A1a.6 Birds

A1a.6.1 Introduction

The UK and its surrounding seas are very important for birds. The extensive network of cliffs, sheltered bays, coastal wetlands, and estuarine areas, provide breeding and wintering grounds for nationally and internationally important numbers of individual bird species and assemblages. As a signatory to a number of international conservation conventions, the UK has a legal obligation to conserve bird species and their habitats.

The baseline provides a description of the main colonies and sites for seabirds and waterbirds in each of the Regional Sea areas, as well as a description of their distribution at sea. It has been compiled using a variety of resources, and draws data from recent surveys of seabird colonies and sites used by waterbirds during winter.

A1a.6.2 UK context

A1a.6.2.1 Seabirds and waterbirds

Some twenty five species[1] of seabird regularly breed in the UK and Ireland as do a number of other waterbird and wader species (Table A1a.6.1). The definition of "waterbird" varies slightly between authorities, but for the purpose of this report, waterbird includes seaducks, divers and grebes, bittern and herons, rails, crakes and coots and wildfowl (this group includes swans, geese and ducks – the Joint Nature Conservation Committee (JNCC) refer to this group as waterfowl).

Table A1a.6.1: Seabird and waterbird species regularly breeding in the UK and Ireland

Family	Species
Seabirds	
Procellariidae	Four species: fulmar (*Fulmarus glacialis*), Manx shearwater (*Puffinus puffinus*), storm petrel (*Hydrobates pelagicus*), Leach's petrel (*Oceanodroma leucorhoa*)
Phalacrocoracidae	Two species: cormorant (*Phalacrocorax carbo*), shag (*Phalacrocorax aristotelis*)
Sulidae	One species: gannet (*Morus bassanus*)
Stercorariidae	Two species: great skua (*Catharacta skua*), Arctic skua (*Stercorarius parasiticus*)
Laridae	Seven species: herring gull (*Larus argentatus*), common gull (*Larus canus*), black-headed gull (*Larus ridibundus*), lesser black-backed gull (*Larus fuscus*), great black-backed gull (*Larus marinus*), Mediterranean gull (*Larus melanocephalus*), kittiwake (*Rissa tridactyla*)
Sternidae	Five species: Sandwich tern (*Sterna sandvicensis*), roseate tern (*Sterna dougallii*), common tern (*Sterna hirundo*), Arctic tern (*Sterna paradisaea*), little tern (*Sterna albifrons*)
Alcidae	Four species: guillemot (*Uria aalge*), razorbill (*Alca torda*), black guillemot (*Cepphus grylle*), puffin (*Fratercula arctica*)

[1] The JNCC seabird monitoring programme references twenty six seabird species regularly breeding in the UK, which includes the red throated diver. This environmental section includes this species in the divers/grebes group.

Family	Species
Waterbirds and waders	
Anatidae	Twenty-one species: mute swan[1] (*Cygnus olor*), greylag goose[1] (*Anser anser*), Canada goose[1] (*Branta canadensis*), Egyptian goose[1] (*Alopochen aegyptiacus*), shelduck[1,2] (*Tadorna tadorna*), mandarin[1] (*Aix galericulata*), wigeon[1,2] (*Anas penelope*), gadwall[1] (*Anas strepera*), teal[1] (*Anas crecca*), mallard[1] (*Anas platyrhynchos*), pintail[1] (*Anas acuta*), garganey (*Anas querquedula*), shoveler[1] (*Anas clypeata*), pochard[1] (*Aythya farina*), tufted duck[1] (*Aythya fuligula*), eider[1,2] (*Somateria mollissima*), common scoter[1,2] (*Melanitta nigra*), goldeneye[1] (*Bucephala clangula*), red-breasted merganser[1,2] (*Mergus serrator*), goosander[1] (*Mergus merganser*), ruddy duck[1] (*Oxyura jamaicensis*)
Gaviidae	Two species: red-throated diver[1] (*Gavia stellata*), black-throated diver[1] (*Gavia arctica*)
Podicipedidae	Four species: little grebe[1] (*Tachybaptus ruficollis*), great crested grebe[1] (*Podiceps cristatus*), Slavonian grebe[1] (*Podiceps auritus*), black-necked grebe[1] (*Podiceps nigricollis*)
Ardeidae	Three species: bittern[1] (*Botaurus stellaris*), little egret[1,2] (*Egretta garzetta*), grey heron[1,2] (*Ardea cinerea*)
Rallidae	Five species: water rail[1] (*Rallus aquaticus*), spotted crake (*Porzana porzana*), corncrake[1] (*Crex crex*), moorhen[1] (*Gallinula chloropus*), coot[1] (*Fulica atra*)
Haematopodidae	One species: oystercatcher[1,2] (*Haematopus ostralegus*)
Recurvirostridae	One species: avocet[1,2] (*Recurvirostra avosetta*)
Charadriidae	Four species: little ringed plover[1], (*Charadrius dubius*) ringed plover[2] (*Charadrius hiaticula*), golden plover[1,2] (*Pluvialis apricaria*), lapwing[1,2] (*Vanellus vanellus*)
Scolopacidae	Eleven species: dunlin[1,2] (*Calidris alpina*), ruff[1,2] (*Philomachus pugnax*), snipe[1] (*Gallinago gallinago*), woodcock[1] (*Scolopax rusticola*), black-tailed godwit[1,2] (*Limosa limosa*), whimbrel[1] (*Numenius phaeopus*), curlew[1,2] (*Numenius arquata*), common sandpiper[1,2] (*Actitis hypoleucos*), greenshank[1,2] (*Tringa nebularia*), redshank[1,2] (*Tringa totanus*), red-necked phalarope[1,2] (*Phalaropus lobatus*)

Notes: [1] Waterbird species which also regularly overwinter/stage in the UK. [2] Species which make significant use of the marine/maritime habitats during breeding.
Source: JNCC website http://jncc.defra.gov.uk/page-1419, Hume (2002)

The UK lies on some of the major migratory flyways of the east Atlantic, with many species not only overwintering in the area, but also using the UK as a stopover during spring and autumn migrations (Table A1a.6.2 – see also species[1] from Table A1a.6.1). Birds do not use fixed migratory corridors, with migration instead (usually) a broad front.

Table A1a.6.2: Waterbirds and waders which regularly overwinter/stage in the UK[1]

Family	Species
Anatidae	Fifteen species: Whooper swan (*Cygnus cygnus*), Bewick's swan (*Cygnus columbianus bewickii*), bean goose (*Anser fabalis*), pink-footed goose[2] (*Anser brachyrhynchus*), (European) white-fronted goose (*Anser albifrons albifrons*), (Greenland) white-fronted goose (*Anser albifrons flavirostris*), (Nearctic) barnacle goose[2], (Svalbard) barnacle goose[2] (*Branta leucopsis*), (dark-bellied) brent goose[2] (*Branta bernicla bernicla*), (Light bellied) brent goose[2], (Svalbard) brent goose[2] (*Branta bernicla hrota*), scaup[2] (*Aythya marila*), long-tailed duck[2] (*Clangula hyemalis*), velvet scoter[2] (*Melanitta fusca*), smew[2] (*Mergus albellus*)
Gaviidae	One species: great northern diver[2] (*Gavia immer*)
Podicipedidae	One species: red-necked grebe[2] (*Podiceps grisegena*)
Charadriidae	One species: grey plover (*Pluvialis squatarola*)
Scolopacidae	Ten species: knot[2] (*Calidris canutus*), sanderling[2] (*Calidris alba*), little stint[2] (*Calidris minuta*), curlew sandpiper[2] (*Calidris ferruginea*), purple sandpiper[2] (*Calidris maritima*), Jack snipe[2] (*Lymnocryptes minimus*), bar-tailed godwit (*Limosa lapponica*), green sandpiper (*Tringa ochropus*), wood sandpiper (*Tringa glareola*), spotted redshank[2] (*Tringa erythropus*)

Notes: [1] Wintering birds, which also breed in the UK, are shown in Table A1a.7.1. [2] Species which make significant use of marine/maritime habitats during winter/passage
Sources: JNCC website http://jncc.defra.gov.uk/page-1419, Holt et al. (2015)

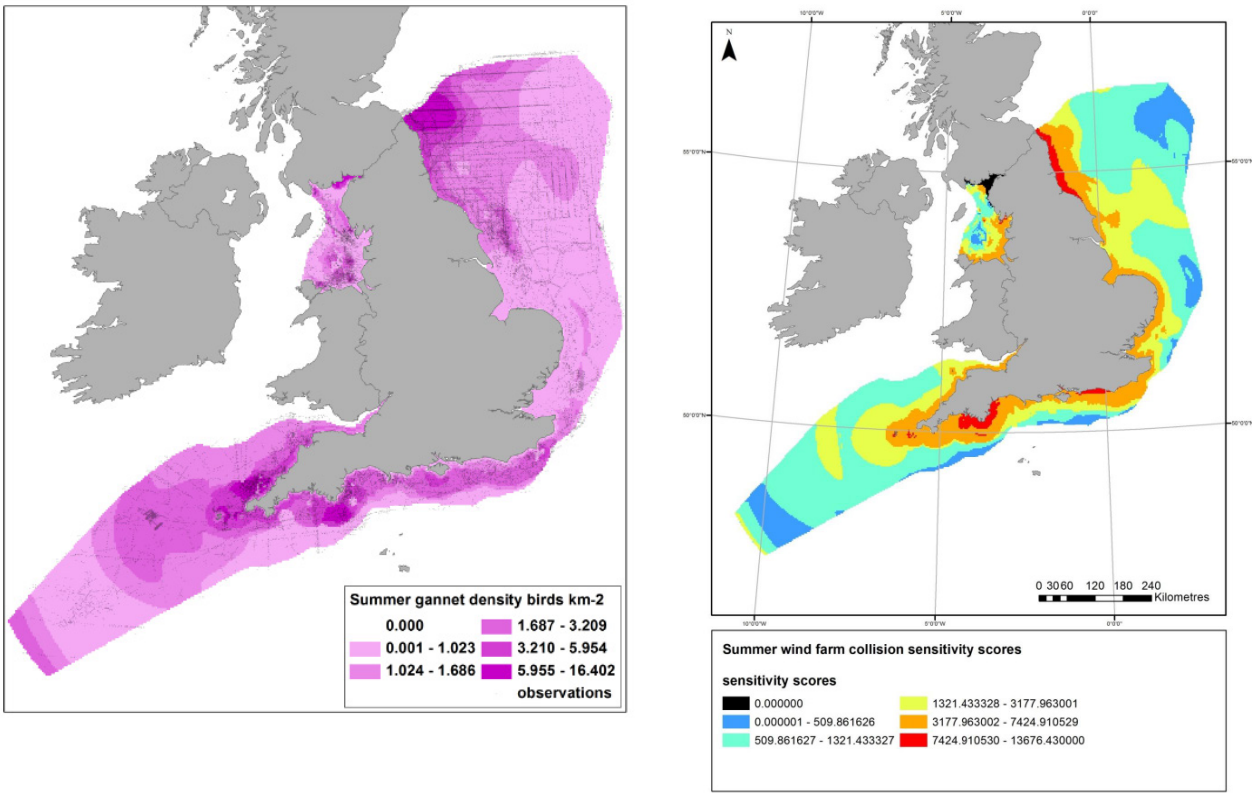
A1a.6.2.2 Publications

Relevant publications or work undertaken contributing to the present baseline knowledge of UK bird species, from which final, or preliminary results have been used to inform the assessment (in Section 5 of the Environmental Report) of bird sensitivity to elements of this plan/programme are summarised below.

European Seabirds at Sea (ESAS) was established in 1991 and is an international collaboration between organisations throughout north-west Europe, and consists of a common database for data from systematic seabird monitoring programmes conducted in British, Dutch, Belgian, German, Danish, Swedish and Norwegian waters. The current version of the database contains over two million records of bird sightings collected over 25 years. Information from ESAS is also included in OBIS-SEAMAP (Ocean Biogeographic Information System – Spatial Ecological Analysis of Megavertebrate Populations), a spatially referenced database for marine mammal, seabird and sea turtle data (http://seamap.env.duke.edu/).

The ESAS database, along with aerial survey data collected by the Wildfowl & Wetlands Trust (WWT) are the two main datasets used to develop the GIS tool SeaMaST (Seabird Mapping and Sensitivity Tool) which aims to provide evidence of sea area use by seabirds and inshore waterbirds in English territorial waters, and mapping their sensitivity to offshore wind farms (Bradbury *et al*. 2014). See Figure A1a.6.1 for example outputs of gannet distribution and collision and displacement sensitivity respectively.

Figure A1a.6.1: Predicted densities of gannets in summer (left graphic) and summer wind farm collision sensitivity scores (right graphic)



Notes: Predicted densities of gannets in summer from DSM of ESAS boat and WWT Consultancy aerial data, with survey observations shown. Collison sensitivity produced using highest densities either from ESAS or WWT density predictions.
Source: Bradbury et al. (2014)

A census of all 25 seabird species that regularly breed in Britain and Ireland has been carried out on three occasions: Operation Seafarer (1969-70, Cramp *et al*. 1974); the Seabird Colony Register (SCR) (1985-88, Lloyd *et al*. 1991) and Seabird 2000 (1998-2000, Mitchell *et al*. 2004). The SCR served as the foundation for future seabird population monitoring and facilitated the collection of colony information and also led to the initiation of the Seabird Monitoring Programme (SMP) which began in 1986. This involves the regular monitoring of seabird demographics such as population size and breeding success, with results available annually. The most detailed monitoring occurs at "key sites" including the Isle of Man, Fair Isle, Canna and Skomer: with recent publications for the Isle of May (Newell *et al*. 2013), and Canna colonies (Swann 2013). The Royal Society for the Protection of Birds (RSPB) are working with partners including JNCC, the British Trust for Ornithology (BTO), SNH, Natural England, Natural Resources Wales and others, to build support for another national seabird census and are hoping to have an up-to-date population estimate of the UK and Irelands breeding seabirds by 2019 (RSPB website).

Mavor *et al*. (2008) detailed the 18th annual report of the results of seabird monitoring at colonies in the UK and Ireland in the now discontinued JNCC publication *Seabird numbers and breeding success in Britain and Ireland*. It is replaced by the SMP and the online Seabird Population Trends and Causes of Change which is updated annually. The online report highlight notable changes in seabird numbers and breeding performance at each colony studied: trend information is presented at the UK level and separately for Scotland, Wales, England, Northern Ireland, Republic of Ireland, all-Ireland, Channel Islands and Isle of Man, with interpretation of trends and reasons for change given largely at UK level.

The first edition of the BTO's Northern Ireland Seabird Report covering 2013 was published in 2014, with the second report published in 2015. This report, to be published annually, provides details on breeding seabird numbers and productivity from sites across Northern Ireland. A full register of known, possible or potential nesting sites (consistent with the Seabird Monitoring Programme site register) was created.

In the UK and Ireland, seabird surveys are undertaken using standard survey guidelines for each species – see Table A1a.6.3 and these units have been used throughout the section where applicable.

Table A1a.6.3: Representative breeding season foraging ranges of some seabird species

Unit	Abbreviation	Description
Apparently Occupied Nest	AON	An active nest occupied by a bird, pair of birds, or with eggs or chicks present
Apparently Occupied Site	AOS	An active site occupied by a bird, pair of birds, or with eggs or chicks present. Used for species without obvious nests.
Apparently Occupied Territory	AOT	An active nest, with eggs or chicks, apparently incubating or brooding adult, with adults distracting or alarm calling, with pairs/single bird in potential breeding habitat, apparently attached to the area.
Apparently Occupied Burrow	AOB	An apparently active and occupied burrow which may have a nest
Individuals	Ind	Individual birds

Source: Walsh et al. (1995), BTO (2015)

The RSPB's publication *The State of the UKs Birds 2015,* is an annual publication which pulls data from a range of sources, to provide an in-depth overview of the status of bird populations in the UK and gives an update on trends.

The annual report "*The state of the UK's birds*" is a collaborative publication from the RSPB, BTO, WWT and the UK Government's statutory nature conservation agencies, and is now on its 16th edition. The report provides an overview of the health of bird populations in the UK and its overseas territories.

In the UK, terrestrial, coastal and marine Special Protection Areas (SPAs) have already been classified in compliance with the "Birds Directive" (79/409/EEC) and the UK is continuing to identify and designate SPAs (offshore or with marine components) as required under Directive 2009/147/EC on the conservation of wild birds (a codified version of the Birds Directive). UK SPAs are not just designated for seabird and waterbird/wader species/assemblages, with a number of other bird species, which utilise coastal and island habitats, qualifying, either for their breeding or wintering population under the Directive.

The JNCC report by Kober *et al*. (2010) on the numbers and distribution of seabirds within the British Fisheries Limit aimed to assist in identifying potential marine SPAs. The report used a suite of analyses based on UK selection guidelines 1.1-1.3 (see Table A1a.6.4), with Kober *et al*. (2012) providing an overview of further analyses carried out to select areas to be considered under stage 1.4. The first report identified only a small number (8) of possible SPA locations (under stages 1.1-1.3 – Stroud *et al*. 2001) with limited temporal and geographical spread for a small number of species; the second report identified an additional suite of twenty-nine areas (under stage 1.4 – Mudge & Buxton 2013) and 5 "near-qualifying" areas that only just failed to meet the criterion of regularity. The next stage is for these to be evaluated based on ecological criteria; a time line for this is not yet known.

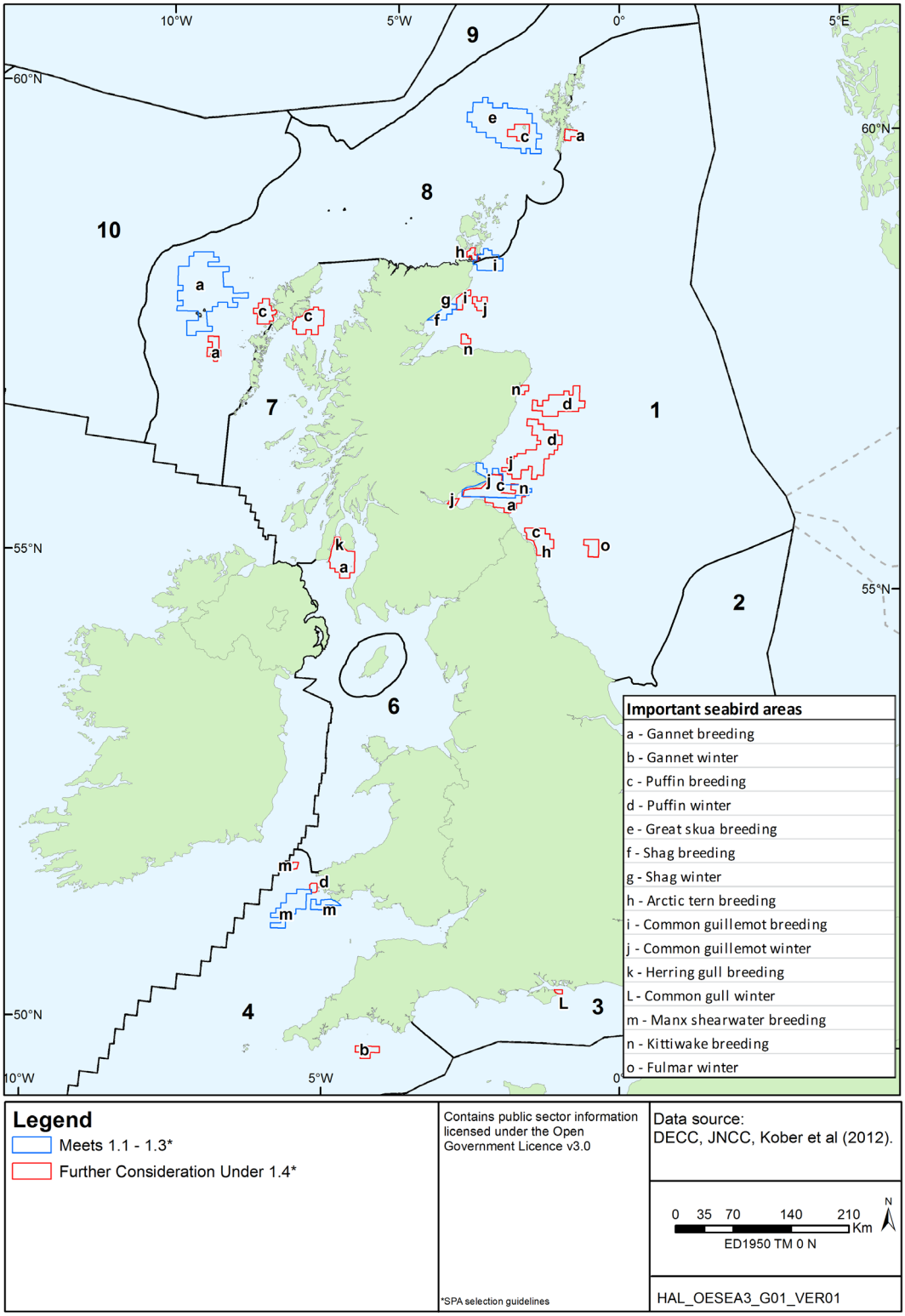
Table A1a.6.4: UK SPA selection guidelines[1]

Stage	Component
1.1	Numbers of species listed on Annex I of the Birds Directive should exceed 1% of the agreed Great Britain (GB) (or if relevant the all-Ireland) population for the species on a regular basis
1.2	For migratory species not listed on Annex I of the Birds Directive, numbers at a site should exceed 1% of the agreed biogeographic population[2] for the species on a regular basis
1.3	For waterbird species assemblages, more than 20,000 waterbirds (as defined by the Ramsar Committee) of at least two species, should occur regularly at a site
1.4	Where application of stages 1.1-1.3 does not identify an adequate suite of areas, sites may be selected if they satisfy one or more of various ecological criteria listed under Stage 2 (e.g. by virtue of population size and density, by contributing to species range etc.).

Notes: [1]. SPA selection should be determined in two stages. Stage 1 is intended to identify areas that are likely to qualify for SPA status on the basis of threshold populations, or other ecological considerations. Stage 2 is intended to consider locations identified at Stage 1 as well as other potentially important areas to select the most suitable areas. The stages above (1.1-1.4) are the components of Stage 1, under which an area may be considered. 2. Biogeographic population is defined as a group of birds which breed in a particular location (or group of locations), breed freely within the group, and rarely breed or exchange individuals with other groups (Lloyd et al. 1991).
Source: Stroud et al. (2001)

From Kober *et al*. (2010, 2012), four important multispecies regions were evident: the outer Firth of Forth, with the Wee Bankie and Marr Bank; the inner Firth of Forth; the Moray Firth and the north and west of the Shetland islands (Regional Seas 1 and 8). These areas were identified as being important for a variety of species or seabird assemblages. Other important areas, but for lower number of species included those off the north coast of Scotland, around St Kilda and to the west of Skomer and Skokholm (Kober *et al.* 2012) (see Figure A1a.6.2).

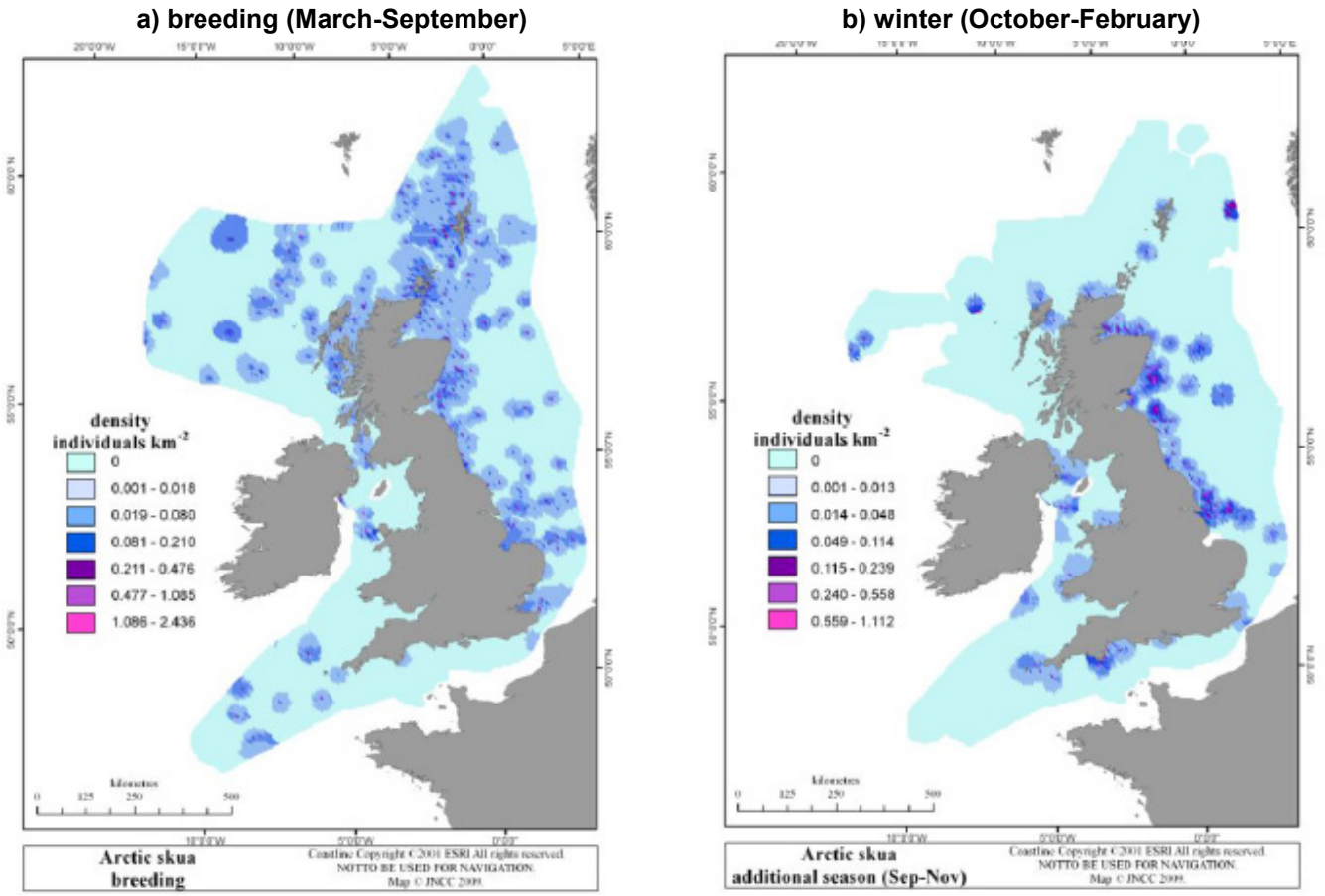
Figure A1a.6.2: Important seabird areas identified under stage 1.1-1.4 criteria



Note: All important seabird areas identified for a total of 11 species. Areas meeting stages 1.1-1.3 are displayed, near-qualifying areas are not shown.
Source: Kober at al. (2012)

Kober *et al*. (2010) produced density surface maps for selected species, see example in Figure A1a.6.3.

Figure A1a.6.3 a & b: Predicted density surface maps of Arctic skua



Source: Kober at al. (2010)

In 2012, Thaxter *et al*. published a review of representative breeding season foraging ranges; which with other data could be as a preliminary tool for identifying possible Marine Protected Areas. Table A1a.6.5 summarises the maximum foraging distances and an indication of confidence level (highest, moderate, low, uncertain, poor) from Thaxter *et al*. (2012b).

Table A1a.6.5: Representative breeding season foraging ranges of some seabird species

Species	Maximum foraging ranges (km)	Confidence of assessment
Eider	80	Poor
Red-throated diver	9	Low
Fulmar	580	Moderate
Manx shearwater	32 & >330	Moderate
Storm petrel	>5	Poor
Leach's storm petrel	<120	Poor
Gannet	590	Highest
Cormorant	35	Moderate
Shag	17	Moderate
Arctic skua	75	Uncertain
Great skua	13 & 219	Moderate, Low
Black-headed gull	40	Uncertain
Common gull	50	Poor
Mediterranean gull	20	Uncertain
Herring gull	92	Moderate

Species	Maximum foraging ranges (km)	Confidence of assessment
Lesser black-backed gull	181	Moderate
Kittiwake	1202	Highest
Sandwich tern	54	Moderate
Roseate tern	30	Low
Common tern	30	Moderate
Arctic tern	30	Moderate
Little tern	11	Low
Guillemot	135	Highest
Razorbill	95	Moderate
Puffin	200	Low

Source: Thaxter et al. (2012b)

Wakefield *et al*. (2015), looking at colonial breeding animals constrained by their colony location and limited by resource availability, used the satellite tracks of 184 individual (chick-rearing) foraging gannets from 12 neighbouring colonies in the British Isles to test whether among-colony segregation occurred and the potential mechanisms for these. They found gannets from these colonies foraged in largely mutually exclusive areas and proposed the colony-specific home ranges were determined by density-dependant competition, rather than territoriality; despite potential overlap of home ranges, foraging birds show movement away from neighbouring colonies. From the analysis, Wakefield *et al*. (2015) suggest, contrary to the prevailing view, between colony segregation as a result of density-dependant completion, is the norm when aggregations of colonial central-place foragers, such as gannets, occur at high densities, requiring a re-examination of the current understanding of their foraging ecology.

Cook *et al*. (2015) reviewed some of the important areas identified by Kober *et al*. (2010, 2012), and other independent information to give "*the most robust and complete evidence-base possible (given current knowledge) on which to base any future decisions*" (this review looked at 25 of the 42 aggregations identified by Kober *et al*. 2010, 2012). These 25 areas were a shortlist of areas considered by the Statutory Nature Conservation Bodies for designations as marine SPAs for seabirds.

Cook *et al.* (2015) found the quality and quantity of independent data for aggregations identified by Kober *et al*. (2010, 2012) was variable. This notwithstanding, the report notes "*even in cases with limited data availabilty, there were often strong ecological reasons to suggest the areas identified by Kober et al. (2010, 2012) were likely to be of importance to seabirds*", with an anticipation that knowledge gaps could be filled through further marine bird surveys, broad scale tracking projects (e.g. the RSPB FAME project – see below) or more detailed tracking studies.

Seaward extensions of 1, 2 or 4km from existing site boundaries, were proposed by the JNCC for thirty-eight seabird colonies. Thirty-one of these were in Scotland and the extensions were confirmed in 2009 by the Scottish Government. The extension of the boundaries to include marine feeding areas for seabirds for three of the remaining seven sites: Glannau Aberdaron ac Ynys Enlli/Aberdaron Coast and Bardsey Island, Grassholm, and Skokholm and Skomer were confirmed by the Welsh Assembly in 2014.

In 2014, SNH published a suite of Scottish marine draft Special Protection Areas[2]; there will be a formal consultation process of those dSPAs confirmed for progression by Scottish Ministers. SNH will progress the marine dSPAs within 12 nautical miles from the Scottish coast and JNCC will progress those offshore. The marine dSPAs in Scottish waters are summarised in Table A1a.6.6.

Table A1a.6.6: Suite of marine dSPAs in Scotland being considered for progression[1]

Marine bird interest category	Summary of sites
Inshore wintering waterfowl	Of 22 areas of search identified of potentially hosting qualifying numbers of wintering divers, grebes and seaduck, 9 areas have been shortlisted as representing the main concentrations and range of species.
Seabird aggregations	Data from the European Seabird at Sea database used in hotspot analysis, to identify aggregations of seabirds. From this, 5 areas have been included in the suite.
Foraging areas for breeding terns	Tern movements from breeding tern colonies analysed to identify foraging distributions around colonies of interest. 5 colonies have been chosen all of which overlap with categories of marine SPA interest.
Foraging areas for breeding red-throated divers	Survey and tracking data from important red-throated diver areas were used to determine foraging distributions. 6 sites have been included in the network of dSPAs, all overlap with other marine bird interests.
Important areas for European shag	Inshore wintering waterfowl data, seabird aggregations analysis and tracking data from the shag colony on the Isle of May enabled identification of important foraging areas around this colony (which is part of a terrestrial SPA). 4 areas have been identified and selected for inclusion in the suite of dSPAs, all of which overlap other marine bird interests.

Reference: SNH (2014a). Notes: [1] this table summaries information on possible draft SPAs released in a joint SNH/JNCC/Marine Scotland information pack, to alert stakeholders to additional marine sites likely to be considered by the Scottish Government

The only bird species included as a search feature for the identification of Marine Protected Areas (MPA) and Marine Conservation Zones (MCZ) is the black guillemot, a species which is not considered migratory in the UK and not included as an Annex I species on the Birds Directive. Summaries of the MPAs and proposed MCZs for black guillemot are described in the relevant sections below - see also the Conservation section (Appendix A1j).

The Natural England commissioned report, *Non-breeding season populations of seabirds in UK waters* was published in 2015 (Furness 2015) and this reviews evidence of seabird populations present in UK waters during this time, including not only birds from the UK, but also those from overseas populations, that pass through UK waters on migration, or winter in UK waters. The overall aim of the project is to review and define species-specific non-breeding season seabird populations at biologically defined minimum population scales, in order to enable potential impacts of marine renewable developments to be apportioned during the non-breeding season.

A number of satellite tagging studies have been commissioned on behalf of the DECC SEA programme. These include a 3 year RSPB study of the foraging ranges of northern gannets

[2] See http://www.snh.gov.uk/docs/A1350044.pdf

from the Bempton Cliff breeding colony (Regional Sea 2) and overlaps with offshore wind farm zones (Langston & Boggio 2011, Langston & Teuten 2012 and Langston *et al*. 2013a and b). The BTO tagged lesser black-backed gulls (Alde-Ord Estuary SPA, Regional Sea 2) and great skuas (Foula/Hoy, Regional Sea 8) to better understand the connectivity between these species and areas of consented and proposed offshore windfarm areas (e.g. Thaxter *et al*. 2011, 2012a, 2014). As part of a wider study the University of Leeds tagged adult gannets raising chicks at Bass Rock (Regional Sea 1) over three consecutive breeding seasons (2010-2012) to estimate the foraging ranges and densities of birds at sea and their flight heights during different activities and spatial variation in flight height and potential collision risk with offshore wind farms during foraging trips. These results were compared to collision risk predictions using flight heights reported from ship-based and radar-based studies by Cleasby *et al*. (2015).

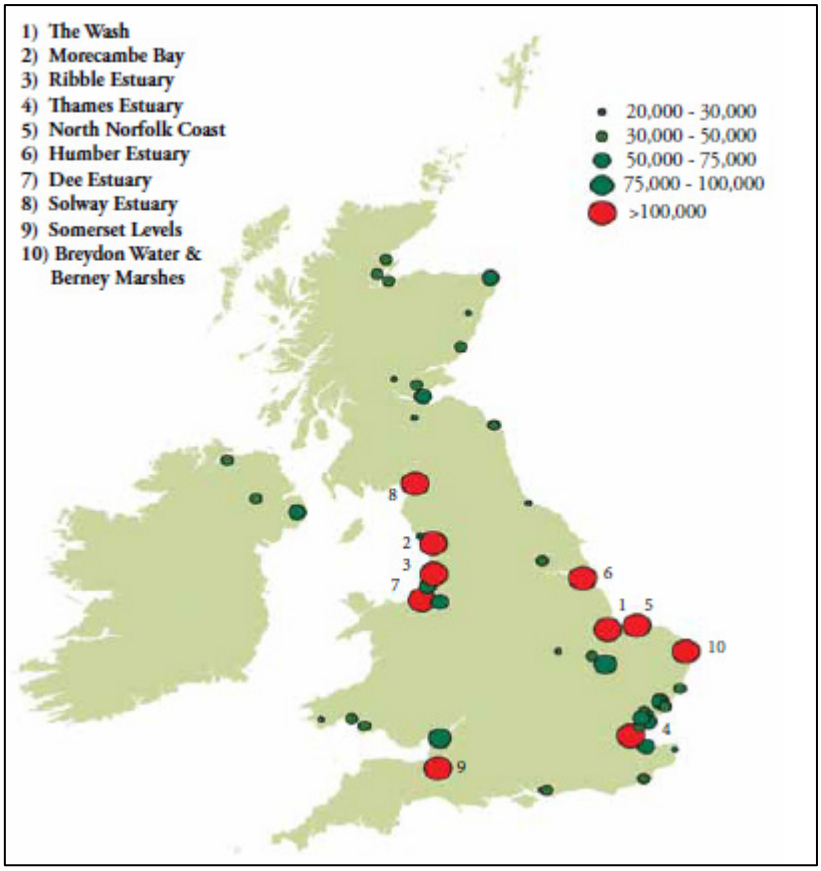
A number of other projects have been commissioned to allow improved collision risk modelling from a range of colonies including high resolution GPS tagging of gannets at Bass Rock and Ailsa Craig, of lesser black backed gulls at Skokholm and South Walney and herring gulls at South Walney. High resolution tagging of Bewick's swans, has been undertaken to improve understanding of migration routes and to allow improved turbine collision risk modelling.

