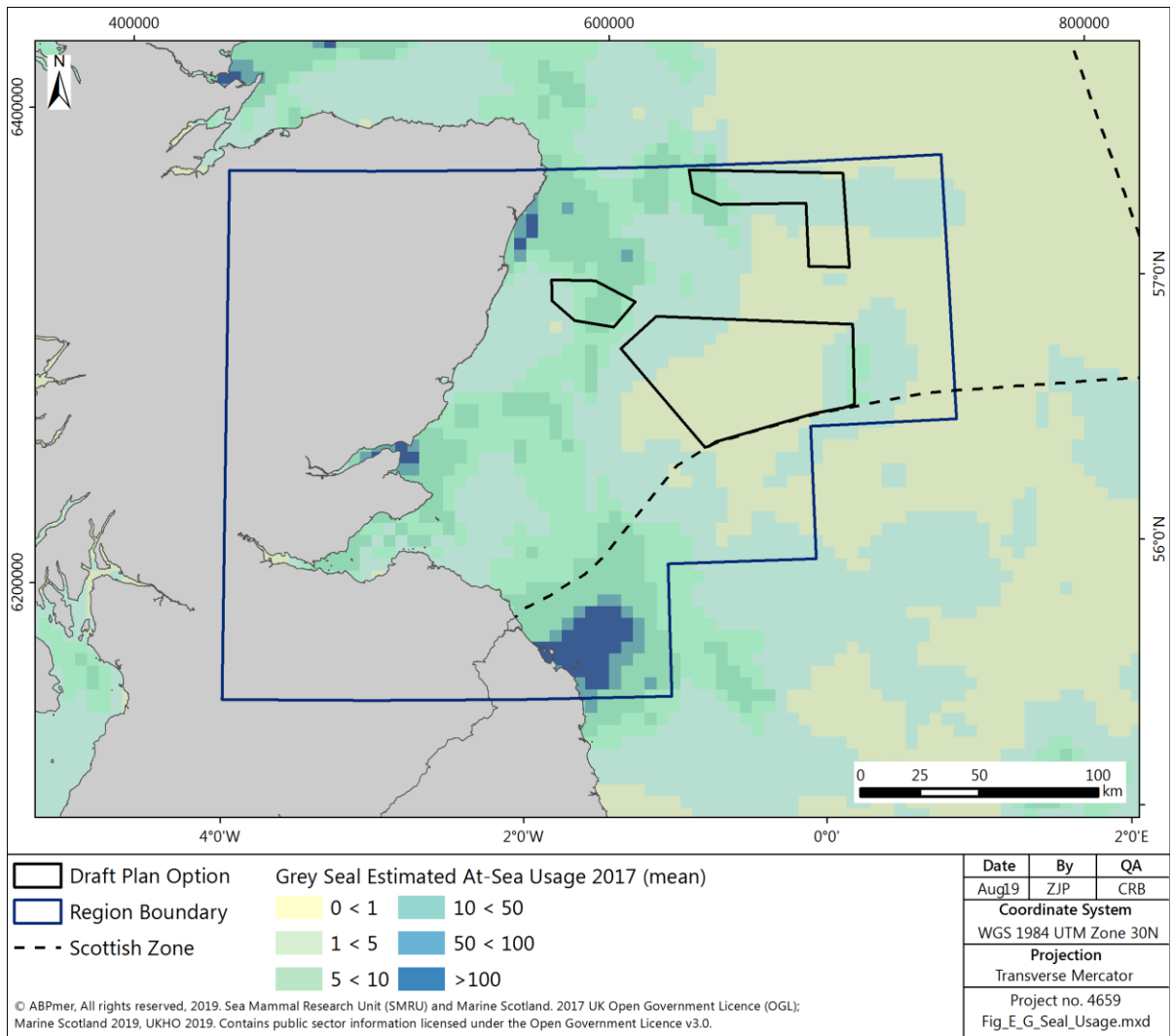


Figure 264 East region: grey seal at sea usage

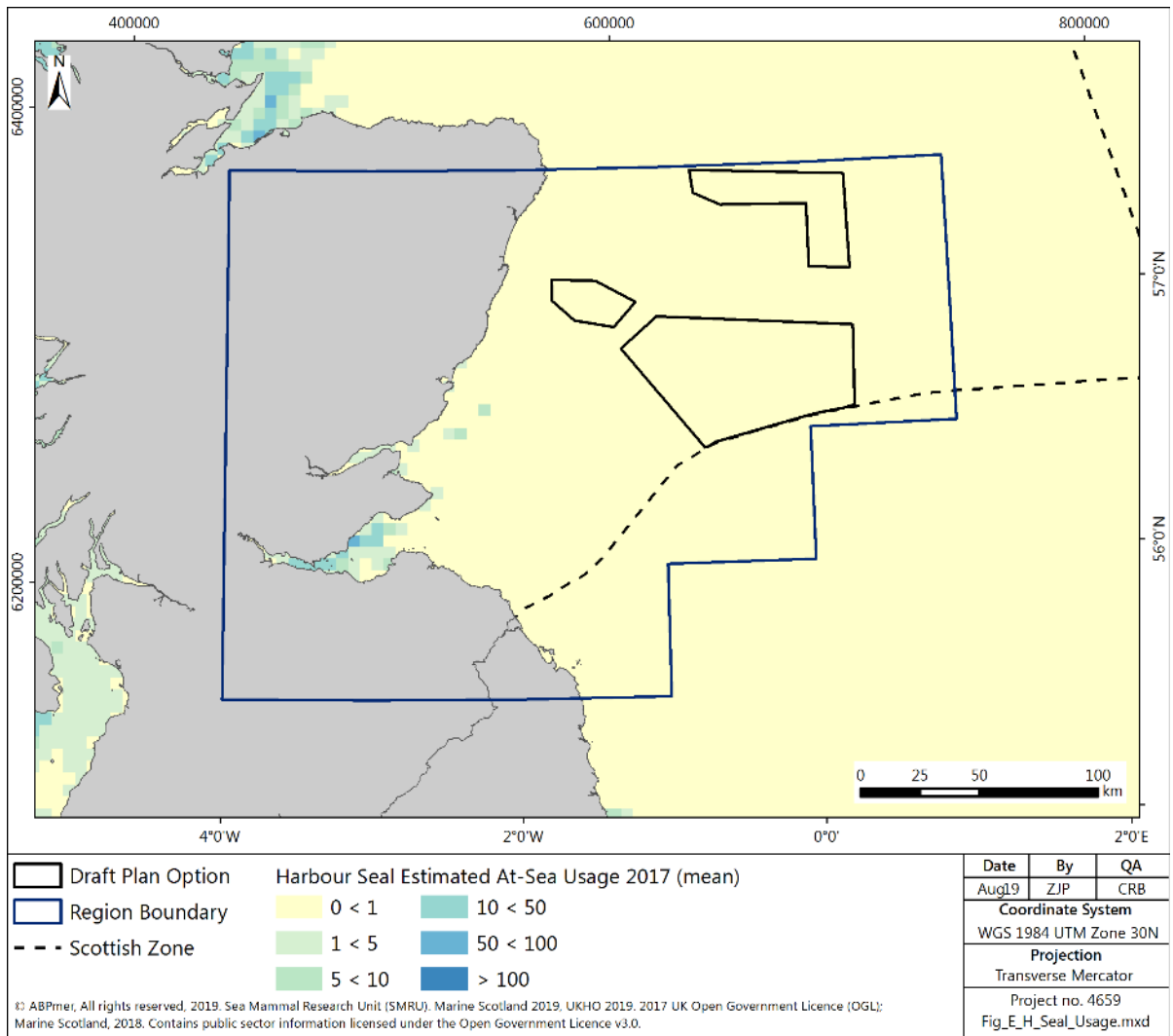


Figure 265 East region: harbour seal at sea usage

Birds

- 7.4.22 The importance of the East region to birds is demonstrated in the designation of 9 SPAs and the further 2 proposed SPAs with marine elements with additional terrestrial sites, as discussed above.
- 7.4.23 There are both breeding and non-breeding populations of a wide variety of seabirds in the East region. Several significant seabird colonies are found around the coastlines, particularly on the coastline to the north and south of Aberdeen, and in the southern extent of the Firth of Forth.
- 7.4.24 The majority of the seabird colonies within the East region are reviewed as part of the SPA management process, and in the majority of SPA the overall condition of the seabird or waterbird assemblages, with the exception of Forth Islands SPA and St Abbs Head to Fast Castle SPA, are assessed as favourable. However, at an individual species level a number of species are identified as being in unfavourable condition, and therefore management measures are in place to reduce