

# Planning Scotland's Seas

SEA of Plans for Wind, Wave and  
Tidal Power in Scottish Marine Waters  
Appendix B: Baseline Information

# Table of Contents

|     |  |     |
|-----|--|-----|
| 1   | Environmental Baseline .....               | 2   |
| 1.1 | Introduction .....                         | 2   |
| 1.2 | Biodiversity, Flora and Fauna.....         | 2   |
| 1.3 | Population and Human Health .....          | 59  |
| 1.4 | Water .....                                | 67  |
| 1.5 | Climatic Factors .....                     | 73  |
| 1.6 | Marine Geology and Coastal Processes ..... | 76  |
| 1.7 | Historic Environment.....                  | 90  |
| 1.8 | Landscape .....                            | 101 |

# 1 Environmental Baseline

## 1.1 Introduction

- 1.1.1 This appendix of the Environmental Report presents relevant environmental baseline information for the seven environmental topic areas scoped into this Strategic Environmental Assessment (SEA). The following sections also present an overview of the key overarching issues and pressures on each environmental topic area in the terms of Scotland's marine environment and in the context of offshore renewables development.

## 1.2 Biodiversity, Flora and Fauna

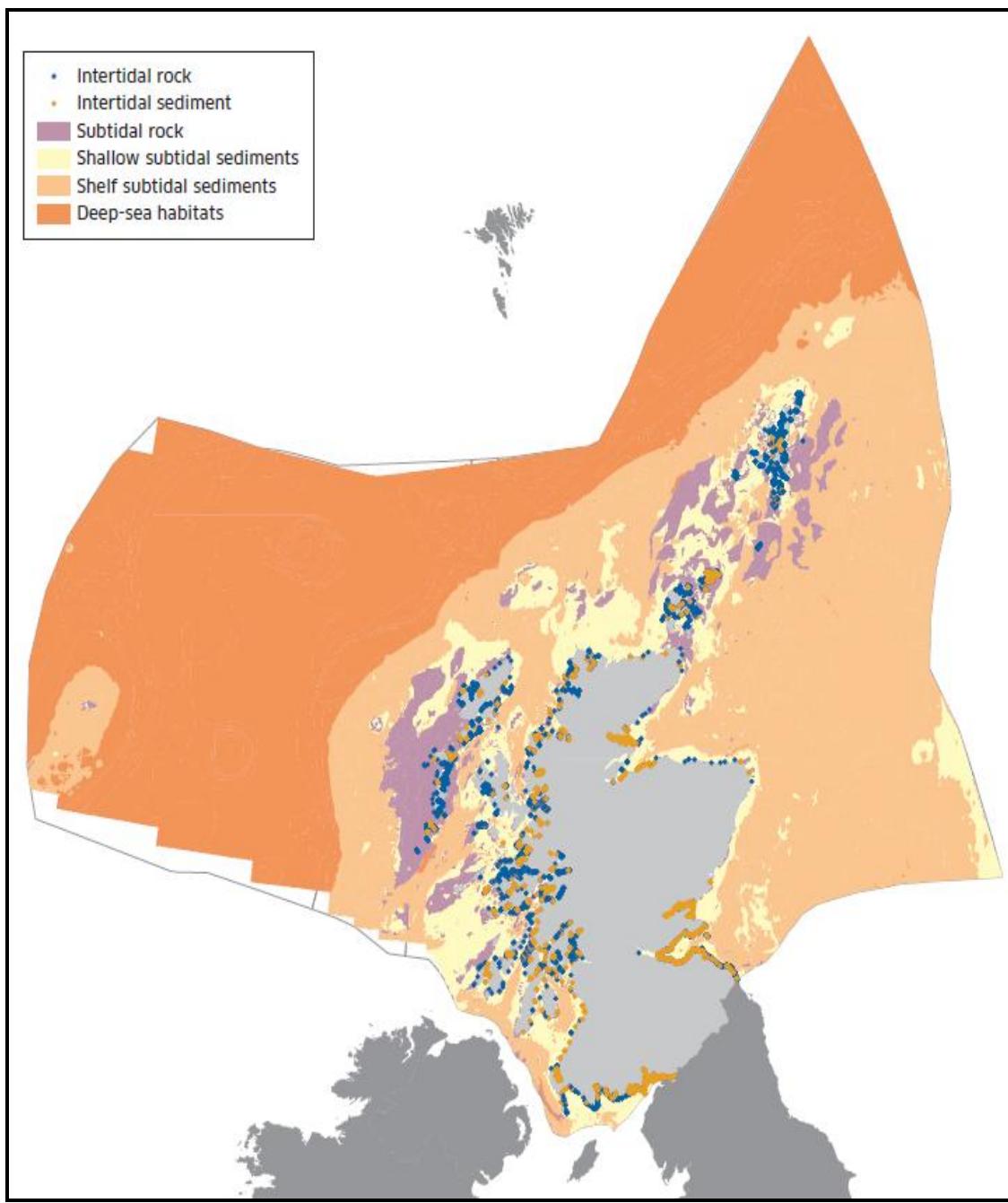
### *Key Issues Summary*

- General pressures on biodiversity, flora and fauna include climate change, development, dredging, pollution, marine litter, fishing, invasive non-native species, other coastal and marine users (e.g. oil and gas, aquaculture, recreation), and the vulnerability of marine and coastal species and habitats to these pressures.
- Species and habitats considered to be vulnerable to these pressures include shoreline and tidal habitats, coral reefs and mudflats, each of which support a wide range of species such as snails, clams, mussels and oysters, bony fish, shellfish, cetaceans (i.e. whales, dolphins and porpoises), elasmobranchs (i.e. sharks, skates and rays), seals, otters and many types of birds.
- The importance of Scotland's marine and coastal areas is demonstrated through the designation of and value off many sites of importance to nature conservation.
- There is a high degree of uncertainty in many aspects of marine biodiversity, and the potential for working towards filling data gaps has been identified.

### *National Marine Baseline*

#### Habitats

- 1.2.1 Six broad habitats are found in Scottish waters: intertidal rock, intertidal sediment, subtidal rock, shallow subtidal sediments, shelf subtidal sediments and deep-sea habitats. The spatial distribution of these habitats is displayed in Figure B1.2.1.



**Figure B1.2.1: Modelled Distribution of Habitats in Scottish Waters<sup>1</sup>**

- 1.2.2 Intertidal rock represents around 48% of Scotland's coastline. These habitats are located at the shoreline, comprise bedrock, boulders and cobble substrate, and are characterised by wave exposure, salinity and tides. The upper regions of many rocky shores are relatively species poor, especially on exposed coasts, but towards the bottom of the shore, species richness can be very high. They host many important ecosystems (e.g. seaweed communities) and are important resting and foraging places for many animals (e.g. grey seals, otters and various wading birds)<sup>2</sup>.
- 1.2.3 Intertidal sedimentary habitats make up around 50% of Scotland's coastline, and comprise mobile shingle, gravel, sand, mud or combinations of these, and

<sup>1</sup> Scottish Government (2011) Scotland's Marine Atlas, Scottish Government pg. 071

<sup>2</sup> Scottish Government (2011) Scotland's Marine Atlas, Scottish Government pg. 076

vascular plant communities in the upper shores that form saltmarshes. These habitats support communities of animals that are typically species poor but highly productive (e.g. burrowing worms and bivalve molluscs)<sup>3</sup>. Many such habitats are designated as Special Protection Areas (SPAs) and are important for overwintering birds.

- 1.2.4 Subtidal rock habitats comprise bedrock, boulders and cobbles occurring below the water mark. They range in depth, and as such, their make-up is strongly affected by the availability of light. Shallow areas are typically dominated by seaweed communities while the communities in deeper areas comprise exclusively of marine animals<sup>4</sup>.
- 1.2.5 Shallow and shelf subtidal sediment habitats cover an extensive area of the seabed, and comprise shingle, gravel, sand and mud substrates. However, these habitats can also include inshore sediments such as lagoons and mael beds, and often support diverse marine communities in these areas. They extend to depths below the effects of wave patterns (around 50 – 70m below sea level) with shelf sediments extending to 200m depth<sup>5</sup>.
- 1.2.6 Deep sea habitats occur beyond the continental shelf break at depths typically greater than around 200m below sea level. Knowledge of these habitats is currently limited but is increasing, and they are found almost entirely to the north and west of Scotland, and comprise predominantly deep sea sediments, with occurrences of cold water coral reefs, coral carbonate mounds, submarine canyons and sea mounts<sup>6</sup>.
- 1.2.7 The term benthic marine habitats is used to describe all biological communities associated with the sea floor, from the top of the intertidal zone and inner reaches of estuaries to the deep sea. The composition of the benthos varies widely within Scotland's waters, and it plays a key role in supporting the marine ecosystem. The benthos contains a wide range of flora and fauna species whose importance has been recognised by their inclusion as priority marine features (PMFs) (e.g. sea grass beds, tidal-swept algal communities, blue mussel beds)<sup>7</sup>.

### Designations

- 1.2.8 Designations at a European level protect internationally important and threatened habitats and species, and are called Natura sites. These sites are made up of Special Protection Areas (SPA), designated for threatened or vulnerable bird species listed in Annex I of the Birds Directive, and Special Areas of Conservation (SAC) selected for a number of habitats and species, both terrestrial and marine, which are listed in the Habitats Directive.

<sup>3</sup> Scottish Government (2011) Scotland's Marine Atlas, Scottish Government pg. 078

<sup>4</sup> Scottish Government (2011) Scotland's Marine Atlas, Scottish Government pg. 082

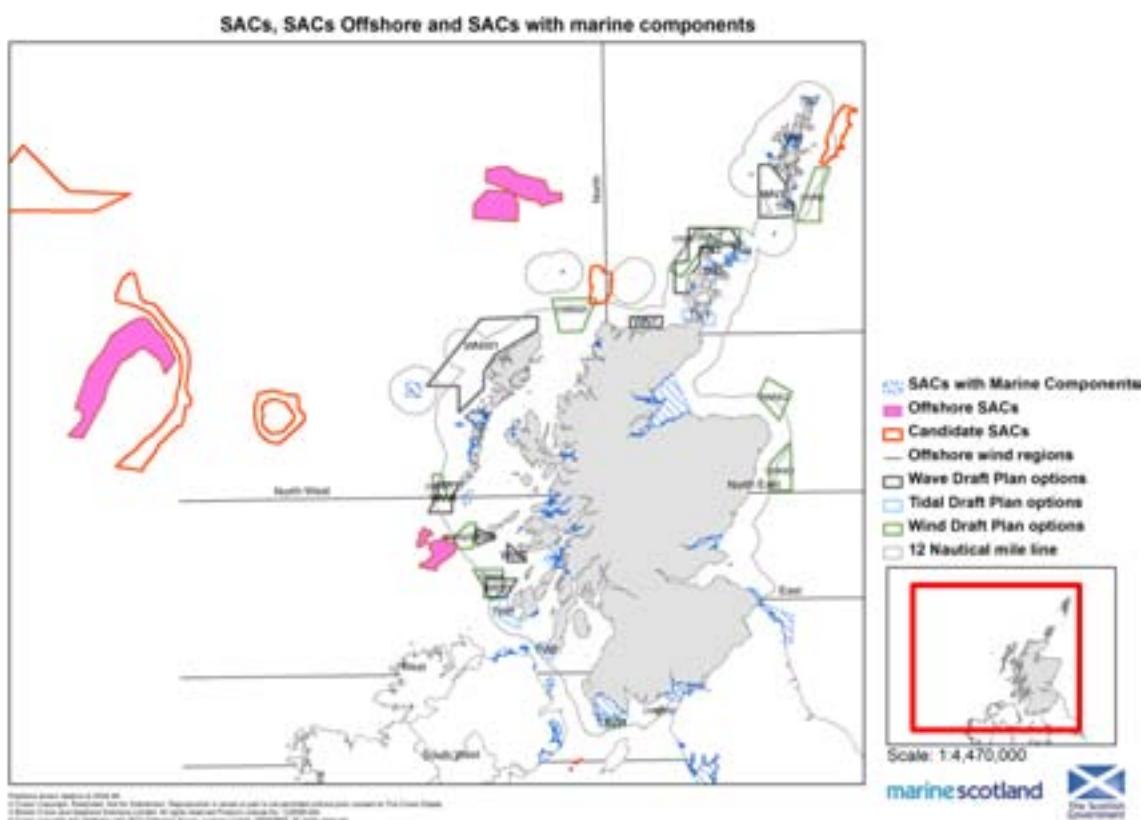
<sup>5</sup> Scottish Government (2011) Scotland's Marine Atlas, Scottish Government pg. 090-099

<sup>6</sup> Scottish Government (2011) Scotland's Marine Atlas, Scottish Government pg. 100-103

<sup>7</sup> SNH (2012) Recommended list of Priority Marine Features in Scotland's seas [online] Available at: <http://www.snh.gov.uk/protecting-scotlands-nature/safeguarding-biodiversity/priority-marine-features/priority-marine-features/> [accessed 10/05/2013]

## *Special Areas of Conservation (SACs)*

- 1.2.9 Scotland has a number of marine and coastal protected sites. There are 40 coastal and offshore marine Special Areas of Conservation (SACs), one possible (pSAC) and six candidate areas (cSACs)<sup>8</sup> covering habitat types such as sandbanks, sea caves, estuaries, mudflats, coastal lagoons, shallow inlets and bays and reefs. Furthermore they include several species including otter, bottlenose dolphin, grey seal, and harbour seal, amongst others<sup>9</sup>. The pSAC and cSACs in the Scottish offshore region were submitted in October 2012, and comprise Sound of Barra, Anton Dohrn Seamount, East Rockall Bank, Hatton Bank, Pobie Bank Reef and Solan Bank Reef.
- 1.2.10 As of January 2011, of the 129 habitat features identified on designated sites in Scotland, 94 of the 96 assessed were considered to be in favourable condition. In terms of fauna features, some 86% of mammal features and 84% of waterfowl features assessed were considered to be favourable. However, just under half of seabirds features assessed were considered in an unfavourable or unfavourable-recovering condition<sup>10</sup>.



**Figure B1.2.2: Marine Special Areas of Conservation (SACs)**

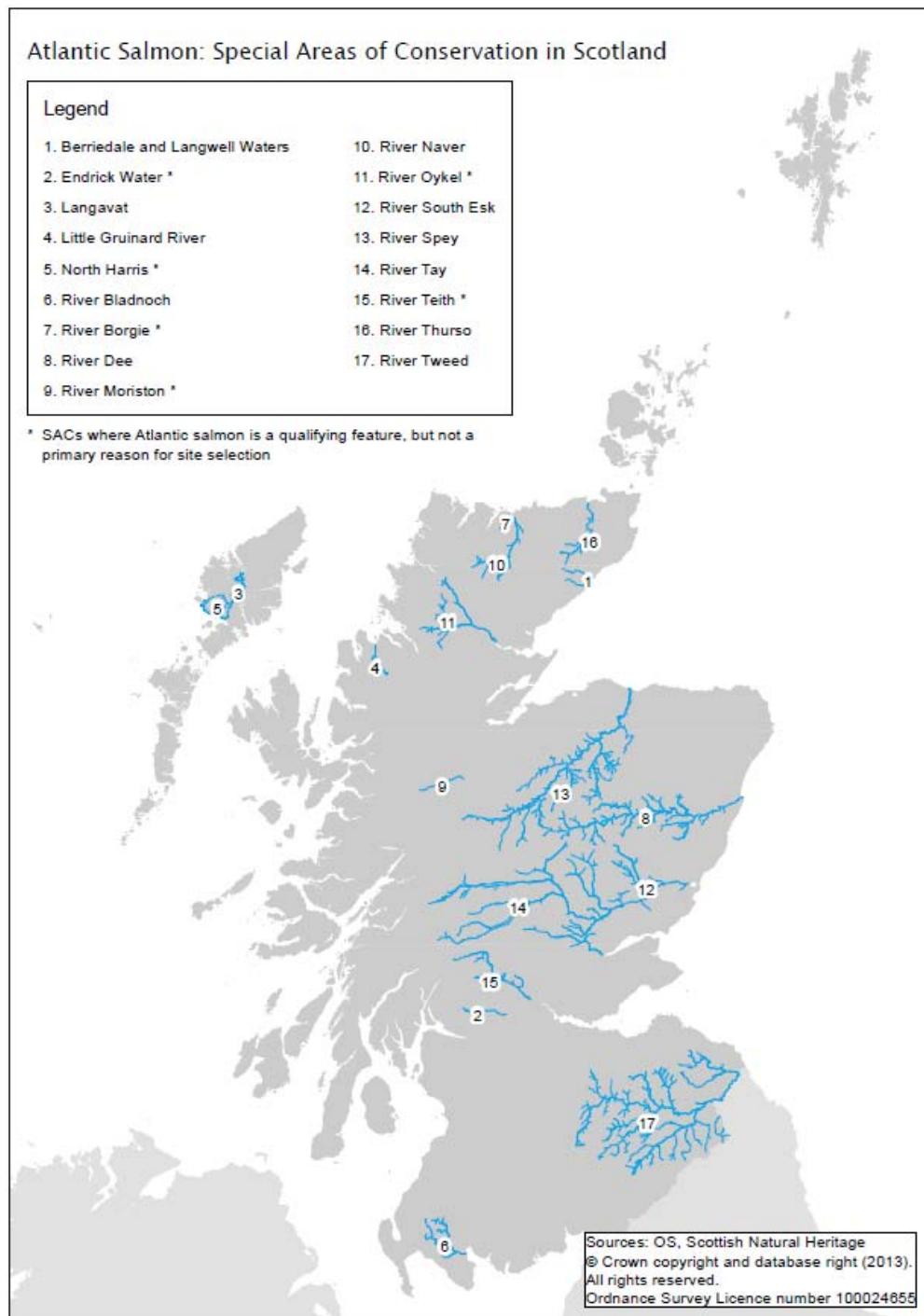
- 1.2.11 A number of important rivers have also been designated due to their coastal and marine relevance, particularly over the presence of mobile species such as Atlantic salmon. Some 17 SACs have been designated due to their importance

<sup>8</sup> Scottish Government (2012) MPA Progress Report to the Scottish Parliament, Annex B Special Areas of Conservation (SACs) [online] Available at: <http://www.scotland.gov.uk/Publications/2012/12/6655/20> [accessed 16/05/2013]

<sup>9</sup> Scottish Government (2011) Scotland's Marine Atlas, Scottish Government pg. 072

<sup>10</sup> Scottish Government (2011) Scotland's Marine Atlas, Scottish Government pg. 074

for Atlantic salmon, either as a qualifying feature or as the primary reason for selection, located largely in the East, North East and North regions of the Scottish mainland<sup>11</sup>. Of these, two are considered to be favourable-maintained (River Tay and River Dee), with the remaining 15 classified as having unfavourable-recovering status<sup>12</sup>. Many of Scottish rivers and estuaries also support important populations of Sea trout, also listed as a Priority Marine Feature (PMF).



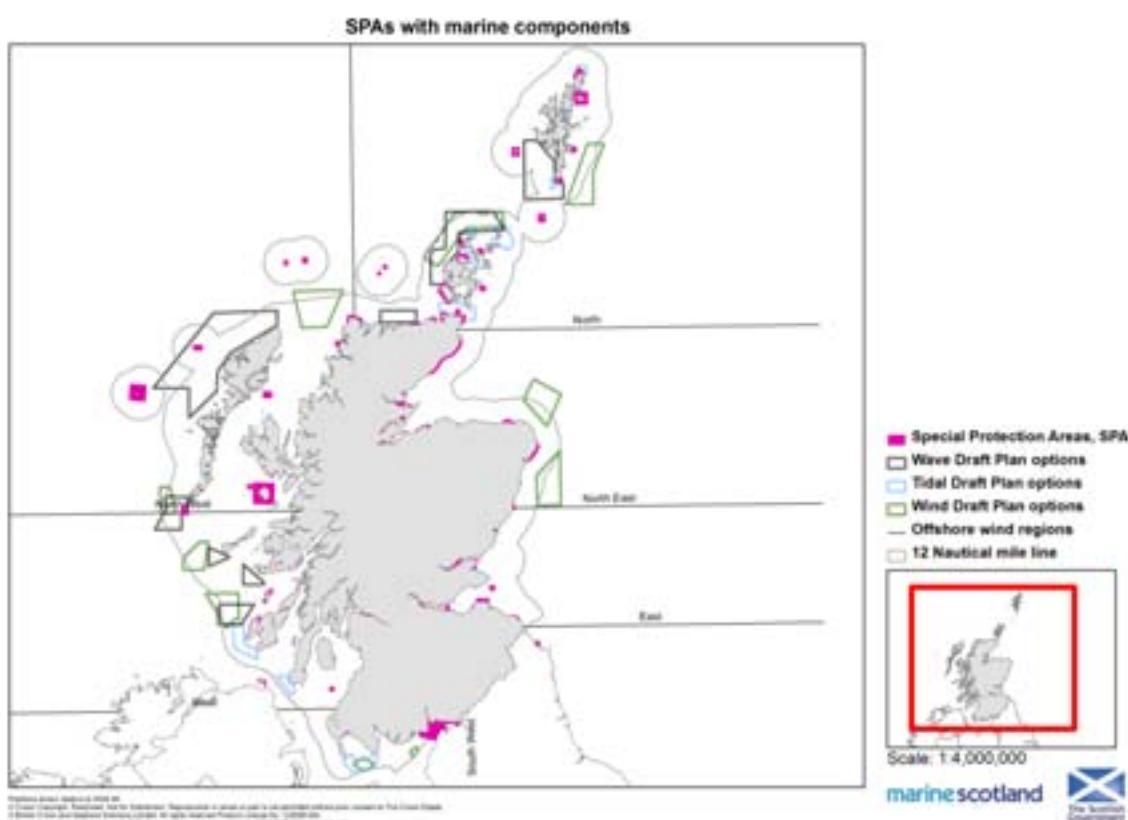
**Figure B1.2.3: Atlantic Salmon Special Areas of Conservation in Scotland**

<sup>11</sup> SNH (undated) Salmon in the Classroom, Special Areas of Conservation [online] Available at: [http://www.snh.org.uk/salmonintheclassroom/salmon\\_conservation.shtml](http://www.snh.org.uk/salmonintheclassroom/salmon_conservation.shtml) [accessed 08/05/2013]

<sup>12</sup> SNH (2013) SNH Information Service, Sitelink [online] Available at: <http://gateway.snh.gov.uk/sitelink/index.jsp> [accessed 09/05/2013]

## *Special Protection Areas (SPAs)*

- 1.2.12 Scotland's marine environment includes many areas that are of international importance for bird species (i.e. seabirds, waders, ducks, geese and swans). Scotland's Environment Web identifies 58 Special Protection Areas (SPAs) designated for their importance to birds, that have marine or coastal components<sup>13</sup>. Although Scotland's coastal SPAs support large colonies of seabirds, there is ongoing concern about the continuing decline in the overall seabird populations, particularly in the Northern and Western Isles<sup>14</sup>. SPAs relevant to the plan option areas are discussed further in the appropriate sections of the regional baseline.



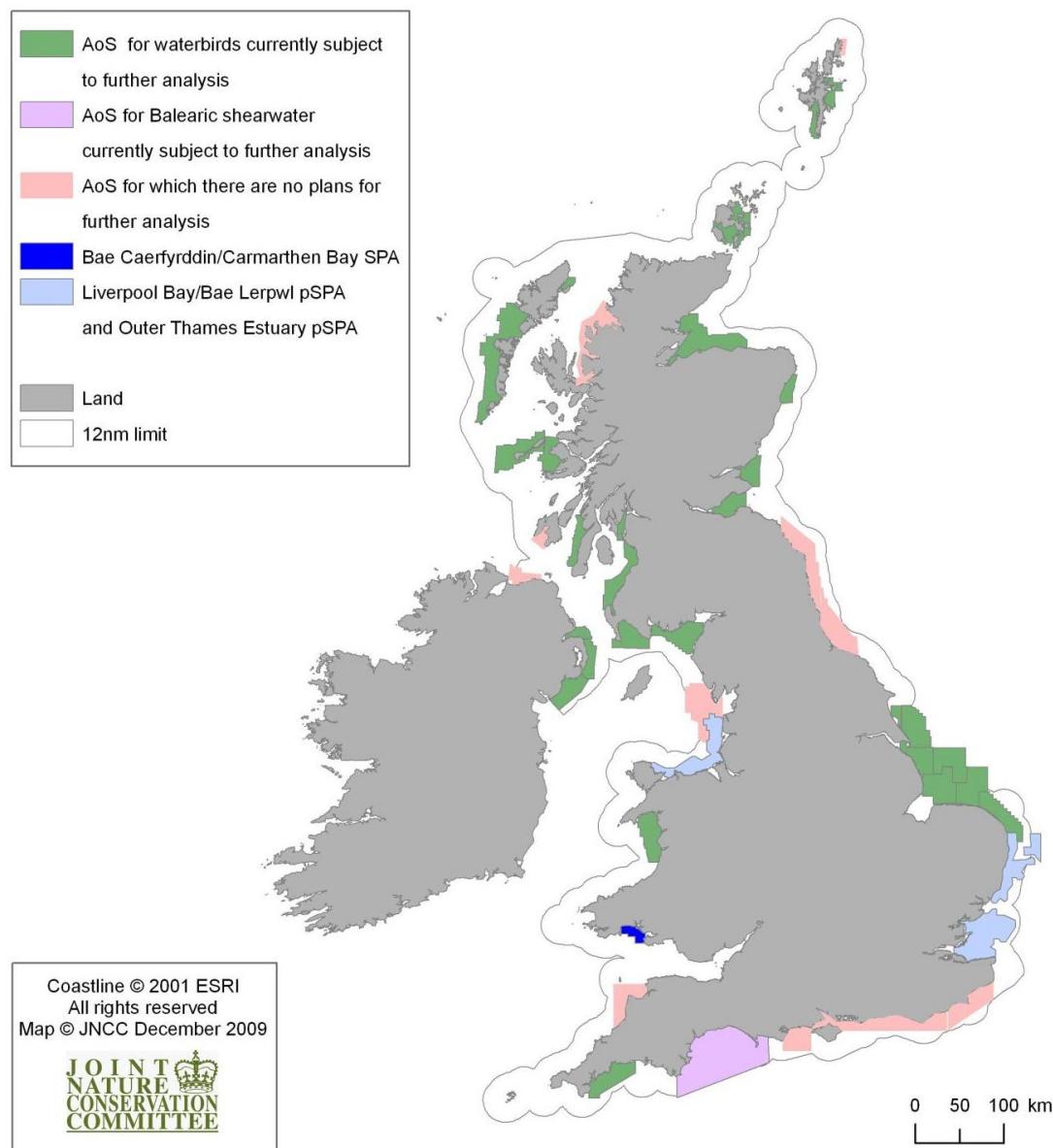
**Figure B1.2.4: Marine Special Protection Areas (SPAs)**

- 1.2.13 The Joint Nature Conservation Committee (JNCC) have started a process to identify possible marine SPAs using existing and targeted survey data, and development of a series of maps showing several Areas of Search (AoS). These areas do not represent formal designations but rather provide additional information for identifying important aggregations of waterbirds in Scotland and across the UK.
- 1.2.14 The AoS identified in Scotland largely complement the existing network of SPAs, and are located around the Scottish coastline and amongst the Northern

<sup>13</sup> Scotland's Environment (2011) Coastal Waters [online] Available at: [http://www.environment.scotland.gov.uk/our\\_environment/water/coastal\\_waters.aspx](http://www.environment.scotland.gov.uk/our_environment/water/coastal_waters.aspx) (accessed 13/12/12)

<sup>14</sup> Scottish Government (2011) Scotland's Marine Atlas, Scottish Government pg. 005

and Western Isles, and include important coastal areas such as the Firth of Forth, Moray Firth, Solway Firth and Firth of Tay, amongst others<sup>15</sup>.

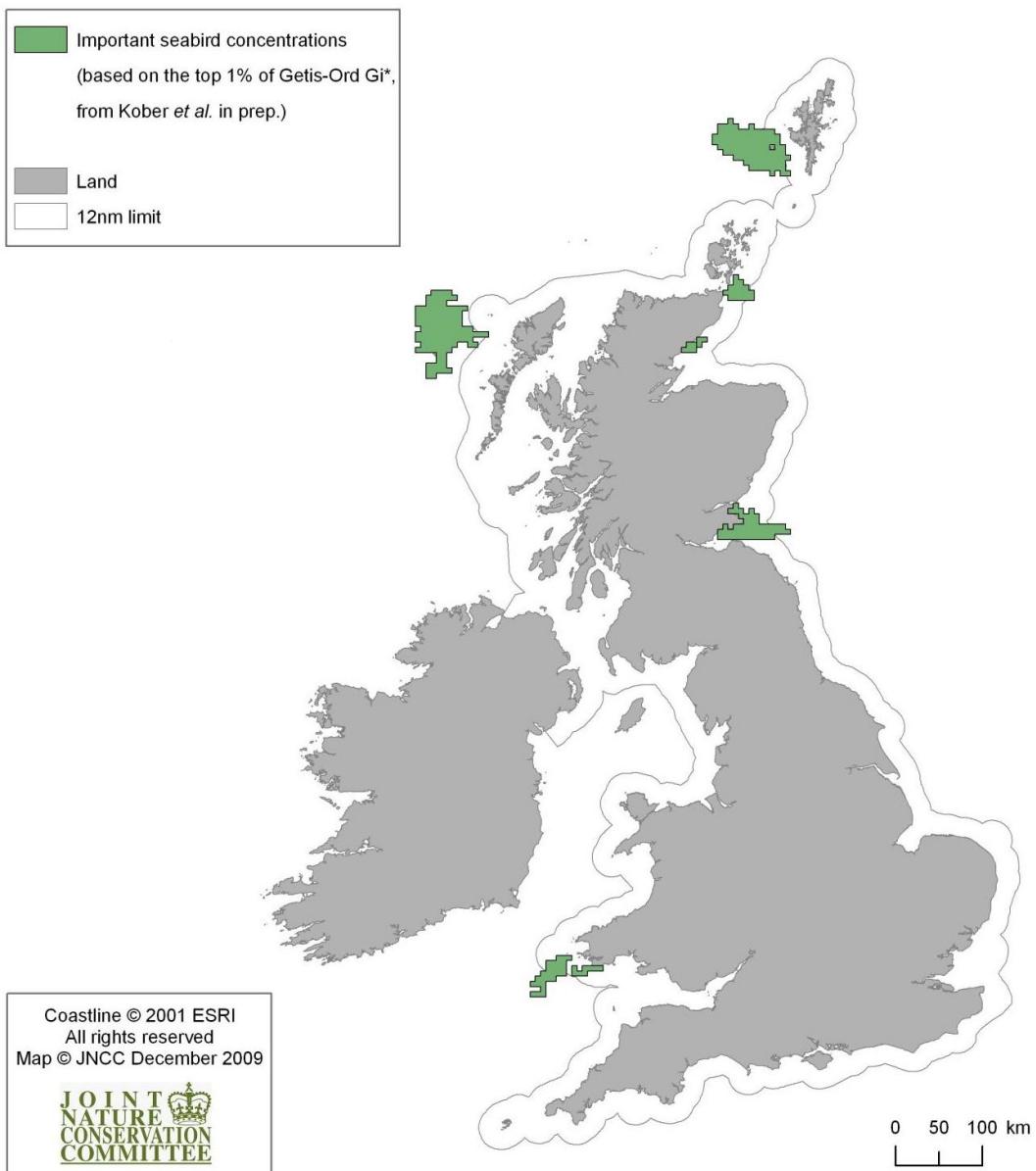


**Figure B1.2.5: Areas of Search for Inshore Aggregations of Waterbirds Outwith the Breeding Season**

- 1.2.15 The JNCC have also identified a further five areas of important seabird concentrations, including the areas near the Firth of Forth and Firth of Tay; between Golspie and Helmsdale; east of the Pentland Firth; to the west of Shetland; and to the north west of Lewis<sup>16</sup>. The AoS identified by JNCC do not represent formal designations but provide additional information for identifying important aggregations of seabirds in Scotland.

<sup>15</sup> JNCC (2009) Classified SPAs, pSPAs and Areas of Search (AoS) for inshore aggregations of waterbirds and Balearic shearwater outwith the breeding season [online] Available at: [http://jncc.defra.gov.uk/pdf/SPA\\_AOS\\_Maps%2020091216.pdf](http://jncc.defra.gov.uk/pdf/SPA_AOS_Maps%2020091216.pdf) [accessed 8/5/2013]

<sup>16</sup> JNCC (2009) Important Seabird Concentrations Being Considered in an SPA Context [online] Available at: [http://jncc.defra.gov.uk/pdf/SPA\\_AOS\\_Maps%2020091216.pdf](http://jncc.defra.gov.uk/pdf/SPA_AOS_Maps%2020091216.pdf) [accessed 8/5/2013]



**Figure B1.2.6: Important Seabird Concentrations Being Considered in an SPA Context**

*Priority Marine Features (PMFs)*

- 1.2.16 Many marine mammal species, including grey and harbour seals, and cetaceans (i.e. Common dolphin, Bottlenose dolphin, White-beaked dolphin, Risso's dolphin, Harbour porpoise, Minke whale, Killer whale, Sperm whale, Fin whale, Northern bottlenose whale and Sowerby's beaked whale) are also recognised as PMFs, as are several species of elasmobranchs (i.e. Basking shark, Blue shark, Porbeagle shark, Leafscale gulper shark, Spiny dogfish, Portuguese dogfish, Common skate and Sandy rays)<sup>17</sup>. Furthermore, Scottish waters contain several species of elasmobranchs that are not PMFs but are nonetheless important to marine biodiversity, including skates and rays (e.g.

<sup>17</sup> Scottish Government (2011) Scotland's Marine Atlas, Scottish Government pg. 116 – 129

Starry skate, Shagreen ray, Thornback ray) and sharks (e.g. Tope, Starry smoothhound, Nursehound)<sup>18</sup>.

- 1.2.17 Marine plant life is key to the health of our seas and the species it supports, with Scotland's seas including a wide range of seaweeds, phytoplankton and sea grasses closer to the coast, many of which have been recognised as PMFs (e.g. Sea grass beds; Blue, Horse and Flame shell mussel beds; Native oysters, European spiny lobster)<sup>19</sup>. Some species, including those with coastal interests such as the Freshwater pearl mussel, have seen significant population declines to the point that these species are now rare in Europe, giving extra significance to UK and Scottish populations<sup>20</sup>. In many cases, this significance has been demonstrated through the designation of SACs for the conservation of these species.

#### *Marine Protected Areas (MPAs)*

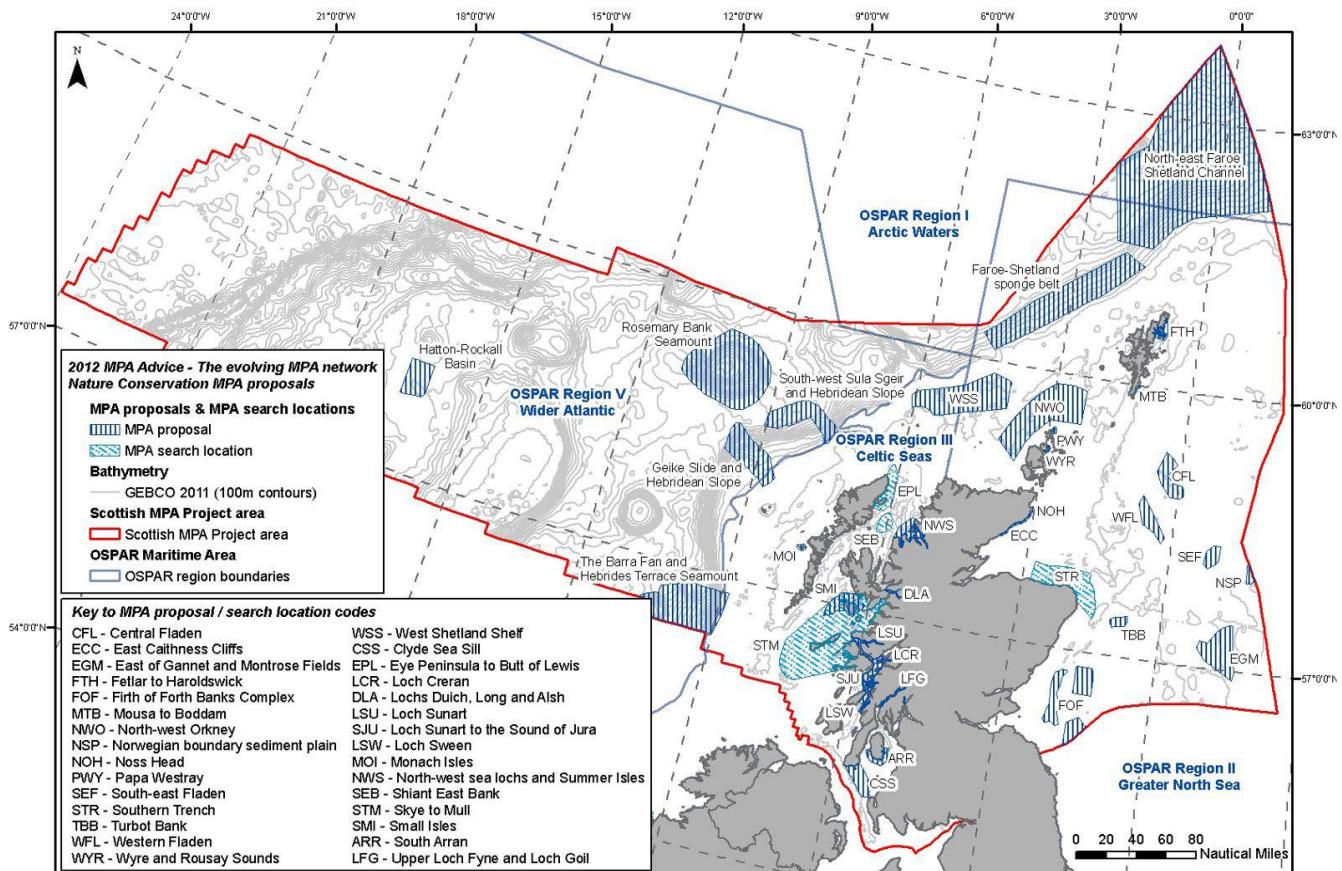
- 1.2.18 Scottish Ministers are committed to setting up a national network of ecologically coherent Marine Protected Areas (MPAs) to protect features of conservation importance in both inshore and offshore waters adjacent to Scotland. This will provide protection for features beyond those which are of European significance.
- 1.2.19 The Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009 both contain new powers to designate Marine Protected Areas (MPAs) to protect features of conservation importance in both inshore and offshore waters adjacent to Scotland, and that a network of MPAs in UK seas is created to protect biodiversity and geodiversity. This network will contribute to a range of measures to manage and protect our seas for current and future generations, while also contributing to our agreement with international partners to create an ecologically coherent network of well-managed MPAs in the North East Atlantic. The Sectoral Plans for Wind, Wave and Tidal energy will take cognisance of these MPA proposals, and a linked consultation on the MPA proposals will be published alongside this consultation.

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<sup>18</sup> Scottish Government (2011) Scotland's Marine Atlas, Scottish Government pg. 119

<sup>19</sup> Scottish Government (2011) Scotland's Marine Atlas, Scottish Government pg. 76 – 103

<sup>20</sup> JNCC (undated) Invertebrate species: molluscs, 1029 Freshwater pearl mussel, Margaritifera margaritifera [online] Available at: <http://jncc.defra.gov.uk/protectedsites/sacselection/species.asp?featureintcode=s1029> [accessed 31/05/2013]



**Figure B1.2.7: Marine Protected Area Proposals<sup>21</sup>**

### *Sites of Special Scientific Interest (SSSI)*

- 1.2.20 Sites of Special Scientific Interest (SSSI) are a national level designation that underpin international nature conservation designations such as SACs and SPAs, and will contribute to the development of Scotland's MPA network<sup>22</sup>. While Scotland's SSSI are primarily terrestrial as their extent is to the mean low water spring tide, there are 56 sites in Scotland which have some intertidal and/or seal interests<sup>23</sup>.

### *Mobile Species*

- 1.2.21 Whilst many designated sites are based on the presence of protected species, mobile species provide particular challenges for determining effects of activity in the marine environment, not least because of difficulties in identifying their movements. There are gaps in information relating to the precise movements of seabirds, seals, cetaceans, elasmobranchs and fish (such as Lamprey and Atlantic salmon). For some, 'hotspots' in the observed distribution of certain species have been identified, in areas where research has been undertaken, such as Basking sharks (*Cetorhinus maximus*), mainly to the south west of Tiree,

<sup>21</sup> SNH, JNCC (2012) Advice to the Scottish Government on the selection of Nature Conservation Marine Protected Areas (MPAs) for the development of the Scottish MPA network [online] Available at: [http://www.snh.org.uk/pdfs/publications/commissioned\\_reports/547.pdf](http://www.snh.org.uk/pdfs/publications/commissioned_reports/547.pdf) (accessed 13/12/12)

<sup>22</sup> SNH (2012) How are SSSI selected and notified? [online] Available at: <http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/national-designations/sssis/sssi-selection/> (accessed 13/12/12)

<sup>23</sup> Scottish Government (2011) Scotland's Marine Atlas, Scottish Government pg 72.

and south of Barra and Canna Island, located off the west coast of Scotland<sup>24</sup>. Ongoing research projects such as the Basking shark tagging project being jointly undertaken by SNH and the University of Exeter<sup>25</sup>, the Future of the Atlantic Marine Environment (FAME)<sup>26</sup> and numerous studies into tracking seabird movements, including several on the use of the eastern Atlantic Flyway by migratory wading and diving birds, are aimed at improving this knowledge-base and may form potential inputs on these issues in future assessments.

### *Non-native Species*

- 1.2.22 A number of non-native species are known to be present in Scottish waters, although only a few are currently considered to be invasive (e.g. leathery and carpet sea squirts, wireweed, acorn barnacle, etc.). Some species have become widespread, well-established and, in some instances, are having adverse impacts on both native species (e.g. out-competition, predation, etc.) and our marine industries<sup>27 28</sup>.
- 1.2.23 Shipping is considered to be the primary source of the introduction and spread of these species, through pathways such as hull or anchor attachment, and in ballast waters and sediments, amongst others. However, the potential for climate change and aquaculture to contribute to the introduction or spread of non-native species has also been identified<sup>29 30</sup>.

### Pressures

- 1.2.24 Scotland's coastal and marine habitats are subject to a number of pressures including climatic factors such as temperature increases, acidification, sea-level rise and changes in wave regimes; development and land use change including coastal development, dredging and pollution<sup>31</sup>; non-native or invasive species<sup>32</sup>; marine litter; commercial fishing and over-fishing in particular<sup>33</sup>; and a range of other activities (i.e. recreation, anchoring and some fishing activities)<sup>34</sup>.
- 1.2.25 A key pressure in itself, climate change and Scotland's adaptation to it, may also contribute to other pressures or exacerbate their effects. For example,

<sup>24</sup> Speedie, C.D., Johnson, L.A., Witt, M.J., (2009) Basking Shark Hotspots on the West Coast of Scotland: Key sites, threats and implications for conservation of the species. Commissioned Report No.339.

<sup>25</sup> Witt M.J., Doherty P.D., Hawkes L.A., Godley B.J., Graham R.T. and Henderson S.M. (2013) Basking shark satellite tagging project: post-fieldwork report, Scottish Natural Heritage Commissioned Report No. 555 [online] Available at: [http://www.snh.org.uk/pdfs/publications/commissioned\\_reports/555.pdf](http://www.snh.org.uk/pdfs/publications/commissioned_reports/555.pdf) [accessed 08/05/2013]

<sup>26</sup> RSPB (2013) Future of the Atlantic marine Environment (FAME) [online] Available at: <http://www.rspb.org.uk/ourwork/projects/details/255106-future-of-the-atlantic-marine-environment-fame-> [accessed 08/05/2013]

<sup>27</sup> Scottish Government (2011) Scotland's Marine Atlas, Scottish Government, pg. 138 – 139.

<sup>28</sup> Non-Native Species Secretariat (2011) Impact Examples [online] Available at: <https://secure.fera.defra.gov.uk/nonnativespecies/index.cfm?sectionid=54> [accessed 21/05/2013]

<sup>29</sup> Scottish Government (2011) Scotland's Marine Atlas, Scottish Government, pg. 138 – 139.

<sup>30</sup> Scottish Government (2011) Scotland's Marine Atlas, Scottish Government, pg. 188 – 189.

<sup>31</sup> Scotland's Environment Website (SEWeb), coastal waters [online] Available at:

[http://www.environment.scotland.gov.uk/our\\_environment/water/coastal\\_waters/pressures.aspx](http://www.environment.scotland.gov.uk/our_environment/water/coastal_waters/pressures.aspx) (accessed 25/03/2013)

<sup>32</sup> *ibid*

<sup>33</sup> Scottish Government (2011) Scotland's Marine Atlas, Scottish Government pg 132

<sup>34</sup> Scotland's Environment Website (SEWeb), coastal waters [online] Available at:

[http://www.environment.scotland.gov.uk/our\\_environment/water/coastal\\_waters/pressures.aspx](http://www.environment.scotland.gov.uk/our_environment/water/coastal_waters/pressures.aspx) (accessed 25/03/2013)

changing wave patterns have the potential to increase coastal erosion in vulnerable areas<sup>35</sup>.

- 1.2.26 Additional pressures, such as effects from noise and electro-magnetic fields (EMF), may also potentially affect marine fauna<sup>36</sup>. However, evidence relating to the nature and scale of the impact of undersea disturbances such as noise, vibration and EMF, on marine species including fish, mammal and elasmobranch behaviour is still emerging.

### ***Regional Baseline***

#### Information Relating to the Presentation of Regional Data Sets

##### *Sea Distribution*

- 1.2.27 The Sea Mammal Research Unit (SMRU) at the University of St Andrews was engaged to develop the at-sea grey and harbour seal distribution maps presented in this baseline<sup>37</sup>. Grey seal and harbour seal telemetry data obtained from monitoring electronically tagged seals between 1991 – 2012 combined with haul out count data from 1988 – 2012 to produce UK-wide maps of estimated density and associated confidence intervals for each species.
- 1.2.28 The ‘usage’ maps presented in this baseline were produced by monitoring movement patterns, with each trip to sea being indexed by the departure and arrival haul out site. The resulting patterns of at-sea usage was then scaled by the number of seals counted in aerial surveys at these haul outs sites to produce estimates of mean density (seals per 5 x 5 km grid cells)<sup>38</sup>.

##### *Basking Shark Maps*

- 1.2.29 The Basking shark ‘hotspot’ map for the West Coast was derived from survey data presented in Speedie et al. (2009)<sup>39</sup>. The ‘hotspot’ data set for the West region is the product of a concerted survey in that area as it is known for high concentrations of basking sharks at certain times of year. It should be noted however that while this area appears important for this species, is not the only area where Basking sharks are found within Scottish waters.
- 1.2.30 The Basking shark maps presented in this baseline also show historic surface sightings data from around the UK originating from the Basking Shark Watch

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<sup>35</sup> SNH (2010) Climate Change at the Coast, [online] Available at: <http://www.snh.gov.uk/about-scotlands-nature/rocks-soils-and-landforms/coasts/climate-change/> (accessed 25/03/2013)

<sup>36</sup> Gill, A.B. & Bartlett, M. (2010). Literature review on the potential effects of electromagnetic fields and subsea noise from marine renewable energy developments on Atlantic salmon, sea trout and European eel. Scottish Natural Heritage Commissioned Report No.401 [online] Available at: [www.snh.org.uk/pdfs/publications/commissioned\\_reports/401.pdf](http://www.snh.org.uk/pdfs/publications/commissioned_reports/401.pdf) (accessed 25/03/2013)

<sup>37</sup> Marine Scotland (2013) Grey and Harbour Seal Usage Maps [online] Available at: <http://www.scotland.gov.uk/Topics/marine/science/MSInteractive/Themes/seal-density> [accessed 21/05/2013]

<sup>38</sup> Sea Mammal Research unit (2013) Marine Mammal Scientific Support Research Programme MMSS/001/11, Grey and harbour seal density maps, Prepared for Marine Scotland [online] Available at: <http://www.scotland.gov.uk/Resource/0041/00416981.pdf> [accessed 21/05/2013]

<sup>39</sup> Speedie C.D., Johnson L. A. and Witt M.J. (2009) Basking Shark Hotspots on the West Coast of Scotland: Key sites, threats and implications for conservation of the species, Commissioned Report No.339.

and Seaquest Southwest databases<sup>40</sup>. These sightings have been split into pre and post 1999 periods for temporal relevance.

### *Seabird Vulnerability Maps*

- 1.2.31 The seabird and diving bird vulnerability maps presented in this baseline were developed using the European Seabirds at Sea (ESAS) dataset. This dataset was used to generate Geographic Information System (GIS) layers representing the vulnerability of seabird species to offshore energy devices, with the outputs presented in this baseline representing an aggregation of data for species available in the ESAS database. The relative proportion of the Scottish population distribution for each species was then calculated. An empirically derived vulnerability factor<sup>41 42</sup> was then applied to this relative distribution in order to represent where bird populations may be at higher risk from offshore devices.
- 1.2.32 The data used for the maps was restricted to boat transect surveys carried out between 1980 and 2004, within the British Fishery Limit. The mapped densities are not raw data but interpolated data, produced using Poisson kriging and, in a few cases, the interpolated densities were rescaled where deemed appropriate. The densities shown are mapped on a grid of 6 x 6km, which was the maximum resolution possible. As the underlying survey effort varied considerably, both temporally and spatially, and to maximise the data coverage, data from all years was pooled for each species.
- 1.2.33 Therefore the data presented in these maps represents an overall view of vulnerability for seabird and diving birds, rather than reflecting specific vulnerabilities for individual species<sup>43</sup>.

### *Cetacean Relative Distribution*

- 1.2.34 The relative distribution data presented for cetaceans presented in this baseline was processed using a similar approach to that undertaken for the ESAS seabird dataset. The number of cetacean encounters per grid square was scaled to represent the proportion of the total number of encounters for each species. This was done by dividing the number of encounters in each grid square for each species by the total number of encounters for that species.
- 1.2.35 A grid square in this data set is ¼ of an ICES statistical rectangle which amounts to approximately 800 km<sup>2</sup>. The proportions of numbers encountered for all species were added together to represent a combined relative distribution. In order to avoid very small numbers, these numbers were multiplied by 1000.

<sup>40</sup> Witt M. J., Hardy T., Johnson L., McClellan C. M., Pikesley S. K., Ranger S., Richardson P. B., Solandt J.-L., Speedie C., Williams R. and Godley B. J. (2012) Basking sharks in the northeast Atlantic: spatio-temporal trends from sightings in UK waters Marine Ecology Progress Series, 459, 121 – 134.

<sup>41</sup> Furness B. and Wade H. (2012) Vulnerability of Scottish Seabirds to Offshore Wind Turbines, MacArthur Green Ltd and ERI Thurso, Reviewed by David MacArthur , 5 February 2012.

<sup>42</sup> Furness B. and Wade H. (2012) Vulnerability of Scottish Seabirds to Offshore Wind Turbines, MacArthur Green Ltd and ERI Thurso, Reviewed by David MacArthur , 8 February 2012.

<sup>43</sup> Kober K., Webb A., Win I., Lewis M., O'Brien S., Wilson L.J. and Reid J.B. (2010) Seabird density surface maps: A summary of how seabird density surfaces were generated from European Seabird at Sea (ESAS) data, JNCC Unpublished information paper.

### *Uncertainty in Data*

- 1.2.36 The process of developing these maps and estimating mean densities involved managing a degree of uncertainty. Processes such as aggregating data for several species (e.g. collision and displacement vulnerabilities for seabirds and diving birds) has in itself a degree of uncertainty, and if not considered carefully, has the potential to mislead. The potential for a number of effects is acknowledged (e.g. potential data skew towards more prominent or abundant species) and while this is not considered to significantly affect the overarching outcomes of this SEA, it is noted that interpretation of these maps should be undertaken with care.
- 1.2.37 For the purposes of this assessment, the Basking shark, cetaceans, seal and seabird maps contained within this baseline provide an indication of species distributions and/or vulnerabilities within Scotland's waters for these broad fauna groups. Their inclusion also provides additional texture in the assessment, allowing the broad spatial consideration of these biodiversity interests in the context of the plan option areas rather than providing definitive evidence on individual species or providing detailed guidance to prospective developers. Rather, it is anticipated that detailed faunal surveys will likely form a key component of future project level assessments for individual developments.

### North East

- 1.2.38 In general terms, the habitats along the north east coastline consist largely of shallow subtidal sediments near the coast, changing to shelf subtidal sediments further offshore. Areas of subtidal rock near the coast between Fraserburgh and Peterhead, and coastal areas of intertidal rock and sediments along the northern Aberdeenshire coastline also support diverse benthic habitats<sup>44</sup>.
- 1.2.39 While the intertidal and subtidal rock habitats are in relatively good condition, and in some areas improving (e.g. Moray Firth), the predominant subtidal sediments are in generally poor condition due largely to inshore and offshore fishing pressures<sup>45</sup>.
- 1.2.40 Key designations identified within this region<sup>46</sup>:
- SACs including the Moray Firth, an extensive area designated for Bottlenose dolphin and its subtidal sandbanks; Culbin Bar designated for its Atlantic salt meadows, shifting dunes, and coastal shingle; Dornoch Firth and Morrich More, protected for estuarial / coastal habitats and interests for protected species (i.e. common seals and otters); River Dee protected for its interest to important species (i.e. Freshwater pearl mussel, Atlantic salmon and otter); and the River Spey protected for its

<sup>44</sup> Scottish Government (2011) Scotland's Marine Atlas, Scottish Government, pg. 71.

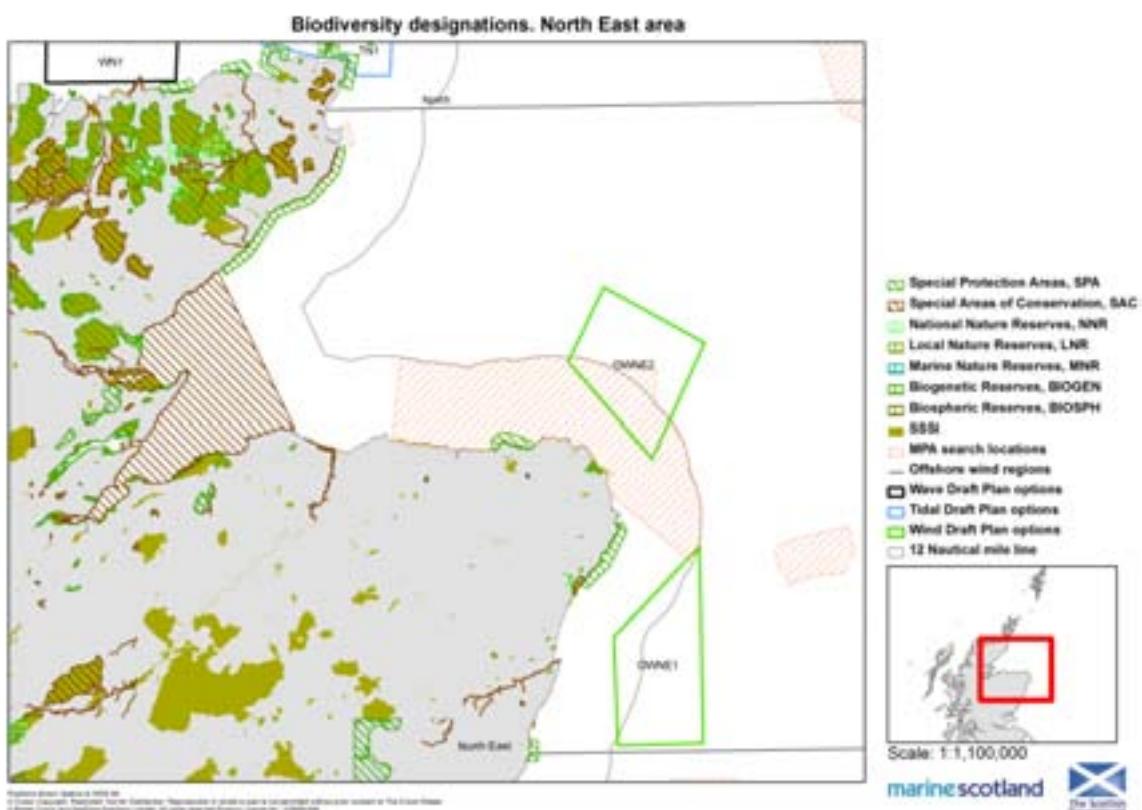
<sup>45</sup> Scottish Government (2011) Scotland's Marine Atlas, Scottish Government, pg. 16 – 19.