Other major seabird tagging projects include FAME (Future of the Atlantic Marine Environment) and STAR (Seabird Tracking and Research), with tracking of seabirds on the coast of Britain and Ireland, and internationally (counts also carried out in colonies in Portugal, France and Spain). The data from both projects is publicly available via the RSPB.

Other reports from a variety of different sources, e.g. Wildlife Trust publications, project specific ornithological surveys and journals (e.g. Ibis and Scottish Birds) are available and provide additional information on birds at specific areas of interest. In addition, survey data and reports collected during the planning, building and operating of offshore renewable energy projects, is provided by the Marine Data Exchange, with The Crown Estate acting as trustee for the data (http://www.marinedataexchange.co.uk/).

The annual Wetland Bird Survey (WeBS) is a partnership scheme of the British Trust for Ornithology (BTO), WWT, RSPB and JNCC (Holt *et al*. 2015) and provides information on the population size, distribution and the most important sites for non-breeding waterbirds (i.e. wildfowl and waterfowl) in the UK. It aims to provide the principal data on which the conservation of populations and wetland habitats is based. WeBS monitoring continues two long-running count schemes; synchronised 'Core Counts' conducted once per month year round, at a wide variety of coastal and wetland sites and 'Low Tide Counts' on selected estuaries with the aim of identifying key areas used principally by feeding birds. UK wetlands supporting the largest aggregations of wintering waterbirds (based on data collected 2008/09-2012/13) are shown in Figure A1a.6.4. Counts from 2013/2014 and the 5 year mean count from the top principal sites within each Regional Sea area are described within the relevant sections. A comprehensive list of all sites supporting more than 10,000 birds is available at www.bto.org/webs.

Figure A1a.6.4: Largest wintering waterbird aggregations in the UK (2009/10-2013/14)



Notes: Wetlands supporting average annual peaks of 20,000+ waterbirds. The top 10 wetlands, all averaging 100,000+ birds are labelled. Numbers are based on summed species peaks in each year.
Sources: Hayhow et al. (2015), Holt et al. (2015)

As part of the DECC SEA programme, WWT is continuing the analysis of 50 tagged whooper swans, recording migration data during their spring and autumn migrations as well as interpreting existing WWT satellite tracking data in relation to windfarm locations for three goose species (Svalbard Barnacle goose, Greenland white-fronted goose and East-Canadian light-bellied brent goose) (Griffin *et al*. 2011, Griffin *et al*. 2010a and 2010b), (see also Regional Sea 1 and 6 sections).

The JNCC are assessing areas possibly supporting important aggregations of wintering divers, seaduck and grebes for potential SPA protection and have conducted aerial surveys in a number of areas including the south Cornwall coast (O'Brien *et al*. 2014), Cardigan Bay (O'Brien *et al*. 2015) and inshore marine areas (e.g. Firth of Forth, Firth of Tay, Aberdeen Bay etc.) (Lawson *et al*. 2015) – see Regional Sea sections 4 and 6 for descriptions of South Cornwall coast and Cardigan Bay respectively.

Lawson *et al*. (2015) presented details of wintering aggregations of inshore waterbirds in over 20 areas of search around Scotland to inform SNH advice on possible locations for SPA designations. A combination of aerial survey, land based counts or boat based survey were used, targeting inshore waterbirds that spend the winter within coastal areas. The search area covered, where feasible, inshore waters from the low tide mark to ~50m depth. Data were collected from 2000-2010 during winter (November to March) and species which exceeded the Stage 1.1, 1.2 and 1.4 thresholds (Stroud *et al*. 2001, Mudge & Buxton 2013) for each area were identified. The areas of search and the species encountered are described in the relevant Regional Sea sections. Of the target species, four species were not present in numbers >1% of

their UK populations in any of the areas of search: goosander, great crested grebe, red-necked grebe and cormorant, and two areas did not hold any species in relevant numbers.

Individually no areas of search held numbers above the threshold of 20,000 individuals for assemblage feature (Stage 1.3). However, by combining two areas of search, which are in close proximity, creating a single site the *Outer Firth of Forth and Tay Bay complex*, this exceeded the threshold (>31,000 individuals) and this merged area is under consideration as a proposed SPA (see Regional Sea 1) (Lawson *et al*. 2015). If some existing intertidal SPAs which abut inshore areas of search are included, the overall populations may exceed the threshold for assemblages (Lawson *et al.* 2015).

A1a.6.3 International context of seabird populations

The importance of British and Irish seabird populations can be considered in global and biogeographical contexts. The latter is of particular importance in terms of the EU Directive on the Conservation of Wild Birds (EC/79/409), as under Article 4, member states are required to classify SPAs for important populations of birds. A biogeographical population is defined as a group of birds which breed in a particular location (or group of locations), breed freely within the group, and rarely breed or exchange individuals with other groups (Lloyd *et al*. 1991).

A1a.6.4 Ecological context

Seabirds have a variety of feeding methods and are able to exploit most marine food sources. Diverse feeding strategies are also seen between species. Gulls are very opportunistic and are adaptable; equally at home feeding on fishing boat discards, foraging on estuarine mudflats, rocky shores or inland on newly ploughed fields. Gulls and skuas also steal food from other birds or directly predate other seabirds' eggs and chicks, occasionally killing adult birds. Some species, e.g. petrels and kittiwake, are surface feeders or feed at shallow depths on fish, plankton and crustaceans. Other seabirds can exploit deeper waters, either plunge diving to relatively shallow depths, and greater depths by those species that can swim under water. Terns plunge for fish and crustaceans, such as sandeels, sprats and aquatic invertebrates, while the gannet can plunge-dive deeper than terns and exploit a deeper prey source including herring, sprat, sandeels and mackerel. Several species, including the cormorant, shag, divers and the auks, can dive and swim to collect deeper water and demersal species, including flatfish, saithe, whiting, sprat and sandeels.

Waterbirds with short beaks, e.g. dunlin, prey on species at the sediment surface while species with long slender bills can forage for deeper burrowed prey. Slender billed species tend not to overturn stones in search of prey as seen in the turnstone. Oystercatchers and other birds with similar beak structure probe mud- and sandflats for prey such as bivalve molluscs.

Due to the wide range of habitats which they exploit and their high position in the food chain, birds can provide good indicators of the state of the environment. Changes at lower trophic levels, particularly those affecting the abundance of their prey species, may result in marked effects on birds populations. For example, the decline in breeding success at many seabird colonies has been attributed to low food availability, particularly of sandeels - a major food source for many species. Additionally, changes in the levels of discarded fish from commercial fishing vessels will alter the availability of food for species which scavenge on this resource.

A1a.6.5 Features of Regional Sea 1

Regional Sea 1 extends along the east coast of Shetland and follows the east coast of Britain from Duncansby Head to Flamborough Head, and encompasses the inshore and offshore areas of the northern North Sea. For the purposes of this section, the whole of Shetland will be

described, not just the east coast, with the whole of Orkney, including an offshore area to the east of the Islands is described in Regional Sea 8.

Some areas of this region are extremely important for seabirds and coastal waterbirds, with much of the cliffed coastline colonised by seabirds and the region is used throughout the year by species (for breeding, wintering or on migration). The area also includes many important offshore areas which seabirds depend upon for prey and for large proportions of the year, their habitat, e.g. some species of seabird spend the winter at sea. Important areas include the cliff and island habitats and the many firths, including Cromarty, Dornoch, Tay and Firth of Forth and an area that straddles the border of Regional Sea 1 and 2, Flamborough Head and Bempton Cliffs. The description of this site has been included in the Regional Sea 2 area.

Sites referred to or described in this section are listed geographically north to south where possible.

A1a.6.5.1 Seabird species and distribution

Of the seabird species currently breeding in the UK, only the Mediterranean gull is not recorded as breeding in Regional Sea 1. Coastal areas here support thousands of breeding seabirds and a summary of the most important breeding seabird colonies, all of which are designated as SPAs, are shown in Table A1a.6.7.

Table A1a.6.7: Important breeding seabird colonies in Regional Sea 1

Site	Species (includes designated features and those present in assemblages)
Hermaness, Saxa Vord and Valla Field	Gannet, great skua, puffin
Fetlar	Arctic tern, great skua, Manx shearwater
Ramna Stacks and Gruney	Leach's storm petrel
Papa Stour	Arctic tern
Noss	Gannet, great skua, guillemot, fulmar, kittiwake, puffin
Mousa	Arctic tern, storm petrel
Sumburgh Head	Arctic tern, shag
Fair Isle	Arctic tern, guillemot, fulmar, gannet, shag, Arctic skua, kittiwake, razorbill, puffin
East Caithness Cliffs	Guillemot, herring gull, kittiwake, razorbill, shag
Cromarty Firth	Common tern
Inner Moray Firth	Common tern
Troup, Pennan & Lion's Head	Guillemot, gannet
Loch of Strathbeg	Sandwich tern
Buchan Ness to Collieston Coast	Herring gull
Ythan Estuary, Sands of Forvie & Meikle Loch	Common tern, little tern, sandwich tern, herring gull
Fowlsheugh	Guillemot, kittiwake, razorbill
Firth of Tay & Eden Estuary	Little tern
Firth of Forth Islands Firth of Forth	Arctic tern, common tern, roseate tern, sandwich tern, gannet, lesser black-backed gull, puffin, shag
St Abbs Head to Fast Castle	Shag, kittiwake, guillemot
Lindisfarne	Little tern
Farne Island	Arctic tern, common tern, roseate tern, sandwich tern, guillemot, puffin, cormorant, shag
Northumbrian Coast	Little tern

Site	Species (includes designated features and those present in assemblages)
Coquet Island	Arctic tern, common tern, roseate tern, sandwich tern, puffin
Teesmouth & Cleveland Coast	Little tern

Notes: Sites in bold are designated as Seabird Assemblages of International Importance, under Article 4.2 of the Birds Directive are shown in bold (qualifying level is 20,000 birds).
Sources: JNCC website (http://jncc.defra.gov.uk/page-2598), Mitchell et al. (2004)

Of the potential suite of marine draft SPA (dSPA) areas in Scotland, presented in the joint SNH/JNCC publication (SNH 2014a), three dSPA for their breeding seabird species have been proposed in this region and are being evaluated: Moray Firth (shag); Ythan Estuary (sandwich tern, little tern) and Outer Firth of Forth and Tay Bridge Complex (little gull, common tern, Arctic tern, gannet, Manx shearwater, shag, kittiwake, guillemot, razorbill, puffin, black-headed gull, common gull, herring gull). Both the Moray Firth and the Outer Firth of Forth and Tay Bay Complex draft SPAs also include wintering waterbird species as proposed protected features. These sites, along with the draft marine SPAs summarised in the other regional areas, are being evaluated and formal consultation will be carried out, if these sites are confirmed for progression by the Scottish Minister (SNH 2014a).

The Farne Islands SPA and the Coquet Islands SPA have both had 1km seaward extensions to existing SPA boundaries to encompass marine areas, and there is a proposed extension to the Teesmouth and Cleveland Coast SPA to include two additional features for protection, breeding avocet and common tern, and an extension of 5km in both direction along the coast from the existing SPA boundary and a 3.5km seaward extension.

Shetland and the north-east coast of Scotland have a number of seabird colonies, the boundaries between which are often indistinct. Many of these colonies are regarded as of international importance for seabirds and are amongst the most important areas for offshore seabirds in Europe.

With the exception of sites on the west coast of Scotland and Orkney, Shetland is the only other place in Britain where Arctic and great skua breed, with breeding sites located throughout the archipelago; no birds have been recorded breeding in England or Wales and only the great skua is a recent potential breeder in Northern Ireland (see Regional SEA 6). It is thought that Arctic skuas have probably declined more than any other seabird in the period between 1986 and 2014, with the 2014 population index estimated to be 81% lower than in 1986 (JNCC 2015). A marked decline in its population on Shetland (42%) between the SCR and Seabird 2000 is leading to calls for extensive survey work on Shetland to ascertain the scale of the decline (JNCC 2015). In contrast, the great skua has been showing increases in colonies surveyed in the region, e.g. Hermaness, Noss, Mousa.

Shetland (including Foula), has also seen a decline in the number of breeding shags. In 2013, counts from Sumburgh Head to Mousa found a 72% decline in nests counted compared to that found in 2010, with the number of active nests also declining from 97% to 51% over this period (JNCC 2014). There were 22% fewer nests found in south-east Yell in 2013 (137 nests found, 91% active) compared to 2009 (176 nests, 99% active), while there was a 17% decrease in nests found on Fetlar between 2013 (105, 72% active) and the previous survey in 2002 (126, 94% active). Decreases were also recorded on Foula's north, east and south coasts (154 apparently occupied nests AON) from the 2007 survey, compared to 451 AON in 2000) with decreases also recorded on the west coast of Foula (JNCC 2014). Colonies of shags along the eastern coast of Regional Sea 1, from the Northern Isles to Berwickshire, also saw declines between 2013 (1,872 AON) and the preceding decade (3,433 AON during 2004) (JNCC 2014). The biggest decline from colonies in Regional Sea 1 between Seabird 2000 and surveys in

2013 and 2014 were at Fair Isles (-69%, survey in 2013), Firth of Forth Islands (-41%, 2014) and St Abb's Head (-54%, 2014) (JNCC 2015).

Guillemot numbers in study plots on mainland Shetland have been falling since peak numbers were recorded in 2000, with plots surveyed in 2013 holding 70% fewer guillemots, declines which continued with the 2014 survey, e.g. numbers at Sumburgh Head fell 55% between Seabird 2000 and the 2014 survey. Study plots surveyed over the same time period (2000-2013) also recorded declines at Fowlsheugh (-28%) and St Abb's Head (-19%) (JNCC 2015).

There was little change in kittiwake numbers in Scotland between Operation Seafarer and the SCR, after which numbers began to decline. A steady decline has continued with the index in 2013 recording 23% of the 1986 baseline. Some of the largest colony declines have been in the Northern Isles (See Regional Sea 8 for Orkney), with colonies in Shetland declining at an average rate of just over 14% per annum (while there was also a decline in colonies down the east coast, the average decline was slower at an estimated 5.3% per annum (JNCC 2014).

The Moray Firth and surrounding coastline is of year round importance for birds. Breeding seabirds including kittiwake, guillemot and razorbill at coastal colonies, such as on the Caithness Cliffs, commute offshore to feed, potentially over Smith Bank. Cormorants, shags, gulls and terns tend to feed closer to shore. Other major colonies along this coast include the Sands of Forvie, which supports the majority of the Scottish breeding population of sandwich terns, and which has seen numbers of little tern roughly halved from that recorded in Seabird 2000 (JNCC 2014). Fowlsheugh, one of the largest guillemot colonies in the UK, the Isle of May which supports one of the largest colonies of common tern and Bass Rock, which from counts in 2014, led to it being named the world's largest gannet colony, with some 75,000 apparently occupied sites (AOS); an increase of 24% since a similar count was made in 2009 (Scottish Seabird Centre website) (Figure A1a.6.5). Seas extending outwards from seabird colonies become important in the post breeding season, when adults and young leave the nest; gannet chicks for example leave the colonies during August and September and remain on the sea surface for about a week until they are able to fly.

Figure A1a.6.5: Bass Rock gannet colony, June 2014

Source: Murray et al. (2015)

During the breeding season, adult gannets from the Bass Rock colony have been recorded foraging up to 590km away, with many birds foraging much closer (Hamer *et al*. 2000, 2007). Between mid-June and mid-August, over three consecutive breeding seasons (2010 (n=49), 2011 (n=25) and 2012 (n=33)) adult gannets raising chicks were caught at the nest, where they were fitted with GPS loggers; a subset of which were also fitted with pressure loggers in 2011 (n=11) and 2012 (n=5) (Cleasby *et al*. 2015) in order to identify foraging ranges. These were found to extend up to 536.5km from the colony (mean ± SD = 180.9km±106.0, n=516 trips by 55 individuals) and encompassed proposed wind farm sites close to the Firth of Forth and elsewhere in the North Sea. The core area of foraging activity overlapped extensively with proposed wind farm sites close to the colony.

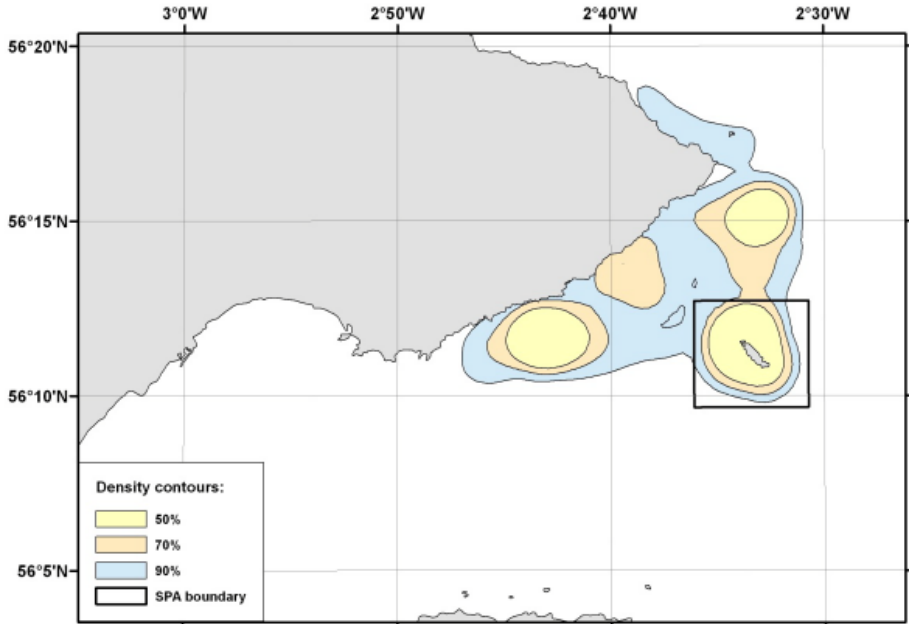
One of the two main mainland gannet breeding colonies is also found in Regional Sea 1 at Troup Head (north east coast of Scotland); the other being Bempton Cliffs (see Regional Sea 2). Other key areas for breeding seabirds include Isle of May, Inchcolm, Leith Docks, Inchkeith and St Abb's Head.

The stronghold in Scotland for the roseate tern, the rarest breeding seabird in Britain (RSPB website) was the Firth of Forth and the three islands in the Forth which held colonies have seen declines over the last 40 years. Only one of the colonies has been active in recent years but this too has apparently disappeared due to flooding, predation and disturbance, with the breeding status of this species only being maintained in Scotland through the occurrence of single pairs occasionally frequenting other tern colonies. Puffins on the Isle of May showed an increase in numbers between Seabird 2000 (42,000 AOB) and 2003 (69,300 AOB) followed by a substantial decline in 2009 (44,971 AOB), with numbers recorded in 2013 (46,200 AOB), showing little recovery over that four year period (JNCC 2014).

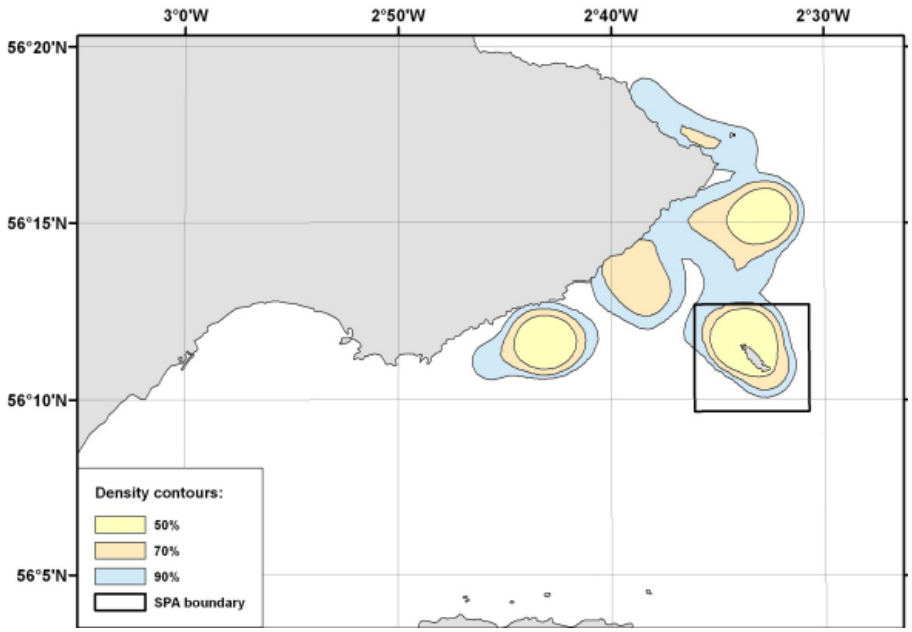
Continuing the work to support the fulfilment of the UK's obligations under the Birds Directive, including the creation of a network of SPAs "*for regularly occurring migratory birds*" the JNCC looked at shag distribution from location data collected from breeding birds on the Isle of May (1987-2010), with the aim of informing the identification of possible suitable SPA areas for this species. Three core foraging areas were identified: the area surrounding the Isle of May; an inshore area north of the island near Fife Ness and an inshore area west of the island, along the mainland coast – use of these three main foraging areas varied between years (Daunt *et al*. 2015) (see Figures A1a.6.6 a and b).

Figure A1a.6.6 a & b: Foraging range of shags breeding on Isle of May

a) over the whole study period (1987-2010)



b) in the years where GPS loggers were deployed (2003-2010),



Notes: 50%, 70% and 90% kernel density contours and the current SPA boundary are shown.
Source: Daunt et al. (2015)

Along the English coast, between Berwick-upon-Tweed and just north of Flamborough Head, are two of the most important seabird breeding sites at Farne Island and Coquet Island, with other colonies present including Holy Island and Long Nanny, Marsden Bay, South Gare and Filey North Cliffs. Coquet Island supports one of the largest breeding colonies of roseate terns, with 100 pairs of the red-listed[3] threatened species recorded in 2015, compared to 24 pairs in 1999. The increase has been attributed to a programme of conservation including the creation

[3] The International Union for Conservation of Nature red list of threatened species, see http://www.iucnredlist.org/

of shingle terraces and the introduction of nest boxes (RSPB website: http://www.rspb.org.uk/groups/westonsupermare/news/2015/7/), but this may be to the detriment of other colonies, with the birds abandoning them in favour of Coquet (JNCC 2014).

Coquet Island also supports one of the two largest colonies of puffins in England, the other is Farne Island, also in Regional Sea 1, which between them, held 95% of England's puffins during the last census. In the intervening period, the population has fluctuated, showing a decrease of around one third immediately after Seabird 2000, with some recovery by 2008, and now showing signs of decline again (12,344 Apparently Occupied Burrows (AOB) recorded in 2013, 36% fewer than 2008); with limited recovery seen on the Farne Islands, a larger colony than Croquet with a 24% decline recorded between 2003 (55,674 AOB) and 2008 (36,835 AOB) and only a slight increase by 2013 (39,962 AOB). Craigleith and Fidra, two islands in the Firth of Forth also saw little change in puffin numbers between the 2013 (5,000 AOB and 755 AOB respectively) and 2009 surveys (4,500 and 800 AOB respectively) (JNCC 2014).

A1a.6.5.2 Seabird distribution at sea

Seabird distribution and abundance in the northern and central North Sea varies throughout the year, with offshore areas, in general, containing peak numbers of birds following the breeding season and through winter. Seabirds are distributed closer inshore during the breeding season, foraging closer to coastal breeding colonies in spring and early summer (see Table A1a.6.9).

The inshore areas between Fetlar and Haroldswick in Shetland and waters along the East Caithness Coast have been recognised for their importance for black guillemot with the designation of two Marine Protected Areas (MPAs). The Fetlar to Haroldswick MPA covers the area where the North Sea and Atlantic Ocean meet, encompassing a variety of islands, open coastline, sheltered bays and voes and where turbulent mixing of waters and strong tides occur and the East Caithness Cliffs MPA, encompasses the nearshore waters off the coast between Wick and Helmsdale in the north of Scotland used by foraging black guillemot (~1,500 breeding birds (SNH 2014c & d)).

The waters of the Outer Moray Firth and the nearshore waters off the Moray coast are of particular importance as feeding areas; the broad area encompassed by Smith Bank as defined by the 50m depth contour has sandy sediment suitable for sandeel burrowing, and sandeels have been commonly recorded in grab samples across the area. After breeding, adult and juvenile auks move offshore where the adults moult. The waters around Smith Bank also support the largest year round concentration of shags in British waters, while the coast along the southern Moray Firth is of particular year round importance for herring gulls.

Boat-based surveys were conducted for the Beatrice Offshore Wind Farm (BOWL) project in the Moray Firth between October 2009 and September 2011 (RPS 2012) and covered an area of approximately 383km^2 which included a 4km buffer of the wind farm site boundary. A single aerial survey was undertaken in March 2011 where weather prevented the use of boat based methods. For the 22 boat-based surveys, 21,419 individuals were recorded across 22 species. Those most frequently observed species are summarised in Table A1a.6.8.

Table A1a.6.8: Most frequently observed birds from Beatrice Demonstrator and BOWL project surveys

Species	Beatrice AP		BOWL Area 2008-2011
	Observations	Individuals	Observations
Kittiwake	1,138	2,943	2,519
Auk[1]	1,113	5,757	12,249
Fulmar	887	1078	2459
Gannet	528	707	528
Great black-backed gull	246	424	502
Herring gull	137	193	415
Great skua	49	51	91
Shag	30	63	41
Sooty shearwater	17	34	118
Arctic tern	-	-	29
Arctic skua	-	-	19

Notes: All data are totals for the year. [1]*All auk species segregated (includes guillemot, black guillemot, little auk, puffin and razorbill)*
Sources: Talisman (2006), RPS (2012)

In early autumn, the waters off the Aberdeenshire coast are of particular importance to moulting auk, and moulting rafts can be found widely dispersed in many areas of the North Sea, particularly off the eastern coast of Scotland and northern England. Puffins, which do not moult until spring, can be found concentrated in the area around the Buchan Front (*ca*. 60-100 km off the Aberdeenshire coast) during this time. Table A1a.6.9 describes the general distribution of seabirds at sea throughout the year.

In the southern part of the region, similar behaviours, i.e. foraging relatively close inshore during breeding/chick rearing, then dispersal after fledging is also seen in the seabird colonies on the English coast and islands, e.g. Farne Island, Northumbrian coast, although nearshore waters off the Northumbrian coast hold concentrations of seabirds for much of the year. Further offshore, areas are not as important as offshore areas to the north and south.

Table A1a.6.9: General seabird distribution at sea in the Regional Sea 1 area

Month	General distribution
January	Guillemot and razorbill are abundant in the Moray Firth and close to the coasts of eastern Scotland and northern England. Guillemots return to Shetland waters. Herring and great black-backed gulls most frequently seen in the Moray Firth and off the eastern coast of Britain. Glaucous gulls reach an annual peak in the northern North Sea. Although commonest off Shetland, fulmars are present in high numbers, in most offshore areas of the northern and central North Sea, with spring migration in January in most years. Breeding birds can attend nest sites from early winter, but as this species can forage vast distances, nest attendance during this time may be sporadic. .
February	Main concentrations of guillemots present in Moray Firth and Firth of Forth, birds also around the southern half of Shetland. Important numbers present off most of Scottish coast and Silver Pit. Puffins present in large numbers and widely distributed in northern North Sea. Adult gannets returning, with the areas off south east Scotland and north-east England important at this time. Herring and great black-backed gulls most common off east coast of England. Spring migration of Manx shearwater (Feb-Mar).

Month	General distribution
March	Guillemots and puffins return to the vicinity of their colonies. Razorbills present in Outer Silver Pit area. Main concentrations of kittiwakes in northern North Sea, off Orkney and Shetland, and more gannets return. Highest densities of fulmar present off main breeding areas, but many also present in central North Sea. Herring and great black-backed gulls from Norway return north-eastwards, fewer birds seen off the east coast of England. Gulls remaining in area are breeding birds and the Moray Firth remains important.
April	Breeding season for some seabirds begins at the end of the month. Many birds returning to colonies and pre-breeding feeding, both close to colonies and further offshore. Kittiwakes remain widely distributed particularly in north near main breeding areas. Large numbers of gannets found near colonies. Many immature gannets attend at colonies during summer (for shorter times than breeding adults). Great skuas return to breeding grounds in Shetland. Terns return in greatest numbers.
May	Start of breeding season for most seabirds, birds away from colonies likely to be immature. Areas including Shetland, Caithness, Aberdeenshire, Firth of Forth and Farne Islands, the most important for auk species. Birds still forage at distances further from the colonies than during chick rearing. Manx shearwater, storm petrels and Arctic skua start arriving back in the northern North Sea.
June	Peak of breeding season. Majority of seabirds in coastal areas. Majority of the guillemots in Shetland & Moray Firth, with important concentrations also found further south. Most breeding guillemots do not feed further than 30km from their breeding site. At end of month, guillemot chicks start to leave colonies & disperse into northern North Sea. Breeding razorbills feed closer to shore than guillemots. Some adult gannets forage great distances from breeding sites, with many staying much closer, with immatures still present. Kittiwakes forage in similar areas as guillemots, razorbill and puffin. Breeding Arctic and great skua feed close to colonies.
July	The nesting season for many species of seabird ends in late June/early July, and adult and juvenile birds start to move south to wintering grounds or move to areas where they form moulting flocks. The area of the Shetland Basin, over some of the banks of the central North Sea and off the Moray Firth and Aberdeenshire coasts support large concentrations of birds than at any other time of the year. Birds widely dispersed so many areas of the North Sea hold vulnerable populations.
August	The highest number of auks occurs off east coast of Scotland and northern England. Black guillemots moult at this time and are found at specific moult sites concentrated in sheltered inshore waters around Shetland. Puffins disperse rapidly from colonies. Young gannets start to leave and are flightless for a short period with areas close to colonies containing vulnerable concentrations. Fledglings ringed on sea below colony at Noss moved on average 60km/day during the first 10-16 days. Autumn migration of Manx shearwater.
September	Distribution of auks spreads outwards into North Sea. Inshore areas off the east coast of Scotland and north-east England remain important for birds, but the width of the area away from the coast is greater than in August. The sea off the Scottish and north-east English coast between Moray Firth and Barmade Bank of importance to guillemot. Largest concentrations of razorbills found off Moray Firth (and the inner area of the Firth also important for Manx shearwaters) and east of the Forth and Tay, these areas are also important for puffins. Great skuas become widespread in North Sea as they leave their breeding sites and move south. Great black-backed gulls move across the North Sea from Norway and found off east coast of England. Fulmars numerous and widespread across most of northern and central North Sea. Peak autumn migration of gannet.
October	Southward shift in guillemot and razorbill populations, however the inshore band off Scotland and northern England still hold the largest numbers. Puffins found in offshore areas, with areas in central North Sea holding the most birds. Kittiwake distribution moves south and large numbers of birds found off Yorkshire and the Moray Firth. Small numbers of little auks arrive in northern North Sea. Fulmars remain common throughout most of the northern North Sea.
November	Areas off eastern coast of Britain remain important for guillemots and razorbills. The east coast of Scotland holds relatively few birds compared to other times of the year, with the exception of the Firth of Forth and its approaches. Another important area is off north-eastern England, stretching east to the Dogger Bank and south to the Outer Silver Pit. Flocks of kittiwake found around fishing fleets in the Fladen Ground and several winter visitors become more common in northern North Sea: an obvious change is the arrival of gulls in offshore waters, with herring gulls from Norway moving south-west across the North Sea to areas including the Fladen Ground.

Month	General distribution
December	Large numbers of guillemots close to coasts, with the most important area being the southern shore of the Moray Firth. Main area for puffins is Outer Silver Pit, but also present in central North Sea, off the north-east and east coasts of England and Scotland. Considerable numbers of little auk present in areas including the Dogger Bank and inshore towards Yorkshire. Fulmars commonest in northern North Sea.

Sources: Tasker & Pienkowski (1987), Skov et al. (1995), Furness (2015)

A1a.6.5.3 Waterbird species and distribution (breeding, wintering and migratory)

There is a diverse array of habitats throughout Shetland, the eastern coast of Scotland, including its many firths and the north-east coast of England, including wet grassland, shingle, sand dune, saltmarsh and intertidal mud and sand flats, which support breeding and wintering populations of waterbirds; some areas support bird species and assemblages in internationally important numbers.

Of the important coastal locations of this Regional Sea designated as SPAs with waterbirds are designated features, the majority of sites are designated for over-wintering birds rather than breeding waterbirds, with a small number of exceptions, e.g. the Hermaness, Saxa Vord and Valla Field SPA includes breeding red-throated diver and Fetlar, which includes breeding dunlin and whimbrel. Table A1a.6.10 describes principal sites in this region for non-breeding waterbirds, all of which are designated as SPAs (for passage and wintering birds) and Wetlands of International Importance (Article 4.2 of the Birds Directive).