pressure on these species. Species of importance in the East region include herring gull, shag, razorbill, kittiwake, Arctic tern, common tern, gannet, lesser black-backed gull, roseate tern, sandwich tern, puffin, fulmar, guillemot, shag and cormorant, in addition to a number of terrestrial or waterbird species. Wakefield *et al*³⁴⁰ identify that the coastal seas throughout the East region are utilised by considerable numbers of seabirds. The areas of high usage identified in the multi-species analysis within the study correspond with the areas of high recording shown in Figure 266. Seabird usage of the seas to the east, further offshore, is assessed as being lower.
- 7.4.25 Figure 266 maps the total records of birds recorded in the marine environment in the East region. Whilst the data mapped has not been corrected for survey effort, it highlights areas of high importance, particularly in the outer Firth of Forth and associated with the seabird colonies on the coast to the north of Aberdeen, although recordings are high in coastal areas across the North-east region. The DPOs are largely in areas of lower recording, noting that this may be an artefact of lower survey effort. The exception to this is DPO E3, which is closer to the seabird colonies on the coast and therefore sits in seas of higher usage.
- 7.4.26 There are also a small number of coastal areas identified as either IBA or RSPB reserves in the East region, concentrated around the Firths of Forth and Tay, with some associated with seabird colonies on the coastline to the north and south of Aberdeen (Figure 266).

³⁴⁰ Wakefield, E., Owen, E., Baer, J., Carroll, M., Daunt, F., Dodd, S., Green, J., Guilford, T., Mavor, R., Miller, P., Newell, M., Newton, S., Robertson, G., Shoji, A., Soanes, L., Votier, S., Wanless, S., Bolton, M. 2017. Density, fine-scale tracking, and large-scale modeling reveal the regional distribution of four seabird species, *Ecological Applications*, 27(7), 2017, pp. 2074-2091. Available at https://www.researchgate.net/publication/317959907_Breeding_density_fine-scale_tracking_and_large-scale_modeling_reveal_the_regional_distribution_of_four_seabird_species.

7.4.27 In addition to breeding populations within the East region, terrestrial and seabird species are known to transit the area as migratory species, both during day and night time.