<sup>46</sup> Marine Scotland (2012) Offshore Wind - Regional Locational Guidance [online] Available at: <http://www.scotland.gov.uk/Topics/marine/marineenergy/Planning/windrlg> (accessed 25/03/2013)

species interests (i.e. Sea lamprey, Atlantic salmon, otters and Freshwater pearl mussels);

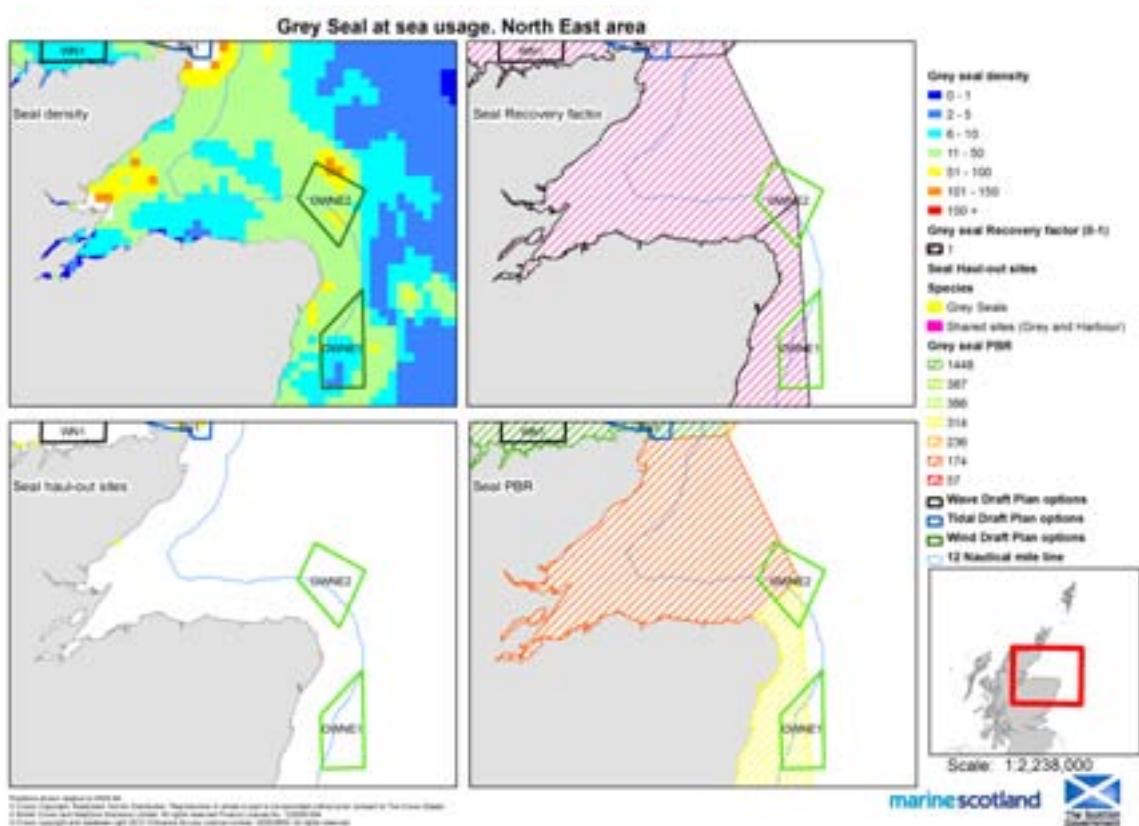
- SPAs including the East Caithness Cliffs located to the north west of the plan option area OWNE2; and areas such as Dornoch Firth and Loch Fleet, Cromarty Firth, Moray and Nairn Coast, Inner Moray Firth, Troup Pennan and Lion's Heads SPAs located further west of OWNE2. Designated sites such as Buchan Ness to Collieston Coast SPA, Fowlsheugh SPA, and the Ythan Estuary and Sands of Forvie SPA, SAC and SSSI are located to the west of the OWNE1;
- Numerous SSSI have been identified within the region, including a significant length of the Moray Coast recognised for its coastal vegetation, habitats and geology; and
- Further sites of interest located in inland areas, including SACs, SPAs and SSSI, that support a range of species that have relationships with the coastal and marine environment. These include the Caithness and Sutherland Peatlands SPA, protected for its bird species and habitats that form a network of sites covering an extensive area of land.

- 1.2.41 The North East region contains two plan option areas for wind energy (OWNE1 and OWNE2). The proximity of these areas to ecological designations is displayed below. The map identifies that the plan option areas overlap with the Southern Trench MPA search area, which is being assessed as a result of its features including seabed habitats, White-beaked dolphin and Minke whale.



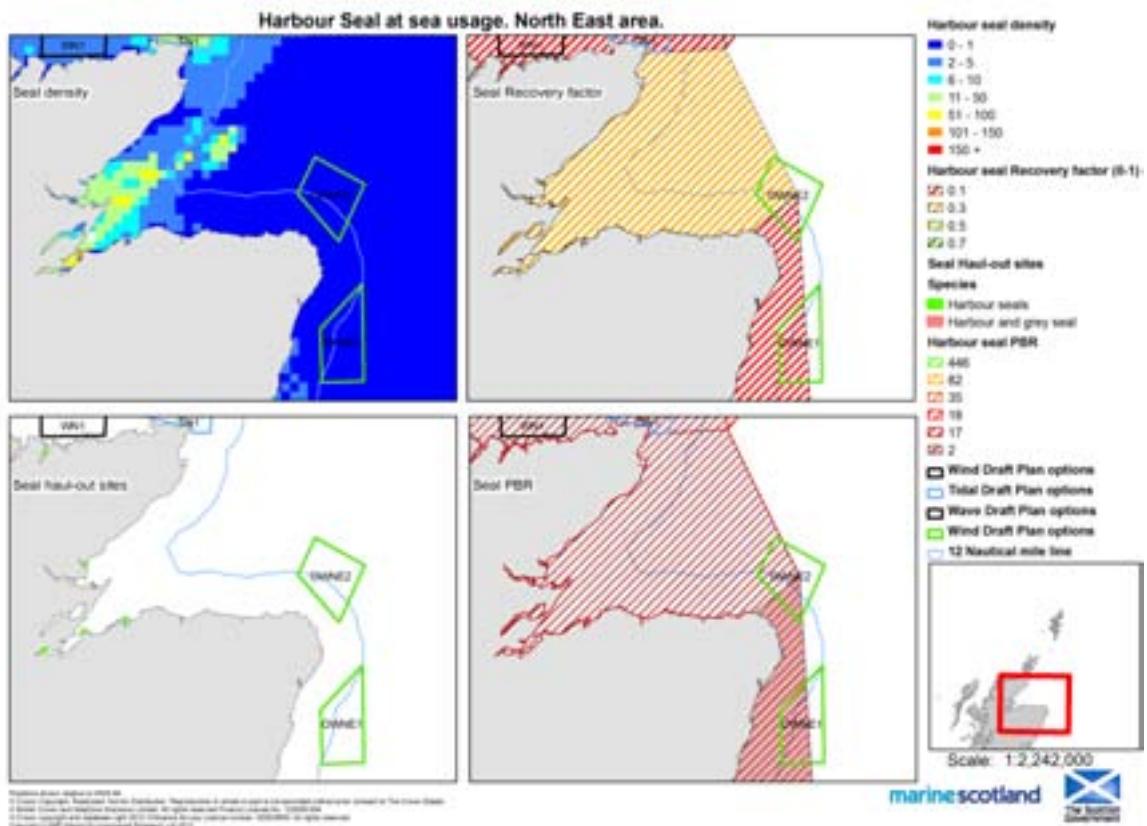
**Figure B1.2.8: Biodiversity Designations and Proposed MPAs in the North East (Plan Option Areas)**

- 1.2.42 As demonstrated in Figures B1.2.9 – B1.2.12, marine mammals and elasmobranchs can be found within this region. The Moray Firth in particular is renowned for its bottlenose dolphin population, and the Inner Firth has been designated as an SAC for their protection. The nearby Dornoch Firth and Morrich More SAC is designated for the protection of common seals.
- 1.2.43 Spatial distribution data obtained from Scottish seal monitoring programmes confirms the movement of mainly grey seals, along Scotland's east and north east coasts, and in offshore areas within this region<sup>47</sup>. While no seal haul-out sites have been identified within the plan option areas, there are four seal haul out sites located elsewhere in the region at Findhorn, Ardersier, Loch Fleet and Lothmore between Helmsdale and Brora. The first three are haul out sites for common seals and the fourth for grey seals. The common seal haul-out sites serve a well-studied population based in the Inner Moray Firth, which is known to range widely in the more open parts of this environment. Haul out areas have also been identified outside of the region, near the Firth of Tay and Firth of Forth to the south.

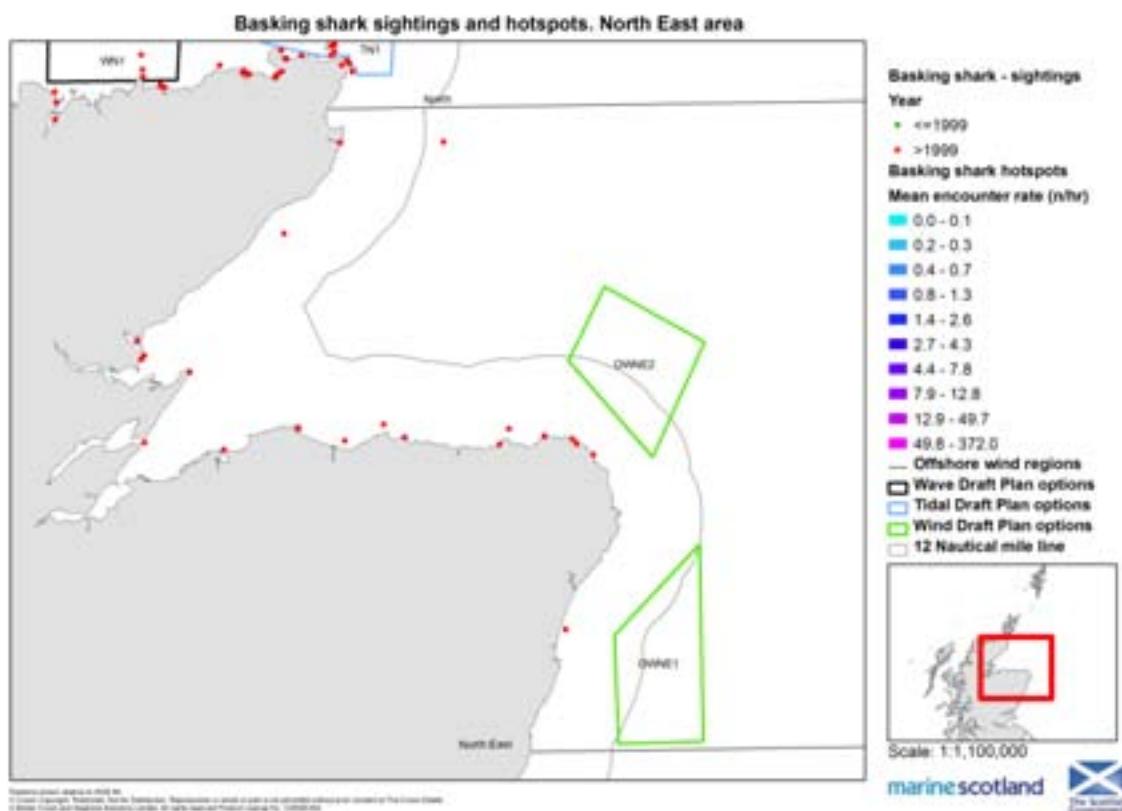


**Figure B1.2.9: Grey Seal At-Sea Usage in the North East (Plan Option Areas)**

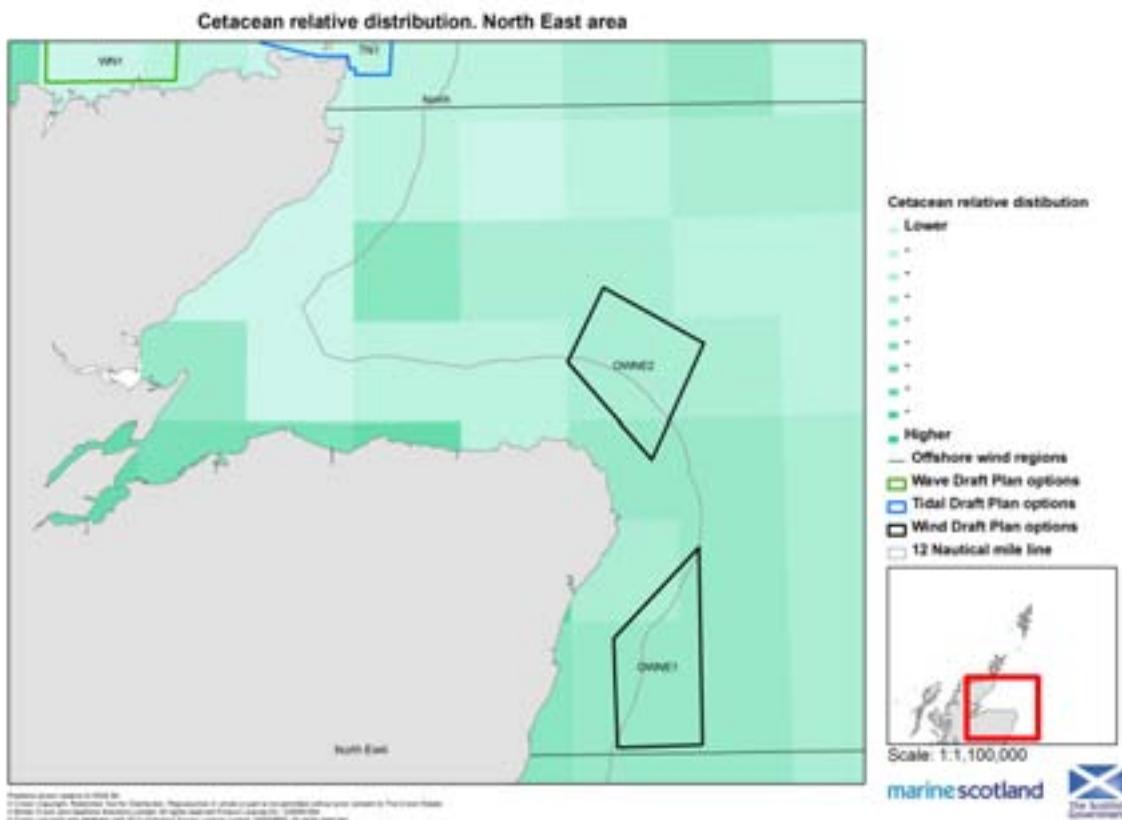
<sup>47</sup> Jones E., McConnell B., Sparling C. and Matthiopoulos J. (2013) Marine Mammal Scientific Support Research Programme MMSS/001/11, Grey and harbour seal density maps, 21 February 2013, Prepared by SMRU for the Scottish Government [online] Available at: <http://www.scotland.gov.uk/Resource/0041/00416981.pdf> [accessed 08/05/2013]



**Figure B1.2.10: Harbour Seal At-Sea Usage in the North East (Plan Option Areas)**



**Figure B1.2.11: Basking Shark Sightings and Hotspots in the North East (Plan Option Areas)**



**Figure B1.2.12: Cetacean Relative Distribution in the North East (Plan Option Areas)**

- 1.2.44 The region also contains spawning or nursery areas for several commercially important species of fish, including high intensity spawning sites for Sandeels and nursery waters for cod and whiting, amongst others<sup>48</sup>. However, there remains a high degree of uncertainty and data gaps, particularly relating to spawning activities.
- 1.2.45 The River Dee, River Spey, River South Esk, River Oykel and Berriedale and Langwell Waters have been designated as SACs for their importance to Atlantic salmon<sup>49</sup>. River Moriston has also been designated an SAC with Atlantic salmon as a qualifying feature. Many rivers and estuaries along the coastline are also used by Atlantic salmon and Sea trout populations<sup>50</sup>, some of which are at near historic low levels (e.g. Sea trout populations along the north coast of the Moray Firth and the Aberdeenshire coast).
- 1.2.46 Two SPAs have been identified in close proximity to the OWNE1 search area. Ythan Estuary, Sands of Forvie and Meikle Loch SPA has been designated to protect breeding and overwintering birds, and supports large populations of

<sup>48</sup> Ellis, J.R., Milligan S.P., Readdy L., Taylor N. and Brown M.J. (2012) Cefas Science Series Technical Report no. 147, Spawning and nursery grounds of selected fish species in UK waters [online] Available at: <http://www.cefas.defra.gov.uk/publications/techrep/TechRep147.pdf> [accessed 08/05/2013]

<sup>49</sup> SNH (undated) Salmon in the Classroom, Special Areas of Conservation [online] Available at: [http://www.snh.org.uk/salmonintheclassroom/salmon\\_conservation.shtml](http://www.snh.org.uk/salmonintheclassroom/salmon_conservation.shtml) [accessed 08/05/2013]

<sup>50</sup> Thorley J.L. (2013) The Potential Influence of Robin Rigg Wind Farm on the Abundance of Adult and Juvenile Atlantic Salmon, A Poisson Consulting Ltd Report prepared for Marine Scotland Science, Pitlochry, Scotland [online] Available at: <http://www.scotland.gov.uk/Resource/0041/00416335.pdf> [accessed 09/05/2013]

Common, Little and Sandwich Terns<sup>51 52</sup>. Buchan Ness to Collieston SPA is also an important area for breeding seabirds and waterbirds, the most common amongst these being Kittiwake, Northern fulmar, Common guillemots and Herring gulls<sup>53 54</sup>.

- 1.2.47 Whilst not a formal designation in Scotland, Important Bird Areas (IBA) have been identified by Birdlife International for wintering waterbirds at Loch of Strathbeg and Troup Head SPA to the west of OWNE2. This site supports large numbers of breeding seabirds and waterbirds on a regular basis, and is considered to be important for breeding Herring gulls and as one of only two Northern gannet breeding colonies on the UK mainland<sup>55</sup>.
- 1.2.48 The Moray Firth also contains significant concentrations of seabirds including Black-legged kittiwake, Common guillemot, Atlantic puffin and European shag, amongst others. Five SPAs are located along the Moray Firth coast between Nairn and the East Caithness cliffs, and the coastal areas around the Moray Firth basin are recognised as being internationally important for populations of wintering and passage wildfowl, and nationally important for many breeding species of ducks<sup>56</sup>.
- 1.2.49 Figures B1.2.13 to B1.2.16 display the locations of IBAs and Royal Society for the Protection of Birds (RSPB) Reserves in the North East region, and present displacement and collision vulnerabilities for seabirds in this region.

<sup>51</sup> BirdLife International (2013) Important Bird Areas factsheet: Ythan Estuary and Sands of Forvie [online] from <http://www.birdlife.org> (accessed 26/03/2013)

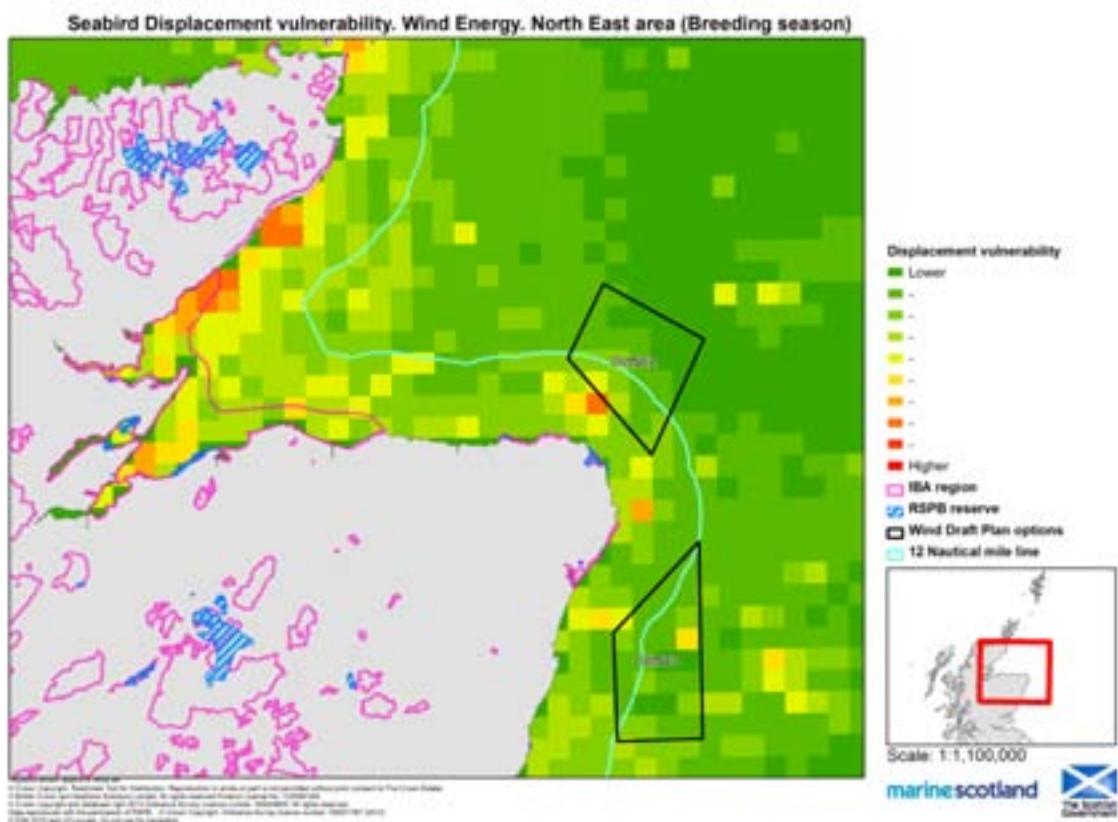
<sup>52</sup> Marine Scotland (2012) Population Trends of Breeding Seabird Colonies in Scottish SPAs, Final report [online] Available at: <http://www.scotland.gov.uk/Resource/0040/00402058.pdf> [accessed 22/05/2013]

<sup>53</sup> BirdLife International (2013) Important Bird Areas factsheet: Buchan Ness to Collieston. [online] from <http://www.birdlife.org> (accessed 26/03/2013)

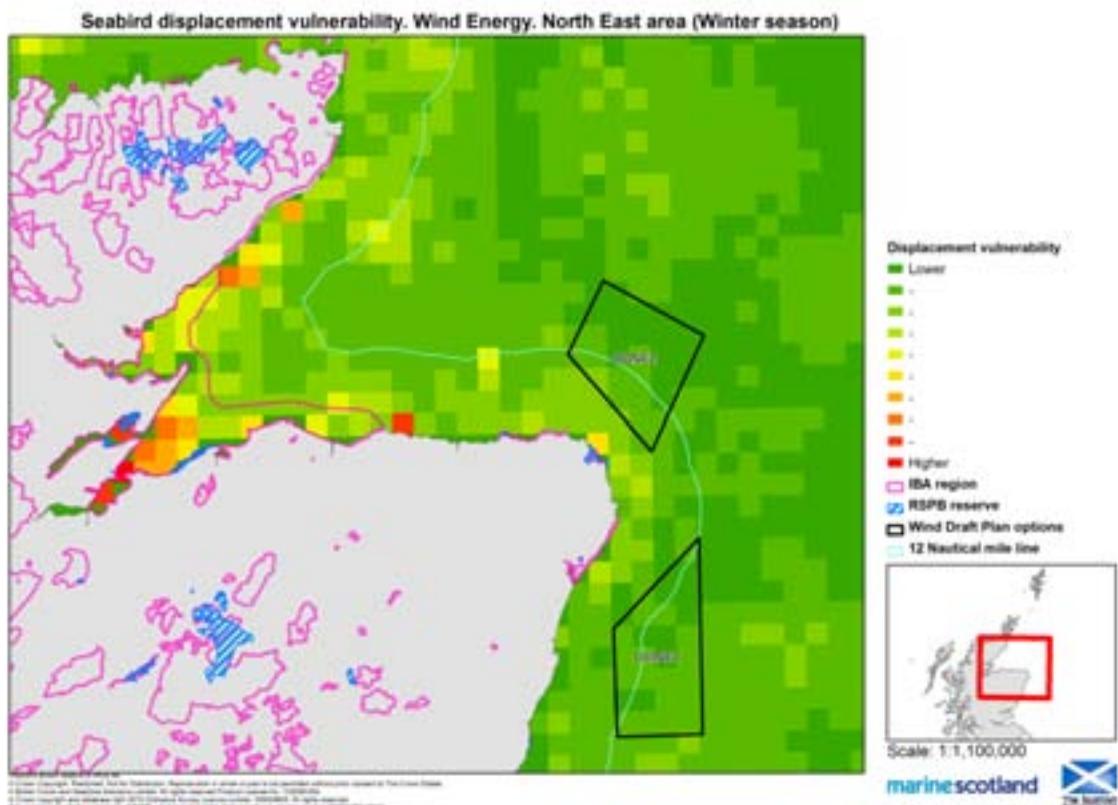
<sup>54</sup> Marine Scotland (2012) Population Trends of Breeding Seabird Colonies in Scottish SPAs, Final report [online] Available at: <http://www.scotland.gov.uk/Resource/0040/00402058.pdf> [accessed 22/05/2013]

<sup>55</sup> BirdLife International (2013) Important Bird Areas factsheet: Loch of Strathbeg. [online] from <http://www.birdlife.org> (accessed 26/03/2013)

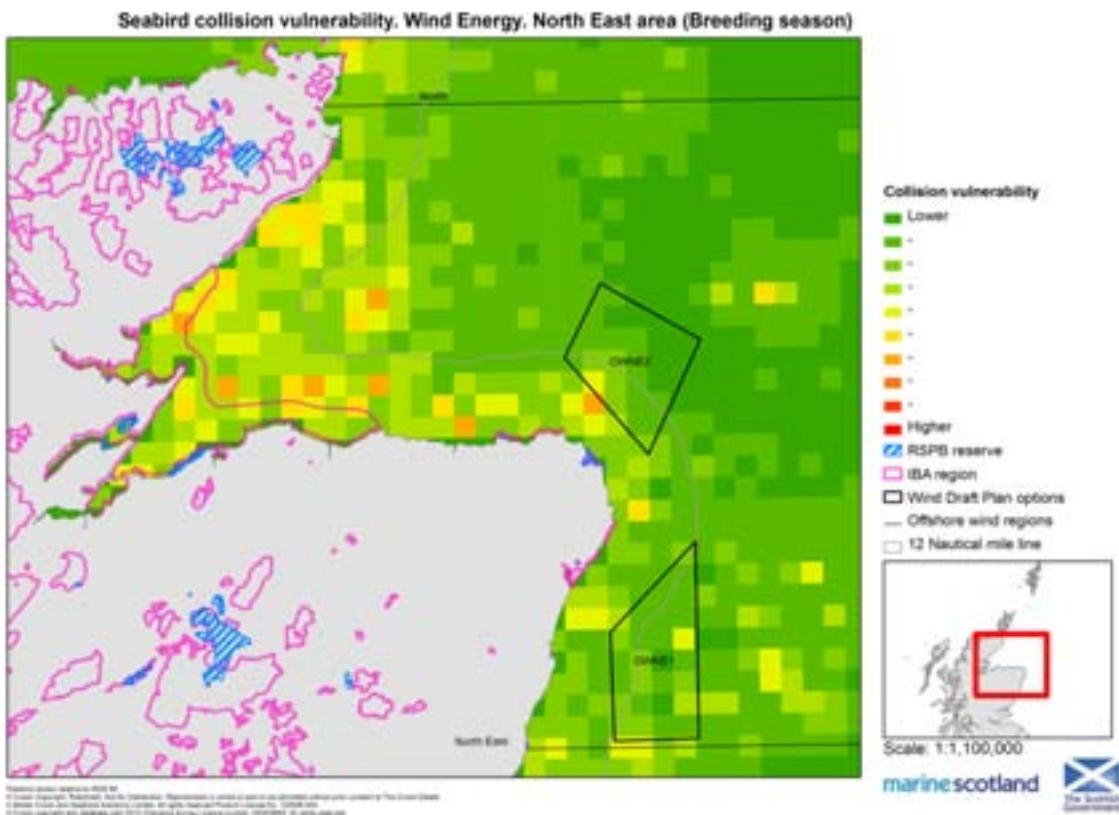
<sup>56</sup> BirdLife International (2013) Important Bird Areas factsheet: Moray Basin, Firths and Bays. [online] from <http://www.birdlife.org> (accessed 26/03/2013)



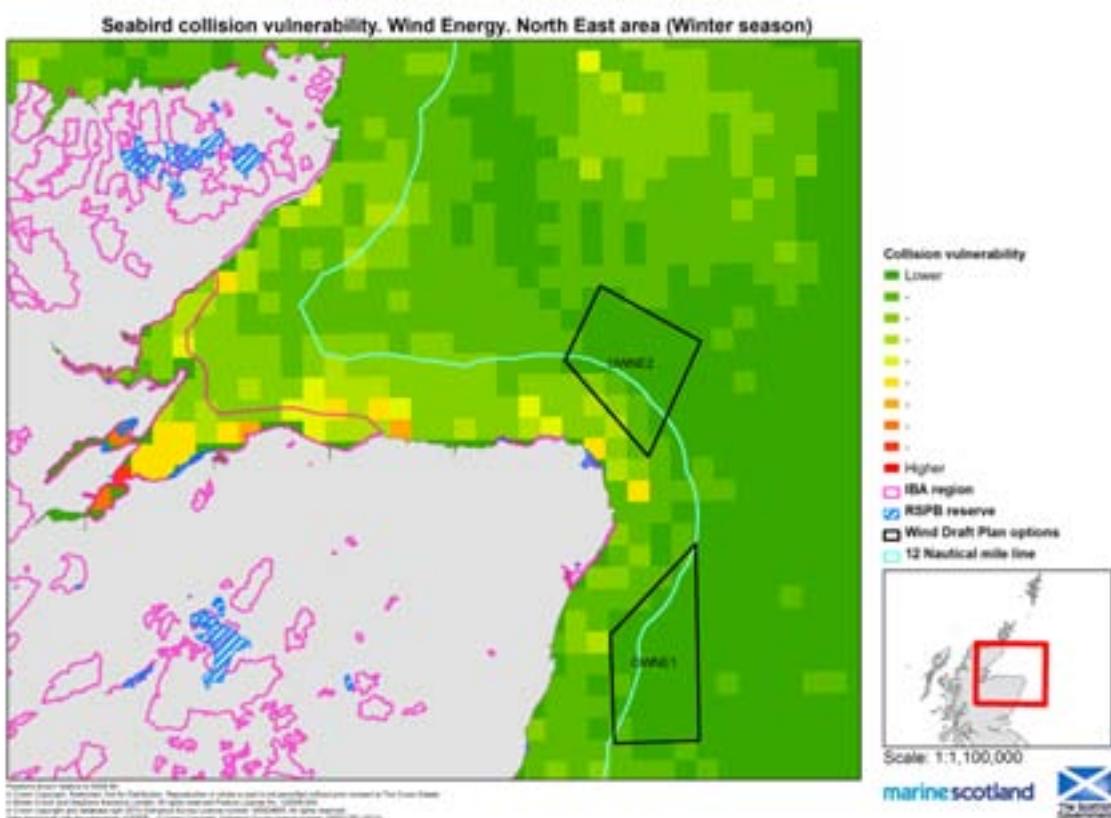
**Figure B1.2.13: Seabird Displacement Vulnerability from Wind Energy in the North East (Breeding Season)**



**Figure B1.2.14: Seabird Displacement Vulnerability from Wind Energy in the North East (Winter Season)**



**Figure B1.2.15: Seabird Collision Vulnerability from Wind Energy in the North East (Breeding Season)**



**Figure B1.2.16: Seabird Collision Vulnerability from Wind Energy in the North East (Winter Season)**

## North

- 1.2.50 In general terms, the habitats in eastern part of this region consist of extensive offshore areas dominated by flat sandy seabeds with large sections of subtidal rock. The nearby inshore firths consist of intertidal rock and sediments such as sandbanks and mudflats, bordered by sandy or rocky coastlines. The western exposed coasts of Shetland and Orkney are generally rockier, and a sharp contrast to the dominant subtidal sediments extending along much of the North Sutherland Coastline.
- 1.2.51 While much of the region is dynamic, particularly the western coasts of Orkney and the Pentland Firth, the sheltered inlets are recognised for their importance for local biodiversity. Although many of these habitats are in good condition, some shallow subtidal sediments have been adversely impacted from scallop dredging<sup>57</sup>.
- 1.2.52 Orkney, Shetland and the North Sutherland Coast have a wealth of designated sites and features including<sup>58</sup>:
- SACs located in Orkney, including Sanday SAC, an extensive area designated for its marine habitat features and common seals; and Faray and Holm of Faray SAC designated for grey seals.
  - SACs located in Shetland, such as Mousa, North Fetlar and Ronas Hill – North Voe, the Vadills, East Mires and Lumbister, and Sullom Voe designated for their marine features and/or common seals; Yell Sound Coast designated for common seals and otters; and pSAC Pobie Bank Reef located to the east of the Shetland Islands that partly overlaps a plan option area, and supports reef habitats and a range of important species (e.g. harbour porpoise, grey seal and common seal).
  - SACs located along the North Sutherland and Caithness Coast, including Strathy Point, Caithness and Sutherland Peatlands, Durness and Cape Wrath containing a range of habitats and coastal features (e.g. dunes, dune grassland, bogs and vegetated sea cliffs) and list a range of species as features (e.g. otters). SACs located at River Naver, Thurso and Borgie have been designated for their importance to Atlantic salmon.
  - SPAs located in Orkney, including West Westray, Papa Westray (North Hill and Holm), Calf of Eday, East Sanday Coast, Marwick Head and Rousay SPAs at the northern end of the Isles, and Hoy SPA in the south west. All sites have been designated for their interests for birds.
  - SPAs located around Shetland, including Fetlar, Otterswick and Graveland, Ronas Hill – North Roe and Tingan, Papa Stour, Foula, Mousa, Noss, Sumburgh Head, and Hermaness, Saxa Vord and Valla Field SPAs. All of these sites have been designated for their interests for

<sup>57</sup> Scottish Government (2011) Scotland's Marine Atlas, Scottish Government, pg. 14 – 17.

<sup>58</sup> Marine Scotland (2012) Offshore Wind - Regional Locational Guidance [online] Available at: <http://www.scotland.gov.uk/Topics/marine/marineenergy/Planning/windrlg> (accessed 25/03/2013)

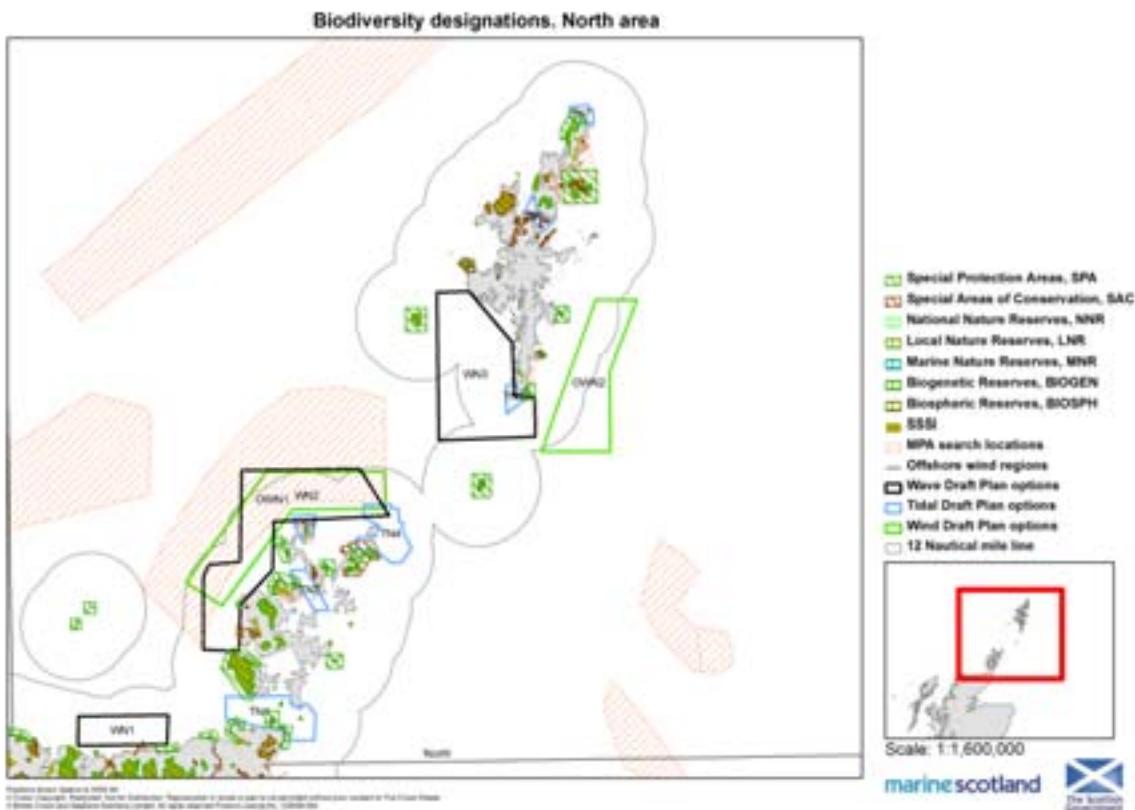
birds, including large assemblages of seabirds. Fair Isle SPA also lies to the south of the region.

- SPAs located along the North Sutherland Coast and Caithness, including the North Caithness Cliffs, Caithness and Sutherland Peatlands, Caithness Lochs, North Sutherland Coastal Islands and Cape Wrath SPAs. All sites have been designated for their interests for birds, including large assemblages of seabirds.
- Possible MPA locations identified around Papa Westray due to black guillemot interests and north west Orkney and Mousa in Shetland due to their role in supporting Sandeels. The Faroe Shetland Channel located north west of Shetland, has been recognised for its role in supporting habitats such as muds, sands and gravels and its aggregations of deep sea sponges. Other possible MPAs in the vicinity are recognised for habitats such as muds, sands and gravels which support a range of species (e.g. aggregations of deep sea sponges, horse mussel beds, maerl beds, burrowing bivalves, seabirds such as Black guillemots).

- 1.2.53 The North region contains two plan option areas for wind energy (OWN1 and OWN2), three for wave energy (WN1 – WN3) and seven tidal energy (TN1 – TN7) plan option areas. The location of these plan option areas to ecological designations are displayed below. The maps demonstrate overlap between several plan option areas and the North West Orkney proposed MPA which is being proposed as a result of features including Sandeels, and geomorphology (i.e. sand bank, sand wave field, sediment wave fields).
- 1.2.54 Many of the SACs identified with marine components in Shetland and Orkney are designated for grey and harbour seals. For example, Faray and Holm of Faray SACs contain the second-largest breeding colony in the UK, and Sanday, North Rona and Yell Sound Coast SACs are of importance for grey and common seals respectively. Otters form a further qualifying feature for seven SACs in Orkney and Shetland, with a further two SACs located on the North Sutherland Coast.
- 1.2.55 The Orkney archipelago, Pentland Firth and Stroma are home to 34 haul-out sites for both grey and common seals, with a further 31 sites for harbour seals and six sites for grey seals in around the Shetland Isles. The waters surrounding both the Shetland and Orkney Isles are home to important seal populations<sup>59</sup>, and both have been declared Harbour (Common) Seal Conservation Areas<sup>60</sup>.

<sup>59</sup> Jones E., McConnell B., Sparling C. and Matthiopoulos J. (2013) Marine Mammal Scientific Support Research Programme MMSS/001/11, Grey and harbour seal density maps, 21 February 2013, Prepared by SMRU for the Scottish Government [online] Available at: <http://www.scotland.gov.uk/Resource/0041/00416981.pdf> [accessed 08/05/2013]

<sup>60</sup> Scottish Government (2011) Scotland's Marine Atlas, Scottish Government pg 120.

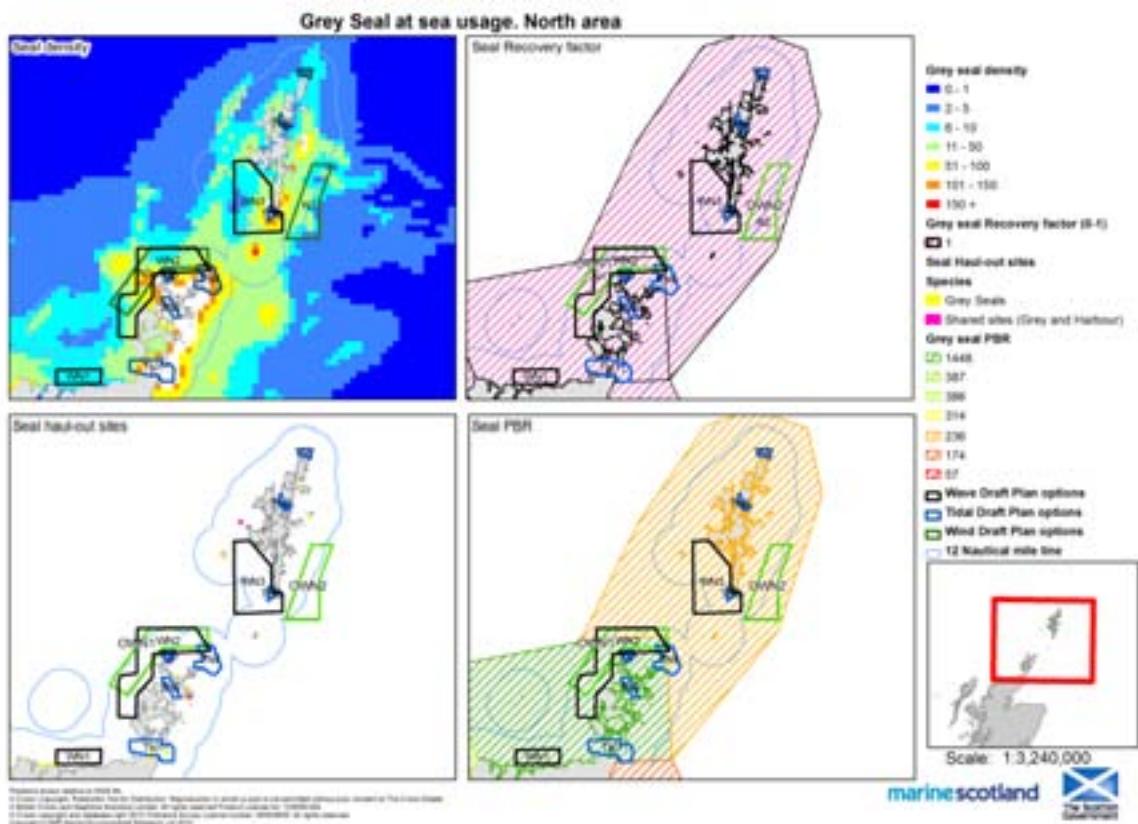


**Figure B1.2.17: Biodiversity Designations and Proposed MPAs in the North (Plan Option Areas)**

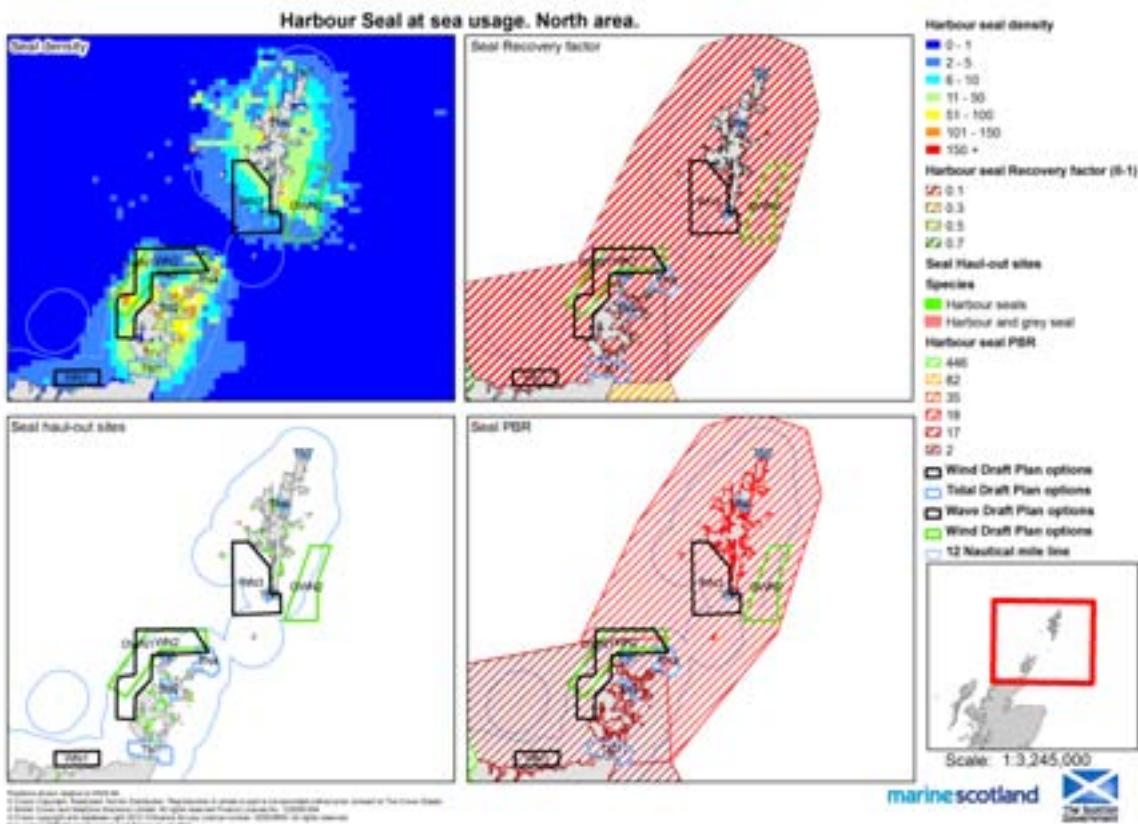
- 1.2.56 A range of cetacean species are regularly sighted around Orkney and Shetland including Minke whale, Harbour porpoise, Orca, Risso's dolphin and White beaked dolphin. The highest abundance of Orcas has been identified north of Muckle Flugga, particularly during mackerel season (January to March and September-October to December).
- 1.2.57 The North region contains a number of important nursery areas for several fish species, including commercially important species such as herring, whiting and anglerfish. However, there remains a high degree of uncertainty and data gaps, particularly relating to spawning activities<sup>61</sup>.
- 1.2.58 While a small number of salmon rivers have been identified within the Northern Isles, the majority of significant salmon rivers in this region are located within Caithness and along the North Sutherland Coast. There is also uncertainty relating to the migratory patterns of adult or post-smolt Atlantic salmon within this area, specifically over whether migration occurs through or around Orkney and Shetland, or if the Pentland Firth is the preferred or only route used<sup>62</sup>.

<sup>61</sup> Ellis, J.R, Milligan S.P. Readdy L., Taylor N. and Brown M.J. (2012) Cefas Science Series Technical Report no. 147, Spawning and nursery grounds of selected fish species in UK waters [online] Available at: <http://www.cefas.defra.gov.uk/publications/techrep/TechRep147.pdf> [accessed 08/05/2013]

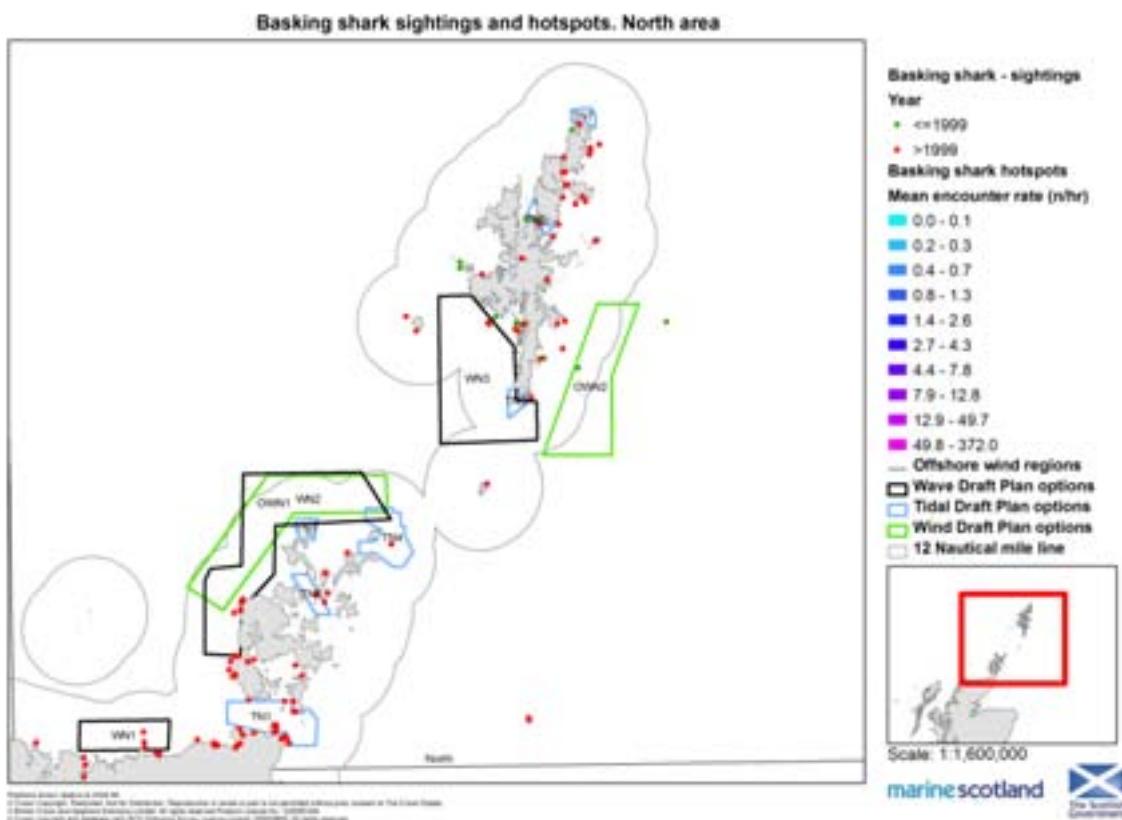
<sup>62</sup> Marine Scotland Science (2010) Scottish Marine and Freshwater Science Volume 1 No 14, Review Of Migratory Routes And Behaviour Of Atlantic Salmon, Sea Trout And European Eel In Scotland's Coastal Environment: Implications For The Development Of Marine Renewables [online] Available at: <http://www.scotland.gov.uk/Resource/Doc/295194/0111162.pdf> [accessed 08/05/2013]



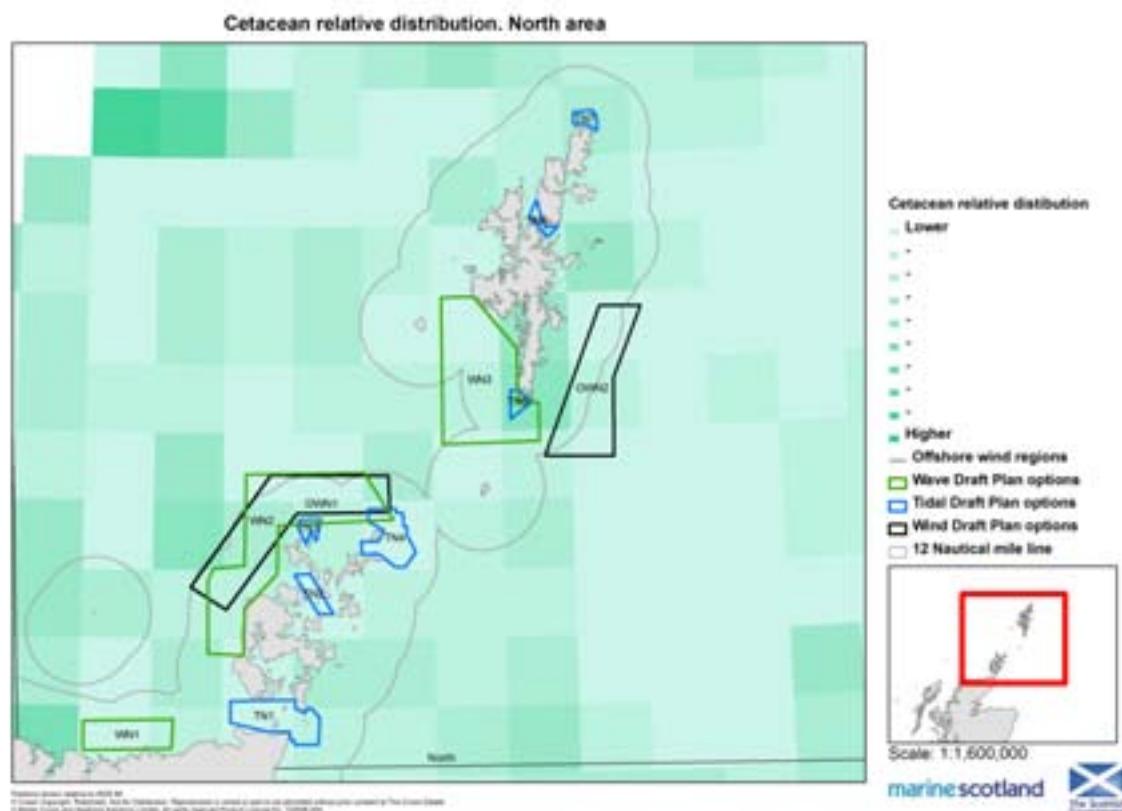
**Figure B1.2.18: Grey Seal At-Sea Usage in the North (Plan Option Areas)**



**Figure B1.2.19: Harbour Seal At-Sea Usage in the North (Plan Option Areas)**



**Figure B1.2.20: Basking Shark Sightings and Hotspots in the North (Plan Option Areas)**



**Figure B1.2.21: Cetacean Relative Distribution in the North (Plan Option Areas)**

- 1.2.59 Orkney's six SPAs provide habitats that support a number of important seabird species including Black legged kittiwake, Common and Black guillemot, Atlantic puffin, European shag, Fulmar, Skua, Cormorant, Razorbill and Arctic tern. In many cases, seabird population numbers and breeding success are tightly linked with the availability of fish prey, such as Sandeels.
- 1.2.60 Shetland also hosts a great variety of breeding and overwintering seabirds and waterbirds. Six SPAs in the Shetland area (including Foula and Fair Isle) provide important habitats that support Arctic tern, Storm petrel, Black backed gull, Black guillemot, Common guillemot, Common tern, Red throated divers, Whimbrel, Ringed plover, Fulmar, Gannet, Duck and eider species, amongst others. Great Skua numbers are high in Shetland and Orkney and it is estimated that over half of the world's population reside in these areas<sup>63</sup>. Fair Isle supports large colonies of breeding seabirds, including Fulmar, Gannets, European shag and Kittiwake, amongst others<sup>64</sup>. The area, designated as an SPA, is also an important stop-over site for migrating birds<sup>65</sup>. During the breeding season, Sumburgh head also supports a range of seabird species including Kittiwake and Fulmar<sup>66</sup>.
- 1.2.61 Whilst not a formal designation, several IBAs have also been identified by Birdlife International in the region. The largest two areas are located at Hoy<sup>67</sup>, based upon its importance for breeding seabirds, waders and raptors, and at Scapa Flow, considered to be important for wintering waterbirds<sup>68</sup>.
- 1.2.62 Figures B1.2.22 to B1.2.29 display the locations of IBAs and RSPB Reserves in the North, and also present displacement and collision vulnerabilities of seabirds within this region.