Table A1a.6.10: Important sites[1] for non-breeding waterbirds in Regional Sea 1

Site	Average number[2,3] (2013/14)	5-year mean[2]	Species (includes designated features and those present in assemblages)
Ronas Hill – North Roe and Tingon	-	-	Red-throated diver
Dornoch Firth	23,768	30,560	Greylag goose, bar-tailed godwit, whooper swan, wigeon, teal, scaup, greenshank
Cromarty Firth	30,884	31,153	Greylag goose, bar-tailed godwit, wigeon, scaup, knot, redshank, whooper swan
Inner Moray/Inverness Firth	32,667	41,001	Pink-footed goose, greylag goose, Slavonian grebe (listed as Moray Firth only), whooper swan, wigeon, teal, pintail, scaup, common scoter (Moray Firth only), velvet scoter (Moray Firth only), goldeneye, red-breasted merganser (Moray Firth only), black throated diver (Moray Firth), oystercatcher, knot, bar-tailed godwit, curlew, redshank
Moray and Nairn Coast	-	-	Greylag goose, pink-footed goose, redshank
Loch of Strathbeg	29,364	44,369	Whooper swan, pink-footed goose, barnacle goose
Ythan Estuary, Sands of Forvie and Meikle loch			Pink-footed goose, redshank, lapwing
Montrose Basin	18,185	43,154	Pink-footed goose, greylag goose, whooper swan, shelduck, wigeon, eider, red-breasted merganser, knot, greenshank, redshank
Forth Estuary	56,944	67,996	Pink-footed goose, greylag goose, Slavonian grebe, knot, bar-tailed godwit, redshank, shelduck, eider, common scoter, velvet scoter, goldeneye, red-breasted merganser, great-crested grebe, red-necked grebe, cormorant, oystercatcher, golden plover, knot, sanderling, dunlin, ruff, black-tailed godwit, curlew, greenshank, turnstone

Site	Average number[2,3] (2013/14)	5-year mean[2]	Species (includes designated features and those present in assemblages)
Lindisfarne	29,954	42,020	Pink-footed goose, barnacle goose, light-bellied brent goose, wigeon, bar-tailed godwit, whooper swan, shelduck, pintail, eider, red-necked grebe, Slavonian grebe, golden plover, grey plover, knot, sanderling, dunlin, redshank, ringed plover, greylag goose, wigeon
Northumbria Coast	-	-	Purple sandpiper, turnstone
Teesmouth and Cleveland Coast	-	-	Knot, redshank, sanderling, ringed plover

Notes: [1]Principal sites for non-breeding waterbirds in the UK as described in the WeBS annual publication and the JNCC SPA website. [2]Average number and mean from WeBS publication, [3] - = figures for sites not described in Holt et al. (2015) supporting more than 10,000 waterbirds are available online via www.bto.org/webs.
Source: Holt et al. (2015), JNCC website (http://jncc.defra.gov.uk/page-2598)

Four new draft marine SPAs have been proposed for their wintering waterbird species: East Mainland Coast, Shetland (great northern diver, red-throated diver, Slavonian grebe, eider, long-tailed duck, red-breasted merganser); Fetlar (red-throated diver); Moray Firth (great northern diver, red-throated diver, Slavonian grebe, scaup, eider, long-tailed duck, common scoter, velvet scoter, goldeneye, red-breasted merganser) and Outer Firth of Forth and Tay Bay Complex (red-throated diver, Slavonian grebe, eider, long-tailed duck, common scoter, velvet scoter, goldeneye, red-breasted merganser) (SNH 2014a).

Shetland is not amongst the most important regions in the UK for wintering waterbirds. However, the north-east coast of Scotland, does include a number of internationally and nationally important sites and the Moray Basin is important for wintering seaduck such as common scoter, goldeneye, long-tailed duck and scaup; large numbers can also be present in waters of the Moray, Cromarty and Dornoch Firths. There is also a late-summer moult migration of Canada geese which move north from Midland breeding grounds to the Beauly Firth (RSPB Website: http://www.rspb.org.uk/community/wildlife/f/1916/t/3784.aspx, & Walker 1970)

The coast between Montrose Basin and Berwick is of UK and international importance for wintering birds, the estuarine, intertidal mudflats and saltmarshes along this coast are of particular importance but sites cannot be considered in isolation, as during the course of a winter some species, for example dunlin, have shown patterns of interchange between sites. Birds such as greylag and pink-footed geese can have considerable distance between feeding and roosting sites, and use both coastal sites and inland lochs and reservoirs.

Much of the coastline between Berwick and Filey Bay in the south is rocky with relatively little marsh close to intertidal areas, although some sites support populations of national and international importance. Being on the major migratory flyway of the east Atlantic, the estuaries of Shetland and the rest of this coastline are important during spring and autumn migration with many birds stopping and staging here as they move to and from wintering and breeding areas. At times of severe cold in mainland Europe estuarine and inter-tidal areas of the UK (especially on the west) can become more important as cold weather refuges. The variation in waterbird abundance and distribution throughout the year is described in Table A1a.6.11.

Waters off this region's coastline are very important for several species of wintering seaduck, including eiders off the Aberdeenshire coast and scoter (common and velvet), shelduck and long-tailed duck off the Moray Firth, Tay, Firth of Forth and Lindisfarne.

Table A1a.6.11: General waterbird distribution in the Regional Sea 1 area

Month	General distribution
January	Large flocks of eider in waters off eastern Scotland. Firth of Forth supports winter peaks of shelduck, large concentrations of common scoter present in Dornoch/Moray Firth. Large flocks of goldeneye present in waters off the Tweed, the Forth, Cromarty and Moray Firths. Moray Firth also supports large flocks of long-tailed duck, as does Scapa Flow. Great northern diver and black guillemot present in waters round Northern Isles with the latter species concentrated in shallow, sheltered waters.
February	Eiders remain in large numbers in waters off eastern Scotland. Peak numbers of long-tailed duck in Scapa Flow and large concentrations still present in Moray Firth. Moray Firth supports large concentrations of common scoter, velvet scoter, goosander and red-breasted merganser. Peak numbers of bar-tailed godwit in Forth along with important flocks of knot and redshank.
March	Marks start of return of many species to breeding grounds, intertidal areas become less important. Numbers of wading birds on estuaries decline. High Arctic nesting species, e.g. bar-tailed godwit, remain in UK sites later than more temperate species and important numbers remain at sites including Lindisfarne and Firth of Forth. Eiders move back towards breeding grounds and high numbers recorded on the Forth
April	Estuaries used by birds on passage from southern wintering grounds to northern breeding grounds. There are less feeding waders in terms of absolute numbers on British estuaries between April and June, although number of birds on passage is thought to be underestimated. Eiders continue to return to breeding grounds near the Tay, on Lindisfarne, on the Ythan and Shetland. Large numbers of brent geese still on wintering grounds.
May	Wildfowl and other waterbirds that have wintered on sites on this coastline return to breeding sites. Numbers of dark-bellied brent geese peak in May, before rapid departure. Migration of divers continues through the North Sea.
June	June is peak of breeding season, most migrant birds that spend winter on/pass through coasts of North Sea have returned to breeding grounds. Eiders, the only seaduck that breeds in any great numbers around the North Sea, are found at main colonies in Shetland, Aberdeenshire and Firth of Forth. There are few waders at estuaries compared to numbers that use these sites outwith the breeding season
July	Some species move to moulting sites after breeding, large concentrations of moulting shelduck found in south-eastern sector of North Sea, smaller concentrations found in Firth of Forth. Common scoter also undergo moulting migration. Largest concentrations found out with Regional Sea 1 but smaller concentrations found off Aberdeenshire, and north-east England. Flocks of moulting eider also found off Aberdeenshire, in Scapa Flow, Wyre Sound and off various areas around Shetland. After breeding, some species of waders return to estuaries and mudflats.
August	Start of main influx of wading birds and ducks into North Sea. Some may remain in area for winter, or stop to moult and/or feed before onward migration southwards. High numbers of redshank found at various sites, including Forth, Tay and Montrose Basin. Lindisfarne and Cromarty Firth hold large populations of bar-tailed godwit, high numbers of eider remain in Forth, off Aberdeenshire, in the Tay and around Lindisfarne. Common scoter numbers off Aberdeenshire peak during this month
September	Peak month for usage of North Sea estuaries. Lindisfarne supports large numbers of wigeon, eider and bar-tailed godwit. Eider present in important numbers in the Forth, Tay, off Aberdeenshire, and large migration of common scoter into Moray and Dornoch Firths. Firth of Forth important for bar-tailed godwit, curlew, redshank and great crested grebe. Large numbers of red-throated divers undergo wing-moult off Aberdeenshire coast and southern Moray Firth.
October	Firth of Forth holds large numbers of ringed plover, bar-tailed godwit and redshank. Large numbers of red-throated divers in wing moult present in Firths of Forth, Tay and off north-east Scotland. Influx of common and velvet scoters, and goldeneye. Large numbers of common scoter found in Dornoch/Moray Firth – and have velvet scoters associated with them (albeit in lower numbers). Firths of Forth and Tay and waters off north-east Scotland support large numbers of red throated divers. Area off the Tay holds large numbers of red-breasted merganser.

Month	General distribution
November	Some light-bellied brent geese move across from Wadden Sea to Lindisfarne. Knot also move westward to Lindisfarne and the Firth of Forth (and other areas on the south-east coast of England, e.g. the Wash). Immigration by more wading birds. Important flocks of turnstone appear on Shetland and Aberdeenshire coasts, while important sites for purple sandpipers include Shetland, Orkney, Aberdeenshire and the outer Firth of Forth. Large flocks of eider on the Tay, and concentrations found in Scapa Flow and goldeneye found in the Forth and Moray/Cromarty Firths. Long-tailed duck arrive in important numbers to the Moray Firth, but often feed offshore. This species also roosts offshore.
December	Lindisfarne and the Firth of Forth of importance to knot, important flocks of turnstone on coast of Shetland and Aberdeenshire, and of purple sandpipers around Shetland, Aberdeenshire and the outer Firth of Forth. Large flocks of eider on the Tay, Scapa Flow, goldeneye in the Forth and Moray/Cromarty Firth. Long-tailed duck continue to arrive in important numbers to the Moray Firth from breeding areas.

Source: Tasker & Pienkowski (1987), Skov et al. (1995)

Seven areas of search from JNCC's programme of surveys for wintering aggregations of inshore waterbirds (Lawson *et al*. 2015) are located in Regional Sea 1 and these, along with the species recorded are described in Table A1a.6.12.

Table A1a.6.12: Areas of search around Scotland and species present

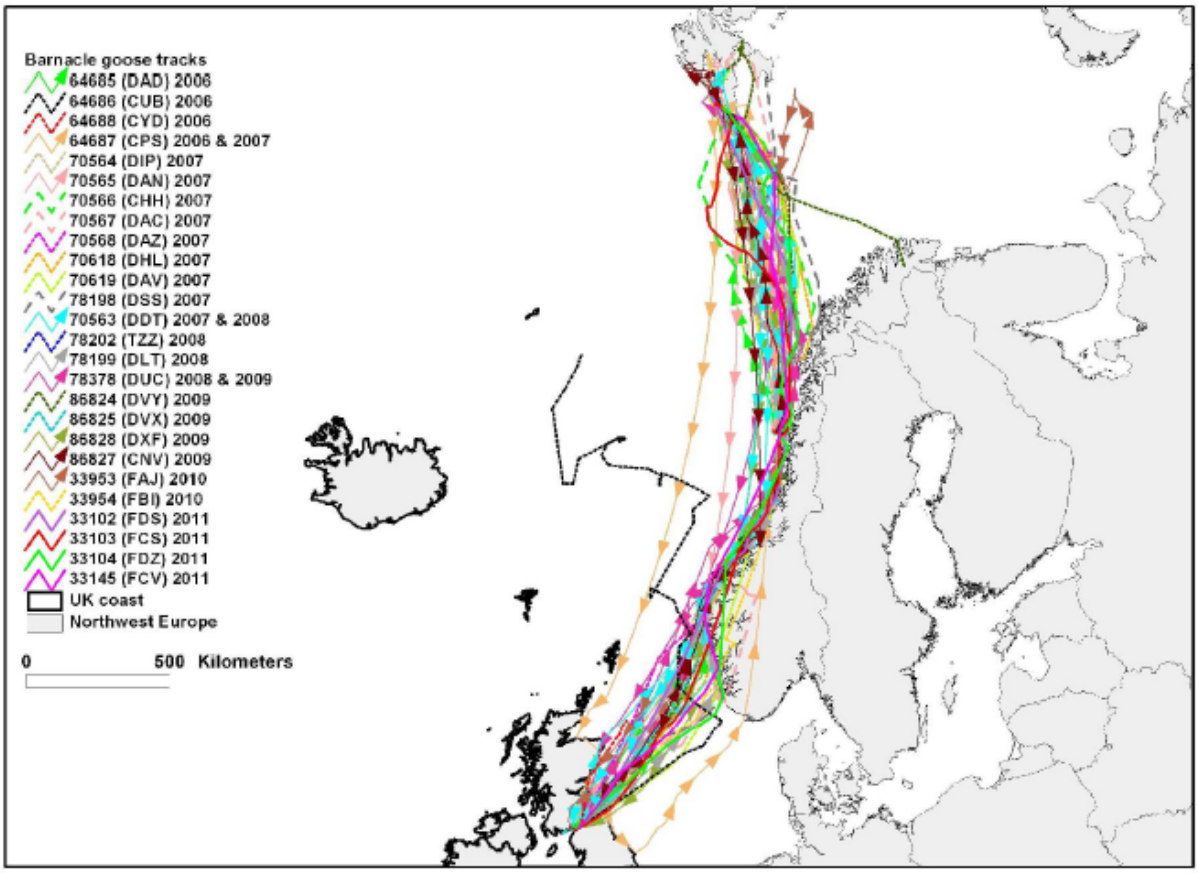
Areas	Species
Unst	No estimate in excess of thresholds for either Stage 1.1, 1.2 or 1.4. This area was the most northerly Scottish area of search and numbers of all seaduck, divers and grebe were low.
East Shetland	Great northern diver[1], Slavonian grebe[1], eider[1,3], long-tailed duck[2], red-breasted merganser[2]
Moray Firth	Red-throated diver[1], great northern diver[1], scaup[2], eider[2], long-tailed duck[2], common scoter[2], velvet scoter[2], goldeneye[2], red-breasted merganser[2]. This area held the largest populations of long-tailed duck, common scoter, velvet scoter and goldeneye of all areas surveyed.
Aberdeen Bay	Red-throated diver[1,4], eider[2,3]
Firth of Tay	Red-throated diver[1], eider[1], long-tailed duck[2], common scoter[2], velvet scoter[2,4], red-breasted merganser[2]. This area supported the largest populations of red-throated diver and eider of all area surveyed.
Firth of Forth	Red-throated diver[1,4], little gull[1,4], eider[2], long-tailed duck[2], common scoter[2], velvet scoter[2], goldeneye[2], red-breasted merganser[2]
West Shetland	Great northern diver[1,4], Slavonian grebe[1], eider[1,3], long-tailed duck[2], red-breasted merganser[2]

Notes: [1]Species that regularly exceeded the relevant UK SPA Selection Guidelines thresholds at Stage 1.1 or Stage 1.2, [2]species that regularly exceeded Stage 1.4 of the selection guidelines (Stroud et al. 2001, Mudge & Buxton 2013). [3]These eider are Somateria mollissima faeroensis *[4]These species did not meet the criteria for regularity (Stroud et al. 2001)*
Source: Lawson et al. (2015), see Stroud et al. (2001) for the UK SPA Selection Guidelines stage definitions and thresholds for species.

All areas except Unst recorded numbers that exceeded the site selection thresholds for that species and this data will assist in the identification of possible SPA locations.

Birds present on the east coast of the UK and in the North Sea can originate from sites and areas on the west coast. Between 2006 and 2011, Griffin *et al*. (2011) looked at the migratory tracks of 26 individual Svalbard barnacle geese (barnacle geese) from and to the Solway Firth during winter and spring migrations. Birds were found to migrate in a north-easterly direction, after first flying 100-110km overland and then exiting the UK from the east coast between North Berwick and Lindisfarne/Holy Island. The migratory front is thought to be broad across the North Sea, narrowing along the coast of Norway (Figures A1a.6.7 (Griffin *et al.* 2011).

Figure A1a.6.7: Overview of the migration route of 26 Svalbard barnacle geese between 2006 and 2011

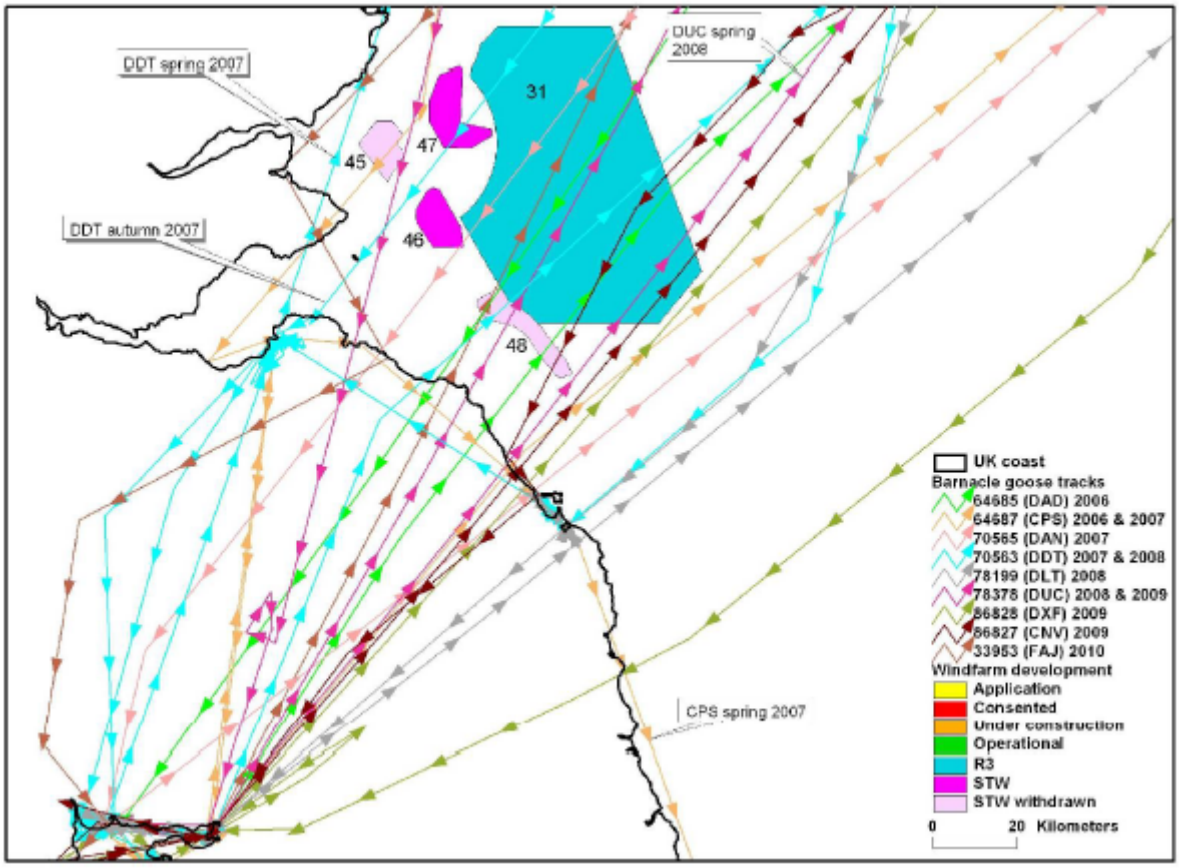


Note: Geese were tracked from and to the Solway Firth on the west (Regional Sea 6) between 2006 and 2011. The migratory front was broadest across the North Sea and across the Barents Sea; the migratory corridor was very narrow along the Norwegian coast in spring. The autumn routes (indicated by southbound arrows) are likely to be inaccurate due to extrapolations between GPS fixes that are often >12 hours and large distances apart, due to the reduced frequency of fixes in lower light levels.
Source: Griffin et al. (2011)

Barnacle geese were found to travel through potential wind farm development areas (e.g. birds were recorded travelling through the southern part of Round 3 Firth of Forth site). Four of the birds tagged in 2011 were fitted with tags that took positions every hour throughout the night in order to determine the night time overland route taken by these birds and if they used the Firth of Forth area (i.e. to rest) or if they passed straight through it. The data from these birds, based on the speeds recorded and distances between consecutive fixes, showed that these birds did not stop on the sea in the Firth of Forth overnight.

However, the cohort of geese in the tagged group did not leave the Solway Firth until late May (later than is typical) and three of the four tagged birds did not stop again during the migration (usually birds have staging stops on-route); leading the authors to suggest the migratory behaviour of this cohort was not representative of the broader population as a whole (Griffin *et al*. 2011). Figure A1a.6.8 shows the tracks through the Firth of Forth of three tagged birds.

Figure A1a.6.8: Migratory tracks of Svalbard Barnacle geese over the Firth of Forth



Note: Full return migration tracks, with repeat tracks for three birds being shown. One of these, DDT, completed two full migrations. Any repeat routes are labelled to distinguish them between years.
Source: Griffin et al. (2011)

A1a.6.6 Features of Regional Sea 2

The coast of Regional Sea 2 runs from Flamborough Head in the north to approximately Deal on the Kent coast in south-east England. This area includes a number of areas suitable for cliff nesting seabirds and some of the most important sites for wintering and passage waterbirds, including the Wash and Thames Estuary. Sites referred to or described in this section are listed geographically north to south where possible.

A1a.6.6.1 Seabird species and distribution

Only a small number of the seabird species breeding in the UK are not listed in Mitchell *et al*. (2004) as breeding within Regional Sea 2 (for example Manx shearwater, storm petrel, Leach's storm petrel, Arctic skua, great skua and black guillemot). The counties along the east and south-east of England support an array of breeding seabirds, some of importance in a national and international context. The most important seabird breeding colonies in Regional Sea 2 (listed in geographical order, from north to south) are indicated in Table A1a.6.13 below.

Table A1a.6.13: Important breeding seabird colonies in Regional Sea 2

Site	Species (includes designated features and those present in assemblages)
Flamborough Head and Bempton Cliffs	Kittiwake, guillemot, razorbill, puffin, gannet, lesser black-backed gull
Humber Flats, Marshes and Coast	Little tern
Gibraltar Point	Little tern
The Wash	Common tern, little tern
Outer Trial Bank (the Wash)	Lesser black-backed gull, herring gull
North Norfolk Coast	Common tern, little tern, Mediterranean gull, roseate tern, sandwich tern
Great Yarmouth North Denes	Little tern
Breydon Water	Common tern
Benacre to Easton Bavents	Little tern
Minsmere – Walberswick	Little tern
Ordfordness	Lesser black-backed gull, herring gull
Alde-Ore Estuary	Little tern, sandwich tern, lesser black-backed gull
Hamford Water	Little tern
Colne Estuary	Little tern
Abberton Reservoir[1]	Cormorant
Blackwater Estuary	Little tern
Foulness	Common tern, little tern, sandwich tern
Medway Estuary and Marshes	Little tern
The Swale	Mediterranean gull
Dungeness to Pett Level	Common tern, little tern, Mediterranean gull

Note: Sites designated as Seabird Assemblages of International Importance are shown in bold (qualifying level is 20,000 birds). [1] *Abberton Reservoir is included as although the reservoir is located a few kilometres inland, many of the birds feed in nearby estuaries.*
Sources: JNCC website (http://jncc.defra.gov.uk/page-2598), Mitchell et al. (2004)

An extension is being considered to the Flamborough Head and Bempton Cliffs SPA; the new site being considered called the Flamborough and Filey Coast potential SPA (pSPA). The proposal includes a terrestrial extension running from the cliffs at Filey Brigg to Cunstone Nab in the west, to encompass important seabird colonies that currently fall outwith the existing SPA, and a 2km marine extension to the existing SPA to encompass waters important to the breeding seabirds of the colony.

During the breeding season, colonies at Filey, Flamborough Head and Bempton Cliffs, regularly support tens of thousands of individual seabirds, while the lack of suitable cliff habitat south of these areas results in fewer nesting seabirds, other than terns and gulls, with most colonies on saltmarshes, remote beaches or offshore sandbanks (Tasker 1998). .

The only gannet colony in England is at Bempton Cliffs and since the 1960s, the colony has been increasing steadily, with a rapid escalation in numbers in recent years (JNCC 2014). With the exception of a dip in 2005, a steep increase in numbers has been recorded between counts in 2004 and 2012 and between 2008 and 2009, numbers increased from 6,954 to 7,859 (an increase of just over 900 nests in one year); this increase being sustained in 2012, when 11,061 nests were reported, an increase of 181% since the 2003/04 census (JNCC 2014/15).

In 2013 the Flamborough Head and Bempton Cliffs SPA Seabird Monitoring Programme (collaborative partnership between RSPB and Natural England, Aitken *et al*. 2013), reported

that prolonged storms in the North Sea during the early part of the year (March) had had a serious impact on birds preparing for the breeding season; e.g. large numbers of auks were washed up either dead or dying from exhaustion/starvation. A secondary effect was seen in species (e.g. kittiwake and gannet) which had protracted breeding seasons, believed in part, to be caused by them struggling to reach breeding condition. However, despite the seabird wrecks and effects of the storms, the study plot counts in 2013 recorded an average total of 1,279 guillemots, the highest since the study began and an increase of 187 on the previous year. The average count of 586 razorbills was also the highest for this species since the study began (Aitken *et al*. 2013).

The 2014 report from the Flamborough Head/Bempton Cliff SPA, described a fairly robust breeding season for the seabirds, with kittiwake numbers improving from the effects of the previous year's storms and auks having their second best year since 2009. Herring gull, fulmar and gannet productivity was down on the previous year, with gannets dropping to the lowest levels recorded over the last six years for uncertain reasons (Aitken *et al*. 2014a).

In terms of population study plot counts, some species showed an increase from 2013 (razorbill increased by 52 individuals from the previous year, guillemot increased by 175 individuals and kittiwake increased by 426 AONs on previous years), with others showing a decrease (herring gull whole colony count recorded 462 AONs, a decline of 33 AON since the 2010 whole colony count – continuing a downward trend seen for this species population across the Flamborough and Bempton colony) and the shag whole colony count of 16 AON, reduced by 8 AON from the 2008 whole colony count) (Aitken *et al*. 2014a).

The 2014 RSPB/Natural England monitoring report from the Filey proposed SPA (Aitken *et al*. 2014b) reported further seabird wrecks in late winter/spring in areas including SW England and Channel Islands, and while this did not appear to have affected the auk population at the Filey pSPA, kittiwake numbers and productivity at the site remained well below the national reference mean (in contrast to that seen at Flamborough Head/Bempton Cliffs SPA – see above). A whole colony population count was also completed at the site, in 2014, recording a total of 16,801 individual birds in the breeding assemblage – the lowest count since annual counts started in 2009. A drop of *ca*. 2,000 kittiwake AON was also recorded, (a drop of 29% from the previous count), which is thought to have contributed to the decrease seen in the whole colony population count.

Further along the coast, Blakeney Point and Scolt Head are important for sandwich tern supporting almost half of the English population. These sites, along with the Farne Islands and Coquet Island (Regional Sea 1) together recorded over 6,600 AONs in 2014 and now probably hold >70% of the English population of this species (JNCC 2015). However, the annual National Trust ranger report from the Blakeney Point colony itself, recorded Sandwich terns having a poor year in 2014, primarily due to fox predation, with numbers of nesting pairs over 1,000 less than 2013. Fox predation also affected black-headed gull and little tern numbers and breeding success (National Trust 2014).

A1a.6.6.2 Seabird distribution at sea

Seabird distribution and abundance in the southern North Sea varies throughout the year, with offshore areas in general, containing peak numbers of birds following the breeding season and through winter (Table A1a.6.14). Zones where water masses meet, hydrographic fronts, can have enhanced primary productivity and aggregations of other marine organisms, including birds. A year round frontal system off the coast of Flamborough Head – the Flamborough Front – an important hydrographic feature close to the boundary between Regional Seas 1 and 2. forms the boundary between Regional Seas 1 and 2. The Outer Silver Pit and the Brown Ridge off the Suffolk coast are also important for seabird foraging, resulting in birds being present in

these areas. This notwithstanding, numbers of seabirds at sea are generally lower in Regional Sea 2 compared with waters further north, with greatest concentrations offshore occurring outside the breeding period.

Table A1a.6.14: General seabird distribution at sea in the Regional Sea 2 area

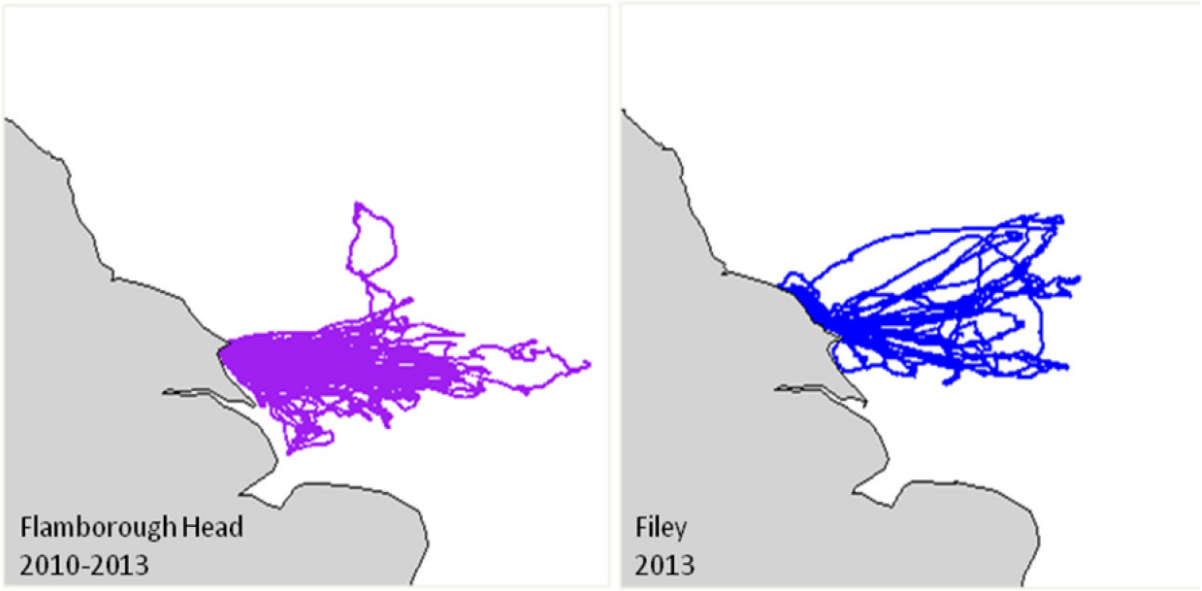
Month	General distribution
January	Auks (guillemots and razorbills) present in large numbers throughout the southern North Sea, particularly over the Outer Silver Pit area.
February	High numbers of auk present off the coast of Flamborough Head and also over the Outer Silver Pit area. Moderate numbers of other seabirds, particularly kittiwake, present over the Silver Pit area and off the Norfolk and Suffolk coast. Return of some adult gannets to the North Sea.
March	The Outer Silver Pit area is important for immature and adult razorbills and puffins are returning to their breeding colonies, including those at Flamborough Head. Some fulmars present in the southern North Sea. High concentrations of guillemots found off Flamborough Head.
April	Breeding season for some seabirds begins at the end of the month, with birds re-establishing/ establishing/defending territories at colonies. Many seabirds, particularly females, feeding to improve body condition; some may feed close to colonies but others may be further offshore. Guillemots off Flamborough Head can forage up to 100km from colony to feed on sandeels. High numbers of sandwich terns associated with colonies at Scolt Head, continues through May, with birds feeding close to colonies during summer.
May	Start of breeding season for most seabirds, laying and incubating eggs. Predominantly immature birds located away from colonies, some birds, e.g. kittiwake, have been found to travel up to 120km away (off Flamborough Head). Large numbers of sandwich and little terns found at breeding sites in southern North Sea.
June	Peak of breeding season. Majority of seabirds in coastal areas, but numbers not large in this area compared to central northern parts of the North Sea. Most migrant birds that winter on North Sea coasts have returned to their breeding grounds.
July	Moulting season for inshore and coastal birds, with some auks flightless at this time. Massive movement of birds from breeding colonies into offshore areas of the North Sea during this month. Aggregations of birds present in coastal waters off the coast of Flamborough Head and Great Yarmouth.
August	Moderate numbers of flightless auks in offshore waters off the coast of Flamborough Head. Higher densities of fulmar also found in this area. Concentrations of sandwich tern are coastal, although some birds feed offshore, and most widely distributed after the breeding season
September	Few auks in offshore area at this time, with concentrations further north in the central and northern North Sea. Great black-backed gulls present, frequently found around trawlers off the east coast of England. Fulmar remains numerous.
October	Southward shift of guillemot and razorbill populations with high concentrations of auks offshore, particularly in the area of southern gas fields off Norfolk and Lincolnshire. Prominent movement of gannet during autumn from the North Sea to the Channel. The North Sea is largely abandoned by lesser black-backed gulls during winter.
November	Few auks present offshore, but not in great numbers. Razorbills from more southerly and westerly colonies fly into southern wintering grounds, including southern North Sea. Fulmar densities similar to those seen in Aug-Oct, but eastern shift in distribution, further into North Sea. Moderate densities of gannet seen over Dogger Bank area, higher densities off Flamborough Head, as dispersion from breeding sites is at maximum. Kittiwakes distributed over large areas of the North Sea, in winter numbers double and areas, including the Silver Pit support large numbers.
December	High concentrations of auks and other seabird species in offshore areas in the southern North Sea. Guillemots are widespread in winter, however densities are generally much lower in the central and southern North Sea than those seen in areas further north.

Sources: Tasker & Pienkowski (1987), Skov et al. (1995), Furness (2015)

The RSPB Seabird Tracking and Research (STAR) project continued its field work tracking kittiwakes with GPS tags at Flamborough Head/Bempton Cliffs and Filey pSPA, with the project now in its fifth year of field work and data collection at Flamborough/Bempton and its second

year at Filey. Findings to date suggest kittiwakes from these sites have different, but overlapping foraging areas; with Filey birds foraging further to the north than Flamborough kittiwakes (Figure A1a.6.9). Foraging areas were also seen to overlap significantly with areas of seabed zoned for wind energy development at Hornsea and Dogger Bank (Aitken *et al*. 2014b).

Figure A1a.6.9: GPS tracking data for kittiwakes from Flamborough Head and Filey



Source: Data from the RSPB STAR project as referenced in Aitken et al. (2014)

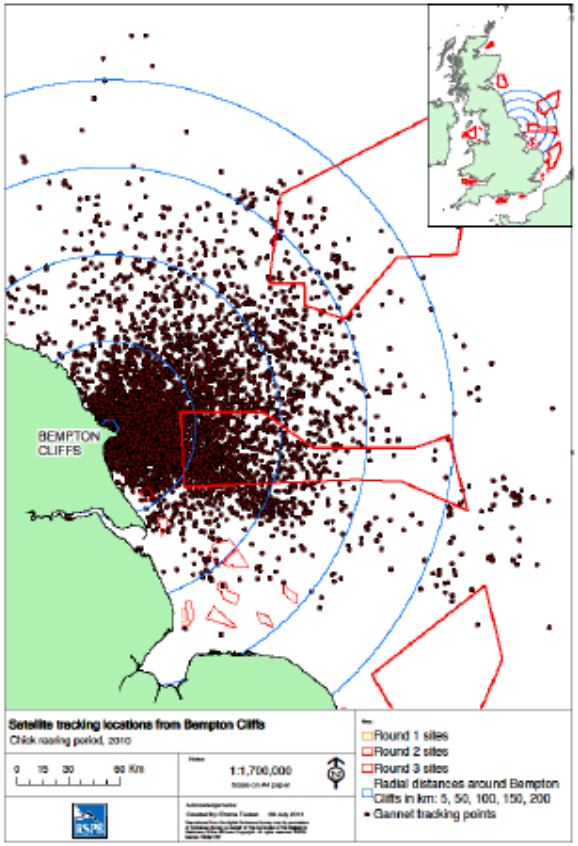
Langston & Boggio (2011), Langston & Teuten (2012) and Langston *et al*. (2013a, b) reported gannet tagging studies at Bempton Cliffs. During chick-rearing most locations recorded were within 200km of Bempton Cliffs, with the highest density of locations within 50-100km. Figure A1a.6.10 shows the combined tracks of locations for each year. Highest densities were to the east and south east, with density declining markedly beyond 150km.

Data from Bempton Cliffs and that from tracking studies of gannets from Bass Rock (Hamer *et al*. 2007, 2009), showed little overlap in the foraging areas used during chick rearing by adults from both colonies. This is contrasted with post-breeding movements of birds, which shows movements of birds from different breeding colonies overlapping (Kubetzki *et al*. (2009), Fort *et al*. (2012), Langston *et al*. 2013a, b).