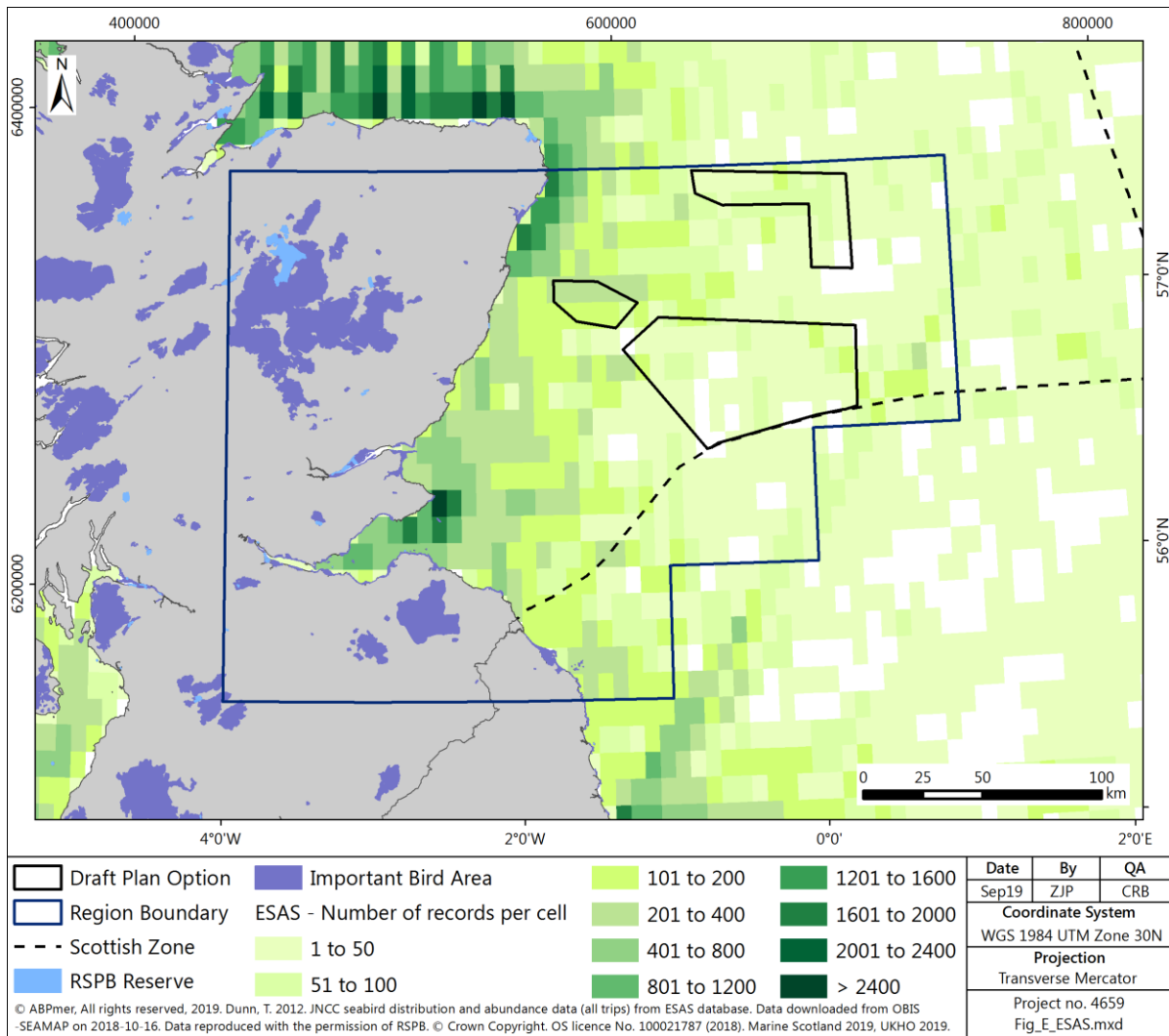


Figure 266 East region: ESAS records per 0.1 degree cell

Cultural Heritage

- 7.4.28 There is one Historic MPA (Campania Historic MPA), shown on Figure 267, designated in the East region, associated with a historic shipwreck in the Firth of Forth.
- 7.4.29 In addition to the Historic MPA, there are a number of scheduled monuments (included protected wrecks) within the East region. Those in the marine environment are concentrated around the coast and include a wide range of historically significant buildings, shipwrecks and structures. There are five shipwrecks designated for the protection of military remains, all located just outside the Firth of Forth. There is no overlap of protected sites and the DPOs. There are additionally numerous other shipwrecks distributed throughout the East region, both within and outwith the DPOs, although the majority are concentrated towards the coastline and within the Firth of Forth.
- 7.4.30 Within the East region, there are several areas which have the potential to be examples of palaeolandscapes (landscapes which have become submerged following occupation by hominids). There is therefore potential that these areas may contain some culturally significant archaeological artefacts. These include areas that may overlap with the shallower DPOs. Further assessment on a smaller scale would be required on a project by project basis.

