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The identification of possible marine SPAs for seabirds in the UK: The application of Stage 1.1 – 1.4 of the SPA selection guidelines

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Summary

In 2009, the European Parliament and the Council adopted Directive 2009/147/EC on the conservation of wild birds (a codified version of the 'Birds Directive' 79/409/EEC as amended). Member states are required to identify and classify the most suitable territories for the conservation of rare and vulnerable (listed in Annex I) and migratory bird species. To fulfil this obligation in the UK, the Joint Nature Conservation Committee is undertaking an in-depth analysis of an existing database (European Seabirds at Sea database) for the identification of seabird concentrations to inform any possible designation of Special Protection Areas in the marine area.

A first series of analyses took place between 2007 and 2010 and identified a suite of eight important areas for seabirds. This was a three-step process involving the generation of continuous seabird density distribution maps from point data using Poisson kriging, the delineation of seabird hotspots based on the Getis-Ord Gi* statistic, and the application of UK SPA selection Stages 1.1-1.3. The guidelines were applied to assess whether species fulfilled the guidelines of regular occurrence and meeting a 1% minimum population threshold. This work was presented in *JNCC Report* 431 (Kober *et al* 2010).

This critical analysis resulted in the identification of a restricted number of locations for a small number of species, addressing only part of their annual life-cycle; hence a second series of analyses was carried out to identify additional areas that might be considered under Stage 1.4 of the UK selection guidelines. A variety of procedures was considered for this second step. The method adopted as the most appropriate followed the same procedure as Kober *et al* (2010), but did not determine numerical thresholds for species; regularity of occurrence, however, was still taken into account. The rationale behind this was that (1) the application of a population threshold, even though suggested by the guidelines, might not be a suitable threshold in the marine environment (e.g. due to turnover of individuals), and (2) the available data were not sufficient to determine accurate population estimates. This second analysis identified an additional suite of 29 areas. The full application of Stage 1.4 of the UK SPA selection guidelines will involve the evaluation of these additional areas based on ecological criteria outlined in Stage 2 of the guidelines, e.g. population size and density, species range, multi-species areas, etc.

In addition to the areas identified under Stages 1.1-1.3 and those which will be considered under Stage 1.4 of the guidelines, five areas emerged that only just failed to meet the criterion of regularity by a narrow margin, so-called near-qualifying areas.

All areas that have resulted from the analysis should be considered further in the light of information from other sources and further assessed under Stage 2 of the SPA selection guidelines.

Contents

Preface

Between January 2007 and October 2011 the Joint Nature Conservation Committee (JNCC) conducted a series of analyses to inform the identification of possible marine Special Protection Areas (SPAs) in the United Kingdom (UK) based on data in the European Seabirds at Sea (ESAS) database. This report is the second which describes progress in the identification of important seabird areas for this purpose. The first report (Kober *et al* 2010) focussed on a suite of analyses based on UK selection guidelines 1.1-1.3 and described their rationale and outcome.

The suite of important areas resulting from this first step identified only a small number of locations with limited temporal and geographic spread for a small number of species. It is the aim of this second report to describe work aimed at identifying additional important areas.

Subsequently to this report, the outcomes of the first and the second steps will be considered in the light of information from other sources (such as tracking/logger data). Any areas that finally emerge as regularly important seabird hotspots could form the basis for further consideration through application of Stage 2 of the SPA selection guidelines.

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1 Introduction

In 2009, the European Parliament and the Council adopted Directive 2009/147/EC on the conservation of wild birds (a codified version of the 'Birds Directive' 79/409/EEC as amended). Member States of the EU are required to identify and classify the most suitable territories for the conservation of rare and vulnerable species (listed in Annex I) and migratory bird species. These areas, Special Protection Areas (SPAs), aim to be the most suitable for these species in the territory of each Member State regardless of whether they occur on land or sea. Identification of SPAs on land began in the 1980s, whereas consideration of suitable areas that happen to be in the marine environment began only in the last decade

The scientific work aimed at identifying marine SPAs is being undertaken by JNCC, mainly on behalf of the UK's Statutory Nature Conservation Bodies (Scottish Natural Heritage, Natural England, the Countryside Council for Wales, and the Northern Ireland Environment Agency). It comprises four strands of work:

1. Marine extensions to existing seabird colony SPAs (McSorely *et al* 2006; Wilson *et al* 2009);
2. Inshore areas used by waterbirds (e.g. seaduck, divers and grebes) outside the breeding season (O'Brien *et al* in press);
3. Inshore- and offshore areas used by true seabirds, for feeding and other activities throughout the year (Kober *et al* 2010); and
4. Other types of SPA not covered by the first three strands, e.g. foraging areas for breeding terns, wintering areas for Balearic shearwater and feeding areas for breeding red-throated diver.

All important areas identified under each strand of work have to undergo a formal selection process prior to recommendation to the European Commission, which includes checking whether these areas comply with the UK SPA selection guidelines (see Stroud *et al* 2001). The guidelines propose a two-step process for the SPA selection:

Stage 1: (considered in this report) identifies areas that qualify for SPA status on the basis of meeting or exceeding population thresholds, or other ecological considerations.
An area may be considered under any one of the following components:

> Stage 1.1. Numbers of Annex I species (as listed in the Birds Directive) exceed 1% or more of the Great Britain (or if relevant the all Ireland) population for the species on a regular basis.
>
> Stage 1.2. Numbers of migratory species (listed in Annex II), exceed 1% or more of the biogeographic population for the species on a regular basis.
>
> Stage 1.3. Seabird assemblages with more than 20,000 individuals (as defined by the Ramsar Committee) and consisting of at least two species, occur on a regular basis.
>
> Stage 1.4. Where the 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 the ecological criteria listed under Stage 2 (e.g. by virtue of population size and density, by contributing to species range, etc).

Stage 2: Evaluates areas identified at Stage 1, as well as additional potentially important areas, based on ecological considerations, to select the most suitable areas. This is not the focus of this report but may be addressed in the future.

This report explains the steps undertaken to identify important areas for seabirds under strand 3 (inshore- and offshore areas for seabirds). A first set of analyses, based on Stages 1.1-1.3, has already been described in Kober *et al* (2010). This report gives an overview of the second set of analyses carried out to select areas to be considered under Stage 1.4, and illustrates how these two sets of analyses relate to each other.

2 Methods

Detailed information about the study area, species of interest, data, data preparation and analyses under Stages 1.1-1.3 has been described in detail in Kober *et al* (2010). We therefore refrain from repeating all details and only give an outline of these subjects to provide a general understanding. For more details please refer to Kober *et al* (2010).

2.1 Area of interest

The area of interest covers the entire British Fishery Limit, including more than 750,000 km^2 and a large variety of marine habitats, seabed and water column features (Connor *et al* 2006). Water depth ranges from 0 to more than 2.5 km.

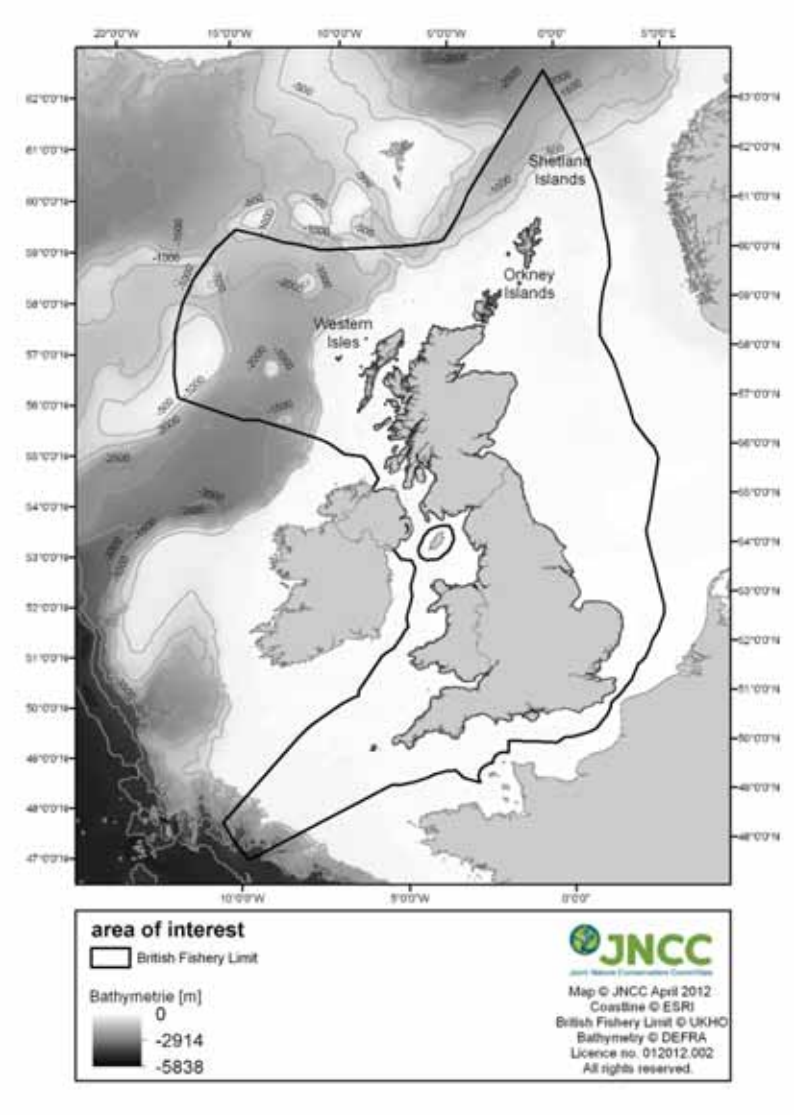

Figure 1. Area of interest. The British Fishery Limit is delineated by a black line.

2.2 Species and seasons of interest

Of the species listed in Annex I of the Birds Directive and of the regularly occurring migratory species, 31 seabirds occur regularly in UK waters and could therefore benefit from SPA protection (Table 1). A further four species, Balearic shearwater (*Puffinus mauretanicus*), Sabine's gull (*Larus sabini*), roseate tern (*Sterna dougallii*) and little tern (*Sternula albifrons*), were excluded from the analysis as adequate data were not available.

In addition to the individual species, species assemblages were also investigated. They were defined as the entire suite of seabirds comprising two or more different species present at a given location.

For the species and assemblages of interest, species-specific seasons were defined that were likely to be characterised by distinctive distribution patterns.