<sup>63</sup> JNCC (2009) Great Skua *Stercorarius skua* [online] Available at: <http://jncc.defra.gov.uk/page-2879> [accessed 23/05/2013]

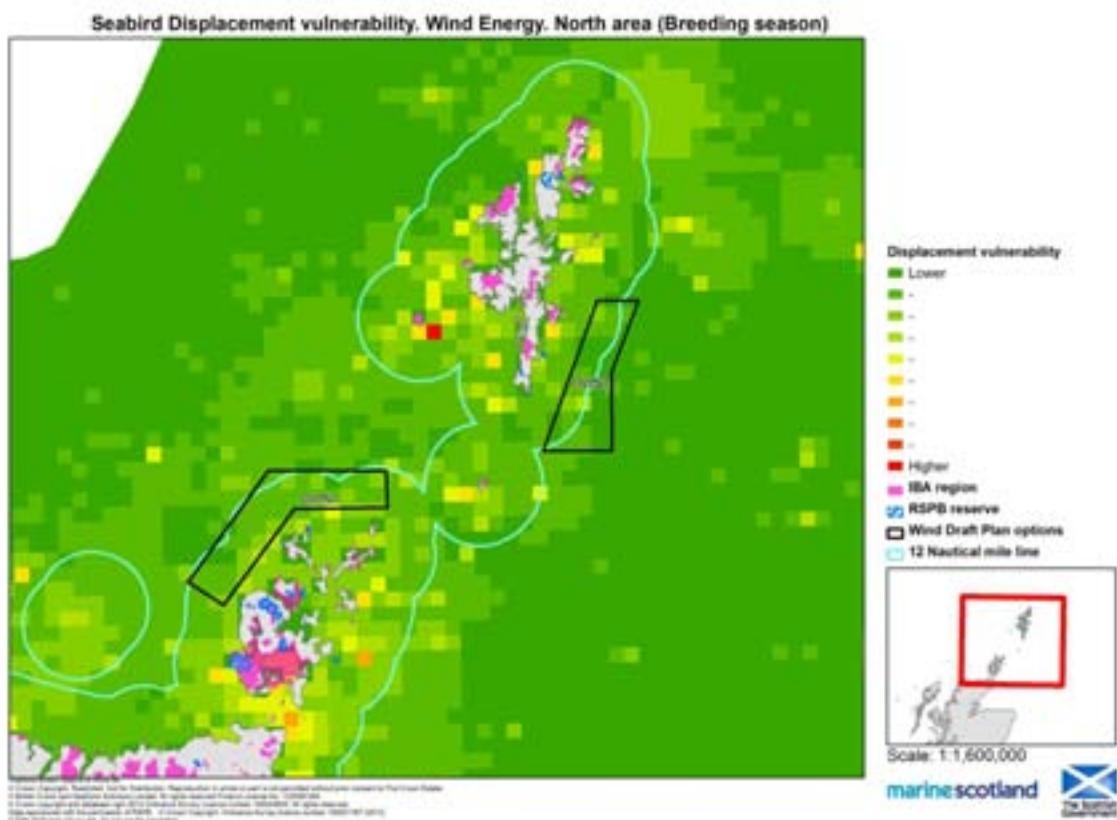
<sup>64</sup> Marine Scotland (2012) Population Trends of Breeding Seabird Colonies in Scottish SPAs, Final report [online] Available at: <http://www.scotland.gov.uk/Resource/0040/00402058.pdf> [accessed 23/05/2013]

<sup>65</sup> BirdLife International (2013) Important Bird Areas factsheet: Fair Isle. [online] from <http://www.birdlife.org/datazone/sitefactsheet.php?id=2468> (accessed 26/03/2013)

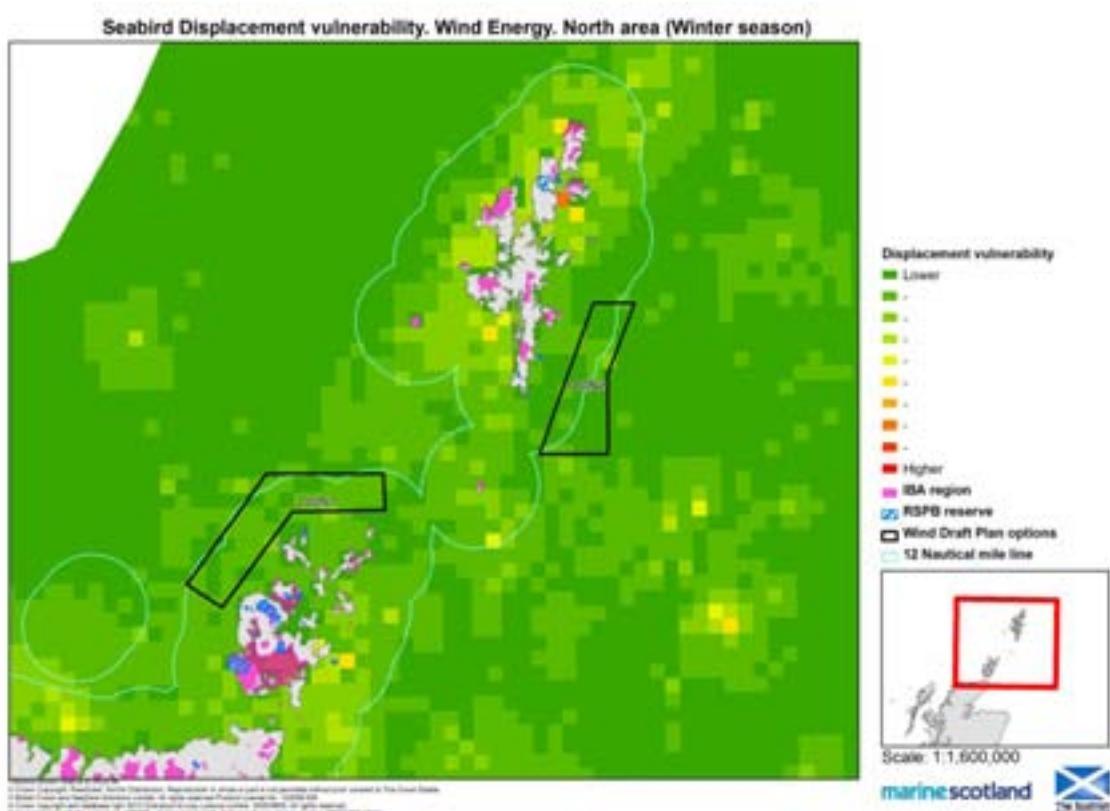
<sup>66</sup> Marine Scotland (2012) Population Trends of Breeding Seabird Colonies in Scottish SPAs, Final report [online] Available at: <http://www.scotland.gov.uk/Resource/0040/00402058.pdf> [accessed 23/05/2013]

<sup>67</sup> BirdLife International (2013) Important Bird Areas factsheet: Hoy. [online] from <http://www.birdlife.org/datazone/sitefactsheet.php?id=2495> (accessed 23/05/2013)

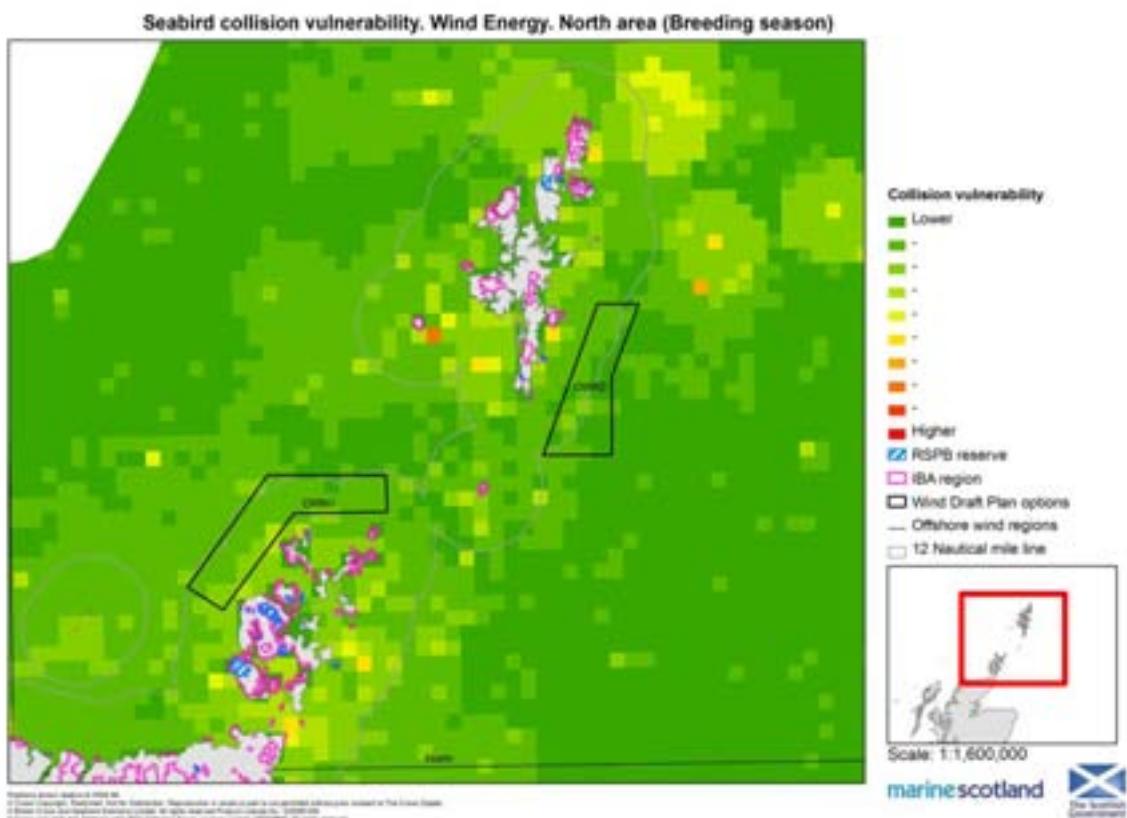
<sup>68</sup> BirdLife International (2013) Important Bird Areas factsheet: Scapa Flow. [online] from <http://www.birdlife.org> (accessed 26/03/2013)



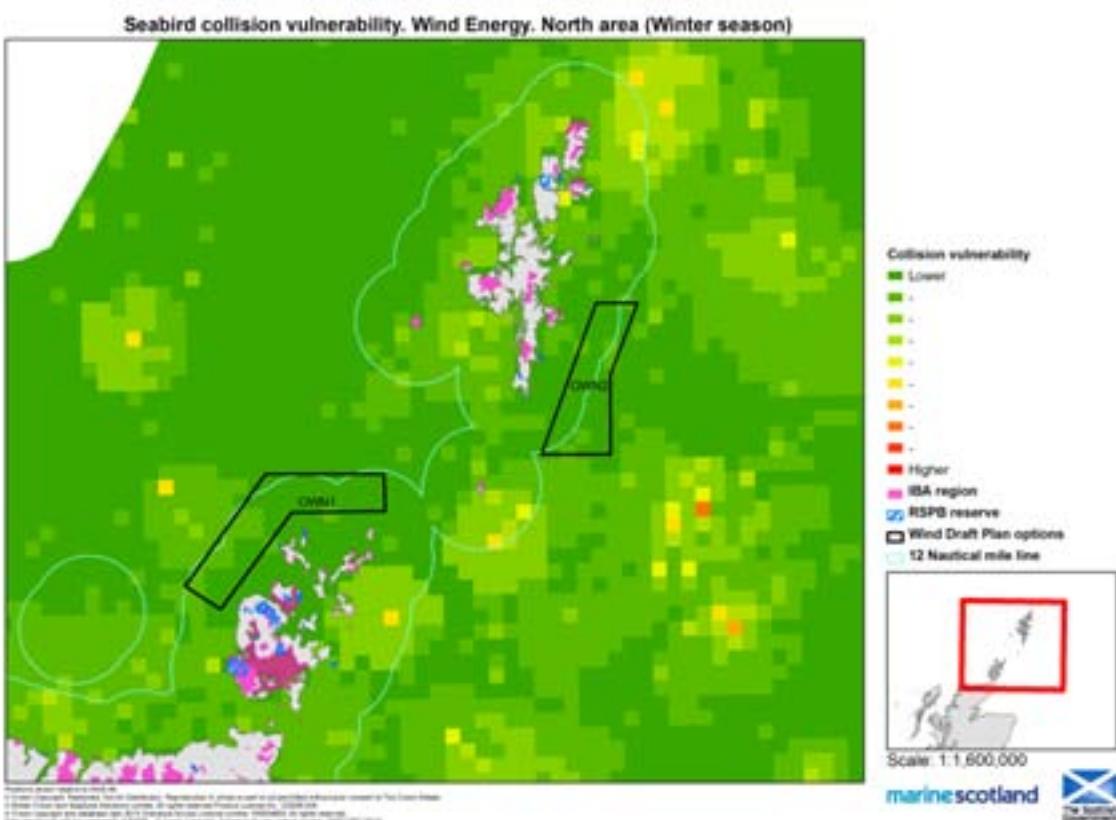
**Figure B1.2.22: Seabird Displacement Vulnerability from Wind Energy in the North (Breeding Season)**



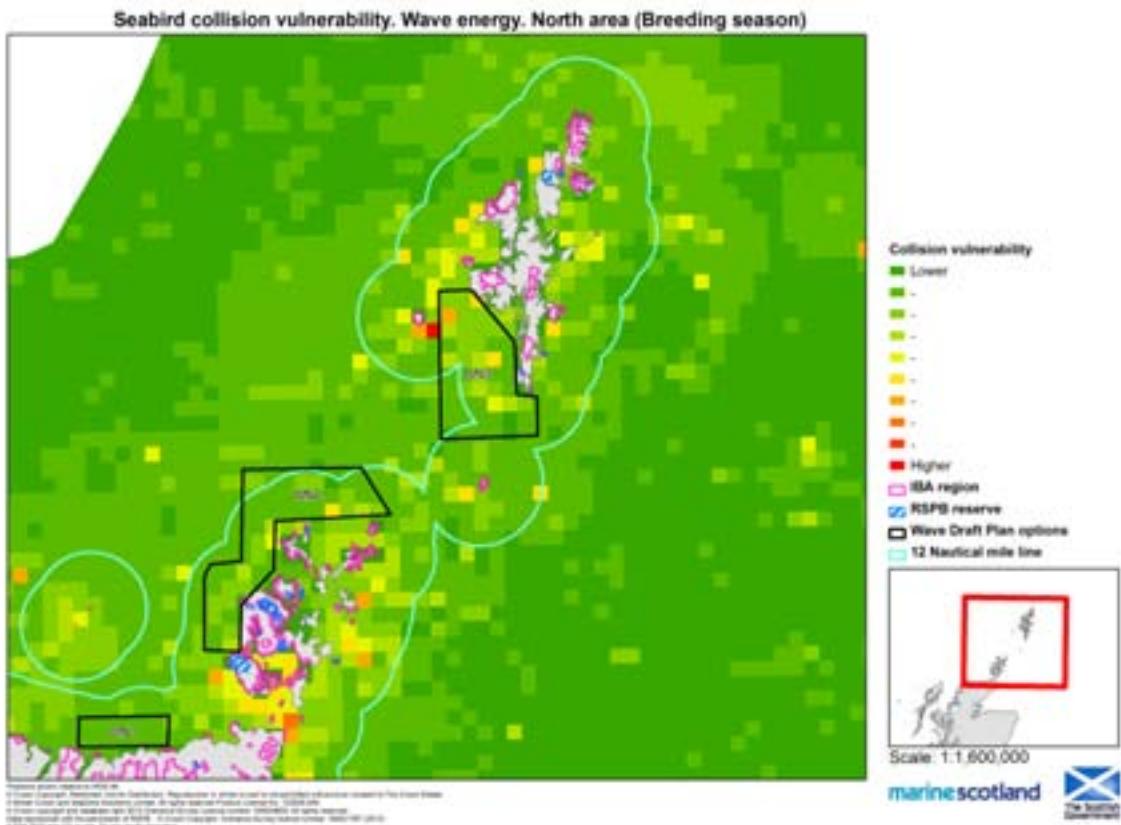
**Figure B1.2.23: Seabird Displacement Vulnerability from Wind Energy in the North (Winter Season)**



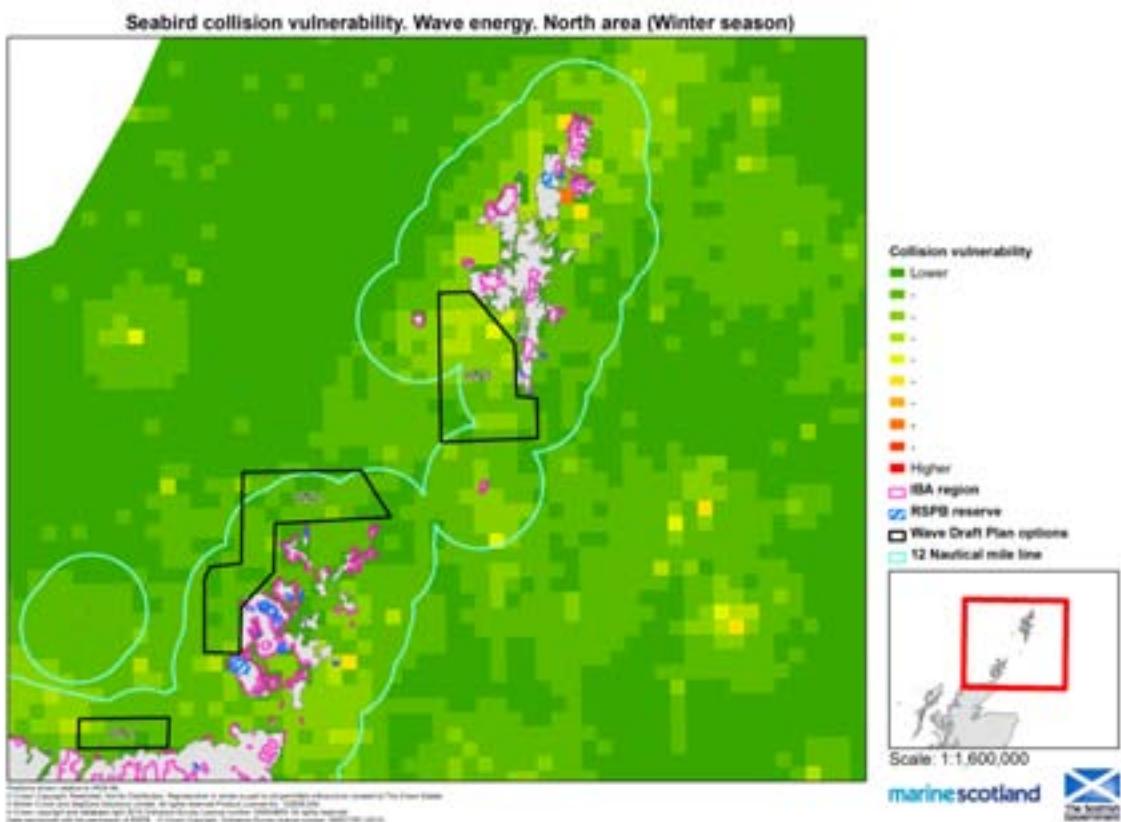
**Figure B1.2.24: Seabird Collision Vulnerability from Wind Energy in the North (Breeding Season)**



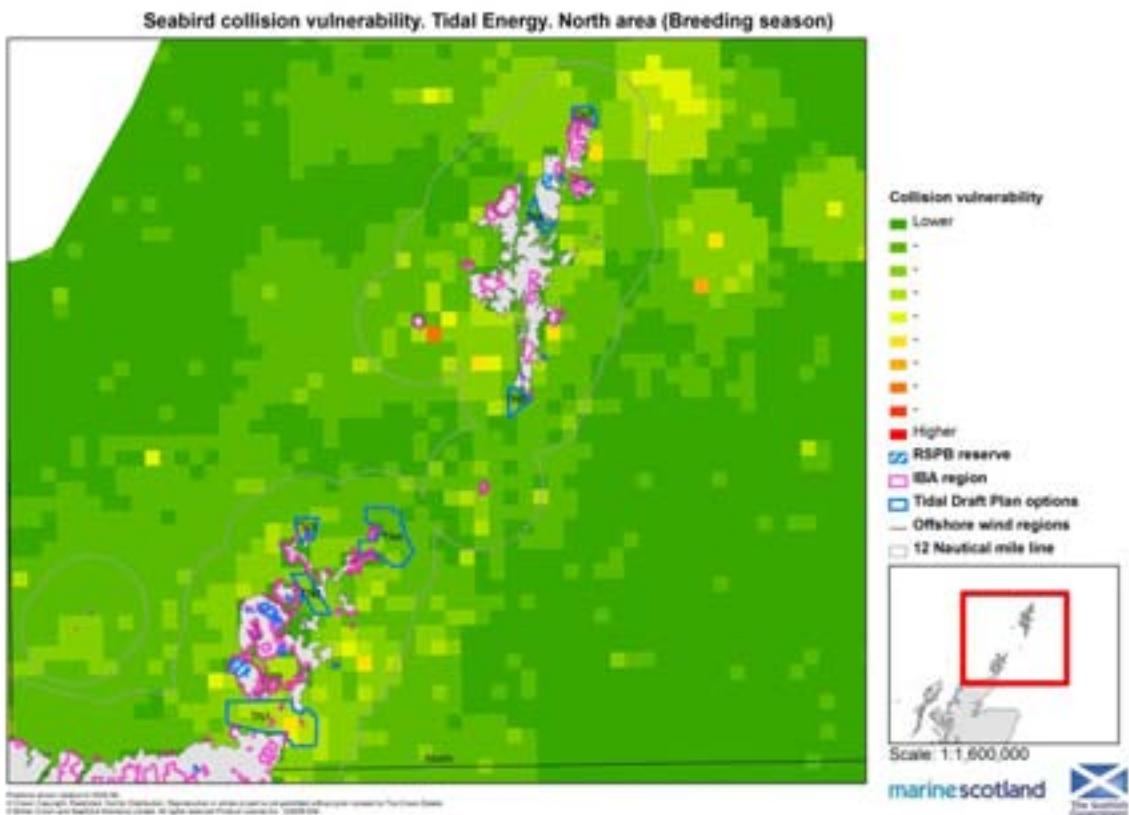
**Figure B1.2.25: Seabird Collision Vulnerability from Wind Energy in the North (Winter Season)**



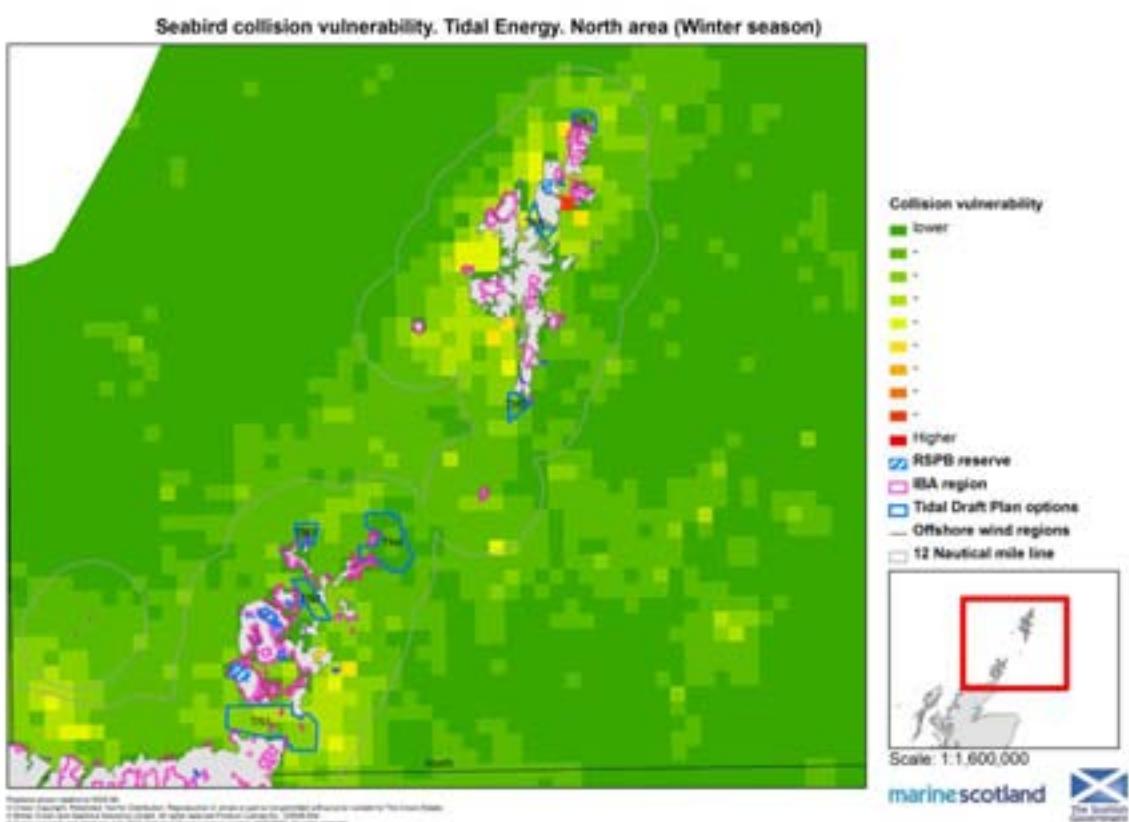
**Figure B1.2.26: Seabird Collision Vulnerability from Wave Energy in the North (Breeding Season)**



**Figure B1.2.27: Seabird Collision Vulnerability from Wave Energy in the North (Winter Season)**



**Figure B1.2.28: Seabird Collision Vulnerability from Tidal Energy in the North (Breeding Season)**



**Figure B1.2.29: Seabird Collision Vulnerability from Tidal Energy in the North (Winter Season)**

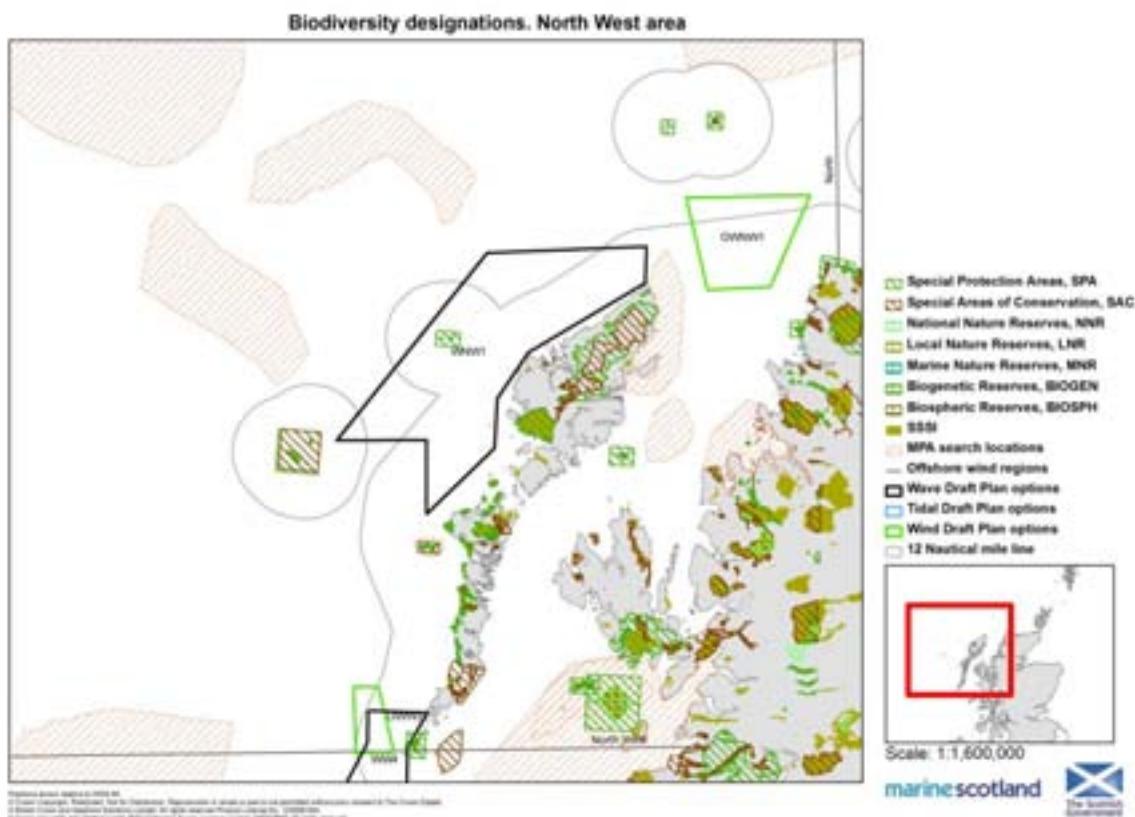
## North West

- 1.2.63 In general terms, the coastal and marine habitats vary across this region, ranging from shallow and shelf subtidal sediments within the Minches, to expansive shallow subtidal sediment and rock habitats west of the Outer Hebridean Isles. While sections of the Lewis coastline and the North West region of the Scottish mainland consist of intertidal rock interspersed with intertidal sediment habitats in some areas, the coastlines themselves can have vastly different appearances. The large fjordic sea lochs and sheltered sandy beaches of the west coast of the mainland provide stark contrast with the exposed and primarily rocky coastlines of Lewis.
- 1.2.64 While these habitats are in relatively good condition overall, pressures such as trawling and scallop dredging on benthic habitats in shallow subtidal habitats, and declines in populations from catches of non-target species have raised concerns in these areas<sup>69</sup>.
- 1.2.65 The north west area has a number of important and designated sites including<sup>70</sup>:
- SACs such as the Langavat and North Harris SACs located in the western region of Lewis, both designated for their Atlantic Salmon interests; coastal protected areas on the Scottish mainland including Oldshoremore and Sandwood SAC designated for its dunes and machair; North Rona SAC designated for its sea cliffs, caves, reefs, and importance to grey seal populations; the Sound of Barra pSAC proposed for its reefs, sandbanks and qualifying habitat essential to the reproduction of harbour seal; and cSACs such as the offshore Darwin Mounds, Wyville Thomson Ridge and Solan Bank Reef sites for their important reef features;
  - SPAs including North Rona and Sula Sgeir SPA, Sule Skerry SPA and Sule Stack SPA, designated for their seabird interests. In some instances, designated sites such as Flannan Isles SPA, are located within a plan option area (WNW1);
  - Onshore protected areas such as Cape Wrath, Handa and the extensive Lewis Peatlands SPAs are also protected for a number of bird species, and may have coastal or marine relevance; and
  - Potential MPAs located around the north east coast of Lewis based upon its value for Sandeels and Risso's dolphin, the Shiant Isles located further into the Minch, and two further areas in the North Minch and to the west of Lewis due to their interests for white-beaked dolphins. On the Sutherland Coast, an area known as the North West Sea Lochs and Summer Isles has also been included for further assessment as an MPA due to its value as a sea loch habitat.

<sup>69</sup> Scottish Government (2011) Scotland's Marine Atlas, Scottish Government, pg. 10 – 11, 71.

<sup>70</sup> Marine Scotland (2012) Offshore Wind - Regional Locational Guidance [online] Available at: <http://www.scotland.gov.uk/Topics/marine/marineenergy/Planning/windrlg> (accessed 25/03/2013)

- 1.2.66 The North West region contains one wind (OWNW1) and one wave (WNW1) plan option area. The proximity of these areas to ecological designations is displayed in Figure B1.2.30.

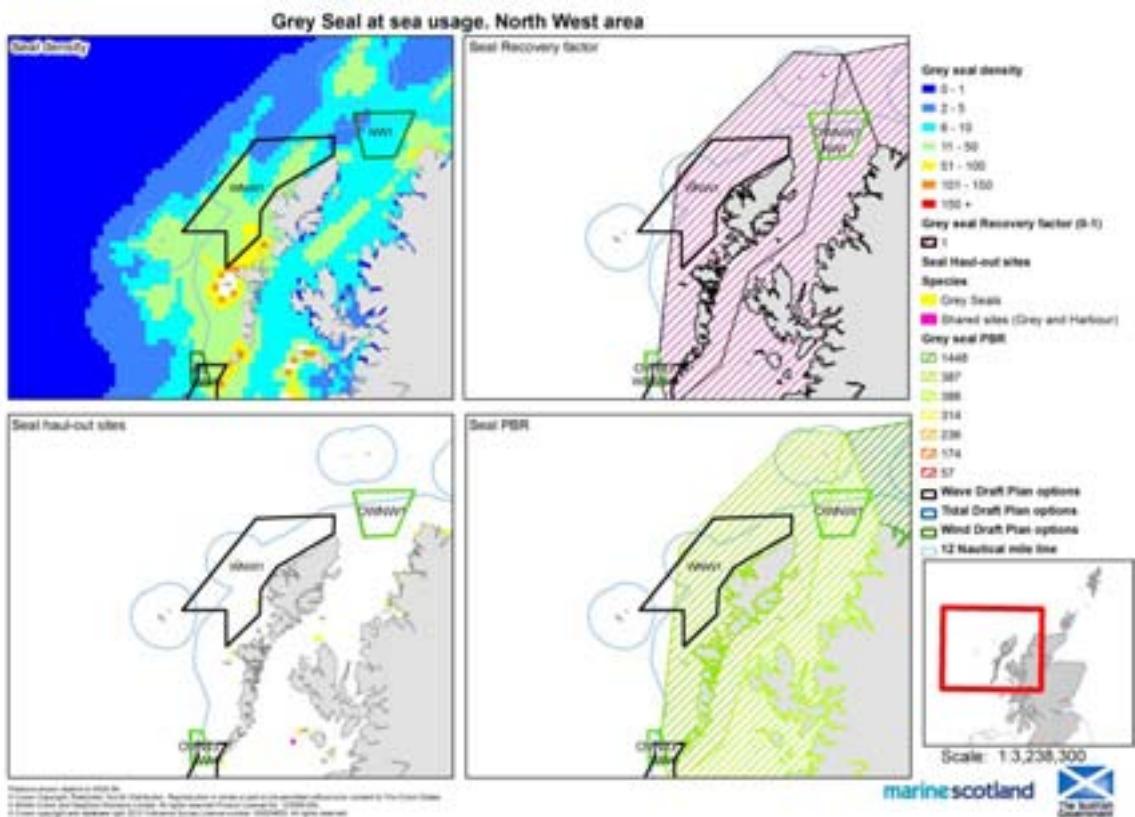


**Figure B1.2.30: Biodiversity Designations and Proposed MPAs in the North West (Plan Option Areas)**

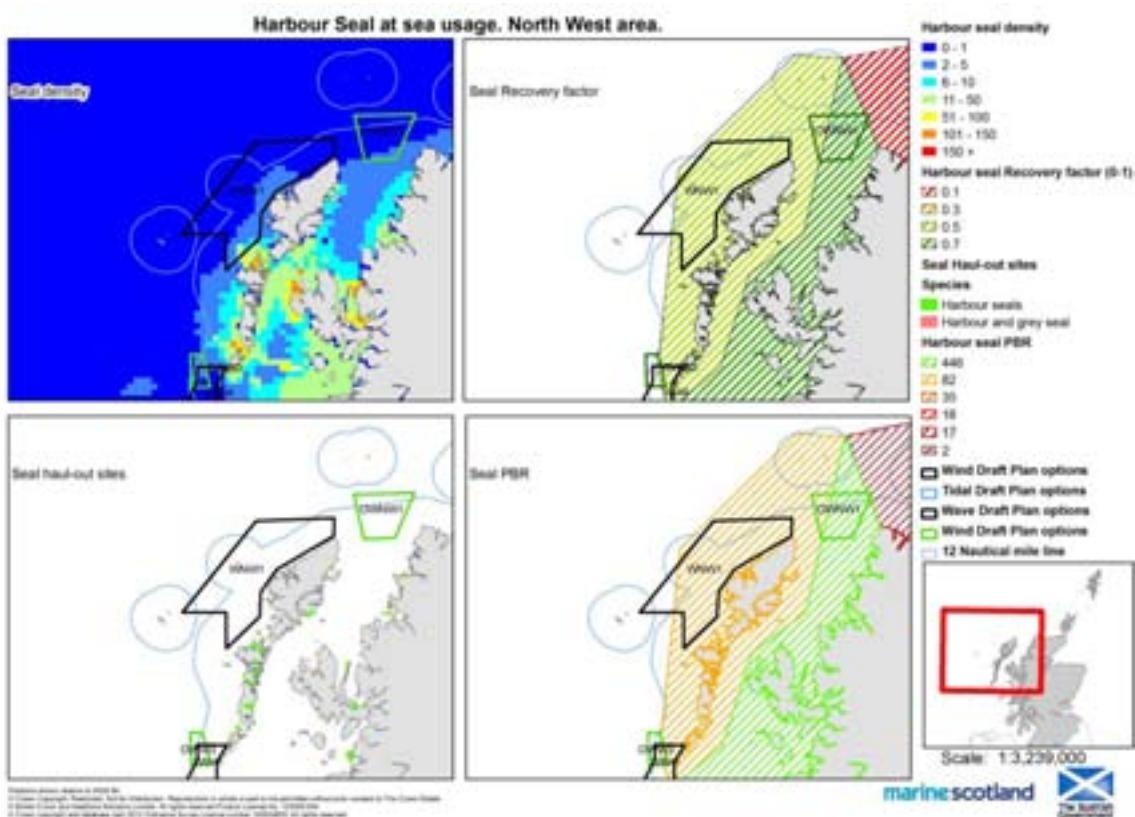
- 1.2.67 Many cetacean species are frequently sighted around the North Minch, including Minke whale, Orca, White beaked dolphin, Short beaked common dolphin, Risso's dolphin and Harbour porpoise.
- 1.2.68 While not regarded a 'hotspot', sighting data indicates that this area is used by Basking sharks<sup>71</sup>. Seal monitoring data indicates several areas of high activity are present within the region, including coastal areas near Cape Wrath for grey seals, and to the west of Harris and North Uist for both grey and common seals<sup>72</sup>. A seal SAC has been established to the south at Ascrib, Isay and Dunvegan off the Isle of Skye for common seals, and seal haul-out sites are located at various points along the north east coast of the mainland, to the north and east of the Isle of Skye, to the west and east of Uist, and to east of Lewis.

<sup>71</sup> Marine Scotland (2012) Offshore Wind - Regional Locational Guidance [online] Available at: <http://www.scotland.gov.uk/Topics/marine/marineenergy/Planning/windrlg> (accessed 25/03/2013)

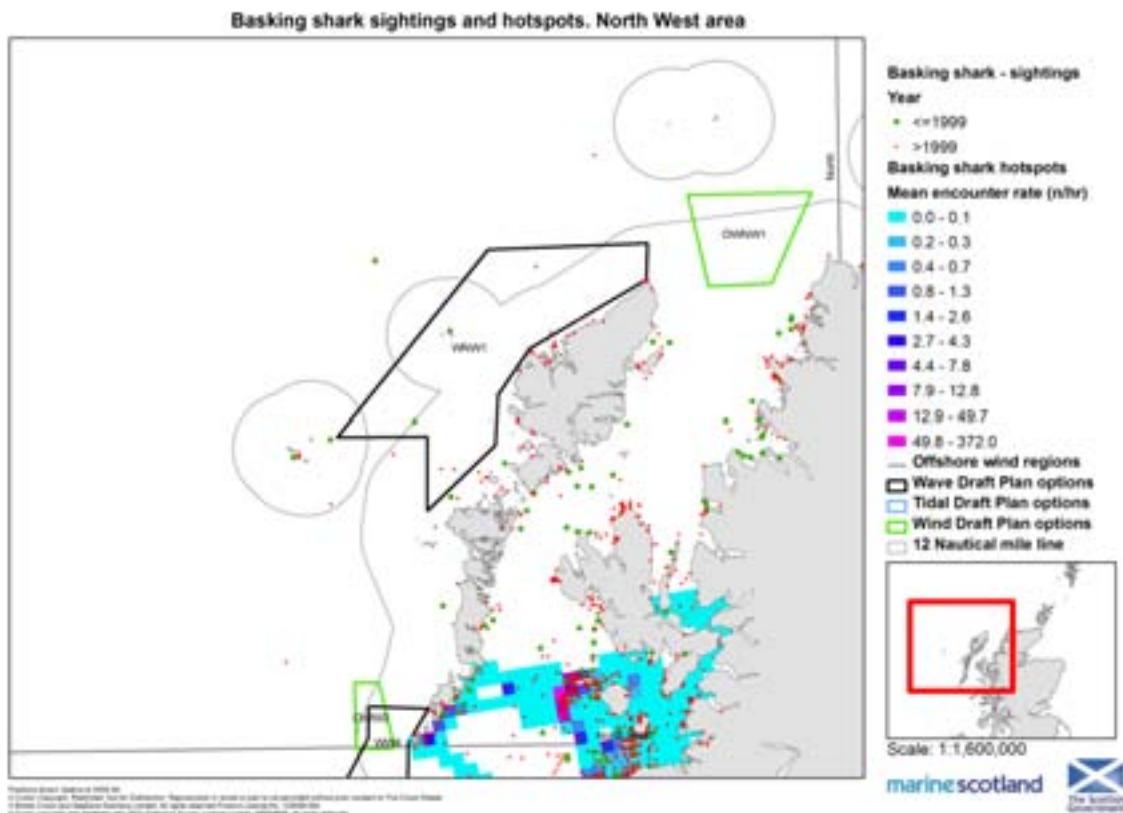
<sup>72</sup> Jones E., McConnell B., Sparling C. and Matthiopoulos J. (2013) Marine Mammal Scientific Support Research Programme MMSS/001/11, Grey and harbour seal density maps, 21 February 2013, Prepared by SMRU for the Scottish Government [online] Available at: <http://www.scotland.gov.uk/Resource/0041/00416981.pdf> [accessed 08/05/2013]



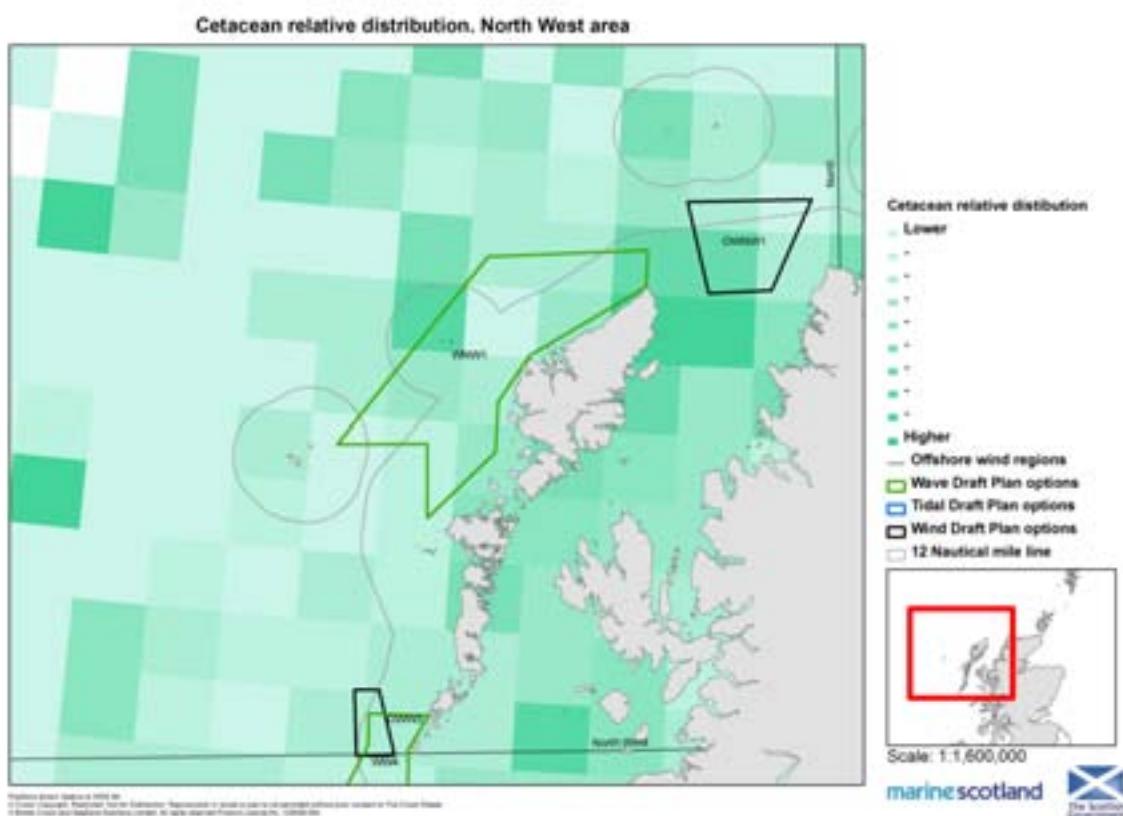
**Figure B1.2.31: Grey Seal At-Sea Usage in the North West (Plan Option Areas)**



**Figure B1.2.32: Harbour Seal At-Sea Usage in the North West (Plan Option Areas)**



**Figure B1.2.33: Basking Shark Sightings and Hotspots in the North West (Plan Option Areas)**



**Figure B1.2.34: Cetacean Relative Distribution in the North West (Plan Option Areas)**

- 1.2.69 A number of high intensity nursery grounds have been identified within the region for commercially fish species such as herring, whiting and mackerel, amongst others. However, there remains a high degree of uncertainty and data gaps for many species, particularly relating to spawning activities<sup>73</sup>.
- 1.2.70 SACs have been designated at North Harris and Langavat for their importance for Atlantic salmon. However, other rivers in the region, both in the Hebridean Isles and the North West region of the Scottish mainland are also likely to be used by Atlantic salmon and Sea trout populations<sup>74</sup>.
- 1.2.71 The North West region contains many important areas for seabirds including SPAs at Cape Wrath, Handa Island, Sula Sgeir and Sule Skerry, and Sule Stack. These areas provide important habitats for nesting and breeding birds, including Petrel, Auk, Gull, Gannet, Fulmar, Common guillemot and Black legged kittiwake. Flannan Islands SPA located to the west of Lewis also provides nesting for similar bird species, but is also regarded as an important site for Leach's Petrel and is one of only seven known nesting localities in the EU<sup>75</sup>.
- 1.2.72 Several IBAs have also been identified in this region by Birdlife International, including large proportions of Lewis and Harris, and a blend of large and small areas in Highland areas in the north west portion of the Scottish mainland. Whilst not a formal designation, the identification of these areas provides an additional layer of data for consideration in this baseline, and adds weight to the importance attributed to sites such as Cape Wrath<sup>76</sup> and the Lewis Peatlands<sup>77</sup> for breeding seabirds and waterbirds.
- 1.2.73 Figures B1.2.35 to B1.2.40 display the locations of IBAs and RSPB Reserves in the North West region, and presents displacement and collision vulnerabilities of seabirds within this region.

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<sup>73</sup> Ellis, J.R, Milligan S.P. Readdy L., Taylor N. and Brown M.J. (2012) Cefas Science Series Technical Report no. 147, Spawning and nursery grounds of selected fish species in UK waters [online] Available at:

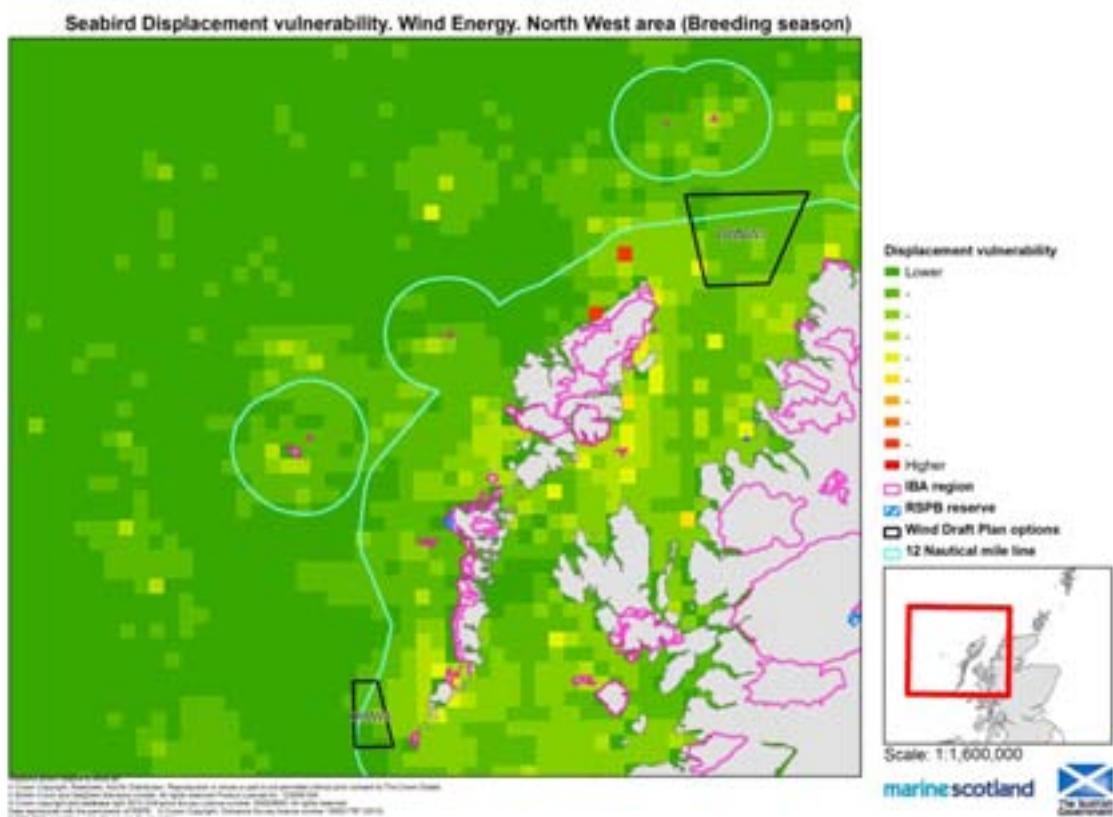
<http://www.cefas.defra.gov.uk/publications/techrep/TechRep147.pdf> [accessed 08/05/2013]

<sup>74</sup> Marine Scotland Science (2010) Scottish Marine and Freshwater Science Volume 1 No 14, Review Of Migratory Routes And Behaviour Of Atlantic Salmon, Sea Trout And European Eel In Scotland's Coastal Environment: Implications For The Development Of Marine Renewables [online] Available at: <http://www.scotland.gov.uk/Resource/Doc/295194/0111162.pdf> [accessed 08/05/2013]

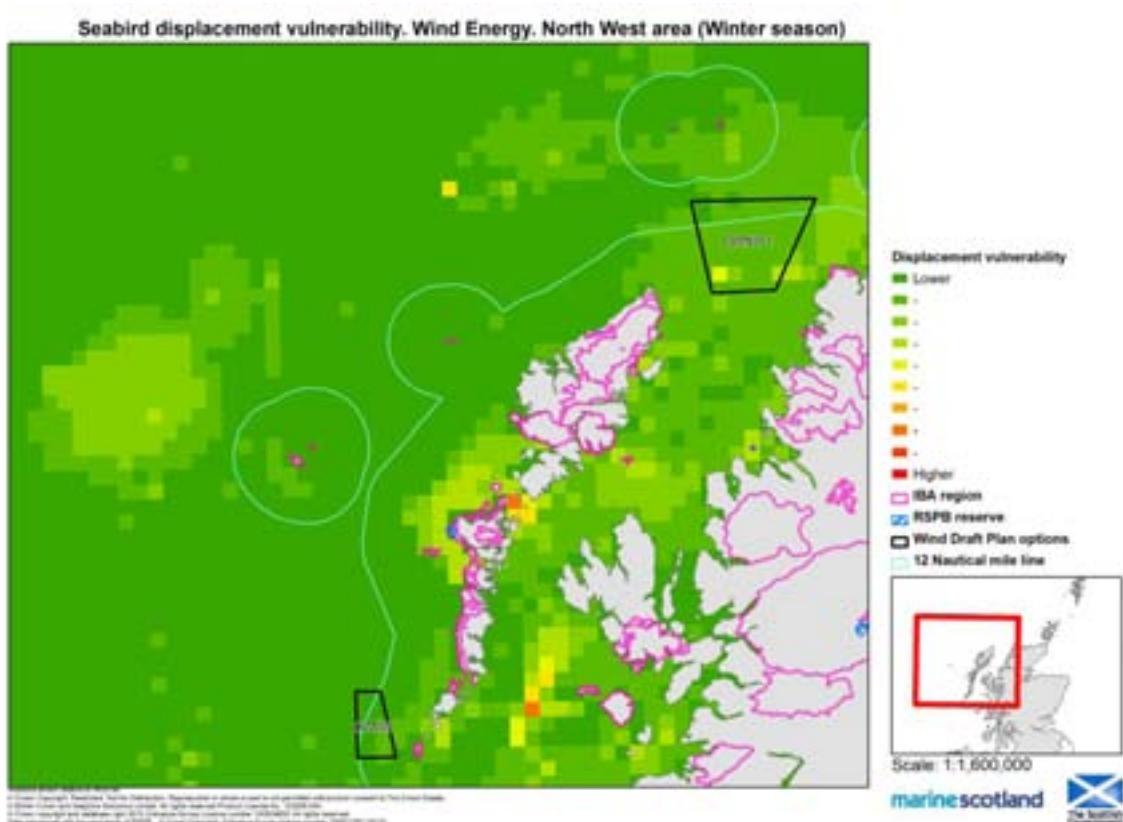
<sup>75</sup> JNCC (2001) SPA Description: Flannan Isles [online] Available at: <http://jncc.defra.gov.uk/default.aspx?page=1846> [accessed 23/05/2013]

<sup>76</sup> BirdLife International (2013) Important Bird Areas factsheet: Cape Wrath [online] Available at:  
<http://www.birdlife.org/datazone/sitefactsheet.php?id=2440> [accessed 23/05/2013]

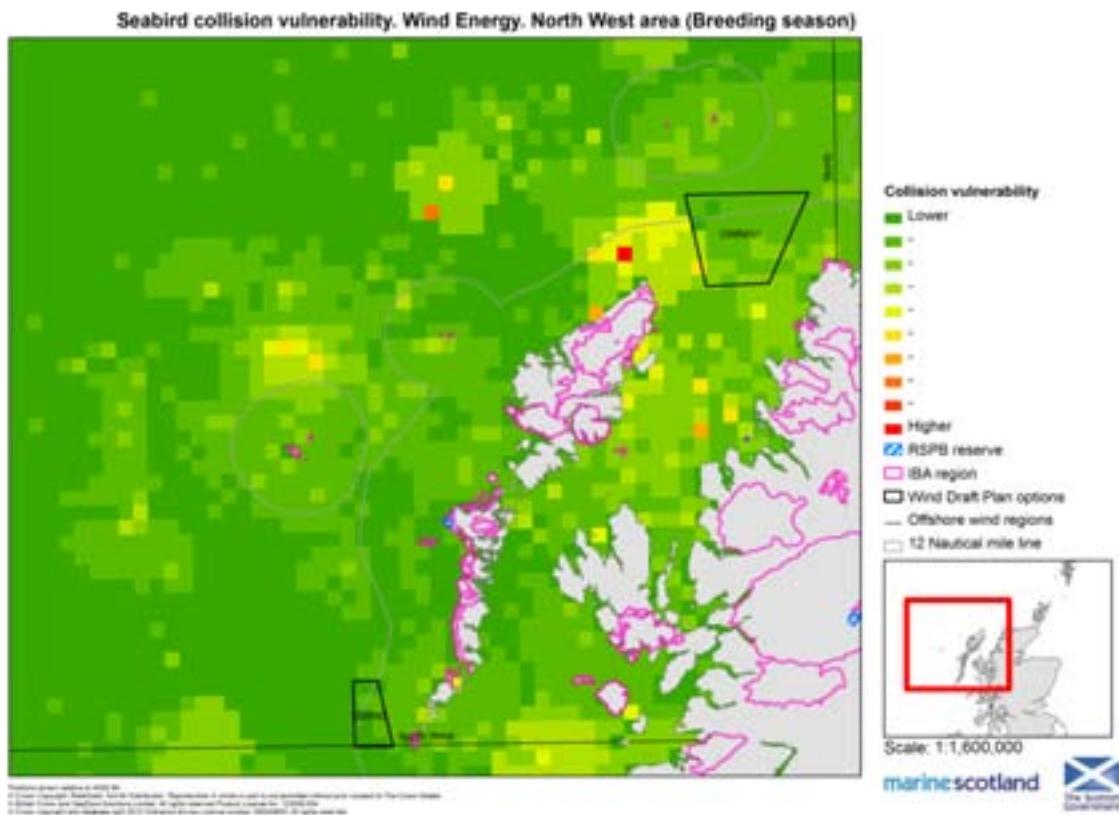
<sup>77</sup> BirdLife International (2013) Important Bird Areas factsheet: Lewis Peatlands [online] Available at:  
<http://www.birdlife.org/datazone/sitefactsheet.php?id=2506> [accessed 23/05/2013]



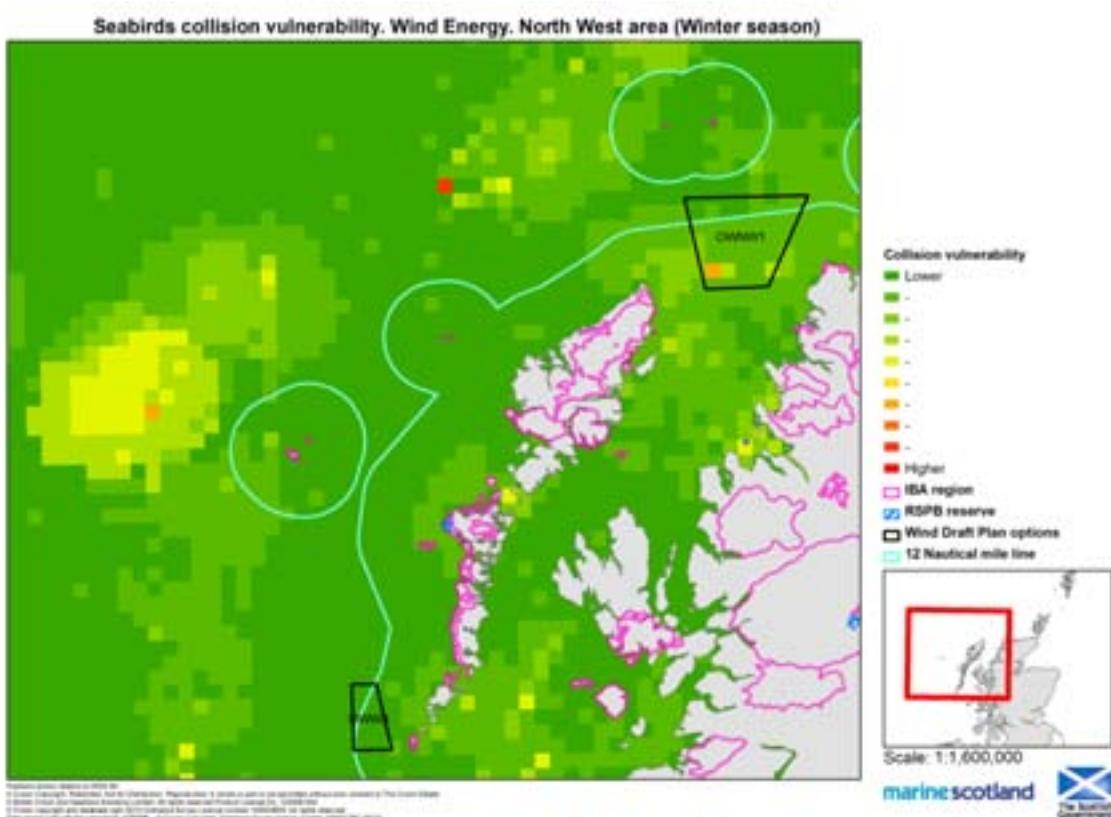
**Figure B1.2.35: Seabird Displacement Vulnerability from Wind Energy in the North West (Breeding Season)**



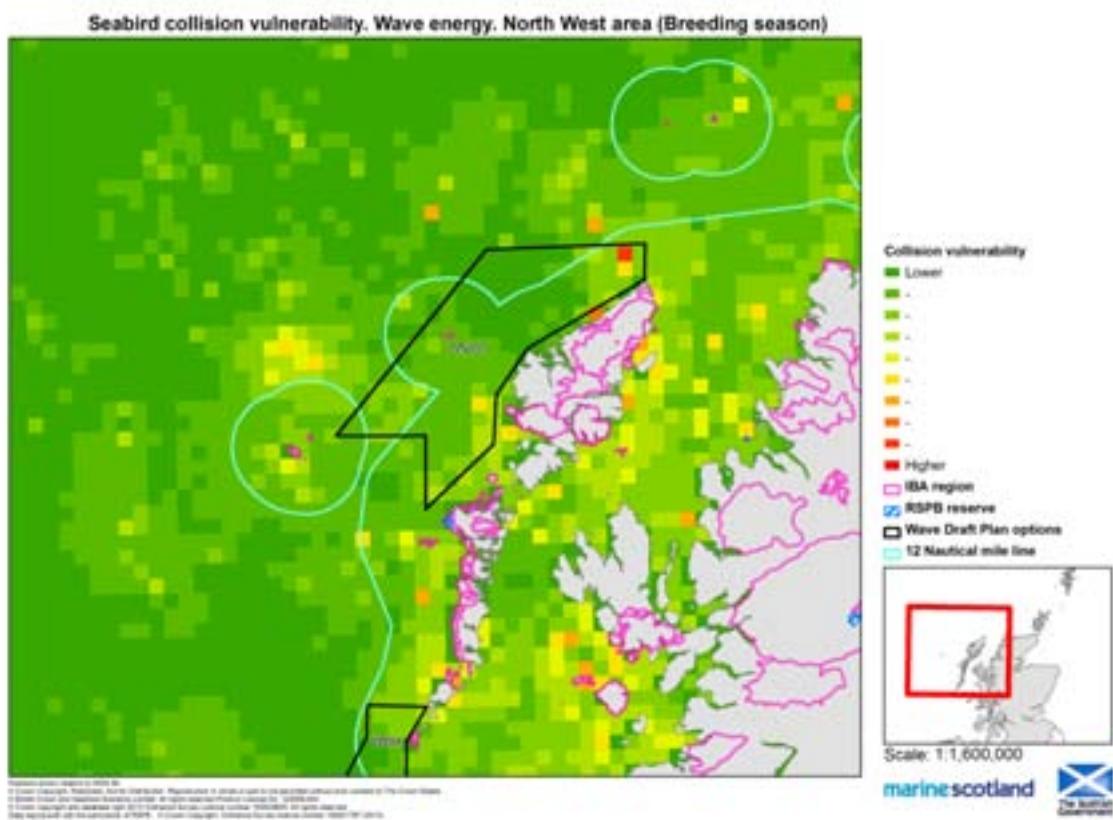
**Figure B1.2.36: Seabird Displacement Vulnerability from Wind Energy in the North West (Winter Season)**