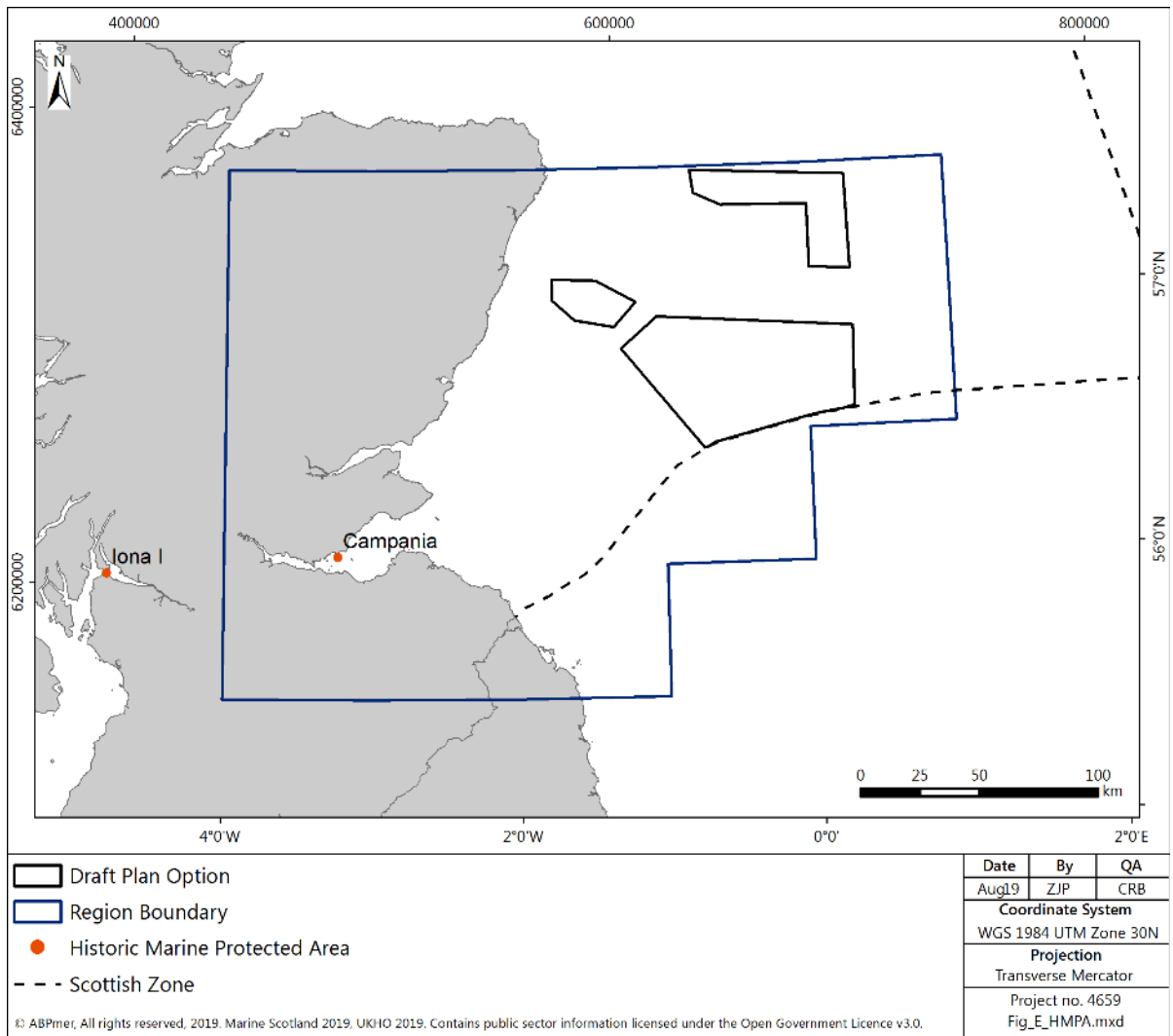


Figure 267 East region: Historic MPA

Landscape / Seascape

- 7.4.31 Within the East region, as for the North-east region landscapes and seascapes are considered to be less sensitive in comparison to the North and West regions. No NSAs have been designated within the region.
- 7.4.32 Candidate SLA which have been identified by the City of Edinburgh Council are over 100km from the nearest DPOs.
- 7.4.33 When considering the sensitivity of the coastline Scott *et al*³⁴¹ identified that the coastline within the East region associated with mainland Scotland is of medium or low to medium sensitivity, due to the simple landform and general absence of focal features. The two areas identified by Scott *et al.* as medium sensitivity are associated with the Firths of Forth and Tay, both of which are over 80km from the nearest DPOs. The DPOs nearest to the coastline (E3 approximately 15km east of the coastline near Aberdeen) is located adjacent to coastline identified by Scott *et al.* as of low to medium sensitivity.

³⁴¹ Scott, K.E., Anderson, C., Dunsford, H., Benson, J.F. and MacFarlane, R. 2005. An assessment of the sensitivity and capacity of the Scottish seascape in relation to offshore windfarms. Scottish Natural Heritage Commissioned Report No.103 (ROAME No. F03AA06). Available at <https://www.nature.scot/snh-commissioned-report-103-assessment-sensitivity-and-capacity-scottish-seascape-relation-windfarms>.

7.5 Planning Issues

7.5.1 There are eight local authorities with coastal interests within the East region:

- Aberdeenshire,
- Aberdeen City,
- Angus,
- Dundee City,
- Fife,
- City of Edinburgh,
- East Lothian, and
- Scottish Borders

7.5.2 Aberdeenshire Council in 2004³⁴² identified that the 250km coastline in the region offered unexplored potential for offshore wind, however there is no further guidance or consideration of offshore wind in documentation with the exception of considering siting for sub-stations.