Table 1. Seabird species and seasons of interest.

common name	scientific name	season		
		breeding/summer	winter	additional season
northern fulmar	*Fulmarus glacialis*	March - July	Aug - Feb	
Cory's shearwater	*Calonectris diomedea*	July - Oct		
great shearwater	*Puffinus gravis*	July - Oct		
sooty shearwater	*Puffinus griseus*	July - Nov		
Manx shearwater	*Puffinus puffinus*	May - Sep		Oct – Nov
European storm-petrel	*Hydrobates pelagicus*	June - Oct		
Leach's Storm-petrel	*Oceanodroma leucorhoa*	June - Oct		
northern gannet	*Morus bassanus*	May - Sep	Oct - April	
great cormorant	*Phalacrocorax carbo*	April - Aug	Sep - March	
European shag	*Phalacrocorax aristotelis*	March - Sep	Oct - Feb	
pomarine skua	*Stercorarius pomarinus*			March – June, Aug – Nov
Arctic skua	*Stercorarius parasiticus*	May - Aug		Sep – Nov
long-tailed skua	*Stercorarius longicaudus*			May – June, Sep - Nov
great skua	*Stercorarius skua*	May - Aug	Sep - April	
black-legged kittiwake	*Rissa tridactyla*	May - Sep	Oct - April	
black-headed gull	*Larus ridibundus*	April - Aug	Sep - March	
little gull	*Larus minutes*	May - July	Dec - April	Aug – Nov
great black-backed gull	*Larus marinus*	April - Aug	Sep - March	
Mediterranean gull	*Larus melanocephalus*			All year
common gull	*Larus canus*	May - Aug	Sep - April	
lesser black-backed gull	*Larus fuscus*	May - Aug	Sep - April	
herring gull	*Larus argentatus*	April - Aug	Sep - March	
Iceland gull	*Larus glaucoides*		Nov - April	
glaucous gull	*Larus hyperboreus*		Oct - March	
Sandwich tern	*Sterna sandvicensis*	May - Aug	Sep – Oct	
common tern	*Sterna hirundo*	May - Sep		
Arctic tern	*Sterna paradisaea*	May - Aug		
common guillemot	*Uria aalge*	May - June	Oct - April	Aug – Sep
Razorbill	*Alca torda*	May - June	Oct - April	Aug – Sep
little auk	*Alle alle*		Nov - March	
Atlantic puffin	*Fratercula arctica*	April - July	Aug - March	
All species (assemblage)		All breeding months	Nov - March	July - Aug

2.3 Data

The ESAS database is the most comprehensive and longest running data-set for the distribution of seabirds at sea in north-west European waters (Pollock and Barton 2006). The data were obtained using transects, collected during targeted boat surveys and from vessels of opportunity, over the past three decades. For further details on ESAS see Reid and Camphuysen (1998). No other robust data with the required spatial extend are currently available.

For the analysis data from1980-2006 were extracted. Observers counted all birds on the water within a 200m or 300m wide line transect (split into three or four distance bands: 0-50m, 50-100m, 100-200m and 200-300m) running parallel to the track line of the boat (Webb and Durinck 1992). Flying birds in the transect area were counted using the snapshot method described in Tasker *et al* (1984). Seabird numbers and effort (area surveyed) were pooled for transect sections and assigned to the location of the starting point of each section. The result was a sequence of point locations along transects, stretching through the British Fishery Limit, each holding information about seabird numbers and effort employed at that particular location.

Data collected during sea state force 6 and above and during poor visibility were excluded to avoid poor quality bird counts through impaired observational conditions. To avoid overestimating seabird numbers and double counting, observations of birds associated with vessels were omitted. In spite of this measure, abundances of species known as ship-followers may be increased due to the presence of fishing vessels. Unfortunately the data did not allow us to distinguish between seabirds attracted to an area because of an abundance of fish, and birds being attracted to fishing vessels.

2.3.1 Effort

The data were collected from vessels of opportunity, therefore effort varied over time between different regions of the study area. Kober *et al* (2010) showed that, between 1980 and 1998, the amount of area surveyed varied between a maximum of 8286 km^2 and minimum of 2157 km^2. After 1998, effort steadily decreased until it reached 13km^2 in 2006. Effort was generally much higher in summer than during the rest of the year. During the first half of the 1980s, data collection concentrated on the North Sea and the areas north of the UK, with little effort in other regions. During the second half of the 1980s and in the 1990s, effort shifted between regions all around the UK. From 2000 onwards, effort concentrated again on the North Sea and the areas north of the UK (for more details on effort see chapter 2.5 in Kober *et al* (2010)). As a result, seabird density estimates at some locations might be mostly based on observations from the early 1980's, while at other locations observations from the 1990's may be more influential. A potential bias could therefore arise if important seabird areas are identified based on only a very limited number of data from one or two years. This potential bias is hypothetical and there are no means to assess whether it has influenced the identification of important areas for seabirds. However, to provide an indication of the number and spread of years of data that were influential in hotspot identification, Table 5 indicates which years had sufficient data to test for the presence of an area. It should be noted also that areas with fewer than three years of data did not exhibit regular presence according to our criteria, and were therefore not considered further.

2.4 Data preparation

2.4.1 Spatial extent and resolution

Data were analysed from within the British Fishery Limit and from within a buffer of 100 km surrounding it. The buffer was necessary to ensure high quality interpolated values at the

margins of the British Fishery Limit as well. To reduce processing time, data were summarised into 6x6 km grid-cells, containing the sum of birds observed and the observation effort employed (for details see Kober *et al* (2010)). In order to account for ecological differences between marine areas, which could influence kriging through spatial autocorrelation (Kober *et al* 2010), data were split by regions of putative similar seabird habitat. These were based on the Defra regional seas classification (DEFRA 2004), although some of the regional seas were amalgamated to better reflect seabird regions, based on expert knowledge.

2.4.2 Temporal extent and resolution

All data were collected between 1980 and 2006, and fed into a single data layer to allow for the best available coverage. However, data were split by species, season (breeding, summer, winter and, in a few cases, additional seasons) and seabird region to allow for differentiation between ecologically key stages in the birds' annual cycles.

For the species and assemblages of interest, species-specific seasons were defined that were likely to be characterised by distinctive distribution patterns (Table 1). For seabird assemblages two seasons (winter, summer) were defined by month. In contrast, a third stage (breeding) was not defined by a fixed time period for all species, but data from species during their individual breeding seasons were pooled. The breeding season of assemblages contains therefore data, which were not necessarily collected simultaneously.

2.4.3 Decline of detection probability of birds at increasing distances

When surveying seabirds along a transect line, distant birds sitting on the water are easier to overlook than those sitting closer. Failure to detect individuals however, could lead to the underestimation of bird densities. To account for this potential bias Distance sampling might usually be applied (Buckland *et al* 2001). However, this was not possible as about one third of the data did not have associated distance information. As an alternative, 'detection-correction-factors' were calculated for each species and applied to the raw data. These provide a simple approximation of the corrections applied in Distance sampling and were the only possible correction for the potential bias.

Because sea state has a large impact on detectability, detection-correction factors were calculated separately for sea state 0 (mirror calm); sea states 1 - 3 (sea with wavelets and few whitecaps); and sea states 4-5 (small to moderate waves with numerous whitecaps).

In cases where sufficient data were not available or where there was no apparent decrease in detectability with increased distance from observer, no correction factor was applied, leading to potentially conservative population estimates for these species. In the case of seabird assemblages, numbers were the sum of all species, after they were corrected for detection. For the factors applied see Appendix 1, Table A 1.

2.5 Analysis under Stages 1.1-1.3 of the SPA selection guidelines

2.5.1 Generation of continuous seabird density surface maps

In order to create continuous seabird density surface maps (a grid surface) from transect data (discrete data points) data were interpolated at locations where no data were collected using Poisson kriging. This geostatistical tool is particularly suitable for zero-inflated data with variable effort, such as the ESAS data, because it minimises the standard errors of the predicted densities (Monestiez *et al* 2005). Poisson kriging was applied to data-sets for all target species, regions and seasons. Regions with data for the same species-season were re-amalgamated to create a continuous map covering the entire British Fishery Limit. For more information on the application of Poisson kriging see Kober *et al* (2010).

A map was produced for every region and season where a species was seen on more than five data points. The resolution of the seabird densities maps was identical to that of the input data: 6x6km. Where species occurred in insufficient numbers in the area of interest (<5 observation per seabird region), no density surface was generated.

2.5.2 Rescaling of maps to meet population estimates

Maps could show higher or lower seabird densities than feasible due to unequal sampling effort in time and space and the possibility of ship-following individuals. To address in particular the issue of ship-following species, seabird densities on the maps were compared with data from Barrett *et al* (2006), who estimated total numbers of seabirds in different North Atlantic sea regions. The population estimates of Barrett *et al* were adjusted to meet the different spatial and temporal coverage of the populations subject of this analysis; for details see Kober *et al* (2010). A subsequent rescaling of the seabird density surfaces was applied to five species that are known to be attracted to ships and which showed typically larger total numbers obtained from the kriged maps than those estimated by Barrett *et al* (2006): northern fulmar, northern gannet, great skua and great black-backed gull during breeding and wintering periods; and kittiwake during winter. For rescaling factors see Appendix 1, Table A 2.

2.5.3 Identification and delineation of seabird concentrations

To delineate seabird concentrations, a hotspot analysis was carried out by calculating the local Getis-Ord Gi* statistic (Getis and Ord 1992; Ord and Getis 1995) for each data point. Getis-Ord Gi* is a ratio between the average of a variable within a defined radius around a central location, and the average of the variable in the entire study area. It is a measure of how high and clustered values are and gives more weight to high values when they are aggregated compared to high values when they are isolated.

To delineate seabird hotspots on the Getis-Ord Gi* surface, the locations with the UK-wide highest Getis-Ord Gi*values were chosen. Two threshold values were used and compared: the top 5% and the top 1% of all Getis-Ord Gi*on a map. Only those Getis-Ord Gi*s at locations with seabird densities >0 birds/km^2 were taken into consideration, thus the size of the area defined by the highest n% of Gi*s varies between density surface maps. If neighbouring cells were identified, their boundaries were merged and they were treated as a single hotspot.

The choice of a threshold has a large effect on the number and size of seabird hotspots identified. During several workshops with stakeholders[1], the top 1% threshold was deemed to be the most widely acceptable for further consideration. By analogy it corresponds with the

[1] Both workshops were hosted by Marine Scotland and took place on the 27 July 2010 (Victory Quay) and on the 16 November 2011(New Register House).

1% significance threshold used in statistics and with the 1% population thresholds suggested by the RAMSAR criteria and the UK SPA selection guidelines. Accordingly this report refers only to the work based on the top 1% threshold.