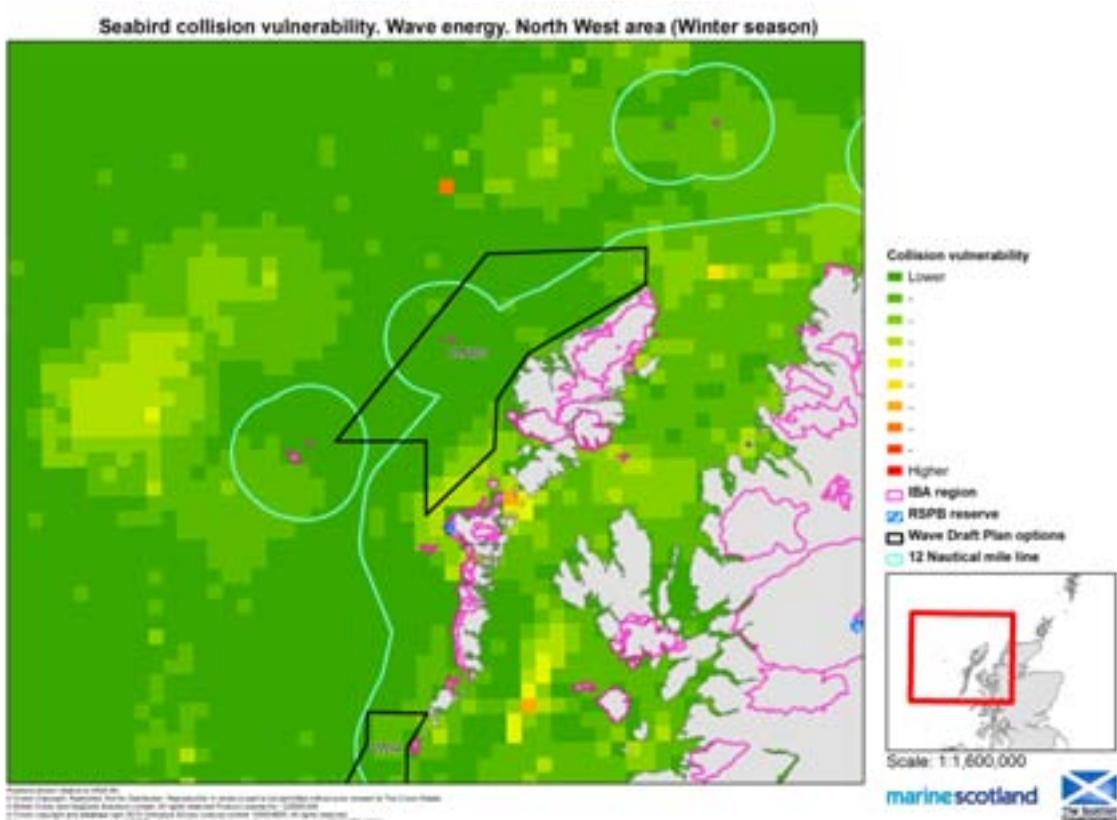
**Figure B1.2.37: Seabird Collision Vulnerability Risk from Wind Energy in the North West (Breeding Season)**



**Figure B1.2.38: Seabird Collision Vulnerability from Wind Energy in the North West (Winter Season)**



**Figure B1.2.39: Seabird Collision Vulnerability from Wave Energy in the North West (Breeding Season)**



**Figure B1.2.40: Seabird Collision Vulnerability from Wave Energy in the North West (Winter Season)**

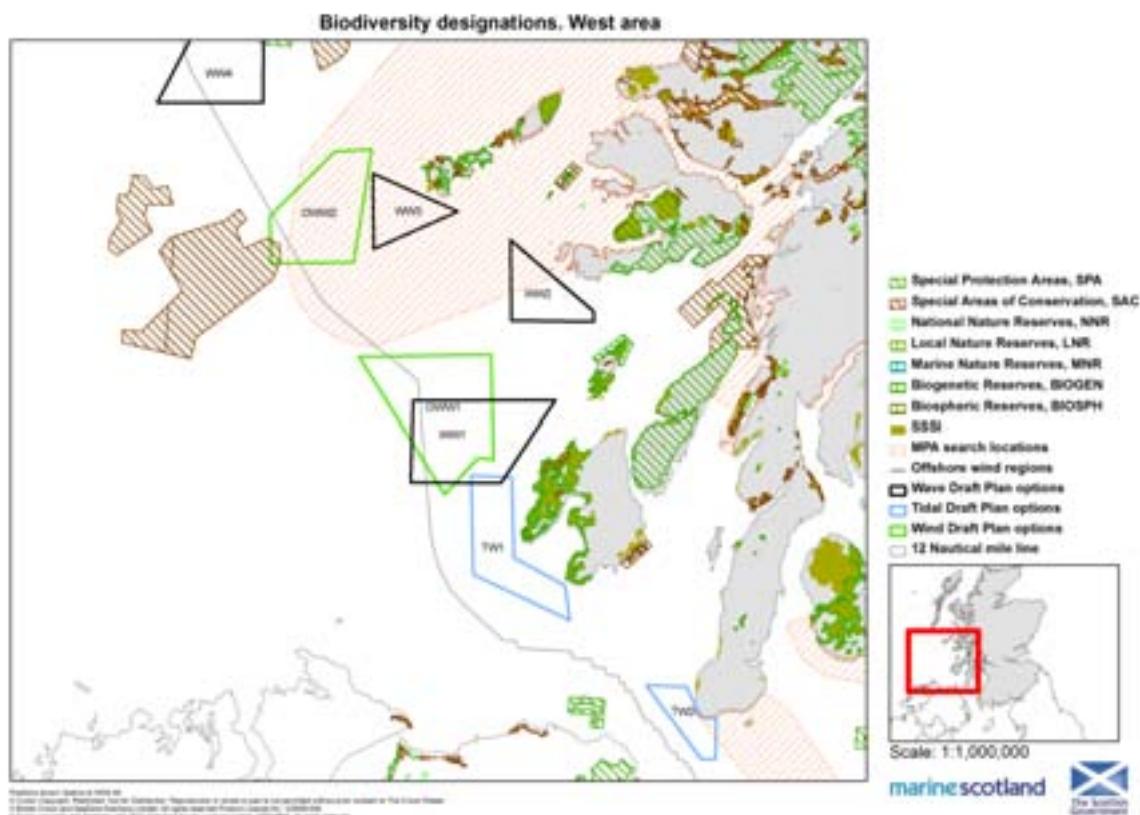
## West

- 1.2.74 The coastal and marine habitats vary throughout this region, ranging from predominantly shallow and shelf subtidal sediments amongst and to the west of the Inner Hebrides, to subtidal rock regions west and south west of Barra. This variation in habitat type supports a diverse range of marine flora and fauna including, amongst others, cold water coral reefs near Mingulay, Sea pen and Nephrops grounds, and marine mammals and seabirds amongst the Inner Hebrides.
- 1.2.75 While these habitats are considered to be in relatively good condition overall, pressures from activities such as trawling, particularly in relation to shallow subtidal sediment habitats, and declines in some fish and marine mammal species have prompted concern in some areas<sup>78</sup>.
- 1.2.76 Designated sites within the West region include<sup>79</sup>:
- SACs including the South East Islay Skerries SAC designated for harbour seals, and candidate areas located close to but outwith the plan option areas at East Mingulay cSAC and Stanton Banks cSAC. Both of these sites have been identified as candidate sites for their reef features;
  - SPAs including Rum for its seabird, diver and Golden eagle interests. This site has also been recognised as an SAC to protect its rich diversity of habitats. Other SPA sites identified include the Rinnns of Islay SPA, SSSI and Ramsar site designated for birds and habitat features; Laggan SPA designated for birds and habitat features; the Oa SPA and SSSI protected for habitat and Chough interests; the Tiree Wetlands and Coast SPA protected for a number of bird species including geese and waders; Coll SPA protected for geese; and the Mingulay and Berneray SPA protected for a range of seabirds (i.e. Puffin, Guillemot, Fulmar, Kittiwake, Shag and Razorbill).
  - SSSI located amongst the Inner Hebrides and along the Kintyre coastline, many of which have also been designated as SACs and SPAs. The Sanda Islands SSSI, protected for its bird interests (e.g. Black guillemot) and located off the Kintyre peninsula, has been identified within an MPA area of search;
  - Northern Irish protection areas have also been identified as being of potential relevance due to their proximity to several plan option areas in the southern part of this region. These sites include Rathlin Island, Red Bay and North Antrim Coast SACs, each protected for their marine and/or coastal habitats.
  - A number of proposed MPAs are located within the region, including the large Skye to Mull MPA search area.

<sup>78</sup> Scottish Government (2011) Scotland's Marine Atlas, Scottish Government, pg. 8 – 9, 71.

<sup>79</sup> Marine Scotland (2012) Offshore Wind - Regional Locational Guidance [online] Available at: <http://www.scotland.gov.uk/Topics/marine/marineenergy/Planning/windrlg> (accessed 25/03/2013)

- 1.2.77 The West region contains three wind (OWW1 – OWW3), four wave (WW1 – WW4) and two tidal (TW1 – TW2) plan option areas. The proximity of these areas to ecological designations is displayed in Figure B1.2.41, which also shows an overlap between some of the plan option areas (OWW2, WW2 and WW3) and the Skye to Mull MPA search area, and one tidal plan option area (TW2) to the MPA search area to the south of the Kintyre peninsula.



**Figure B1.2.41: Biodiversity Designations and Proposed MPAs in the West (Plan Option Areas)**

- 1.2.78 A range of cetacean species are often sighted in this region and around the plan option areas, including Harbour porpoise, Minke whale, Short beaked common dolphin, White beaked dolphin and Orca. Other species, such as White sided dolphin, Bottlenose dolphin and Risso's dolphin have also been observed in these waters<sup>80 81</sup>. Elasmobranchs are commonly observed in this region, with several Basking shark and Common skate 'hotspots' identified, in particular one in the vicinity of Mull and Coll where a healthy but critically endangered population of skate has been identified<sup>82</sup>.
- 1.2.79 The Basking shark 'hotspots' are based around Hyskeir, Canna, Gunna Sound, Coll, West Mull and the Treshnish Isles, the Clyde Sea and South of Barra<sup>83</sup>. This area has been the focus of Basking shark tagging studies, with several

<sup>80</sup> Scottish Government (2011) Scotland's Marine Atlas, Scottish Government, pg 124 – 129.

<sup>81</sup> Paxton, C.G.M. Mackenzie, M., Burt, M.L., Rexstad E. and Thomas L. (2011) Phase II Data Analysis of Joint Cetacean Protocol Data Resource, Report to Joint Nature Conservation Committee [online] Available at: [http://jncc.defra.gov.uk/pdf/JCP\\_Phase\\_II\\_report.pdf](http://jncc.defra.gov.uk/pdf/JCP_Phase_II_report.pdf) (accessed 09/05/2013)

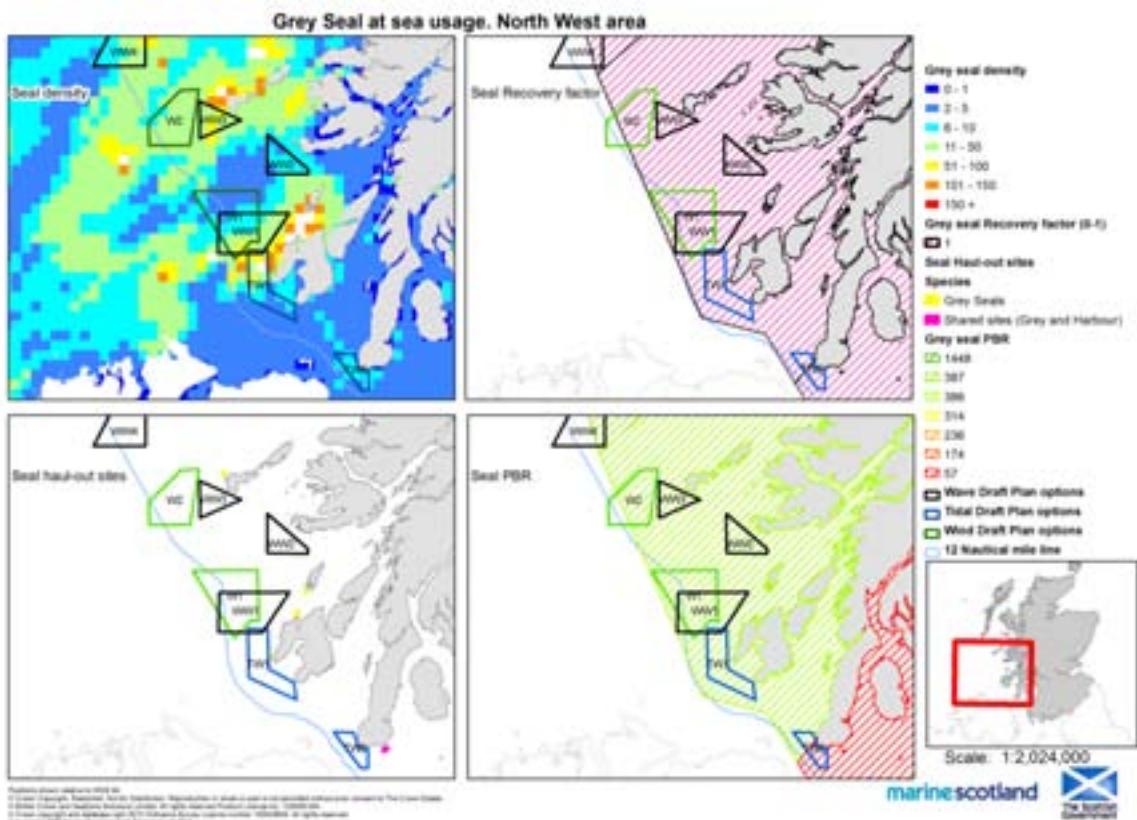
<sup>82</sup> Scottish Government (2011) Scotland's Marine Atlas, Scottish Government, pg 116 – 117.

<sup>83</sup> SNH (undated) Basking Shark Hotspots In West Scotland [online] Available at:

<http://www.snh.org.uk/pdfs/publications/marine/baskingsharkhotspotsflyer.pdf> [accessed 08/05/2013]

studies suggesting that the Inner Hebrides may be an important summer habitat for the Basking sharks. However, further data will be required to confirm the preliminary observations of these studies<sup>84</sup>.

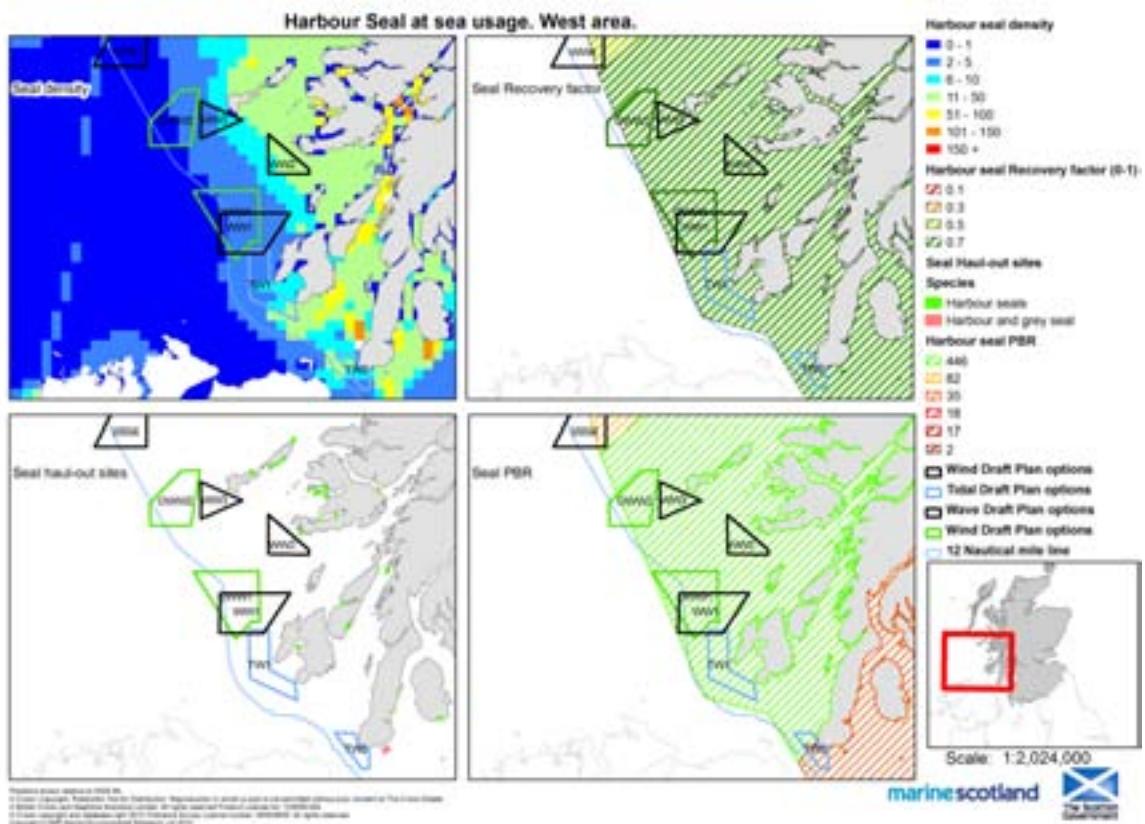
- 1.2.80 SACs established at the Treshnish Isles and Monach Islands have been recognised for their importance to grey seals, and SACs at the Isle of Lismore and Islay Skerries have been established due to their importance to common seals. There are a number of seal haul out areas within the region including sites near Oronsay, Mull, Jura and Islay and the Kintyre peninsula.
- 1.2.81 The region contains important nursery grounds for several commercially important species of fish, including Spurdog, Herring, Whiting and Anglerfish amongst others. However, there remains a degree of uncertainty and spatial data gaps, particularly in relation to fish spawning sites in Scottish waters<sup>85</sup>. While no rivers in the region have been designated for their importance for Atlantic salmon, many rivers and estuaries in the region are known to be used by both Atlantic salmon and Sea trout.



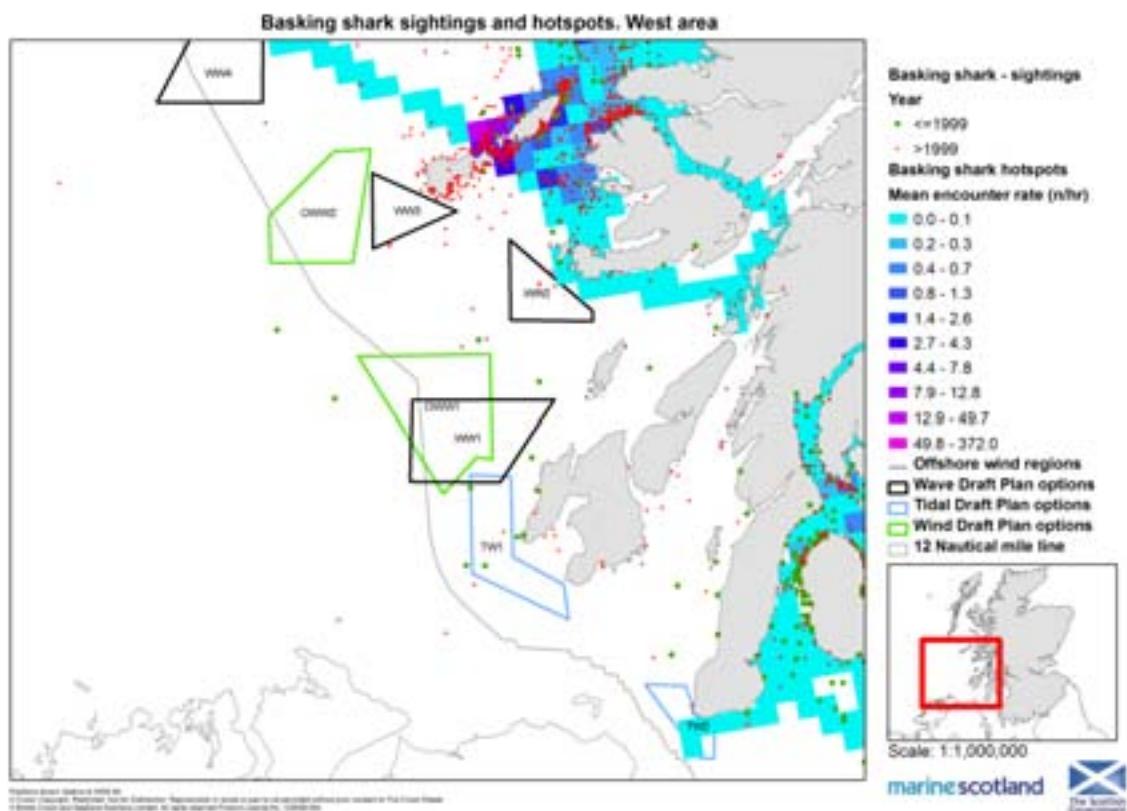
**Figure B1.2.42: Grey Seal At-Sea Usage in the West (Plan Option Areas)**

<sup>84</sup> Witt M.J., Doherty P.D., Hawkes L.A., Godley B.J., Graham R.T., and Henderson S.M. (2013) Basking shark satellite tagging project: post-fieldwork report, Scottish Natural Heritage Commissioned Report No. 555 [online] Available at: [http://www.snh.org.uk/pdfs/publications/commissioned\\_reports/555.pdf](http://www.snh.org.uk/pdfs/publications/commissioned_reports/555.pdf) [accessed 08/05/2013]

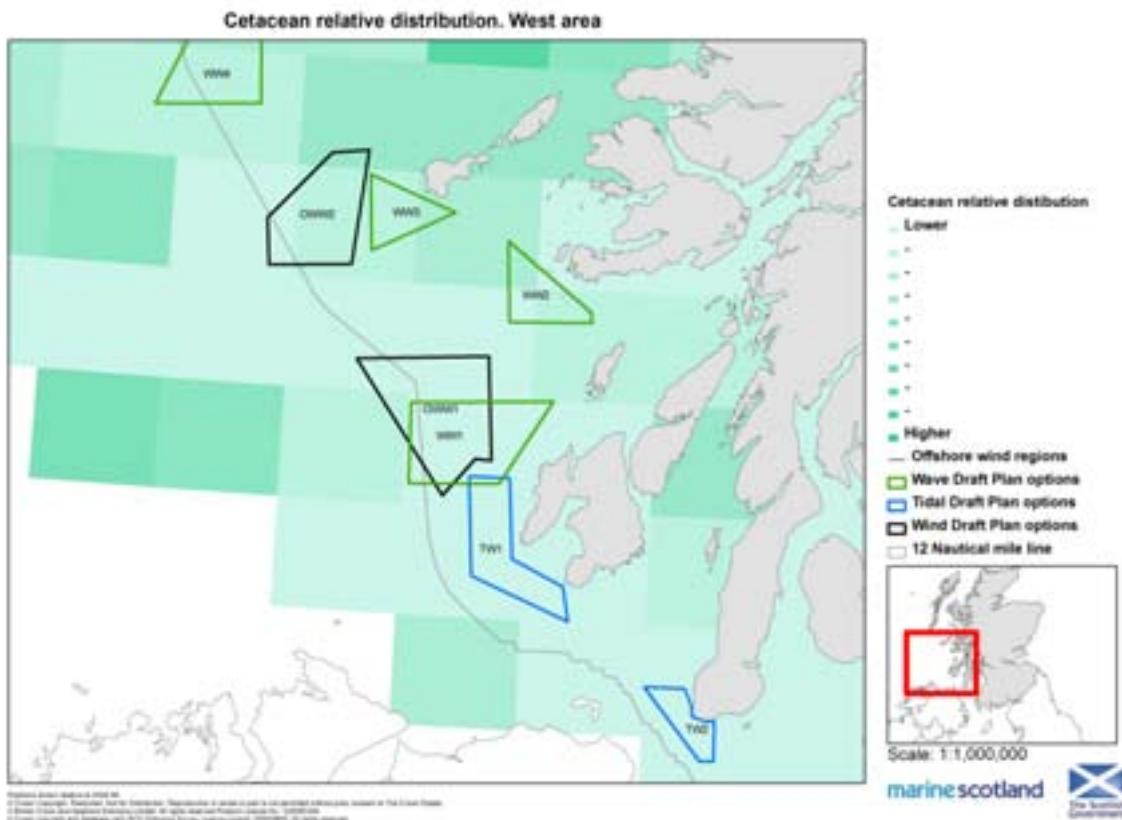
<sup>85</sup> Ellis, J.R., Milligan S.P., Reddy L., Taylor N. and Brown M.J. (2012) Cefas Science Series Technical Report no. 147, Spawning and nursery grounds of selected fish species in UK waters [online] Available at: <http://www.cefas.defra.gov.uk/publications/techrep/TechRep147.pdf> [accessed 08/05/2013]



**Figure B1.2.43: Harbour Seal At-Sea Usage in the West (Plan Option Areas)**



**Figure B1.2.44: Basking Shark Sightings and Hotspots in the North (Plan Option Areas)**



**Figure B1.2.45: Cetacean Relative Distribution in the West (Plan Option Areas)**

1.2.82 Several SPAs been established within close proximity of the plan option areas in the west region, including:

- Canna and Sanday which supports a range of seabird species including Puffin, Guillemot, Kittiwake, Herring Gull and Shag<sup>86</sup>;
- The isle of Rum is noted for its colony of Manx shearwater, whilst also supporting other breeding seabirds such as Kittiwake, Guillemot, Auk, Gull, and rarer species like the Golden eagle<sup>87 88</sup>;
- Mingulay and Berneray, located near the border of the West and North West regions, are designated as important breeding sites for a range of bird species including Razorbill, Puffin, Guillemot, Fulmar, Kittiwake and Shag. Many of these species are known to feed in the surrounding waters of the South Minch<sup>89</sup>;
- The Treshnish Isles are considered to be important for their breeding seabird colonies, especially those of the Storm petrel. While the most important seabird colonies are on Lunga, which also supports the majority

<sup>86</sup> Marine Scotland (2012) Population Trends of Breeding Seabird Colonies in Scottish SPAs, Final report [online] Available at: <http://www.scotland.gov.uk/Resource/0040/00402058.pdf> [accessed 23/05/2013]

<sup>87</sup> Marine Scotland (2012) Population Trends of Breeding Seabird Colonies in Scottish SPAs, Final report [online] Available at: <http://www.scotland.gov.uk/Resource/0040/00402058.pdf> [accessed 23/05/2013]

<sup>88</sup> JNCC (2001) SPA Description: Rum [online] Available at: <http://jncc.defra.gov.uk/page-1863> [accessed 23/05/2013]

<sup>89</sup> JNCC (2001) SPA Description: Mingulay and Berneray [online] Available at: <http://jncc.defra.gov.uk/page-1853> [accessed 23/05/2013]

of the Storm petrel populations, the Isles are also considered to be important for wintering Greenland Barnacle Goose<sup>90</sup>;

- North Colonsay and the Western cliffs are important for breeding seabirds such as Gulls and Auks<sup>91</sup>, as well as Guillemot and Kittiwakes during breeding season<sup>92</sup>. These birds are known to feed outside the SPA in surrounding waters, as well as those located further afield. Chough is also a resident species of cliffs in these areas<sup>93</sup> and SPAs have been established at Oronsay and South Colonsay to protect both Chough and Cornkrake populations;
- Gruinart Flats<sup>94</sup>, Bridgend Flats<sup>95</sup> and Laggan<sup>96</sup> are designated for the protection of passing populations of Barnacle goose and/or Greenland white fronted goose; and
- Ailsa Craig is protected for its important nesting and breeding sites for a range of seabird species, including Guillemot, Gull, Kittiwake, and most notably, one of the largest colonies of Gannet in the world. The seabirds nesting here feed in surrounding waters outside the SPA as well as in marine areas further afield<sup>97</sup>.

1.2.83 In addition to sites of European importance, several IBAs have been identified across the West region. The Colonsay and Ornsay IBA reflects the presence of seabird species such as breeding Common guillemot and Black legged kittiwake populations. Rarer species such as the Corncrake have also been recorded in this area. Other IBAs in the region including those on Mull, Tiree, Coll, Islay, the Kintyre peninsula, Gigha Island, Machrihanish and the Arran Moors support a range of important bird species;

1.2.84 Figures B1.2.46 – B1.2.53 display the locations of IBA and RSPB Reserves in the North West, and present displacement and collision vulnerabilities for seabirds within the region.

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<sup>90</sup> JNCC (2001) SPA Description: Treshnish Isles [online] Available at: <http://jncc.defra.gov.uk/default.aspx?page=1941> [accessed 23/05/2013]

<sup>91</sup> JNCC (2001) SPA Description: North Colonsay and Western Cliffs [online] Available at: <http://jncc.defra.gov.uk/page-1952> [accessed 23/05/2013]

<sup>92</sup> Marine Scotland (2012) Population Trends of Breeding Seabird Colonies in Scottish SPAs, Final report [online] Available at: <http://www.scotland.gov.uk/Resource/0040/00402058.pdf> [accessed 23/05/2013]

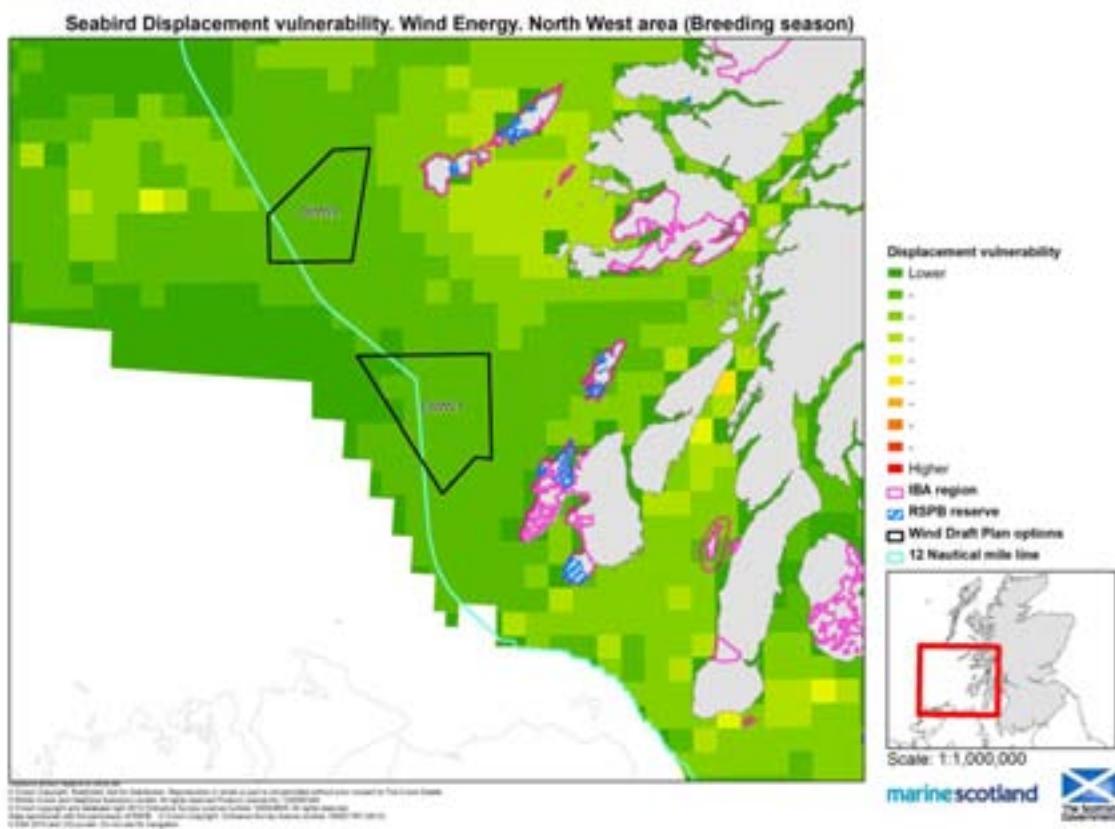
<sup>93</sup> BirdLife International (2013) Important Bird Areas factsheet: North Colonsay and the Western cliffs [online] from <http://www.birdlife.org> (accessed 26/03/2013)

<sup>94</sup> JNCC (2001) SPA Description: Gruinart Flats, Islay [online] Available at: <http://jncc.defra.gov.uk/default.aspx?page=1942> [accessed 23/05/2013]

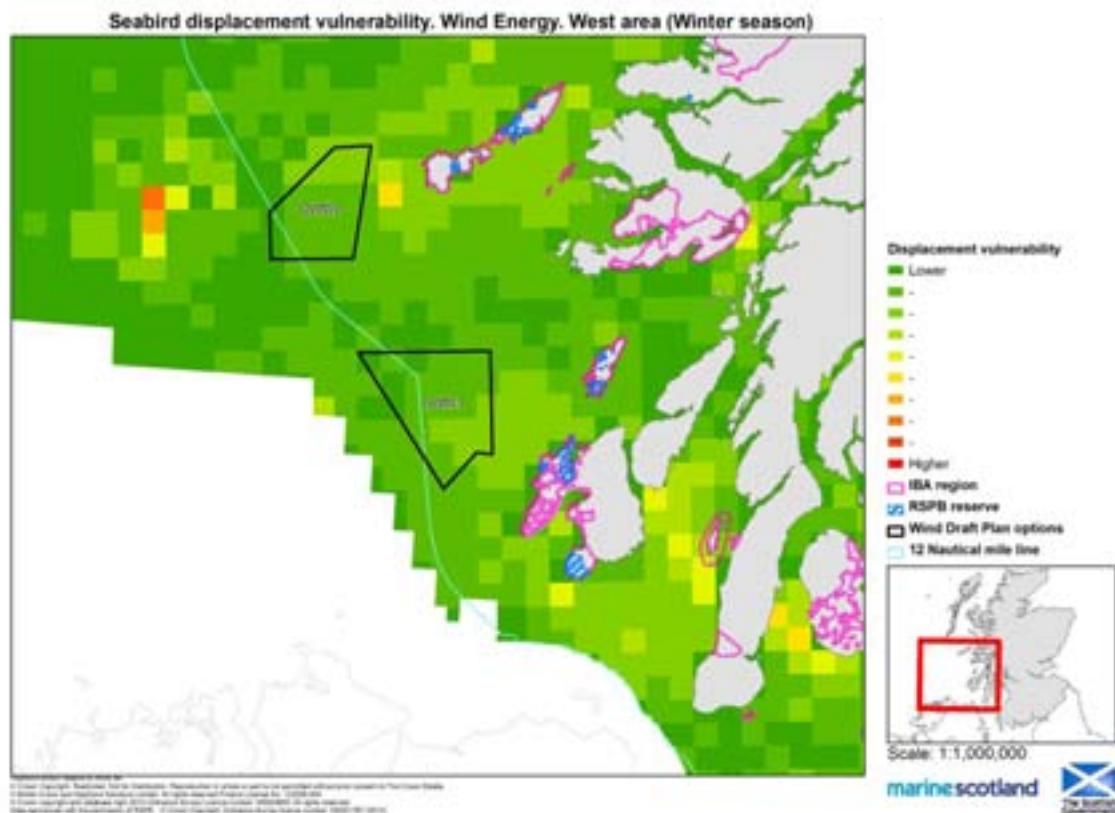
<sup>95</sup> JNCC (2001) SPA Description: Bridgend Flats Islay [online] Available at: <http://jncc.defra.gov.uk/default.aspx?page=1943> [accessed 23/05/2013]

<sup>96</sup> JNCC (2001) SPA Description: Laggan Islay [online] Available at: <http://jncc.defra.gov.uk/default.aspx?page=1944> [accessed 23/05/2013]

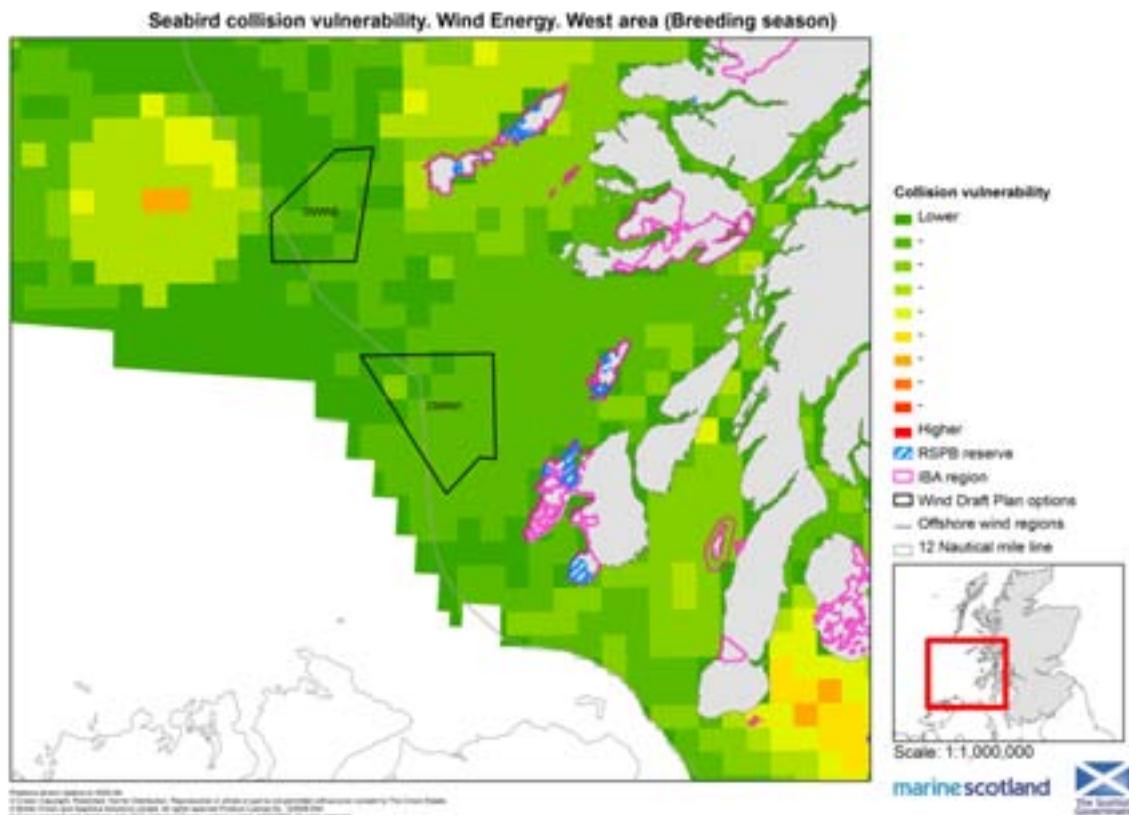
<sup>97</sup> JNCC (2001) SPA Description: Ailsa Craig [online] Available at: <http://jncc.defra.gov.uk/default.aspx?page=1949> [accessed 23/05/2013]



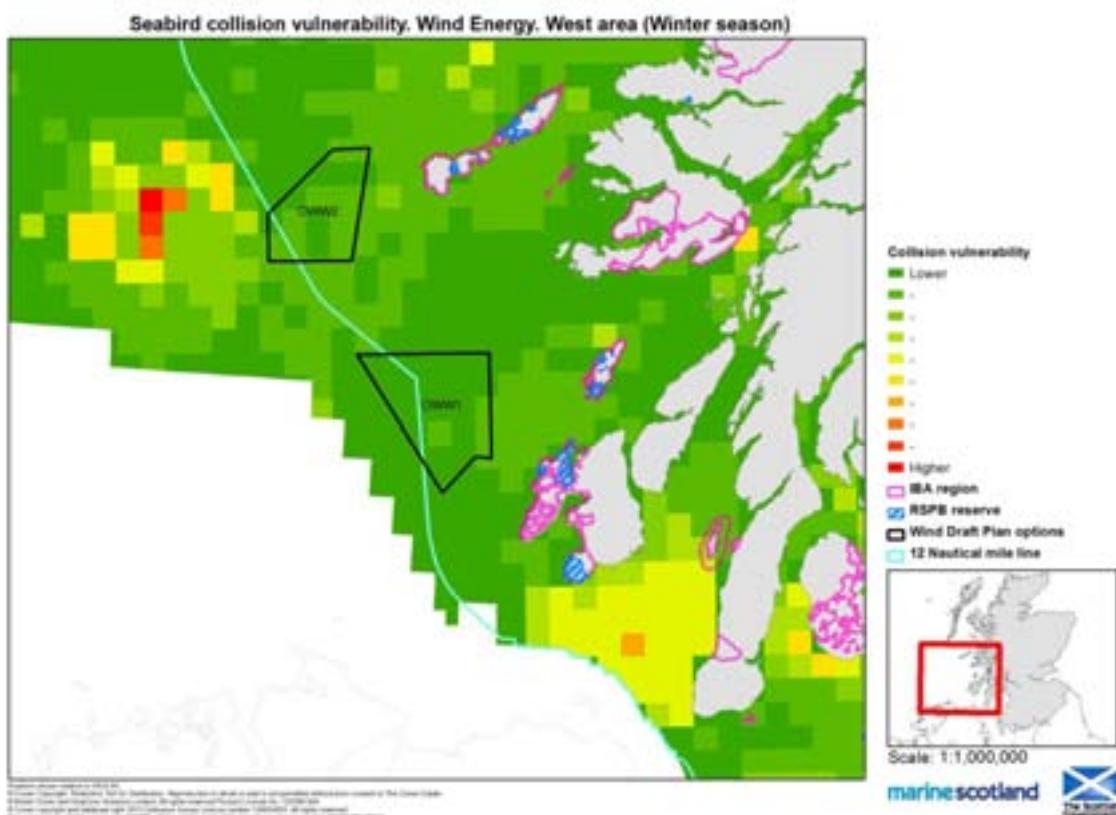
**Figure B1.2.46: Seabird Displacement Vulnerability from Wind Energy in the West (Breeding Season)**



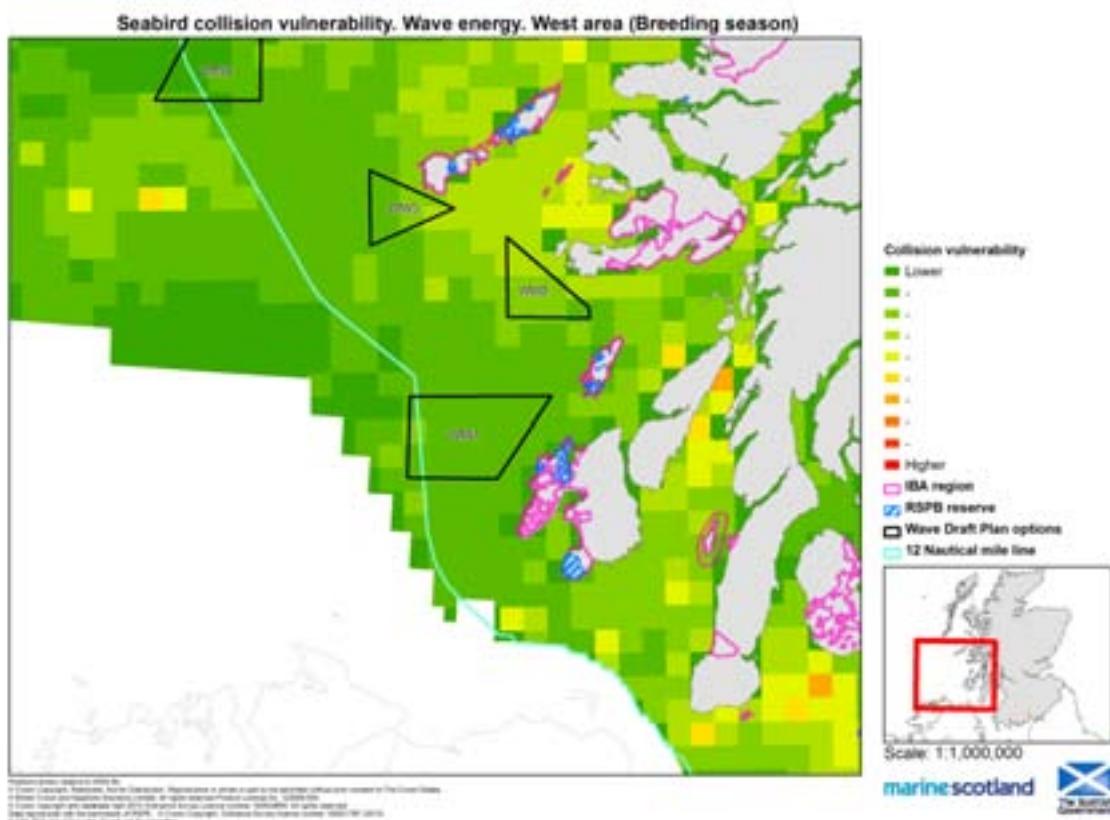
**Figure B1.2.47: Seabird Displacement Vulnerability from Wind Energy in the West (Winter Season)**



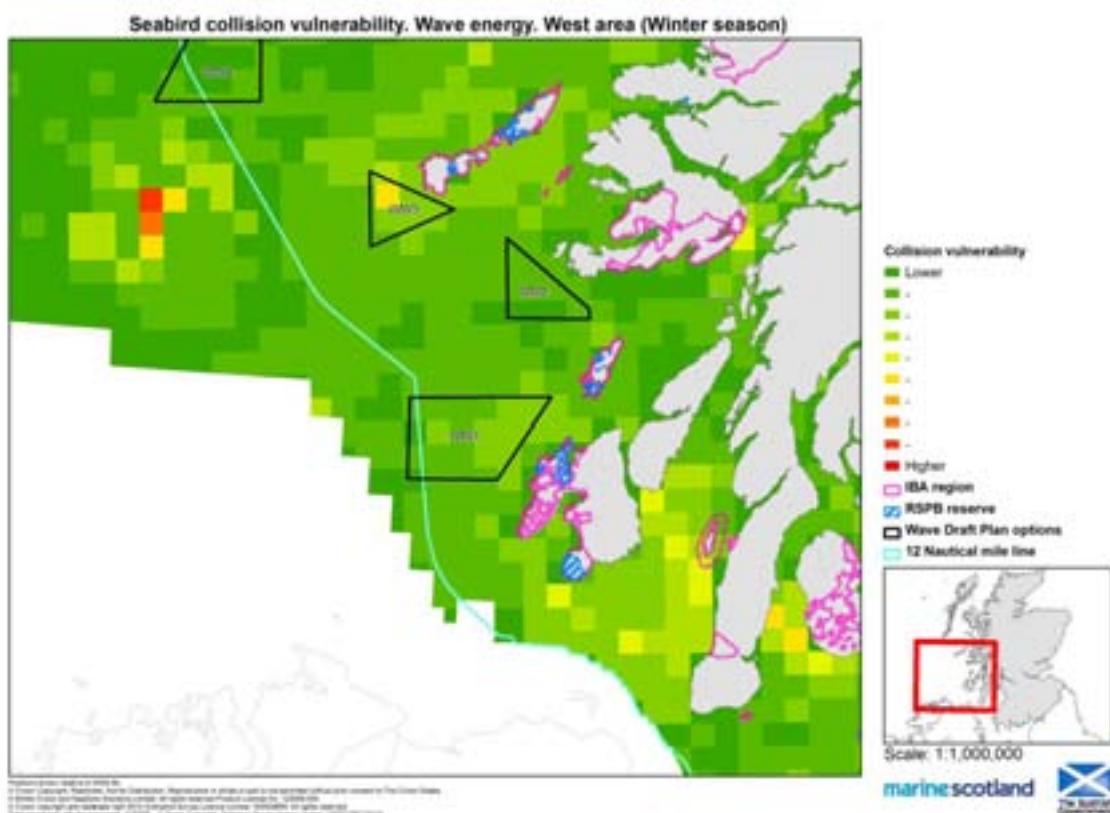
## **Figure B1.2.48: Seabird Collision Vulnerability from Wind Energy in the West (Breeding Season)**



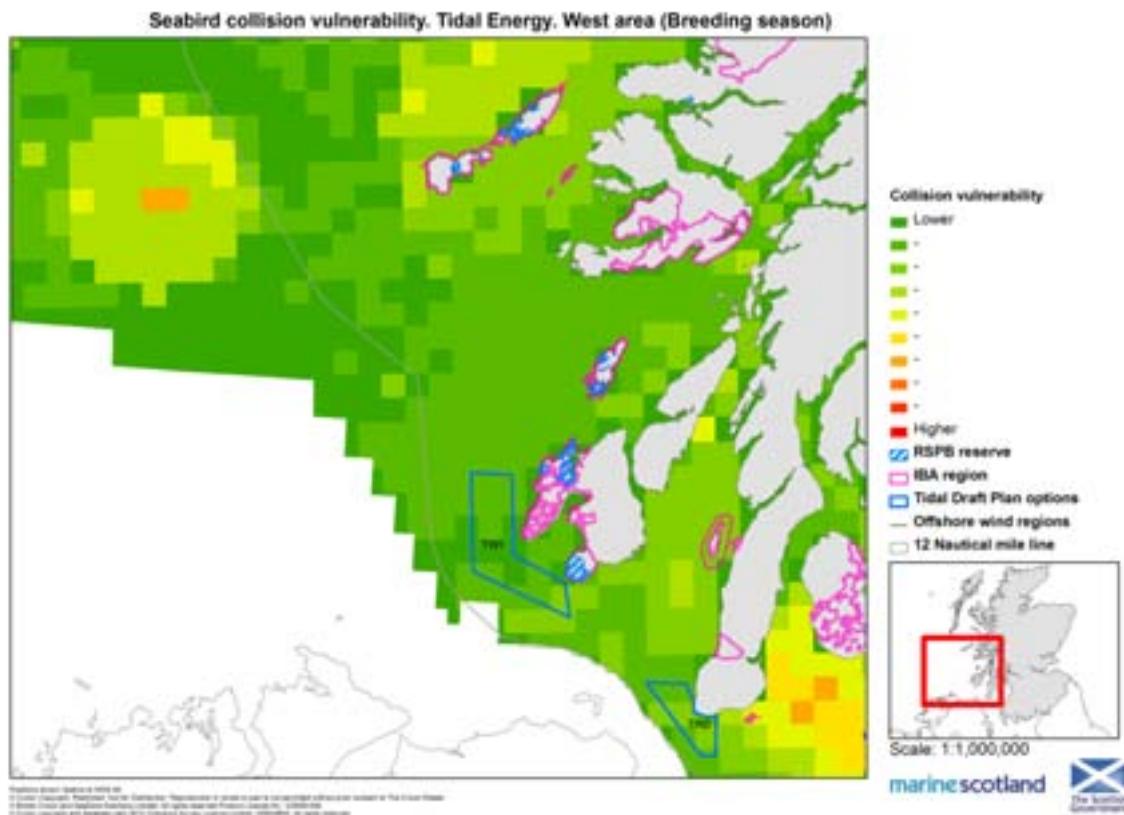
**Figure B1.2.49: Seabird Collision Vulnerability from Wind Energy in the West (Winter Season)**



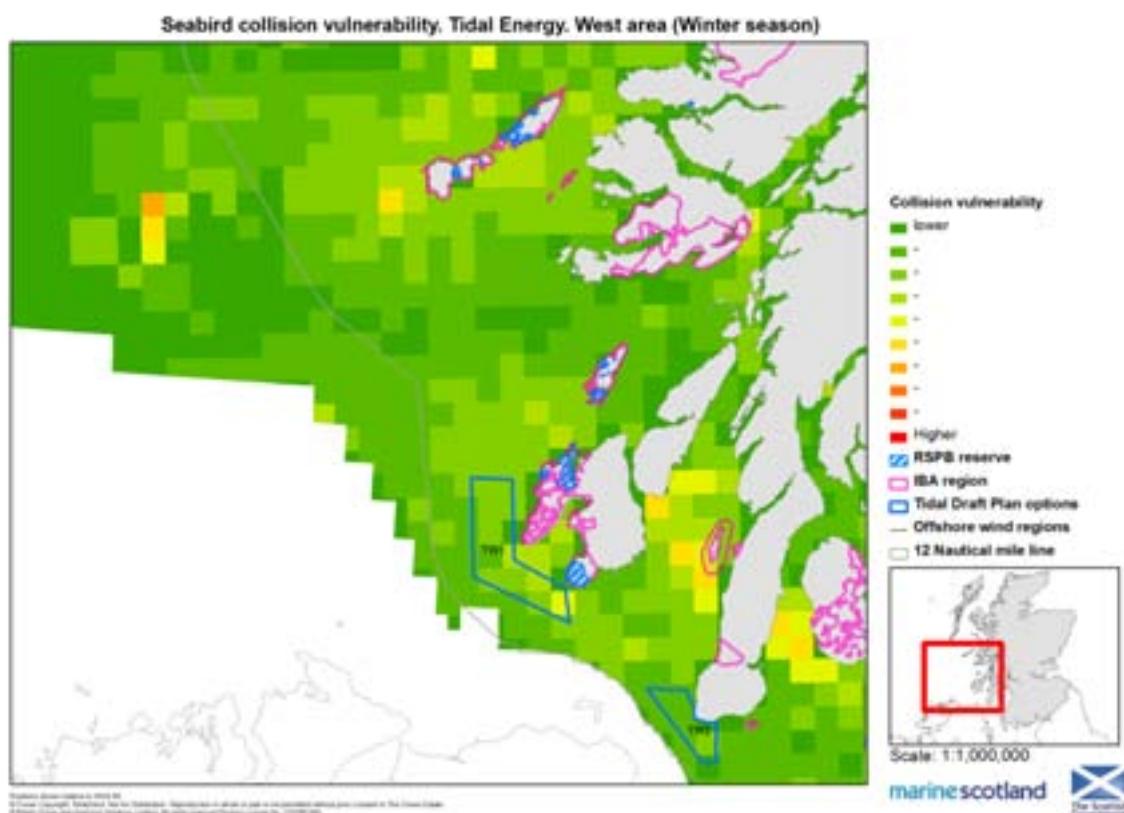
**Figure B1.2.50: Seabird Collision Vulnerability from Wave Energy in the West (Breeding Season)**



**Figure B1.2.51: Seabird Collision Vulnerability from Wave Energy in the West (Winter Season)**



### **Figure B1.2.52: Seabird Collision Vulnerability from Tidal Energy in the West (Breeding Season)**



**Figure B1.2.53: Seabird Collision Vulnerability from Tidal Energy in the West (Winter Season)**

## South West

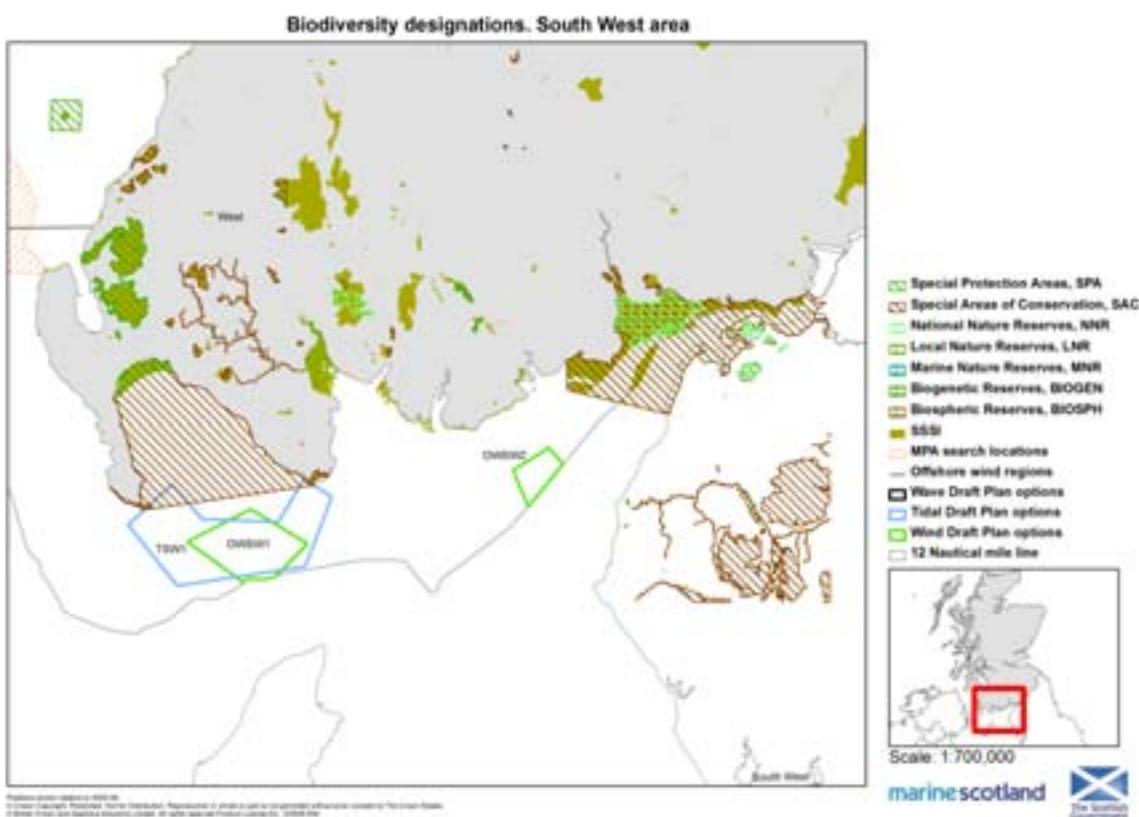
- 1.2.85 While largely expansive shallow and shelf subtidal sediments extend across this region, the coastal habitats within the Solway Firth vary from west to east. The Luce Bay coastline largely consists of intertidal rock habitats, changing to predominantly intertidal sediments near the entrance to the River Nith at the eastern edge of the Firth. Several of these areas have been recognised and designated for their importance to a number of different species.
- 1.2.86 The status of these habitats within the region is largely mixed. Intertidal rocky and sediment habitats are generally deteriorating, with rocky habitats noted as being under threat from invasive non-native species such as wireweed (*Sargassum muticum*). While shallow subtidal rocky habitats are generally considered to be in a better state, the shallow subtidal habitats present in the region are considered to be relatively degraded. In a species context, the reduced populations of some fish species, particularly commercial species, is considered to be of major concern<sup>98</sup>.
- 1.2.87 The South West region and its neighbouring areas have a wealth of designated sites and features<sup>99</sup>:
- SACs including Luce Bay and Sands SAC designated for its coastal and inshore habitats and its support for Great crested newts; the Solway Firth SAC that overlaps with the Solway Firth SPA and Ramsar sites, and designated for its estuarial / coastal habitat and species features (e.g. River lamprey and Sea lamprey); River Bladnoch SAC designated for its Atlantic salmon interests; and Mull of Galloway SAC designated for its vegetated sea cliffs.
  - SPAs including the Upper Solway Flats and Marshes designated as both an SPA and Ramsar site for the bird species it supports; Loch of Inch and Torrs Warren SPA located at the northern end of Luce Bay, designated for its support for Hen harrier and Greenland white-fronted goose species; and Loch Ken, River Dee Marshes, and Glenapp and the Galloway Moors SPAs located inland but with the potential for coastal relevance. The Rinnns of Islay SPA, SAC and SSSI was designated for a range of bird species and other features, and has also been included due to its proximity to the plan option areas;
  - Numerous SSSI and local nature conservation designations in the region, including some with particular relevance to development offshore. These include the Cree Estuary SSSI notified for a range of features including Smelt, Pink-footed goose, coastal geomorphology, and saltmarsh and mudflats; Loch Ryan which is highlighted as a Marine Consultation Area; Wigtown Bay Local Nature Reserve; and the Cairnsmore of Fleet, Merrick Kells and Silver Flowe Biosphere Reserves

<sup>98</sup> Scottish Government (2011) Scotland's Marine Atlas, Scottish Government, pg. 8 – 9, 71.