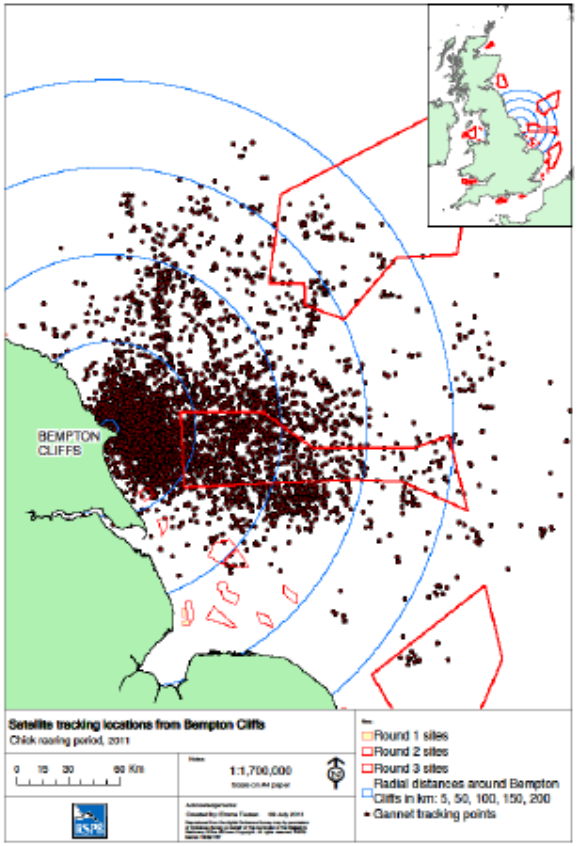
Information for the early post-breeding period, in each year, indicated variability in dispersal and migration away from Bempton Cliffs and the potential for interaction with several different wind farms at that stage in the gannet annual cycle (Langston *et al*. 2013a, b). Increased numbers of locations were recorded in the East Anglia zone, contrasting with few locations during chick-rearing, while the same was seen in the Dogger Bank zone; relatively few locations were recorded during chick-rearing but more during post-breeding.

Figure A1a.6.10: Combined tracking locations for adult gannets from Bempton Cliffs

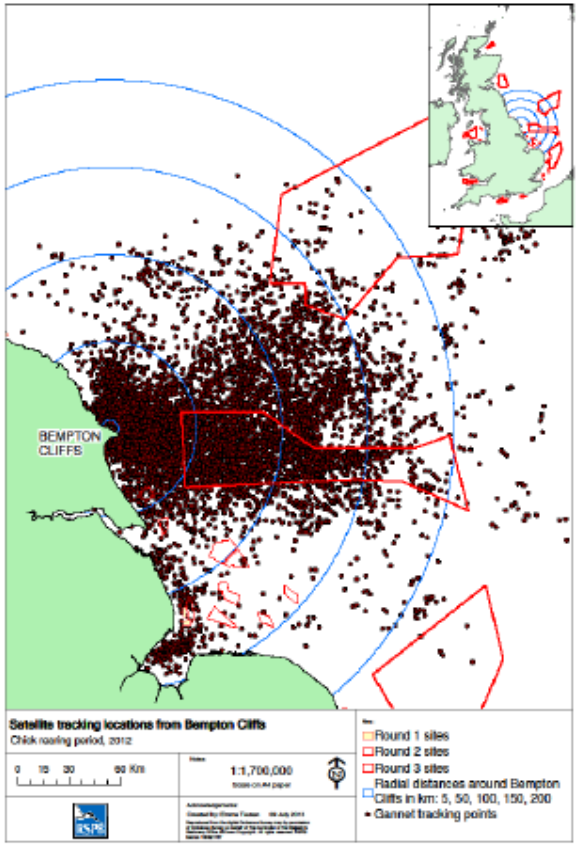
a)



b)



c)



Note: Combined tracking locations for adult gannets from Bempton Cliffs based on a) 6,272 at sea locations in 2010 (n= 14 birds), b) 4,914 locations in 2011 (n=13 birds) and c) 8,674 locations in 2012 (n=15 birds), during chick-rearing period. The concentric blue rings are the 5km buffer around the central location of Bempton Cliffs, with added 50km, 100km, 150km and 200km buffers to aid interpretation of foraging distances. Inset shows the location of Bempton Cliffs.
Source: Langston et al. (2013a,b)

A DECC SEA-funded project on the movements of lesser black-backed gulls and great skuas from SPAs at Orford Ness (part of the Alde-Ore Estuary SPA) (lesser black-backed gulls) and Foula SPA and Hoy SPA (great skua); information from these latter sites are in the Regional Sea 8 section. The study aimed to understand the connectivity of these species with areas of proposed or consented wind farm sites, the extent to which these species used the areas of already constructed/partially constructed wind farms and provide an assessment of the flight altitudes of these species that could inform collision risk modelling. Preliminary results from the three years of study (2010, 2011 and 2012) were published (Thaxter *et al*. 2011, Thaxter *et al*. 2012a), with a final report (Thaxter *et al*. 2014) providing comprehensive analysis of the data from all three years.

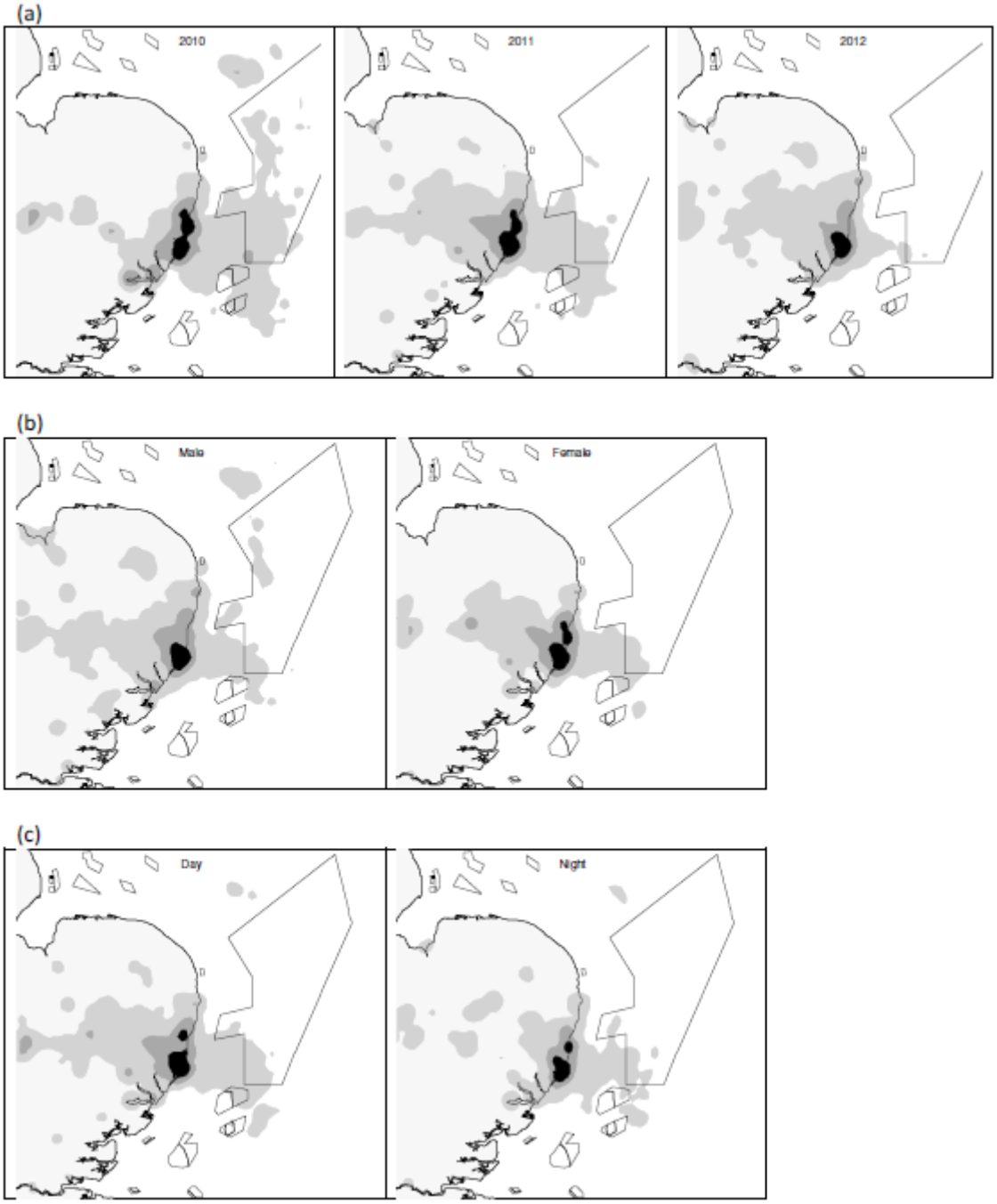
The maximum foraging range of lesser black-backed gulls was recorded as 159km, consistent with previously reported (Thaxter *et al*. 2012a, 2014). Of the birds tagged, connectivity with areas either consented or identified for offshore renewable developments was recorded.

Over half the birds in each year (7 of 10 birds (2010), 14 of 18 (2011) and 8 of 14 (2012)) used areas of operational, consented or proposed offshore wind farm including the Round 3 East Anglia development zone, the Greater Gabbard wind farm and the Galloper extension to the Gabbard site. One bird also overlapped with an operational Round 1 site at Scroby Sands during 2010 and 2012 (Thaxter *et al*. 2014). The area usage for all years is shown in Figure A1a.6.11).

Time spent offshore across all birds was an average of 15% in 2010, 6% in 2011 and 7% in 2012 and although the East Anglia Zone was used most out of all the wind farm areas; the time spent even in this large zone across all bird data only amounted to 4% in 2010 (maximum per bird, 15%), 1% in 2011 (maximum 8%) and <1% in 2012 (maximum 1%) and much less time was spent in the smaller existing, consented and proposed wind farms in each year (Thaxter *et al*. 2014).

Individual lesser black-backed gulls showed significant differences in their behaviour, with some foraging over a wider area and more offshore than others, individuals also differed significantly in their wind farm usage across the season and between years.

Figure A1a.6.11: Area usage by lesser black-backed gulls during 2010, 2011 and 2012

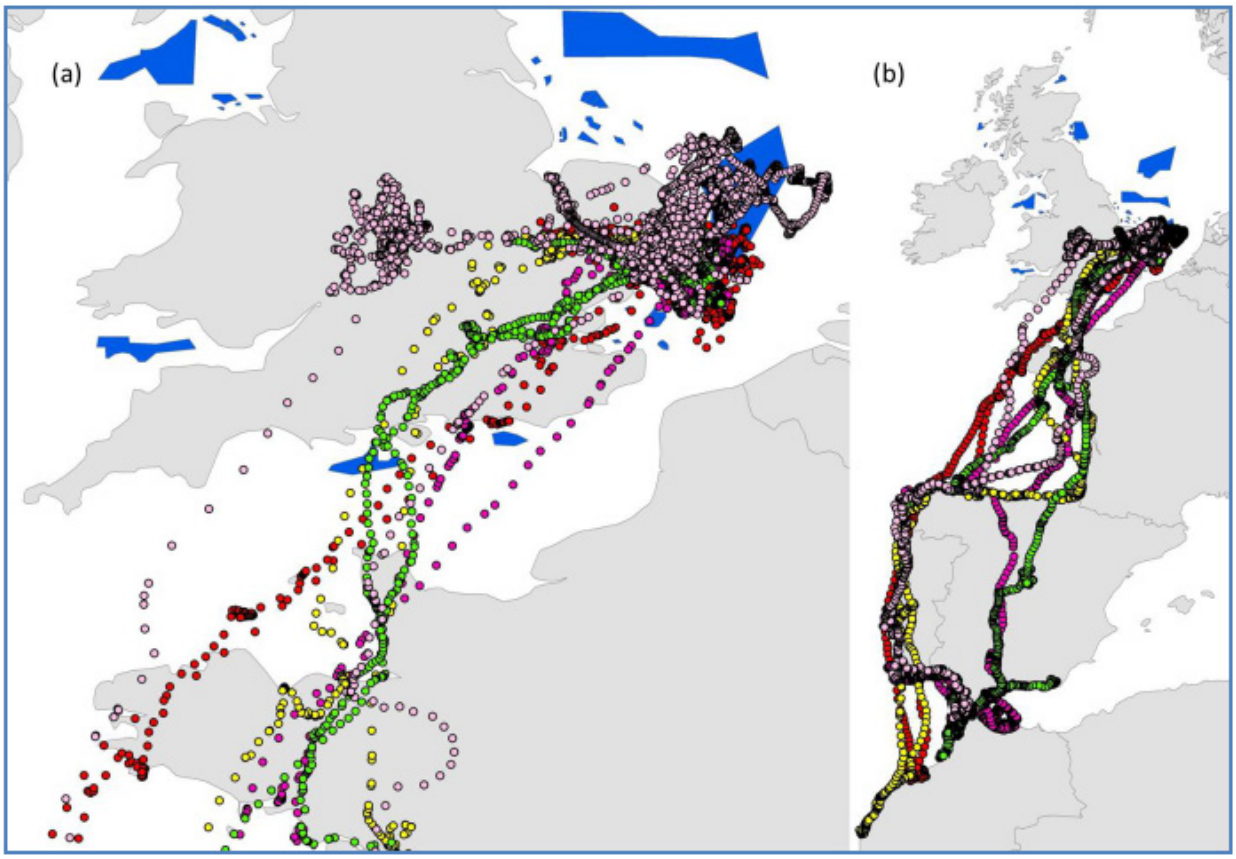


Notes: Spatial area usage by lesser black-backed gulls during (a) respective years of 2010, 2011 and 2012, b) by male and female lesser black-backed gulls and (c) by all birds between day and night. Shown are the 95% KDE (Kernel Density Estimation) (light grey) representing the total area usage, 75% KDEs (medium grey) and 50% KDE, representing core area usage.
Source: Thaxter et al. (2014)

Data was also collected on migration and wintering locations. Information was available for six (for the period 2010/11), fifteen (2011/12) and eleven (2012/13) birds and of these, six, fourteen and six birds from the respective time periods, had sufficiently functioning tags to provide over-winter information. For those birds which information was complete over the three years, four birds remained in the UK and thirteen migrated to wintering areas to the south – i.e. Mediterranean areas of Spain, Portugal and Morocco with one bird in 2010 reaching as far south as Mauritania – see Figure A1a.6.12 for flight paths). Wintering destinations were

consistent within individuals between years and temporally, outward migration across the English Channel and Bay of Biscay appeared to be variable, depending on whether the individual left straight after breeding, or remained for longer elsewhere in the UK (late July to early December, peaking in November). Return routes were more focused (mid-February to mid-April, peaking in mid-March) (Thaxter *et al*. 2014).

Figure A1a.6.12: Flight path of tagged lesser black-backed gulls on migration 2010/2011



Notes: Flight path of tagged lesser black-backed gulls a) leaving and returning to Orford Ness on migration between July 2010 and April 2011 and b) their movements throughout migration and overwinter. Tracks of different individuals are shown in different colours, and UK offshore developments are shown in blue.
Source: Thaxter et al. (2012a)

A1a.6.6.3 Waterbird species and distribution (breeding, wintering and migratory)

Along this coastline, estuarine and/or soft coast habitats, including vegetated shingle, sand dunes, coastal lagoons, saltmarshes, dry and wet (and seasonally flooding) grasslands support high densities of breeding waterfowl, particularly waders, and several areas are of local, national and international importance. Notable wetland species breeding in Regional Sea 2 include bittern and avocet and a number of areas have been designated as SPAs partly due to their breeding populations of these species: North Norfolk Coast (avocet and bittern); Broadland (bittern); Benacre to Easton Bavents (bittern); Minsmere-Walberswick (avocet and bittern); Alde-Ore Estuary (avocet); Foulness (avocet); Medway Estuary and Marshes (avocet), and The Swale (avocet).

This coastline is also one of the most important in the UK for wintering and passage waterbirds, particularly wildfowl species, both in spring and autumn as it lies on the principal migratory flyway of the east Atlantic. The importance of the area to these wintering and migratory birds may increase during periods of severe cold when there may be influxes of birds to the region. Some of the most important sites in the Region, all of which are designated as SPAs and some

of which are also designated as Wetlands of International Importance, along with the species they support, are described in Table A1a.6.15.

Table A1a.6.15: Important sites[1] for non-breeding waterbirds in Regional Sea 2

Site	Average number[2,3] (2013/14)	5-year mean[2]	Species (includes designated features and those present in assemblages)
Humber Flats, Marshes and Coast (numbers for Humber Estuary)	120,114	125,177	Pink-footed goose, dark-bellied brent goose, shelduck, ringed plover, golden plover, grey plover, lapwing, knot, dunlin, black-tailed godwit, bar-tailed godwit, redshank
Gibraltar Point	-	-	Bar-tailed godwit, grey plover, knot
The Wash	429,759	373,453	Pink footed goose, dark-bellied brent goose, shelduck, pintail, oystercatcher, ringed plover, golden plover, grey plover, lapwing, knot, sanderling, dunlin, black-tailed godwit, bar-tailed godwit, curlew, redshank, wigeon, teal, eider, cormorant, avocet, greenshank, mallard
North Norfolk Coast	98,389	160,319	Pink footed goose, dark bellied brent goose, wigeon, pintail, ringed plover, knot, black-tailed godwit, bar-tailed godwit, European white-fronted goose, gadwall, teal, shoveler, common scoter, red-breasted merganser, red-necked grebe, cormorant, oystercatcher, avocet, golden plover, grey plover, sanderling, ruff, curlew, redshank, greenshank, turnstone, sandwich tern
Breydon Water/ Berney Marshes	113,903	100,033	Bewick's swan, pink-footed goose, wigeon, shoveler, avocet, golden plover, lapwing, black-tailed godwit, teal, pintail, dunlin, ruff, redshank
Minsmere-Walberswick	-	-	Avocet
Alde-Ore Estuary (numbers from Alde Estuary)	32,988	32,947	Avocet, black-tailed godwit, wigeon, gadwall, teal, shoveler, black-tailed godwit, redshank
Deben Estuary	-	-	Avocet
Stour & Orwell Estuary (numbers from Stour Estuary)	48,799	50,419	Ringed plover, grey plover, knot, black-tailed godwit, dark-bellied brent goose, shelduck, pintail, avocet, grey plover, dunlin, redshank, turnstone
Hamford Water	62,228	48,739	Dark-bellied brent goose, ringed plover, grey plover, shelduck, little grebe, avocet, golden plover, grey plover, knot, dunlin, ruff, black-tailed godwit, bar-tailed godwit, redshank
Colne Estuary	26,687	24,987	Dark-bellied brent goose, shelduck, cormorant, avocet, grey plover, black-tailed godwit, redshank
Abberton Estuary	-	-	Gadwell, shoveler, teal
Blackwater Estuary	83,695	69,570	Dark-bellied brent goose, golden plover, grey plover, knot, dunlin, black-tailed godwit, redshank, shelduck, wigeon, teal, pintail, Slavonian grebe, cormorant, avocet, ruff, greenshank
Dengie Flats	55,842	55,328	Grey plover, knot, bar-tailed godwit, dark-bellied brent goose, oystercatcher, golden plover, dunlin
Crouch-Roach Estuary	29,239	30,853	Dark-bellied brent goose, redshank, shelduck, pintail, avocet, golden plover, ruff
Foulness	-	-	Dark-bellied brent goose, grey plover, knot
Benfleet and Southend Marshes	-	-	Avocet, bar-tailed godwit, golden plover, redshank

Site	Average number[2,3] (2013/14)	5-year mean[2]	Species (includes designated features and those present in assemblages)
Thames Estuary and Marshes	194,635	164,114	Dark-bellied brent goose, teal, shoveler, oystercatcher, avocet, ringed plover, grey plover, knot, dunlin, black-tailed godwit, bar tailed godwit, redshank, European white-fronted goose, shelduck, wigeon, gadwall, tufted duck, red-throated diver, little grebe, cormorant, golden plover, sanderling, ruff, curlew, greenshank
Outer Thames Estuary (marine SPA)	-	-	Red-throated diver
Medway Estuary	28,876	25,087	Pintail, avocet, black-tailed godwit, shelduck, shoveler, cormorant, ringed plover, grey plover, knot, curlew, redshank, greenshank
Swale Estuary	36,478	61,005	Wigeon, teal, pintail, ringed plover, golden plover, black-tailed godwit, dark-bellied brent goose, shelduck, shoveler, great-crested grebe, oystercatcher, avocet, grey plover, knot, ruff, redshank

Notes: [1]Principal sites for non-breeding waterbirds in the UK as described in the WeBS annual publication and the JNCC SPA website. Sites marked in bold are designated as Wetlands of International Importance under Article 4.2 of the Birds Directive. [2]Average number and mean from WeBS publication. [3] - = figures for sites not described in Holt et al. (2015), supporting more than 10,000 waterbirds are available online via www.bto.org/webs.
Source: Holt et al. (2015) and JNCC website (http://jncc.defra.gov.uk/page-2598)

The Greater Wash draft SPA is currently being evaluated and has a combination of breeding seabirds (e.g. common tern, little tern) and wintering waterbirds (e.g. bar-tailed godwit, Bewick's swan, common scoter, gadwall and shelduck) as proposed designated features. Numerically this area is one of the most important areas in Britain for wintering waterbirds, moulting waders (early autumn), breeding waders, terns and other seabirds (SPA citation). An extension of the existing Outer Thames Estuary SPA boundary, to encompass the marine environment around the breeding colonies is also being considered, to protect seabird foraging areas.

Other areas within the region that support important numbers of wintering and passage waterbirds, but are not designated as SPAs include Pegwell Bay (e.g. greenshank, red-throated diver great-crested grebe and barnacle goose) and Orwell Estuary (e.g. black-tailed godwit, dunlin, shelduck and dark-bellied brent goose). At the 2013/2014 WeBS count these sites recorded an average number of 18,567 and 24,197 birds respectively (Holt *et al*. 2015). The area is also important for some species which only winter at a few sites in Britain e.g. the bean goose and the dark-bellied brent goose.

A programme of DECC funded aerial surveys of birds (waterbird and seabird) in strategic wind farm areas were conducted over a ~7 year period between 2001 and 2008 in areas including the Thames Estuary and the Greater Wash as well as areas on the west (e.g. Liverpool Bay and Carmarthen Bay). Bird distributions were described in the 2009 OESEA publication and summary information from these has been included in Table A1a.6.16.

Table A1a.6.16: General waterbird distribution in the Regional Sea 2 area

Month	General distribution
January	Severity of the weather will influence the movement westward of some bird species from the Wadden Sea. In mild winters, more birds will remain on the eastern side of the North Sea. The Thames area is important for diver species and shelduck (the Wash is also important for this species). Goldeneye are present in large numbers at Blackwater, the Colne and the Wash.
February	Sites such as the Wash, the north Kent marshes, Medway, Blackwater, Hamford Water and Stour support large numbers of shelduck and are important for flocks of waders, including grey plover and redshank.
March	Some bird species that have wintered in the UK begin to return to breeding grounds and numbers start declining at British sites, however numbers are still high, particularly at sites such as Medway, Swale, Dengie, Hamford Water and Blackwater. Large numbers of shelduck still present at the Wash, Stour and Blackwater.
April	Birds with breeding sites outwith the UK, continue to leave their wintering grounds along the British coast. Birds on passage continue to use these sites. The Wash and the Humber remain important for species e.g. dark-bellied brent goose, dunlin, knot and curlew, and the Wash continues to support important numbers of shelduck. Concentrations of common scoter are found off the Kent coast.
May	Peak of migration to breeding grounds (outwith the UK) for several species such as ringed plover, grey plover, knot, sanderling, dunlin, bar-tailed godwit and turnstone. The Wash and the Humber continue to support important numbers of birds, including dark-bellied brent geese and dunlin.
June	Peak of breeding season for species which breed in the UK. Migrant birds that winter in the UK and passage birds have all returned to their breeding grounds, with eider being the only seaduck which breeds in any significant numbers. Strongholds for this species are further north, in Scotland and also the Wadden Sea.
July	Large numbers of waders move to sites along the coast including the Wash, Blackwater and Stour estuaries. Shelduck moult during this month, peak numbers occur in the Helgoland Bight (east of the Wadden Sea), with smaller concentrations found in the Humber and the Wash. Relatively small flocks of moulting common scoter also found in the outer Thames estuary and smaller numbers of this species off North Norfolk Coast; larger numbers recorded off the coast of south Suffolk and north Essex.
August	Start of the main influx of wading birds and ducks to the North Sea, e.g. the Wash and the estuarine systems further south, e.g. Blackwater, Dengie, Stour and the Medway, with many sites supporting important numbers of birds.
September	Peak month for estuary usage. Large numbers of waders and ducks at estuaries, such as the Wash and the Humber.
October	Areas including the Wash and the Humber remain important for oystercatcher, grey plover, sanderling, dunlin, knot and redshank and the Thames estuary complex supports large numbers of ringed plover, grey plover and redshank. During early winter, large numbers of common scoter present in the Wash, with smaller numbers located off the North Norfolk Coast. Most common scoter occurred in the outer parts of the Wash, with no obvious distribution change as winter progressed and no apparent movement offshore.
November	Some birds, including knot and sanderling move west from the Wadden Sea to sites on the east coast of England, e.g. Humber and the Wash. Other sites remain important, supporting similar numbers and species to that seen in October. Shelduck moult has been completed and large flocks move from sites in the Wadden Sea to areas on the Wash and further north at Teesmouth. The Wash and Colne support large influxes of goldeneye and pink-footed goose return to the North Norfolk area. During much of the winter, the Thames has high numbers of divers (e.g. red-throated, black-throated and great northern) with highest concentrations occurring off estuarine mouths and in inshore areas; low densities recorded far from shore.
December	More estuaries on this coast become important for shelduck as numbers increase: Medway, Blackwater, Colne and Hamford. The Wash remains one of the most important estuaries in the western North Sea for wading birds. Small numbers of divers (e.g. red-throated, black-throated and great northern) occurred far from shore, with what appears to be a general movement offshore in late winter. Large numbers of eider recorded throughout the winter, with greatest numbers in the Greater Wash area during mid winter. Very few eiders recorded in the Thames during mid winter.

Source: Tasker & Pienkowski (1987), Skov et al. (1995), WWT Consulting (2008).

A1a.6.7 Features of Regional Sea 3

This region encompasses the eastern Channel, from Deal in the east to close to Dartmouth in Devon. Suitable habitat for nesting seabirds is limited. There are some estuarine and soft coastal areas notable for breeding, wintering and passage waterbirds. Sites referred to or described in this section are listed geographically east to west where possible.

A1a.6.7.1 Seabird species and distribution

Of the seabird species currently known to breed in the UK, thirteen do not breed along the eastern Channel coastline (Mitchell *et al*. 2004). The remaining twelve species breed throughout the area in varying numbers.

Overall, this region is of relatively less importance for breeding seabirds than elsewhere in the UK; with the exception of the Mediterranean gull, which although colonising other parts of England, appears to be maintaining a small central breeding presence along the south coast. The most notable breeding sites along this coast are described in Table A1a.6.17, as all of which are designated as SPAs and have breeding seabirds listed as qualifying features. However, none of these sites have been designated as supporting Seabird Assemblages of International Importance under Article 4.2 of the Birds Directive.

Table A1a.6.17: Important breeding seabird colonies in Regional Sea 3

Site	Species includes designated features and those present in assemblages)
Dungeness to Pett Levels	Common tern, little tern, Mediterranean gull
Pagham Harbour	Little tern
Chichester and Langstone harbours	Little tern, sandwich tern, common tern
Solent and Southampton Water	Common tern, little tern, Mediterranean gull, roseate tern, sandwich tern
Poole harbour	Common tern, Mediterranean gull
Chesil Beach and The Fleet	Little tern

Source: JNCC website (http://jncc.defra.gov.uk/page-2598), Mitchell et al. (2004)

A proposal to extend the Poole Harbour SPA is being evaluated. This includes the addition of two new features, breeding Sandwich tern and overwintering little egret, and the extension of the existing boundary to encompass the harbour mouth and the subtidal and intertidal areas not currently in the boundary.

A1a.6.7.2 Seabird distribution at sea

Seabird numbers in coastal waters off this stretch of coastline are generally low, with most breeding seabird species from the region feeding in estuaries, on exposed intertidal areas or in other shallow, inshore waters (Tasker 1998).

Between November and February, fulmar are widely distributed throughout the eastern Channel and a similar distribution continues through to July and the species only appears to be absent between August and October. Gannets move from the North Sea to the Channel in winter, and although widely distributed throughout its North Sea range, there are several distinct concentrations one of which is the Channel, e.g. eastern area of the Channel and off of Start Point (Skov *et al*. 1995). Gannets are also distributed throughout the whole of the Channel between May and August, probably associated with the breeding colonies on the Channel Islands. In winter, the eastern area of the Channel supports good numbers of common gull.

After the breeding season, lesser black-backed gulls in the Channel are likely to be from the Channel Island colonies, while some ~15,000 birds can winter in the area; this species also uses the Channel to enter and exit the North Sea (Skov *et al.* 1995). Lesser black-backed gulls largely abandon the North Sea in winter, with large numbers spending winter in the English Channel, with many found in the Celtic and Irish Seas and SW Approaches (Regional Sea 4 and 6) (Furness 2015). Herring gulls are widely distributed throughout the Channel between November and February with distribution more concentrated in the eastern Channel between May and October. During winter, great black-backed gulls are widely distributed throughout the Channel with distribution concentrating in the eastern and western areas between August and October. Kittiwakes are also widely distributed in low numbers in the Channel throughout the year (Barton & Pollock 2007).

In winter guillemots are widely distributed in low numbers, with distribution concentrated in the eastern Channel between March and April. Razorbills are present in low numbers in the Dover Strait and the eastern Channel in winter and appear to be scarce or absent during the remainder of the year (Skov *et al*. 1995).

A1a.6.7.3 Waterbird species and distribution (breeding, wintering and migratory)

Coastal habitats suitable for waterbird breeding within this region include estuaries, wet grassland, shingle/sand beaches and chalk cliff, and there are several notable breeding assemblages: Pagham Harbour (e.g. garganey, shoveler, gadwall and lapwing), Pett Levels (e.g. garganey and shoveler) and Rye and Chichester Harbour (e.g. ringed plover and oystercatcher). Chichester Harbour also provides important breeding areas for shelduck, while Pagham Harbour supports important numbers of Slavonian grebe during winter. Breeding redshank, lapwing, snipe and oystercatcher are found at sites further along the coast, including Poole Harbour, Southampton Water, Newton Estuary and Solent Marshes, with the Solent/Isle of Wight a stronghold for ringed plover in the region, while Abbotsbury supports colonially breeding mute swans.

The mixture of habitats along this coastline also attracts wintering and passage species, with several notable sites (see table A1a.6.18).

Table A1a.6.18: Important sites[1] for non-breeding waterbirds in Regional Sea 3

Site	Average number[2,3] (2013/14)	5-year mean[2]	Species (includes designated features and those present in assemblages)
Thanet Coast and Sandwich Bay	-	-	Turnstone
Dungeness and Rye Bay	29,076	31,245	Gadwall, shoveler, pochard, smew, greenshank, Bewick swan
Pagham Harbour	-	-	Ruff, pintail
Chichester Harbour **Langstone Harbour**	47,044 31,716	47,549 30,828	Dark-bellied brent goose, dunlin, black-tailed godwit, shelduck, red-breasted merganser, little grebe, golden plover, grey plover, bar-tailed godwit, curlew, greenshank, redshank, little egret
Portsmouth Harbour	-	-	Dark bellied brent goose
Solent and Southampton Water	-	-	Black-tailed godwit, dark-bellied brent goose, ringed plover, teal
Poole harbour	-	-	Avocet, black-tailed godwit, shelduck
Chesil Beach and The Fleet	-	-	Dark-bellied brent goose
Exe Estuary	-	-	Avocet, Slavonian grebe

Notes: [1]Principal sites for non-breeding waterbirds in the UK as described in the WeBS annual publication and the JNCC SPA website. Sites in bold are designated as Wetlands of International Importance under Article 4.2

of the Birds Directive. [2]Average number and mean from WeBS publication. [3] - = figures for sites not described in Holt et al. (2015) supporting more than 10,000 waterbirds are available online via www.bto.org/webs.
Source: Holt et al. (2015) and JNCC website (http://jncc.defra.gov.uk/page-2598)

There are also a number of RSPB reserves in the region including Adur Estuary and Pilsey Island, notable for their wintering and passage birds, which include dark-bellied brent goose, which returns to Pilsey Island in the autumn months (RSPB website: e.g. https://www.rspb.org.uk/discoverandenjoynature/seenature/reserves/).

A1a.6.8 Features of Regional Sea 4 & 5

Regional Seas 4 and 5 include the western English Channel and Celtic Sea (4) and the Atlantic South West Approaches (5). Regional Sea 4 extends along the south-east English coast encompassing Devon, Cornwall, Somerset and Gloucestershire and the south Wales coast around to St Govan's Head, while Regional Sea 5 is entirely open sea (oceanic).

Sites referred to or described in this section are listed geographically south to north where possible.

A1a.6.8.1 Seabird species and distribution

The region is close to the southern limit of the breeding ranges of several species and 17 species are listed as breeding in Regional Sea 4 and compared to other areas around the UK, there are a limited number of sites designated for either individual species or seabird assemblages. Table A1a.6.19 provides a summary of important colonies in the region, all of which are designated as SPAs.

Table A1a.6.19: Important breeding seabird colonies in Regional Sea 4 and 5

Site	Species (includes designated features and those present in assemblages)
Isles of Scilly	Storm petrel, lesser black-backed gull
Grassholm	Gannet
Skokholm and Skomer	Storm petrel, lesser black-backed gull, Manx shearwater, puffin, razorbill

Note: Sites designated as Seabird Assemblages of International Importance, under Article 4.2 of the Birds Directive, are shown in bold (qualifying level is 20,000 birds).
Sources: JNCC website (http://jncc.defra.gov.uk/page-2598), Mitchell et al. (2004)

The Isles of Scilly form an archipelago of over 200 islands and rocks. They lie some 45km south-west of Land's End and experience low levels of disturbance and predation, making them suitable for nesting seabirds. The Isles of Scilly are important for breeding Manx shearwater, with the archipelago and Lundy (see below), the main areas where this species breeds in England. In 2013 a project was set up to eradicate the rats on St Agnes and Gugh and the uninhabited islands to try and halt/reverse the decline seen in nesting seabirds. Two years on, and after a period of at least 15 years with no recorded nests, storm petrels were recorded nesting successfully on St Agnes and Gugh, where previously they had nested on a few outer rocks and islands (which have no rats) The work on the Isles has also benefited Manx shearwater, puffin and guillemot.

Lundy Island in the Bristol Channel, which, although not designated as an SPA is important for its breeding seabird populations. Surveys have shown that the population of Manx shearwater had declined on the island as a result of predation by rats. An eradication programme under the auspices of the Lundy Seabird Recovery Group took place between November 2002 and March

2004 (Appleton *et al*. 2006) and an RSPB survey in 2008 showed the populations of several bird species had increased, including Manx shearwaters, guillemots, razorbills and puffins. Numbers of Manx shearwater on Lundy remain encouraging, with 3,451 Apparently Occupied Burrows (AOB) recorded in 2013, compared to an estimated 1,081 Apparently Occupied Sites (AOS) in the 2008 survey (JNCC 2014). The proposed Lundy MCZ includes Manx shearwater as a designated feature, along with guillemot, razorbill and puffin (as well as other non-avian features – see Appendix A1j, Conservation).