7.5.3 The Aberdeen City Council, in its sustainable energy action plan³⁴³, identifies the potential for offshore wind installations to support its objective to increase the share of alternative technologies producing energy to the consumers. It identifies the role that it can play in supporting the development of the supply chain within the city. As part of this Aberdeen City Council have been involved in the establishment of the Aberdeen Renewables Energy Group, which seeks to support companies developing capacity to support offshore wind.

7.5.4 Angus Council recognises its role in inputting to the application process for offshore wind farms, and notes its involvement in the development for the landfall and transmission of energy produced by offshore wind farms, both current and future³⁴⁴. Further, Angus Council has previously identified that it may request Marine Scotland to seek £5000 per megawatt installed capacity per annum for community benefits from offshore wind developers³⁴⁵.

7.5.5 Following on from identification as a strategically important port location for marine renewable development Dundee City Council has sought to unlock opportunities in the Offshore Wind sector, through the creation of Energy Dundee and through development of training schemes to support the energy industry³⁴⁶. Planning was previously consented for the development of the port

³⁴² Aberdeenshire Council. 2004. The Renewable Energy Strategy, A strategy to promote the generation of energy from renewable sources. Available at https://www.aberdeenshire.gov.uk/media/6391/renewable_energy2.pdf.

³⁴³ Aberdeen City Council. 2016. Aberdeen's Sustainable Energy Action Plan. Available at <https://www.aberdeencity.gov.uk/sites/default/files/2017-09/Powering%20Aberdeen%20Action%20Plan.pdf>.

³⁴⁴ Angus Council. 2012. Angus Local Plan Review, Implementation Guide for Renewable Energy Proposals. Available at <https://archive.angus.gov.uk/localplan/>.

³⁴⁵ Angus Council. 2013. Draft Renewable Energy Community Benefit Policy. Available at <http://archive.angus.gov.uk/renewableenergycbp/>.

³⁴⁶ EnergyDundee. undated. [online] available at <http://www.energydundee.com/renewables>.

area to support renewables; however, construction was not undertaken and planning consent has now lapsed.

- 7.5.6 Fife Council recognises its role in the consenting process for offshore wind is limited to the supporting onshore infrastructure, for servicing facilities and for cable landfalls. It does, however, identify potential for impacts from offshore wind on the seascape and environment, alongside potential socio-economic benefits for the region³⁴⁷.
- 7.5.7 City of Edinburgh Council has not directly addressed the potential for offshore wind in the sea adjacent to the city, and notes in its Sustainable Energy Development Plan only that there is limited potential for wind energy development within the city.
- 7.5.8 East Lothian Council recognises³⁴⁸ the potential for future offshore wind development in the Firth of Forth, identifying that harbours within the Council's area of responsibility have the potential to support the offshore wind installations. However, the LDP notes that the harbours should be prioritised for current uses (specifically including fishing). In addition, the LDP notes that there are currently consented sub-stations for cable landfalls and expects developers to reduce potential impacts by combining infrastructure, particularly identifying the potential for impacts on historic assets on or near the coasts³⁴⁹. Similar to the City of Edinburgh Council SLA identifies the potential for its coastline to be impacted by Wind Turbines in the Supplementary Planning Guidance³⁵⁰, however these areas are approximately 60km from the nearest DPOs.
- 7.5.9 The Scottish Borders Council does not consider offshore wind within its guidance on renewable energy, although it notes that the only restrictions on the placement of wind energy installations within its jurisdiction are the two NSA, both of which are inland and would not be impacted by offshore wind.

³⁴⁷ Fife Council. 2013. Wind Energy Planning Supplementary Guidance, Enterprise Planning and Protective Services. Available at http://publications.fifedirect.org.uk/c64_WindenergySPG.pdf.

³⁴⁸ East Lothian Council. 2016. Proposed Local Development Plan. Available at https://www.eastlothian.gov.uk/info/210547/planning_and_building_standards/12242/local_development_plan/2.

³⁴⁹ *ibid*.