<sup>99</sup> Marine Scotland (2012) Offshore Wind - Regional Locational Guidance [online] Available at: <http://www.scotland.gov.uk/Topics/marine/marineenergy/Planning/windrlg> (accessed 25/03/2013)

- Designated areas in Northern Ireland and England, including Strangford Lough (Northern Ireland) and Drigg Coast (England) SACs, St. Bee's Head Heritage Coast located in Cumbria, and several SSSI and local natural heritage designations also located along the Cumbrian coast. On the Isle of Man, there are 17 Areas of Special Scientific Interest (one of which is also a National Nature Reserve) and Ballaugh Curragh that has been designated as a Ramsar site due to bird interests.

1.2.88 The South West region contains two wind (OWSW1 and OWSW2) and one tidal (TSW1) plan option areas. The proximity of these areas to ecological designations is displayed in Figure B1.2.54.

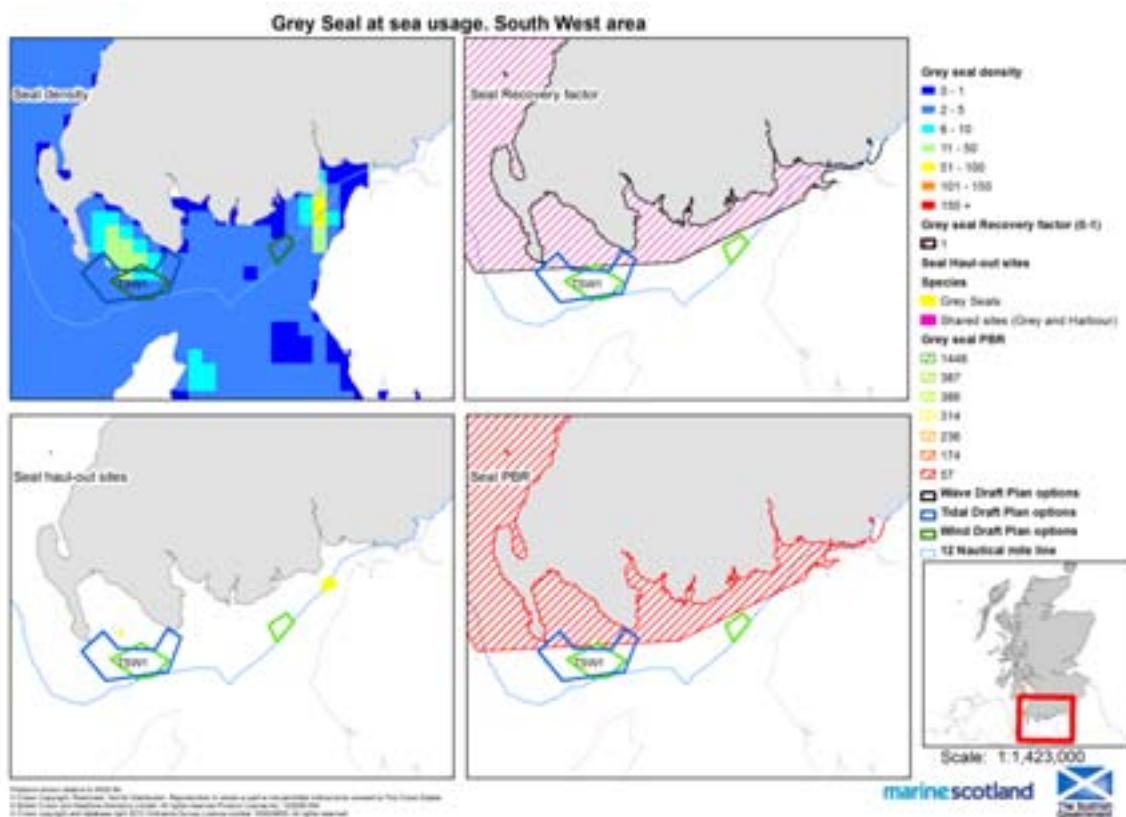


**Figure B1.2.54: Biodiversity Designations and Proposed MPAs in the South West (Plan Option Areas)**

1.2.89 In general terms, the South West region has a lower diversity of marine mammals than other regions. Harbour porpoise are perhaps the most regular users, particularly in the eastern regions of the Solway Firth, with occasional encounters with the Short-beaked common dolphin. Risso's dolphin and White beaked dolphin encounters are quite low<sup>100</sup>. Whilst the area is not a 'hotspot' for Basking sharks, sightings have been recorded around the coastal areas of Luce Bay, Wigtown Bay and the Isle of Man over the last 25 years, including a number of sightings near to plan option areas OWSW1 and TSW1.

<sup>100</sup> Paxton, C.G.M. Mackenzie, M., Burt, M.L., Rexstad E. and Thomas L. (2011) Phase II Data Analysis of Joint Cetacean Protocol Data Resource, Report to Joint Nature Conservation Committee [online] Available at: [http://jncc.defra.gov.uk/pdf/JCP\\_Phase\\_II\\_report.pdf](http://jncc.defra.gov.uk/pdf/JCP_Phase_II_report.pdf) (accessed 09/05/2013)

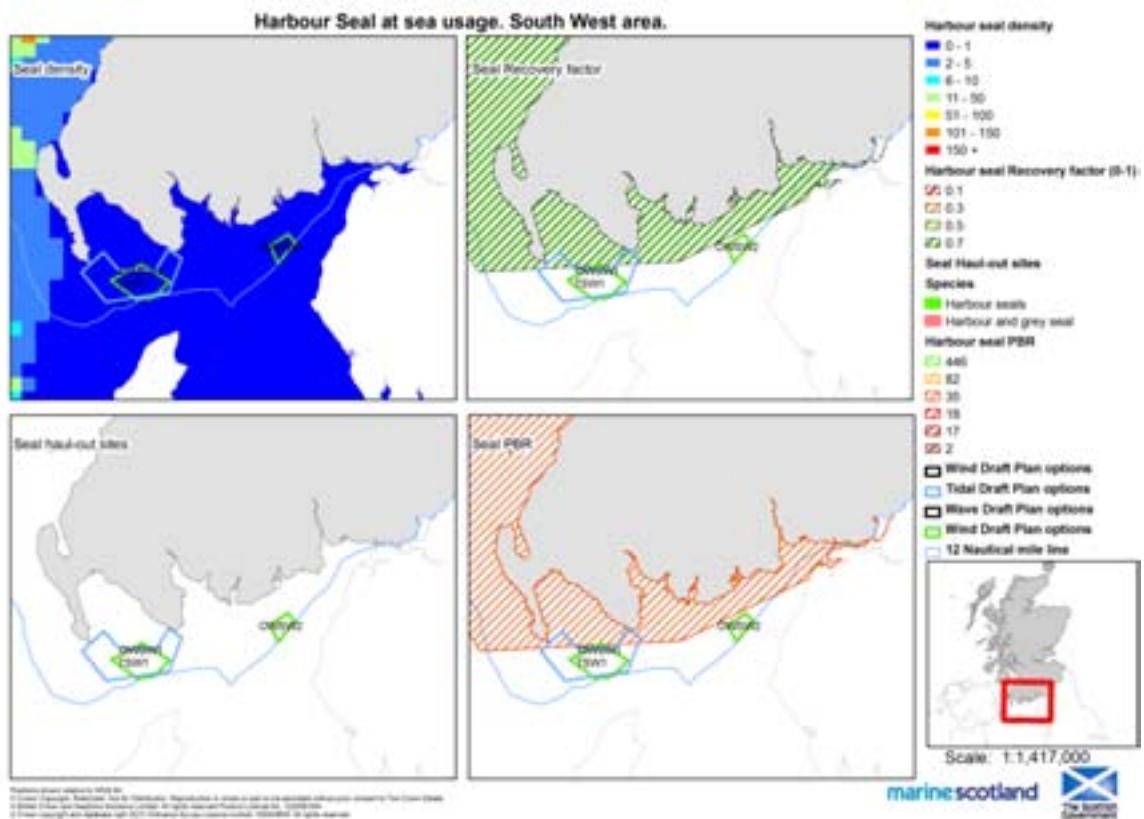
- 1.2.90 None of the SAC sites in this region have been established for seal interests. However, several seal haul-out sites have been identified in the general area at Little Scares, immediately outside of Luce Bay and within the Solway Firth at the outer sandbanks. Both of these sites are used by grey seals.
- 1.2.91 The waters of the Solway Firth and the northern portion of the Irish Sea contain known nursery areas for several fish species, particularly the eastern portion of the Firth, including commercially important species such as Spurdog, Herring, Cod, Whiting and Sole amongst others. Spawning areas for Plaice and Sole have been identified within the eastern portion of the Solway Firth, although there is a high degree of uncertainty in available spawning and nursery data.
- 1.2.92 The River Bladnoch has been designated as an SAC for its importance to Atlantic salmon<sup>101</sup>. However, many rivers and estuaries along the coastline of the Solway Firth are known to be used by Atlantic salmon populations for spawning and nursery grounds, and also support important Sea trout populations<sup>102</sup>.



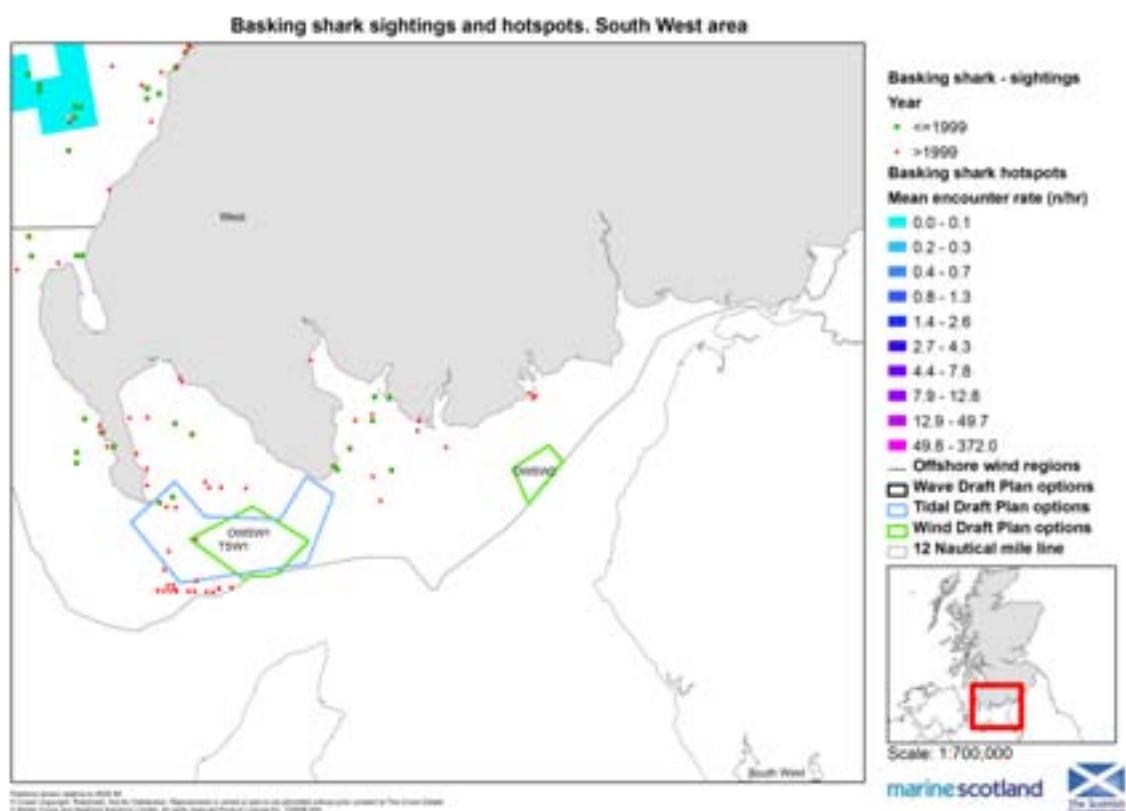
**Figure B1.2.55: Grey Seal At-Sea Usage in the South West (Plan Option Areas)**

<sup>101</sup> SNH (undated) Salmon in the Classroom, Special Areas of Conservation [online] Available at: [http://www.snh.org.uk/salmonintheclassroom/salmon\\_conservation.shtml](http://www.snh.org.uk/salmonintheclassroom/salmon_conservation.shtml) [accessed 08/05/2013]

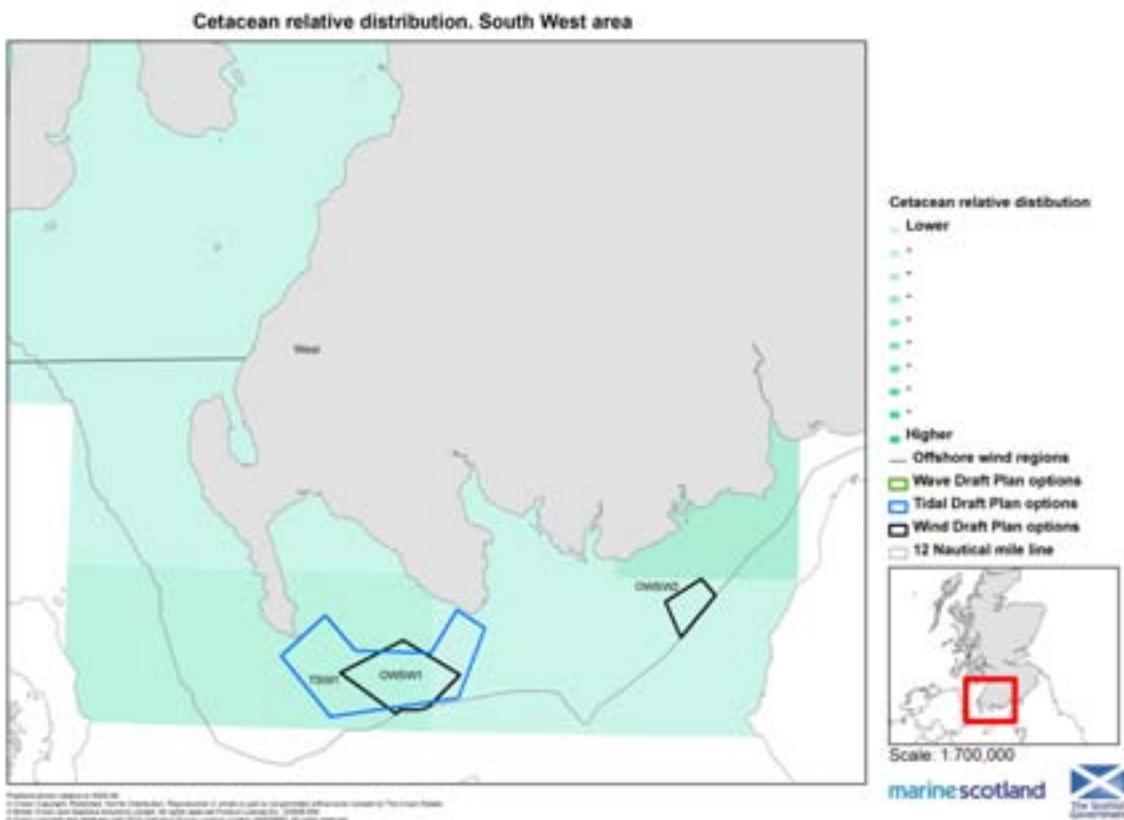
<sup>102</sup> Thorley J.L. (2013) The Potential Influence of Robin Rigg Wind Farm on the Abundance of Adult and Juvenile Atlantic Salmon, A Poisson Consulting Ltd Report prepared for Marine Scotland Science, Pitlochry, Scotland [online] Available at: <http://www.scotland.gov.uk/Resource/0041/00416335.pdf> [accessed 09/05/2013]



**Figure B1.2.56: Harbour Seal At-Sea Usage in the South West (Plan Option Areas)**



**Figure B1.2.57: Basking Shark Sightings and Hotspots in the South West (Plan Option Areas)**



**Figure B1.2.58: Cetacean Relative Distribution in the South West (Plan Option Areas)**

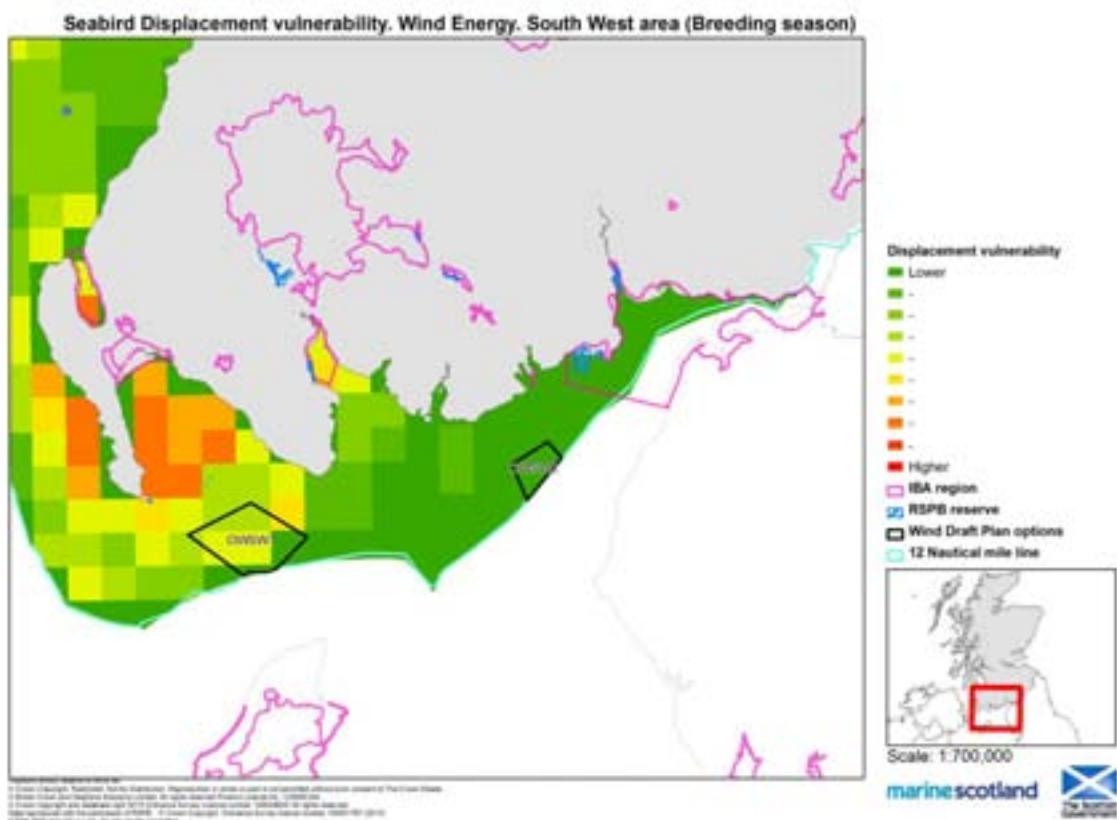
- 1.2.93 The Solway Firth area supports a variety of species of seabirds, particularly during breeding season, reflected in the designation of sites such as the Upper Solway Flats and Marshes, Loch of Inch and Torrs Warren SPA, Rinnis of Islay SPA, and inland areas such as Loch Ken, River Dee Marshes, and Glenapp and the Galloway Moors SPAs. Together, these areas support species such as Greater cormorant, Black headed gull, Common gull, Sandwich tern, Manx shearwater, and, to a lesser degree, Northern gannet, Razorbills, Hen harrier and Geese<sup>103</sup>. Outside the breeding season, species numbers within this area are generally reduced with the exception of Black headed gulls which concentrate their numbers inshore near Luce Bay<sup>104</sup>.
- 1.2.94 IBAs have been identified by Birdlife International at Luce Bay and Loch of Inch and Torrs for their importance for wintering geese. The IBA at Loch Ryan supports important numbers of wintering waterbirds, while others found at Mochrum and Castle Lochs, Wigtown Bay and Upper Solway flats and Marshes, reflect the importance of these areas for wintering wildfowl and waders<sup>105 106</sup>. Figures B1.2.59 to B1.2.64 display displacement and collision vulnerabilities of seabirds within the South West region.

<sup>103</sup> SNH (2013) SNHi, Interactive Map [online] Available at: <http://www.snh.gov.uk/publications-data-and-research/snhi-information-service/map/> [accessed 23/05/2013]

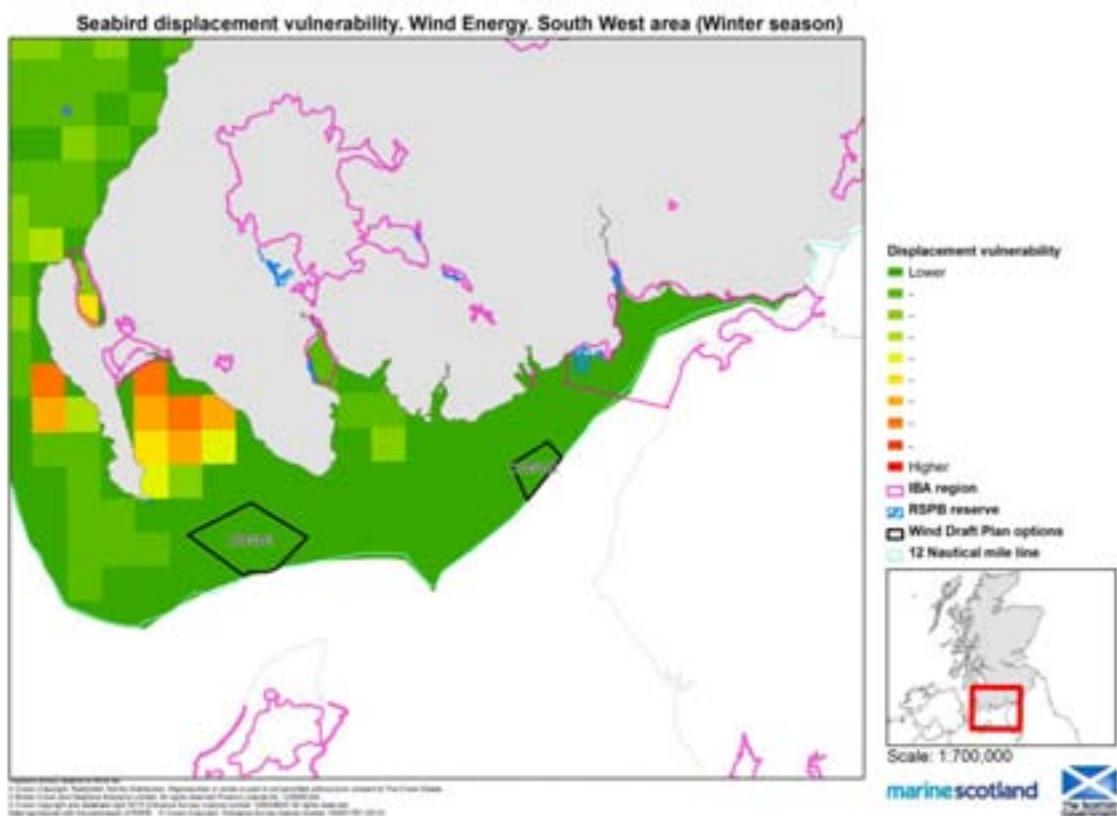
<sup>104</sup> Marine Scotland (2012) Offshore Wind - Regional Locational Guidance [online] Available at: <http://www.scotland.gov.uk/Topics/marine/marineenergy/Planning/windrlg> (accessed 25/03/2013)

<sup>105</sup> BirdLife International (2013) Important Bird Areas factsheet: Wigtown Bay [online] from <http://www.birdlife.org> (accessed 26/03/2013)

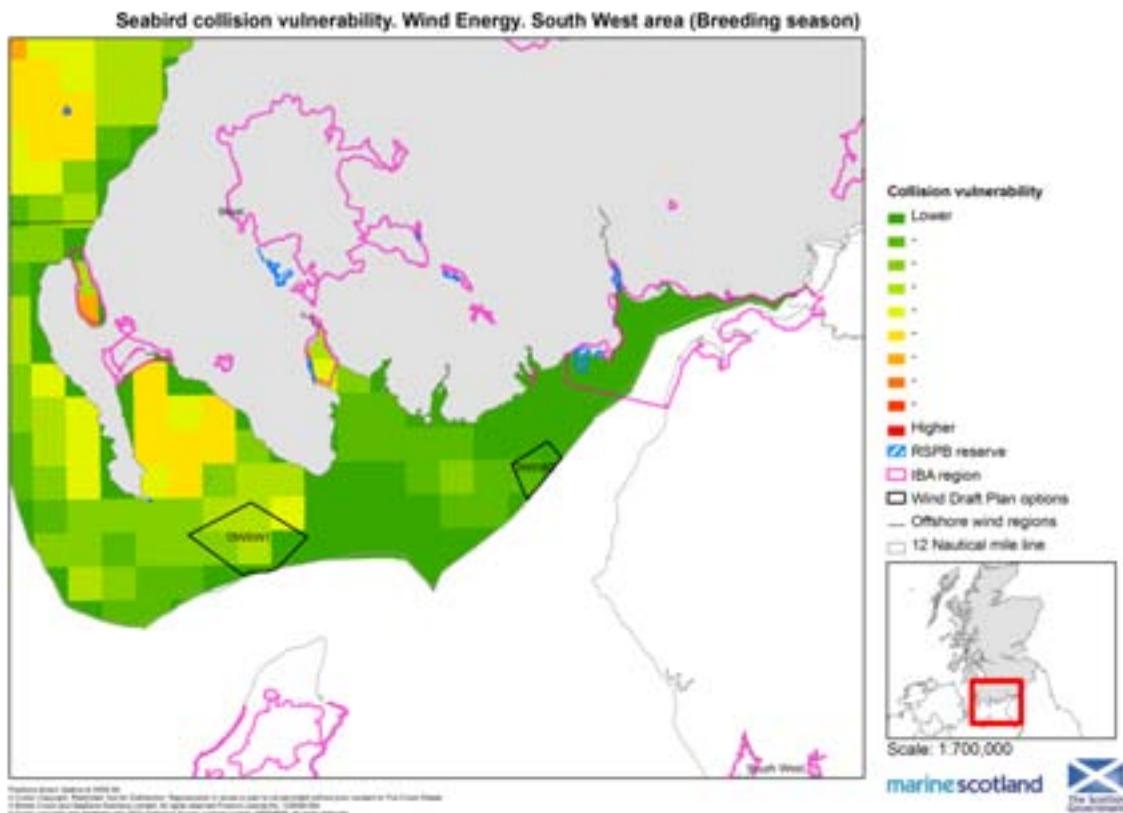
<sup>106</sup> BirdLife International (2013) Important Bird Areas factsheet: Upper Solway Flats and Marshes [online] from <http://www.birdlife.org> (accessed 26/03/2013)



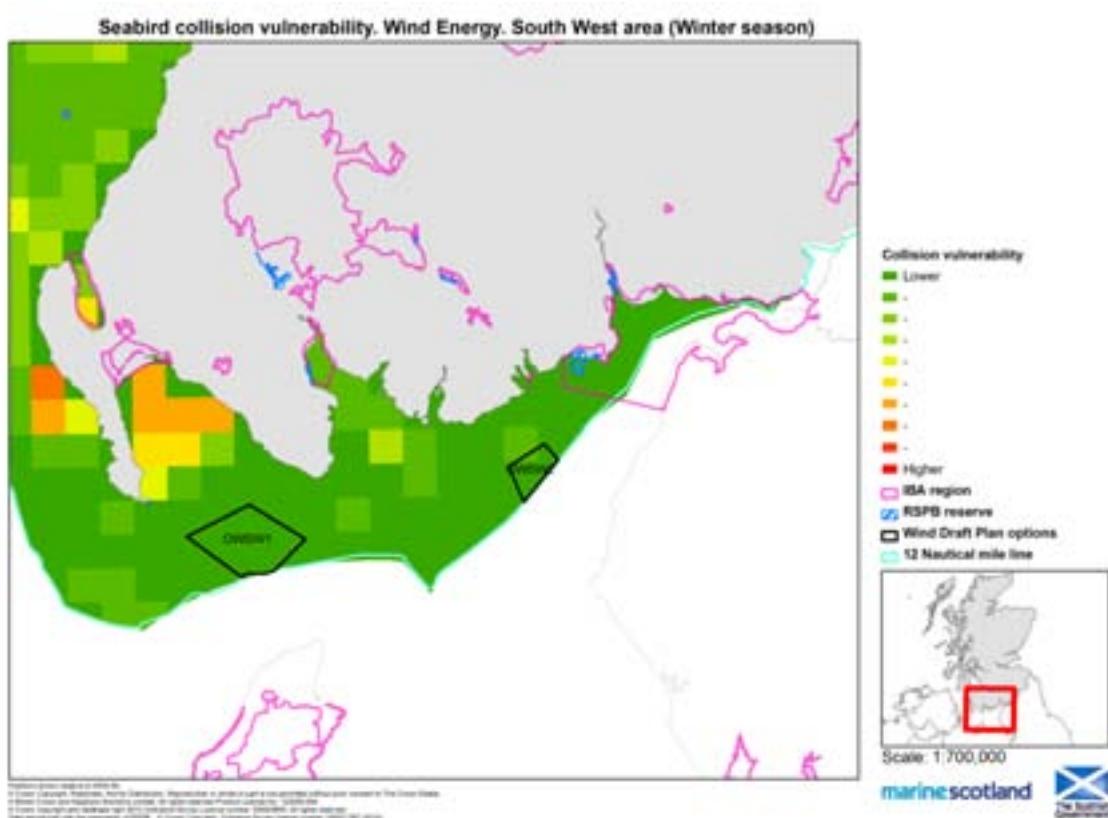
**Figure B1.2.59: Seabird Displacement Vulnerability from Wind Energy in the South West (Breeding Season)**



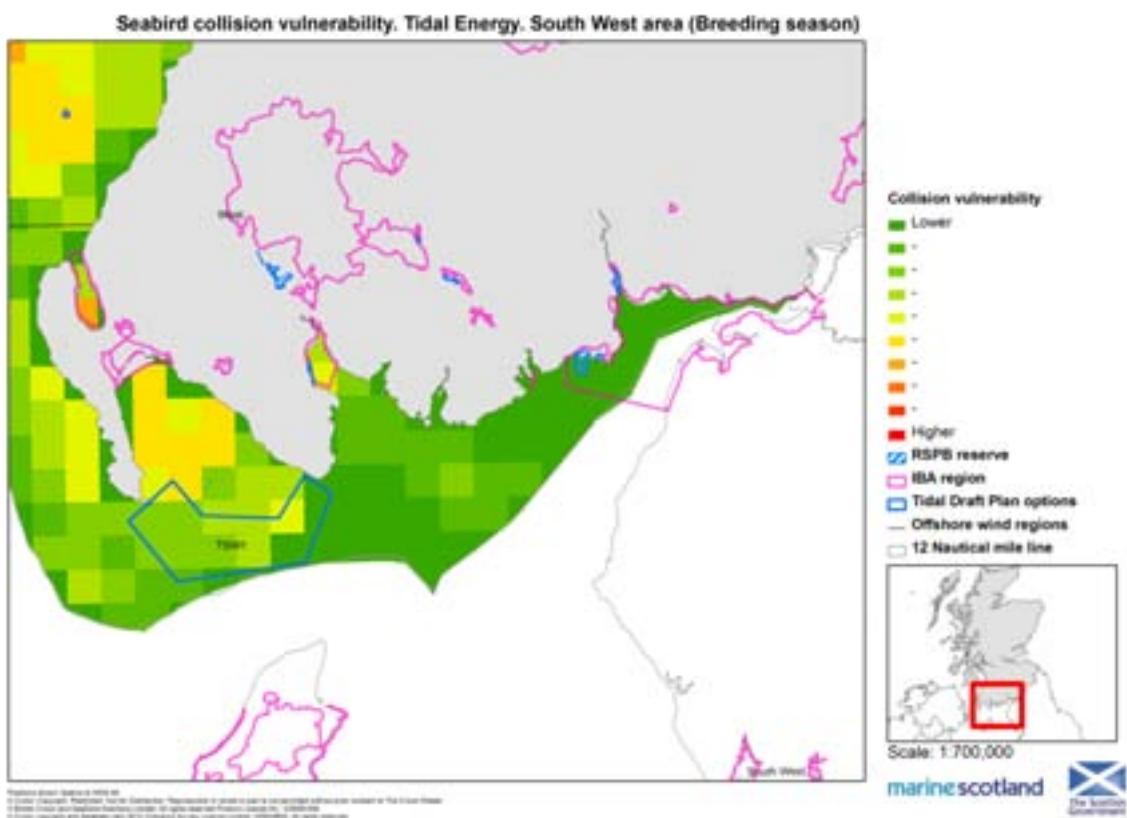
**Figure B1.2.60: Seabird Displacement Vulnerability from Wind Energy in the South West (Winter Season)**



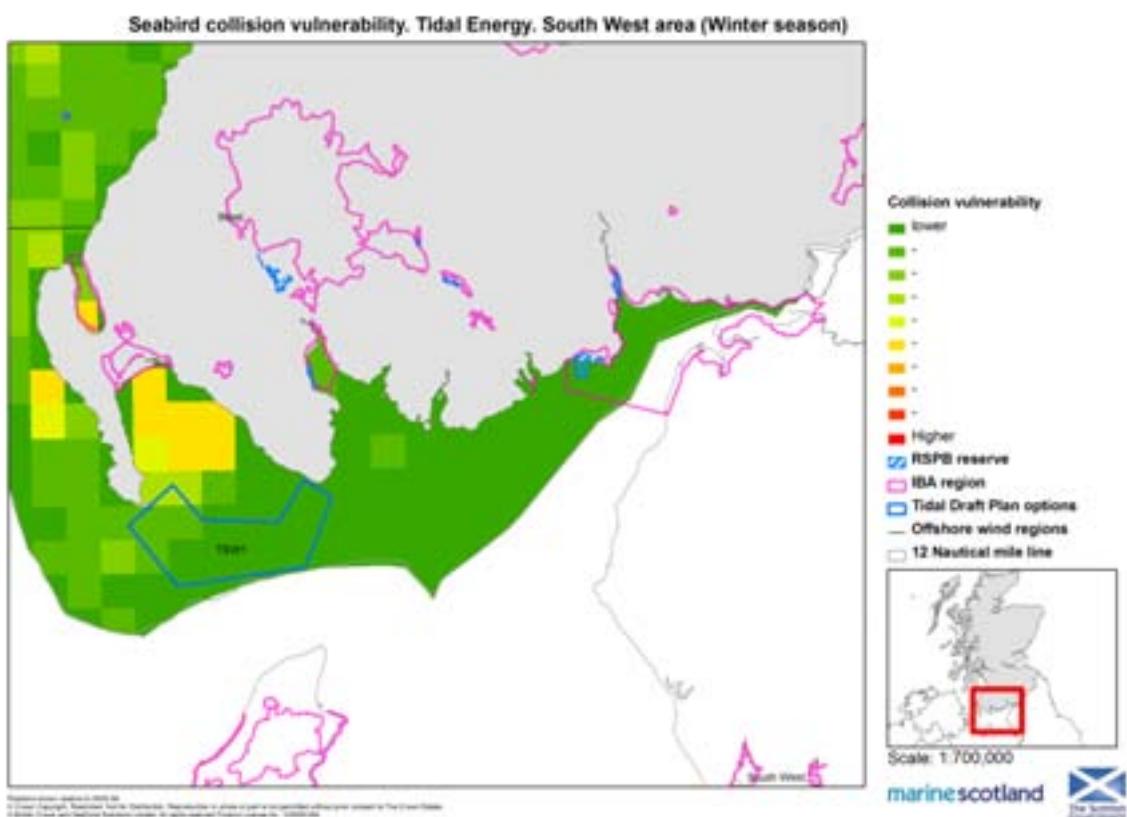
**Figure B1.2.61: Seabird Collision Vulnerability from Wind Energy in the South West (Breeding Season)**



**Figure B1.2.62: Seabird Collision Vulnerability from Wind Energy in the South West (Winter Season)**



**Figure B1.2.63: Seabird Collision Vulnerability from Tidal Energy in the South West (Breeding Season)**



**Figure B1.2.64: Seabird Collision Vulnerability from Tidal Energy in the South West (Winter Season)**

## 1.3 Population and Human Health

### ***Key Issues Summary***

- There is an east – west split in the rural characteristics of coastal communities, with the islands, north and west coast typically having smaller populations coupled with greater distances to services.
- The west coast and island communities typically have a greater reliance on marine core areas as part of the local economy.
- Coastal and marine recreation opportunities can make an important contribution to human health and coastal economies.
- Risks associated with accident and mortality rates in the marine environment could alter with an increase in the number of offshore structures and vessel movements.

### ***National Marine Baseline***

#### Population distribution and change

- 1.3.1 The population of Scotland in 2011 was estimated at 5.295 million people<sup>107</sup>. Coastal communities (within 5 km of the coast) make up around 41% of the total population of Scotland, with 68% of the coastal population living within the ‘developed coast’ consisting of urban areas such as large towns and cities, and 14% living within the ‘undeveloped coast’ consisting of small towns and rural holds with agricultural land<sup>108</sup>. The ‘isolated coast’ is remote and sparsely populated but contains 18% of Scotland’s coastal population<sup>109</sup>. While there are many settlements on the coast, less than 15% of its length has been developed<sup>110</sup>.
- 1.3.2 A positive sense of place is important to people living in many rural and coastal areas, and the importance of the quality of the environment raises concerns that detrimental effects on amenity could lead to decreasing populations and adversely impact on property values and businesses.

#### Employment and Deprivation

- 1.3.3 Neighbourhood statistics data for local authorities with a coastline and the Scottish Index of Multiple Deprivation (SIMD) show that the majority of coastal communities are not included within the lowest percentiles, and appear to suffer less income and employment deprivation than the inner city and urban areas in Scotland’s central belt<sup>111</sup>. The exceptions being clusters of urban

<sup>107</sup> Scotland's Census 2011 (2012) Statistical Bulletin [online] Available at: <http://www.scotlandsensus.gov.uk/en/censusresults/bulletin.html> (accessed 02/04/2013)

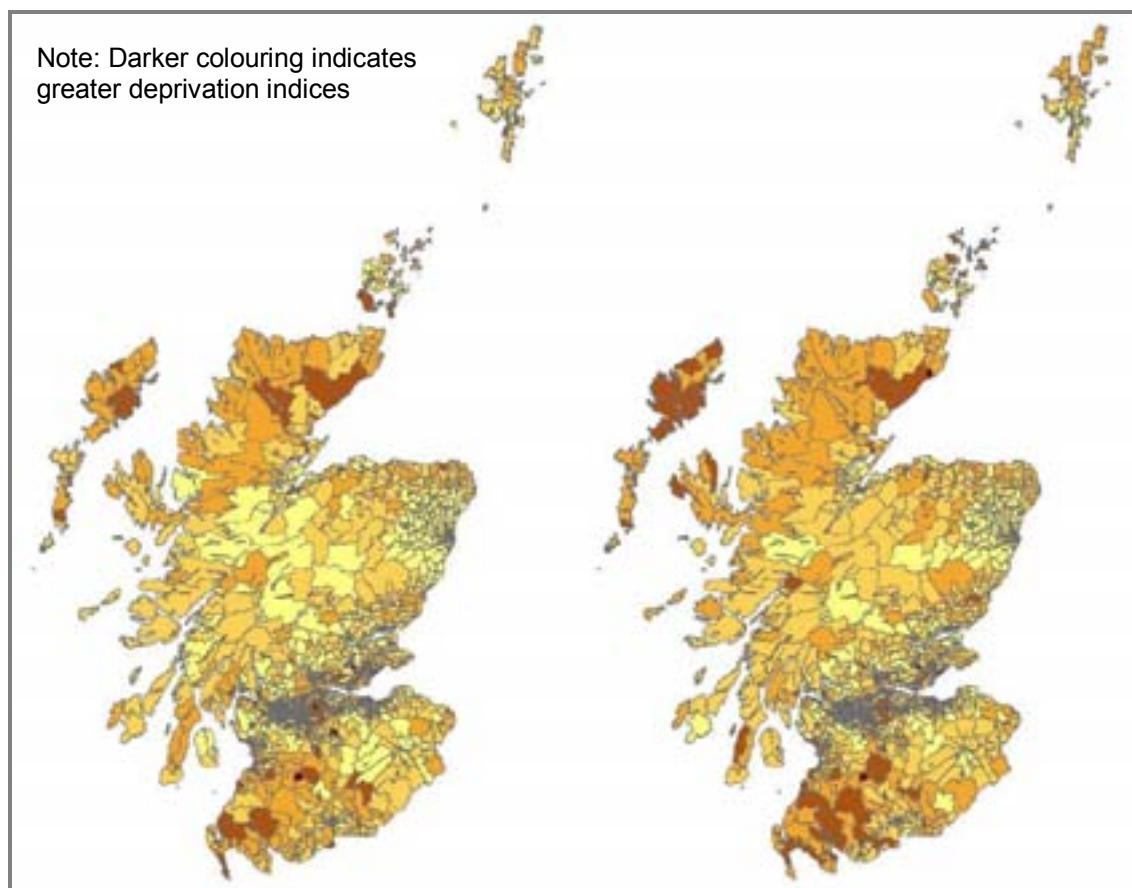
<sup>108</sup> The James Hutton Institute (2010) Scotland's Coastal Assets [online] Available at: [http://www.hutton.ac.uk/sites/default/files/files/publications/hutton\\_coast\\_booklet\\_web.pdf](http://www.hutton.ac.uk/sites/default/files/files/publications/hutton_coast_booklet_web.pdf) (accessed 02/04/2013)

<sup>109</sup> *ibid*

<sup>110</sup> Scottish Government (2008) National Planning Framework 2 [online] Available at: <http://www.scotland.gov.uk/Publications/2008/01/07093039/3> (accessed 02/04/2013)

<sup>111</sup> Scottish Government (2012) Scottish Index of Multiple Deprivation [online] Available at: <http://simd.scotland.gov.uk/publication-2012/> (accessed 28/06/2012)

communities in the South-West around Ayr and Irvine, in the North East around Aberdeen, in Eilean Siar and in some parts of south-west Dumfriesshire.



**Figure B1.3.1: Areas in Scotland ranked according to the Education and Income Domains (darker areas show greater deprivation indices)**

- 1.3.4 Scottish coastal communities play an important economic role, and as detailed in the regional summaries, many areas are economically successful.
- 1.3.5 Employment information indicates that around 1.6% of Scottish employment was in the core marine sector in 2008, and of this, some 31% of employment was in the Fishing, Fish Farming or Fish processing sectors<sup>112</sup>. The industries that contribute to the core marine sector include:
- Construction of water projects;
  - Renting of water transport equipment;
  - Fish farms;
  - Fishing;
  - Processing and preserving of fish and fish products;
  - Sea and coastal water transport and supporting activities;
  - Building and repairing of ships and boats;

<sup>112</sup> Scottish Government (2011) Scotland's Marine Atlas, Information for the national marine plan, Scottish Government

- Service activities incidental to oil and gas extraction excluding surveying; and
- Extraction of crude petroleum and natural gas.

### North East

- 1.3.6 Scottish coastal communities play an important economic role in the North East. Aberdeen and Aberdeenshire are making a transition from reliance on oil and gas, and are applying their energy sector and offshore strengths to the development of renewable and clean energy technologies. Aberdeen Harbour is important in providing support to the offshore industry and in accommodating a growing volume of freight.
- 1.3.7 Peterhead is the North Sea's largest white fish port, and also provides logistical support for the North Sea oil and gas industry whilst handling an increasing number of cruise vessels. The port of Montrose provides import and export services for agricultural and oil related businesses and is a base for oil rig support vessels.

### North

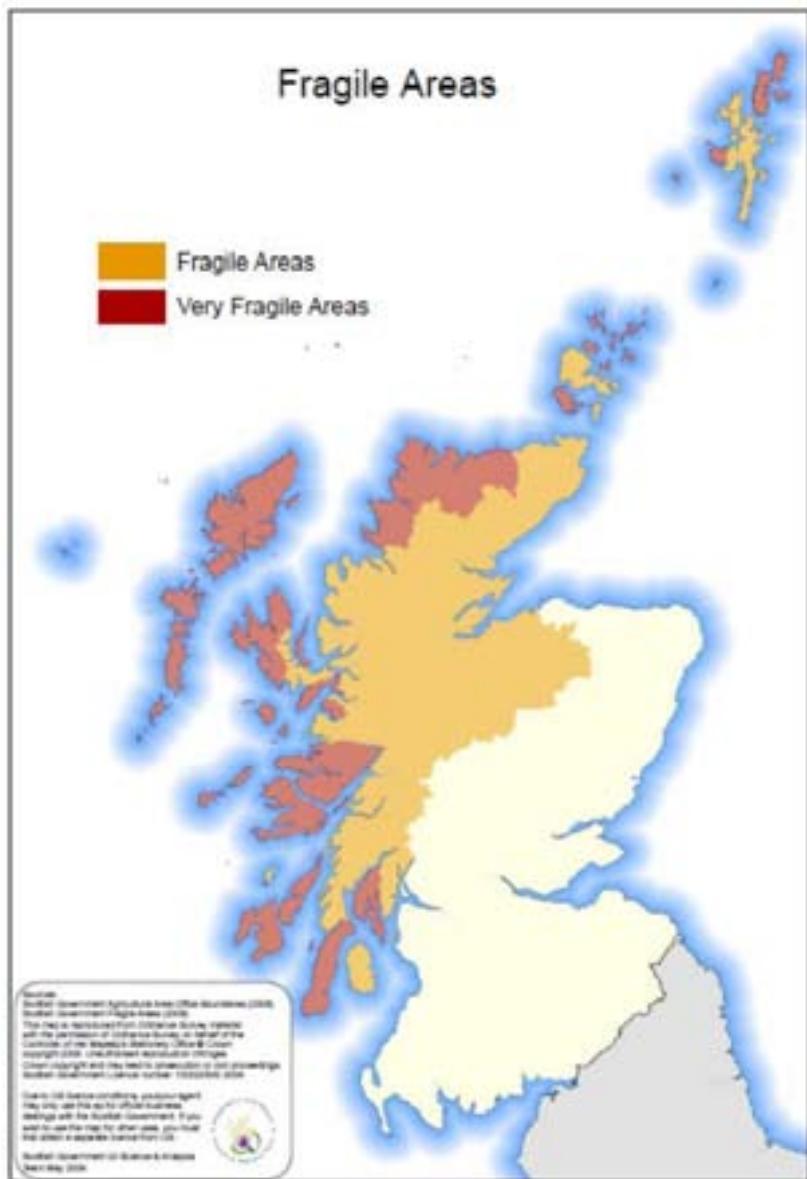
- 1.3.8 The Moray Firth area has experienced substantial growth, while Orkney and Shetland have benefitted from oil and gas related activities.

### North West

- 1.3.9 The expansion of salmon and shellfish farming, tourism, food processing, small-scale manufacturing and service provision has contributed to growth in areas such as Skye, Mull, Arran, Wester Ross, Ardnamurchan and Mid Argyll, underlining the importance of their coastal location and character.

### West and South West

- 1.3.10 Ayrshire and the South West are an important gateway for Scotland, with extensive coastal areas of a rural character. Coastal towns such as Ayr, Troon and Hunterston play an important role as key transport corridors in the region.
- 1.3.11 There are challenges for some coastal and island communities. This includes some of the more remote areas such as Eilean Siar, parts of Caithness and Sutherland and Kintyre, where there has been a continuing decline. Through the Fragile Areas Programme, Highlands and Islands Enterprise (HIE) and local authorities are giving particular attention to the needs of the Outer Hebrides, North Skye, the outlying islands of Orkney and Shetland, the Argyll islands and the remote West mainland. Figure B1.3.2 displays the locations of more fragile areas within these parts of Scotland.



**Figure B1.3.2: Highlands and Islands Enterprise Fragile Areas<sup>113</sup>**

#### Marine Transport and Connectivity

- 1.3.12 Caledonian MacBrayne ferries carried around 5.3 million passengers in 2009, some 4% more than in 2008. Northlink Ferries carried around 309,000 passengers in 2009, equating to around 4% more than in 2008. Orkney Ferries carried 329,000 passengers in 2009, 3% more than in 2008. Shetland Islands Council services carried 637,000 passengers in 2009, an increase of 0.5% on 2008. In 2009, 1.9 million passengers were carried on ferry services between Scotland and Northern Ireland, the busiest Scottish port for this traffic being Stranraer<sup>114</sup>.
- 1.3.13 There are four international airports in Scotland with scheduled services: Edinburgh Airport, Glasgow International Airport, Aberdeen Airport and

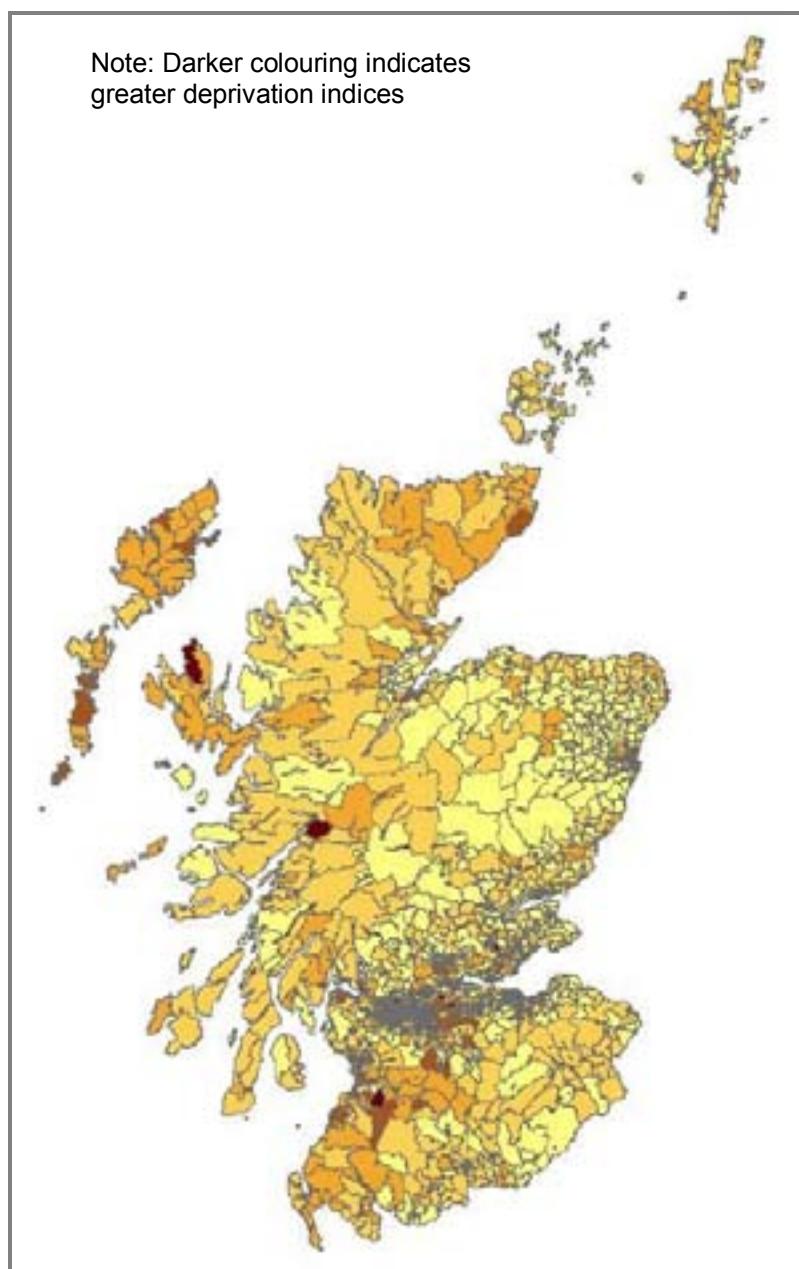
<sup>113</sup> Highland and Islands Enterprise work in Fragile Areas [online] Available at: <http://www.hie.co.uk/about-hie/our-priorities/strengthening-communities-and-fragile-areas/fragile-areas.html> (accessed 04/04/2013)

<sup>114</sup> Transport Scotland Scottish Transport Statistics No. 29 2010 Edition [online] Available at: <http://www.scotland.gov.uk/Resource/Doc/933/0109841.pdf> (accessed 04/04/2013)

Glasgow Prestwick International Airport. Highlands and Islands Airports Limited operate eleven small airports across the Highlands, Orkney, Shetland and the Western Isles (Sumburgh, Kirkwall, Wick, Stornoway, Inverness, Benbecula, Barra, Tiree, Islay, Dundee, and Campbeltown)<sup>115</sup>. However, connectivity remains a key challenge facing Scotland's island communities.

#### Health, wellbeing and deprivation in coastal areas

- 1.3.14 Health SIMD<sup>116</sup> data displayed in Figure B1.3.3 demonstrates that coastal and island communities are mostly ranked within the top 20-100% of all areas in Scotland although there are parts of the north and the Western Isles where health conditions appear to be in or moving towards the lower percentiles.



**Figure B1.3.3: Areas in Scotland ranked according to Health Domain**

<sup>115</sup> Highlands and Islands Airports (undated) [online] Available at: <http://www.hial.co.uk/> (accessed 04/04/2013)

<sup>116</sup> Scottish Government (2012) Scottish Index of Multiple Deprivation [online] Available at: <http://www.scotland.gov.uk/Topics/Statistics/SIMD/> (accessed 04/04/2013)

1.3.15 Research has identified that coastal zones are less likely to be deprived than inland areas<sup>117</sup> with just 6% of these areas in the East Region falling into the most deprived percentile (compared with 12% of all data zones), 0% in South West (compared with 3% of all data zones) and 11% in West Region (compared with 15% of all data zones). The North East had just 2% (compared with 15% of all data zones), the West Region just 1% (compared with 9% of all data zones), and the South West 0% (compared with 1% in all data zones).