There is a single gannet colony in Wales on Grassholm. In 2009, 39,282 AOS were recorded using a high resolution digital image, making this the third largest gannetry in the UK and Ireland, and comparing this to counts in 1984, 1999 and 2004, the growth rate of the colony is still increasing (JNCC 2014).

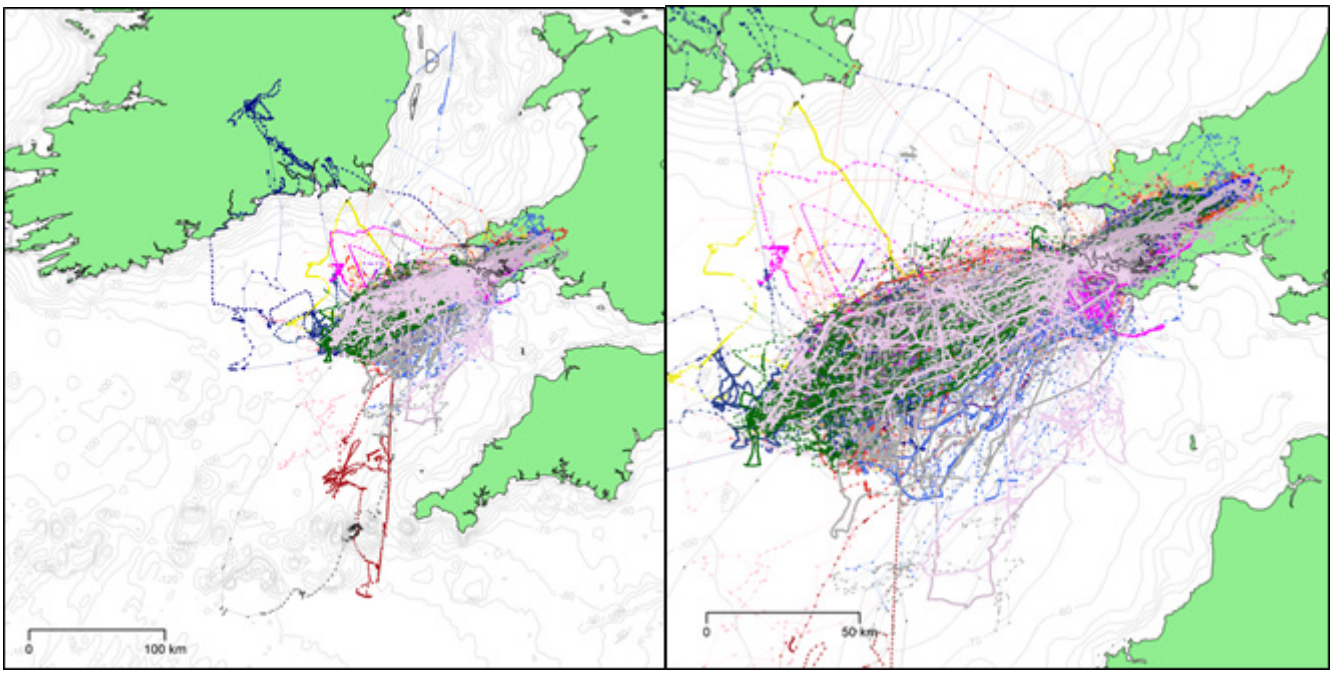
Skomer and Middleholm islands support internationally important numbers of Manx shearwater and lesser black-backed gull and nationally important numbers of guillemot and razorbill. The colony of lesser black-backed gull on Skomer was once the largest colony in Britain and Ireland while the island also supports the largest colonies of guillemot, razorbill and fulmar in Wales. Skokholm has internationally important numbers of Manx shearwater and nationally important numbers of lesser black-backed gulls. Kittiwake breed on Skomer, while both islands also support storm petrel, herring gull and the main Welsh colonies of puffin.

Declines in the number of lesser black-backed gulls have been recorded at the Skomer and Skokholm colonies, which in 2013 had 9,608 AON compared to 15,291 AON in 1987 (JNCC 2014). In contrast, guillemot numbers on Skomer appear to have increased at a constant rate of *ca*. 5% per annum over the last 30 years, while 11,497 individual puffins were recorded in 2012, compared to over 19,000 individuals counted in 2013. However, the increase may be due to later breeding by puffins on Skomer, i.e. a greater proportion of the population were above ground and visible, compared to previous years (JNCC 2014).

Thaxter *et al*. (2015) reports on the first year of a DECC-funded BTO study of foraging lesser black-backed gulls from South Walney (part of the Morecambe Bay SPA in Regional Sea 6) and Skokholm Island. A total of 2,830 trips were recorded with birds having an offshore foraging range of up to 210km (mean 22km): Figure A1a.6.13 shows the flight paths of gulls from Skokholm. Data collected also included post-breeding trips that were of longer duration and distance than those during incubation and chick-rearing (Thaxter *et al*. 2015).

At the time of the 2014 data collection, there were no offshore wind farm zones in UK waters with which the tagged birds from Skokholm interacted, including existing, consented or proposed zones; only one bird showed a potential interaction with the proposed Round 3 Atlantic Array development area (since cancelled). However, birds made wider movements later in the season, with four birds flying across the Irish Sea then overland in Ireland, thus having the potential to interact with Irish offshore wind farm zones. There are a number of proposed/consented wind farm zones along the eastern coast of Ireland, and five of the closest to the Skokholm and Skomer SPA are either consented (Codling Wind Park, Arklow Bank Phases 1 and 2) or had an application submitted (Dublin Array, Codling Wind Park extension).

Figure A1a.6.13: Flight paths of tagged lesser black-backed gulls from Skokholm 2014



Notes: Tracks of 25 lesser black backed gulls tracked from Skokholm (Skokholm and Skomer SPA) in 2014; two different spatial extents shown.
Source: Thaxter et al. (2015)

A1a.6.8.2 Seabird distribution at sea

The numbers of birds at sea are generally low compared to waters further to the north. The greatest concentrations of birds at sea generally occur outside the breeding period when gannets and gulls are more common offshore and there is immigration by guillemots and razorbills to offshore waters in winter (Barton & Pollock 2007).

In the breeding season the largest concentrations of birds occur around the Castlemartin coast as birds remain relatively near the Grassholm and Skomer and Skokholm colonies and waters in the far west of the region are used by relatively high numbers of Manx shearwater and gannet. Gannet is the only species listed as a qualifying feature for the Grassholm SPA, while storm petrel, Manx shearwater, puffin and razorbill are listed for the Skomer and Skokholm SPA. In 2015, applications to extend both the Grassholm SPA and the Skokholm and Skomer SPA were submitted to the EU. The proposed marine extension to the Grassholm SPA is an additional 2km radius (to include the seabed, water column and sea surface), measured from the existing SPA seaward boundary (the mean low water mark). The extension to the Skomer and Skokholm SPA is also for marine areas around the colonies, important for seabirds, particularly Manx shearwater. Prior to dusk during the breeding season, adult Manx shearwaters assemble in rafts on the sea surface before returning to their burrows to feed their chicks. These rafts can consist of several thousand individual birds and the proposed extension will cover this rafting area. Both extensions to the marine areas acknowledge the importance of the marine areas around these colonies for seabirds. Also in recognition of the importance of the seas west of Pembrokeshire, this area has been identified as an area for consideration for future designation as an SPA, for Manx shearwater (Natural Resources Wales 2015 https://naturalresources.wales/media/3938/wales-marine-spa-and-sac-faqs-version-2-april-2015-english-final-1.pdf)

With the exception of August and October, low numbers of fulmar are present in the western Channel. Relatively high numbers of gannet are concentrated just off the Plymouth coast

between November and February, with low numbers present throughout the rest of the western Channel and also between May and August. Small numbers of great skua are found off the Plymouth coast between November and March but are absent from the area during the rest of the year. Lesser black-backed gulls are present in low numbers throughout the western Channel between November and February. The species may also be present in low numbers between May and June, but their distribution is not as widespread in the Channel as previously (historically) (Skov *et al.* 1995).

Great black backed gull are widespread, in low numbers, throughout the Channel between November and February, while between August and October they are concentrated in the western Channel. Kittiwake are present throughout the Channel in all months of the year.

Guillemots are present in the Channel in low numbers between November and February, and May and June. Razorbill, which can often be associated with guillemot, are present off the coast of Plymouth in low numbers between December and February and are relatively absent from the area for the remainder of the year (Skov *et al.* 1995). However, data from aerial surveys indicates that during the mid-winter period, at least, there are potentially substantial numbers of auks to the west of Bude Bay near Plymouth with numbers increasing, in early spring, off north Cornwall.

The Balearic shearwater breeds in the Balearic Islands and the south coast of France, before migrating and traditionally, gathering to moult in late summer in northern and central parts of the Bay of Biscay. Over the last 10 years, this moulting population has shifted northwards, with large numbers now recorded, principally between July and October, in the western English Channel, with Portland Bill in Dorset (Regional Sea 3) being a prime site. Birds are also seen off the Cornwall, Devon and west Wales coast.

A1a.6.8.3 Waterbird species and distribution (breeding, wintering and migratory)

The region has a number of key areas for wintering (and some breeding) waterbirds; the oceanic nature of Regional Sea 5 means that no breeding waterbirds are present. Similarly, there are no areas for wintering waterbirds and any birds within the Regional Sea 5 area are likely to be on passage. The presence of breeding and wintering waterbirds is therefore confined to Regional Sea 4.

The Severn Estuary along with the Somerset and Gwent Levels provide breeding habitat for a number of species. These areas comprise extensive areas of saltmarsh and associated wet grassland, expanses of intertidal sand and mud flats, as well as large vegetated sand dune systems and reed beds; the Somerset Levels is one of the most important areas in the region for breeding waders. Important numbers of redshank breed in the region and other notable species that breed here include snipe, teal, lapwing, ringed plover, oystercatcher and shelduck.

Smaller sites within the region, such as the Exe and Tamar estuaries support important numbers of breeding shelduck which also breed on the Isles of Scilly, along with mallard, oystercatcher and ringed plover.

The region is important for wintering birds as well as birds on passage; the region lies on the major migratory flyway of the east Atlantic, with many birds passing through this area on their way to and from wintering areas on the African, Mediterranean and south-west European coasts to Arctic breeding grounds. The important of the region can also increase for these birds if severe weather affects sites in the east of Britain or Europe, e.g. counts on the Severn Estuary

in 2010/11 were higher than recent averages for many species, thought to be as a response to cold weather elsewhere, with species using the area as a cold weather refuges (BTO website).

The most important sites for non-breeding waterbirds in the region are shown in Table A1a.6.20 below, all of which are designated as SPAs, some of which are also designated for their Wetland Assemblages of International Importance (see also Conservation section A1j). Sites are listed geographically south to north.

Table A1a.6.20: Important sites[1] for non-breeding waterbirds in Regional Sea 4

Site	Average number[2,3] (2013/14)	5-year mean[2]	Species (includes designated features and those present in assemblages)
Tamar Estuaries Complex	-	-	Avocet, little egret
Somerset Levels	91,324	100,764	Mute swan, wigeon, gadwall, teal, shoveler, lapwing, bean goose, golden plover, ruff, Bewick's swan
Severn Estuary	74,810	75,295	Mute swan, Bewick's swan, bar-tailed godwit, shelduck, pintail, shoveler, ringed plover, dunlin, pochard, golden plover, ruff, black-tailed godwit, curlew, greenshank, redshank
Burry Inlet	29,972	34,232	Pintail, oystercatcher, knot, black-tailed godwit, dark-bellied brent goose, shoveler, dunlin, curlew, greenshank
Carmarthen Bay (marine SPA)	21,347	43,227	Common scoter, curlew, sanderling, oystercatcher, golden plover, black-tailed godwit, greenshank

Notes: [1]Principal sites for non-breeding waterbirds in the UK as described in the WeBS annual publication and the JNCC SPA website. Sites in bold are designated as Wetlands of International Importance under Article 4.2 of the Birds Directive. [2]Average number and mean from WeBS publication. [3] - = figures for sites not described in Holt et al. (2015) supporting more than 10,000 waterbirds are available online via www.bto.org/webs.
Source: Holt et al. (2015) and JNCC website (http://jncc.defra.gov.uk/page-2598)

Two other SPAs in the region are Castlemartin Coast and Ramsay and St David's Peninsula Coast, both with breeding and wintering chough as their protected feature.

For breeding species, key areas in the region for wintering birds are the Severn Estuary and the Somerset Levels and Carmarthen Bay, with inshore areas also important for wintering seaduck including the area around Falmouth. An area between Falmouth Bay and St Austell Bay is being proposed as a SPA for its populations of wintering birds; the area is the most important site in the UK for wintering black-throated divers and the most important site in England for great northern diver. Another species that occurs in important numbers here is Slavonian grebe. The proposed boundary encompasses an area from Nare Point to Southground Point, including parts of Carrick Roads and the Helford Estuary and a seaward area extending out from the mean high water mark out to the 49m depth contour (including the intertidal zone).

The Severn Estuary is one of the largest estuaries in the UK and supports significant numbers of wintering and passage birds; wintering numbers at this site are regularly in excess of 70,000 individuals and at peak times, is one of the few UK estuaries that support in excess of 100,000 birds. Aggregations of shelduck gather to moult post-breeding and British and Irish birds move to the Helgoland Bight of the Wadden Sea and can be here from mid-July to the end of August, before returning to wintering grounds. Significant late summer moulting concentrations of shelduck can also occur in the UK, including at Bridgewater Bay in the Severn Estuary (JNCC website http://jncc.defra.gov.uk/pdf/UKSPA/UKSPA-A6-27.pdf).

Carmarthen Bay was the first wholly marine SPA designated in the UK – and this was designated for a single feature, wintering common scoter. It is estimated that more than 50% of the non-breeding population of this species is found at fewer than ten sites in the UK and Carmarthen Bay is considered one of the most important, although numbers here do fluctuate; a maximum of 22,300 birds were recorded in 2002/03, after which numbers declined, a trend which continued until 2007/08, followed by very high counts in 2009/10 and then again in 2012/13 (low numbers were recorded in 2010/11). Numbers and distribution of common scoter in the Bay reflects the density of food available, and the most consistent feeding areas are offshore from Amroth and Pembrey Sands (Carmarthen Bay and Estuaries European Marine Site website, http://english.cbeems.org/the-ems/carmarthen-bay-spa/).

The south Cornwall coast has been identified as an area of search (AoS) by JNCC as it may support important aggregations of wintering divers, seaducks and grebes warranting protection as a marine SPA. The AoS runs from St Austell Bay in the east to the tip of The Lizard Peninsula in the west and extends 23km out to sea. Within the South Cornwall AoS there are no existing SPA designations although there is an Important Bird Area (the South Cornwall Coast IBA, in the UK IBAs do not offer legal protection to birds), selected for its numbers of black-throated divers, great northern divers and Slavonian grebe (O'Brien *et al*. 2014).

Data was gathered from three aerial surveys (January 2007, March 2007 and February 2009) and four shore-based counts in 2009-2011. From these it was found that two species exceeded the Stage 1.1 UK SPA Selection Guidelines threshold (Stroud *et al*. 2001 and see Appendix A1j, Conservation): black-throated diver (estimated count of 115 individuals, selection threshold is 6 for this species, as well as exceeding the 50 individuals usually considered the minimum for site selection) and great northern diver (estimated count of 74 individuals, threshold 25 individuals), with both species having nearshore distributions – see O'Brien *et al*. 2014.

Four waterbird and one seabird species counted along the South Cornwall Coast, did not exceed the Stage 1.2 UK SPA Guideline Threshold applicable to them: black-necked grebe; red-necked grebe; Slavonian grebe; red-breasted merganser and shag. Despite not reaching the threshold applicable to them, the numbers counted for black-necked grebe (39 individuals) was the highest marine population counted, making the South Cornwall Coast the most important area in the UK for this species. The number for red-necked grebe (6 individuals) was the largest population in England and the most southerly population in the UK, making the area a potential contributor to the range requirements for this species and the number counted for shag (333 individuals) may be one of the largest populations in England and one of the most southerly, again contributing to the range requirements (O'Brien *et al*. 2014).

Outside Scotland, the South Cornwall AoS is the most important area for a number of these species: the area is several hundred miles south of the main UK wintering population of great northern diver; the area is the third most important for red-necked grebe, after the Firth of Forth and Scapa Flow and during winter, shags have a northerly distribution, with coastal areas of Scotland supporting high numbers, so numbers at Gerrans's Bay in the South Cornwall AoS are amongst the most important outside Scotland (O'Brien *et al*. 2014).

Other species of diver, grebe and seaduck were recorded but in such low numbers that none exceeded the thresholds; with the south Cornwall coast area searched being of low importance for these species compared to other areas around England (O'Brien *et al*. 2014)

A1a.6.9 Features of Regional Sea 6

Regional Sea 6 encompasses the Irish Sea and includes several important seabird breeding colonies, most notably those on offshore islands and estuarine systems.

Sites referred to or described in this section are listed geographically south to north where possible.

A1a.6.9.1 Seabird species and distribution

All 25 seabird species known to breed in the UK, breed in the Irish Sea area; the majority of those breeding however are made up of just five species: Manx shearwater; gannet; lesser black-backed gull; guillemot and herring gull (Barton & Pollock 2005). The area supports one of two large gannetries located in the wider west coast region, at Ailsa Craig (see below), the other being Grassholm (see Regional Sea 4 and 5).

There are a number of important seabird colonies (Table A1a.6.21) where several seabird species occur in internationally important numbers and with at least 20,000 seabirds. All sites listed below are designated SPAs. .

Table A1a.6.21: Important breeding seabird colonies in Regional Sea 6

Site	Species (includes designated features and those present in assemblages)
Glannau Aberdaron and Ynys Enlli / Aberdaron Coast and Bardsey Island	Manx shearwater
Ynys Feurig, Cemlyn Bay and The Skerries	Arctic tern, common tern, roseate tern, sandwich tern
Ynys Seiriol / Puffin Island	Cormorant
The Dee Estuary	Common tern, little tern
Ribble and Alt Estuaries	Common tern, lesser black-backed gull
Morecambe Bay	Little tern, sandwich tern, herring gull, lesser black-backed gull
Duddon Estuary	Sandwich tern
Carlingford Lough	Common tern, sandwich tern
Strangford Lough	Arctic tern, common tern, sandwich tern
Outer Ards	Arctic tern
Copeland Islands	Puffin, Arctic tern
Larne Lough	Common tern, roseate tern, sandwich tern
Ailsa Craig	Razorbill, lesser black-backed gull, gannet

Notes: Sites designated as Seabird Assemblages of International Importance under Article 4.2 of the Birds Directive, are shown in bold (qualifying level is 20,000 birds).
Source: JNCC website (http://jncc.defra.gov.uk/page-2598), Mitchell et al. (2004)

There are also a couple of coastal SPAs in the region for breeding and wintering chough, e.g. Mynydd Cilan, Trwyn y Wylfa ac Ynysoedd Sant Tudwal / Mynydd Cilan, Trwyn y Wylfa and the St Tudwal Islands SPA and Glannau Ynys Gybi / Holy Island Coast SPA.

The Glannau Aberdaron and Ynys Enlli/Aberdaron Coast and Bardsey Island SPA holds a large breeding population of Manx shearwater (as well as a resident population of chough, the other bird species listed as a feature of the site) in excess of 16,000 birds. Manx shearwater feed outside the SPA as well as in the Irish Sea, but the importance of the waters around the SPA have been acknowledged in the proposed extension to the SPA boundary to include marine feeding areas – this proposed extension was submitted in 2015 to the EU for consideration.

Sandwich terns are confined to one location in Wales, at Cemlyn Lagoon on Anglesey. The colony regularly holds over 1,100 pairs and the last five breeding seasons have all seen new peaks, with 2,617 pairs nesting in 2014 (JNCC 2015). Increases have also been seen in Arctic tern numbers, a species which, in Wales, only breed on Angelsey. Between 1969 and 1990

numbers have increased and this increase has continued, with the national population now more than doubled over the last decade. The Skerries, lying approximately 3km off Carmel Head, Anglesey, holds over 80% of the Welsh population and over 3,500 pairs were recorded nesting here between 2011 and 213 (JNCC 2014).

Currently there is only one colony of little tern in Wales, at Gronant (Clwyd) at the Dee Estuary, where numbers have fluctuated over the years, but has shown a general upward trend; in recent years the colony has held at least three times the number of pairs it did in 1986, with approximately 135 AON in 2014 (JNCC 2014). The abandonment of the colony at Shotton steelworks (River Dee) is thought to be the main cause of the steep decline of common tern in Wales (the last recorded breeding success at this location was in 2008). Although this species visited the site between 2009 and 2012, there was no successful breeding, with birds either leaving the site before breeding commenced, or attempted to breed, but failed (JNCC 2014).

During the breeding season, over 61,000 individual seabirds can be present at Morecombe Bay, and this site is a Seabird Assemblage of International Importance, as are the Ribble and Alt Estuaries which, regularly support 30,000 individual seabirds, including black headed gull and lesser black-backed gull; the area is also important for its breeding population of common tern. The Ribble Estuary is the larger of the two and during the summer, the large expanse of saltmarsh and areas of coastal grazing marsh support large concentrations of breeding seabirds which feed both offshore and inland.

St Bee's Head is the only English breeding site for black guillemot and has breeding populations of razorbill, herring gull and cormorant. The SCR count recorded 14 individual black guillemots at St Bees head, but this number halved by Seabird 2000. In 2011 and 2012 ten individuals were counted, and nine in 2013. .

The Isle of Man has a diversity of habitats suitable for supporting a number of different breeding seabirds; but like other areas of the UK, breeding bird numbers have fluctuated. On the Island, the largest seabird breeding colonies are found on the Calf of Man, Peel Hill, the Ayres, Maughold Brooghs and the cliffs around the Sugarloaf. Since the late 1990s there has been a decline in fulmar number at the Calf of Man, the largest colony regularly counted, with numbers in 2014 their lowest since 1986 (<50 AOS) (JNCC 2015). The small population of breeding Manx shearwater is also confined to this area and, with the completion of the rat eradication programme here in recent years, the population of this species has increased from 127 AOB in 2011 to 424 AOB in 2014 (JNCC 2015). As seen in colonies elsewhere kittiwake numbers at the Calf of Man colony have decreased substantially since Seabird 2000. 182 AON were recorded in 1999, dropping to 13 AON in 2013 – with no data submitted for 2014. The current status of kittiwake on the Isle of Man as a whole is unknown (JNCC 2015).

Another species to have shown a decline at the Calf of Man colony is guillemot. Since Seabird 2000, there have been declines of 25% (e.g. counts from 2009, 2012 and 2014) and 50% (e.g. 2010 and 2013) from that Seabird 2000 number (JNCC 2015). Little tern are known only to nest in one area of the Isle, and some 44 nesting pairs were recorded in 2013, compared to 20 from Seabird 2000 census (JNCC 2014). Immigration is thought to be a factor increasing the numbers (JNCC 2014). Arctic terns have shown contrasting numbers over the same period and in 2012 only 3 nesting pairs were recorded. However, in 2013 over 25 AON were recorded, the highest number since 1986 (JNCC 2014).

In Northern Ireland, there are a number of important sites for seabirds: Carlingford Lough; Strangford Lough; Outer Ards; Copeland Islands; Larne Lough; Bird Island; The Gobbins and The Maidens.

At Carlingford Lough, although numbers here are low, this is the third most important site in Northern Ireland for great black-backed gull. Sandwich terns formerly bred here before abandoning the site. However, 76 pairs bred here in 2014, the first successful breeding here since 2010 (BTO 2015).

Strangford Lough is one of the most frequently monitored sites in Northern Ireland. Along with Copeland Islands supports the largest concentrations of common (or mew) gull (33 AON in 2014, similar to 2013, but down from a peak of 532 in 2010) and amongst the largest concentrations of lesser black-backed gull and herring gull. Shag were present, but stopped breeding here in 2007. Numbers of black-headed gull recorded in 2014 (1,181 AON) were the lowest since 1986, when annual monitoring began. This area is also one of the main areas for breeding little tern, common tern, sandwich tern and Arctic tern – between 2008 and 2012 this area recorded a decrease in Arctic tern of 90% (while numbers at Copeland have stabilised) and along with Larne Lough, supports small numbers of breeding Mediterranean gull (<10 pairs). (BTO 2015, JNCC 2014, 2015).

The BTO Northern Ireland has been working with the Copeland Bird Observatory, to introduce puffins as a breeding species to Lighthouse Island (having known to have bred on the Island in the past) (BTO Website). In May 2012, 50 decoy puffins, and an acoustic attraction system was deployed and attracted up to 50 puffins, which stayed until late July. In mid March 2013, decoys and acoustic system were again deployed to try and attract birds to the area early in the breeding season so that they attempt to breed; it is thought that one pair bred on the island in 2015 (BTO personal comments, cited on BTO Website), it is unknown if this attempt was successful.

Copeland Island supports the only, confirmed, extant colony of Manx shearwater in Northern Ireland; with birds on Lighthouse Island (3,444 pairs in 2007) and Big Copeland (1,406 pairs in 2007). It also supports one of the largest colonies in Northern Island of common gull (452 AON in 2012, down from a peak of 830 in 2009); the largest colony in Northern Ireland of Arctic tern – the population stabilising at ~750 pairs in recent years; a large colony of lesser black-backed gull (~1,009 AOT in 2012, up from 420 AOTs in 2005) and concentrations of herring gull, although this area has seen a decline. Black-headed gull are also present, the 2014 count recorded 180 pairs, well below the peak of the early 2000s (BTO 2015, JNCC 2014, 2015).The Gobbins cliffs at Islandmagee, on the Causeway Coastal Route, supports a variety of breeding seabird including fulmar, cormorant, shag and the second largest colony of kittiwake, in Northern Ireland after Rathlin (Regional Sea 7), although this is only ~10% the size of Rathlin. Also present are small satellite colonies of guillemot (1,510 individuals in 2014), razorbill (240 individuals in 2014 – the lowest ever recorded) and puffin (54 in 2014, similar to 2013) (BTO 2015).

The Maidens supports the largest colonies of shag in Northern Ireland and small numbers of breeding Mediterranean gull (<10 pairs). This site may be the only remaining colony in Northern Ireland for breeding roseate tern – this species being all but extinct in Northern Ireland having suffered a near-terminal decline in the late 1980s.

Another important site in Northern Ireland for breeding seabirds is Larne Lough, which along with Strangford Lough, Larne Lough is one of the main costal sites for little tern, sandwich tern and common tern. This area also supports important concentrations of black guillemot (125 birds in 2014).

One of the largest colonies of lesser black backed gulls in England is located at South Walney, which during Seabird 2000 held over 30% of the national population (Mitchell *et al.* 2004). Since then, numbers have fallen considerably; in 1999 some 19,487 AON were recorded,

compared to only 3,850 AON in 2014 (JNCC 2015). South Walney also supports the largest colony of herring gull in England (holding approximately one-fifth of the national population) and this too has seen a considerable decrease in numbers since Seabird 2000. Some 10,129 AON were recorded in 1999, compared to only 535 in 2014, with lack of food, increased predation and botulism (for the earlier declines seen), thought to be amongst the causes for the declines (JNCC 2015).

Ailsa Craig in the outer Firth of Clyde, is important for cliff nesting species including kittiwake, fulmar, guillemot, razorbill, gannet and herring gull. The area is a Seabird Assemblage of International Importance as it supports some 65,000 individual seabirds during the breeding season. The decline of kittiwake numbers has also been evident at this colony; 1,675 Apparently Occupied Nests (AON) were recorded at Seabird 2000, compared to 489 AON recorded in a 2013 survey, a decline of nearly 71% (JNCC 2014). There has also been a 50% decline in guillemot numbers on Ailsa Craig between Seabird 2000 (9,415 individuals) and the most recent survey in 2014 (4,681 individuals) (JNCC 2015).

A1a.6.9.2 Seabird distribution at sea

The offshore feeding areas for birds from breeding colonies in Regional Sea 6 are of key importance (Tasker 1995) and this is being recognised through either extensions to existing SPA boundaries (i.e. Liverpool Bay/Bae Lerpwl) and areas being considered for protection (e.g. seas around Anglesey for Arctic, common, Sandwich and roseate tern and). Most auks (guillemots, puffin and razorbill) feed within 30km of the colony, while gannets and lesser black-backed gulls frequently forage near fishing fleets in and around the area (Stone *et al*. 1995). Offshore sandbanks, such as Bais Bank (off St David's Head, Pembrokeshire) are important for sandeels (*Ammodytes* spp), a key prey species for a number of seabirds.

Areas of the Irish Sea vary in importance over the year. Manx shearwater return to European waters in spring to breed and from May to August birds remain relatively close to their breeding colonies. Fronts are regions of enhanced biological productivity (Begg & Reid 1997) and in August and September, flocks of Manx shearwater in the Irish Sea Front area possibly hold the majority of the population from the adjacent UK breeding colonies before they leave for their wintering grounds. Different species (e.g. Manx shearwater, guillemots, and razorbills) have been observed to utilise spatially distinct areas of the Irish Sea Front, indicative of different foraging strategies.

Gannet, are present throughout the year, but are generally only in the North Channel and St George's Channel in autumn and winter (Mackey *et al*. 2005). Moderate numbers of birds are recorded in summer, with highest numbers in mid to late summer (peak counts from WWT surveys carried out between 2001 and 2007 were 357 birds) (BERR 2007). Birds concentrate around colonies during the breeding season and following breeding, are more widely distributed throughout the Irish Sea, with concentrations found around the Irish Sea and Celtic Sea Fronts. Small numbers have been recorded in early winter (96 birds), dropping as winter progressed. Birds occurred offshore from Fleetwood to the Ribble Estuary and off north Wales, with birds off the Cumbrian coast occurring closer to shore. Highest densities were recorded offshore during this time (BERR 2007).

Other species found in the area throughout the year are cormorant and shag primarily in coastal regions off Liverpool (cormorant) and in the North Channel (shag). Herring gulls are also present year round with concentrations offshore and in coastal waters of the central Irish Sea. Kittiwakes are widely distributed over the whole of the area (Mackey *et al.* 2005). The WWT surveys between 2001 and 2007 recorded peaks of 281 birds in early summer and 325 birds in mid-winter (BERR 2007), with little variation in numbers during winter. During summer,

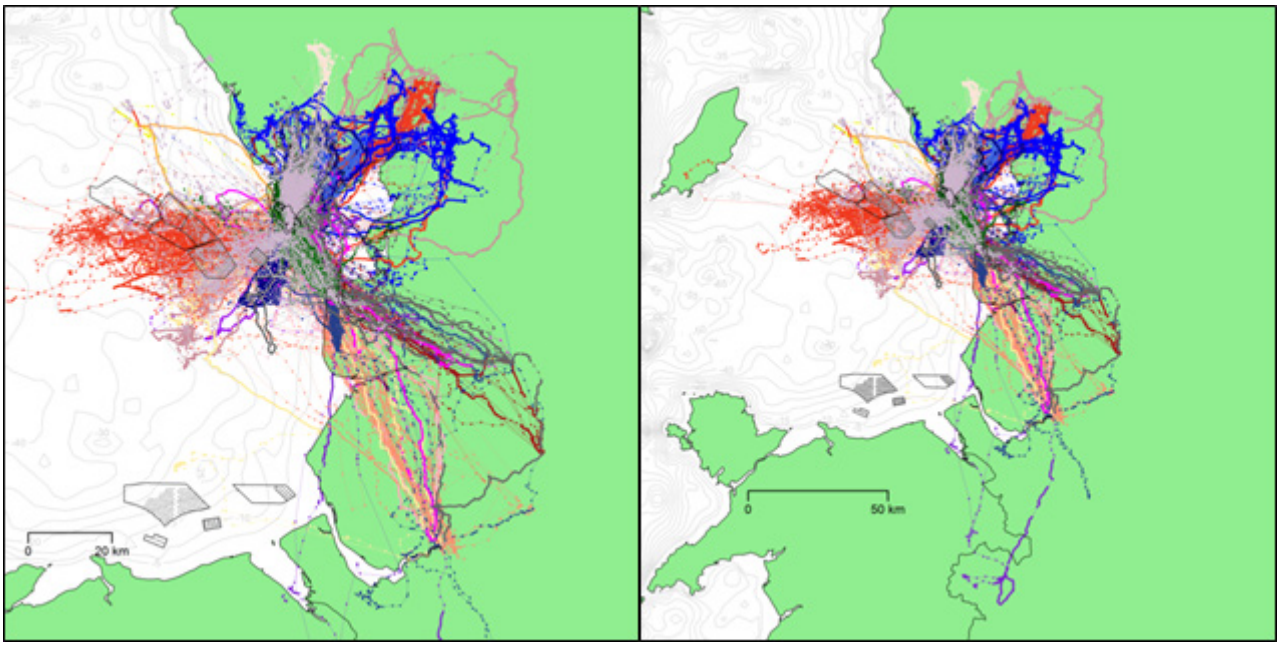
distribution is patchy and areas off north Wales hold larger numbers, with more birds off Blackpool than in winter and few birds off Cumbria.

Highest densities of guillemot are generally observed during the breeding and post-breeding seasons, located in coastal waters around colonies. Densities decrease during autumn and winter, but they remain present in the area (Mackey *et al*. 2005). Razorbill distribution is generally less widespread than that of guillemots. Both species congregate in large concentrations post breeding, where adults moult and the young are still flightless. Concentrations of moulting auks are found throughout the Irish Sea from July through August, becoming more localised in the western and central Irish Sea during late August and September. In mid-late summer, concentrations have been recorded in offshore waters off Blackpool and inshore areas around Great Ormes head (BERR 2007) and by October and through November high densities are still present in the North Channel, with concentrations also found in the eastern Irish Sea and Cardigan Bay (Webb *et al.* 1995). Peak numbers of auks in early and mid-winter have been recorded in the north-west of the region, after which numbers dropped slightly and large concentrations recorded off Angelsey and offshore from the mouth of the Solway (BERR 2007).

In winter, concentrations of little gull are found in Liverpool Bay, with a wintering population in the Irish Sea, some utilising sandbanks south of Dublin Bay (area outwith the scope of this SEA) as roosts. In August 2010, the Liverpool Bay/Bae Lerpwl SPA was designated, with red-throated diver as the protected bird feature. Extensions to the SPA have been proposed to provide protection to little gull, the foraging areas of common tern (from the colony at Seaforth) and little tern (The Dee Estuary SPA) and cormorant as a named feature of the assemblage. The WWT surveys from 2001-2007 found little gulls in offshore areas from Cumbria to the Dee Estuary and that these gradually moved closer to shore from the Ribble Estuary southwards as winter progressed (BERR 2007).

Thaxter *et al.* (2015) describes the first year of a study at South Walney of twenty-four tagged lesser blacked gull and twenty-four tagged herring gull (lesser black-backed gulls from Skokholm are also being studied, see Regional Sea 4&5). Final analyses is still to be carried out on herring gull data but initial assessment shows birds using coastal areas and mudlfats near to the colony, inland trips to local towns, fields and water bodies, as well as trips further afield across Morecambe Bay to Blackpool. Lesser black-backed gulls tracked from Walney showed individual variations in habitat use (inland and offshore). Birds had an offshore foraging range of up to 88km (mean 8km) and total foraging range across the May to September period of 170km (mean 14km), on trips lasting up to 205hrs (mean 5hrs) (see Figure A1a.6.14). Fifteen of the 24 birds tagged showed connectivity with offshore wind farm areas; most of the 15 travelled through the Barrow Offshore Wind Farm area, which is closest to the colony and a few birds used the Walney extension zone. The behaviour of gulls within the area of active wind farms is to be investigated in future analysis (Thaxter *et al*. 2015).