2.5.4 Application of the SPA selection guidelines

To assess the identified hotspots against the SPA selection guidelines, two main criteria were considered:

1. Population size

Population thresholds applied to single species areas for assessment at Stages 1.1 and 1.2, and are given in Appendix 1, Table A 3. They are based on the latest available population estimates and may therefore differ from those used in Kober *et al* (2010). Please note that even though updated population estimates were applied, areas identified were identical to those specified in Kober *et al* (2010) For each hotspot identified the total number of seabirds was calculated from the kriged density surfaces by summing the values in the grid cells within each hotspot and comparing these with the thresholds.

For seabird assemblage density surface maps, numbers from single-species density surface maps were added together. If the seasons for the assemblages (winter and summer) coincided with more than one single-species season they were calculated as means, weighted by the number of months covered by the different seasons. For the breeding season, all single-species density surface maps during breeding were added together.

2. Regularity

The definition of regularity for aggregations of birds derives from Ramsar, where "..the requisite number of birds is known to have occurred in two thirds of the seasons for which adequate data are available. ..". Since all data from 25 years were pooled to create one density surface map, a regularity check was not possible based on the maps. Instead several Mann-Whitney U-tests were carried out to test, for any given year with sufficient data, for differences between the raw data from within a hotspot and the raw data outwith hotspots. Significantly higher densities within a hotspot suggested that the hotspot was present during that year. Hotspots present during (1) at least three years, and (2) at least two thirds of all years when data were sufficient for testing were defined as being present on a regular basis.

2.5.5 Near-qualifying areas under Stages 1.1-.1.3

The aim of testing for regularity was to ensure that areas were significant hotspots on a regular basis and not just for a limited period of time. But the principle of an area holding significant numbers in at least two thirds of years when data were collected (based on a minimum of 3 years of presence) is somewhat arbitrary and, in borderline cases should not be applied too strictly. Areas failing to meet the criterion of regularity by a narrow margin were therefore reconsidered.

2.5.6 Alternative: Identification and delineation of seabird concentrations within seabird regions

As an alternative approach to the UK-wide one, the use of the top 1% grid cells for each individual seabird region was also investigated (for a description of the seabird regions see 2.4.1 and Kober *et al* (2010)), to identify areas which are important on a regional scale. This method led to the identification of hotspots with slightly different dimensions to the ones identified under the UK-wide approach. When, however, Stages 1.1.-1.3 were applied, the remaining hotspots were almost identical to the ones based on a UK-wide approach. A seabird regions-approach was therefore not pursued further.

2.6 Selecting areas to be considered under Stage 1.4

The analysis under Stages 1.1-1.3 of the SPA selection guidelines identified only a small number of locations with limited temporal and geographic spread for a small number of species; hence it seemed appropriate to apply Stage 1.4 of the SPA Guidelines to identify additional areas.

A number of approaches (see below) were developed to identify potential additional areas for consideration under Stage 1.4, in a repeatable and objective manner, and they were applied to all species and season combinations. All of these use as a starting point the seabird density surfaces generated by the steps described in 2.5.1 - 2.5.2. Most of these approaches also applied the Getis-Ord statistic (exemption: Appendix 1, Preference areas). The main difference from Stages 1.1-1.3 is that the guidelines concerning regularity and population thresholds were not applied in the same way. Instead, other methods were adopted to choose consistent hotspots which might be suitable areas for SPAs.

Of all approaches considered only one (2.6.1 Regularly occurring hotspots (no population thresholds applied)) was deemed suitable to identify areas under Stage 1.4 and will therefore be represented in the methods and results section. All other approaches were deemed unsuitable for varying reasons. These latter methods are described in Appendix 2.

2.6.1 Regularly occurring hotspots (no population thresholds applied)

The rationale behind this approach was based on the observation that most of the seabird hotspots identified fell from further consideration because they did not meet strict application of the SPA selection guidelines. In order to justify continued consideration of identified areas, the application of the criterion of regular occurrence was considered as being essential for the identification of persistent important seabird hotspots, even though this is not required by Stage 1.4 of the guidelines. It might be argued that regular occurrence is an important element of the Stage 2 guideline pertaining to history of occupancy. Therefore all hotspots identified were tested for their regular occurrence; the only numerical requirement, however, was a minimum of 50 individuals per hotspots, which prevents the selection of areas holding only very few individuals. This was exceeded by all but one regularly occurring hotspots (one regularly occurring hotspot of Arctic skua during breeding did not reach 50 individuals). The test for regular occurrence was identical to that described under 2.5.4: a series of Mann-Whitney U-test was conducted (per year) to detect differences between raw data from within a hotspot and outside hotspots. If a hotspot held significantly higher numbers than elsewhere, it was assumed as being present during that year. If the hotspot was present during at least 3 years and at least 2/3 of all years with sufficient data for the test, it was assumed to be present on a regular basis.

2.6.2 Near-qualifying areas under Stage 1.4

Near-qualifying areas were also identified for these revisited hotspots, in exactly the same way as they were identified for hotspots under Stages 1.1-1.3 of the guidelines (see 2.5.5).

3 Results

The results of the analyses conducted under Stages 1.1-1.3 of the UK SPA selection guidelines were described in detail in Kober *et al* (2010), where the Poisson kriged distribution maps of the seabirds are presented. Under Stages 1.1-1.3 the analysis identified a total of 2201 hotspots (based on top 1% of Getis-Ord Gi* values) for the 31 species and species assemblages. Of these, 63 exceeded the required 1% population thresholds (Table 2), and 38 hotspots were present on a regular basis. Only eight hotspots met both criteria (Table 2), covering together 11,525km^2 or 1.5% of the area of search. In the following maps (Figures 2 - Figure 10) these areas are shown in red.

In addition to the areas identified under Stages 1.1-1.3 of the guidelines, Kober *et al* (2010) also identified three near-qualifying areas under Stage 1.4, within which numerical thresholds were exceeded, but the criterion of regularity was not met by a narrow margin, defined as failing to meet the target ratio (being present at least 2 out of 3 years) by less than 1 year (Table 2). In the following maps (Figures 2 - 10) these areas are shown in blue. They cover an additional 864km^2, accounting for 0.1% of the area of search.

Analyses conducted to identify areas to be considered under Stage 1.4 of the SPA guidelines led to the identification of 29 additional areas (Table 2). These additional areas were identified by determining which of the original 2201 hotspots occurred on a regular basis, regardless of whether numerical thresholds were met. In Figures 2-10 these areas are shown in orange and they cover 11,540km^2 (1.5% of the area of search). They were supplemented by two additional near-qualifying areas (indicated in green) (Table 2), which add a further 252km^2 or 0.03% to the study area.

Individual areas were labelled with numbers on the maps, and, referring to those labels, more information about the areas is given in Appendix 3.

Table 2. Numbers of hotspots identified during the different analyses and in relation to the selection criteria.

			regularity			population threshold	areas meeting Stages 1.1-1.3		additional areas to be considered under 1.4	
		Number of hotspots	hotspots regularly occurring	hotspots not regularly occurring	hotspots with insufficient data for the test	hotspots exceeding the required threshold	hotspots meeting both criteria	near-qualifying hotspots	hotspots regularly occurring	near-qualifying hotspots
northern fulmar	breeding	64	-	3	61	3	-	1	-	-
	winter	64	1	2	61	3	-	-	1	-
Cory's shearwater	summer	8	-	-	8	-	-	-	-	-
great shearwater	summer	4	-	-	4	-	-	-	-	-
sooty shearwater	summer	23	-	2	21	-	-	-	-	-
Manx shearwater	breeding	49	3	2	44	3	2	1	1	-
	add. season	-	-	-	-	-	-	-	-	-
European storm-petrel	breeding	20	-	-	20	5	-	-	-	-
Leach's Storm-petrel	breeding	3	-	-	3	2	-	-	-	-
northern gannet	breeding	80	5	4	71	1	1	-	4	-
	winter	26	1	3	22	1	-	-	1	-
great cormorant	breeding	8	-	-	8	-	-	-	-	-
	winter	7	-	-	7	-	-	-	-	-
European shag	breeding	16	1	4	11	3	1	-	-	-
	winter	21	2	2	17	1	1	-	1	-
pomarine skua	add. season 1	18	-	-	18	-	-	-	-	-
	add. season 2	25	-	-	25	-	-	-	-	-
Arctic skua	breeding	58	1	3	54	-	-	-	-*	-
	add. season	32	-	-	32	-	-	-	-	-
long-tailed skua	add. season 1	3	-	-	3	-	-	-	-	-
	add. season 2	1	-	-	1	-	-	-	-	-
great skua	breeding	38	1	6	31	1	1	-	-	1
	winter	89	-	-	89	1	-	-	-	-
black-legged kittiwake	breeding	130	4	23	103	-	-	-	4	-
	winter	97	-	2	95	1	-	-	-	-
black-headed gull	breeding	19	-	1	18	-	-	-	-	-
	winter	12	-	-	12	-	-	-	-	-

* the regularly occurring hotspot held <50 individuals (in this case: 41)

Cont. Table 2. Numbers of hotspots identified during the different analysis and in relation to the selection criteria.

			regularity			population threshold	areas meeting Stages 1.1-1.3		additional areas to be considered under 1.4	
		number of hotspots	hotspots regularly occurring	hotspots not regularly occurring	hotspots with insufficient data for the test	hotspots exceeding the required threshold	hotspots meeting both criteria	near-qualifying hotspots	hotspots regularly occurring	near-qualifying hotspots
little gull	breeding	1	-	-	1	1	-	-	-	-
	winter	-	-	-	-	-	-	-	-	-
	add. season	8	-	1	7	8	-	-	-	-
great black-backed gull	breeding	9	-	3	6	-	-	-	-	-
	winter	49	-	4	45	1	-	-	-	-
Mediterranean gull	all year	-	-	-	-	-	-	-	-	-
common gull	breeding	40	-	2	38	-	-	-	-	-
	winter	32	1	2	29	-	-	-	1	-
lesser black-backed gull	breeding	54	-	1	53	-	-	-	-	-
	winter	33	-	2	31	2	-	-	-	-
herring gull	breeding	57	1	11	45	2	-	-	1	-
	winter	66	-	11	55	1	-	-	-	-
Iceland gull	winter	6	-	-	6	-	-	-	-	-
glaucous gull	winter	24	-	-	24	-	-	-	-	-
Sandwich tern	breeding	6	-	-	6	-	-	-	-	-
	winter	-	-	-	-	-	-	-	-	-
common tern	breeding	7	-	-	7	-	-	-	-	-
Arctic tern	breeding	69	2	5	62	-	-	-	2	-
common guillemot	breeding	66	2	3	61	5	1	-	1	-
	add. season	63	-	7	56	1	-	-	-	-
	winter	93	5	8	80	-	-	-	5	-
razorbill	breeding	46	-	2	44	-	-	-	-	-
	add. season	30	-	4	26	-	-	-	-	-
	winter	34	-	4	30	-	-	-	-	-
little auk	winter	51	-	-	51	5	-	-	-	-
Atlantic puffin	breeding	43	6	5	32	1	1	-	5	-
	winter	32	2	5	25	-	-	-	2	-
All species	breeding	136	-	19	117	8	-	1	-	-
	summer	103	-	6	97	1	-	-	-	1
	winter	128	-	2	126	1	-	-	-	-
total		**2201**	**38**	**164**	**1999**	**63**	**8**	**3**	**29**	**2**