### Recreation

1.3.16 Marine and coastal recreation forms a valuable and growing industry for Scotland, and encompasses a wide range of activities. The Marine Atlas<sup>118</sup> and draft Regional Locational Guidance for Wind, Wave and Tidal Energy<sup>119</sup> provide detail on the types and extents of these activities, and these are summarised below:

- Bathing is undertaken mainly in the south-west, east, north-east and northern parts of the Scottish mainland.
- Recreational boating takes place throughout Scotland but is concentrated in the Clyde and along the West Coast, the Moray Firth, Solway Firth and the Firths of Tay and Forth. Recent developments along the East Coast, and within the Orkney and Shetland Isles, have increased the potential for cruising routes between the Caledonian Canal and the Shetlands with well-placed facilities and stopping points en route.
- Surfing is focused around the far North coast of Scotland (particularly around Thurso), the North coast from Buckie to Fraserburgh and locations down the East coast including Fife, and from North Berwick to the border. Other locations include the Kintyre peninsula, Islay, Tiree, the Western Isles (particularly the West coast of Lewis) and the North coast of Orkney.
- 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 Voluntary Marine Reserve of St Abbs and Eyemouth off the Berwickshire coastline. The islands of the Inner Hebrides, the Firth of Forth coast, and the East coast from the north of Dundee to the Dornoch Firth contain popular diving destinations.
- The majority of sea kayaking and canoeing is undertaken close to shore, exploring interesting aspects of the coast such as sea caves, inlets and wildlife. Popular kayaking areas include the Inner Hebrides, East Grampian Coast, Firth of Clyde and Firth of Forth, with areas around Arisaig, Knoydart, Sound of Sleat, Argyll Islands, Oban to Fort William and the Clyde particularly popular locations.
- Recreational sea angling is carried out from most regions of the Scottish coastline, with a wide range of species caught depending on the region

<sup>117</sup> ABPMer (2012) Socio-economic baseline Reviews for Offshore Renewables in Scottish Waters, Marine Scotland

<sup>118</sup> Scottish Government (2011) Scotland's Marine Atlas, Information for the national marine plan, Scottish Government , pg 152-155

<sup>119</sup> Marine Scotland (2012) Regional Locational Guidance [online] Available at:

<http://www.scotland.gov.uk/Topics/marine/marineenergy/Planning/> (accessed 04/04/2013)

and the time of year. The highest densities of anglers are found in the more heavily populated areas of the coast around Glasgow, Clyde, Edinburgh and Fife. However, launch points are concentrated along the Argyll Coast and Islands, Solway Firth, Firth of Clyde, Firth of Tay, North Coast, and East Grampian Coast.

- Coastal and marine wildlife tourism, involving onshore activities such as bird and seal-watching, and offshore activities involving marine wildlife tourism specialist operators who provide access to areas for certain marine species (e.g. cetaceans, dolphins, Basking sharks and seals).

### Risks to Human Health

- 1.3.17 While there are controls on marine disposals and the designation of specific locations for disposals in the marine environment, a variety of sites have been used historically for this purpose. Historic disposal sites, used for the disposal of radioactive substances, industry waste and sewage sludge, could release potentially hazardous material which may impact upon the surrounding environment and have associated adverse impacts on human health if disturbed<sup>120</sup>.
- 1.3.18 The EC Bathing Water Directive seeks to preserve, protect and improve the quality of the environment and to protect human health<sup>121</sup>. Microbiological regulation and monitoring is driven by the risk to public health from pathogens in water, and bathing water quality is assessed in Scotland through the presence of total and faecal coliforms and faecal streptococci. If swallowed in sufficient quantities these can cause stomach upsets and ear infections<sup>122</sup>. In a similar way, the quality of shellfish water is assessed based on the presence of faecal coliforms (i.e. E. coli. content) in shellfish flesh. Potential sources of contamination in this respect are difficult to distinguish, but improvements to these waters is currently being addressed by Scottish Water and River Basin Management Planning to improve sewage effluent treatment, reduce storm overflows and preventing animal faeces from entering the water environment<sup>123</sup>. These issues are considered in greater detail under the environmental topic of water.
- 1.3.19 Some 407 water related fatalities that occurred in marine and inland waters in the UK in 2011, excluding suicides, crimes and unrecorded incidents. Of these, 79 incidents occurred in coastal, shore or beach areas, 41 at sea, 30 in lochs, 26 in ports or harbours, with the remainder in inland areas (i.e. baths, rivers, etc.). Excluding figures for inland areas, 38 of these incidents related to sailing or boating, 11 related to angling, 21 related to swimming, and just three to surfing activities<sup>124</sup>.

<sup>120</sup> Defra (2010) Charting Progress 2 [online] Available at:

[http://chartingprogress.defra.gov.uk/feeder/Section\\_3.16\\_Waste\\_Disposal.pdf](http://chartingprogress.defra.gov.uk/feeder/Section_3.16_Waste_Disposal.pdf) (accessed 04/04/2013)

<sup>121</sup> European Commission (2006) The 2006 Bathing Water Directive [online] Available at:

[http://ec.europa.eu/environment/water/water-bathing/index\\_en.html](http://ec.europa.eu/environment/water/water-bathing/index_en.html) (accessed 04/04/2013)

<sup>122</sup> Scottish Government (2011) Scotland's Marine Atlas, Information for the national marine plan, Scottish Government pg 56

<sup>123</sup> *ibid*

<sup>124</sup> National Water Safety Forum (2013) UK Water Related Fatalities 2011 – WAID Database Report [online] Available at:

[http://www.nationalwatersafety.org.uk/waid/info/waid\\_fatalincidentreport\\_2011.pdf](http://www.nationalwatersafety.org.uk/waid/info/waid_fatalincidentreport_2011.pdf) (accessed 10/05/2013)

- 1.3.20 Despite Scotland's large marine areas, the high-level of use of the marine environment has proven to be potentially hazardous. Marine Accident Investigation Branch (MAIB) incident report figures indicate that a total of five collisions<sup>125</sup> and 10 groundings<sup>126</sup> have been reported for all vessels in Scottish waters since 2005, largely occurring in the Inner Hebridean Isles, Aberdeen Harbour and the Firth of Clyde. Of these, four collisions and eight groundings involved merchant vessels, one of each involved ferries, and one grounding involved a leisure craft.
- 1.3.21 There were seven fatalities on UK-registered merchant and fishing vessels and five fatalities on leisure craft in Scottish waters in 2011. While a further eight fatalities were recorded on foreign-registered dry-cargo vessels in UK waters in 2011, it is not known if any occurred within Scottish waters as there is currently no requirement for non-UK flagged vessels to report accidents outside of ports and harbours to the MAIB<sup>127</sup>.
- 1.3.22 A study of shipping routes and the potential for collision was undertaken as part of the SEA of Marine Renewables<sup>128</sup>. The study used recorded automatic identification system (AIS) data undertaken over a two-week span in January 2006<sup>129</sup>, and concluded that close quarter events (described as vessels travelling within 500m range of one another) are a common occurrence between vessels in Scottish waters, particularly along narrow waterways and near to or on approach to ports and harbours. Most of these occurrences involved vessels on common routes, vessels running beside one another, or tug or pilot boats near to port. None were classified as a 'near miss' or a potential collision.

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<sup>125</sup> MAIB (2011) Reports by Incident – Collision/Contact, [online] Available at:

[http://www.maib.gov.uk/publications/investigation\\_reports/reports\\_by\\_incident/collision\\_contact.cfm](http://www.maib.gov.uk/publications/investigation_reports/reports_by_incident/collision_contact.cfm) [accessed 10/05/2013]

<sup>126</sup> MAIB (2011) Reports by Incident – Grounding, [online] Available at:

[http://www.maib.gov.uk/publications/investigation\\_reports/reports\\_by\\_incident/grounding.cfm](http://www.maib.gov.uk/publications/investigation_reports/reports_by_incident/grounding.cfm) [accessed 10/05/2013]

<sup>127</sup> MAIB (2012) Annual report 2011 [online] Available at:

[http://www.maib.gov.uk/cms\\_resources.cfm?file=/MAIB\\_Annual\\_Report\\_2011.pdf](http://www.maib.gov.uk/cms_resources.cfm?file=/MAIB_Annual_Report_2011.pdf) [accessed 09/05/2013]

<sup>128</sup> Faber Maunsell (2007) Scottish Marine Renewables: Environmental Report [online] Available at:

<http://www.scotland.gov.uk/Resource/Doc/1086/0048531.pdf> [accessed 09/05/2013].

<sup>129</sup> Marine and Risk Consultants Ltd (2007) The Provision of Additional Studies in Relation to the Scottish Executive Strategic Environmental Assessment for Marine Renewables – Study 3: Shipping and Navigation, Prepared for the Scottish Executive, Published 27 February 2007, [online] Available at: <http://www.scotland.gov.uk/Resource/Doc/1086/0048990.pdf> [accessed 09/05/2013].

## 1.4 Water

### ***Key Issues Summary***

- Contamination of the water environment as a result of marine activities such as the use of anti-fouling paint, pollution from oil spillage and sewage.
- Although coastal waters are generally of good or better status under the Water Framework Directive, poorer water quality is found in areas such as the Firth of Forth and Firth of Clyde.
- Pollution of coastal waters resulting from activities on land, in particular from agricultural activities.
- Polluted water impacts on habitats and species, tourism and aquaculture (particularly shellfish), all of which require high water quality.
- Coastal and marine litter impacts on biodiversity and other marine activities.

### ***National Marine Baseline***

- 1.4.1 Scotland's marine water resources support important industries including fishing, oil and gas industry and renewable power generation. In very simple terms the offshore and coastal water residual movement is northwards on the west coast (the Scottish Coastal Current) and southerly in the North Sea as a result of the inflow of mixed coastal and oceanic water of the Fair Isle Current<sup>130</sup>.
- 1.4.2 The tidal range varies around the Scottish coastline with a low tidal range at Shetland and off Kintyre and high tidal ranges at the heads of the Firths (e.g. up to 7m in the Solway Firth). Tidal currents can be strong and intensified in localised areas, often where the flow is constrained by topography or in constricted bedrock channels (e.g. between Orkney and Shetland, the Pentland Firth and off the Mull of Kintyre)<sup>131</sup>.
- 1.4.3 Benthic marine habitats include all biological communities associated with the sea floor, from the top of the intertidal zone and inner reaches of estuaries down to the deep sea. These habitats are considered under the topic of biodiversity.

### **Water Quality and Ecological Status**

- 1.4.4 There are a number of mechanisms in place for monitoring and managing the quality of our waters:
- The Water Framework Directive (WFD) establishes a framework for the protection of inland surface waters (rivers and lakes), transitional waters

<sup>130</sup> Marine Scotland (2012) Regional Locational Guidance [online] Available at: <http://www.scotland.gov.uk/Topics/marine/marineenergy/Planning/> (accessed 04/04/2013)

<sup>131</sup> *ibid*

(estuaries), coastal waters and groundwater, with the aim of ensuring all aquatic ecosystems meet 'good status' by 2015<sup>132</sup>;

- River Basin Management Plans (RBMP) have been prepared for the Scotland and Solway-Tweed River Basin Districts (RBD) to address the requirements of the Directive in relation to the management of Scotland's river systems. Both plans also provide an overview of the state of the water environment for their districts<sup>133</sup>. SEPA are now in the process of developing the second RBMPs for completion in 2015.

- 1.4.5 Scotland's coastal and transitional waters (see Figure B1.4.1) are monitored by SEPA to measure performance and compliance with targets for coastal water quality status under the WFD. In all, 63% of Scotland's water bodies were at good or better status in 2010. Of these, some 96% of coastal waters, 86% of estuaries and 54% of sea lochs and freshwater lochs were classed as in 'good' or 'better' condition in 2010<sup>134</sup>.
- 1.4.6 While 96% of coastal waters in Scotland were classified as excellent or good condition, some 95% were reported as having achieved an improvement in condition<sup>135</sup>. However, some coastal water bodies and a particularly high proportion of transitional waterbodies<sup>136</sup> (76%) remain at risk of not meeting the objectives of the WFD by 2015.

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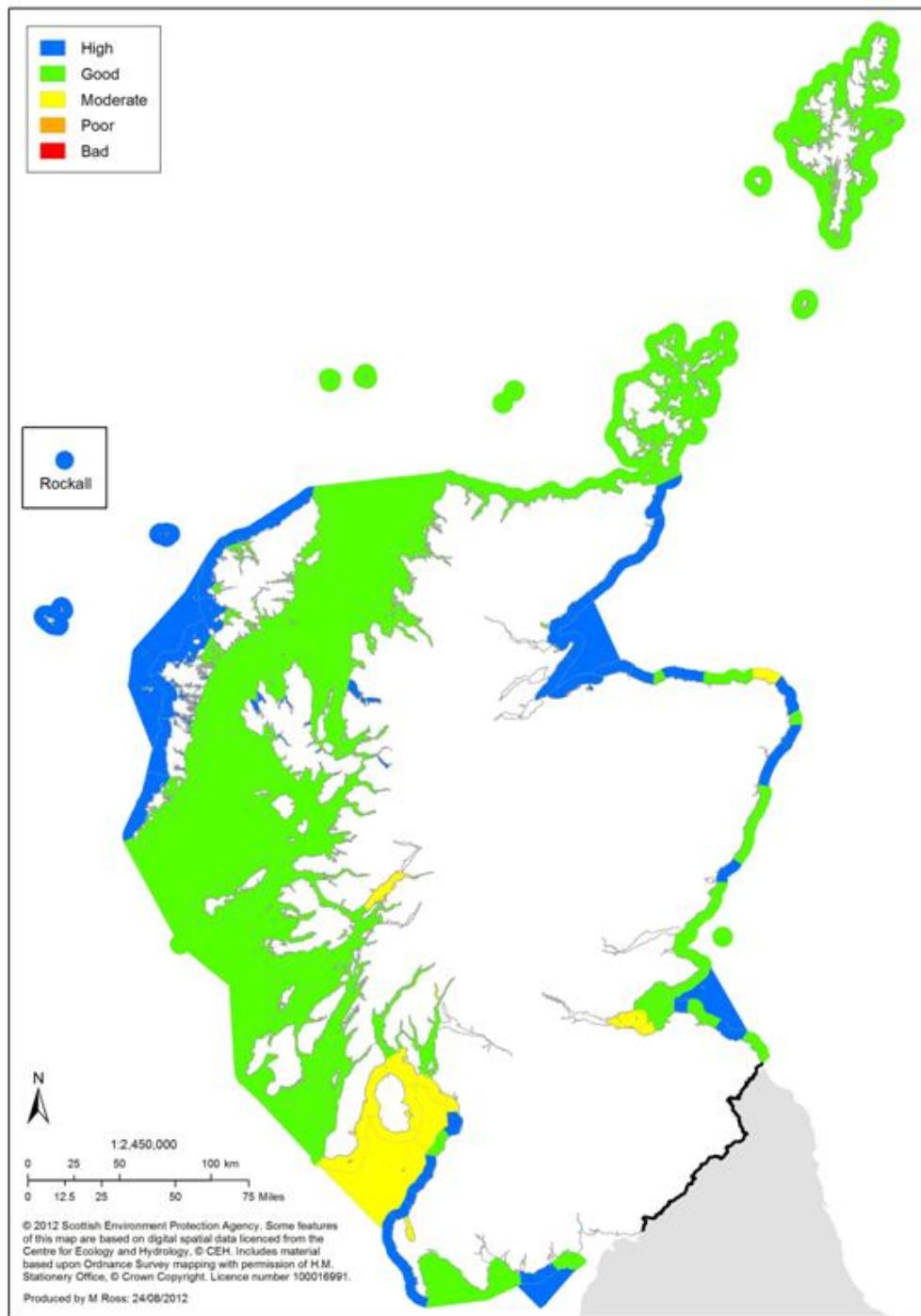
<sup>132</sup> European Commission (2011) EU Water Legislation and the Water Management Directive, [online] Available at: [http://ec.europa.eu/environment/water/participation/notes\\_en.htm](http://ec.europa.eu/environment/water/participation/notes_en.htm) (accessed 04/04/2013)

<sup>133</sup> SEPA (2009) River Basin Management Plans [online] Available at : [http://www.sepa.org.uk/water/river\\_basin\\_planning.aspx](http://www.sepa.org.uk/water/river_basin_planning.aspx) (accessed 04/04/2013)

<sup>134</sup> Scottish Government (2011) Implementation of the Water Environment and Water Services (Scotland) Act 2003 and the Flood Risk Management (Scotland) Act 2009: Annual Report to the Scottish Parliament – 2011, [online] Available at: <http://www.scotland.gov.uk/Publications/2012/08/2854> (accessed 04/04/2013)

<sup>135</sup> SEPA (2011) Water Classification Report 2007 - 2010. [online] Available at: [http://www.sepa.org.uk/water/monitoring\\_and\\_classification/classification.aspx](http://www.sepa.org.uk/water/monitoring_and_classification/classification.aspx) (accessed 04/04/2013)

<sup>136</sup> Defined as extending out to 3 nautical miles for the purposes of the WFD



**Figure B1.4.1: Coastal and Transitional Waters Classification 2011<sup>137</sup>**  
Shellfish Waters

- 1.4.7 In 2012, some 80 coastal water areas in Scotland have been designated “shellfish growing waters” under the EU Shellfish Waters Directive (2006/113/EEC)<sup>138</sup> (see Figure B1.4.2). These areas are predominantly located on the west coast of the Scottish mainland and the Northern and Western

<sup>137</sup> Scotland's Environment (2011) Description of Coastal Waters [online] Available at: [http://www.environment.scotland.gov.uk/our\\_environment/water/coastal\\_waters/description.aspx](http://www.environment.scotland.gov.uk/our_environment/water/coastal_waters/description.aspx) [accessed 08/05/2013]

<sup>138</sup> SEPA (2010) Regulation of Designated Shellfish Waters [online] Available at: [http://www.sepa.org.uk/water/protected\\_areas/shellfish\\_waters/regulation.aspx](http://www.sepa.org.uk/water/protected_areas/shellfish_waters/regulation.aspx) [accessed 08/05/2013]

Isles<sup>139</sup>. In 2010, water quality monitoring undertaken by SEPA indicated that all designated sites (i.e. all 78 sites that were designated as “shellfish growing waters” in 2009) met the minimum environmental quality standards (the ‘mandatory’ standard) set by the Directive, although just 69% of shellfish waters were found to have achieved the more stringent guideline quality standard (the ‘guideline’ standard)<sup>140</sup>. While most designated sites met the stricter guideline values for physical and chemical parameters, exceedances of the stricter bacteriological guideline value were recorded at over a quarter of these sites<sup>141</sup>.

### Potential Contamination Sources

- 1.4.8 Potential sources of pollution of the water environment and the pollutants entering the water environment can be varied, with most likely to be localised and site specific. These can include shipping and boating (e.g. the use of anti-fouling tributyltin and copper paints<sup>142</sup>, and other synthetic substances<sup>143</sup>); oil discharges from incidents, collisions or the release of ballast water<sup>144</sup>; introduced non-native species from ballast or vessel hulls<sup>145</sup>; discrete and diffuse terrestrial sources (e.g. natural weathering, industrial discharges and agriculture<sup>146</sup>), atmospheric sources (e.g. chemical contaminants and dust<sup>147</sup>); marine and beach litter including public litter, sewage related debris, fishing and shipping litter<sup>148</sup>; radioactive contamination (e.g. naturally occurring radioactive material (NORM), wastes<sup>149</sup> and accidental releases<sup>150</sup>); and munitions contamination and military waste<sup>151</sup>.
- 1.4.9 The effects of climate change have the potential to exacerbate impacts from other sources by reducing the ability of the water environment to safely absorb and break down pollution. The likelihood of reduced summer rainfall may mean less water is available in rivers and inland waters for diluting pollutants during these periods<sup>152</sup>. Conversely, expected higher annual river flows, particularly during winter months, may help dilute pollutant discharges to rivers while increasing the quantity of pollutants reaching coastal and marine waters.

<sup>139</sup> Scottish Government (2012) Shellfish Waters – Overview Map [online] Available at: <http://www.scotland.gov.uk/Resource/0039/00394923.pdf> [accessed 08/05/2013]

<sup>140</sup> SEPA (2010) Designated Shellfish Waters in Scotland [online] Available at:

[http://www.sepa.org.uk/water/protected\\_areas/shellfish\\_waters.aspx](http://www.sepa.org.uk/water/protected_areas/shellfish_waters.aspx) [accessed 08/05/2013]

<sup>141</sup> SEPA (2010) Regulation of Designated Shellfish Waters [online] Available at:

[http://www.sepa.org.uk/water/protected\\_areas/shellfish\\_waters/regulation.aspx](http://www.sepa.org.uk/water/protected_areas/shellfish_waters/regulation.aspx) [accessed 08/05/2013]

<sup>142</sup> OSPAR Commission (2010) Quality Status Report 2010 – Assessment of the Impact of Shipping on the Marine Environment [online] Available at: [http://qsr2010.ospar.org/media/assessments/p00440\\_supplements/p00440\\_suppl\\_5\\_release\\_of\\_anti-fouling\\_chemicals.pdf](http://qsr2010.ospar.org/media/assessments/p00440_supplements/p00440_suppl_5_release_of_anti-fouling_chemicals.pdf) (accessed 04/04/2013)

<sup>143</sup> Scottish Government (2011) Scotland’s Marine Atlas, Information for the national marine plan, Scottish Government pg 182

<sup>144</sup> Advisory Committee on Protection of the Sea (ACOPS) Annual survey of Reported Discharges attributed to vessels and offshore oil and gas installations operation in the United Kingdom Pollution Control Zone 2010 [online] Available at:

<http://www.acops.org.uk/documents/annual-marine-pollution-survey-2010.pdf> (accessed 04/04/2013)

<sup>145</sup> Scottish Government (2011) Scotland’s Marine Atlas, Information for the national marine plan, Scottish Government pg 138

<sup>146</sup> Marine Scotland (2011) Scotland’s Marine Atlas: Information for the National Marine, Scottish Government pg 138

<sup>147</sup> Marine Scotland (2012) Clean Seas [online] Available at: <http://www.scotland.gov.uk/Topics/marine/marine-environment/cleanseas> (accessed 04/04/2013)

<sup>148</sup> Scottish Government (2011) Scotland’s Marine Atlas, Information for the national marine plan, Scottish Government pg 066

<sup>149</sup> Defra (2010) Charting Progress 2 [online] Available at:

[http://chartingprogress.defra.gov.uk/feeder/Section\\_3.16\\_Waste\\_Disposal.pdf](http://chartingprogress.defra.gov.uk/feeder/Section_3.16_Waste_Disposal.pdf) (accessed 04/04/2013)

<sup>150</sup> Marine Scotland (2008) Scotland’s Seas: Towards Understanding their State [online] Available at:

<http://www.scotland.gov.uk/Publications/2008/04/03093608/15> (accessed 04/04/2013)

<sup>151</sup> OSPAR (2010) Quality Status Report 2010: Assessment of the impact of dumped conventional and chemical munitions [online] Available at: [http://qsr2010.ospar.org/media/assessments/p00365\\_supplements/p00365\\_suppl\\_1\\_concerns.pdf](http://qsr2010.ospar.org/media/assessments/p00365_supplements/p00365_suppl_1_concerns.pdf) (accessed 04/04/2013)

<sup>152</sup> DEFRA (2012) UK Climate Change Risk Assessment (CCRA) [online] Available at:

<http://www.defra.gov.uk/environment/climate/government/risk-assessment/#report> (accessed 04/04/2013)

## Shellfish Water Designations 2012

|                                       |                                |                             |
|---------------------------------------|--------------------------------|-----------------------------|
| 1. Ardhow and Loch Cuanan Traigh      | 29. Loch Alport                | 57. Loch Brizort            |
| 2. Aghornach Gruinart                 | 30. Loch Beag                  | 58. Loch Sperve             |
| 3. Bay of Yell                        | 31. Loch Brey                  | 59. Loch Shinne             |
| 4. Baile Voe, Yell                    | 32. Loch Creven                | 60. Louis West Loch Tarbert |
| 5. Bay of Firth                       | 33. Loch Elv                   | 61. Lunn                    |
| 6. Broadford Bay and Kyle Area        | 34. Loch Elshort               | 62. Lynn of Lom             |
| 7. Cale - Shetland, Einst Bay         | 35. Loch Erboll                | 63. Mid Yell Voe            |
| 8. Cat Firth                          | 36. Loch Eltive                | 64. Ronas Voe               |
| 9. Cliff Sound                        | 37. Loch Eve                   | 65. Sandeckound Voe         |
| 10. Colonsay                          | 38. Loch Fyne Coastal Strip    | 66. Scavaig Ayre, Deasa Voe |
| 11. Cromarty Bay                      | 39. Loch Glendhu               | 67. Seil Sound              |
| 12. Dales Voe                         | 40. Loch Grumart               | 68. Seil, Ardencaple        |
| 13. Dornoch Firth                     | 41. Loch Harport               | 69. Sound of Kerness        |
| 14. East of Burki Teling and Aith Voe | 42. Loch Inshad                | 70. South Wick, Culloce     |
| 15. Fair Isle                         | 43. Loch Kishorn               | 71. Stromness Voe           |
| 16. Fife Ness to Elie                 | 44. Loch Laxford               | 72. Sulina Voe              |
| 17. Gruining Voe                      | 45. Loch Leurbeit Outer        | 73. Tobremory               |
| 18. Hawkness                          | 46. Loch Lewin                 | 74. Upper Loch Torridon     |
| 19. Inner Loch Laurbost               | 47. Loch Long                  | 75. Uyea Sound              |
| 20. Inner West Loch Tarbert           | 48. Loch Melfort               | 76. Vella Sound             |
| 21. Isle of Ulva, Mull (Loch Tuath)   | 49. Loch Modert, South Channel | 77. Voe of Clouston         |
| 22. Kerness                           | 50. Loch Nevis                 | 78. Weddabster Voe          |
| 23. Kyle of Tongue                    | 51. Loch Roag                  | 79. Weddabster Voe          |
| 24. Kyle of Bute                      | 52. Loch Ryan                  | 80. Whalé Firth             |
| 25. Lismore                           | 53. Loch Sodain                |                             |
| 26. Little Loch Broom                 | 54. Loch Sweenish              |                             |
| 27. Loch a' Chumhainn                 | 55. Loch Spypin                |                             |
| 28. Loch Alort                        | 56. Loch Stigachan             |                             |

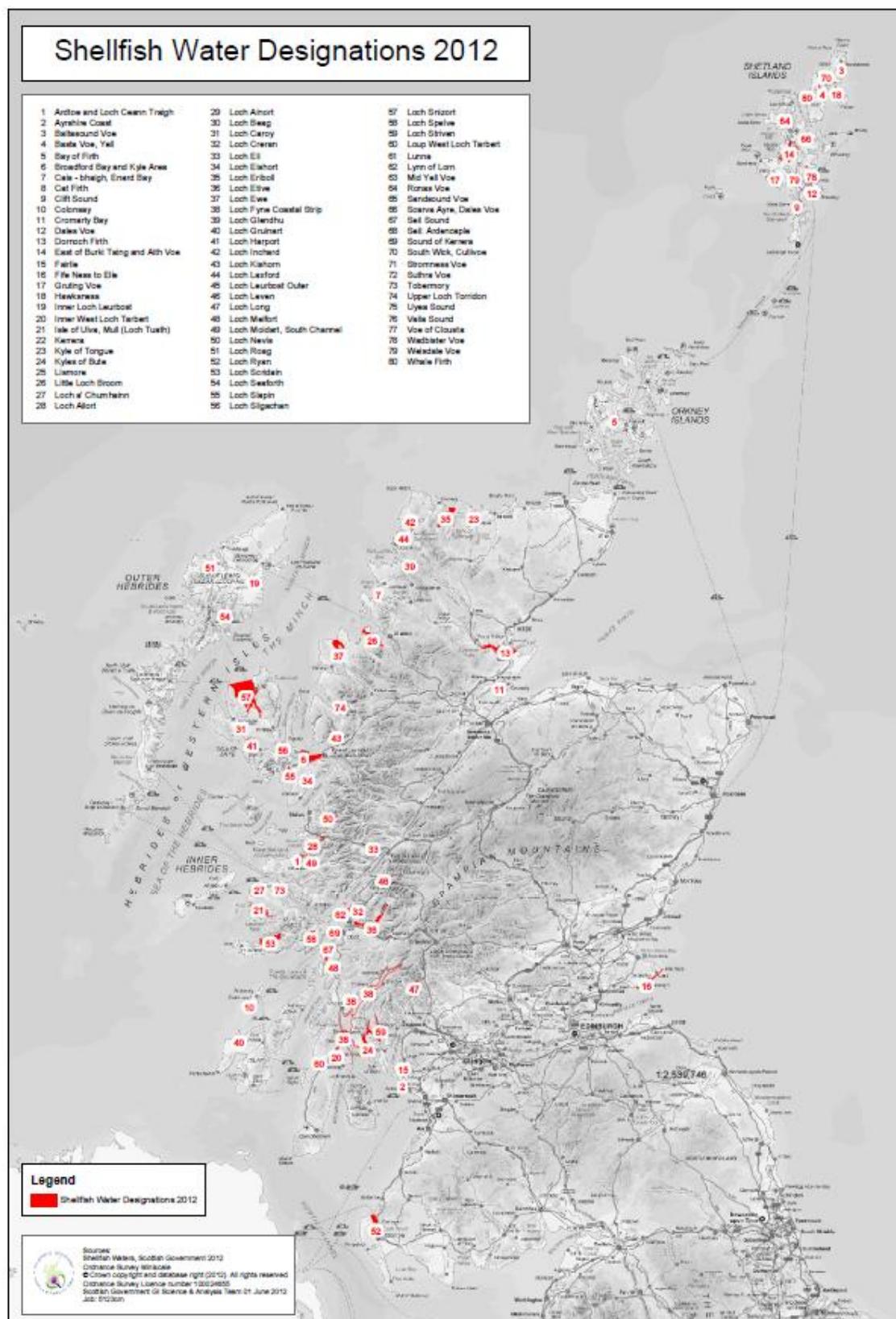


Figure B1.4.2: Location of Shellfish Waters Within Scotland 2012<sup>153</sup>

<sup>153</sup> Scottish Government (2012) Shellfish Waters – Overview Map [online] Available at: <http://www.scotland.gov.uk/Resource/0039/00394923.pdf> [accessed 08/05/2013]

## Bathing Waters

- 1.4.10 Bathing waters are classed as protected areas under Annex IV of the WFD due to their sensitivity to pollution or their economic, social and environmental importance. The EC Bathing Water Directive (2006/7/EC), translated into Scottish law by the Bathing Waters (Scotland) Regulations 2008, aims to preserve, protect and improve the quality of the environment and to protect human health. It sets out two quality standards, the 'mandatory' and the stricter 'guideline' standard, stating that member states should comply with the mandatory standard and aim to comply with the guideline standard. The majority of monitored and sampled sites are located on the east, north-east and south-west coasts, with isolated sites on the north and west coasts, and no sampling sites located in the Northern or Western Isles.
- 1.4.11 Scotland's bathing waters comprise 80 coastal and 3 inland waters, and their quality has steadily improved over recent years. In 2011, 95% of Scotland's bathing waters achieved the 'mandatory' standard for bathing water quality, and of these, nearly half also met the more stringent 'guideline' standard. Just four waters (Sandyhills, Irvine, Lossiemouth East and Eyemouth) failed to achieve mandatory quality compliance<sup>154</sup>. The 2011 monitoring report indicates that pollutants (i.e. bacteria and diffuse pollutants) from agricultural or urban runoff mobilised from heavy rainfall are the most likely causes of these exceedances.

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<sup>154</sup> SEPA (2012) Scottish Bathing Waters 2011 [online] Available at: [http://www.sepa.org.uk/water/bathing\\_waters/bathing\\_water\\_reports.aspx](http://www.sepa.org.uk/water/bathing_waters/bathing_water_reports.aspx) (accessed 04/04/2013)

## 1.5 Climatic Factors

### ***Key Issues Summary***

- Climate change impacts on coastal areas can include sea level change, increased wave height and storm surges.
- Climate change impacts on marine ecosystems can include changing ocean acidity, salinity, rising sea temperatures and rising sea levels.
- Scotland has set targets and implemented actions for emissions reduction and renewable energy generation.
- Climate change adaptation is likely to be required in response to impacts on the marine environment, particularly to minimise impacts and the potential loss of species and habitats.

### ***National Marine Baseline***

- 1.5.1 In the context of the marine environment, climate change has been predicted to lead to an increase in water temperatures, rise in sea levels, changes in wave heights and changes to our coastlines. Since 1961, average temperatures in all parts of Scotland have risen for every season<sup>155</sup> and over the last three decades, sea-surface temperatures around the UK coast have also risen by approximately 0.7°C<sup>156</sup>. At the same time, the seas are becoming more acidic, particularly those to the north and west of Scotland, as increasing amounts of atmospheric carbon dioxide are absorbed at the sea surface. This change in acidity is a concern for marine ecosystems and many organisms that share it<sup>157</sup>.
- 1.5.2 Sea levels around the UK rose by about 1 mm/year in the 20th century (corrected for land movement) although it is estimated that recent increases have been higher than this<sup>158</sup>. Under projections from the UK Climate Impacts Programme 2009 (UKCIP09) model, further rises of between 12 and 76 cm are projected by 2095, with lower probability scenarios suggesting this rise could be even greater with the potential for further adverse impacts on coastal areas and transitional waters<sup>159</sup>.
- 1.5.3 The UK Climate Change Risk Assessment states that there will be more frequent flooding arising from more frequent and intense rainfall, an increase in drought incidents during drier summers, and increases in the frequency of extreme weather events (i.e. storms and flooding)<sup>160</sup>. Associated changes to sea levels, increased wave height and storm surges could have serious

<sup>155</sup> Sniffer (2006) A Handbook of Climate Trends Across Scotland, [online] Available at: [www.sniffer.org.uk](http://www.sniffer.org.uk) (accessed 05/04/2013)

<sup>156</sup> UKCIP (2011) Recent Climate Trends [online] Available at: <http://www.ukcip.org.uk/essentials/climate-trends/> (accessed 05/04/2013)

<sup>157</sup> Scottish Government (2012) Climate Change and Ocean Acidification [online] Available at: <http://www.scotland.gov.uk/Topics/marine/science/atlas/climatechange> (accessed 05/04/2013)

<sup>158</sup> UKCIP (2011) Recent Climate Trends [online] Available at: <http://www.ukcip.org.uk/essentials/climate-trends/> (accessed 05/04/2013)

<sup>159</sup> Marine Climate Change Impacts Partnership (2010) Coastal erosion and Coastal Geomorphology, [online] Available at: <http://www.mccip.org.uk/annual-report-card/2007-2008/marine-environment/coastal-erosion.aspx> (accessed 05/04/2013)

<sup>160</sup> DEFRA (2012) UK Climate Change Risk Assessment (CCRA) Available at: <http://www.defra.gov.uk/environment/climate/government/risk-assessment/#report> (accessed 05/04/2013)

repercussions for marine and coastal environments, and many industries operating in them. There is clear indication that the effects of climate change are already impacting on the marine environment<sup>161</sup>, and this is likely to increase the vulnerability of some habitats and species to future changes in the marine environment<sup>162</sup>.

### Climate Change Mitigation

- 1.5.4 The Climate Change (Scotland) Act 2009 set out a number of provisions for movement to a low carbon economy, and sets legally binding targets of at least a 42% in greenhouse gas emissions by 2020 and of at least 80% by 2050, compared to the 1990 baseline<sup>163</sup>. Increased use of renewable energy is expected to play a key role in reaching these targets and reducing reliance on fossil fuel combustion.
- 1.5.5 A number of renewable energy targets have been set in Scotland. The most relevant target is for renewable sources of energy to generate the equivalent of 100% of Scotland's gross annual electricity consumption by 2020, with interim targets of 31% by 2011 having now been met and a new interim target of 50% by 2015. At present, renewables provide approximately 36.3% of the gross annual consumption of electricity in Scotland<sup>164</sup>.

### Climate Change Adaptation

- 1.5.6 The Scottish Government is committed to adapting to the impacts of climate change that Scotland is already expecting. The natural marine environment is expected to change, and adaptation will be required to minimise impacts and potential loss of species and habitats.
- 1.5.7 The Scottish Governments Climate Change Adaption Framework highlights trends for sea level rise, air and sea temperature and atmospheric Carbon dioxide (CO<sub>2</sub>) concentrations which will need to be factored into marine policy development<sup>165</sup>. Data for waves, salinity, turbidity, suspended particulate matter and circulation were said to not currently show significant trends above their long-term daily and inter-annual variations. The Marine and Fisheries Climate Change Adaptation Plan states that marine planning will need to be responsive to climate change to ensure that decision making can take account of a changing marine environment<sup>166</sup>. During consultation on the Sector Marine Plans the Scottish Government will release a new Climate Change Adaptation

<sup>161</sup> Marine Scotland (2011) Scotland's Marine Atlas: Information for The National Marine Plan, pg 189.

<sup>162</sup> JNCC (2010) Biodiversity and Climate Change – a Summary of Impacts in the UK [online] Available at: <http://jncc.defra.gov.uk/page-5145> (accessed 05/04/2013)

<sup>163</sup> Scottish Government (2009) Climate Change (Scotland) Act 2009. Available at:

<http://www.scotland.gov.uk/Topics/Environment/climatechange/scotlands-action/climatechangeact> (accessed 05/04/2013)

<sup>164</sup> Scottish Government (2011) High level summary of statistics December 2011, Renewable energy [online] Available at: <http://www.scotland.gov.uk/Topics/Statistics/Browse/Business/TrenRenEnergy> (accessed 05/04/2013)

<sup>165</sup> Scottish Government (2009) Scotland's Climate Change Adaptation Framework [online] Available at: <http://www.scotland.gov.uk/Topics/Environment/climatechange/scotlands-action/adaptation/AdaptationFramework/TheFramework> (accessed 05/04/2013)

<sup>166</sup> Scottish Government (2009) Scotland's Climate Change Adaptation Framework: Marine and Fisheries Sector Action Plan [online] Available at: <http://www.scotland.gov.uk/Topics/Environment/climatechange/scotlands-action/adaptation/AdaptationFramework/SAP/MarineandFisheries> (accessed 05/04/2013)

Programme which will set out more information on adaptation in the marine environment.

- 1.5.8 A number of organisations have undertaken modelling and research into the potential impacts of climate change. For example, SEPA has mapped coastal flood risk for Scotland, providing a broad indication of potential flood risk<sup>167</sup>. This work identifies the main areas of flood risk from the sea include land adjacent to river estuaries, the heads of sea lochs and the low lying land adjacent to firths.
- 1.5.9 The Scotland and Northern Ireland Forum for Environmental Research (Sniffer) examined coastal flooding issues in Scotland in 2008, and identified the highest threat of surges being the head of estuaries, most notably the Solway Firth, the inner Moray Firth, the Clyde estuary, the Forth and Tay Firths and Loch Linnhe<sup>168</sup>. The report also mapped potential sea level rise, indicating that sea level rise to the 2080s is likely to be highest in Shetland, Orkney, the Eilean Siar and north coast<sup>169</sup>.

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<sup>167</sup> SEPA (undated) Indicative river & coastal flood map [online] Available at: [http://www.sepa.org.uk/flooding/flood\\_extent\\_maps.aspx](http://www.sepa.org.uk/flooding/flood_extent_maps.aspx) (accessed 04/04/2013)

<sup>168</sup> Ball, T., Werritty, A. Duck, R.W., Edwards, A., Booth L., Black A. R., (2008) Coastal Flooding in Scotland: A Scoping Study, Scotland and Northern Ireland Forum for Environmental Research [online] Available at:

[http://www.sniffer.org.uk/files/7013/4183/7993/FRM10\\_final\\_030908\\_with\\_security.pdf](http://www.sniffer.org.uk/files/7013/4183/7993/FRM10_final_030908_with_security.pdf) (accessed 16/05/2013)

<sup>169</sup> *ibid*

## 1.6 Marine Geology and Coastal Processes

### *Key Issues Summary*

- Potential for increased vulnerability of coastal areas from changes in coastal processes related to marine activities, and also from climate change.
- Pressures from the development of coastal areas
- Potential impacts of marine activities on seabed sediments and natural processes, and their ability to support habitats and species.
- Potential for impacts on marine and coastal areas designated for their geological importance.

### *Designations*

- 1.6.1 Many of Scotland's coastal and offshore marine protected sites (see Biodiversity section) cover important coastal and marine habitats<sup>170</sup>. Whilst some degree of protection can be afforded to marine geology features through SAC and SPA designations and the designation of coastal SSSI which offers the primary mechanism of protection for terrestrial and coastal sites to the seaward limit of local authority areas. Scotland's SSSI are underpinned by the Geological Conservation Review (GCR) undertaken by the JNCC<sup>171</sup>.
- 1.6.2 Together, these designations will contribute to the development of Nature Conservation MPAs which will protect important areas of marine habitat, geology and geomorphology in Scottish waters<sup>172</sup>.

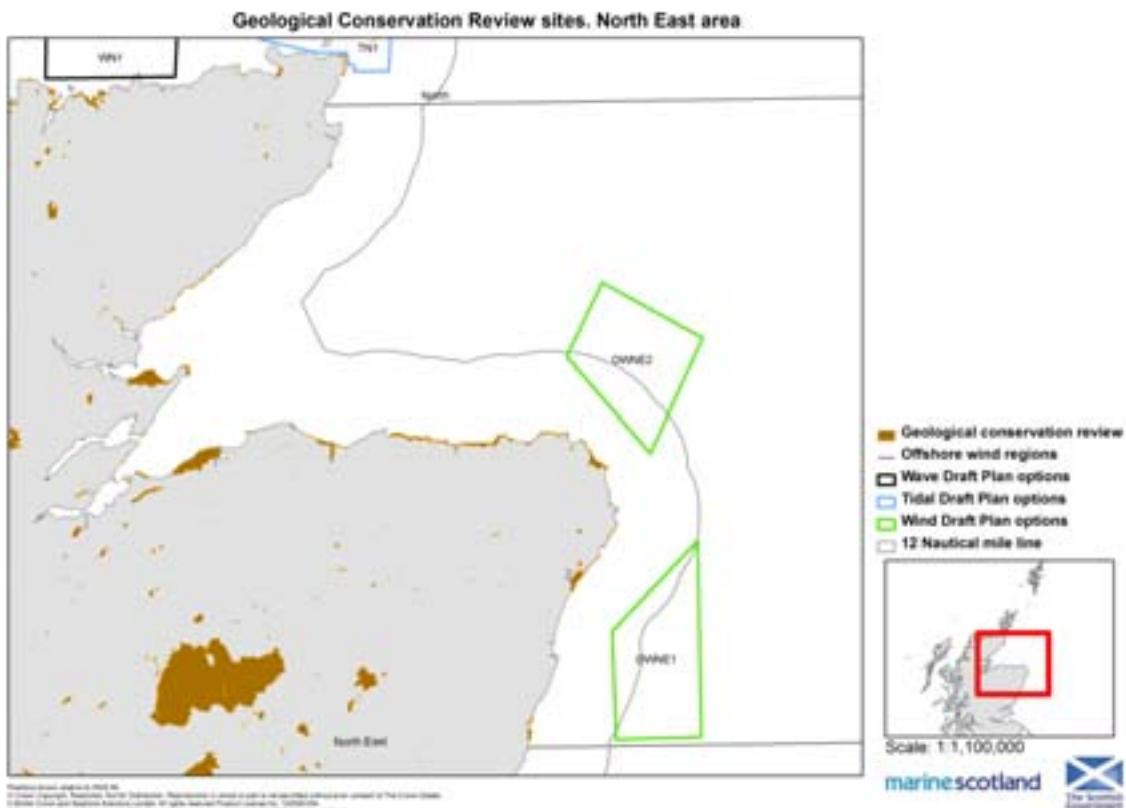
### North East

- 1.6.3 There are several GCR sites along the North East coastline, with two main areas extending along the coast of the Dornoch Firth, with a smaller area of designation near Portmahomack. Other designated areas are located along the eastern coastline to the north and south of Aberdeen, and sections of the along the coastline from Fraserburgh to Lossiemouth (see Figure B1.6.1).

<sup>170</sup> Scottish Government (2011) Scotland's Marine Atlas, Scottish Government pg. 72

<sup>171</sup> SNH (undated) Geological Conservation Review (GCR) Sites [online] Available at: <http://www.snh.gov.uk/protecting-scotlands-nature/safeguarding-biodiversity/protecting/geological-conservation/> [accessed 04/03/2013]

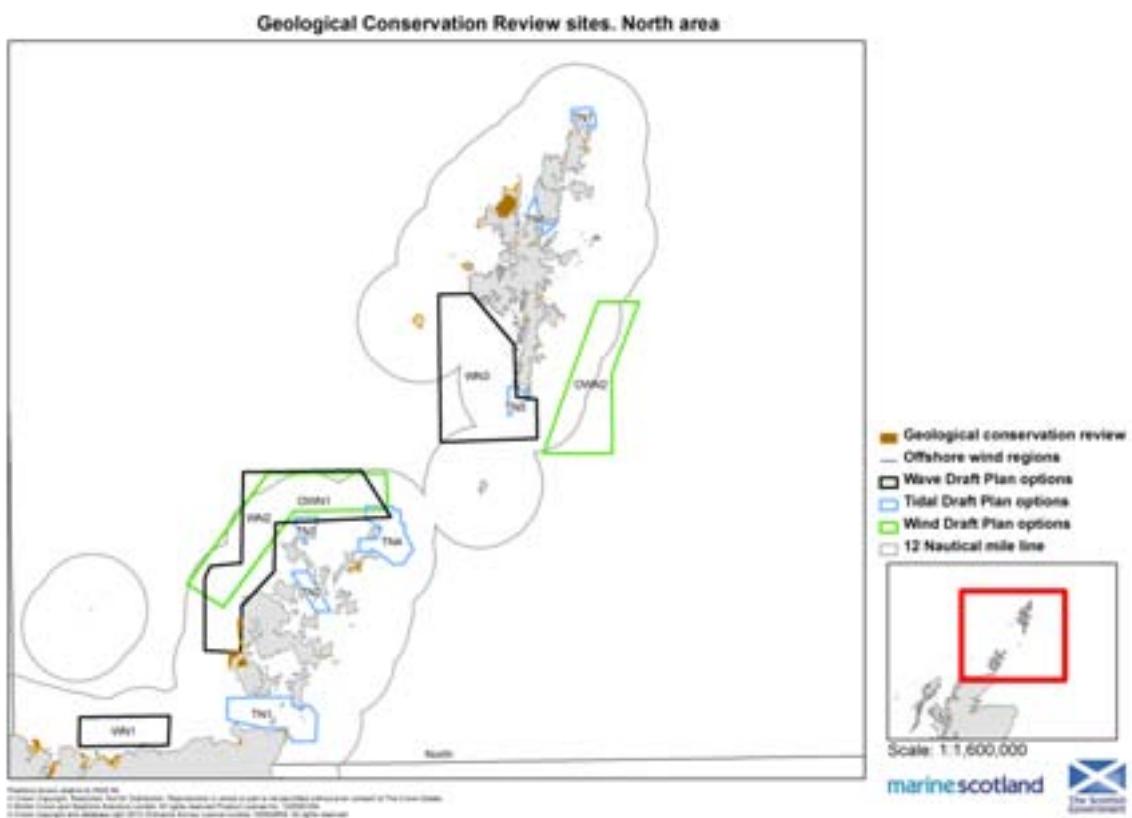
<sup>172</sup> SNH (2013) Marine Protected Areas [online] Available at: [http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/national-designations/marine-protected-areas-\(mpa\)/](http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/national-designations/marine-protected-areas-(mpa)/) [accessed 04/03/2013]



**Figure B1.6.1: GCR sites in the North East**

### North

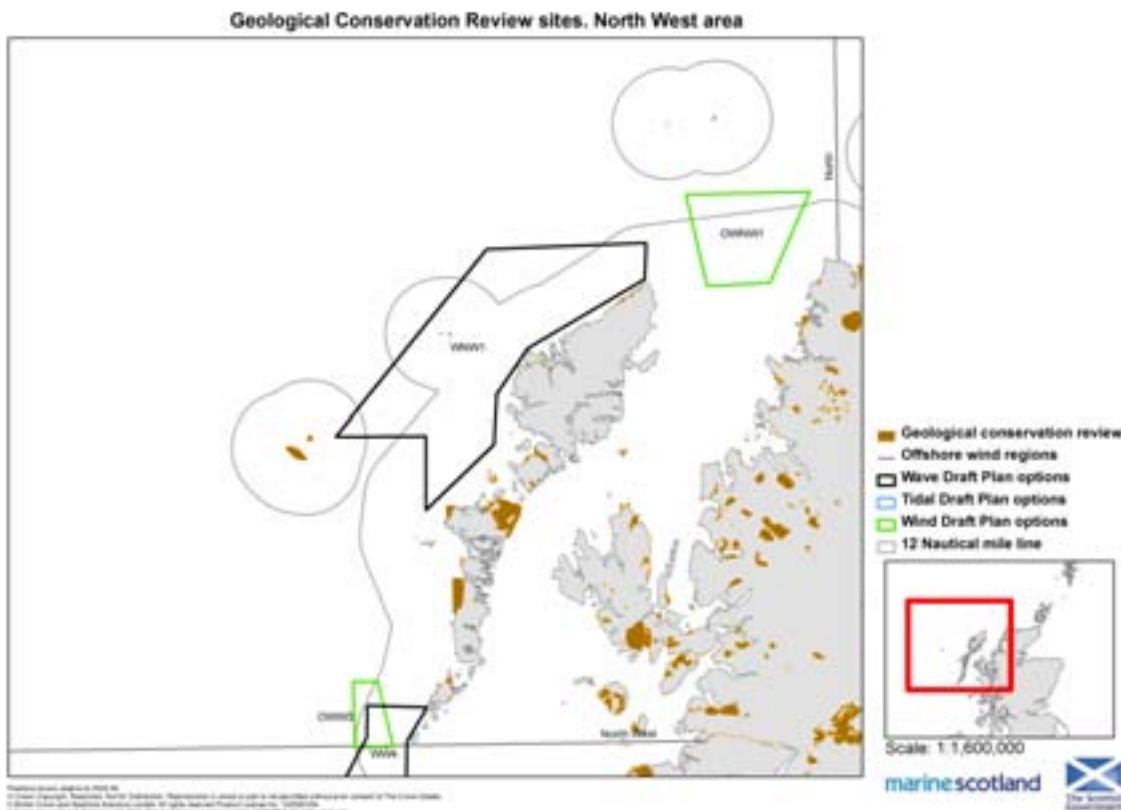
- 1.6.4 There are GCR sites located along numerous coastlines in Shetland, including several designations located at Brae in the north west of the island. The entire coast surrounding the island of Foula is also designated. In Orkney the southern tip of Hoy and the coastline to the west of Stromness are the main areas of designation.
- 1.6.5 There are also concentrations of GCR sites extending along the north mainland coastline near Durness and around Loch Eriboll, which continues further inland past Tongue. There are some smaller areas further along the coastline near Thurso and Castleton, and near the furthest tip of the mainland at Cape Wrath (see Figure B1.6.2).



## **Figure B1.6.2: GCR Sites in the North**

North West

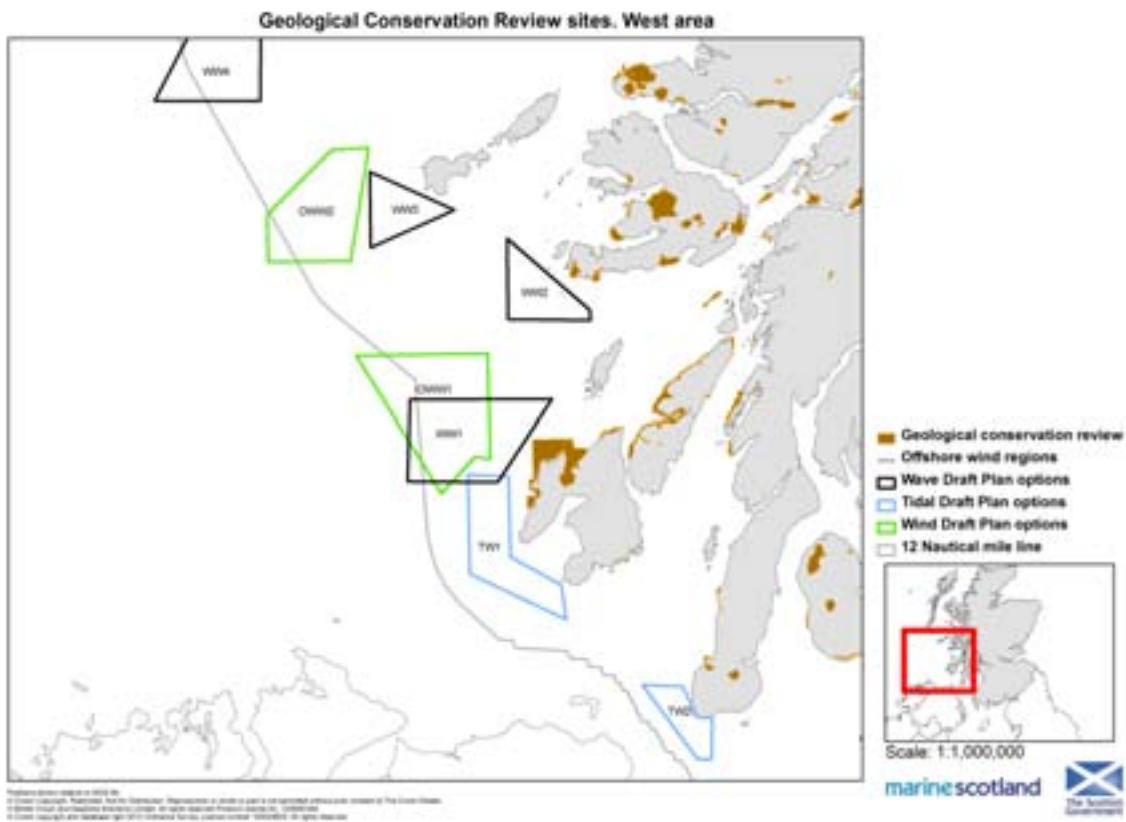
- 1.6.6 GCR sites are scattered along the coast from Cape Wrath at the northern point of the Scottish mainland, southwards to Ullapool. In the Western Isles, there are small GCR areas on the north west coast of Lewis, in the north east region of Harris, in the north east and north west regions of North Uist, and smaller designations on the south coastline of Barra. The whole coastline of St Kilda is also designated as a GCR site (see Figure B1.6.3).



**Figure B1.6.3: GCR Sites in the North West**

### West

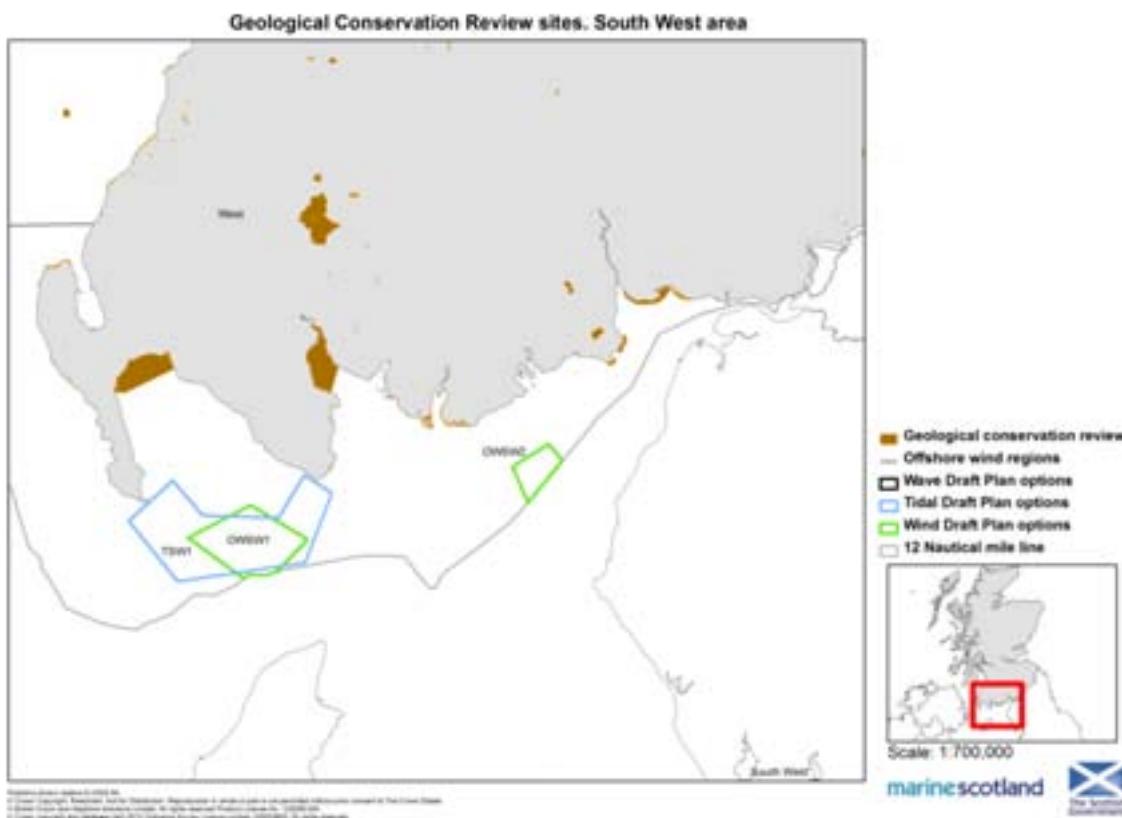
- 1.6.7 GCR sites have been identified in the vicinity of plan option areas at the south west tip of the Isle of Mull, along much of the west coast of Jura, and large areas have been identified along both the north west coastline of Islay including offshore areas to the north west (see Figure B1.6.4).



**Figure B1.6.4: GCR Sites in the West**

### South West

- 1.6.8 There are areas of GCR designations scattered along the Solway coast. The largest of these areas are located in coastal areas in Luce Bay and Wigtown Bay, with pockets of smaller designations at the coast by Kirkcudbright and further inland from the Solway Firth (see Figure B1.6.5).