³⁵⁰ East Lothian Council. undated. Special Planning Guidance (SPG) Appendix 2: Special Landscape Areas. Available at https://www.eastlothian.gov.uk/info/210547/planning_and_building_standards/12284/natural_environment_and_planning/2.

8 Abbreviations

Abbreviation	Definition
AIS	Automatic Identification System
AONB	Area of Outstanding Natural Beauty
AoS	Area of Search
ATBA	Area To Be Avoided
CalMac	Caledonian MacBrayne Clyde & Hebridean Ferries
CCC	Committee on Climate Change
CCS	Carbon Capture and Storage
Cebr	Centre for Economics and Business Research
Cefas	Business Research Ltd
CfD	Contract for Difference
cSAC	candidate Special Area of Conservation
DPO	Draft Plan Option
D&R	Demonstration and Research
EC	European Commission
EMEC	European Marine Energy Centre
ECU2	East Coast Onshore 275 kV Upgrade
EnFAIT	Enabling Future Arrays in Tidal
EOWDC	European Offshore Wind Demonstration Centre
ESAS	European Seabirds At Sea
ESCA	European Subsea Cables Association
EU	European union
FRMS	Flood Risk Management System
FTE	Full Time Equivalent
GEN	Generation
GIS	Geographic Information System
GVA	Gross Value Added
GW	Gigawatt
HIAL	Highlands and Islands Airports Ltd.
HIE	Highlands and Islands Enterprise
HM	Her Majesty
HMNB	Her Majesty's Naval Base

Abbreviation	Definition
HMR	Helicopter Main Routes
HMS	Her Majesty's Ship
HRA	Habitat Regulations Appraisal
HSD2	Harbour Seal Decline 2
HVDC	High Voltage Direct Current
HWDT	Hebridean Whale and Dolphin Trust
IBA	Important Bird Area
ICES	International Council for the Exploration of the Sea
IMO	International Maritime Organisation
ISLES	Irish Scottish Links on Energy Study
IUCN	International Union for the Conservation of Nature
kWm ⁻²	Kilowatt per metre squared
LDP	Local Development Plan
MeyGen	MeyGen Ltd
MMO	Marine Management Organisation
MOD	Ministry of Defence
MPA	Maritime Protected Area
MSP	Members for the Scottish Parliament
MTDG	Marine Tourism Development Group
MV	Motor Vessel
MW	Megawatt
NAFC	North Atlantic Fisheries College
NATS	National Air Traffic Service
NCMPA	Nature Conservation Marine Protected Area
NE	North East
NGL	Natural Gas Liquids
NMPi	National Marine Plan interactive
NPF	National Planning Framework
NRIP	National Renewable Infrastructure Plan
NSA	National Scenic Area
O&C	Opportunity and Constraint
OGA	Oil and Gas Authority

Abbreviation	Definition
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
OWF	Offshore Wind Farm
PARC	Port and Resource Centre
PEXA	Practice and Exercise Area
PMF	Protected Marine Feature
pMPA	proposed Maritime Protected Area
pNCMPA	proposed Nature Conservation Marine Protected Area
pSPA	proposed Special Protection Area
QLS	Quarterly Location Statistics
RAF	Royal Air Force
RLG	Regional Locational Guidance
RSPB	Royal Society for the Protection of Birds
RYA	Royal Yachting Association
SAC	Special Area of Conservation
SCCS	Scottish Centre for Carbon Storage
SCOS	Special Committee on Seals
SEA	Strategic Environmental Assessment
SEIA	Social & Economic Impact Assessment
SEPA	Scottish Environment Protection Agency
SFDAD	Scottish Flood Defence Asset Database
SIMD	Scottish Index of Multiple Deprivation
SLA	Special Landscape Area
SMRU	Sea Mammal Research Unit
SNH	Scottish Natural Heritage
SPA	Special Protection Area
SPG	Special Planning Guidance
SSACN	The Scottish Sea Angling Conservation Network
SSEN	Scottish and Southern Electricity Networks
SSSI	Site of Special Scientific Interest
SW	South West
SXA	Scottish Exercise Area
TSS	Traffic Separation Scheme

Abbreviation	Definition
UK	United Kingdom
UKMMAS	United Kingdom Marine Monitoring and Assessment Strategy
VMS	Vessel Monitoring System
WES	Wave Energy Scotland
WFD	Water Framework Directive
WMS	Web Map Service