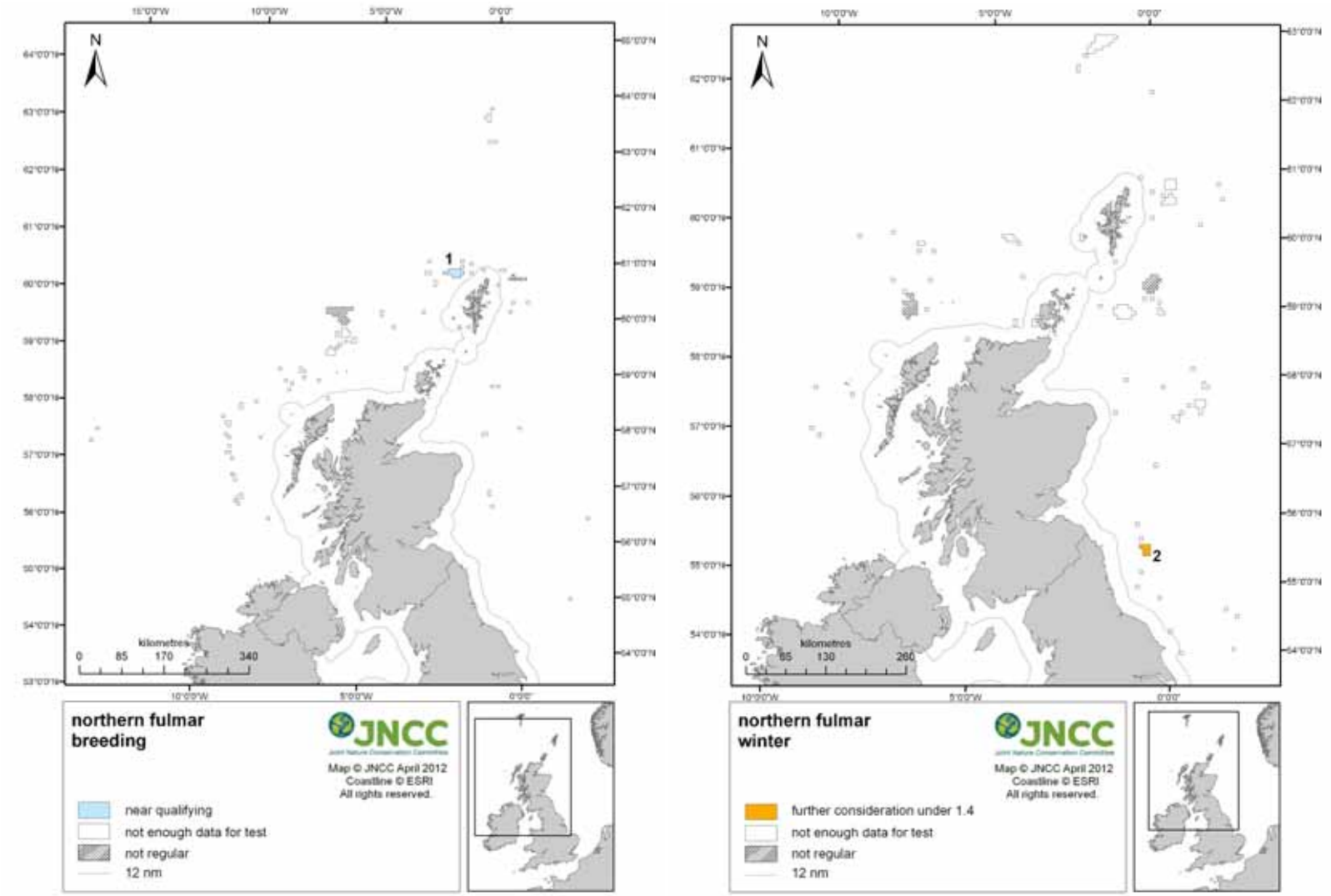

Figure 2. Important areas identified for northern fulmar during breeding (left) and winter (right): hotspots for possible further consideration under Stage 1.4 (orange), near-qualifying areas under Stages 1.1-1.3 (blue), hotspots with insufficient data for the test for regularity (clear) and hotspots tested but not meeting the criterion of regularity (hatched).

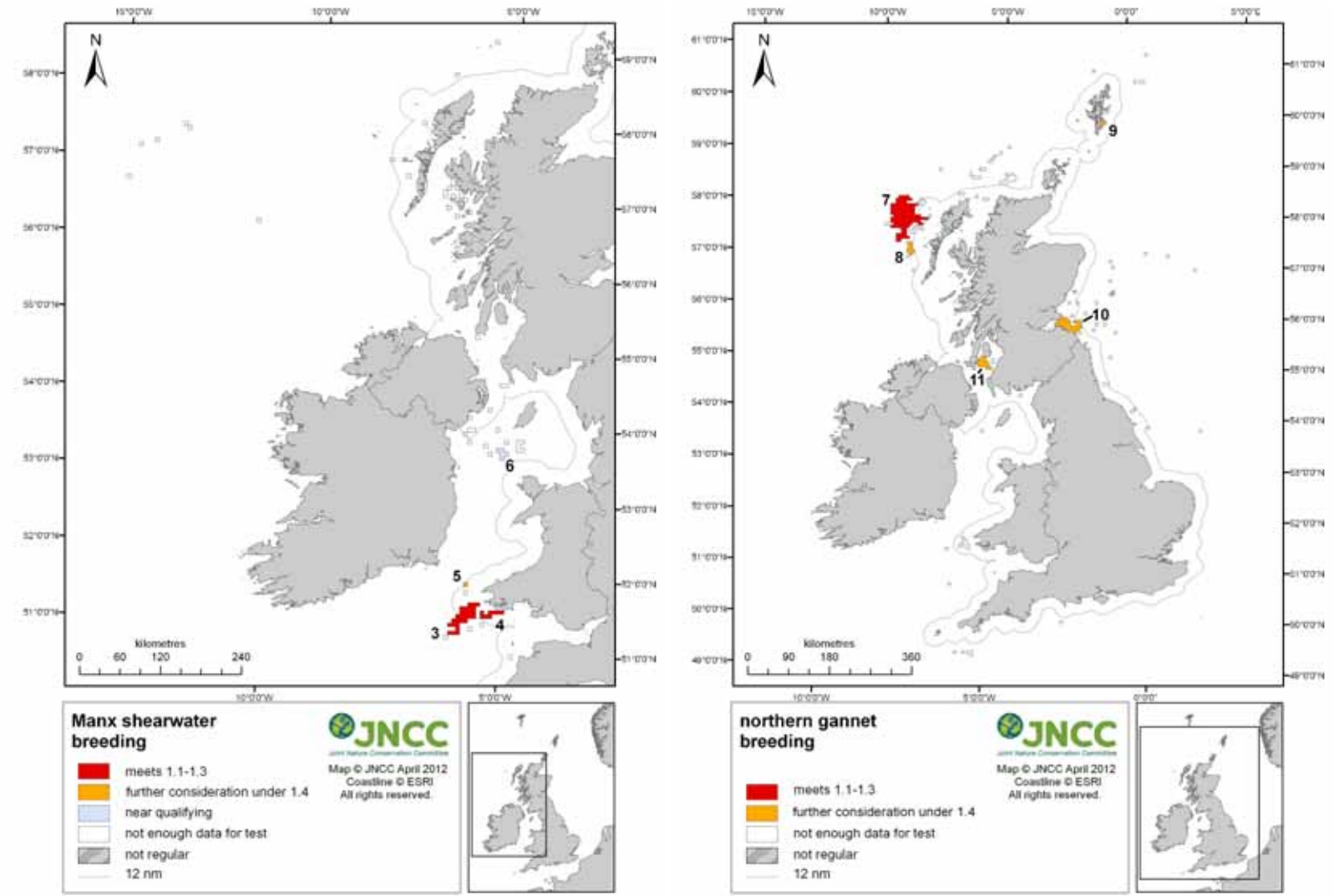

Figure 3. Important areas identified for Manx shearwater during breeding (left) and northern gannet during breeding (right): hotspots meeting Stages 1.1-1.3 (red), hotspots for possible further consideration under Stage 1.4 (orange), near-qualifying areas under Stages 1.1-1.3 (blue), hotspots with insufficient data for the test for regularity (clear), and hotspots tested but not meeting the criterion of regularity (hatched).