**Figure B1.6.5: GCR Sites in the South West**

### *Soils and sediments*

- 1.6.9 Much of Scotland's landscape and coastline was initially formed through the processes of glacial erosion and deposition<sup>173</sup>, and even today, the land continues to change through coastal processes such as wave action, sediment movement, erosion and accretion<sup>174</sup>. The 2004 Erosion survey of Scotland's coastline reported that it comprises predominantly hard coasts consisting of rocks and cliffs (70%); soft coasts considered potentially susceptible to erosion impacts, consisting of unconsolidated gravels, sand and silts (29%); and artificial coasts such as harbours and sea walls (less than 1%)<sup>175</sup>.
- 1.6.10 The offshore environment in Scottish waters ranges from shelf sea areas to deep ocean regions with depths greater than 2,000m. The continental shelf includes the Malin and Hebrides Shelf Seas, Orkney and Shetland Shelf Seas, and the North Sea. The shelf seas are marked by notable features such as banks (e.g. Stanton Banks, Viking Bank) and deep channels.
- 1.6.11 In general, the marine sediments around Scotland are sandy or gravelly and originate from deposits created during the Quaternary glaciation. Strong currents and wave action may also have prevented deposition of recent muddy sediment or winnowed it to leave a coarse-grained lag deposit. Muddy

<sup>173</sup> Gordon JE, Lees G, Leys KF, MacFayden CCJ, Puri G, Threadgould R and Kirkbride V (2002) Natural Heritage Zones: Earth Sciences, [online] Available at: <http://www.snh.gov.uk/docs/A337648.pdf> [accessed 05/04/2013]

<sup>174</sup> SNH (2001) Natural Heritage Futures – Coasts and Seas, [online] Available at: [www.snh.gov.uk/docs/A306281.pdf](http://www.snh.gov.uk/docs/A306281.pdf) [accessed 04/04/2013]

<sup>175</sup> SNH (undated) information on coastal erosion [online] Available at: <http://www.snh.gov.uk/about-scotlands-nature/rocks-soils-and-landforms/coasts/erosion/> [accessed 04/04/2013]

sediments principally occur near-shore or further offshore, in depressions on the sea floor, where currents may be relatively weak. They also occur beyond the shelf break (200m water depth) to the west of the Western Isles. The concentration of calcareous material varies greatly in seabed sediments reflecting the amount of shell material in different areas; locally, they can be very high<sup>176</sup>.

### Scotland's Bathymetry

- 1.6.12 The bathymetry of Scottish waters shows a sharp distinction between the east and west coasts. The east coast bathymetry presents mostly uniform depths and shallow inclines interspersed with localised trenches. The water deepens to the east towards the North Sea to an average of around 100m, with deeper sections of up to 200m present in some locations (e.g. the south east Moray Firth, the Devil's Hole and 110 mile Holes). These depths also increase to the north of the Shetland Isles, where the average depth is estimated to be around 110m inshore of the shelf edge.
- 1.6.13 In contrast, the seabed off Scotland's west coast shelves steeply away from the coast, and deep waters occur relatively close to the land, contrasting the shallow shelving found to the west of the Outer Hebrides. The west coast bathymetry has been deepened by glacial scouring, as demonstrated by sea lochs such as those in the Argyll and Bute area, and depths can be highly variable. Beyond shallow coastal areas, it is estimated that the average depth is around 60m off Scotland's west coast, although a wide range of depths between 10 – 320m have also been identified in some areas.
- 1.6.14 The shelf edge or western trench creates a natural bathymetric demarcation that borders Scotland to the west. This trench starts at between 40 and 60 miles west of the Outer Hebrides, and follows a broadly north-south direction off the west of Scotland, and a northeast-southwest direction further to the north. Depths generally increase rapidly offshore, roughly ranging from 200m to greater than 2,000m<sup>177</sup>. Data from the British Geological Society (BGS) demonstrates that Scottish waters display a wide range of seabed habitats, ranging from scoured rock or coarse sediment to muddy gravel or fine sand in some areas.

### Coastal Change

- 1.6.15 There is a strong interaction between wave, tide and current energy, and the processes of erosion and sedimentation. For example, these processes can aid stability of soft shorelines through the supply of sediment, and can reduce stability through the removal of sediment.
- 1.6.16 Coastal erosion and accretion are significant problems affecting many coastal communities, both in Scotland and around the world. While natural wave

<sup>176</sup> Marine Scotland (2008) Scotland's Seas: Towards Understanding their State, Chapter 2 [online] Available at: <http://www.scotland.gov.uk/Resource/Doc/218570/0058690.pdf> [accessed 04/04/2013]

<sup>177</sup> Scottish Government (2013) Bathymetry [online] Available at: <http://www.scotland.gov.uk/Topics/marine/science/MSInteractive/datatype/Bathymetry> [accessed 04/04/2013]

action, tidal currents and drainage have typically been the main drivers of coastal erosion, in more recent times, human activities (i.e. land reclamation, coastal or offshore, etc.) and natural disasters have also played a significant role in exacerbating these natural processes<sup>178</sup>.

- 1.6.17 The Marine Climate Change Impacts Partnership (MCCIP) estimated that in 2010-11, around 7% of Scotland's coast was protected by engineering or artificial structures<sup>179</sup>. The use of engineered sea defences and softer solutions such as the managed realignment of coastlines may become increasingly important in the future with additional pressures from rising sea levels and erosion/deposition associated with climate change<sup>180</sup>. Of the estimated 429km of artificial coastline on Scotland's mainland, some 307km is part of our coastal defences with the remainder being other developments (i.e. piers and harbours)<sup>181</sup>. However, these sea defences themselves can also have adverse effects on the coast. For example, inappropriate defences can transfer erosion issues further along the coast<sup>182</sup>, and offshore developments have the potential for creating similar effects.
- 1.6.18 The Erosion project undertaken in 2004 categorised Scotland's coast and summarised the nature of the coastline, whilst assessing its potential stability and behaviour (See Figure B1.6.6). This assessment found that three quarters of Scotland's coast was considered broadly stable, 8% was considered accretional<sup>183</sup>. In 2010-11, it was estimated that 12% of Scotland's coastline was erosional<sup>184</sup>. As shown in Figure B1.6.7, the sections of Scotland's coastline identified as being subject to either erosion or accretion include key areas along the east coast between Montrose to Dunbar, the Firth of Clyde, the inner Moray Firth, and parts of the Northern and Western Isles. Coastal protection plans have been introduced in some of these areas<sup>185</sup>. The erosional portion of coastlines largely consists of beaches, sand dunes, conglomerates/soft-rock cliffs, machair and marshes with muddy sediments<sup>186</sup>.

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<sup>178</sup> Prasetya G (unknown) Chapter 4: Protection From Coastal Erosion, Thematic paper: The role of coastal forests and trees in protecting against coastal erosion [online] Available at: [ftp://ftp.fao.org/docrep/fao/010/ag127e/ag127e07.pdf](http://ftp.fao.org/docrep/fao/010/ag127e/ag127e07.pdf) (accessed 04/04/2013)

<sup>179</sup> Marine Climate Change impacts Annual Report Card 2010-2011 <http://www.mccip.org.uk/media/7562/mccip-report-2010-2011.pdf> (accessed 04/04/2013)

<sup>180</sup> SNH (2010) Climate Change at the Coast, [online] Available at: <http://www.snh.gov.uk/about-scotlands-nature/rocks-soils-and-landforms/coasts/climate-change/> (accessed 04/04/2013)

<sup>181</sup> Scottish Government (2011) Scotland's Marine Atlas, Coastal Protection and Flood Defence [online] Available at: <http://www.scotland.gov.uk/Publications/2011/03/16182005/67> (accessed 04/04/2013)

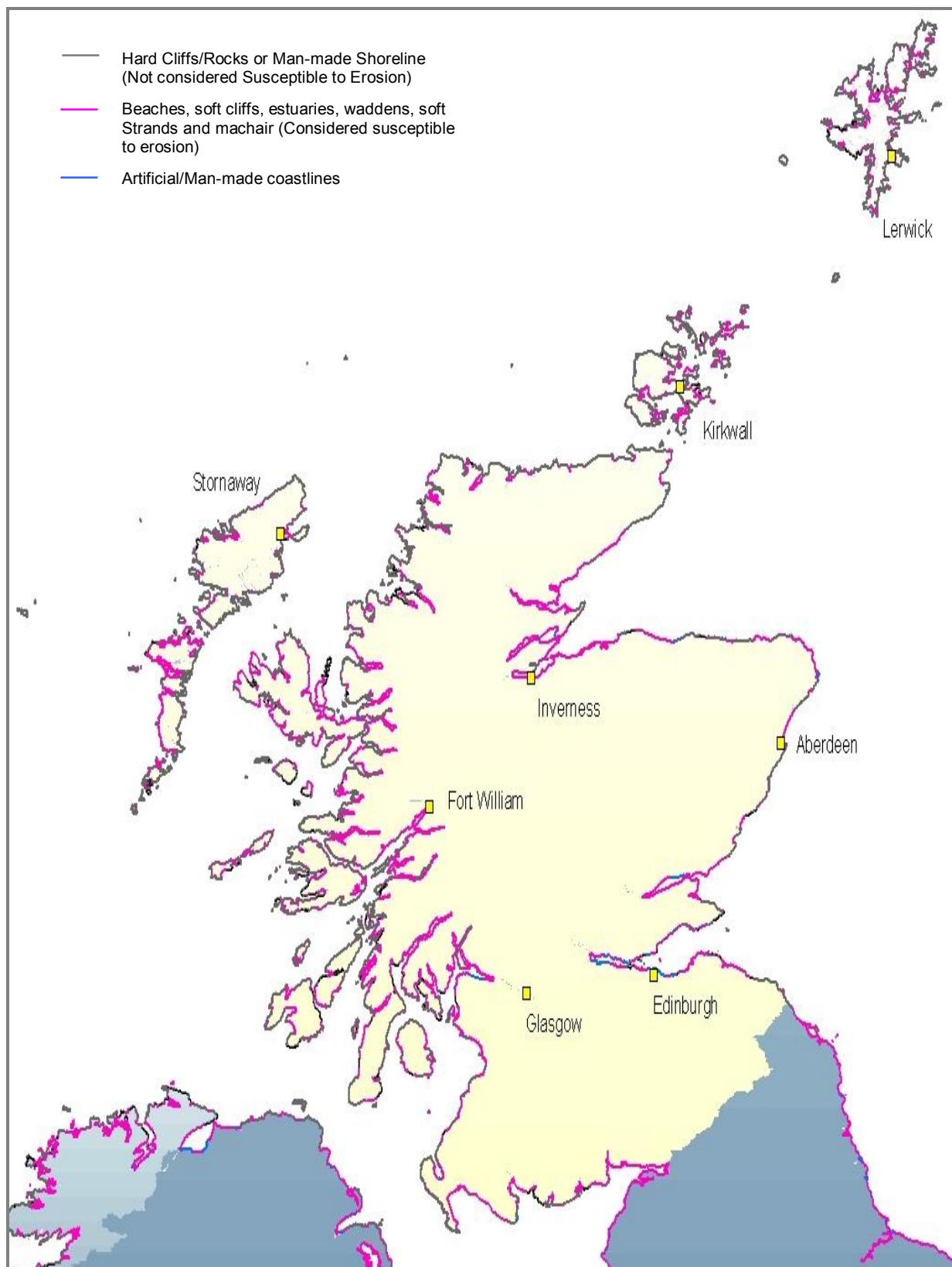
<sup>182</sup> SNH (undated) information on climate change at the coast [online] Available at: <http://www.snh.gov.uk/about-scotlands-nature/rocks-soils-and-landforms/coasts/climate-change/> (accessed 04/04/2013)

<sup>183</sup> SNH (2012) Coastal Erosion [online] Available at: <http://www.snh.gov.uk/about-scotlands-nature/rocks-soils-and-landforms/coasts/erosion/> (accessed 04/04/2013)

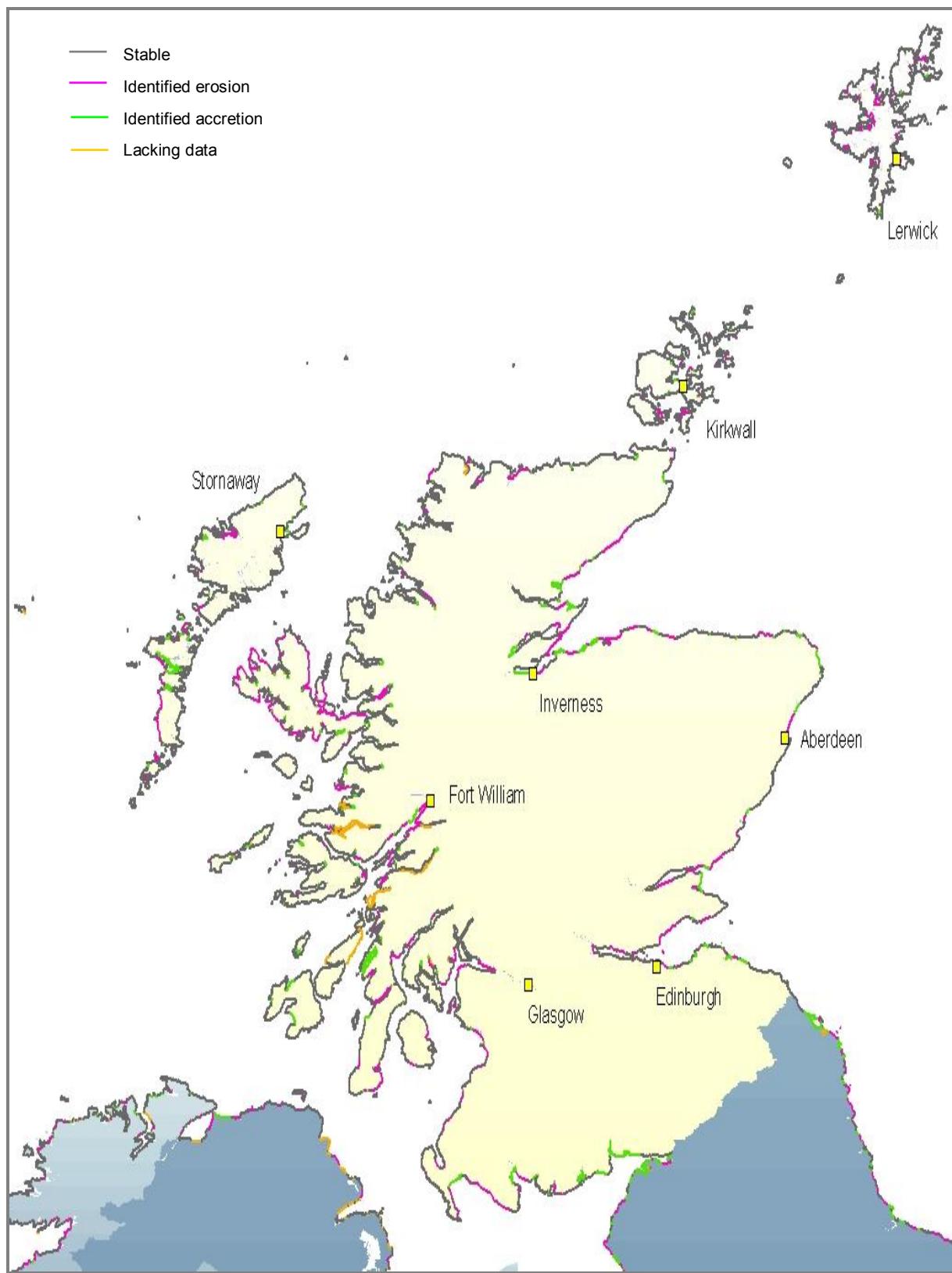
<sup>184</sup> Marine Climate Change Impacts Annual Report Card 2010-2011 <http://www.mccip.org.uk/media/7562/mccip-report-2010-2011.pdf> (accessed 04/04/2013)

<sup>185</sup> SNH (2001) Natural Heritage Futures – Coasts and Seas, [online] Available at: [www.snh.gov.uk/docs/A306281.pdf](http://www.snh.gov.uk/docs/A306281.pdf) (accessed 04/04/2013)

<sup>186</sup> European Commission (2004) Euroision: Living with Coastal Erosion in Europe – Sediment and Space for Sustainability – Results for the Euroision Study, [online] Available at: <http://www.euroision.org/reports-online/reports.html> (accessed 04/04/2013)



**Figure B1.6.6: Erosion Coastal Survey and Erosion Potential**



**Figure B1.6.7: Euroision Coastal Erosion Survey 2000**

## Dredging and Disposal

- 1.6.19 Historically, the marine aggregate extraction industry has been small in Scotland, largely due to a lack of suitable and readily accessible resources on the seabed, and an adequate supply of land available. However, as of 2011, two marine aggregate production areas were located in Scottish waters.
- 1.6.20 The first and largest is in the Firth of Forth, licensed for the extraction of up to 6 million cubic metres over 10 years, although with only one extraction to date of nearly 130,000 tonnes (86,260m<sup>3</sup>) for use as in-fill in the Leith Western Dock Reclamation Project in 2005. The second area is located in the Firth of Tay, although this region has not been used for several years. However, it is estimated that the Firth of Tay site could supply some 66,000m<sup>3</sup> a year<sup>187</sup>.
- 1.6.21 While in the past, a wide range of materials have been disposed at sea (e.g. industrial wastes, colliery mine-stone and sewage sludge), only the disposal of dredged material from ports, harbours and marinas is currently permitted. In 2009, there were some 66 open sites designated and routinely used for marine disposal within Scotland, with a further 50 sites either closed or disused<sup>188</sup>.
- 1.6.22 While the volume of material disposed of remained relatively constant between 2005 and 2009, a total of around 3.8 million tonnes of dredged spoil was deposited in designated disposal sites in Scottish waters in 2011, a significant increase from the 2009 total of around 2.5 million tonnes. This equated to around 40% of the allowable total of over 10.2 million tonnes that could have been deposited under licence<sup>189</sup>. Most of the disposal since 2005 – 2011 has been undertaken in designated areas near to the highest densities of population and industry<sup>190</sup> (e.g. the Firth of Forth, the Clyde and off Scotland's east coast)<sup>191</sup>.

## ***Spatial Bathymetry and Seabed Baseline Information***

- 1.6.23 Greater detail on spatial bathymetry and sediment composition predicted by European University Information Systems (EUNIS) habitat data is presented in the Wind, Wave and Tidal Regional Locational Guidance (RLGs).

### North East

#### *Aberdeenshire East Coast*

- 1.6.24 The seabed off the Aberdeenshire east coast consists predominantly of sand near to the coast, with coarser sediments including gravelly sands further offshore. The EUNIS predicted habitats dataset classifies these areas as infralittoral and circalittoral fine or muddy sands near-shore to deep circalittoral

<sup>187</sup> Scottish Government (2011) Scotland's National Marine Plan, Interim Sustainability Appraisal Report [online] Available at: <http://www.scotland.gov.uk/Publications/2011/03/21114728/22> (accessed 04/04/2013)

<sup>188</sup> Scottish Government (2011) Scotland's Marine Atlas, Scottish Government, pg. 176

<sup>189</sup> Scottish Government (2012) Disposal Sites – Open [online] Available at:

<http://www.scotland.gov.uk/Topics/marine/seamanagement/nmpihome/Productive/disposalsitesopen> [accessed 04/04/2013]

<sup>190</sup> Scottish Government (2011) Scotland's Marine Atlas, Scottish Government, pg. 176

<sup>191</sup> Scottish Government (2012) Disposal Sites – Open [online] Available at:

<http://www.scotland.gov.uk/Topics/marine/seamanagement/nmpihome/Productive/disposalsitesopen> [accessed 04/04/2013]

sand and circalittoral coarse sediment offshore, with depths ranging from 60m to 110m offshore.

#### *North East Coast*

- 1.6.25 The sediment composition changes somewhat approaching the north east tip of the Scottish mainland, with sandy gravel found located near the coastline, interspersed with large pockets of slightly gravelly sand and gravelly sand near to the tip, and sandy gravel, sand and muddy sand areas to the west towards the Moray Firth. The EUNIS dataset classifies the area as deep circalittoral sand and coarse sediment at the north east tip of the mainland, to circalittoral muds to the west. There is a sharp increase in depth to the north of this area, 60 – 200m at its deepest, due to the presence of the Moray Firth trench.

#### North

##### *Shetland*

- 1.6.26 The seabed surrounding the Shetland Isles consists mainly of coarse sediments such as sandy gravels and gravelly sands, with areas of sand identified to the south west, east and south east of the Isles. The EUNIS dataset describes the seabed habitats as predominantly deep circalittoral coarse sediments and sands, with some areas of deep circalittoral rock to the east of the isles. The depth of the seabed varies from shallow areas near to the Shetland coast to around 130m at some points within the plan option areas.

##### *Orkney*

- 1.6.27 The seabed surrounding the Orkney Isles consists mainly of coarse sediments such as sandy gravels and gravelly sands, with some patches of sandy sediments to the south west and south east of the Isles, and undifferentiated rock in the narrow section of the Pentland Firth between Orkney and the mainland. The EUNIS dataset describes the area as being generally composed of circalittoral coarse sediments, deep circalittoral coarse sediments and sands all around the Isles, with the exception of deep moderate and high energy circalittoral rock within the narrows of the Pentland Firth. The dataset also predicted infralittoral and circalittoral coarse sediments in the vicinity of the tidal energy area of search within the Stronsay and Westray Firths.
- 1.6.28 The depth of the seabed varies from 30 – 170m around and within the Isles, the deepest areas being located to their north west beyond the offshore wind and wave plan option areas.

##### *North Mainland*

- 1.6.29 The seabed in the Pentland Firth consists of undifferentiated rock in the narrow section of the Firth between Orkney and the mainland, with coarse sediments including sandy gravels, gravelly sands and sands to the west along the North Sutherland Coast and to the east of the Pentland Firth. The EUNIS data describes the area as deep moderate and high energy circalittoral rock within the narrows of the Firth, with shallow and deep circalittoral coarse sediments to

the east and west, interspersed with circalittoral fine or muddy sand pockets offshore of the North Sutherland Coast. Depths vary from 20 – 100m in the Pentland Firth and off the North Sutherland coast, with the narrows of the Firth the shallowest part.

### North West

#### *North West Mainland (Cape Wrath)*

- 1.6.30 The seabed beneath the North Minch, bordered by Cape Wrath to the south east and Lewis to the south west, consists largely of coarse sediments including sands, gravelly sands and sandy gravels. The EUNIS data describes the area as circalittoral coarse sediments and sands with areas of finer sediments near to the Cape Wrath and Lewis coastlines, and with deep circalittoral coarse sediments and deep circalittoral sands found further to the north of the Minches. Depths vary from 50 to 140m across the area, with the deeper areas generally located within the western part of the offshore wind area of search and in the central and western parts of the North Minch.

#### *Western Isles (West of Lewis)*

- 1.6.31 The seabed to the north west of Lewis consists mainly of sandy and gravelly sediments, with large areas of undifferentiated solid rock outcrops to the west of Lewis and to the north west of Uist, that create a 'V shape' around sandy and gravelly sediment areas. The EUNIS data classes these rock outcrops as low energy circalittoral rock, and the sandy and gravelly sediment areas as circalittoral and deep circalittoral coarse sediments. Depths in this region range from 30 to 140m with an average depth of around 80m within the wave energy area of search (WNW1).

#### *Western Isles (West and South West of Barra)*

- 1.6.32 The seabed to the west of the southern tip of the Outer Hebrides consists mainly of undifferentiated rock outcrops to the immediate west of Barra, with sandy and gravelly sediments further west and south. The EUNIS data confirms this description but differentiates between the rock outcrops, classing the easternmost part of this rock outcrop as low energy infralittoral rock, the central region as low energy circalittoral rock, and the westernmost part as deep moderate energy circalittoral rock. The remainder of the seabed sediments are predicted to be predominantly circalittoral coarse sediments and sands. The depths around this region are highly variable, ranging from 20 to 120m with an estimated average depth of around 80m.

### West

#### *Barra to Islay*

- 1.6.33 The seabed in this large area is composed mainly of sandy sediments to the north, giving way to coarser gravelly sand and sandy gravel in the shallower waters north of Islay, with coarser gravels in some areas west of Islay. The EUNIS data classified these habitats as circalittoral sand or muddy sands with

infralittoral coarse sediments or rock to the south west of Tiree, getting coarser to the south with circalittoral coarse sediments and deep circalittoral coarse sediments predicted.

- 1.6.34 Depths in this large area are highly variable, reaching over 100m to the south west of Islay.

*Islay to Kintyre*

- 1.6.35 The seabed in this large area is composed mainly of coarse sediments such as gravels, sandy gravels and gravelly sands near Islay, giving way to more coarse sediments including sandy gravels, albeit with a small area of muddy sandy gravel identified southwest of the Kintyre peninsula. Mud and muddy sand sediments were predicted in the region between Kintyre and Jura. The EUNIS data describes this area in much the same way, with circalittoral coarse sediments near Islay and deep circalittoral coarse or mixed sediments predicted in the south west. It describes the area between Jura and the northern portion of the Kintyre Peninsula containing deep circalittoral sand or mud. Depths vary markedly within this region, reaching around 150m at the extent of Scottish territorial waters in the North Channel.

South West

*Solway Firth*

- 1.6.36 The seabed within the Solway Firth is varied, ranging from mixed coarse sediments such as sandy gravels, gravelly sands and some gravelly muddy sands to the south west of the Mull of Galloway and to the south of Wigtown Bay, to coarser sediments in waters south of Luce Bay. Finer sediments including extensive sandy and muddy sand sediments are located further east in the Firth to the east of the River Dee, whilst muddy sandy gravel sediments are located within Luce Bay itself, and finer muddy sand and mud sediments are located within neighbouring Wigtown Bay. The EUNIS data confirms this, predicting habitats of circalittoral coarse sediments to the south west of the Mull of Galloway, circalittoral coarse and mixed sediments to the south of Luce Bay, infralittoral fine sand or muddy sand within Luce Bay, and predicted circalittoral fine sand, mud and muddy sands within Wigtown Bay and further east in the Firth.
- 1.6.37 This area south of the Luce Bay and Wigtown Bay shows shallow bathymetry of 20-60m deepening in an east-west direction where it deepens rapidly, reaching depths of 140m at the extent of Scottish Territorial Waters in the North Channel.

## 1.7 Historic Environment

### ***Key Issues Summary***

- While a number of coastal and marine historic environment assets are protected by designation, there are gaps in knowledge regarding the location and status of many marine sites.
- Potential for adverse impacts to marine and coastal archaeology from the physical siting and operation of marine developments and associated infrastructure activities.
- The setting of coastal features of interest can be impacted by changes resulting from marine and coastal development.
- The sensitivity of many coastal historic assets and the potential for impacts to coastal archaeology from changes in coastal processes and increased erosion exacerbated by offshore development.

### ***National Marine Baseline***

- 1.7.1 Scotland's historic environment and cultural heritage help to create a sense of place, wellbeing and identity, enhancing the distinctiveness of the coast and attracting visitors to Scotland<sup>192</sup>. A wide range of archaeological sites can be found on the foreshore and seabed ranging from the remains of ships and aircraft lost at sea, to valued harbours, lighthouses and other structures at the coastal fringe.
- 1.7.2 These historic assets are a non-renewable resource, and their survival is conditioned by a complex interplay of natural and man-made factors. The combination of seawater and sediment provides an important setting within which the preservation of archaeological remains is supported. Natural factors such as seabed movement from wave and tidal energy, relative sea-level rise, seabed topography and sediment type, biological colonisation, salinity, water acidity or alkalinity and levels of oxygenation often present conditions suitable for their preservation<sup>193</sup>.

### **Historic Assets in Coastal and Marine Environments**

- 1.7.3 While many sites lie wholly within the marine environment, it is believed that there are many more unprotected sites of interest on and around Scotland's coastline<sup>194</sup>. The Orkney and Shetland coasts in particular, contain many Neolithic and Mesolithic structures that are now below sea level. As such, Scotland's seabed and inter-tidal areas contain the remains of many important historic assets, ranging from artefacts and structures deposited on the seabed, structures built on the seabed or in inter-tidal areas, and submerged sites that were previously above sea level.

<sup>192</sup> Scottish Government (2011) Scotland's Marine Atlas, Information for the national marine plan, Scottish Government pg. 156

<sup>193</sup> Historic Scotland (undated) Towards a Strategy for Scotland's Marine Historic Environment [online] Available at: [www.historic-scotland.gov.uk/marine-strategy.pdf](http://www.historic-scotland.gov.uk/marine-strategy.pdf) (accessed 08/04/2013)

<sup>194</sup> Scottish Government (2011) Scotland's National Marine Plan Interim sustainability appraisal report [online] Available at: <http://www.scotland.gov.uk/Publications/2011/03/16135933/0> (accessed 08/04/2013)

- 1.7.4 At present more is known about historic assets on land than those in marine and coastal environments. Historically, there has been a heavy reliance on ad hoc discoveries of sites in coastal areas rather than through data gathered in structured research frameworks and survey programmes<sup>195</sup>. However, since 1995, the Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS) has recorded maritime information from readily available sources, a process that is now undertaken regularly for terrestrial sites. However, despite significant progress being made, the shortage of accurate locations and descriptions for most reported sites remains an issue.

### Designations

- 1.7.5 Scotland has 34 statutory designated sites wholly within the marine environment. These include eight designated wreck sites, nine scheduled monuments including seven wrecks in Scapa Flow, four listed buildings and 13 sites designated under the Protection of Military Remains Act 1986<sup>196</sup>. It is thought that many more such sites exist, and more coastal sites are likely to be known locally, but remain unreported as archaeological sites<sup>197</sup>.
- 1.7.6 It is estimated that there are 38,000 historic and unprotected sites of interest around Scotland's coast. These areas include St Kilda and the Heart of Neolithic Orkney World Heritage Sites (WHS), scheduled monuments, gardens and designed landscapes, archaeological remains, listed buildings and other sites located in conservation areas around our coastline<sup>198</sup>. There are 97 managed and accessible coastal and marine heritage sites ranging from the two World Heritage Sites, coastal properties in care of Historic Scotland, maritime and coastal heritage museums, historic ships and designated wreck sites<sup>199</sup>. For these sites, the sea can be an integral part of their setting and a key element in how they are experienced, understood and appreciated. The Inventory of Gardens and Designed Landscapes also recognises 390 nationally important sites, some of which have coastal locations<sup>200</sup>.
- 1.7.7 WHS status is governed by the United Nations Educational, Scientific and Cultural Organisation (UNESCO). Where development has the potential to affect a WHS the consenting authority should protect and preserve its Outstanding Universal Value (OUV). UNESCO states that OUV reflects cultural and/ or natural significance which "is so exceptional as to transcend national boundaries and of importance for present and future generations of all humanity"<sup>201</sup>. The statement of OUV is key for the future effective protection

<sup>195</sup> Historic Scotland (undated) Towards a Strategy for Scotland's Marine Historic Environment [online] Available at: [www.historic-scotland.gov.uk/marine-strategy.pdf](http://www.historic-scotland.gov.uk/marine-strategy.pdf) (accessed 08/04/2013)

<sup>196</sup> Scottish Government (2011) Scotland's Marine Atlas: Information for the National Marine Plan, pg. 156.

<sup>197</sup> Scape Trust (undated) Shorewatch [online] Available at: <http://www.scapetrust.org/html/shorewatch.html> (accessed 08/04/2013)

<sup>198</sup> Scottish Government (2011) Scotland's National Marine Plan: Interim SA Report [online] Available at: <http://www.scotland.gov.uk/Publications/2011/03/16135933/12> (accessed 05/04/2013)

<sup>199</sup> Scottish Government (2011) Scotland's Marine Atlas, Information for the national marine plan, Scottish Government pg. 156

<sup>200</sup> Historic Scotland (2012) The Inventory of Gardens and Designed Landscapes in Scotland: A guide for owners, occupiers and managers [online] Available at: [www.historic-scotland.gov.uk/gardens.pdf](http://www.historic-scotland.gov.uk/gardens.pdf) (accessed 08/04/2013)

<sup>201</sup> United Nations Educational, Scientific and Cultural Organisation (UNESCO) (no date), World Heritage Sites [online] Available at: [http://www.unesco.org/world\\_heritage\\_sites](http://www.unesco.org/world_heritage_sites) (accessed 13/05/2013)

and management of the WHS and has been considered within management plans for St Kilda and the Heart of Neolithic Orkney WHS<sup>202</sup> <sup>203</sup>.

1.7.8 The Marine (Scotland) Act 2010 provides for the designation of Historic Marine Protection Areas (Historic MPAs)<sup>204</sup>. Consultation opened on 18 March 2013 on amendments to the Drumbeg Historic MPA and proposals for a further six Historic MPA:

- Campania, Firth of Forth;
- Dartmouth, Sound of Mull;
- Duart Point, Sound of Mull;
- Kinlochbervie, Sutherland;
- Mingary, Ardnamurchan; and
- Out Skerries, Shetland.

1.7.9 The designation process covers the transition of existing designated wreck sites and underwater scheduled monuments to MPA status and identification of further priority sites.

#### Pressures on coastal and marine archaeology

1.7.10 Key relevant pressures to Scotland's coastal and marine heritage assets include coastal and offshore development, the effects of climate change, and coastal erosion and flooding<sup>205</sup>. Coastal erosion poses a major issue for historic and archaeological sites in many coastal areas, and one that is likely to be exacerbated given predictions of the likely effects of climate change (e.g. sea level rise, increased intensity of storms, erosion and risk of flooding)<sup>206</sup>. Among the sites most at risk are some of Scotland's unique and special sites, such as Skara Brae in Orkney<sup>207</sup>.

1.7.11 Coastal and marine development is a known driver of change in the marine historic environment<sup>208</sup>. Vessel anchoring, dredging, and construction of port facilities, bridges, and offshore developments have the potential to adversely affect these resources<sup>209</sup>. However, the survival of individual marine heritage assets can be highly variable and evidence shows that high levels of

<sup>202</sup> The National Trust for Scotland (2010) St Kilda World Heritage Site Management Plan 2011 – 2016 [online] Available at: <http://www.kilda.org.uk/12th%20November%202010%20-%20St%20Kilda%20Consultation.pdf> [accessed 13/05/2013]

<sup>203</sup> Orkney Islands Council (2010) The Heart of Neolithic Orkney World Heritage Site: Supplementary Planning Guidance [online] <http://www.orkney.gov.uk/Service-Directory/R/heart-of-neolithic-orkney-world-heritage-site-spq.htm> [accessed 13/05/2013]

<sup>204</sup> Scottish Government (2010) Marine (Scotland) Act 2010 [online] Available at: <http://www.scotland.gov.uk/Topics/marine/seamanagement/marineact> (accessed 08/04/2013)

<sup>205</sup> Scottish Government (undated) Scotland's environment, estuaries and seas wildlife [online] Available at: [http://www.environment.scotland.gov.uk/our\\_environment/built\\_environment/historic\\_environment.aspx](http://www.environment.scotland.gov.uk/our_environment/built_environment/historic_environment.aspx) (accessed at 08/04/2013)

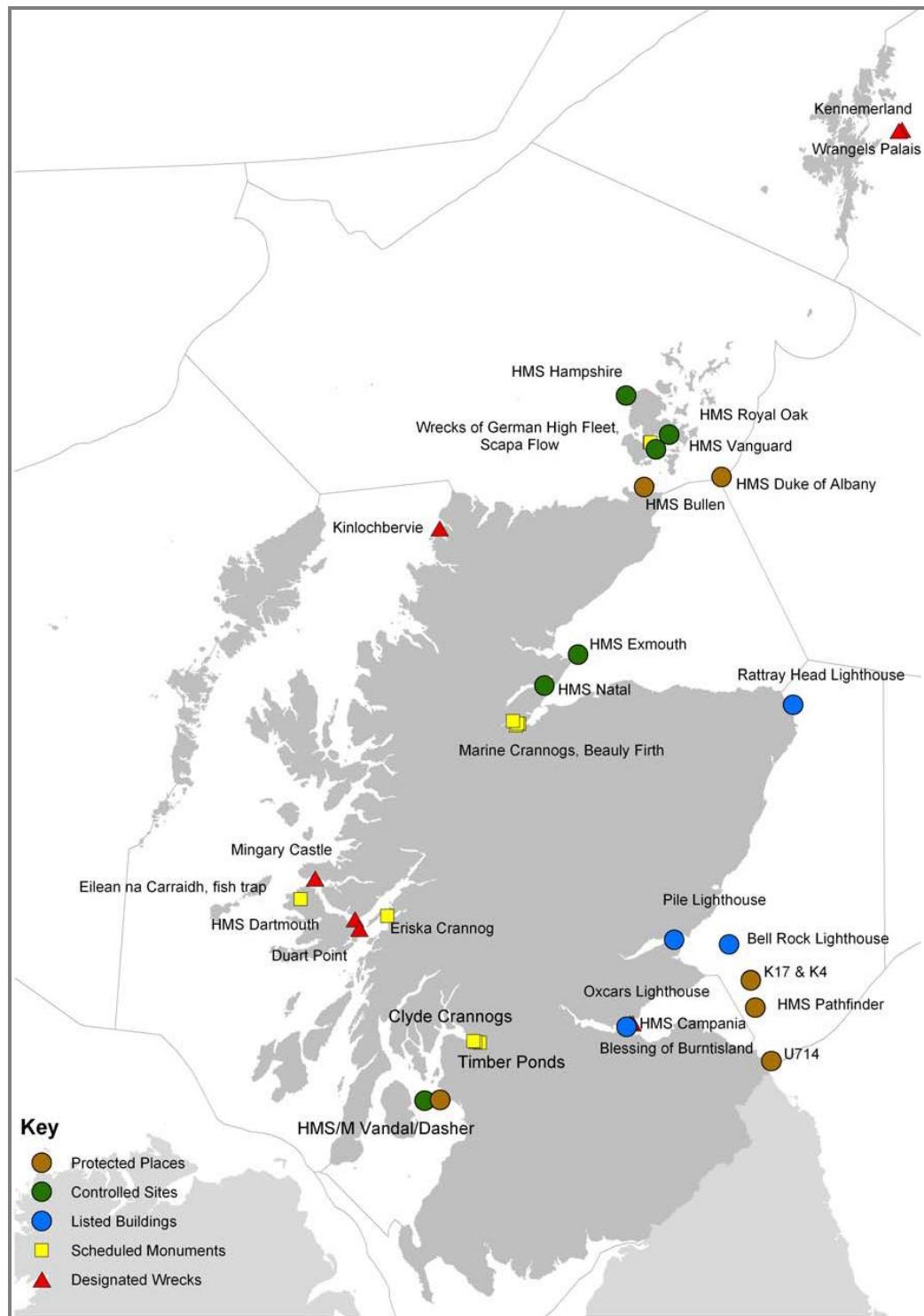
<sup>206</sup> Historic Scotland (undated) Towards a Strategy for Scotland's Marine Historic Environment [online] Available at: [www.historic-scotland.gov.uk/marine-strategy.pdf](http://www.historic-scotland.gov.uk/marine-strategy.pdf) (accessed at 08/04/2013)

<sup>207</sup> Scottish Government (2011) Scotland's National Marine Plan Interim sustainability appraisal report [online] Available at: <http://www.scotland.gov.uk/Publications/2011/03/16135933/0> (accessed at 08/04/2013)

<sup>208</sup> Historic Scotland (undated) Towards a Strategy for Scotland's Marine Historic Environment [online] Available at: [www.historic-scotland.gov.uk/marine-strategy.pdf](http://www.historic-scotland.gov.uk/marine-strategy.pdf) (accessed at 08/04/2013)

<sup>209</sup> Scottish Government (2011) Scotland's National Marine Plan Interim sustainability appraisal report [online] Available at: <http://www.scotland.gov.uk/Publications/2011/03/16135933/0> (accessed at 08/04/2013)

preservation can occur where seabed conditions allow and disturbance is avoided<sup>210</sup>.



**Figure B1.7.1: Map of Scotland's Marine Coastal Heritage Designations<sup>211</sup>**

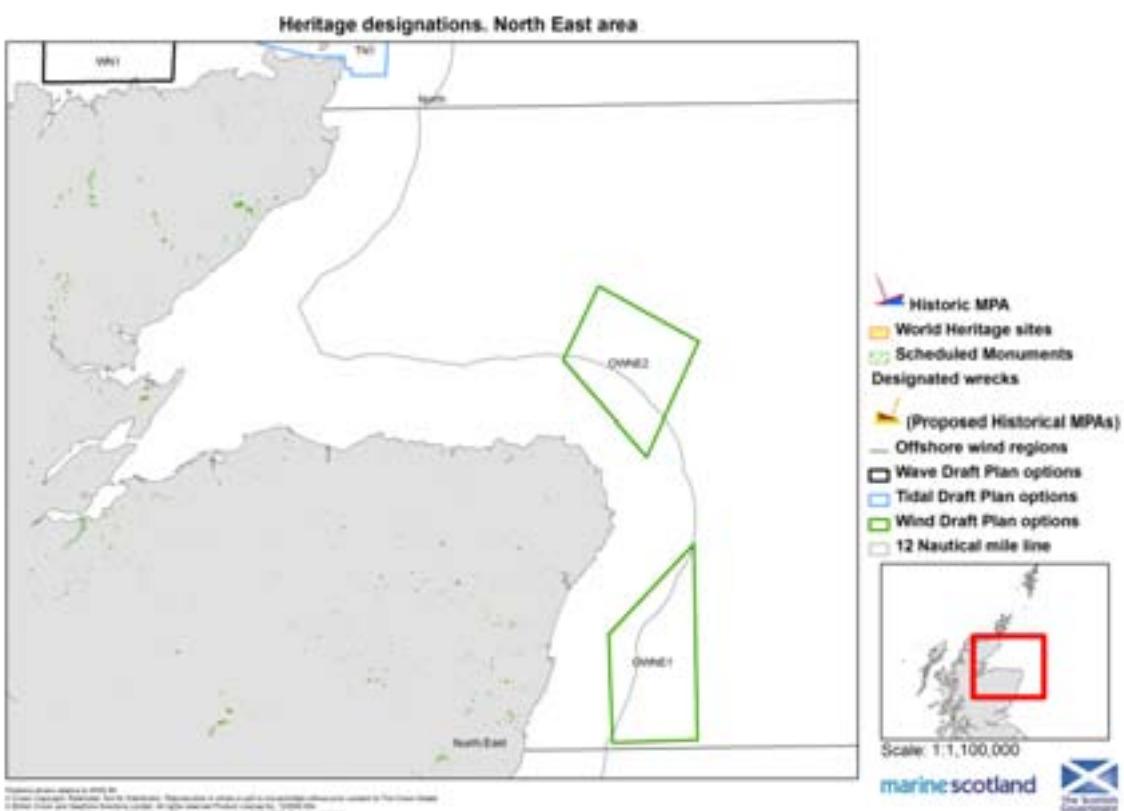
<sup>210</sup> Scottish Government (2011) Scotland's National Marine Plan: Pre-consultation draft [online] Available at: <http://www.scotland.gov.uk/Publications/2011/03/21114728/0> (accessed at 08/04/2013)

<sup>211</sup> Historic Scotland (2012) Marine Protected Areas in the Seas around Scotland, Guidelines on the selection, designation and management of Historic Marine Protected Areas [online] Available at: <http://www.historic-scotland.gov.uk/historicmpaguidelines.pdf> [accessed 08/04/2013]

## ***Regional Baseline***

### **North East**

- 1.7.12 While there are no designated historic sites in the north east region or the plan option areas, this marine area has a high concentration of wreck sites, particularly at or near to the coastline at the north east tip between Fraserburgh and Peterhead.
- 1.7.13 The Aberdeenshire coastline contains a range of sensitive coastal sites and buildings with historic interests. Of particular note are the A-listed Girdleness Lighthouse in Aberdeen, and Castle Cowie and Dunnottar Castle near Stonehaven on the eastern coast; and numerous sensitive coastal sites such as scheduled Kinnaird Head Castle and Lighthouse, and other castles and churches located around Fraserburgh.



**Figure B1.7.2: Historic Environment Designations in the North East**

### **North**

#### ***Shetland***

- 1.7.14 The Shetland region contains a wide variety of coastal and marine historic features, the most notable being the protected wreck sites at Kennemerland and Wrangels Palais at Out Skerries<sup>212</sup>, proposed as an Historic MPA by Historic Scotland. A large number of other wrecks have been located around

<sup>212</sup> Historic Scotland (2013) Scotland's Historic Wrecks [online] Available at: <http://www.historic-scotland.gov.uk/index/heritage/wrecksites/scotlands-historic-wrecks.htm> [accessed 05/04/2013]

the Isles, including some 14 locally protected wreck sites located mainly along the east Shetland coastline<sup>213</sup>. Extensive areas along the Shetland coastline and waters have also been identified as being potentially of interest for submerged archaeology.

- 1.7.15 The Shetland coastline contains a range of sensitive and/or listed sites including buildings, brochs, forts, monuments and other sites with historic interests, largely in clusters across the many islands, and many identified as being at risk as a result of coastal erosion. Of particular note is the A-listed Sumburgh Head Lighthouse at the southern tip of the Shetland mainland, Muckle Flugga lighthouse in the north, and Inner Skaw houses and field system in North Unst.

#### *Orkney*

- 1.7.16 The Orkney isles and surrounding waters contain a wide variety of coastal and marine historic features, the most notable being the Heart of Neolithic Orkney World Heritage Site covering most of the western coastline of West Mainland and Hoy, and the remains of seven scheduled wrecks of ships from the German High Seas Fleet in Scapa Flow. A voluntary underwater conservation zone is in place around these wrecks. A large number of other wrecks have been identified around the Orkney Islands, with several in proximity to the plan option areas located to the north, west and south of the islands. Extensive coastal and marine areas around the islands have been identified as potentially being of interest for submerged archaeology.
- 1.7.17 The Orkney Isles contain a wide range of listed buildings and scheduled monuments including lighthouses, brochs, fortifications, cairns, chapels, dwellings and other monuments with varying levels of listing and importance located around the Orkney coast. Of particular note are the A-listed Pentland Skerries Lighthouses, Stackel Brae castle near the Pentland Firth; and monuments on the Island of Stroma.

#### *North Mainland*

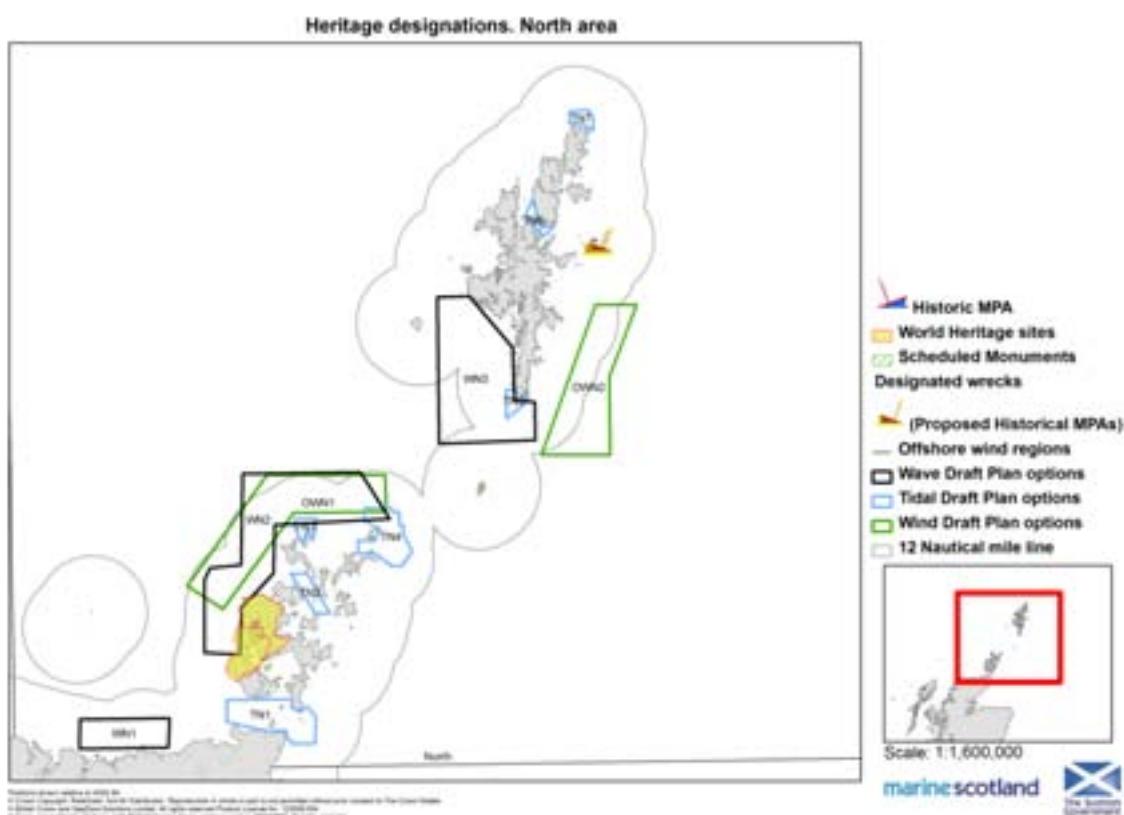
- 1.7.18 The North Sutherland and Pentland Firth coasts and their adjacent waters contain a number of coastal and marine historic features, largely comprising offshore and coastal wrecks, and a range of listed buildings and historic monuments. These monuments include the prehistoric coastal remains of brochs, standing stones, stone rows, tumuli and chambered cairns<sup>214</sup>. In general, the eastern part of the North Sutherland coast contains a larger number of these coastal sites than the western portion, with the highest densities generally located in the more populated areas (e.g. Thurso)<sup>215</sup>.

<sup>213</sup> SSMEI (2010) A Marine Spatial Plan For The Shetland Islands, Part Two: Marine Atlas Consultative Draft - 3rd Edition [online] Available at: <http://www.nafc.ac.uk/webdata/files/part%20two%20marine%20atlas.pdf> [accessed 05/04/2013]

<sup>214</sup> The Scottish Government (2012) Pentland Firth and Orkney Waters Marine Spatial Plan Framework and Regional Locational Guidance for Marine Energy, Draft Report [online] Available at: <http://www.scotland.gov.uk/Resource/Doc/295194/0096884.pdf> [accessed 08/04/2013]

<sup>215</sup> RCAHMS (2012) Pastmap [online] Available at: <http://jura.rcahms.gov.uk/PASTMAP/Map> [accessed 08/04/2013]

1.7.19 The Pentland Firth is also recognised to have high potential for submerged cultural features such as prehistoric landscapes, shipwrecks and anchorages<sup>216</sup>. The Firth also contains the wreck of HMS Bullen, designated under the protection of Military Remains Act 1986, and the wreck of HMS Duke of Albany located to the east of the Firth<sup>217</sup>. Other notable historic sites in this region include the A-listed Castle of Mey and its designated gardens located near John O'Groats and around 500m from the coast.



**Figure B1.7.3: Historic Environment Designations in the North**

### North West

#### *North West Mainland*

1.7.20 Scotland's north west coastline and its adjacent waters, contain a range of coastal and marine features of historic significance. The western coastline to the south of Cape Wrath contains one Historic MPA at Kinlochbervie and a proposed Historic MPA located near Ardmore Point, both based around historic wreck sites. The North Minch contains a large number of known wrecks located in both coastal and marine areas, with numerous sites located within the offshore wind energy area of search (OWNW1).

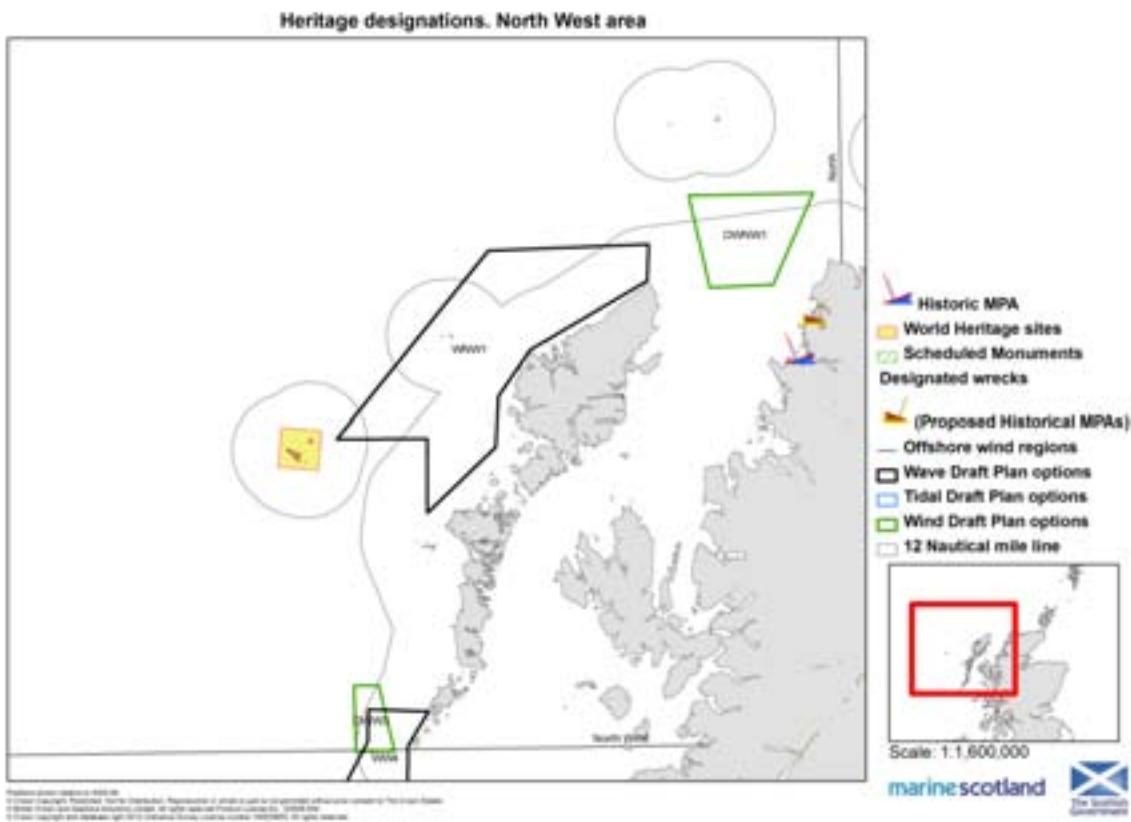
<sup>216</sup> Orca Marine (2012) Project Adair: Mapping marine heritage sites in Orkney and the Pentland Firth, Desk-based Assessment March 2012 [online] Available at: <http://www.orkney.uhi.ac.uk/studying-at-oc/departments/archaeology/archaeology-files/mapping-marine-heritage-sites-in-orkney-and-pentland-firth> [accessed 08/04/2013]

<sup>217</sup> Historic Scotland (2012) Marine Protected Areas in the Seas around Scotland, Guidelines on the selection, designation and management of Historic Marine Protected Areas [online] Available at: <http://www.historic-scotland.gov.uk/historicmpaguidelines.pdf> [accessed 08/04/2013]

- 1.7.21 A number of listed buildings and scheduled monuments are located in this area, ranging from historic buildings to scheduled monuments with varying levels of listing and importance. Of particular prominence is the A-listed Cape Wrath Lighthouse located at the north west point of the Scottish mainland.

*Western Isles and St Kilda*

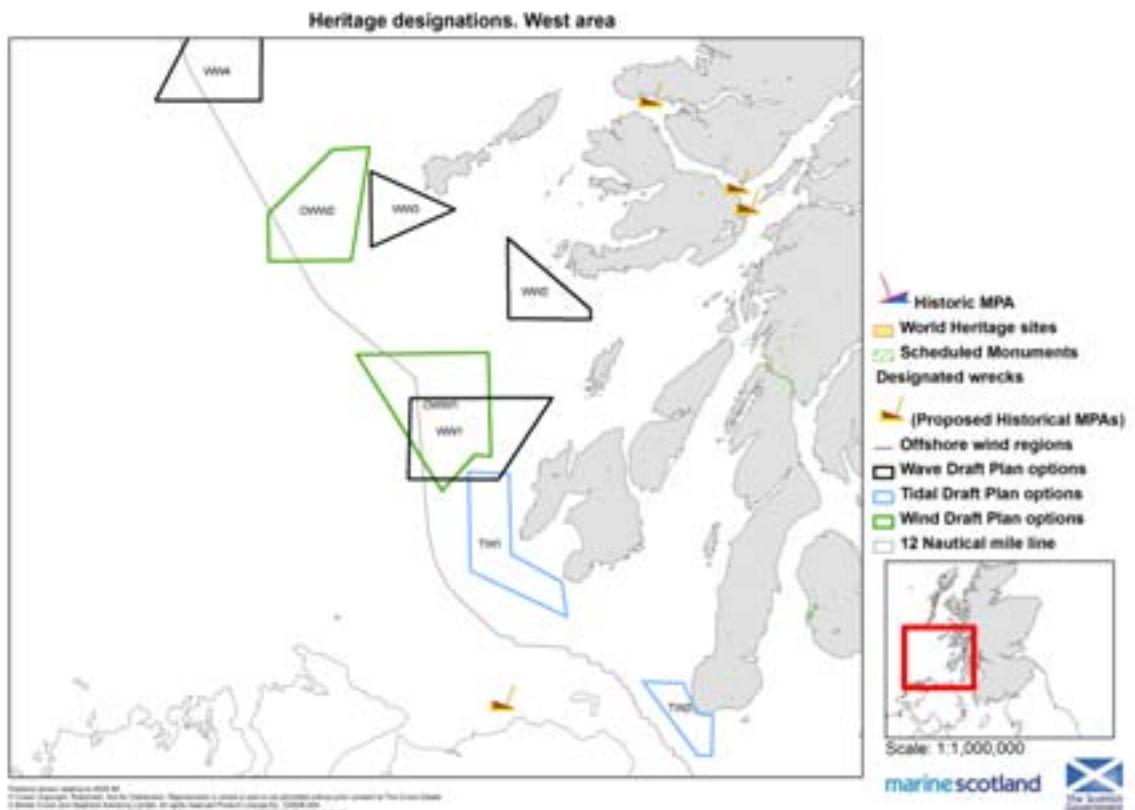
- 1.7.22 The western isles and its adjacent waters contain a number of coastal and marine historic features. While no designated wrecks are located in this region, a number of known wreck sites have been identified around the east and north west coastlines, and further offshore in the Minches. Several isolated wreck sites have also been identified located to the west of the Isles within the offshore wave energy area of search (WNW1). Clusters of known wreck sites have been identified in coastal areas near Stornaway, Scalpay, Barra and the Sound of Harris. In addition, the east and north west coasts of Lewis, and the coastal regions of North Uist, Benbecula and South Uist have been identified as potentially being of interest for submerged archaeology.
- 1.7.23 The Western Isles also contain a vast array of land-based historical features, many of which have coastal relevance. These sites largely consist of scheduled and unscheduled monuments including duns, cairns and forts, with a range of listed buildings also identified along the coastline. A particularly high density of these sites has been identified in the northern portion and along the north west coast of the Isle of Lewis, with other clusters of sites identified in the southern isles (e.g. Barra, Mingulay and Sandray). Notable sites include the A-listed lighthouses at Barra Head and the Butt of Lewis, a concentration of sites in Port Nis on Lewis, and the St Kilda archipelago, located 66km west of Benbecula, designated as a WHS.