Figure A1a.6.14: Flight paths of tagged lesser black-backed gulls from Walney 2014



Note: Tracks of 24 lesser black backed gulls tracked from Walney (Morecambe Bay SPA) in 2014; two different spatial extents shown.
Source: Thaxter et al. (2015)

The importance of marine areas in the region for black guillemot has also been acknowledged by the designation of the Clyde Sea Sill Marine Protected Area (MPA). This covers an area from the Mull of Kintyre to the Rhins of Galloway, and encompasses a persistent thermal front located where the waters of the Irish Sea meet the calmer, less saline waters of the Clyde Sea. There are a number of protected features within the site, including black guillemot, a breeding colony of which forage around Sanda, Sheep Islands and Glunimore in the north-west of the MPA (SNH 2014b).

A1a.6.9.3 Waterbird species and distribution (breeding, wintering and migratory)

The numbers of breeding waders and other waterbirds in this region is relatively low compared to other parts of Britain, though the Dyfi Estuary is one of the most important areas in Wales for breeding waders, particularly breeding redshank, teal, red-breasted merganser and shelduck and breeding eider, oystercatcher and lapwing are found on the Isle of Man.

Large numbers of ringed plover breed in Morecambe Bay, the Solway Firth and Luce Bay, with these areas holding the main breeding concentrations of this species on the west coast of Britain outside the Western Isles (Cradock & Stroud 1996). The area also includes Milford Haven which support breeding shelduck. The Inner Solway, the Ribble, Morecambe Bay and Duddon Estuary have large breeding populations of shelduck, redshank, oystercatcher, dunlin (the most southerly regularly saltmarsh breeding dunlin in Britain) and curlew. The dry grassland breeding population of shelduck in the Ribble Estuary is the most numerous in Britain. Breeding eider are also found in Morecambe Bay (the most southerly breeding population in Britain) and around Walney Island (Gibbons *et al*. 1993).

For wintering birds and birds using the area on passage between sites, there are a number of important sites within the region, some supporting well in excess of 100,000 birds each year (Table A1a.6.22).

Table A1a.6.22: Important sites[1] for non-breeding waterbirds in Regional Sea 6

Site	Average number[2,3] (2013/14)	5-year mean[2]	Species (includes designated features and those present in assemblages)
Dyfi Estuary / Aber Dyfi	-	-	Greenland white-fronted goose
Traeth Lafan / Lavan Sands, Conway Bay	-	-	Oystercatsher
Dee Estuary	124,603	124,120	Light-bellied brent goose (Svalbard population), shelduck, pintail, oystercatcher, knot, dunlin, black-tailed godwit, redshank, wigeon, teal, cormorant, grey plover, sanderling, ruff, greenshank
Liverpool Bay (marine SPA)	-	-	Red-throated diver
Mersey narrows and North Wirral Foreshore	-	-	Redshank, turnstone
Mersey Estuary	87,205	71,952	Shelduck, teal, dunlin, black-tailed godwit, redshank, curlew, golden plover, ringed plover, pintail
WWT Martin Mere	41,861	29,808	Whooper swan, pink-footed goose, shelduck, teal, pintail
Ribble Estuary **And Alt Estuary**	173,508 62,343	202,278 72,47	Whooper swan, pink-footed goose, shelduck, wigeon, teal, pintail, oystercatcher, ringed plover, grey plover, lapwing, knot, sanderling, dunlin, black-tailed godwit, bar-tailed godwit redshank, shoveler, golden plover, ruff, curlew, greenshank
Morecambe Bay	163,288	202,338	Pink-footed goose, shelduck, pintail, oystercatcher, knot, dunlin, black-tailed godwit, bar-tailed godwit, curlew, redshank, teal, shoveler, goldeneye, red-breasted merganser, great crested grebe, cormorant, ringed plover, golden plover, grey plover, sanderling, greenshank
Duddon Estuary	17,186	20,918	Pintail, curlew, redshank, ringed plover, sanderling, knot
Kilhough Harbour			Light-bellied brent goose
Strangford Lough	65,111	70,139	Mute swan, light-bellied brent goose (Nearctic population), shelduck, knot, bar-tailed godwit, redshank, whooper swan, wigeon, teal, mallard, pintail, shoveler, eider, goldeneye, red-breasted merganser, great crested grebe, grey heron, oystercatcher, ringed plover, golden plover, grey plover, lapwing, dunlin, black-tailed godwit, curlew, greenshank, turnstone
Outer Ards	-	-	Light-bellied brent goose, ringed plover, turnstone
Belfast Lough	-	-	Bar-tailed godwit, redshank, turnstone
Belfast Lough – Open Water	-	-	Great crested grebe
Larne Lough	-	-	Light-bellied brent goose
Loch of Inch and Torrs Warren	-	-	Greenland white-fronted goose
Upper Solway Flats and Marshes (figures for Solway Estuary)	98,703	109,297	Whooper swan, pink-footed goose, barnacle goose (Svalbard population), shelduck, pintail, oystercatcher, ringed plover, knot, dunlin, redshank, teal, scaup, great crested grebe, cormorant, golden plover, sanderling, ruff, black-tailed godwit, bar-tailed godwit, curlew, greenshank, turnstone
Black Cart	-	-	Whooper swan
Inner Clyde Estuary	-	-	Redshank

Notes: [1]Principal sites for non-breeding waterbirds in the UK as described in the WeBS annual publication and the JNCC SPA website. Sites in bold are designated as Wetlands of International Importance under Article 4.2 of the Birds Directive. [2]Average number and mean from WeBS publication. [3] - = figures for sites not described in Holt et al. (2015) supporting more than 10,000 waterbirds are available online via www.bto.org/webs.
Source: Holt et al. (2015) and JNCC website (http://jncc.defra.gov.uk/page-2598)

The proposed extension to the Liverpool Bay/Bae Lerpwl SPA, as well as including seabirds (see above) also looks to add red-breasted merganser as a named feature of the assemblage. There are also two other SPAs in the region, both for breeding and wintering chough.

In addition to those sites already designated as SPAs in the region, the Solway Firth has been proposed as a draft marine SPA and is being evaluated. Features for designation are a combination of waterbird species (red-throated diver, common scoter, goosander, ringed plover and lapwing) and seabirds (cormorant, herring gull, black-headed gull) (SNH 2014a). Two other important sites in the region, not designated as SPAs, but which have a 5year mean in excess of 20,000 individual birds each are Wigtown Bay (21,197 average birds for 2013/14 and 5year mean of 20,750 – species include whooper swan, pink-footed goose, barnacle goose) and the Cleddau Estuary (20,868 for 2013/14 and 21,396 5year mean – species include little grebe, shelduck, wigeon, teal, dunlin and curlew).

The WTT aerial surveys conducted between 2001 and 2007 primarily in winter, to aid in the identification of potential marine SPAs recorded distribution of a number of waterbird species. These surveys included locations on the east coast of the UK (e.g. Thames/The Wash areas – see regional Sea 1) and the west coast and information from these was included in the OESEA document published in 2009. A summary of the distribution in the Regional Sea 6 area is provided in Table A1a.6.23 below.

Table A1a.6.23: Summary description of waterbird distribution

Species	Description of distribution
Common scoter[1]	In winter, highest numbers recorded in the north west of the region, distribution clumped. Peak numbers ~ 25,000 birds. Highest numbers over Shell Flat, extending south to the mouth of the Ribble and in Colwyn Bay. The Solway holds moderate numbers in early winter but as winter progresses there appears to be a gradual distribution shift southwards, with a movement to offshore areas in late winter.
Divers[2]	Birds present in low, but consistent numbers, throughout winter, widely distributed with highest concentrations from the Ribble Estuary along the north Wales coast to Conway Bay and in the Solway Firth. Smaller numbers present in areas offshore from Morecambe Bay (birds found up to 30km from shore). Numbers dropping in mid-winter and remaining low for rest of winter.
Eider	During winter the majority of birds recorded (peak of 986 birds in mid-winter) were in the outer parts of Morecambe Bay, with small numbers around Walney Island. Small numbers also present in Conwy and Colwyn Bay, off the mouths of rivers Conwy and Clwyd. During summer all eider recorded occurred around the outer part of Morecambe Bay.

Note: [1] These survey programmes includes locations on the east coast of the UK (see regional Sea 2) and the west coast UK survey areas held significantly higher numbers than the east coast survey areas. [2] Red-throated, black-throated, great northern and those not identified to species.
Source: BERR (2007)

Four areas of search from JNCC's programme of surveys for wintering aggregations of inshore waterbirds (Lawson *et al*. 2015) are located in Regional Sea 6 and these, along with the species recorded are described in Table A1a.6.24.

Table A1a.6.24: Areas of search around Scotland and species present

Areas	Species
Solway Firth	Red-throated diver[1], scaup[2,3], common scoter[2]. This area is shared with England and was the most southerly of the Scottish areas of search. It supported the highest numbers of goosander of all inshore areas surveyed but did not exceed the relevant 1% threshold.
Luce Bay	Great northern diver[1], no estimate in excess of threshold for Stage 1.4
Loch Ryan	No estimate in excess of threshold for Stage 1.1 and 1.2, scaup[2], eider[2,3], red-breasted merganser[2]
Firth of Clyde	Red-throated diver[1], Slavonian grebe[1,3], eider[2], goldeneye[2], red-breasted merganser[2]. Great crested grebe and cormorant were recorded in the highest numbers here of all areas surveyed, but did not exceed the relevant 1% thresholds under Stage 1.2 or 1.4.

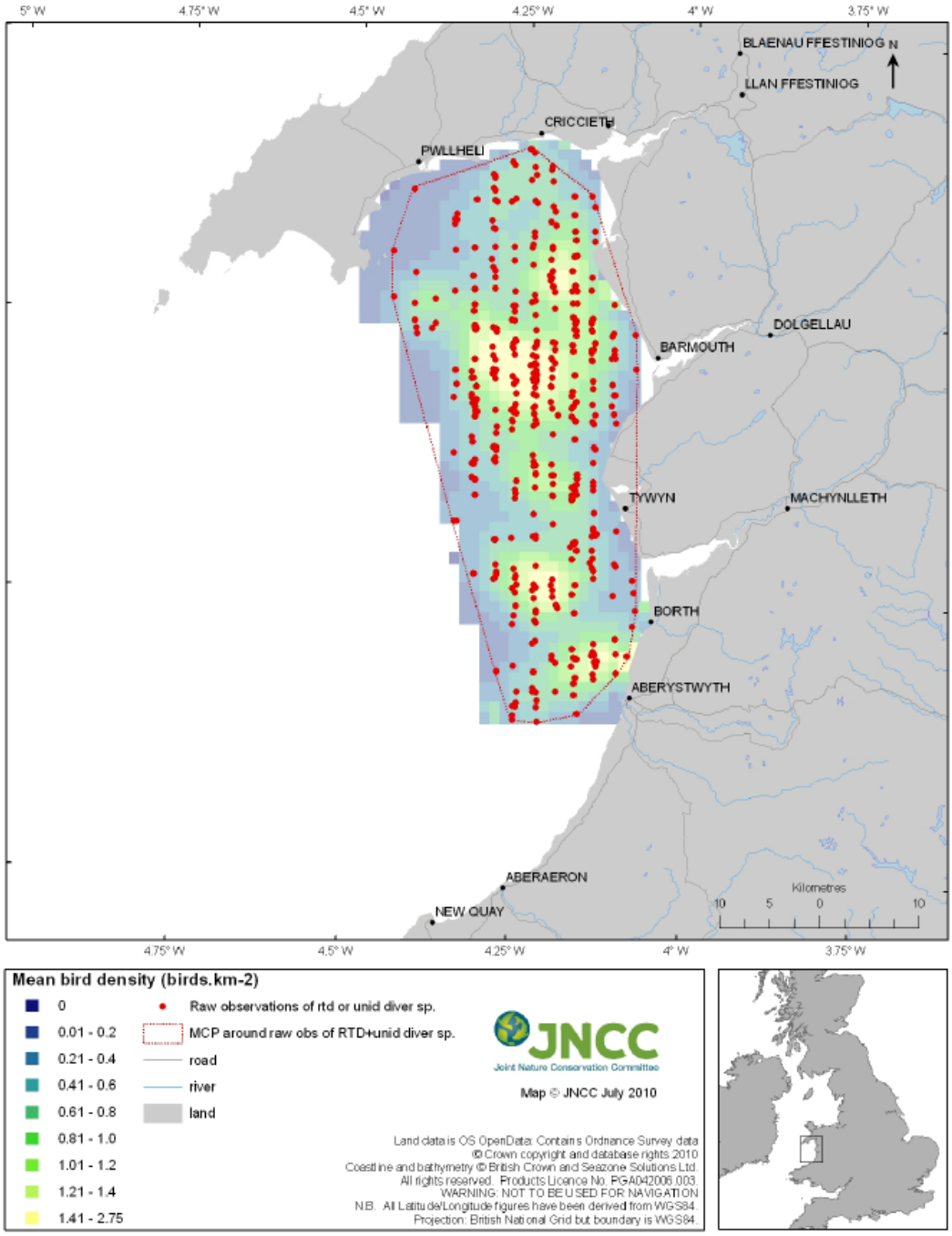
Notes: [1]Species that regularly exceeded the relevant UK SPA Selection Guidelines thresholds at Stage 1.1 or Stage 1.2, [2]species that regularly exceeded Stage 1.4 of the selection guidelines (Stroud et al. 2001, Mudge & Buxton 2013, Lawson et al. 2015). [3]These species did not meet the criteria for regularity (Stroud et al. 2001)
Source: Lawson et al. (2015), see Stroud et al. (2001) for the UK SPA Selection Guidelines stage definitions and thresholds for species.

The Bae Ceredigion/Cardigan Bay area was identified by JNCC as an area of search which may hold important numbers of waterbirds during the non-breeding season for possible SPA designations. Several large rivers flow into the Bay in this area, some of which form large estuarine areas and these and other habitats provide areas for both breeding and wintering birds. In the greater Bae Ceredigion/Cardigan Bay area there are already coastal SPA designations for breeding and wintering chough, breeding Manx shearwater and wintering Greenland white fronted goose, but no SPA for inshore areas important for wintering aggregations (JNCC website). Seven aerial surveys were carried out in the north-east of the area, north of Aberystwyth and east of St Tudwel's Islands, over four winters during 2000/01 to 2003/04.

Species recorded during the surveys were primarily eider, common scoter, red-breasted merganser and red-throated diver. Of these, only the red-throated diver numbers exceeded the UK SPA Selection Guideline threshold for Stage 1.1 (estimated numbers 1,078 individuals, guideline threshold of 170) (Stroud *et al*. 2001, O'Brien *et al.* 2015) (Figure A1a.6.15). Although common scoter was the most numerous species, numbers recorded did not exceed the guideline threshold (16,000 individuals) and neither eider, nor red-breasted merganser exceeded their respective thresholds (O'Brien *et al*. 2015). The waterbird assemblage for the area was taken as the sum of the mean peaks for the four species recorded; other species which were recorded infrequently and in low numbers were not included in the assemblage calculation. The Stage 1.3 UK SPA Guideline Threshold for assemblage is 20,000 individuals, and the highest calculated from the Bay area surveyed was 11,063 (O'Brien *et al*. 2015).

The North Cardigan Bay area is now under consideration for protection of the wintering population of red-throated diver.

Figure A1a.6.15: Observed concentrations of red-throated diver

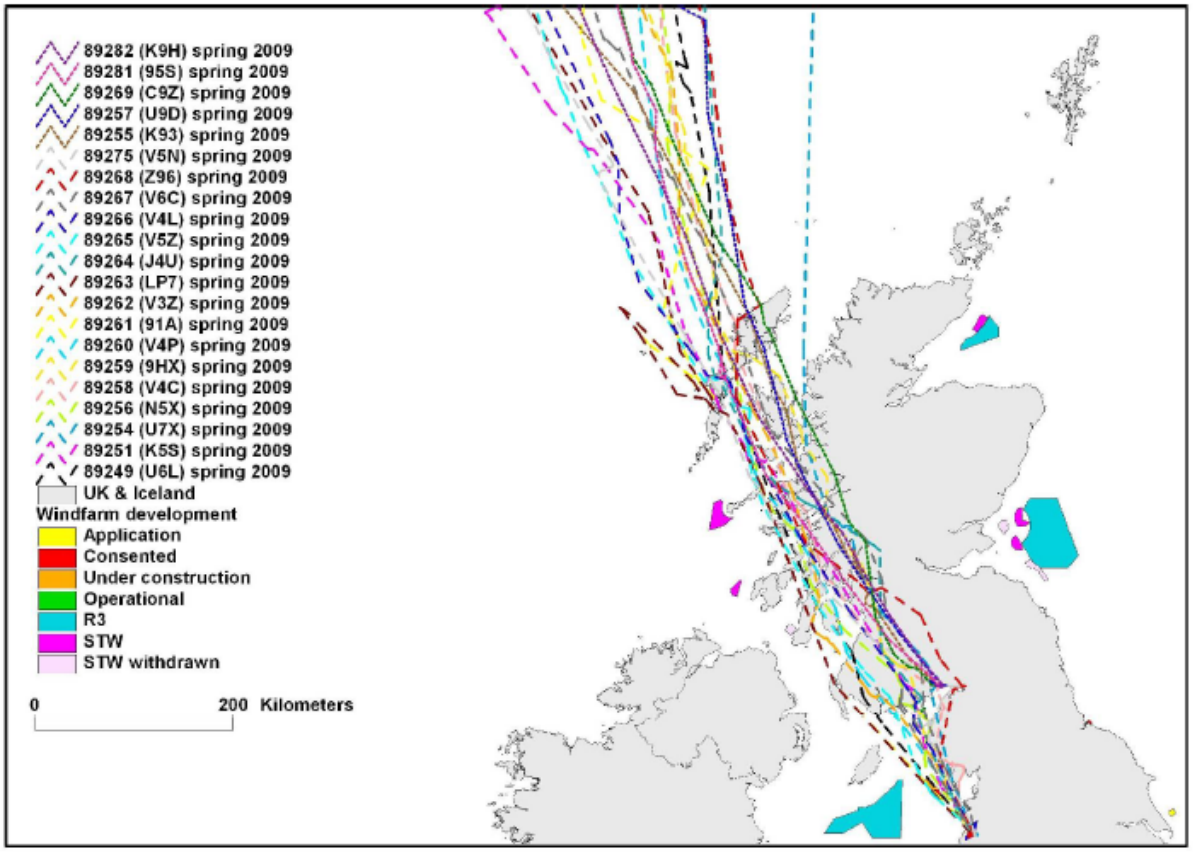


Source: O'Brien et al. (2015)

Griffin *et al*. (2011) published findings from a DECC-funded extension to a previous study commissioned by COWRIE Ltd on the migration routes of whooper swans and geese in relation to wind farm footprints. These studies build a picture of migratory movements of these birds and identify any potential connectivity with existing and potential renewable development zones. Although routes traverse through a number of different Regional Sea areas, i.e. 7, 8 and 10, birds were tracked from sites located within Regional Sea 6: Caerlaverock/Martin Mere (whooper swan); Northern Ireland (light-bellied Brent goose), Loch Ken, Dumfries and Galloway (Greenland white-fronted goose) and Solway Firth (Svalbard barnacle goose), so the description from the study has been included in this regional description.

Whooper swans tracked from Caerlaverock/Martin Mere had a broad migration route and showed variation between years; birds starting at the same starting point took different routes between the UK and Iceland, (Figure A1a.6.16) and the same individual showed variation in the route taken in repeat tracks.

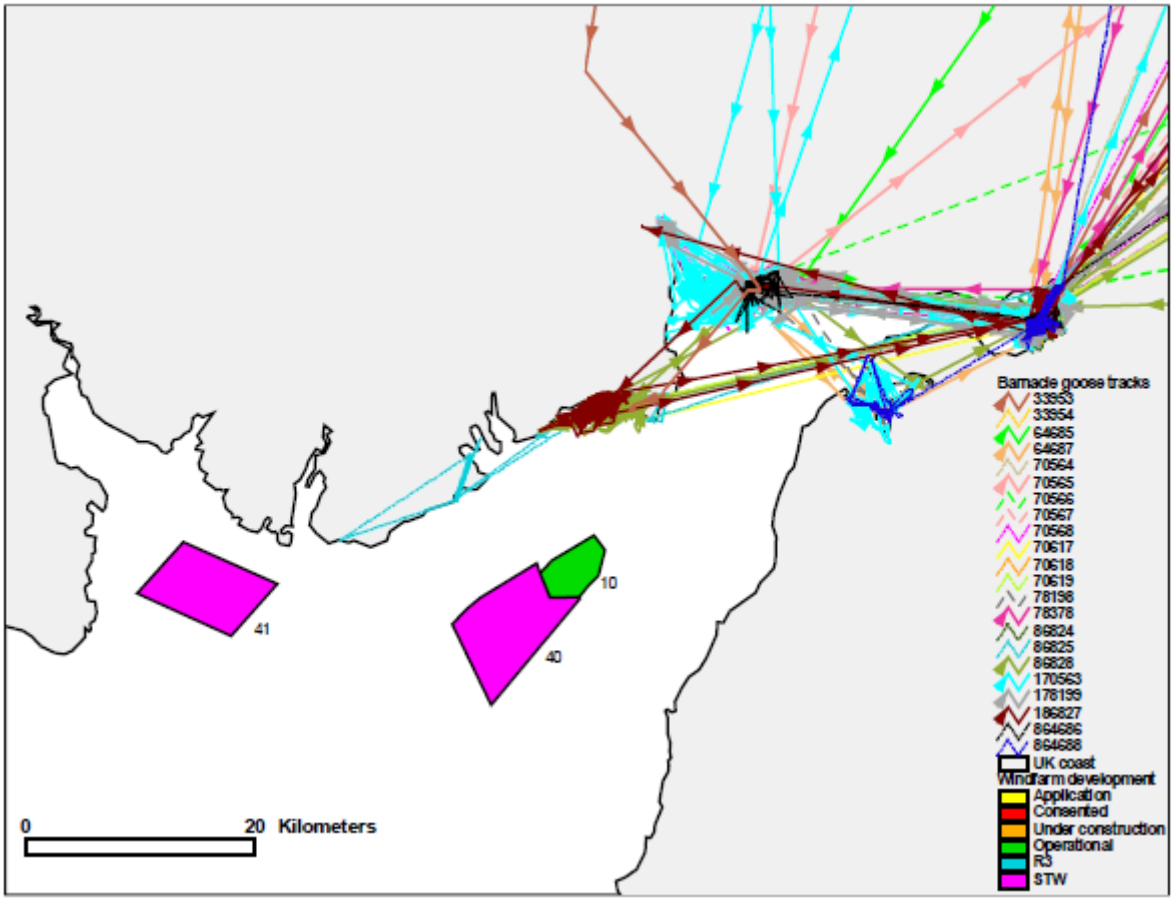
Figure A1a.6.16: Migration routes of 21 adult male Whooper swans tracked in spring 2009



Source: Griffin et al. (2011). Migration routes of 21 adult male Whooper swans tracked in 2009. Tracks selected for birds that completed their migration to Iceland alive and with tags intact from either WWT Caerlaverock or WWT Martin Mere.

The Solway Firth is extremely important for Svalbard Barnacle geese (Barnacle geese), with most of the population wintering in this area (Griffin *et al*. 2011) from September to late May. Movements during winter are relatively short (Figure A1a.6.17) with migration overland also relatively short *ca*. 100-110 km (see Regional Sea 1). Up to 2,000 Barnacle geese are known to use Wigtown Bay, feeding on saltmarshes (February and March), maybe moving here as food supplies become depleted at Caerlaverock (Griffin *et al*. 2011)

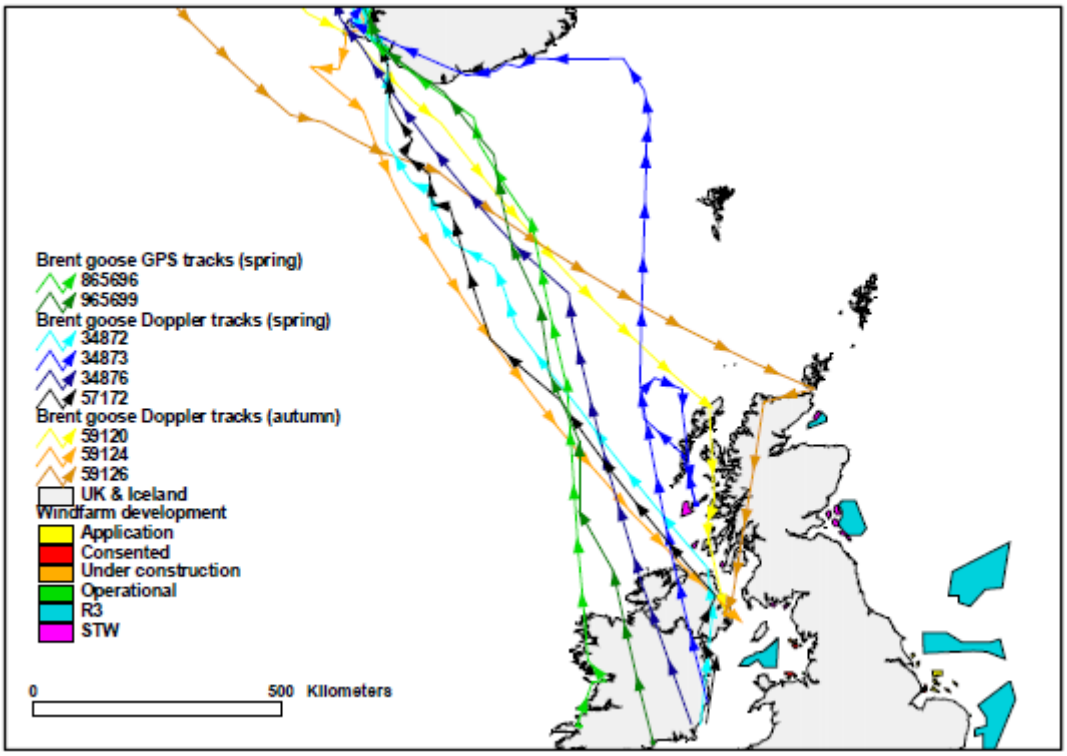
Figure A1a.6.17: Within-winter movements for 22 Svalbard Barnacle geese (2006-2010)



Source: Griffin et al. (2011). Geese tracked on the Solway Firth between 2006-2010.

WWT and the Icelandic Institute for Natural History have been tracking light-bellied brent geese which make a significant return migration from their wintering grounds in Northern Ireland/Iceland to their breeding grounds in the Canadian High Arctic (Figure A1a.6.18 overview of routes) (Griffin *et al.* 2011).

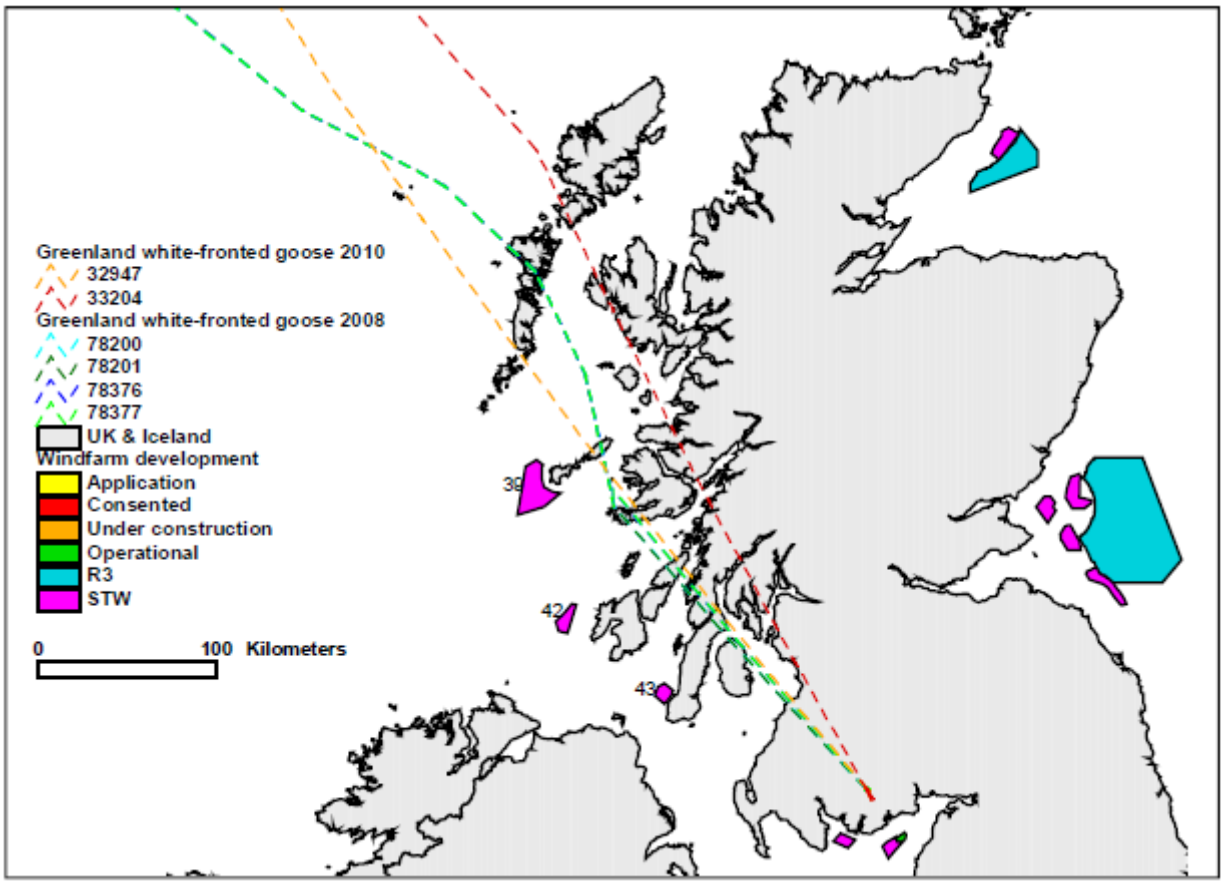
Figure A1a.6.18: Overview of migratory routes of light-bellied brent geese 2005/06



Source: Griffin et al. (2011). Light-bellied brent geese full migration route to Iceland.

Only a small number of Greenland white-fronted geese were tracked by WWT in 2008 and 2010 from the population that winters at Loch Ken, Dumfries and Galloway therefore, few generalisations about the migration routes of the population at large can be made. Data on movements from these birds are shown in Figure A1a.6.19. Extrapolated tracks suggest all birds probably exited the UK via the Uists or Lewis.

Figure A1a.6.19: Spring migration routes by 6 Greenland white-fronted geese in 2008 and 2010



Source: Griffin et al. (2011). Migration routes from Loch Ken, Dumfries & Galloway in 2008 and 2010.

A1a.6.10 Features of Regional Sea 7

Regional Sea 7 encompasses the Minches and western Scotland. The border of this region runs down the centre of the Western Isles and also includes sites in Northern Ireland. The west coast of Scotland has many large and small islands, relatively free from predators and disturbance making them ideal for nesting seabirds. This coast also has a large number of sea lochs and sheltered sounds, suitable for breeding, wintering and migrating waterbirds.

Sites referred to or described in this section are listed geographically south to north where possible.

A1a.6.10.1 Seabird species and distribution

The coast in this region comprises a diversity of cliff and cliff top habitats, as well as large and varied sand dune systems, many of which are associated with bays and hard cliffs. There are also small offshore islands, islets and stacks, making it ideal for breeding seabirds. Table A1a.6.25 describes the main colonies, all of which are SPAs and the species present.

Table A1a.6.25: Important breeding seabird colonies in Regional Sea 7

Site	Species (includes designated features and those present in assemblages)
Rathlin Island	Razorbill, kittiwake, guillemot
Sheep Island (NI)	Cormorant
Glas Eileanan	Common tern
Treshnish Isles	Storm petrel
Rum	Manx shearwater
Canna and Sanday	Puffin, guillemot, kittiwake, herring gull, shag
Shiant Isles	Razorbill, puffin, fulmar, shag, guillemot
Priest Island (Summer Isles)	Storm petrel
Handa	Razorbill, great skua, kittiwake, Arctic skua, guillemot

Note: Sites designated as Seabird Assemblages of International Importance are shown in bold (qualifying level is 20,000 birds).
Source: JNCC website (http://jncc.defra.gov.uk/page-2598), Mitchell et al. (2004)

The main Northern Irish sites within Regional Sea 7 are Rathlin Island and Sheep Island. Rathlin Island has several sea stacks and many of these are important for breeding seabirds. The island supports a diverse assemblage of breeding seabirds, including auk and gull species and is the largest seabird colony in Northern Ireland and one of the most important seabird breeding sites in the UK and Ireland. Large changes in fulmar numbers have been seen at Rathlin Island; between 1999 and 2007, whole-colony counts revealed a 47% decline down to 1,072 AOS, while a repeat survey in 2011 found numbers had increased to 1,518 AOS (BTO 2015).

Rathlin Island is the main site in Northern Ireland for breeding guillemot, with numbers varying: Seabird 2000 recorded >95,000 individual guillemots (96% of the national population), which fell by 14% in a subsequent 2007 survey. A repeat survey in 2011 recorded some 130,445 individuals, representing a rise of 60% in four years and making it the largest colony in the UK. The Island is also very important for razorbill (87% of the national population during Seabird 2000 – with some 22,975 individuals recorded in 2011) and puffin (98% of the national population), and also for breeding black guillemot. There is a proposal to designate Rathlin as a Marine Conservation Zone (pMCZ), for features including black guillemot, with the cliff and sea area between Bull Island and Church Bay appearing to be important breeding and feeding areas for this species, see Figure A1a.6.33 (Department of the Environment 2015).

Rathlin Island is one of the largest colonies of shag in Northern Ireland, although the long term trend for this species at this location is downward (BTO 2015). Shag numbers here have not shown an increase over ~4years, with surveys in 2007 and 2011 recording 46 and 47 pairs respectively, compared to over 100 recorded during SCR (JNCC 2014). The area also supports the largest colony of kittiwake in Northern Ireland, where numbers grew from 6,822 AON in 1985 to 9,917 AON in 1999, but dropped back to 7,922 in 2011 (latest survey) (BTO 2015).

The first (known) successful breeding attempt by great skuas on Rathlin Island was in 2011, when one pair fledged one chick. In the following two years birds were present but did not breed, but a pair bred in 2014 (BTO 2014).

Sheep Island supports a breeding colony of cormorant. However, this colony has fluctuated in numbers and has shown an overall decrease in numbers since 1985 (380 pairs) to just 95 pairs in 2014 (BTO 2014). Muck Island to the north supports smaller colonies of kittiwake (251 AON in 2014), herring gull, guillemot (1,745 individuals in 2014, similar to 2013 numbers), razorbill

(402 individuals in 2014, a 54% decrease from 2013) and the occasional sighting of puffin, but no confirmed breeding (BTO 2015).

Rum is a large island to the south-west of Skye noted for its large colony of Manx shearwater. Of the estimated 126,545 pairs recorded during Seabird 2000, some 120,000 of these were found on Rum, with the Treshnish Isles holding 1,283 pairs (St Kilda held the second largest concentration at 4,803 pairs). No information on population trends from these large colonies exist since Seabird 2000 (JNCC 2015).