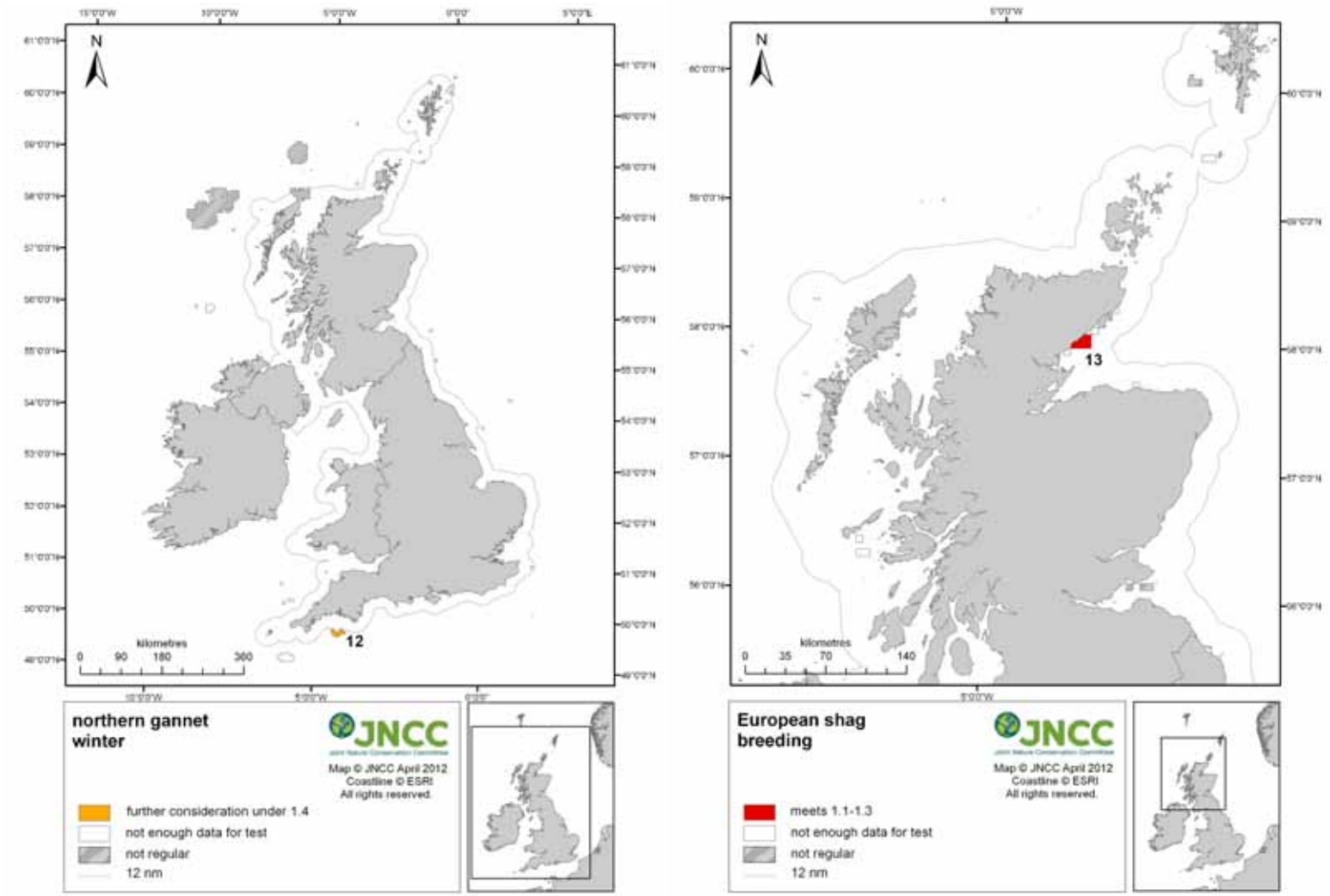

Figure 4. Important areas identified for northern gannet during winter (left) and European shag during breeding (right): hotspots meeting Stages 1.1-1.3 (red), hotspots for possible further consideration under Stage 1.4 (orange), hotspots with insufficient data for the test for regularity (clear), and hotspots tested but meeting the criterion of regularity (hatched).

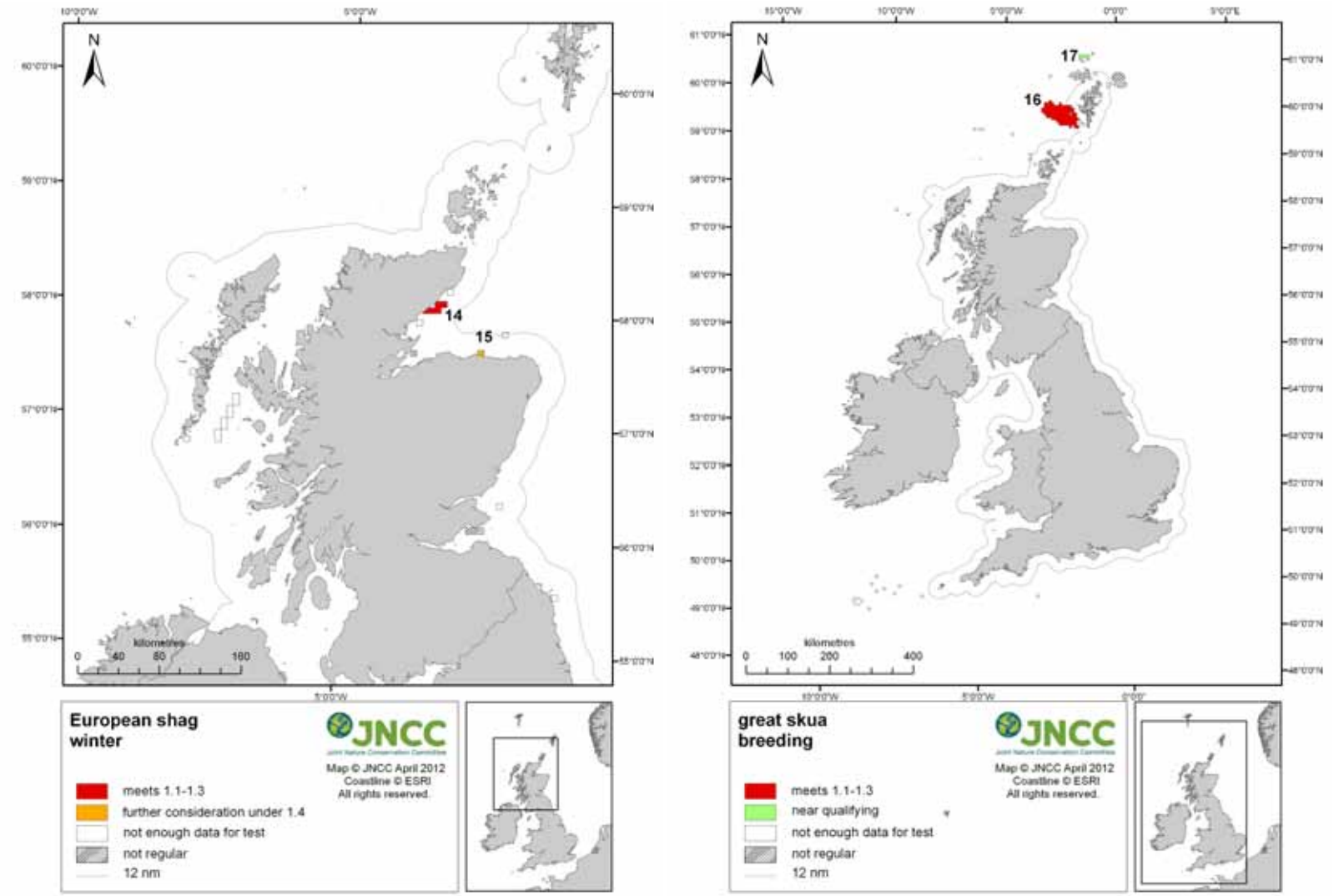

Figure 5. Important areas identified for European shag during winter (left) and great skua during breeding (right): hotspots meeting Stages 1.1-1.3 (red), hotspots for possible further consideration under Stage 1.4 (orange), near-qualifying hotspots under Stage 1.4 (green), hotspots with insufficient data for the test for regularity (clear), and hotspots tested but not meeting the criterion of regularity (hatched).

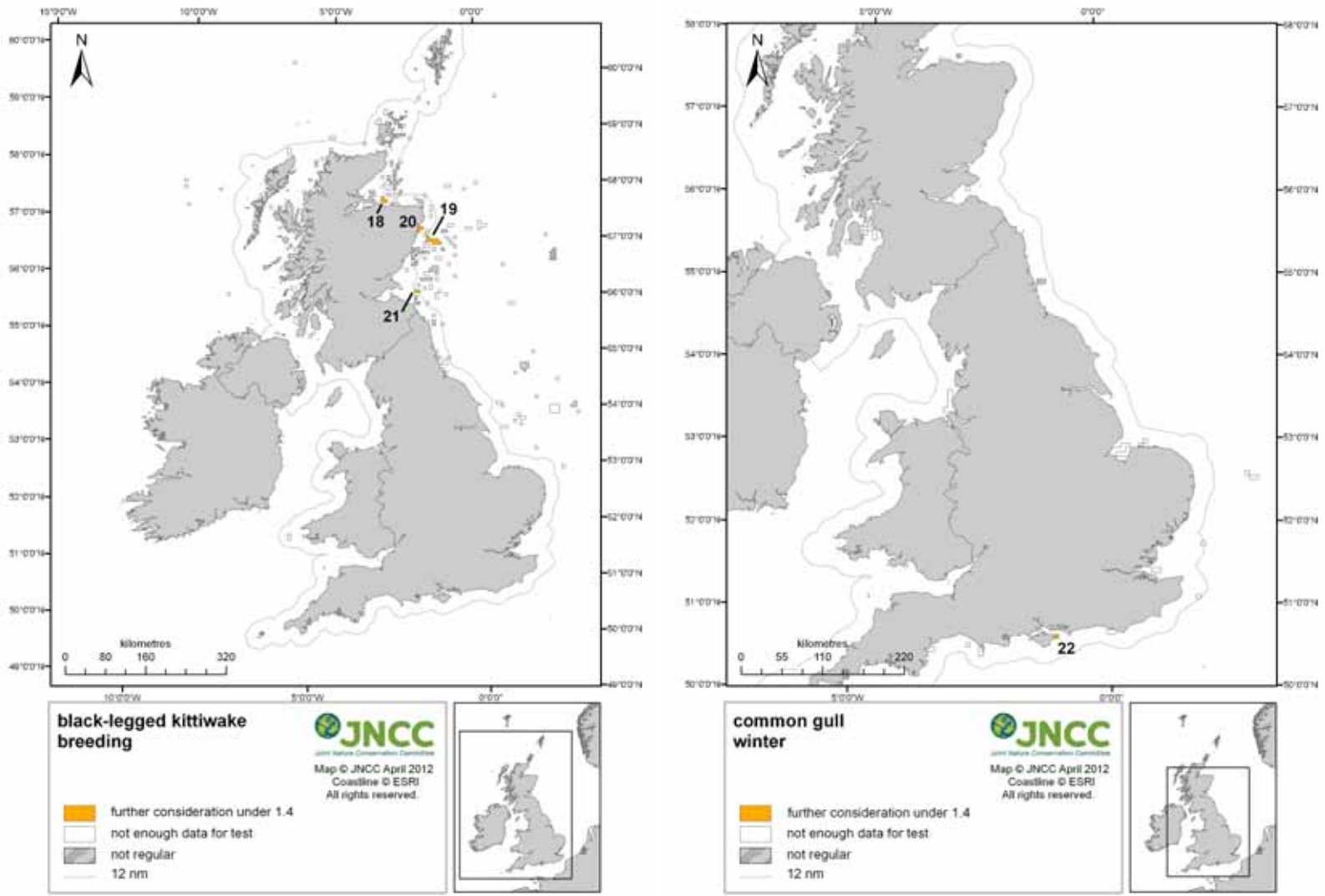

Figure 6. Important areas identified for black-legged kittiwake during breeding (left) and common gull during winter (right): hotspots for possible further consideration under Stage 1.4 (orange), hotspots with insufficient data for the test for regularity (clear), and hotspots tested but not meeting the criterion of regularity (hatched).