**Figure B1.7.4: Historic Environment Designations in the North West**

## West

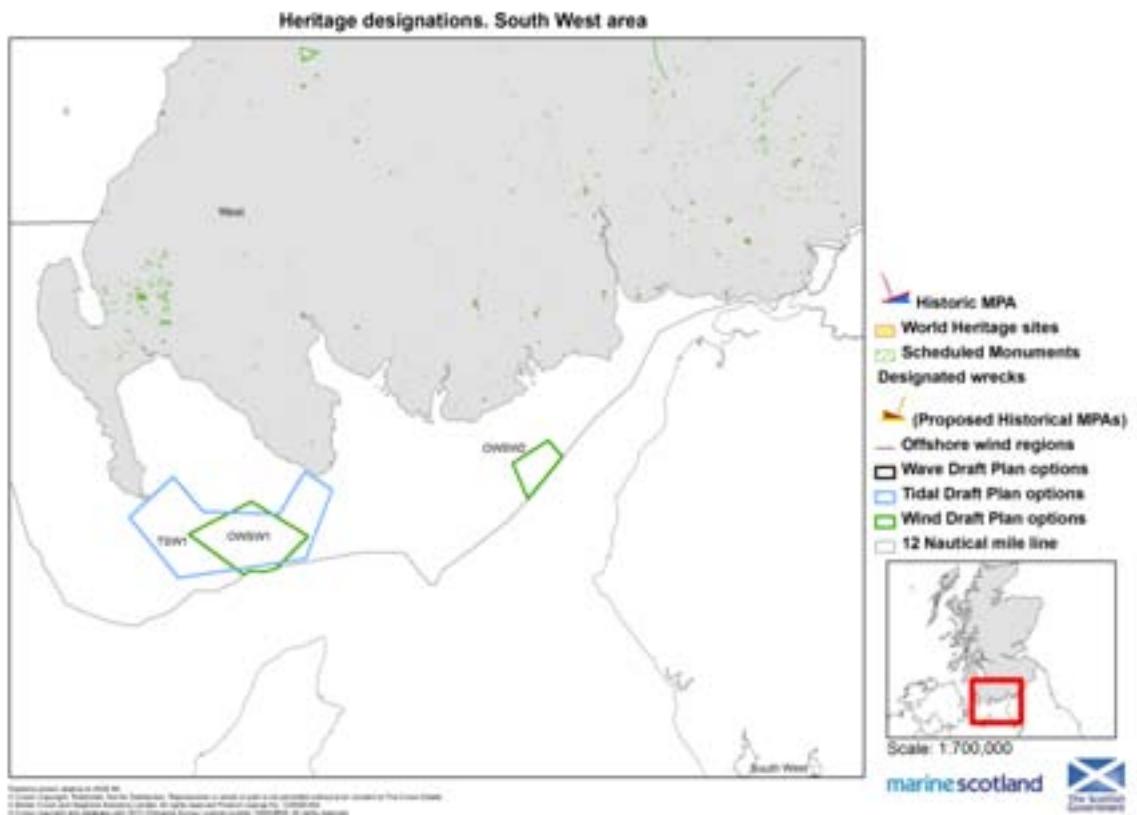
- 1.7.24 The long and complex coastlines within Scotland's western isles contain many sites of historic features, and significant sections of coastal and marine areas in Tiree, Colonsay, Islay and Kintyre have been identified as being of potential interest for submerged archaeology. There are a number of marine and coastal wreck sites along the many coastlines within this region, including small clusters of wreck sites located near the west coast of Tiree, the west and south coasts of Islay, and along the southern and south east coasts of Kintyre. All of these sites are located adjacent to offshore wind, wave and/or tidal plan option areas.
- 1.7.25 These valued coastal areas also contain a wide range of historical features. These include designated sites such as lighthouses and listed buildings, scheduled fortifications, early church sites and a range of other monuments of varying importance and designation. Notable sites in the region include Iona Abbey on Iona, Dhu Heartach Lighthouse in Colonsay, Rinns of Islay Lighthouse in Orsay, coastal chapels in the Oa, and A-listed Skerryvore Lighthouse in Tiree.



**Figure B1.7.5: Historic Environment Designations in the West**

### South West

- 1.7.26 While no designated wrecks are located within this region, there are a plethora of marine and coastal wreck sites to the west of the Rhins Peninsula, within Luce Bay and located further east within the Solway Firth. Much of the coastline along the western edge of the Rhins Peninsula and within the Solway Firth itself has been identified as potentially being of interest for submerged archaeology.
- 1.7.27 The Firth's coastline contains a wide range of historical features, including those at or close to the shoreline, and also sites considered to have a coastal relevance. The south coast of Dumfries and Galloway in particular is a rich area in terms of scheduled coastal sites, with particularly large numbers of scheduled monuments, unscheduled monuments and listed buildings are located near the Mull of Galloway, Burrow Head and Abbey Head. These areas are located in proximity to the offshore wind or tidal plan option areas.



**Figure B1.7.6: Historic Environment Designations in the South West**

## 1.8 Landscape

### ***Key Issues Summary***

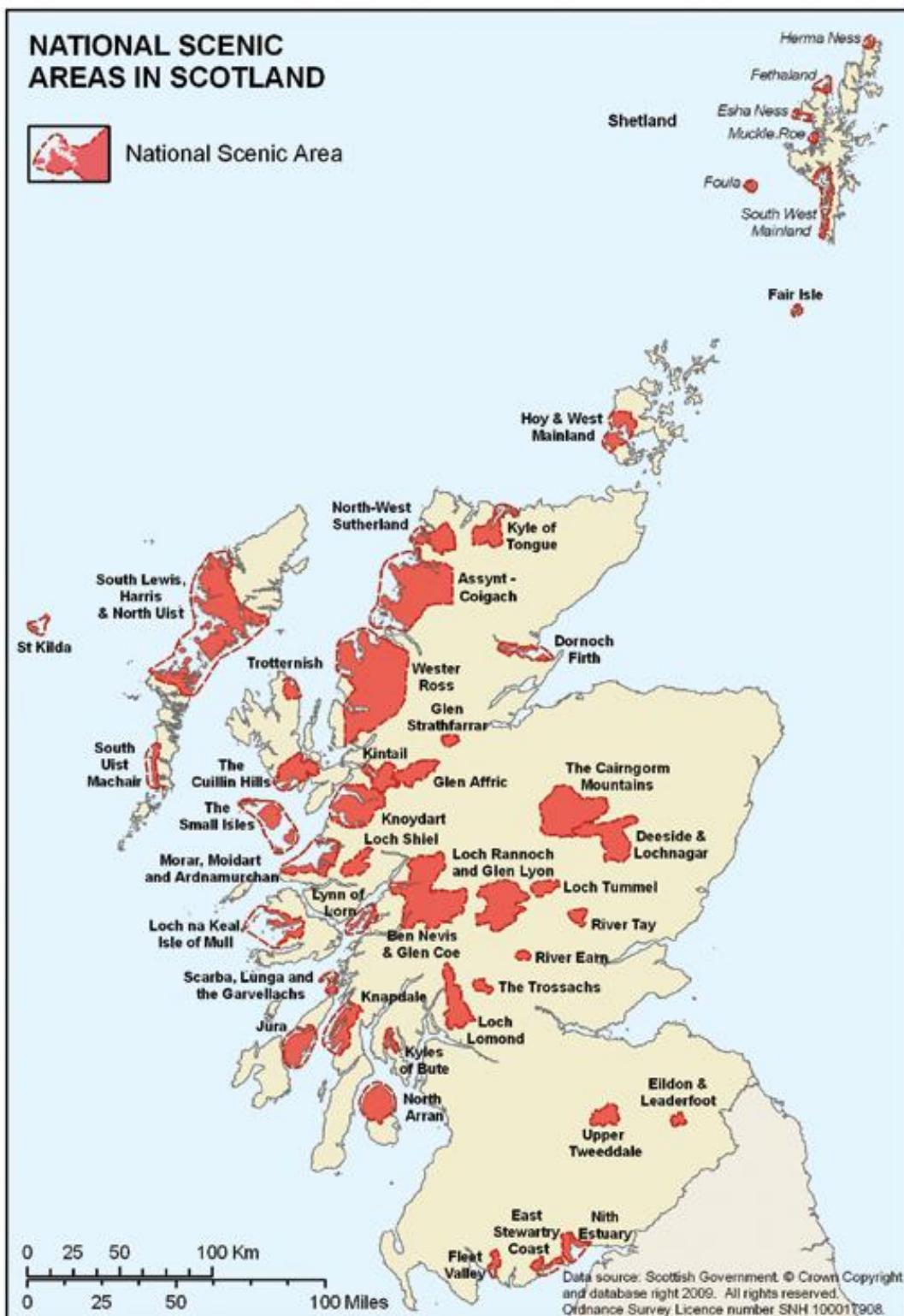
- There are a large number of coastal designations, many with marine components.
- Sensitivity of coastal landscapes and communities to visual impacts from coastal and marine development as a result of their high landscape and seascapes quality, natural character and wildness.
- Potential for cumulative impacts of onshore and offshore development on landscape and seascapes character and scenic value.
- Pressures from coastal erosion due to the expected effects of climate change.

### ***National Marine Baseline***

#### Designations

- 1.8.1 Over 12% by area of Scotland has been classified as a National Scenic Area (NSA) and national parks have been established in the Cairngorms and Loch Lomond and The Trossachs. Scotland contains 40 NSAs, a designation given to identify areas of outstanding scenery and locations considered to represent Scotland's finest landscapes. Of these, some 27 are located within or adjacent to coastal areas and include views of transitional or coastal waters. As shown in Figure B1.8.1, these areas are predominantly located on the west coast and amongst the Northern and Western Isles.
- 1.8.2 The coast also provides the landscape setting for Scotland's World Heritage Sites at St Kilda and the Heart of Neolithic Orkney. Several sites located in Northern Ireland (i.e. Giant's Causeway and Causeway Coast World Heritage Site) and England (i.e. Frontiers of the Roman Empire and Hadrian's Wall World Heritage Site) have also been designated by the responsible authorities in those parts of the UK. World Heritage Status covers both landscape and historic environment attributes, and many of these sites also have coastal elements.
- 1.8.3 A number of local authorities have identified local landscape designations. Many of these local designations lie in coastal locations in the Northern and Western Isles, and along the south-western, western, north-western and northern coastlines of the Scottish mainland.
- 1.8.4 Scottish Natural Heritage (SNH) have identified areas of 'relative wildness' in Scotland through a process involving the consideration of the perceived naturalness of the land cover, the ruggedness of the terrain, remoteness from public roads or ferries, and the visible lack of buildings, roads, pylons and other modern artefacts. While the maps, shown in Figures B1.8.2 and B1.8.3, do not include offshore areas, they illustrate the core areas of wild land and provide an overview of the high level of wildness attributed to coastal areas on Scotland's

north-west coast and in the Western Isles in particular. The relationship between these landscapes and the offshore environment is relevant to this assessment.



**Figure B1.8.1: National Scenic Areas of Scotland**<sup>218</sup>

<sup>218</sup> SNH (2009) National Scenic Areas in Scotland [online] Available at: <http://www.snh.gov.uk/docs/B691407.pdf> [accessed 16/05/2013]

## Core areas of wild land in Scotland 2013

 Core areas of wild land

Only the most extensive areas of high wildness have been selected as core areas of wild land

Produced by Geographic Information Group.

Job 44498

Version 1: 25 April 2013

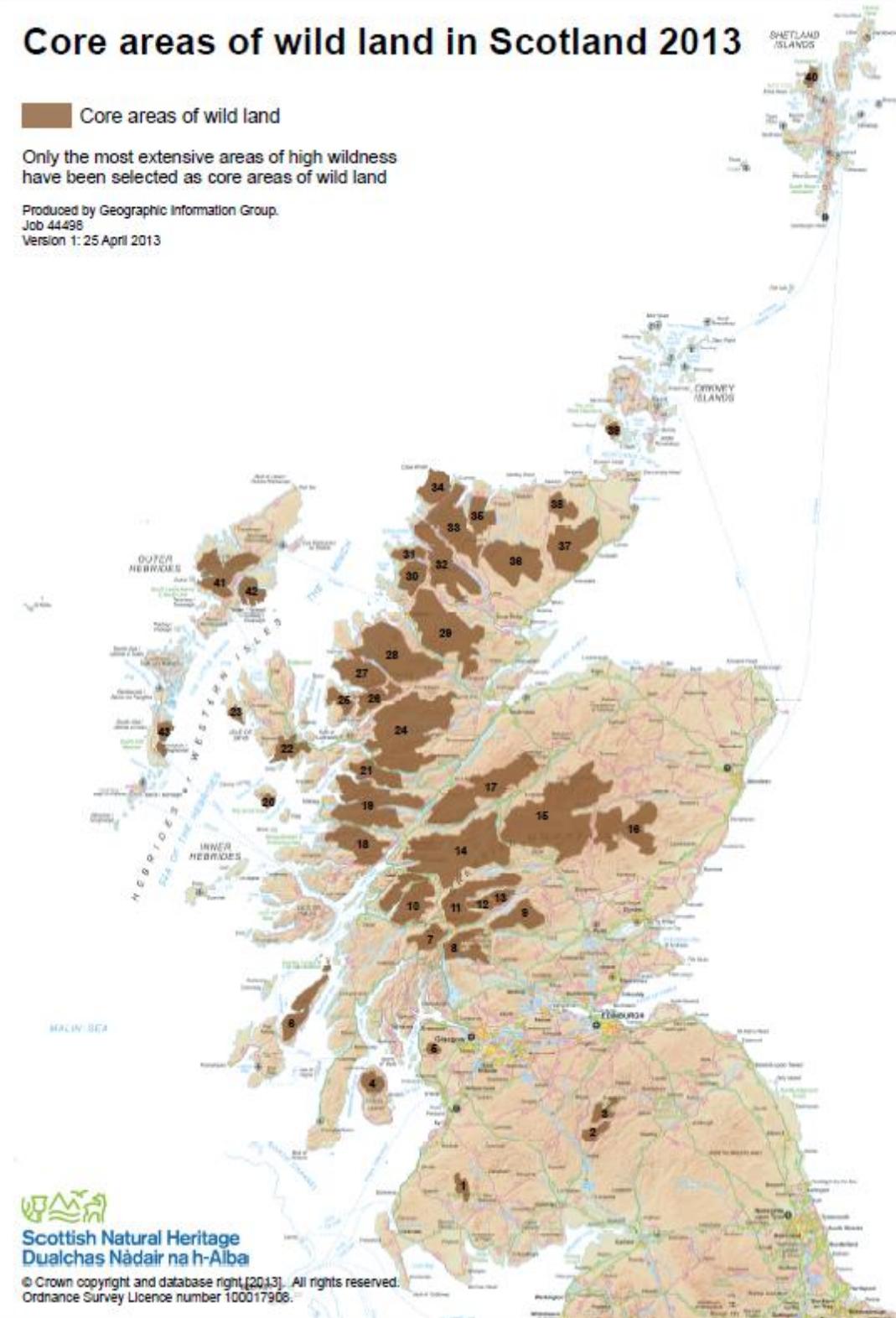
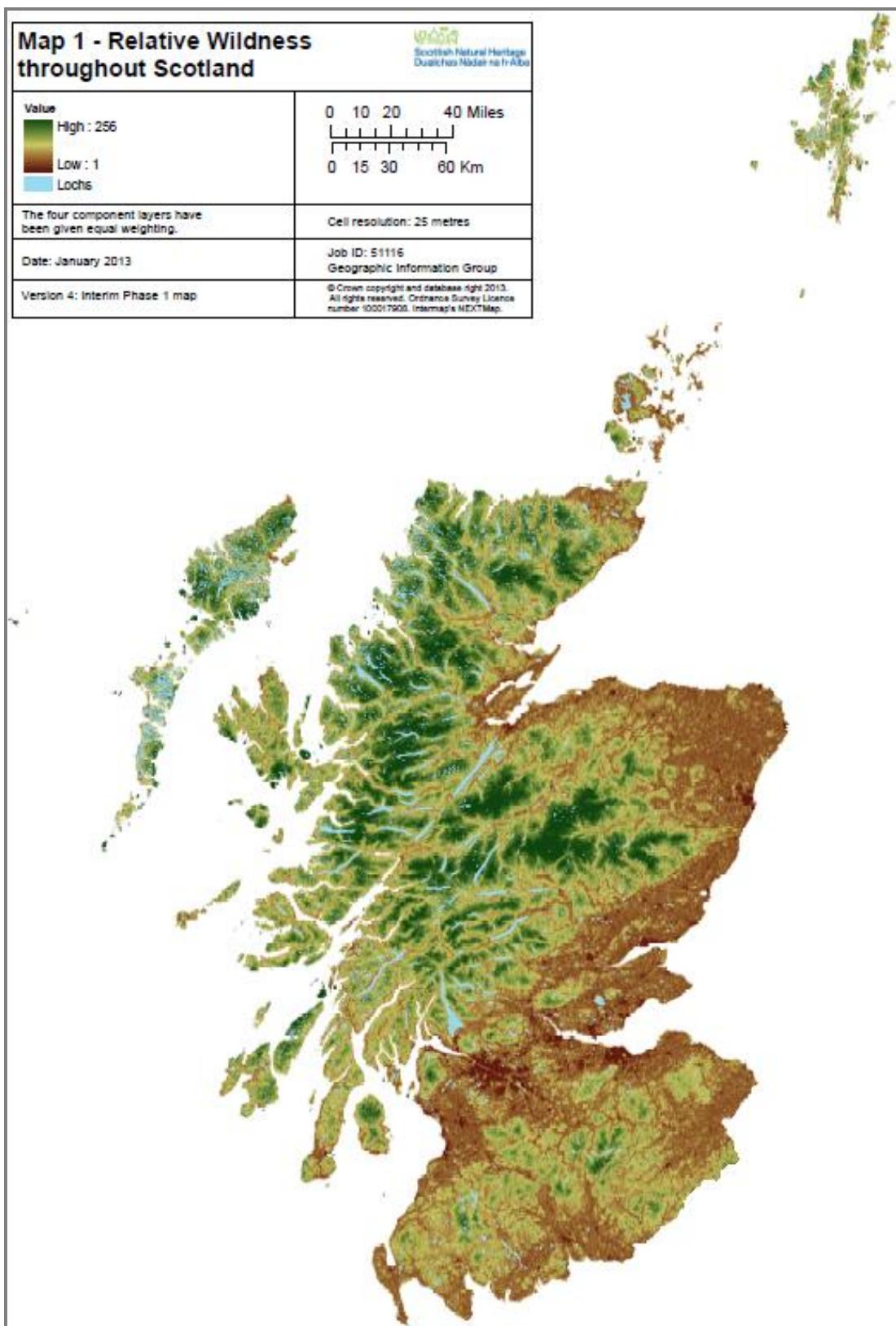


Figure B1.8.2: Core Areas of Wild Land in Scotland 2013<sup>219</sup>

<sup>219</sup> SNH (2013) Core Areas of Wild Land in Scotland 2013 [online] Available at: <http://www.snh.gov.uk/docs/A916597.pdf> [accessed 31/05/2013]



**Figure B1.8.3: Map of Relative Wildness in Scotland<sup>220</sup>**

- 1.8.5 Two sites within Scotland have become members of the European Geoparks Network and the UNESCO Global Geoparks Network: The North West Highlands Geopark; and Geopark Shetland. Although not specifically a

<sup>220</sup> SNH (2012) Map of Relative Wildness Throughout Scotland [online] Available at: <http://www.snh.gov.uk/docs/A810729.pdf> [accessed 09/05/2013]

landscape designation, these sites have been recognised for their internationally significant geodiversity, with both sites having coastal and/or landscape elements<sup>221</sup>.

### Pressures

- 1.8.6 The main sources of pressure on Scotland's landscapes and seascapes are from coastal and marine development and the anticipated effects of climate change. Coastal and offshore development, including increases in renewable developments and aquaculture in coastal and offshore waters, may exert pressures on valued coastal landscapes and seascapes.
- 1.8.7 Changes to coastal processes, specifically changes to coastal erosion and accretion processes, has the potential to alter these coastal landscapes and seascapes. While currently identified as an issue along sections of Scotland's coastline, the potential for erosion is expected to increase in the future with additional pressures resulting from rising sea levels and storminess associated with climate change considered likely to exacerbate existing processes<sup>222</sup>.

### ***Regional Baseline***

#### North East

- 1.8.8 While there is only one NSA within the North East region relating to the coast (the Dornoch Firth NSA), it is not located near the plan option areas located off the north eastern tip of the mainland and to the east of Aberdeen.
- 1.8.9 SNH identified 42 landscape character areas in Aberdeenshire in their Landscape Character Assessments undertaken in the late 1990s, classifying the different landscapes found in Aberdeenshire<sup>223</sup>. However, the recently adopted Aberdeenshire Local Development Plan (LDP) does not identify local landscape designations<sup>224</sup>. Instead, it intends producing further planning advice on landscape character areas which will highlight areas of increased landscape sensitivity, reflecting those areas formerly designated as Areas of Landscape Significance (ALS) in the Aberdeenshire Local Plan (shown in Figure B1.8.4).
- 1.8.10 As such, there is currently no detailed information on the landscape qualities of the landscape character areas beyond these previous assessments. However, based on the extent of the ALS previously identified, this is likely to include large areas of coastal landscape, and as such, any development proposals within these plan option areas would need to take into account potential impacts on the special qualities identified in these areas.

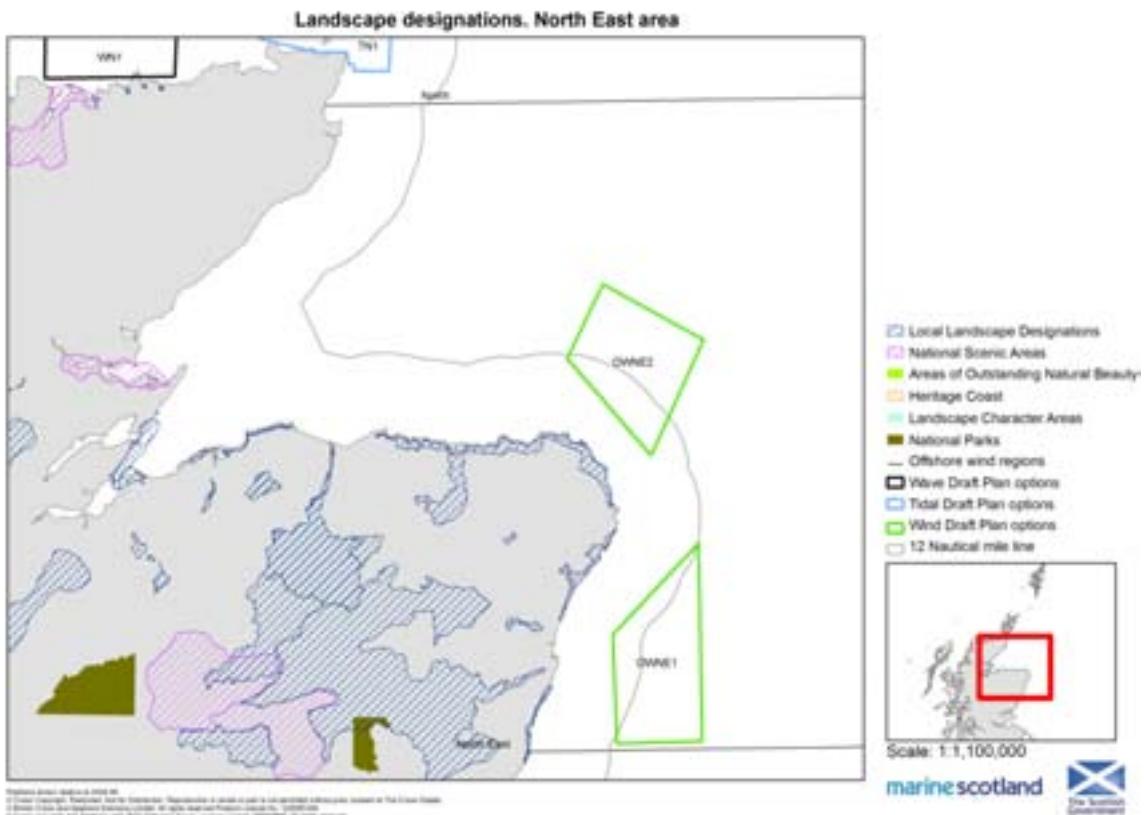
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<sup>221</sup> European Geoparks Network (undated) Meet our Geoparks [online] Available at: [http://www.europeangeoparks.org/?page\\_id=168](http://www.europeangeoparks.org/?page_id=168) [accessed 03/03/2013]

<sup>222</sup> SNH (2002) Natural Heritage Zones: A National Assessment of Scotland's Landscapes [online] Available at: <http://www.snh.gov.uk/docs/A337653.pdf> [accessed 02/04/2013]

<sup>223</sup> SNH (1999) Landscape Character Assessment (LCA) [online] Available at: <http://www.snh.gov.uk/protecting-scotlands-nature/looking-after-landscapes/lca/> [accessed 02/03/2013]

<sup>224</sup> Aberdeenshire Council (2012) Aberdeenshire Local Development Plan and Supplementary Guidance, 1 June 2012 [online] Available at: [http://www.aberdeenshire.gov.uk/planning/plans\\_policies/plan.asp](http://www.aberdeenshire.gov.uk/planning/plans_policies/plan.asp) [accessed 02/04/2013]



**Figure B1.8.4: Landscape designations in the North East**

North

*Shetland*

- 1.8.11 Seven NSAs have been identified in Shetland with a predominantly coastal character: Fair Isle, Foula, South West Mainland, Muckle Roe, Esha Ness, Fethaland and Herma Ness. These areas are valued for a diverse range of features including the variety of Shetland's extensive coastline including coastal stacks, promontories, cliffs and beaches; coastal views, both close and distant; coastal settlements; hidden coastlines; the effects of wind and shelter; a sense of remoteness; viewing the northern lights; and distinctive cultural landmarks, amongst others<sup>225</sup>.
- 1.8.12 A review of local landscape designations undertaken in 2011 found that a total of 82 Local Protection Areas (LPAs) were identified under the Shetland Local Plan ranging in size from less than one hectare to around 350 hectares in area. These areas had been designated for a range of reasons including landscape, biodiversity, archaeology, and protection of agricultural land<sup>226</sup>.
- 1.8.13 The Proposed Shetland LDP details 17 proposed Local Landscape Areas<sup>227</sup>. These areas have largely been recognised for their coastal elements, some

<sup>225</sup> SNH (2010) The special qualities of the National Scenic Areas, SNH Commissioned Report No.374 [online] Available at: <http://www.snh.gov.uk/docs/B699717.pdf> [accessed 02/03/2013]

<sup>226</sup> Land Use Consultants (2011) Shetland Local Landscape Designation Review: Final Report, Prepared for Shetland Islands Council, October 2011 [online] Available at: <http://www.shetland.gov.uk/planning/documents/ShetlandLLDRFinalReport.pdf> [accessed 02/03/2013]

<sup>227</sup> Shetland Islands Council (2012) Shetland Local Development Plan 2012, Supplementary Guidance: Local Landscape Areas, Appendix 3 [online] Available at: <http://www.shetland.gov.uk/planning/documents/CurrentLocalLandscapeAreasSG1.pdf> [accessed 03/03/2013]

with open and dramatic seascapes, and many with a rich variety of coastlines consisting of rugged coastlines, rocky headlands, tall cliffs, and sheltered sandy beaches and bays. Others have been designated for inland features such as rolling coastal hills or rugged moorland hills, with some identifying settlement areas and remoteness as key qualities of these areas. While all of these areas have coastal elements, eleven are located in the vicinity of the plan option areas including:

- Walls and Vaila, Culswick and Westerwick, Papa Stour and Sandness, and Scat Ness and Sumburgh Head in proximity to wave energy plan option areas;
- Lunna Ness and Lunning, West Sandwick to Gloup Holm, Haroldswick and Skaw, Gloup Voe and Bluemull Sound, and Scat Ness and Sumburgh Head in proximity to tidal energy plan option areas; and
- No Ness and Mousa, Aith Ness and Noss, Gletness and Skellister, and Scat Ness and Sumburgh Head in proximity to offshore wind plan option areas.

1.8.14 Geopark Shetland became a member of the European and UNESCO Global Geoparks Networks in 2009<sup>228</sup>. Although not specifically a landscape designation, it recognises the significant role that the geology of the islands play in the landscape experience, which is often evident at the coast.

1.8.15 The plan option areas are focused on the south west and south east Shetland seabords, and hence any development proposals would need to take into account potential impacts on the special qualities of these areas.

#### Orkney

1.8.16 Just one NSA has been designated on Orkney, the Hoy and the West Mainland NSA, and this area contains large sections of coastline. The special qualities identified by SNH for this area include its archaeological landscape setting demonstrated by its World Heritage Status; the layering of geology, topography, archaeology and land use; the presence of sandstone and flagstone; amongst others<sup>229</sup>. The area's coastal scenery and the contrasts between different land uses (i.e. fertile farmland, unimproved moorland and townscapes) were also identified as contributing to the setting of the area.

1.8.17 The Orkney Islands Council has identified 38 Local Landscape Areas<sup>230</sup>, including four located in the East Mainland, nine in the Southern Isles, ten in the West Mainland, and 15 in the Northern Isles. These areas were developed to support policies within the Orkney LDP and are set out in Supplementary

<sup>228</sup> Shetland Amenity Trust (2013) Geopark Scotland [online] Available at: <http://www.shetlandamenity.org/about-geopark-shetland> [accessed 02/03/2013]

<sup>229</sup> SNH (2010) The special qualities of the National Scenic Areas, SNH Commissioned Report No.374 [online] Available at: <http://www.snh.gov.uk/docs/B699719.pdf> [accessed 02/03/2013]

<sup>230</sup> Local Landscape Designations replace the Areas of Great Landscape Value and Areas of Attractive Settled Landscape designations set out in the Orkney Local Plan 2004

Guidance, which is currently being reviewed<sup>231</sup>. The areas highlight the key characteristics of the Orkney landscape with a strong coastal presence, particularly along the west coast, and include a wide range of landscapes including coastal areas made up of rugged cliffs, beaches, enclosed bays, and isolated coasts; lowland marginal areas consisting of agricultural land and wetlands, amongst others; and rolling upland areas consisting of rolling heath and moorland hills and montane habitats. Many of these areas play important roles in supporting Orkney's coastal biodiversity interests, particularly coastal areas that support important bird populations<sup>232</sup>.

- 1.8.18 The plan option areas for offshore wind and wave energy are focused on the western and northern Orkney seabords. The plan option areas for tidal energy are located to the north and south of the Orkney Isles, and within the Stronsay and Westray Firths. As such, any development proposals would need to take into account the potential for impacts on the special landscape and seascape qualities in these areas.

#### *North Mainland*

- 1.8.19 The Kyle of Tongue NSA is located along the northern coast of the Scottish mainland, immediately south of the proposed area of search for wave energy<sup>233</sup>. However, there are five Special Landscape Areas (SLAs) identified by the Highland Council on the north coast of the Scottish mainland that may also be of relevance to the plan option areas<sup>234</sup>.
- 1.8.20 The three eastern most SLAs (Oldshoremore, Cape Wrath and Durness; Eriboll East and Whiten Head; and Farr Bay, Strathy and Portskerra) and the Kyle of Tongue NSA cover much of the remote coastline between Cape Wrath to Portskerra. This area has varying seaward views which include westward views to the open Atlantic and northward views over the Pentland Firth. The landscape is noted for its largely remote and varied coastlines, with important features such as rugged rocky coastline, rocky headlands and sandy bays that contrast with the green landscapes located further inland. As such, much of this area is valued for its sense of remoteness and isolation<sup>235</sup>.
- 1.8.21 The two SLAs designated at Dunnet Head and Duncansby Head in the northern-most part of the Scottish mainland are located immediately south of the area of search for tidal energy within the Pentland Firth. Both are noted for the extensive seaward views they offer and the landscapes they contain, particularly Duncansby Head with its complex landscape of cliffs, stacks, geos, arches, caves and wave cut platforms. These areas are known to be sensitive

<sup>231</sup> Orkney Islands Council (2011) Landscape Character and Designations Supplementary Guidance April 2011 [available online] <http://www.orkney.gov.uk/Service-Directory/R/landscape-character-and-designations.htm>

<sup>232</sup> Orkney Local Landscape Area descriptions, available from <http://www.orkney.gov.uk/Service-Directory/R/local-landscape-areas.htm>

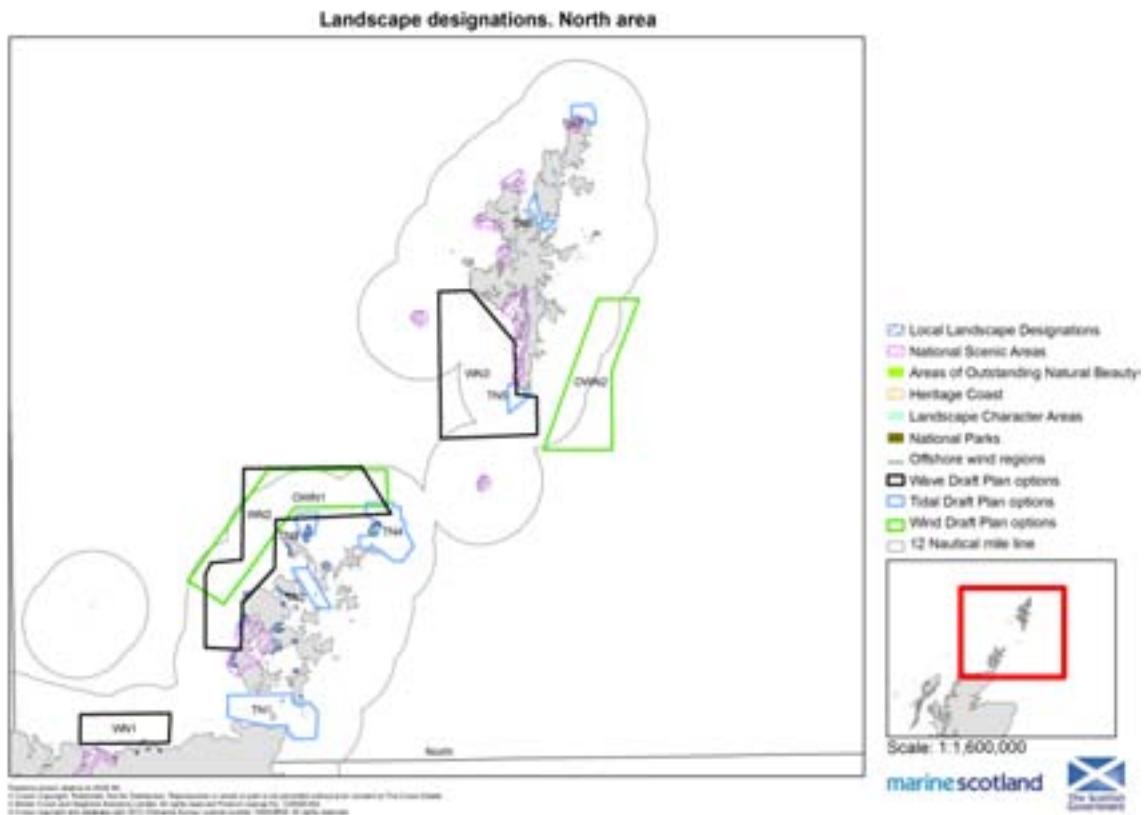
<sup>233</sup> SNH (2010) The special qualities of the National Scenic Areas, SNH Commissioned Report No.374 [online] Available at: <http://www.snh.gov.uk/docs/B699726.pdf> [accessed 02/03/2013]

<sup>234</sup> The Highland Council (2011) Assessment of Highland Special Landscape Areas, June 2011 [online] Available at: <http://www.highland.gov.uk/NR/rdonlyres/75BE9453-1C1D-4076-BCFE-D7A3BEADCB9E/0/AHSLA.pdf> [accessed 02/03/2013]

<sup>235</sup> The Highland Council (2011) Assessment of Highland Special Landscape Areas, June 2011 [online] Available at: <http://www.highland.gov.uk/NR/rdonlyres/75BE9453-1C1D-4076-BCFE-D7A3BEADCB9E/0/AHSLA.pdf> [accessed 02/03/2013]

to development which would impinge on the views from the headland, or affect the perception of scale of the cliff landscape<sup>236</sup>.

- 1.8.22 The plan option areas are focused in the Pentland Firth and off the north coast of the Scottish mainland, and any development proposals would need to take into account the potential for impacts on these designated areas.



**Figure B1.8.5: Landscape designations in the North**

North West

*North West Mainland*

- 1.8.23 Some 10 coastal NSAs are located in the North West region, with local landscape designations also extending large sections of the coastline, with two identified near to the plan option areas.
- 1.8.24 The first, the Assynt – Coigach NSA, extends from the mouth of Loch Broom, near Ullapool to Badcall Bay near Scourie, reaching inland to Ledmore and the peak of Ben More Assynt. The area is valued for its remoteness amongst a diverse coastline, long sea lochs, and unique and towering mountains and contrasting with lowlands comprising hills, moorland and peaty hollows. The special qualities of this area include a wide variety of rocky topography; small settlements nestled within a wider landscape of mountain peaks, wild

<sup>236</sup>The Highland Council (2011) Assessment of Highland Special Landscape Areas, June 2011 [online] Available at: <http://www.highland.gov.uk/NR/rdonlyres/75BE9453-1C1D-4076-BCFE-D7A3BEADCB9E/0/AHSLA.pdf> [accessed 02/03/2013]

moorlands and rocky seascapes; extensive cnochan landscapes; and extensive tracts of wild and native woodland, amongst others<sup>237</sup>.

- 1.8.25 The second, the North-West Sutherland NSA, extends from the north of Scourie Bay to the head of Loch Laxford, reaching inland to the peaks of Ben Stack, Arkle and Foinaven. The special qualities of the NSA, as identified by SNH, reflect the geology of the area. In general terms, the profiles of these peaks provide a backdrop for the area against which the indented shoreline and cnochan coastline lay. Most of the land in this part of Scotland is uninhabited and uncultivated, possessing a wild and secluded feel<sup>238</sup>.
- 1.8.26 Of the local landscape designations, the Oldshoremore, Cape Wrath and Durness SLA covers the north west tip of the Scottish Mainland coastline. It is a section of remote coastline that, like the nearby NSAs, is home to a remote and varied coastline of sheltered sandy bays to rugged cliffs, and is regarded for its remoteness<sup>239</sup>. This area is likely to be the closest to the area of search for offshore wind (OWNW1) located at the North Minch.

#### *Western Isles*

- 1.8.27 Two NSAs are located in the Western Isles in the North West region, and both are located in close proximity to the plan option areas for potential offshore developments. There are no local landscape designations in Eilean Siar.
- 1.8.28 The South Uist Machair NSA extends over the eastern coastal edge of South Uist, and is an area of distinctive flat scenery located between the mountains and the sea. Westward views across the blackland, machair and seashore are horizontal and flat, accentuated by the open sea beyond. At the shoreline, the white shell-sand beaches located along the coastline contribute to the remoteness of the area. This NSA is located to the north east of plan option areas for offshore wind and wave energy<sup>240</sup>.
- 1.8.29 The South Lewis, Harris and North Uist NSA include the upland landscape of southern Lewis and Harris, and the fragmented coast of North Uist. The special qualities of the landscape include the variety of scenery and diverse seascapes, which have a close relationship with the land. North Harris has the highest peaks in the Outer Hebrides that lend it a wild and mountainous character, and affording clear day views spanning to Cape Wrath on the mainland to the east, and to St Kilda to the west. The variation in landscape is demonstrated by the presence of white sandy machair-backed beaches on the west coast, separated by rocky headlands, and the scattering of islands in locations such as the Sound of Harris adding to the value of the diverse seascapes. The size of the NSA is large, and as such, many of the qualities

<sup>237</sup> SNH (2010) The special qualities of the National Scenic Areas, SNH Commissioned Report No.374 [online] Available at: <http://www.snh.gov.uk/docs/B699728.pdf> [accessed 02/03/2013]

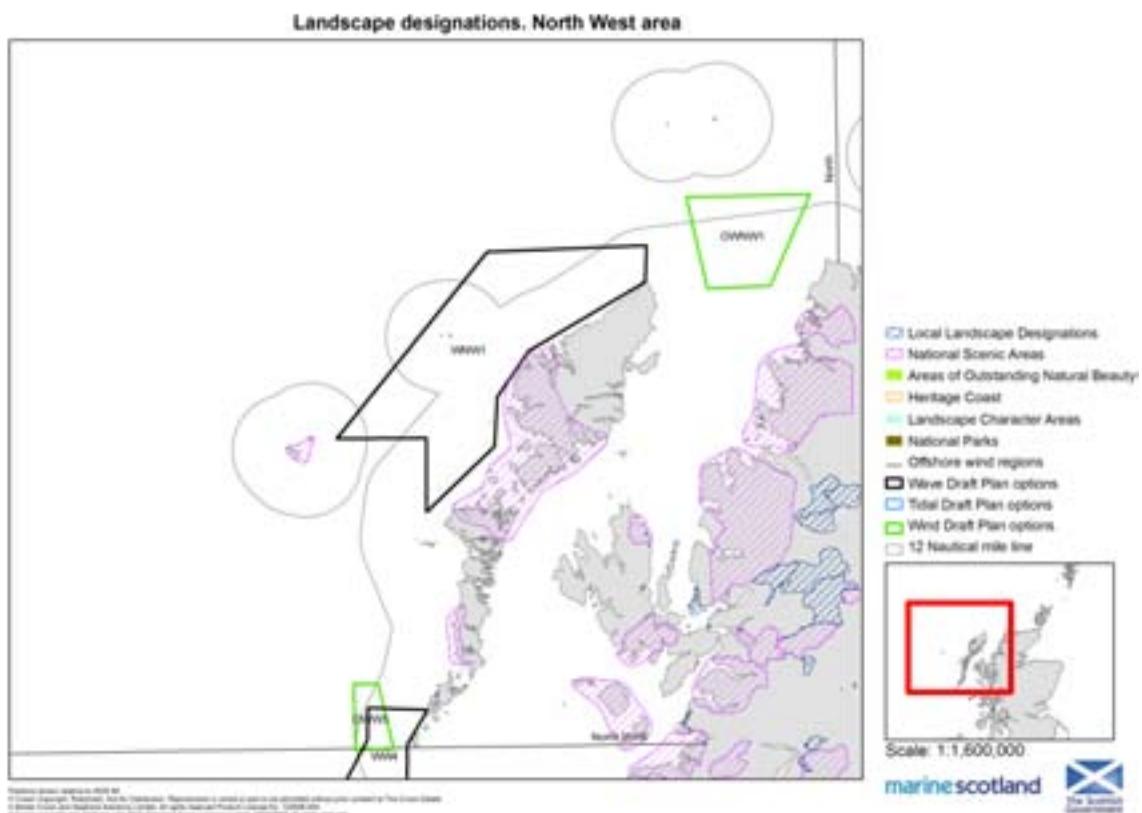
<sup>238</sup> SNH (2010) The special qualities of the National Scenic Areas, SNH Commissioned Report No.374 [online] Available at: <http://www.snh.gov.uk/docs/B699728.pdf> [accessed 02/03/2013]

<sup>239</sup> The Highland Council (2011) Assessment of Highland Special Landscape Areas, June 2011 [online] Available at: <http://www.highland.gov.uk/NR/rdonlyres/75BE9453-1C1D-4076-BCFE-D7A3BEADCB9E/0/AHSLA.pdf> [accessed 02/03/2013]

<sup>240</sup> SNH (2010) The special qualities of the National Scenic Areas, SNH Commissioned Report No.374 [online] Available at: <http://www.snh.gov.uk/docs/B699723.pdf> [accessed 02/03/2013]

attributed to the area are location specific and dependent on prevailing weather conditions. In general, the area is valued for its diverse scenery, its varying landscape formations, and its wildness and remoteness. This NSA is located to the immediately east of an area of search for wave energy (WNW1) spanning along the north west coast of Harris and Lewis<sup>241</sup>.

- 1.8.30 The North West Highlands Geopark is located in the far north of the Scottish mainland, starting at the Summer Isles in Wester Ross, continuing northwards through west Sutherland to the north coast of the Scottish mainland, and eastwards beyond Loch Eriboll to the Moine. The Geopark includes Coigach, Assynt, Eddrachilles and Cape Wrath, and although it is not specifically a landscape designation, the designation reflects the significant role the geology of the area plays in its landscape<sup>242</sup>.
- 1.8.31 The plan option areas are focused on Scottish waters to the north west of the mainland at the North Minch (offshore wind energy area OWNW1), and to the west of Eilean Siar (wave energy WNW1).



**Figure B1.8.6: Landscape designations in the North West**

<sup>241</sup> SNH (2010) The special qualities of the National Scenic Areas, SNH Commissioned Report No.374 [online] Available at: <http://www.snh.gov.uk/docs/B699723.pdf> [accessed 02/03/2013]

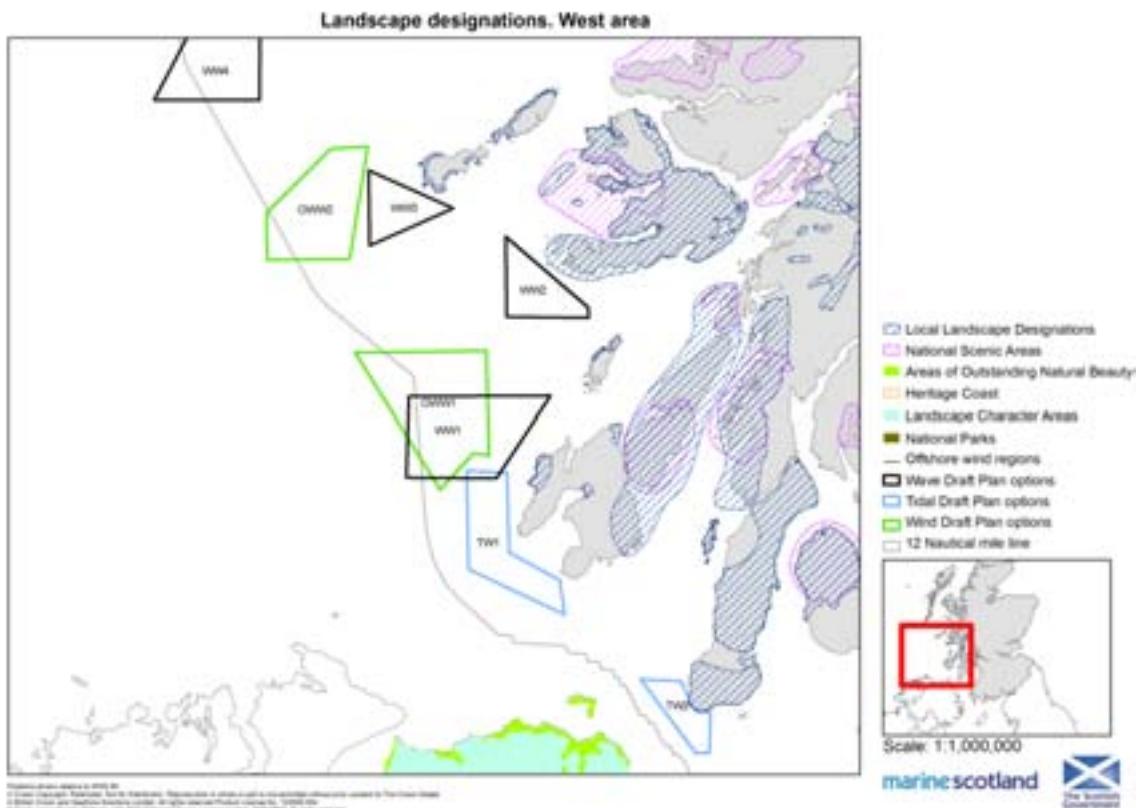
<sup>242</sup> North West Highlands Geopark (2012) Scotland's First European Geopark [online] Available at: <http://www.northwest-highlands-geopark.org.uk/geopark/index.php> [accessed 02/03/2013]

## West

- 1.8.32 There are eight NSAs within the western region that have a strong coastal relationship. However, many of these areas are closely enclosed by the surrounding landforms, such that views of the plan option areas are likely to be limited in many instances. In addition the Northern Irish coastline closest to the Mull of Kintyre contains the Causeway Coast Area of Outstanding Natural Beauty (AONB), and the Antrim Coast and Glens AONB.
- 1.8.33 Loch na Keal, Isle of Mull NSA includes the surrounding slopes above of Loch na Keal, and the islands within the bay comprising Ulva, Gometra, Staffa and the Treshnish Isles. This NSA is valued for its highly distinctive seaways and shores surrounding the sea loch, and the influence of these islands on the landscape. The terraced hills provide a dramatic coast of basalt terraces and cliffs, while the sea loch affords views of a seascape including islands and islet groups. The distinctive character of the islands provides location specific qualities, for example, at Staffa and Fingal's Cave, the Treshnish Isles and the Dutchman's Cap<sup>243</sup>. This area is located to the north east and east of two plan option areas for wave energy (WW2 and WW3).
- 1.8.34 Local landscape designations also extend over much of the coastal area of South Ayrshire, and the peninsulas of Argyll and Bute. These designations, called Areas of Panoramic Quality (APQs), are set out in the Argyll and Bute Local Plan<sup>244</sup>, and include a number of areas that may be relevant to the plan option areas. As for other NSAs in this region, many of these areas are closely enclosed by the surrounding landforms, and views of the plan option areas are likely to be limited in many instances. It is noted that although these areas are marked on the proposals maps in the Local Plan, they do not have any supporting information on their justification or key characteristics. However, many of these areas have coastal elements, and as such, the APQs located at the southern tip of Kintyre, in large parts of Islay, and in large areas of western Mull have been identified in proximity to plan option areas for offshore wind, wave and tidal energy.
- 1.8.35 The plan option areas located to the south west and west of Tiree (OWW2 and WW3), south west of Mull (WW1, WW2 and OWW1), west and north west of Islay (OWW1, WW1 and TW1), and south west of the southern tip of the Kintyre peninsula (TW2) are located in the vicinity of these designated areas. As such, development proposals would need to take into account potential impacts on the quality of these valued areas.

<sup>243</sup> SNH (2010) The special qualities of the National Scenic Areas, SNH Commissioned Report No.374 [online] Available at: <http://www.snh.gov.uk/docs/B699722.pdf> [accessed 02/03/2013]

<sup>244</sup> Argyll and Bute Council (2009) Argyll and Bute Local Plan, Adopted 2009 [online] Available at: <http://www.argyll-bute.gov.uk/planning-and-environment/local-plan> [accessed 03/03/2013]



**Figure B1.8.7: Landscape designations in the West**

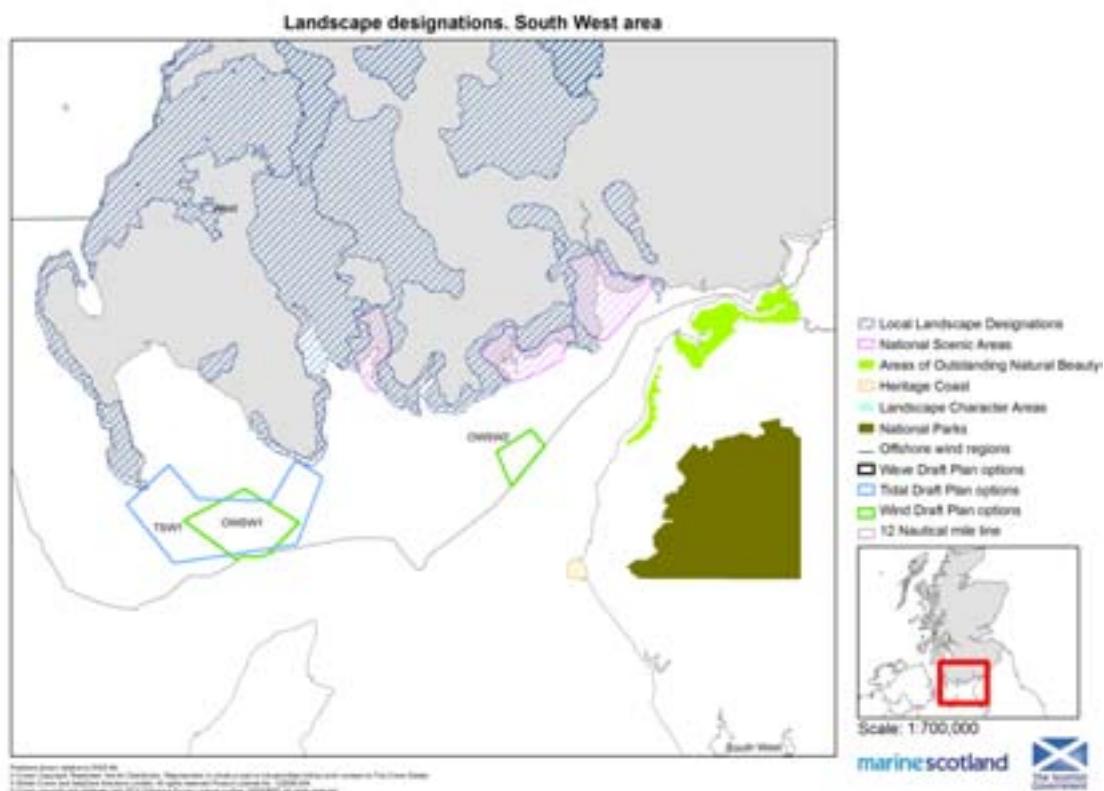
### South West

- 1.8.36 There are three NSAs within Dumfries and Galloway that have a strong coastal relationship with the Solway Firth (Fleet Valley, East Stewartry Coast and Nith Estuary). However, none of these areas are located in direct sight of the plan option areas located to the south of the mainland between Mull of Galloway and Burrowhead. Coastal sections of the Strangford and Lecale AONB, and the Moorne and Slieve Croob AONB in Northern Ireland and the Solway AONB in England could be considerations for development in the South West.
- 1.8.37 Local landscape designations extend over much of the coastal area in this region. Five Regional Scenic Areas (RSA) were identified in a technical paper accompanying the Dumfries and Galloway Proposed LDP<sup>245</sup> with a coastal element. Of these, three are considered potentially relevant to the plan option areas for offshore wind and tidal energy.
- 1.8.38 The Rhins Coast RSA includes the rocky coastlines of the Rhins peninsula, and includes the whole of the narrow peninsula leading to the Mull of Galloway. The coast is characterised by steep cliffs of varying height, raised beaches, rocky foreshores, and small rocky and sandy bays connected by a ribbon of low lying land with scattered farmsteads and occasional coastal villages. Whilst popular with tourists, the coastlines are relatively inaccessible and sparsely populated, approached at intervals by networks of narrow lanes and from

<sup>245</sup> Dumfries and Galloway Council (2013) Dumfries and Galloway Proposed Local Development Plan, Technical Paper, Regional Scenic Areas, January 2013 [online] Available at: <http://www.dumgal.gov.uk/CHtpHandler.ashx?id=359&p=0> [accessed 03/03/2013]

occasional coastal villages connected by major roads. Inland views of the coast tend to be limited in the undulating topography<sup>246</sup>.

- 1.8.39 The Mochrum Lochs RSA is located on the north west side of Luce Bay, and is the smallest of the region's RSAs. The Mochrum Lochs are a combination of inland scattered lochs amidst an undulating topography and the coastal expression of this distinctive moorland landscape. The landscape has an open, exposed, wild feel with a distinctive character, although relatively small in extent and more limited in its coastal aspect<sup>247</sup>.
- 1.8.40 The Machars Coast RSA includes the rocky coastline around the head of the Machars peninsula which has a strong visual relationship with the sea. The landscape comprises smooth undulating hills and valleys and improved pasture, with rocky and knolly areas. The coastline comprises steep, low, grassy cliffs, raised beaches and rocky foreshores with occasional sandy coves, and the landscape is sparsely populated and the coastline relatively inaccessible. As on the Rhins, the coastal influence is lost behind intervening horizons within around a kilometre of the shore<sup>248</sup>.
- 1.8.41 Given the locations of the plan option areas to the south of Luce Bay, any development proposals at these locations would need to take into account potential impacts on the quality of these designated areas.



**Figure B1.8.8: Landscape designations in the South West**

<sup>246</sup> Dumfries and Galloway Council (2013) Dumfries and Galloway Proposed Local Development Plan, Technical Paper, Regional Scenic Areas, January 2013 [online] Available at: <http://www.dumgal.gov.uk/CHtpHandler.ashx?id=359&p=0> [accessed 03/03/2013]

<sup>247</sup> Dumfries and Galloway Council (2013) Dumfries and Galloway Proposed Local Development Plan, Technical Paper, Regional Scenic Areas, January 2013 [online] Available at: <http://www.dumgal.gov.uk/CHtpHandler.ashx?id=359&p=0> [accessed 03/03/2013]

<sup>248</sup> Dumfries and Galloway Council (2013) Dumfries and Galloway Proposed Local Development Plan, Technical Paper, Regional Scenic Areas, January 2013 [online] Available at: <http://www.dumgal.gov.uk/CHtpHandler.ashx?id=359&p=0> [accessed 03/03/2013]



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