Tiree holds the largest concentration of little tern, and in addition to the main colony, smaller colonies are scattered around the island in most years. In 2014, although these satellite colonies, in total, held ~26 pairs, the single majority (25 pairs) was found at a single colony (JNCC 2015). Monitoring of the breeding seabirds on the island over ten years has shown declines in a number of different seabird species including fulmar, guillemot, razorbill, kittiwake, herring and lesser black-backed gull; in contrast common gull has increased significantly, and shag, black guillemot, little tern, Arctic tern and black-headed gull have remained relatively stable (Bowler 2014). In 2009 and 2012 there was the first successful breeding on the island for puffin and great skua respectively (Bowler 2014).

2011 was the 43rd year of the Highland Ringing Group long-term seabird monitoring study on Canna and supported since 1986 by the JNCC. Counts of breeding seabirds showed that many species on Canna were at low levels, compared to peaks counts from the 1980s. Long term declines have been recorded for fulmar, shag and herring gull, guillemots and razorbills, despite these latter two species showing an increase on 2010 numbers; kittiwake and great skua showed significant increases in numbers, (Swan 2013).

The Shiant Isles in the Minch comprise three large and several small islands important for breeding seabirds, especially auks and fulmars during summer. After Coquet Island off Northumberland, Glas Eileanan, a group of three small islets in the Sound of Mull, supports one of the biggest common tern colonies in Britain. Birds from these colonies feed in the surrounding offshore areas as well as inshore waters.

Tiree holds the largest concentration of little terns in Scotland where, in addition to the main colony, many smaller colonies are scattered around the island in most years, each usually holding from a few to up to ten pairs (JNCC 2015). Handa off the west coast provides a strategic nesting site for seabirds that feed in the waters of the northern Minch. Priest Island is the outermost and most exposed of the Summer Isles and lies some 6km off the coast of Wester Ross. It, along with Treshnish Isles (principally Lunga) supports some of the largest storm petrel colonies outside Mousa (Shetland) (Mitchell *et al*. 2004).

The largest declines in guillemot numbers since Seabird 2000, have been colonies in Scotland. The colony at Shiant has seen guillemot numbers decline from 16,456 individuals in Seabird 2000, to 7,684 individuals in 2008 (an overall decline of 53%); while a 50% decline has been recorded at Handa, with numbers dropping from 112,676 individuals in Seabird 2000 to 56,706 in 2011 (equating to a decline of 5.1% per annum) (JNCC 2015). This decline has been mirrored by razorbill, with both sites recording 21% and 70% declines respectively; Shiant Islands fell from 8,046 individuals in Seabird 2000 to 6,340 in 2008 and Handa fell from 16,991 in Seabird 2000 to 5,0477 in 2014 (JNCC 2015).

A1a.6.10.2 Seabird distribution at sea

Seabird distribution off the west coast varies throughout the year. Birds are concentrated in coastal waters and at colonies during the breeding season, while during the post breeding period, adults and young birds disperse from colonies and generally become more widespread

throughout offshore areas or leave the area altogether. Table A1a.6.26 provides a summary of seabird distribution and abundance in these waters throughout the year.

Table A1a.6.26: General seabird distribution at sea in the Regional Sea 7 area

Month	General distribution
January-April	Some bird species start returning to breeding colonies (Mar-Apr), e.g. **Manx shearwater**, **storm petrel**, **gannet**. Prior to breeding, high densities of **fulmar** over shelf and **gannet** remain widely distributed at low densities. **Cormorants** are resident in the region in shallow inshore waters along almost the entire coast. Throughout the year, low densities of **shag**, **black-headed gull** and **common gull** found in inshore areas and the Minch.
May-July	Main concentrations of **fulmar** in waters west of the Western Isles and higher densities in the Minch. Numbers of non-breeding **storm petrels** widespread throughout area in low densities. Immature **gannet** numbers peak in June. **Pomarine skua** found widely distributed through the northern and southern Minch areas between May and November, while **Arctic skua** are widely distributed at low densities between June and August. **Lesser black-backed gull** distributed throughout the Minch at low densities between April and August. **Kittiwake** is recorded in all months of the year, however higher numbers found concentrated around Handa between May and July. During breeding season **Arctic tern** found mainly in inshore waters around Western Isles. June & July sees highest densities of **puffin** concentrated around colonies, including Shiants.
August-October	Fulmar densities remain relatively low in the Minch. Low numbers of **great shearwater** recorded in Minch, with majority occurring further offshore. **Gannets** leave the area during September and October. **Great skua** more widespread but at low densities throughout the Minch. **Herring gull** remains widespread throughout the Minch area, small concentrations of birds at Canna and Sanday and at Handa. Concentrations of **kittiwake** found off Summer Isles and waters around Shiant Islands, during August and September and in waters off Skye during October and December. **Guillemot** in high concentrations in shallow inshore waters of Minch and Sea of Hebrides southwards to Islay. The Minch is an important area for moulting auks during August and an estimated two-thirds of the west coast population of **razorbill** congregate here with the remainder thought to move south into the Irish sea. High densities recorded between Mull and Skye in August. Slightly more restricted range over the winter months, high densities recorded off Mull in February. Moderate densities of **puffin** seen in the Minch. Large movement of **Manx shearwater** through Argyll waters but only small numbers in September and October, and birds from Rum are also thought to migrate past the west of Ireland rather than through the Irish Sea.
November-December	Lowest densities of **fulmar**. **Storm petrels** remain widely distributed at low densities throughout the Minch. Few sightings of **Iceland gulls** seen off the east coast of Lewis. **Great black-backed gulls** found throughout the Minch during all months, however slightly higher numbers found around Coll between October and December. Fewer **guillemots** seen in the Minch between December and April, although adult birds continue to visit colonies during autumn and winter months. High densities recorded off Skye and north coast of Northern Ireland

Source: Pollock et al. (2000), Furness (2015).

The importance of the waters around The Small Isles for black guillemot has been recognised with the potential designation of an MPA. The original MPA was to encompass waters around the islands of Canna and Rum and protect the large breeding colony of some 1,200 individuals which use the waters of the MPA, along with other features (SNH 2014e). After initial feedback, this MPA is undergoing further consultation as to its designation and a possible boundary change, with responses due by January 2016[4].

[4] See Scottish Government Website: http://www.gov.scot/Topics/marine/marine-environment/mpanetwork/MPAMGT/protectedareasmgt/conservationorders

A1a.6.10.3 Waterbird species and distribution (breeding, wintering and migratory)

The presence of sheltered sounds, numerous sea lochs and islands with a varied selection of habitats including machair, makes this region extremely important for wintering and migrating species, particularly geese and wader species. Sites designated as Spas for their wintering and on passage bird populations are described in table A1a.6.27 One of the sites, Sleibhtean agus Cladach Thiriodh (Tiree Wetlands and Coast) also has qualifying breeding waterbirds as qualifying features (dunlin oystercatcher, redshank and ringed plover).

Table A1a.6.27: Important sites[1] for non-breeding waterbirds in Regional Sea 7

Site	Species (includes designated features and those present in assemblages)
Kintyre Goose Roost	Greenland white-fronted goose
Bridgend Flats, Islay	Barnacle goose
Laggan, Islay	Barnacle goose, Greenland white-fronted goose
Rinns of Islay	Whooper swan, Greenland white-fronted goose, common scoter
Gruinart Flats, Islay	Barnacle goose, Greenland white-fronted goose
Sleibhtean agus Cladach Thiriodh (Tiree Wetlands and Coast)	Barnacle goose, Greenland white-fronted goose
Treshnish Isles	Barnacle goose
Coll	Barnacle goose
Rum	Red-throated diver
Shiant Islands	Barnacle goose

Notes: [1]SPA sites for non-breeding waterbirds in the UK as described on the JNCC SPA website. Annual average numbers of wintering birds at the sites can be obtained from the BTO website, if the site is included in their site counts.
Source: JNCC website (http://jncc.defra.gov.uk/page-2598)

Three draft marine SPAs for wintering waterbird species are in this region: Sound of Gigha (great northern diver, eider and red-breasted merganser); Sea of Hebrides, Coll and Tiree (great northern diver, eider) and Rum (red-throated diver) (SNH 2014).

Key sites for wintering species, such as Whooper and Mute swan, greylag goose and Greenland white-fronted goose include sites on Tiree, North and South Uist and Lough Foyle, with the latter of these typically supporting >30,000 species. Other species utilising Lough Foyle during winter includes wigeon, teal, mallard, red-breasted merganser, great-crested grebe, lapwing, dunlin and black-tailed godwit – the last three of these are Birds of Conservation Concern red-listed.

The rocky shorelines of the region are used as staging areas by passage birds, particularly on Islay and Arran, while large numbers of wintering waterbirds are found at the heads of the larger sea lochs, in shallower and sheltered bays.

Seven areas of search from JNCC's programme of surveys for wintering aggregations of inshore waterbirds (Lawson *et al*. 2015) are located in Regional Sea 6 and these, along with the species recorded are described in Table A1a.6.28.

Table A1a.6.28: Areas of search around Scotland and species present

Areas	Species
Sound of Gigha	Great northern diver[1], eider[2], red-breasted merganser[2]
Loch Indaal	Great northern diver[1,2], scaup[2]. This area supported the highest number of scaup of the areas surveyed.
Mull	Great northern diver[1,3], no estimate in excess of thresholds for Stage 1.4
Coll and Tiree	Great northern diver[1], eider[2]
Outer Hebrides	Great northern diver[1], Slavonian grebe[1,3], eider[2], long-tailed duck[2], red-breasted merganser[2]. This area held the highest population of great northern divers of any area surveyed.
Broad Bay	Great northern diver[1], eider[2], long-tailed duck[2]
Wester Ross	Great northern diver[1], black-throated diver[1], red-breasted merganser[2]. This area supported the largest estimated wintering population of black-throated diver of the surveyed areas.

Notes: [1]Species that regularly exceeded the relevant UK SPA Selection Guidelines thresholds at Stage 1.1 or Stage 1.2, [2]species that regularly exceeded Stage 1.4 of the selection guidelines (Stroud et al. 2001, Mudge & Buxton 2013). [3]These species did not meet the criteria for regularity (Stroud et al. 2001)
Source: Lawson et al. (2015), see Stroud et al. (2001) for the UK SPA Selection Guidelines stage definitions and thresholds for species.

The importance of this region can increase during periods of severe cold weather on the east and mainland Europe due to an influx of waterbirds from other coastal or inland regions.

A1a.6.11 Features of Regional Sea 8

Regional Sea 8 encompasses a broad area of Scottish continental shelf from north of Shetland to south of the Western Isles. The coastal habitats in this region range from extensive and diverse cliff formations, stacks, voes, and sand dune, saltmarsh and estuarine systems.

The west coast of Shetland is within Regional Sea 8, and the east coast is in Regional Sea 1; for simplicity Shetland as a whole was described in Section A1a.6.5 above. Sites referred to or described in this section are listed geographically south to north where possible.

A1a.6.11.1 Seabird species and distribution

The majority of the seabird species regularly breeding in Britain and Ireland breed within Regional Sea 8. The region is internationally important in terms of seabird numbers and/or the diverse breeding assemblages it supports and is amongst the most important for offshore seabirds in Europe (Tasker 1997a, b & c, Pollock *et al*. 2000). Table A1a.6.29 summarises the most important breeding seabird sites throughout the region, all of which are designated SPAs.

Table A1a.6.29: Important breeding seabird colonies in Regional Sea 8

Site	Species (includes designated features and those present in assemblages)
Mingulay and Berneray	Razorbill, fulmar, shag, kittiwake, guillemot
South Uist Machair and Lochs	Little tern
Monach Isles	Common tern, little tern, black guillemot
St Kilda	Leach's storm petrel, storm petrel, gannet, great skua, puffin, razorbill, fulmar, Manx shearwater, kittiwake, guillemot
Flannan Isles	Leach's storm petrel, razorbill, puffin, storm petrel, guillemot
North Rona and Sula Sgeir	Storm petrel Leach's storm petrel, gannet, guillemot, razorbill, puffin, fulmar, great black-backed gull, kittiwake
Cape Wrath	Razorbill, kittiwake, guillemot
Sule Skerry and Sule Stack	Storm petrel, gannet, puffin, leach's storm petrel, shag

Site	Species (includes designated features and those present in assemblages)
North Caithness Cliffs	Razorbill, fulmar, kittiwake, guillemot
Pentland Firth Islands	Arctic tern
Hoy	Great skua, fulmar, shag, Arctic skua, great black-backed gull,
Copinsay	Great black-backed gull, kittiwake, guillemot
Marwick Head	Kittiwake, guillemot
Rousay	Arctic tern
Auskerry	Arctic tern
West Westray	Arctic tern, guillemot
Calf of Eday	Fulmar, great cormorant, great black-backed gull, kittiwake, guillemot
Papa Westray (North Hill and Holm)	Arctic tern, Arctic skua
Foula	Arctic tern, leach's storm petrel, great skua, guillemot, puffin, shag

Note: Sites designated as Seabird Assemblages of International Importance, under Article 4.2 of the Birds Directive, are shown in bold (qualifying level is 20,000 birds).
Sources: JNCC website (http://jncc.defra.gov.uk/page-2598), Mitchell et al. (2004)

Scotland holds the majority of the UK population of fulmars and several colonies in this region hold numbers in excess of 1,000 birds. Most recent surveys of Mingulay and Berneray (2014), Flannan Islands (2013) and North Rona (2012) colonies, all recorded decreases from numbers recorded during Seabird 2000 (-14%, -72% and -59% respectively) (JNCC 2015). With the exception of Noss (Shetland), which showed an increase, all colonies in Scotland surveyed post Seabird 2000 declined (JNCC 2015). Colonies surveyed in Orkney included Hoy (19,586 AOS in 2007, compared to 31,596 at Seabird 2000), Copinsay (1,630 in 2008 compared to 2,054) and West Westray Cliffs (677 in 2007, compared to 4,027) (JNCC 2015).

The area is important for Leach's storm petrel. 94% of the UK breeding population are found in the St Kilda archipelago, with the remainder on the Flannan Islands, three other islands in the Western Isles, including North Rona and two islands in Shetland (at Gruney and Gloup Holm) (JNCC 2015). A decline in this species has been seen at St Kilda and North Rona; 1,084 AOS were estimated in 2001 on North Rona but a repeat survey in 2009 estimated the population at 713 AOS (JNCC 2015). A +1% change in gannet AON was recorded between Seabird 2000 (59,622) and the most recent survey in 2013 (60,290), with more substantial changes seen at the Flannan Isles colony (Seabird 2000 recorded 2,760, 2013 survey recorded 5,280, a change of 91%), Sula Sgeir (Seabird 2000 recorded 9,225, 2013 survey recorded 11,230, a change of 22%) and Sule Skerry, which recorded a change of 3,181% between Seabird 2000 (57 AON) and 2013 (1,870 AON). As well as most gannet colonies in the region increasing, new gannetries are forming (e.g. Berneray, Western Isles) and old ones re-colonies (e.g. Rockall, Western Isles) (JNCC 2015).

The decline of guillemot at Scottish colonies between Seabird 2000 numbers and the most recent surveys, is also evident in this region. Surveys carried out between 2007 and 2014 have recorded declines at some of the main colonies, with numbers more than halving at some sites: Mingulay and Berneray (32% decline, 2.4% decline per annum); Hoy (59%, 10.4% per annum); Copinsay (55%, 6.0% per annum); Marwick head (52%, 5.5% per annum) and West Westray Cliffs (8%, 1.0% per annum) (JNCC 2015). Again, as seen in Regional Sea 7, this decline was mirrored by razorbill, where at Mingulay and Berneray numbers dropped by 24% between Seabird 2000 (22,900 individuals) and 2014 (17,400) and 66% at West Westray Cliffs, where numbers dropped from 2,412 individuals to 813 (JNCC 2015).

A1a.6.11.2 Seabird distribution at sea

In general, nearshore waters of Orkney and the north coast of Scotland, and waters off the Outer Hebrides, including Lewis, are important for birds and some areas hold large concentrations of birds virtually throughout the year (Stone *et al*. 1995) and like the North Sea, after breeding season, species that feed further offshore e.g. fulmar, gannet, kittiwake, guillemot, puffin and razorbill leave coastal waters. SAST/ESAS surveys have found several species are present over the deep waters of the Atlantic Frontier (in and adjacent to Regional Sea 8) throughout the year.

Unlike other auk species, the black guillemot is typically found feeding close inshore and rarely disperses from its breeding area, even in winter. The importance of this region for this species is reflected in the designation of two Marine Protected Areas: the Monach Isles, an island group west of North Uist in the Outer Hebrides and Papa Westray, which includes waters around the north of the Island and includes the Holm of Papa Westray. At the Monach Isles, an estimated 820 breeding black guillemot rely on the feeding grounds encompassed by the MPA and at Papa Westray more than 500 black guillemot forage in coastal waters.

A summary of the distribution of the main species is described in Table A1a.6.30.

Table A1a.6.30: General seabird distribution at sea in the Regional Sea 8

Species	Distribution
January-April	High densities of **fulmar** concentrated along the continental slope and around Shetland, prior to breeding season. Adult **gannets** return to the area, with juveniles tending to arrive in May. **Kittiwake** widely distributed along the continental slope and on the shelf, north and north-east of Scotland, with few birds in waters west of Scotland. **Puffins** are widespread and numerous with the majority of **puffins** that breed in the North Sea, breeding in Shetland (Regional Sea 1) and Orkney. Birds also found over deeper waters, as far west as the Rockall Trough and north to the Norwegian Sea – this species often more abundant in oceanic rather than inshore waters. Spring migration of **Arctic skuas** back to area, late March, through April, into May.
May-July	**Gannet** distribution is widespread, at low densities throughout the area. High densities of adults are found near breeding colonies around the Northern Isles: immature birds not tied to colonies are more widely dispersed. Concentrations of **kittiwake** found in coastal waters close to colonies particularly around Orkney and the northern coasts of Caithness and Sutherland. Distribution becomes patchy later in the year with movement away from colonies – distribution also extends to offshore waters south of the Faroes. Concentrations of **guillemot** also found around Orkney, the north coast of Caithness and Sutherland at this time. **Herring gull** distribution is almost entirely coastal. Some adult **Arctic skuas** and **great skuas** that have failed to breed, and some immatures may start to leave colonies.
August - October	High densities of **fulmar** concentrated over shelf waters, particularly north of Scotland and around Shetland. **Guillemots** disperse from colonies and congregate in inshore waters (moulting adults and flightless young). As winter progresses moulting flocks disperse further offshore. Favoured wintering grounds for **herring gull** include offshore areas to the west and north of Shetland and to the west of Scotland. Autumn migration of **Arctic skua** begins in August, through September/October; birds from western waters probably disperse southwards, or south west wards, rather than moving into the North Sea (spring migration seems to be more often through western waters even for adults returning to colonies on Northern Isles. Some young **kittiwake** migrate west and may be distributed across the North Atlantic

Species	Distribution
November - December	Densities of **fulmar** relatively low, with the majority of breeding population thought to remain within a few hundred km of colonies: juveniles are thought to disperse over longer distances. Breeding **fulmar** birds begin returning to Faroe colonies late winter and high densities concentrated in shelf waters, particularly close to large colonies. **Gannet** densities low after the birds leave the area for southern wintering grounds. Lowest numbers of birds found offshore with some dispersal out into the North Atlantic. High numbers of **kittiwake** remain concentrated in inshore waters west and north of Scotland, around Orkney and to the east of fair Isle. Moulting flocks of **guillemot** disperse further offshore, but high densities still present in inshore waters around Orkney (Dec-April). **Puffin** distribution becomes scattered (Oct-Mar), with birds from Shetland and Orkney colonies moving south and wintering in the North Sea. Some birds move north-west of Shetland to beyond the shelf break and over deeper waters of the Faroe Bank, the Faroe- Shetland Channel and the Wyville Thomson Ridge.

Source: Pollack et al. (2000), Furness (2015).

Thaxter *et al*. (2010, 2011, 2012a) described a three year DECC-funded study tagging great skua from Foula and Hoy to identify connectivity with areas of proposed or consented wind farms/renewable projects. Data was collected during the breeding season (May-August) with analysis of all available results published in Thaxter *et al*. (2014).

Foraging trips were defined by the departure and subsequent return of individuals to their nest sites and for all trips the (a) foraging range (the maximum point reached offshore from the colony); (b) the total travel distance per trip (by summing distances between GPS points along the route) and (c) trip duration (time elapsed between departure and return) were calculated. Area utilisation was assessed using kernel density estimation (KDE) with the 50%, 75% and 95% KDEs of the utilisation distribution taken to represent the core, middle and total areas respectively (Thaxter *et al*. 2014).

In 2010, all great skuas that made offshore trips from Foula (three out of four birds), overlapped with a Scottish Territorial Waters (STW) renewable zone N4 and N6 (these areas identified for potential offshore wind sites for south west of Shetland (N4) and west of Shetland (N6) – see Scottish Development International (2011) near to Foula. Similarly, in 2011, the offshore trips of all ten birds overlapped with the same zone. Of the nine birds from Hoy for which there were breeding season data, the offshore trips of two birds did not overlap with any proposed offshore wind farm development zone, while those of the other six showed connectivity with the N1 STW zone and one other bird made a long foraging excursion overlapping with Moray Firth zones NE2 and NE1 (see Scottish Development International (2011) for NE2 and NE1 locations) (Regional Sea 1) (Thaxter *et al*. 2014). Male great skuas spent significantly more time away from the nest than females and made foraging trips of longer duration.

A1a.6.11.3 Waterbird species and distribution (breeding, wintering and migratory)

Species of waterbirds known to breed in Regional Sea 8 include several wildfowl and wader species as well as red-throated diver; this species is known to breed at sites on Orkney and travel between hill-top lochan breeding sites and coastal waters to feed, with Hoy, the mainland Orkney moors, Ronas Hill and Tingon important sites for this species. Caithness and Sutherland are also strongholds for this species and there is a long-established breeding population of gadwall in the wetlands of the area.

Important sites for their wintering and on passage bird populations are described in table A1a.6.31. All of these sites are designated SPAs.

Table A1a.6.31: Important sites[1] for non-breeding waterbirds in Regional Sea 8

Site	Species (includes designated features and those present in assemblages)
South Uist Machair and Lochs (also breeding dunlin, oystercatcher, redshank ringed plover)	Ringed plover, sanderling
Monach Islands	Barnacle goose
North Uist Machair and Islands (also breeding dunlin, oystercatcher, redshank, ringed plover)	Barnacle goose, purple sandpiper, ringed plover, turnstone
North Sutherland Coastal Islands	Barnacle goose
Switha	Barnacle goose
East Sanday Coast	Bar-tailed godwit, purple sandpiper, turnstone

Notes: [1]SPA sites for non-breeding waterbirds in the UK as described on the JNCC SPA website. Average numbers of wintering birds can be obtained from the BTO website if the site is included in their site counts. Source: JNCC website (http://jncc.defra.gov.uk/page-2598)

Three areas in the region have also been proposed as draft marine SPAs for their wintering waterbird species: West coast of the Outer Hebrides (great northern diver, red-throated diver, black-throated diver, Slavonian grebe, eider, long-tailed duck, red-breasted merganser); Pentland Firth and Scapa Flow (great northern diver, red-throated diver, black-throated diver, Slavonian grebe, eider, long-tailed duck, goldeneye, red-breasted merganser) and North Orkney (great northern diver, Slavonian grebe, red-throated diver, eider, long-tailed duck, velvet scoter red-breasted merganser) – breeding seabirds are also proposed protected features for the latter two sites.

There is a large sedentary British greylag goose population, and this is thought to be increasing in abundance and distribution in Scotland (Mitchell *et al*. 2010); this is the only native species of goose breeding in Britain. In order to aid goose management, archipelago-wide surveys of greylag geese in Orkney have been conducted each August since 2012. In August 2014, the survey counted 22,911 birds, a 7.2% increase over August 2013 (Mitchell *et al*. 2014).

For wintering and on passage birds, the coastal and nearshore waters and rocky and sandy shorelines along with the machairs and lochs provide for a variety of seaducks, divers and grebes. This area can experience an influx of wintering and passage birds if severe cold weather occurs along the eastern coast.

Three areas of search from JNCC's programme of surveys for wintering aggregations of inshore waterbirds (Lawson *et al*. 2015) are located in Regional Sea 6 and these, along with the species recorded are described in Table A1a.6.32.

Table A1a.6.32: Areas of search around Scotland and species present

Areas	Species
North Orkney	Great northern diver[1], Slavonian grebe[1,3], eider[2], long-tailed duck[2], velvet scoter[2,3], red-breasted merganser[2], shag[2,3]
Scapa Flow	Great northern diver[1], black-throated diver[1], Slavonian grebe[1], shag[1], eider[2], long-tailed duck[2], goldeneye[2], red-breasted merganser[2]. This area held the highest populations of red-breasted merganser, red-necked grebe, Slavonian grebe and shag of all areas of search.
Loch Eriboll	No estimate in excess of thresholds for either Stage 1.1, 1.2 or 1.4

Notes: [1]Species that regularly exceeded the relevant UK SPA Selection Guidelines thresholds at Stage 1.1 or Stage 1.2, [2]species that regularly exceeded Stage 1.4 of the selection guidelines (Stroud et al. 2001, Mudge & Buxton 2013, Lawson et al. 2015). [3]These population estimates are based on <3 years of data – a minimum of three years of data is needed to establish regularity of occurrence (Stroud et al. 2001).
Source: Lawson et al. (2015), see Stroud et al. (2001) for the UK SPA Selection Guidelines stage definitions and thresholds for species.

In this region, four sites have been proposed as draft marine SPAs with breeding seabirds as features and these are currently being evaluated: St Kilda (gannet, fulmar, storm petrel, guillemot, puffin); Pentland Firth and Scapa Flow (Arctic tern, shag, guillemot); North Orkney (Arctic tern, shag) and Seas off Foula (great skua, fulmar, Arctic skua, guillemot, puffin) (SNH 2014).

A1a.6.12 Features of Regional Sea 9

This area is to the west of Shetland and mainland Scotland and covers the area including the Faroe-Shetland Channel. There are no land masses in this region.

A1a.6.12.1 Seabird species and distribution at sea

Seabirds found at sea over the Faroe-Shetland Channel and to the north of Shetland, are likely to originate mainly from major colonies in the Faroe, Shetland and Orkney Islands and more northerly breeding areas such as Iceland. The areas are probably too far to visit during the breeding season for most species and birds will generally move through the area in late summer and autumn on passage to winter breeding grounds, or in spring on route to breeding colonies or over the winter months.

Areas where birds are likely to be found include:

- North of Shetland – Overall the area is relatively unimportant for seabirds. Species likely to be present include fulmar, gannet, kittiwake and guillemot. Greatest densities of birds (but still low numbers) between March and September, birds present during breeding season (May-July) likely to be non-breeders. Some birds can forage >100km from colonies during breeding (e.g. gannet, fulmar), so may be present in southern part of the area.

- Faroe Shetland Channel – Similar to above, is within maximum foraging range of some species during breeding, but too far for most species during this time and most likely to be used by non-breeders and birds moving through it in late spring/autumn.

- Wyville Thomson Ridge – Increased number of species in moderate densities seen here, a topographic high seabed area where water depths are shallower than those over the channel. Species likely to be present include fulmar, storm petrel, kittiwake, guillemot and puffin.

Seabird distribution is closely correlated to water depth with more birds found over shallower continental shelves than the deeper oceanic waters. Birds present in the deeper slope and oceanic waters will comprise mainly pelagic species (e.g. fulmar, gannet, kittiwake and storm petrel).

A1a.6.12.2 Waterbird species and distribution (breeding, wintering and migratory)

As all of Regional Sea 9 is open seas, there are no breeding waterbirds. Similarly, there are no areas for wintering waterbirds and any birds within the area are likely to be on passage.

A1a.6.13 Features of Regional Sea 10 & 11

Regional Sea areas 10 and 11 cover the offshore areas of the Rockall Trough and Bank (10) and the Atlantic North West Approaches (11) and do not contain any inshore or coastal areas.

A1a.6.13.1 Seabird species and distribution at sea

There are large gaps in the ESAS/SAST survey coverage for the area and since the last SEA there have been no new surveys in the region. General seabird distribution in the region was provided in OESEA, based on the surveys that had been conducted, including details from Pollock & Barton (2006) which provided a review of the ESAS data in this offshore area; and the description of seabird distribution has been included in Table A1a.6.33.

Table A1a.6.33: General seabird distribution at sea in the Regional Sea 10 and 11 areas

Species	Distribution
January - April	**Fulmar** are widespread at low densities, concentrations along shelf edge, north west of Anton Dohrn seamount & over Hatton Bank. **Gannet** also present along shelf edge in high densities, Few birds in deep waters. **Kittiwakes** widespread in inshore waters, further offshore peak densities recorded along shelf break. Densities lowest over Rockall Trough and Bank. **Great black-backed gull** widespread at low to moderate densities as far west as 10ºW. Patches of moderate to high densities along shelf break. Large influx of **lesser black-backed gull**. Low densities in offshore areas such as the Hatton Bank, Rockall Bank and Rockall Trough, although moderate to high density patches over shelf break. Few **puffin,** with numbers increasing in March north of the Western Isles, although densities still low. **Manx shearwater** largely absent from offshore areas, although low densities along shelf break & over Rockall Trough.
May - July	Earliest **common tern** recorded in the area in May, with highest densities recorded in June and July around Western Isles. **Arctic skua** widely scattered in low numbers. Many birds migrating north to Arctic breeding grounds. Highest densities of **puffin** recorded around Western Isles. Widely scattered at low densities along shelf break and eastern edge of Rockall Trough and as far west as Hatton Bank. **Storm petrel** widespread at low to moderate densities over shelf edge to north and west of Western Isles. Highest densities along shelf edge. Occasional **Arctic tern** offshore.
August - October	**Gannet** more widespread in offshore waters with low densities as far west as Hatton Bank. Highest densities north and west of Western Isles close to colonies, low densities along shelf edge. Highest densities of **kittiwake** in inshore waters close to breeding colonies, widespread at low densities over the Rockall Trough and Bank and the Hatton Bank. **Fulmar** are widespread at low to moderate densities, with occasional high densities along shelf break and over Rockall Bank. **Manx shearwater** widely scattered in low densities offshore, with occasional high density patches encountered (e.g. Rockall Bank). Birds encountered over Hatton Bank in June. **Puffins** disperse offshore away from breeding colonies. Low to moderate densities in the north-east Rockall Trough. Low densities over the Rockall Bank in September. Occasional **great black-backed gull** recorded in offshore waters, although very few along shelf break. **Storm petrel** widespread at low to moderate densities over shelf waters, with low densities over the Rockall Bank and north of the Anton Dohrn Seamount (July through to September). May to August, highest numbers of **Leach's storm petrel** recorded north-west of the Western Isles, beyond the shelf edge, in waters greater than 1,000m deep. A few birds recorded far offshore and very few inshore. Low densities of **lesser black-backed gull** throughout the area. **Great skua** widespread in low numbers throughout offshore waters as well as shelf waters. **Arctic tern** more widespread in offshore areas in low to moderate numbers.

Species	Distribution
November - December	Limited survey coverage. Highest densities of **fulmar** north and west of Western Isles & over shelf edge around 57ºN. **Kittiwake** in shelf waters north of Western Isles and occasionally further offshore. Highest densities of **gannet** along shelf edge, November through to April. Few birds in deep waters. Widespread at low densities over shelf waters. Majority of **storm petrel** have left the area. Birds primarily restricted to inshore areas. Low densities of **lesser black-backed gull** with a few individuals scattered offshore. Low numbers of **great skua** observed to north and west of Western Isles. Majority inshore of the shelf break.

Source: Pollack & Barton (2006)

Other migrant seabird species which are present within offshore areas in low numbers and at certain times of the year include sooty shearwater, great shearwater, little auk, pomarine skua and long-tailed skua.

A1a.6.13.2 Waterbird species and distribution (breeding, wintering and migratory)

As all of Regional Sea 10 and 11 are open seas, there are no breeding waterbirds. Similarly, there are no areas for wintering waterbirds and any birds within the area are likely to be on passage.

A1a.6.14 Evolution of the baseline

Birds occupy a wide range of habitats and respond to environmental pressures and studying bird populations, including their abundance and productivity, can provide a good indication of the broad state of the environment around them; long term data on changes in bird populations can also help to interpret shorter term fluctuations in number. Trends are used to assess whether environmental management on bird populations is being effective as well as informing policy makers, government agencies and non-government organisations (Defra 2015).

In 2011 the EU published guidance on the development of wind farms in accordance with EU nature legislation, specifically Natura 2000. The guidance identified the potential impacts arising from both onshore and offshore wind farms on a number of environmental receptors, including birds. Annex II of the guidance presents a list of species considered to be particularly vulnerable to onshore and offshore wind farms, primarily based on the compilation of a number of literary sources listed therein. Those species relevant to the offshore energy SEA, i.e. those which utilise the marine environment are presented in Table A1a.6.34 below. A complete list of all species assessed are listed in EU (2011).

Table A1a.6.34: Bird species considered to be particularly vulnerable to wind farms

Species	Conservation status in Europe[1]	Annex I species	Habitat displacement	Collision	Barrier effect	Change in habitat structure
Sandwich tern	Depleted	Yes		XX		
Common tern	Secure	Yes		XX		
Little tern	Secure	Yes		XX		
Guillemot/Razorbill	Secure	No		XX		
Gannet	Secure	No	X	X		
Cormorant	Secure	No	X	x	x	
Shag	Secure	No				X
Arctic skua	Secure	No	X	X		
Herring gull	Secure	No		x	x	
Chough	Declining	Yes	X	x		

Species	Conservation status in Europe[1]	Annex I species	Habitat displacement	Collision	Barrier effect	Change in habitat structure
Red-throated diver (breeding)	Depleted	Yes	X	X	X	
Red throated diver (wintering)	Depleted	Yes	XXX	X		
Black throated diver	Depleted	Yes	X	X		
Slavonian grebe	Declining	Yes	X	X		
White-fronted goose	Secure	No	XX	X		
Whooper swan	Secure	Yes	X	X		
Bean goose	Secure	No	X			
Pink-footed goose	Secure					
Barnacle goose	Secure	Yes	X	X		
Brent goose	Vulnerable	No	X	X		
Wigeon	Secure	No	XX		x	
Long-tailed duck	Secure	No	XX	X	X	X
Common scoter (breeding)	Secure	No	X			
Common scoter (wintering)	Secure	No	XX	X	X	X
Pochard (flights between feeding and roosting sites in winter)	Declining	No		x	X	
Tufted duck	Declining	No		x	X	
Scaup	Declining	No		x	X	
Eider	Secure	No	X	X	X	X
Eider (staging, wintering)	Secure	No	X	x		
Goldeneye (flights between feeding/roosting sites in winter)	Secure	No		x	x	
Purple sandpiper	Secure	No	X	x	x	
Dunlin	Depleted	No	X	X		
Snipe	Declining	No	XX	X		
Black-tailed godwit	Vulnerable	No	X	x	X	
Golden plover	Secure	No	XX	X	X	
Lapwing	Vulnerable	No	XX	X	x	
Curlew	Declining	No	XX		X	

Notes: [1] After BirdLife International (2004). XXX = Evidence of substantial risk of impact, XX = Evidence or indication of risk or impact, X = Potential risk or impact, x = small or non-significant risk or impact, but still to be considered in assessments. This list is indicative for guidance, and any potential impact will be site-specific
Source: EU (2011)

Information from the JNCC online Seabird Population Trends and Causes of Change showing changes to 2014, along with some figures from the annual publication *The State of the UKs Birds 2015* (Hayhow *et al*. 2015), is shown in Table A1a.6.35.