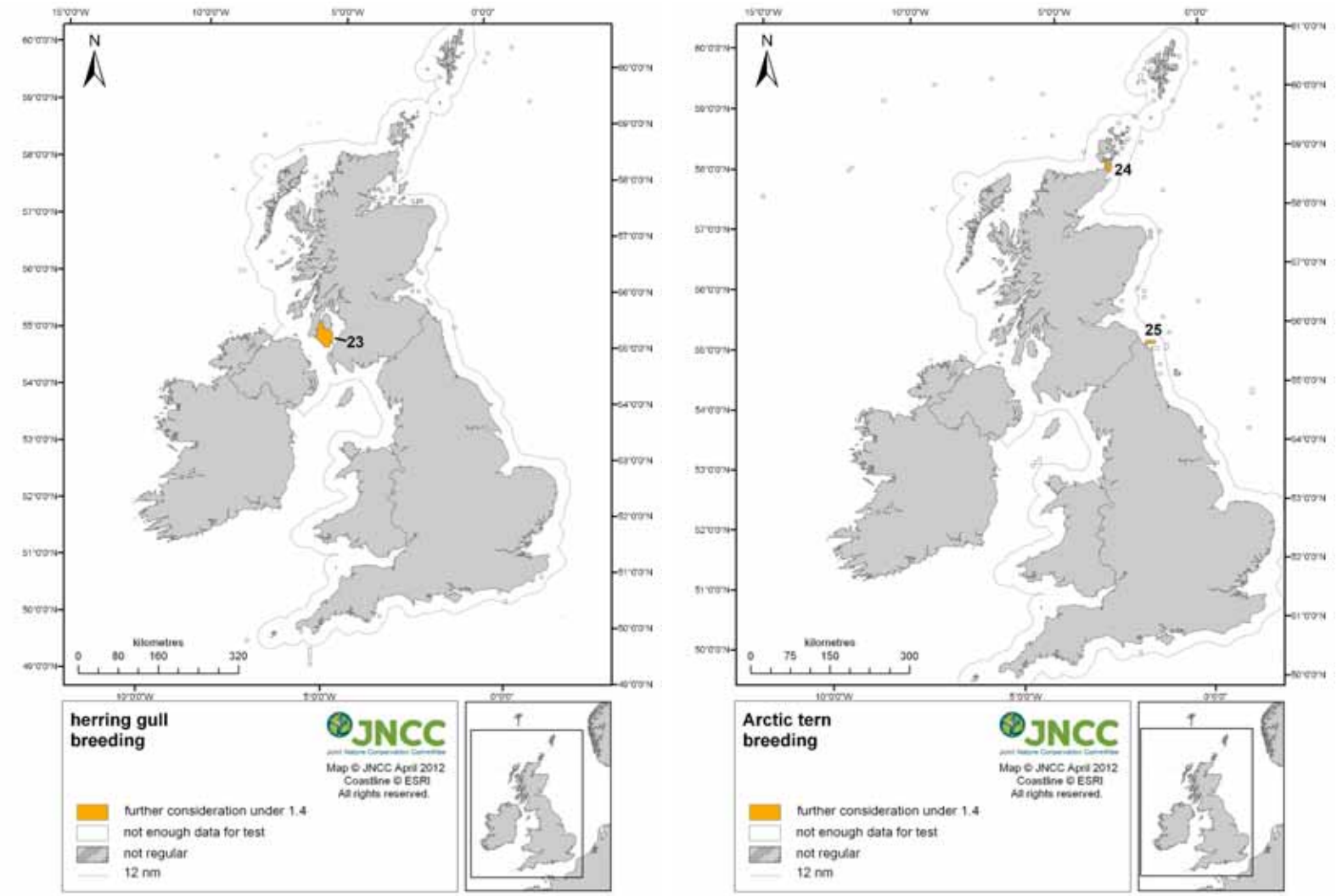

Figure 7. Important areas identified for herring gull during breeding (left) and Arctic tern during breeding (right): hotspots for possible further consideration under Stage 1.4 (orange), hotspots with insufficient data for the test for regularity (clear), and hotspots tested but not meeting the criterion of regularity (hatched).

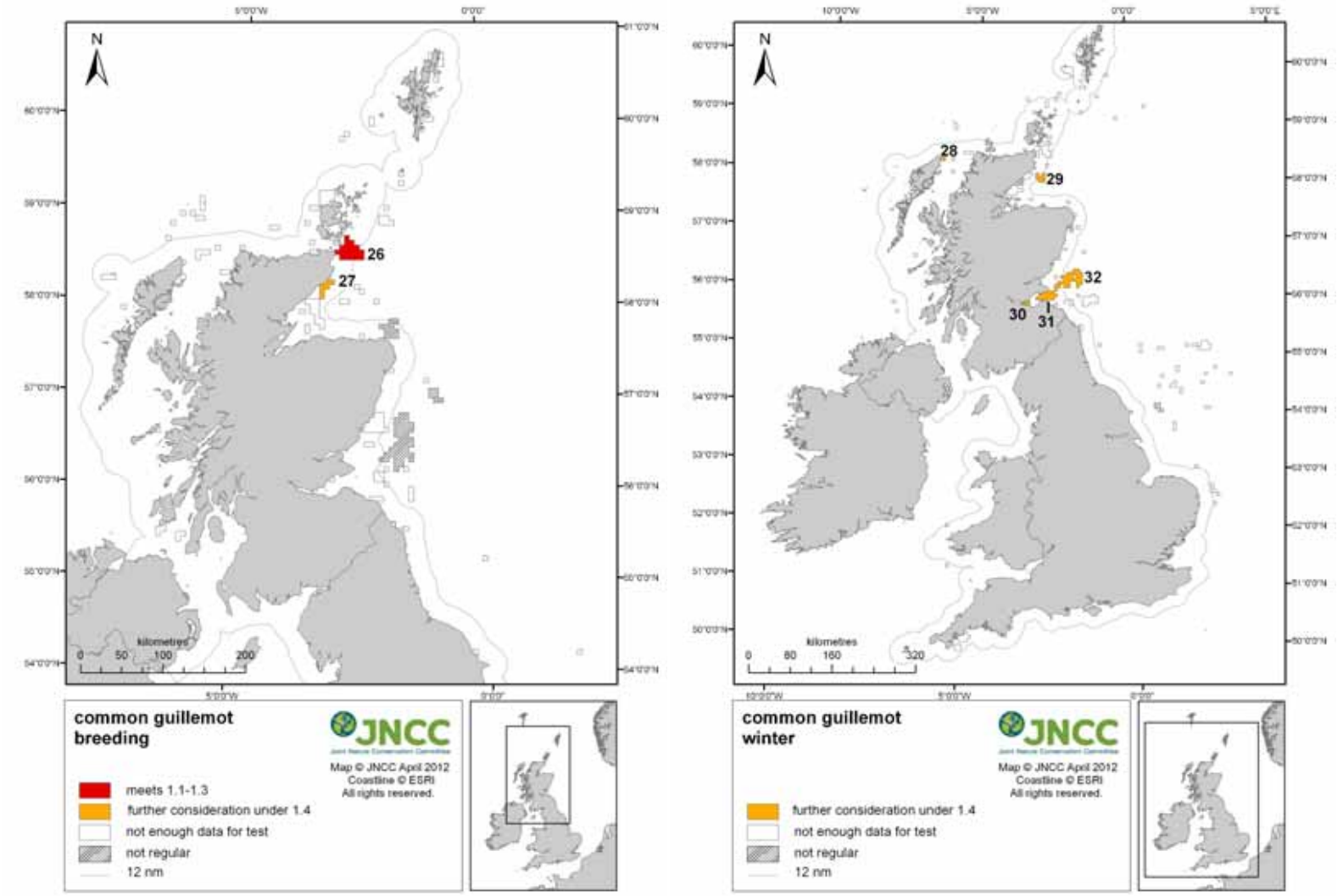

Figure 8. Important areas identified for common guillemot during breeding (left) and winter (right): hotspots meeting Stages 1.1-1.3 (red), hotspots for possible further consideration Stage 1.4 (orange), hotspots with insufficient data for the test for regularity (clear), and hotspots tested but not meeting the criterion of regularity (hatched).

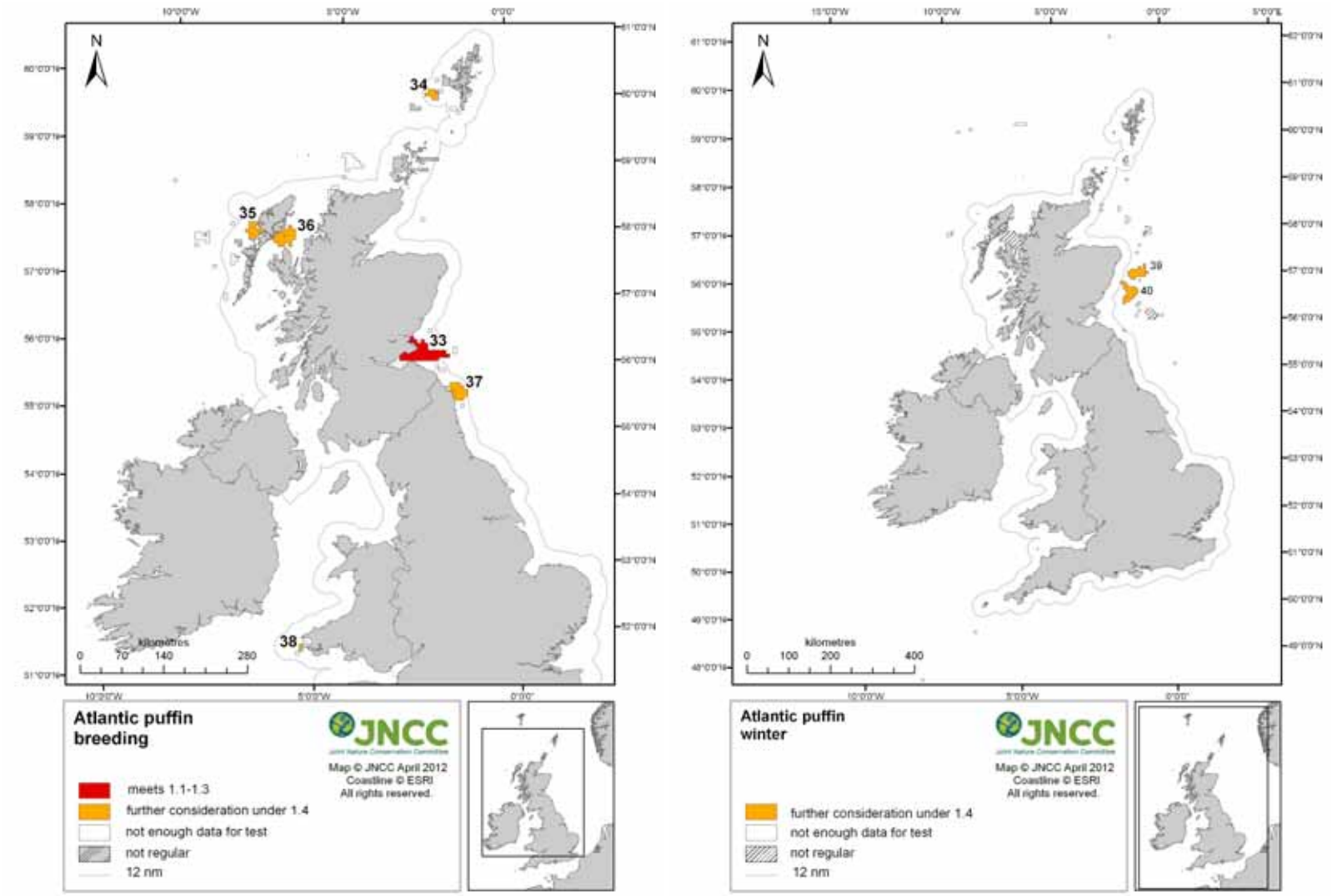

Figure 9. Important areas identified for Atlantic puffin during breeding (left) and during winter (right): hotspots meeting Stages 1.1-1.3 (red), hotspots for possible further consideration under Stage 1.4 (orange), hotspots with insufficient data for the test for regularity (clear), and hotspots tested but not meeting the criterion of regularity (hatched).

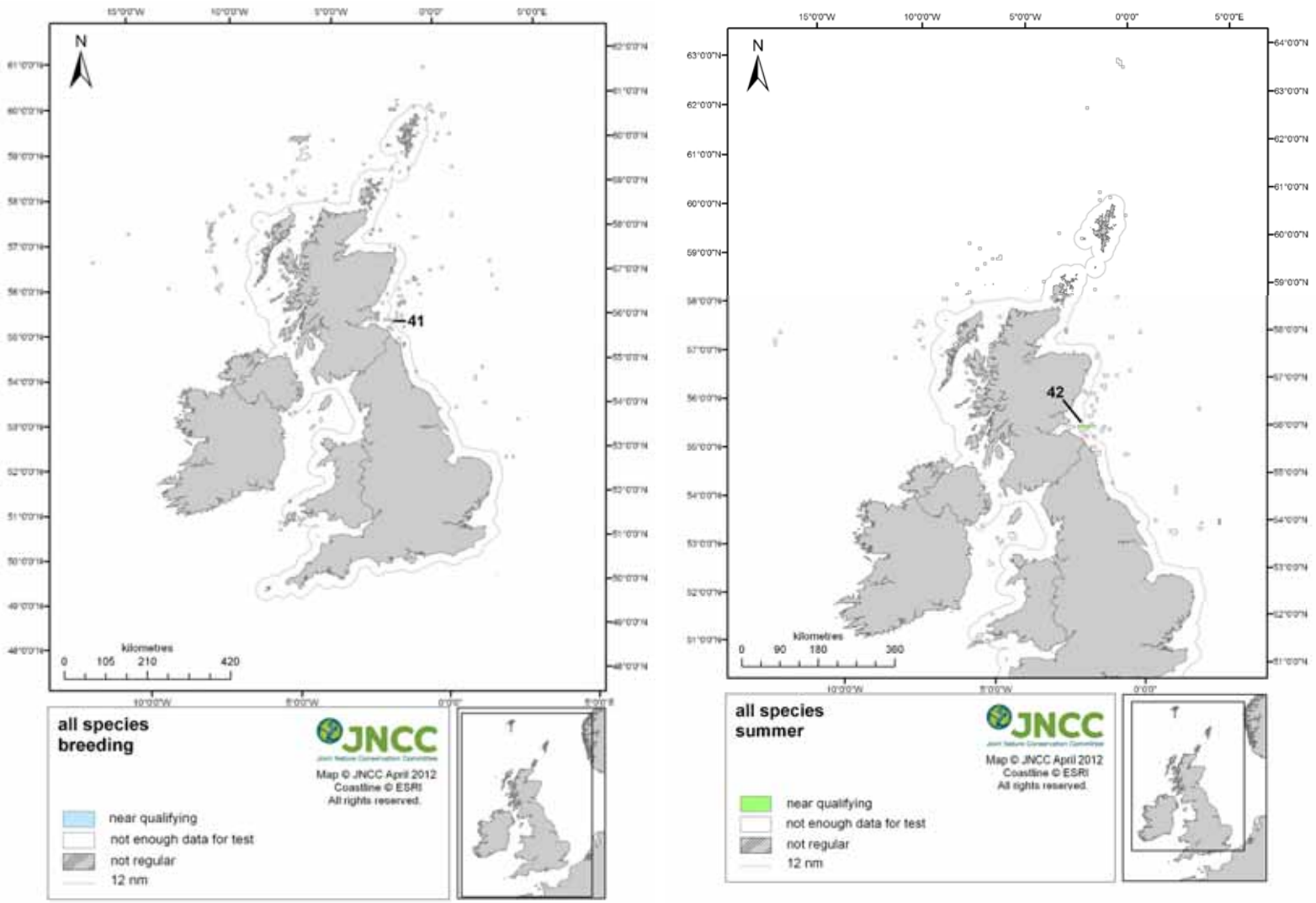

Figure 10. Important areas identified for all species during breeding (left) and during summer (right): near-qualifying areas under Stages 1.1-1.3 (blue), near-qualifying areas under Stage 1.4 (green), hotspots with insufficient data for the test for regularity (clear), and hotspots tested but not meeting the criterion of regularity (hatched).

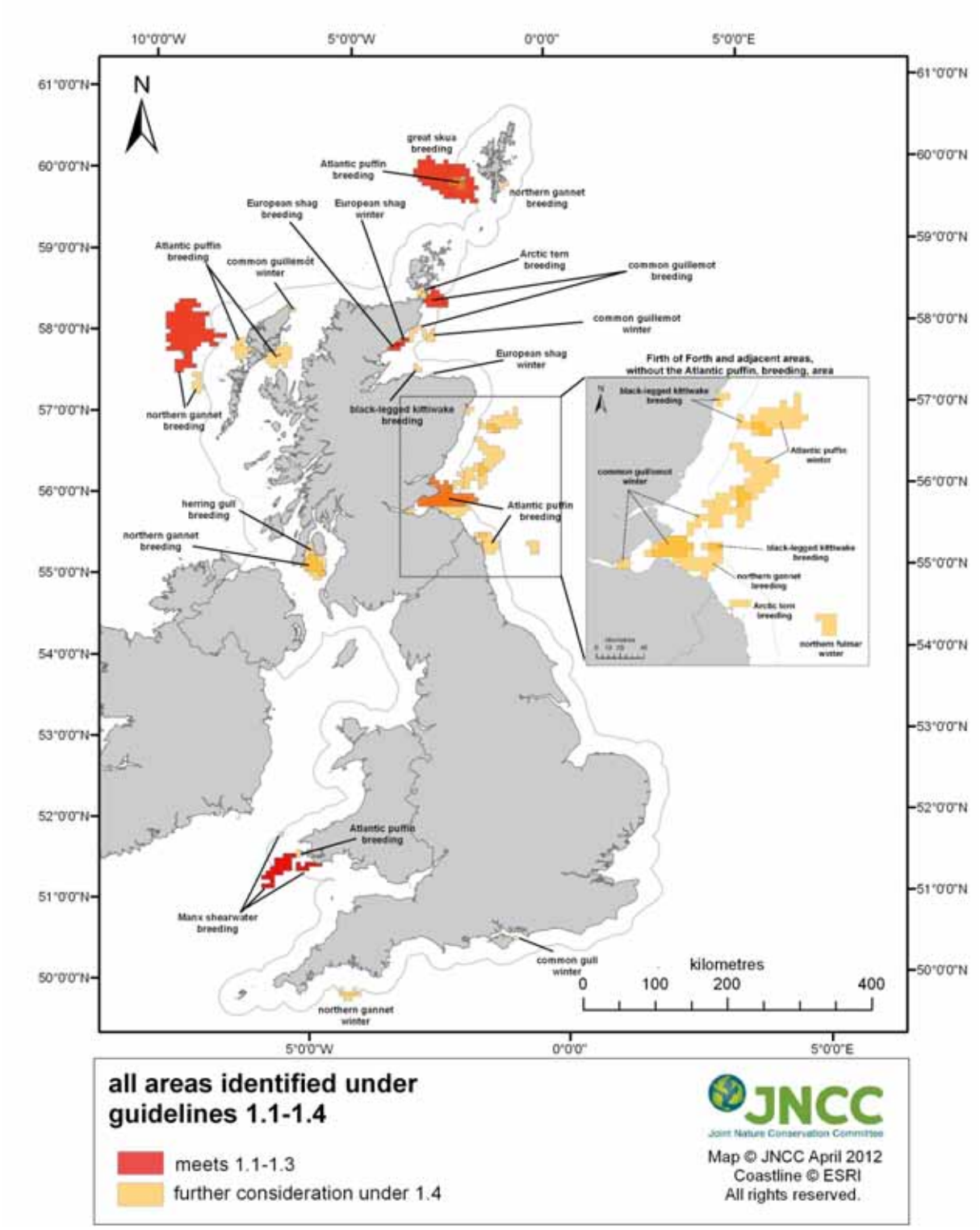

Figure 11. All important seabird areas identified for a total of 11 species. Areas meeting Stages 1.1-1.3 are displayed in red and areas for possible further consideration under Stage 1.4 are displayed in orange. Near-qualifying areas are not shown.

3.1 Summary of areas

Table 3 and Table 4 provide an overview of the number of areas meeting Stages 1.1-1.3, and areas for possible further consideration under Stage 1.4, and the near-qualifying areas respectively. The total area covered and an indication of the numbers of individuals in the areas is also provided.

Table 5 provides an overview of the outcome of the Mann-Whitney U-tests, conducted to investigate the criterion of regular occurrence of areas.