Table A1a.6.35: Seabird population change up to 2014

Species	Population Change %		
	1969-70 to 1985-1988	1985-88 to 1998-2002	2000-2014
Northern fulmar	+77	-3	-18
Manx shearwater	n/a	n/a	n/a
European storm-petrel	n/a	n/a	n/a
Leach's storm-petrel	n/a	n/a	n/a
Northern gannet	+39	+39[1]	26[3]*
Great cormorant	+9	+10	-12
European shag	+21	-27	-38
Arctic skua	+226	-37	-71
Great skua	+148	+26	19[3]
Black-legged kittiwake	+24	-25	-47
Black-headed gull	+5	0	102
Mediterranean gull	n/a	+10,900	n/a
Mew gull	+25	+36	n/a
Lesser black-backed gull	+29	+40	n/a
Herring gull	-48	-13	-38
Great black-backed gull	-7	-4	-6
Little tern	+58	-23	-9
Sandwich tern	+33	-15	-3
Common tern	+9	-9	-20
Roseate tern	-66	-83	127
Arctic tern	+50	-31	34
Common guillemot	+77	+31	22
Razorbill	+16	+21	6
Black guillemot	n/a	+3[2]	n/a
Atlantic puffin	+15	+19	n/a

*Notes: [1]Change between censuses in 1984-5 and 2004-5. [2]Change between censuses in 1982-91 and 1998-2002. [3]Figures from Hayhow et al. (2015), [3]*from Hayhow et al. (2015) and trend derived from census interpolations and extrapolations.*
Sources: JNCC http://jncc.defra.gov.uk/page-3201 (2015), Hayhow et al. (2015)

Over the period 1986 and 2014, declines have been seen in a number of seabird species, some of the most notable (i.e. greater or equal to 50%) being shag, Arctic skua and kittiwake.

Kittiwake abundance in the UK has declined rapidly since the early 1990s; in 2013, the UK index was 28% of that recorded in 1986, the lowest value recorded in 28 years of monitoring (JNCC 2015). Table A1a.6.36 below shows the counts of kittiwakes between the Seabird 2000 and recent surveys at several key colonies, and the rate of decline. The RSPB/Natural England study at Flamborough Head/Bempton Cliffs have also seen a decline in kittiwake numbers.

Table A1a.6.36: Counts of kittiwakes[1] from SPAs in the Regional Sea areas

SPA Name	Seabird 2000 Count	Count (year)	Decline (%)	% per annum
Regional Sea 1				
Hermaness[2] NNR	643	304 (2009)	-53	-7.2
Noss	2,395	507 (2010)	-79	-14.4
Foula	1,934	361 (2014)	-81	-11.3
Sumburgh Head	877	362 (2014)	-59	-6.6
Troup, Pennan and Lion's Head	18,482	14,896 (2007)	-19	-3.5
Buchan Ness to Collieston Coast	14,091	12,542 (2007)	-11	-1.9
Fowlsheugh	18,800	9,337 (2012)	-50	-5.2
Firth of Forth Islands	6,632	3,339 (2014)	-50	-4.8
St Abbs Head[2] NNR	11,077	3,652 (2014)	-67	-7.6
Regional Sea 2				
Farne Islands	5,096	4,175 (2014)	-18	-1.3
Flamborough Head and Bempton Cliffs	42,692	37,617 (2008)	-12	-1.6
Regional Sea 4				
Skomer and Skokholm	2,257	1,488 (2014)	-34	-2.9
Regional Sea 6				
Ailsa Craig	1,675	228 (2014)	-86	-14.2
Regional Sea 7				
Rathlin Island	9,917	7,922 (2011)	-20	-1.9
Handa	7,013	2,715 (2013)	-61	-6.6
Shiant Isles	2,006	549 (2008)	-73	-13.4
Canna and Sanday	1,274	935 (2014)	-27	-2.0
Mingulay and Berneray	5,511	2,878 (2014)	-48	-4.0
Regional Sea 8				
Fair Isle	8,204	963 (2014)	-88	-15.2
West Westray Cliffs	33,281	12,055 (2007)	-64	-11.9
Copinsay	4,256	666 (2012)	-84	-13.3
Marwick Head	5,573	526 (2013)	-91	-15.5
Hoy	795	397 (2007)	-50	-8.3
North Rona and Sula Sgeir	4,119	1,253 (2012)	-70	-8.1
St Kilda	4,268	957 (2008)	-78	-15.3

Notes: [1.] Counts of kittiwake Apparently Occupied Nests (AON) recorded at SPA compared to number recorded during Seabird 2000 along with % decline and per annum change. [2] Data for Hermaness and St Abb's Head relate to only part of the SPA.
Source: JNCC website http://jncc.defra.gov.uk/page-3201 (November 2015)

Tables showing changes between Seabird 2000 and recent surveys for seabirds are available from JNCC website http://jncc.defra.gov.uk/page-3201. Conversely, over the same period, substantial increases have been recorded for other species, e.g. gannet, great skua and razorbill – again, the reasoning behind these increases are not yet fully understood.

From *The State of the UKs Birds 2015*, a number of breeding and wintering bird species show significant trends in numbers (Table A1a.6.37 and A1a.6.38).

Table A1a.6.37: Trends in common breeding waterbirds in the UK

Species	Long-term[1] trend % (1970-2013)	BBS[2] Trend % (1995-2013)
Mute Swan	19	28
Greylag goose	n/a	215
Canada goose	n/a	66
Little grebe	-61	16
Great crested grebe	n/a	4
Golden plover	n/a	-17
Curlew	-63[2]	-46
Common sandpiper	-50	-15
Shelduck	127[2]	-9
Mallard	92	14
Tufted duck	47	32
Moorhen	-30	-15
Coot	56	17
Oystercatcher	n/a	-1
Lapwing	-65	-45
Snipe	n/a	5
Redshank	n/a	-45
Gadwall	n/a	99

*Notes: [1]The long term trends are based on the smoothed estimates of change between 1970 and 2013 in a combined CBC (Common Bird Census)-BBS analysis. For species with evidence of marked differences in the population monitored by the BBS and its predecessor the CBS (marked with a *), the CBC results until 1994 have been used then the BBS results from 1994 to 2014. [2]BBS = Breeding Bird Survey. All BBS trends are based on the smoothed estimates of change in the UK between 1995 and 2013.*
Source: Hayhow et al. (2015)

Species like curlew, common sandpiper and lapwing are consistently showing a decline in numbers between surveys. Unfortunately the reasons for these declines are not fully understood.

Table A1a.6.38: Trends in wintering waterbirds in the UK

Species	Long-term[1] trend % (1987/88-2012/13)	Ten-year trend[2] % (2002/03-2012/13)
Mute swan	66	-6
Bewick's swan	-42	-8
Whooper swan	48	40
Pink-footed goose	100	25
European white-fronted goose	-71	-38
Greenland white-fronted goose	-11	-41
Icelandic greylag goose	-13	16
British greylag goose	164	28
Canada goose	55	7
Greenland barnacle goose	150	39
Svalbard barnacle goose	183	29
Dark-bellied brent goose	5	33
Canadian light-bellied brent goose	79	50
Svalbard light-bellied brent goose	120	2
Shelduck	-23	-19

Species	Long-term[1] trend % (1987/88-2012/13)	Ten-year trend[2] % (2002/03-2012/13)
Wigeon	35	-26
Gadwall	206	20
Teal	67	-3
Mallard	-39	-18
Pintail	-40	-43
Shoveler	69	1
Pochard	-60	-41
Tufted duck	14	5
Scaup	-39	-47
Eider (except Shetland)	-7	-7
Eider (Shetland)	n/a	n/a
Goldeneye	-45	-32
Red-breasted merganser	-15	-20
Goosander	26	9
Ruddy duck	-98	-99
Little grebe	n/a	-12
Great crested grebe	19	-25
Coot	8	-16
Oystercatcher	-21	-19
Avocet	>1000	58
Ringed plover	-58	-42
Golden plover	129	-42
Grey plover	-5	-12
Lapwing	41	-26
Knot	-7	-9
Sanderling	29	4
Purple sandpiper	-55	-10
Dunlin	-27	-24
Black-tailed godwit	370	49
Bar-tailed godwit	-2	-11
Curlew	-3	-13
Redshank	-23	-26
Turnstone	-44	-11

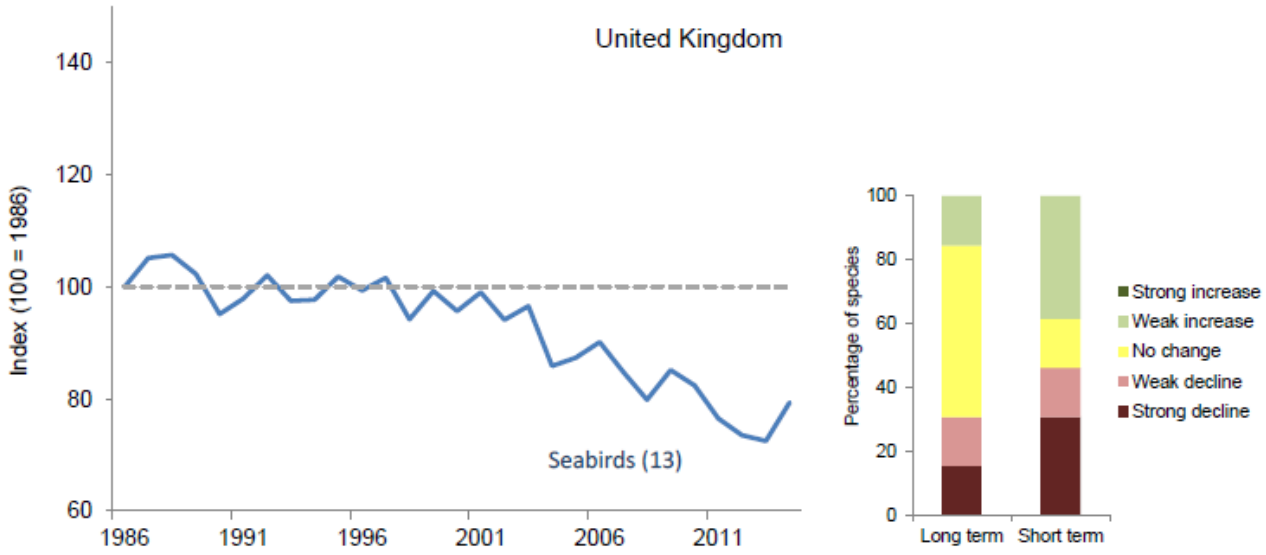
Notes: [1]The long term trends are the % changes between the smoothed index values for 1987-88 and 2012-13. [2]Ten year trends are the % changes between the smoothed index values for 2002/03 and 2012/13. [3]British greylag goose relates to previously cited "re-established" and "North-west Scotland" populations.
Source: Hayhow et al. (2015)

The UK Wild Bird Indicator is an annual publication from Defra that takes data from a variety of sources and is compiled in conjunction with the RSPB, BTO and JNCC. The 2015 publication presents trends up to 2014 from bird populations, including seabirds and wetland birds; the indicators for both continue to decline (Defra 2015). The assessment references two terms: long-term and short-term (see below). Individual bird species population trends are calculated as an index, which relates the population in a given year to a "baseline" (the first year that data are available, which is given a value of 100). Thereafter, the index is expressing the population as a percentage of this "baseline". Smoothed trends, derived from a published statistical

methodology, are also used for assessments s they reduce the short term peaks and troughs resulting from e.g. year to year weather and sampling variations (Defra 2015).

The populations for seabirds and wintering waterbirds are shown in Figures A1a.6.20 and A1a.6.21.

Figure A1a.6.20: Population of seabirds in UK 1986-2014

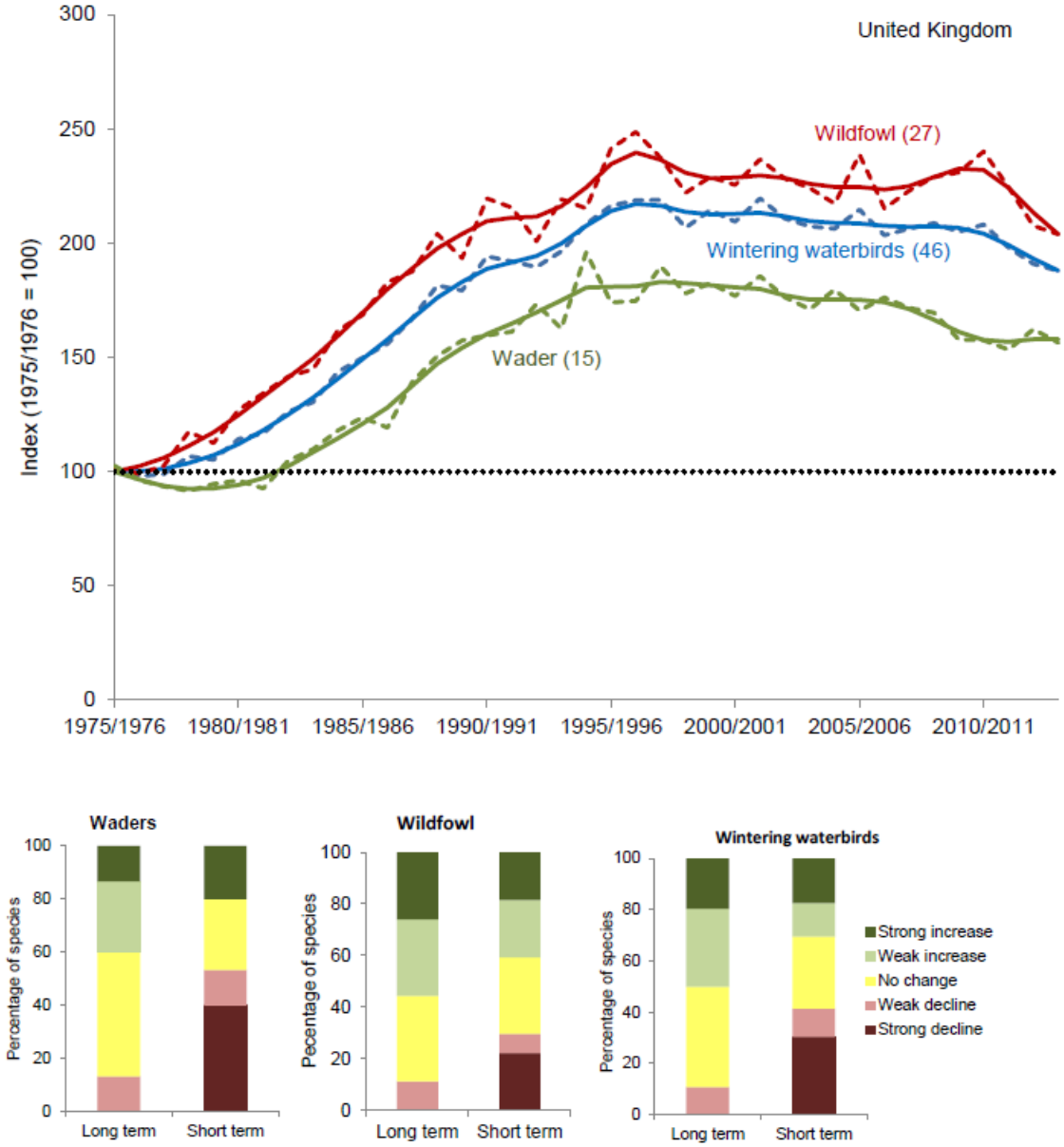


Note: Figure in brackets show number of species. Graph shows unsmoothed trend (solid line).
Source: Defra (2015)

The online WeBS Alerts System (http://www.bto.org/volunteer-surveys/webs/publications/webs-alerts) has site accounts for SPAs and Sites of Special Scientific Interest (SSSI) which includes information on trends over different years (e.g. 5, 10, 25) for the wintering waterbird species for which the site was designated for, with comparisons made between site-specific regional and national trends. WeBS has recorded that over the last three decades, many species have increased in numbers, however, declines are beginning to be detected in some species including offshore seaducks, divers and coastal birds, with counts continuing to indicate declines in eider, long-tailed duck and velvet scoter (Holt *et al*. 2015). The reasons for these declines is not discussed in the WeBS report, but suggestions are given, including changes in winter distribution and migration patterns, thought to be caused by climate change (e.g. turnstone, Slavonain grebe, purple sandpiper), and shifts in the sex balance of the population, to a male dominated population (eider) (Holt *et al*. 2015); an increased mortality of breeding female eiders in the western Gulf of Finland, mainly due to predation by white-tailed sea-eagle and American mink has been suggested as a contributory factor in this shift in the sex ratio in eiders (Lehikoinen *et al.* 2008).

Table A1a.6.39 shows high alert (>50% decrease in waterbird species for which the SPA site is designated) and medium alert (25%-50% decrease) species (WeBS Alerts website: http://www.bto.org/volunteer-surveys/webs/publications/webs-alerts/introduction) at the top five wetland sites in the UK, i.e. those sites holding the greatest number of birds.

Figure A1a.6.21: Population of wintering waterbirds in the UK, 1975/76 to 2013/14



Note: Figures in brackets show number of species. Graph shows unsmoothed trend (dashed line) and smoothed trend (solid line).
Source: Defra (2015)

Table A1a.6.39: Top five wintering wetland bird sites with high and medium alert species (reference winter 2009/10)

Sites	High Alerts	Medium Alerts
The Wash	Shelduck^{LT,SC}, pintail^{LT,SC}, lapwing^{MT}, turnstone^{LT,SC}	Shelduck^{MT}, mallard^{LT,SC} pintailST oystercatcher^{LT,SC} lapwingST dunlin^{MTLT,SC} redshank^{SC}
Morecambe Bay	Mallard^{LT} great crested grebe^{ST,MT,SC} dunlin^{SC} bar-tailed godwit^{LT}	Mallard^{SC} pintail^{ST,SC} goldeneye^{MT,LT,SC} red-breasted merganser^{MT,LT,SC} great crested grebe^{LT} ringed plover^{MT,SC} golden ploverST grey plover^{MT,SC} lapwingST knot^{MT} dunlin^{LT} bar-tailed godwit^{MT,SC} curlew^{MT,SC} turnstone^{LT}
Ribble Estuary	Bewick's swan^{ST,MT,LT,SC} whooper swanST grey plover^{MT,SC} dunlin^{SC}	Shelduck^{ST,MT,SC} oystercatcher^{MT} golden plover^{MT} grey ploverST lapwing^{ST,SC} knot^{SC} bar-tailed godwit^{LT,SC} curlew^{MT}
Thames Estuary	European white-fronted goose^{MT,LT,SC} grey plover^{MT,SC} knot^{ST,MT,LT,SC}	European white-fronted gooseST shoveler^{MT,SC} ringed ploverST lapwing^{MT,SC} dunlinST
North Norfolk Coast	Brent goose (dark-bellied)^{LT} wigeon^{ST,MT} pintail^{MT} velvet scoter^{ST,SC}	European white-fronted goose^{ST,MT} brent goose (dark-bellied)^{MT,SC} pintailST grey plover^{MT} dunlin^{MT}

Source: Cook et al. (2013). Key: ST = short term (5 years), MT = medium term (10 years), LT = long term (up to 25 years), AT = all-time and SC = since classification.

A1a.6.15 Environmental issues

In general, seabird population dynamics differ from those of most landbirds: annual adult survival rates are high and generally exhibit a relatively low variability among years; productivity is comparatively low due to small clutch sizes; juvenile survival is lower than adult survival and tends to be more variable between years and maturity is delayed, with some birds waiting several years before recruitment into the breeding population (e.g. *ca*. 2-3 years for cormorants, 3 years for terns, 4-5 years for gulls, gannets and 9 years for fulmars). The rate of recruitment in seabirds is low due to factors such as low productivity, immature survival and delayed age of first breeding, therefore the rate at which seabird populations can increase is relatively slow compared to most landbirds (Mitchell *et al*. 2004).

Variability in demographic patterns occurs across taxonomic groups of seabirds. Cormorants, terns and gulls have relatively low survival and high recruitment rates while the converse is the case in families such as petrels, auks, gannets and great skuas. Seabird species with high survival rates/low recruitment are sensitive to changes in adult mortality, while those with low survival rates/high recruitment will be sensitive to parameters that determine recruitment rates (the rate at which immature birds join the breeding population for the first time).

Seabirds and other waterbird populations can also decline due to external factors including food and habitat availability, predation, disease, exploitation and pollution – with many of these factors interlinked. For example rising sea temperatures and sea levels, as a result of climate change, can lead to a change in the prey distribution for seabirds, resulting in a reduction in food availability, or loss of habitat e.g. for those shoreline nesting species. There are also potential effects/concerns, synonymous with wind farm developments, namely collision mortality; displacement, habitat loss/change (influencing access to prey and prey availability) and barrier to movement (Langston *et al.* (2013a,b), Thaxter *et al.* (2014)). Adult seabird survival rates tend to be less sensitive to reduction in food availability, however seabird breeding success can be significantly affected by a relatively small reduction in food availability, i.e. when food availability is low, seabirds will fail to breed or young will starve. As reproduction is costly in terms of energy expenditure, seabirds will not exert high breeding effort in years of poor food supply, thereby improving their chances of surviving to breed in subsequent years.

Reduction in adult survival will occur in years of exceptionally poor food availability when there is insufficient food available for self-maintenance. A reduction in their main prey species, the sandeel, has been a well documented factor in the long-term decline in kittiwake numbers and prey availability has also been cited as a potential cause of declining numbers of black guillemot at Northern Ireland sites (BTO 2015). At these sites, the black guillemot feeds almost exclusively on butterfish and the distribution and abundance of this prey will likely influence the population and distribution of the birds.

Adverse weather, such as an increased frequency of extreme storms, also attributed to climate change, have, in recent years, caused wrecks of seabirds, such as puffin, guillemot, razorbill and shag; resulting in either the washing ashore of dead birds, or the arrival at colonies of severely emaciated and near starving birds. Other effects seen have been delayed breeding, and reduced productivity, with fewer chicks fledged. As these and other bird species caught up in wrecks may not breed until their fifth year, the impact these have at a species population level may take several years to be fully determined.

December 2013 saw a change in EU Common Fisheries Policy. Reforms included a legally binding commitment to fish at sustainable levels, decentralised decision making and a ban on discarding edible fish. To enable fishermen to adapt to the change, the landing obligation is being phased in between 2015 and 2019 for all commercial fisheries in European waters (EC website – fisheries: http://ec.europa.eu/fisheries/cfp/fishing_rules/discards/index_en.htm)

One of these reforms (discard ban), has the potential to significantly impact species using discards as a regular food source. Discards have shaped many aspects of seabird foraging, distribution and population dynamics and a ban may have negative consequences by creating a food shortage (Bicknell *et al.* 2013). To combat this, species may have to move to novel environments, or potentially offset the shortage by increasing their predation of other seabirds or kleptoparasitism e.g. the majority of great skua, when nesting in large colonies, tend to feed on fish, including discards, with only a small proportion killing other seabirds (JNCC website). However, great skua can take large numbers of other seabirds; Miles (2010), as cited in Bicknell *et al*. (2013), estimated over 47,000 seabirds are consumed a year by great skua at St Kilda.

Leach's petrel breeds at a small number of widely distributed colonies in the UK and is thought to experience great skua predation losses of ~21,000 per year on St Kilda. While this colony declined by ~54% between 1999 and 2006, this level of predation exceeded the observed decline and a suggested explanation for the disparity was prospective pre-breeders or breeding immigrants from other colonies in the North Atlantic were buffering the impacts from predation (e.g. Phillips *et al*. 1999). A study of inter-colony movement of Leach's petrel using stable isotopes in blood, Bicknell *et al*. (2014) found large scale movements (spanning >3000km) of pre-breeding birds between colonies in Scotland, Iceland and Canada, with their analysis suggesting ~1 in 10 pre-breeders at St Kilda being recent arrivals from another region. These findings emphasise the importance of inter-colony exchange, which has implications for understanding seabird population dynamics.

Seabird distribution at sea is also influenced by the availability of food and discards provided a spatially and temporally predictable food source (Bartumeus *et al*. 2010; Cama *et al*. 2012); a reduction/change in discard availability may lead to increased foraging effort and more energy expended (i.e. during breeding) or alter over-winter at sea distribution (Bicknell *et al*. 2013).

The effects of prey abundance on seabird reproduction success and adult survival will vary depending on the seabird species. Species with large foraging ranges, and low foraging costs, including being able to exploit a range of prey species at a range of depths, will be somewhat buffered against a reduction in food abundance – as these species can switch prey. Effects will

be greater on those species that are for example restricted to feeding close to colonies, or unable to dive and have instead to rely on prey at or close to the sea surface, as seen in kittiwake. This species is restricted to prey at or near the sea surface and is vulnerable to food shortages. A simplistic view; unable to provide for chicks results in lower productivity, leading to fewer chicks being recruited to the breeding population, resulting in a decline in abundance at breeding colonies. However, the strong negative impact of climate change on seabirds apparently evident in the North Sea region is contrasted with studies across four trophic levels in the Celtic Sea, where the situation is less clear (Lauria *et al*. 2012).

Those species with shorter foraging distances will also be affected by food distribution, as seabirds need to nest on suitable habitat that is within foraging range of sufficient prey. If prey distribution changes, for example moving out with current foraging ranges, alternative nesting sites may not be found.

Intra and inter-specific competition will also affect food availability; thereby playing an important role in density dependant regulation of seabird population size. This can occur during winter when there is a widespread depletion of food resources, or during summer, when there could be a local depletion within the foraging range of a colony.

Predation can impact some species, both through predation by invasive non-native species, e.g. rats and mink and also predation by other seabirds/birds.

In a number of areas, e.g. the Scilly Isles and islands off the west coast of Scotland, eradication programmes have removed invasive predators causing some species of bird e.g. Manx shearwaters and storm petrels, to increase as a result (e.g. RSPB website: Shiant Islands http://www.rspb.org.uk/joinandhelp/donations/campaigns/shiantisles/work/index.html and Scilly Isles http://www.rspb.org.uk/whatwedo/projects/details.aspx?id=343296)

Kittiwake numbers in Northern Ireland have declined (e.g. over the last 6-7 years at the three largest colonies – BTO 2015), and a major factor for the decline in local breeding success rates has been predation by corvids. Other bird species, such as common gull and guillemot have also been known to experience predation from both corvids and the larger gull species, e.g. great black-backed gull. In the Northern Isles, predation by great skua on Arctic skua has been recorded and is on the increase, which could be contributing to the decline in numbers there (see above).

There is an increasing problem with seabirds being caught as bycatch in the longline fishing industry. This fishing method involves setting several kilometre long fishing lines with thousands of baited hooks, which can attract scavenging seabirds. These can then become hooked and drown. Longline fishing occurs along the shelf edge off Norway, Scotland and Ireland, as well as round the Faeroes. The species most often caught on longlines in this area is fulmar, however other species including gannet, great skua and large gull species have also been reported. An upside to the discard ban may be a potential reduction in seabird bycatch in fishing gears (Bicknell *et al*. 2013).

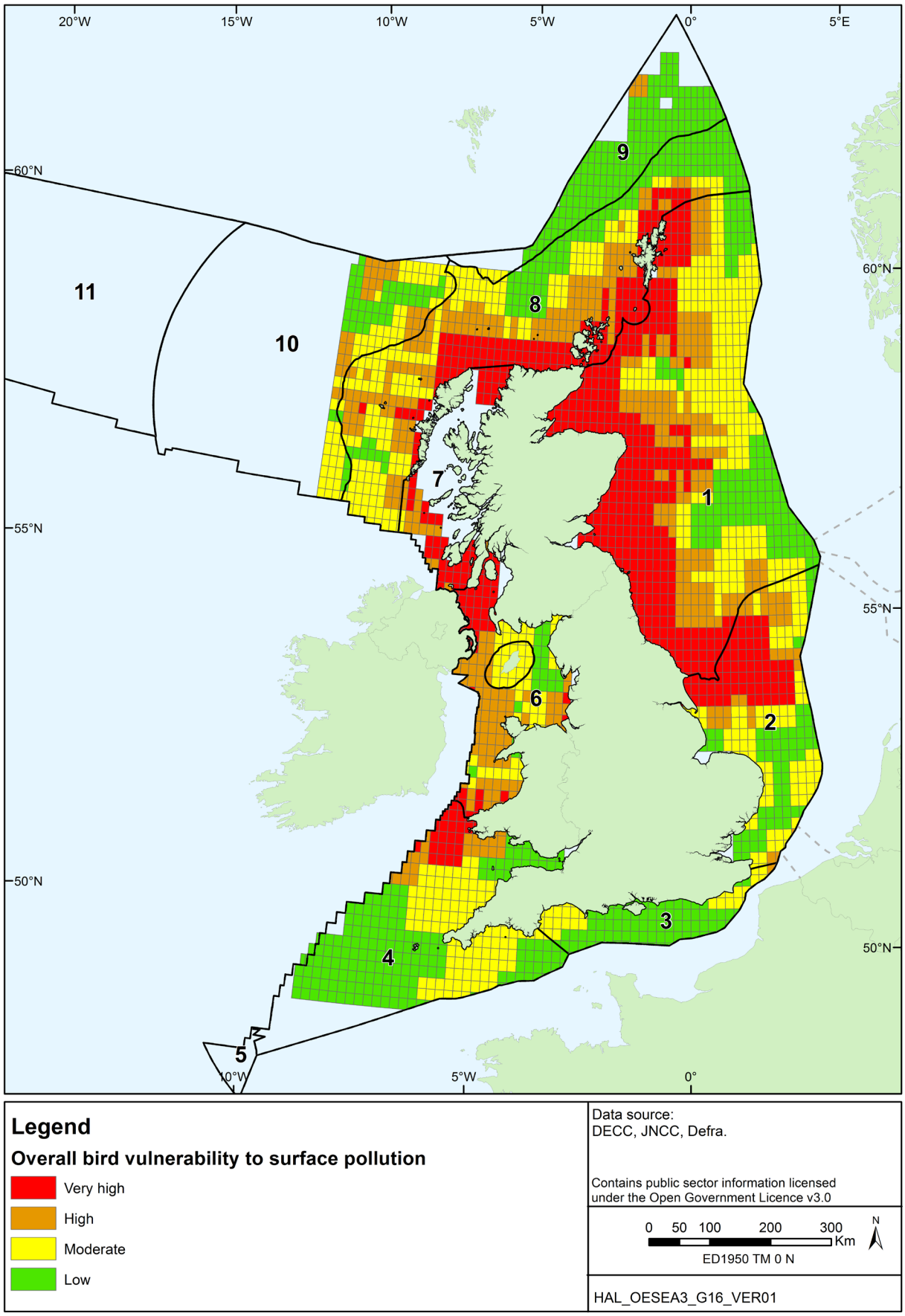
Tagging studies carried out on species such as lesser black-backed gull, gannet and great skua, from various important seabird colonies around the UK, as well as tagging studies of swan and geese species and continuations of pre-existing studies, aim to identify, amongst other things, the sea area usage of these species, flight heights and migration routes to see connectivity with areas of existing or proposed renewable development and to inform collision risk modelling.

Of the studies referenced above, all studies have recorded seabird connectivity to some degree or another, with existing, proposed, or potential renewable development sites, e.g. in the North and Irish Seas. Cleasby *et al*. (2015) used GPS and barometric tracking to derive flight heights of gannets from Bass Rock, and determined the probability of flying at collision risk to be low during commuting between colonies and foraging areas, but was greater during periods of active foraging – resulting in a possible mortality not previously seen in studies which used conventional flight height estimation techniques and which approached levels which could affect long-term gannet population viability. Over the last few years, the majority of research on collision potential has focused on birds, with a growing number of studies on bats (see Appendix 1a.6). Bird collisions are generally with turbine blades, and a focus of recent studies is to look at flight height in relation to blade area; but collisions can also be with turbine masts and associated structures, including guy cables, and power lines (e.g. Langston 2003). Another effect associated with windfarms is displacement; birds are displaced from an area due to construction and/or operational disturbance, effectively amounting to habitat loss, and also the "barrier-effect", where birds avoid the area, deviating from usual flight paths and fly round a windfarm. This latter behaviour results in a higher expenditure of energy, and at times that are high in energy demand, i.e. rearing chicks during breeding, or using fat reserves on migratory trips.

The vulnerability of seabird species to surface pollution at sea varies throughout the year and is dependent on a number of factors: the amount of time spent on the water; total biogeographical population; reliance on the marine environment and the potential rate of population recovery.

The ESAS database and the JNCC seabird vulnerability index (the oil Sensitivity Index) provide useful information at determining seabird distribution and seabird vulnerability, to surface pollution, however coverage is not complete and publications from the data are now dated, with some over 10 years old. This notwithstanding, the index is still generally used as part of the offshore development impact assessment process to identify (spatially and temporally) areas of very high to low vulnerability. Figure A1a.6.22 below shows the overall seabird vulnerability for the UKCS.

Figure A1a.6.22: Overall seabird vulnerability to surface pollution



Source: JNCC (1999)

In 2015, a workshop was held to discuss the potential to update the Oil Sensitivity Index, with a representation from the SNCBs, conservation NGOs, and industry.

Offshore areas not only supports seabirds during winter, with some species, e.g. gannet, herring gull, kittiwake and great black-backed gull distributed throughout these areas at this time, but as the UK lies on a main migratory flyway, a significant number of birds migrate through the region at least twice a year. Birds, sometimes in great numbers, can be attracted to offshore infrastructure light sources, with attraction increased in adverse weather, e.g. low visibility, fog, drizzle). This can potentially result in mortality, through for e.g. collision, or exhaustion (birds can circle installation, depleting important fat reserves). While there is insufficient quantitative data available to determine if this has a significant effect at a species population level, there is evidence this has an impact on a large number of birds (e.g. Bruinzeel *et al*. (2009), OSPAR 2007, 2015, Ronconi *et al.* 2015). A report issued by the OSPAR Commission in 2007 which provided an overview of monitoring results in the UK, Netherlands and Norway described how a Dutch study calculated ~10% of the total bird population crossing the North Sea is impacted in some by the light emitted from the main deck at offshore installations (OSPAR Commission 2007).

In recognition of the potential impact of offshore infrastructure lights on birds, OSPAR published voluntary guidelines to reduce this impact in the OSPAR maritime area[5]. Following the precautionary principle, in the absence of definitive quantitative data, Best Available Techniques (BAT) should be used, including assessing all lighting on installations, identifying if all are essential for safety or not, whether there is potential for reducing external emissions and minimising the number and intensity of lights to avoid or minimise impacts of lighting on birds crossing or using the Greater North Sea region.

Many of the potential effects mentioned above can also impact waterbirds. Historically, declines in breeding waterbirds, in particular waders, have resulted from land management changes, such as drainage, grassland management and the conversion of coastal and floodplain grazing regimes. Where populations persist in small fragmented pockets of high quality habitat, nests and young are vulnerable to predation. Wintering waterbirds are affected by factors including conditions of breeding grounds, persecution in these areas, quality and quantity of wintering coastal and wetland habitat and changes in migratory patterns (Defra 2015).

[5] In 1994, the OSPAR Commission subdivided the maritime area into five regions: Region I (Arctic waters); Region II (Greater North Sea); Region III (The Celtic Sea), region IV (Bay of Biscay and Iberian Coast) and Region V (Wider Atlantic).

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