Table 3. Characteristics of areas identified under Stages 1.1-1.3 and to be considered under Stage 1.4 of the UK SPA selection guidelines. Population thresholds of the relevant populations are provided in Table A 3.

species	season	areas meeting Stages 1.1-1.3					additional areas for possible further consideration under Stage 1.4					all areas combined				
		number of areas	total area (km^2)	number of individuals in areas	% of relevant population in areas	individuals/km^2	number of areas	total area (km^2)	number of individuals in areas	% of relevant population in areas	individuals/km^2	number of areas	total area (km^2)	number of individuals in areas	% of relevant population in areas	individuals/km^2
northern fulmar	winter	-	-	-	-		1	252	6,723	0.1	26.7	1	252	6,723	0.1	26.7
Manx shearwater	breeding	2	1,248	64,792	5.8	51.9	1	36	2,347	0.2	65.2	3	1,284	67,139	6.0	52.3
northern gannet	breeding	1	4,207	51,784	4.5	12.3	4	2,139	16,278	1.4	7.6	5	6,346	68,062	5.9	10.7
	winter	-	-	-	-		1	324	2,144	0.2	6.6	1	324	2,144	0.2	6.6
European shag	breeding	1	160	4,606	2.3	28.8	-	-	-	-		1	160	4,606	2.3	28.8
	winter	1	164	3,179	1.6	19.4	1	34	1,967	1.6	97.0	2	198	6,446	3.2	32.6
great skua	breeding	1	3,455	1,620	4.0	0.5	-	-	-	-		1	3,455	1,620	4.0	0.5
black-legged kittiwake	breeding	-	-	-	-		4	570	18,725	0.2	32.8	4	570	18,725	0.2	32.8
common gull	winter	-	-	-	-		1	35	105	<0.1	3.0	1	35	105	<0.1	3.0
Herring gull	breeding	-	-	-	-		1	1,090	9,430	0.4	8.7	1	1,090	9,430	0.4	8.7
Arctic tern	breeding	-	-	-	-		2	307	1,163	0.7	3.8	2	307	1,163	0.7	3.8
common guillemot	breeding	1	643	28,356	0.3	44.1	1	206	9,040	0.1	43.8	2	850	37,396	0.4	44.0
	winter	-	-	-	-		5	2,065	33,483	0.4	16.2	5	2,065	33,483	0.4	16.2
Atlantic puffin	breeding	1	1,647	56,732	0.4	34.4	5	2,465	48,545	0.4	19.7	6	4,112	105,277	0.8	25.6
	winter	-	-	-	-		2	2,016	6,709	<0.1	3.3	2	2,016	6,709	<0.1	3.3
total		**8**	**11,525**	**211,069**			**29**	**11,540**	**157,959**			**37**	**23,065**	**369,028**		

Table 4. Characteristics of near-qualifying areas identified under Stages 1.1-1.3 and to be considered under Stage 1.4 of the UK SPA selection guidelines. Population thresholds of the relevant populations are provided in Table A 3.

species	season	areas meeting Stages 1.1-1.3					additional areas for possible further consideration under Stage 1.4					all areas combined				
		number of areas	total area (km2)	number of individuals in areas	% of relevant population in areas	individuals/km2	number of areas	total area (km2)	number of individuals in areas	% of relevant population in areas	individuals/km2	number of areas	total area (km2)	number of individuals in areas	% of relevant population in areas	individuals/km2
northern fulmar	breeding	1	504	40,755	0.4	80.9						1	504	40,755	0.4	80.9
Manx shearwater	breeding	1	180	12,039	1.1	66.9						1	180	12,039	1.1	66.9
great skua	breeding						1	216	88	0.2	0.4	1	216	88	0.2	0.4
all species	breeding	1	180	22,131		123.0						1	180	22,131		123.0
	summer						1	36	608		16.9	1	36	608		16.9
total		**3**	**864**	**74925**			**2**	**252**	**695.94**			**5**	**1116**	**75621**		

Table 5. Results of Mann-Whitney U-tests (including Bonferroni corrections) conducted to investigate how regular hotspots were present between 1980 and 2004. “+” indicates that the data within a hotspot were significantly higher than outwith hotspots, “-“indicates that no difference was detected. Blank cells indicate that there were insufficient data to carry out the test. The last two columns indicate which Stages of the SPA selection guidelines the areas were assessed for.

species	area	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	# years present	# years tested	1.1-1.3	1.4
northern fulmar - winter	2								+					+		+											3	3		X
Manx shearwater - breeding	4								+			+		+													3	3	X	
	3								+			+		+		+			-								4	5	X	
	5				-								+			+		+									3	4		X
northern gannet - breeding	11						+	-	+	+						+	-	+									5	7		X
	10	-	+			+	-	-	+						+	+		+	+		+		+	+	+	-	11	15		X
	8							+	+		-								+				-		+		4	6		X
	7	+						+	+	+	+					-		-	-	+		-	+		+		8	12	X	
	9	+	+	-	+				-					+						+							5	7		X
northern gannet, winter	12											+	+	+				+									4	4		X
European shag - breeding	13			+	+											+											3	3	X	
European shag, winter	15			+	+															+							3	3		X
	14		+	+	+																						3	3	X	
great skua - breeding	16		+	-		+		+	+	+		+	+	+		+	+	+	+	+							13	14	X	
black-legged kittiwake - breeding	21																	+					+			+	3	3		X
	19	+	+				+						-			+											4	5		X
	20	+	+			+						+	+	+			+					+					8	8		X
	18			+	+											+											3	3		X
common gull - winter	22											+	+					+	+								4	4		X
Herring gull - breeding	23						+	+	+	+						+	-	-									5	7		X
Arctic tern - breeding	25					+			-																+	+	3	4		X
	24								+					-						+				+		+	4	5		X

Cont. Table 5. Results of Mann-Whitney U-tests (including Bonferroni corrections) conducted to investigate how regular hotspots were present between 1980 and 2004. "+" indicates that the data within a hotspot were significantly higher than outwith hotspots, "-"indicates that no difference was detected. Blank cells indicate that there were insufficient data to carry out the test. The last two columns indicate which Stages of the SPA selection guidelines the areas were assessed for.

species	area	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	# years present	# years tested	1.1-1.3	1.4
common guillemot - breeding	27			+	+																					+	3	3		X
	26								+											+				+			3	3	X	
common guillemot, winter	30		+												+					+							3	3		X
	31	+	+	-	-	+	+	-							+		+			+							7	10		X
	32			-			+						+	+	-		+			+							5	7		X
	29			+	+			+												+							4	4		X
	28							+			+										+						3	3		X
Atlantic puffin - breeding	38											+	+	+	-												3	4		X
	37			-		+			+							+					+			+	+	+	7	8		X
	33		-				+						+		+			+	+		+		+	+	+	+	10	11	X	
	36							+	+	+	+					+				+	+						7	7		X
	35								+		+									+							3	3		X
	34							+		+		-							+	+							4	5		X
Atlantic puffin - winter	40	-	-			+	+		+	+			+	-		+								+			7	10		X
	39	-	-			+	+						+	+	+	+	+										7	9		X
Near-qualifying areas																														
northern fulmar, breeding	1		-					+	-								+	-	+	+		+					5	8	X	
Manx shearwater - breeding	6				-							+	+				-			+							3	5	X	
great skua, breeding	17												-	-				+	+	+										X
all species - breeding	41						-								-			+	+		+		+			-	4	7	X	
all species - summer	42														-				+		+		+			-				X

4 Discussion

4.1 The areas identified under Stages 1.1-1.3 and for possible consideration under Stage 1.4 of the UK SPA selection guidelines

Both series of analyses, one undertaken under stages1.1-1.3 and one to identify areas for possible further consideration under Stage 1.4 of the SPA selection guidelines, identified important areas for a number of seabird species. Under Stages 1.1-1.3 eight areas were identified for six species, supplemented by a further three near-qualifying areas. Under Stage 1.4 an additional 29 areas for a further four species were identified for further consideration (black-legged kittiwake, common gull, herring gull and Arctic tern), and an additional two near-qualifying areas. Both series of analyses have in common that they defined important seabird areas as areas with highest and most aggregated seabird densities that occur on a regular basis. The latter is a constraint that ensures not only the spatial stability of a hotspot, but also evidence that at least three years of sufficient data underpin that area's inclusion.

The difference between the two series of analyses lies in the application of a population threshold: areas identified by Stages 1.1-1.3 hold a minimum of 1% of the relevant population of the species for which this hotspot was identified, whereas areas for possible further consideration under 1.4 can contain fewer birds (but hold at least 50 individuals of the species) and will undergo a further evaluation by Stage 2 criteria before a final set of Stage 1.4 areas is defined. Please note also that Stage 1.4 areas do not formally require meeting the regularity criterion. But since regular occurrence was recognised as being essential for the identification of persistent and important seabird areas, the criterion was applied nevertheless as a quality assurance.

For species with areas identified under Stages 1.1-1.3 of the guidelines, areas identified under 1.4 can provide additional value to a network of protection sites to seabirds, e.g. when they support populations from another colony or region, they extend the range covered by the species considerably, or they hold areas identified by other studies as important foraging grounds.

4.2 Species for which possible SPAs have not been identified

Even though analyses were carried out for all species/season combinations, it did not prove possible to identify hotspots for 21 species. Possible reasons for this are:

1. these species are too evenly distributed to show areas of aggregation;

2. the species distributions are too variable to show important areas at predictable locations;

3. the species are too scarce to show areas of aggregation or to show a regular occurrence at an area; or

4. the location of a species aggregation is either not sampled at all or not sampled frequently enough to show a regular presence.

Of these scenarios (1) and (2) are situations which probably prevail for a number of species, but currently there is not enough evidence to confirm this. In case of (3) a protection area might be sensible, but it would require much more data to identify the best area. Species falling into category (3) are probably Cory's-, great- and sooty shearwaters, long-tailed- and

pomarine skuas, glaucous and Iceland gulls. Finally, (4) could be an issue of concern, particularly when considering the uneven sampling and the gaps in spatial effort in this analysis. Examples of species falling into this category are probably those which concentrate close to shore, like common and Sandwich tern, and some of the gulls such as little gull, whose potential SPA requirements are already addressed by other stands of JNCC work. The latter two issues can only be addressed by either the collection of widespread new data or collation of additional data which could point to unidentified important seabird areas, such as previous publications and historical records. Recognising the large temporal and spatial extent of the existing ESAS database, the lack of evidence for currently unrecognised seabird hotspots and the resource-hungry nature of marine survey, it is unlikely that immediate further survey will be undertaken or would prove value for money.

4.3 Next steps

The identification and designation of marine SPAs needs to be based on robust science using the best available data. Even though the analyses presented herein aimed to ensure the presence of at least a minimum of evidence through the application of the regularity criterion, data in support of this come only from one source, the ESAS data base. Moreover, the uneven sampling effort could mean that important areas were missed in the current analysis. For this reason the collation of corroborative evidence for the identified important areas, as well as for areas which potentially would have been missed, is a prudent and advisable step in the continuing process to identify the most suitable territories for seabirds.

One way of achieving this might be to establish a bespoke at-sea survey programme to “ground-truth” the importance of these areas. However, such a course of action would be very costly and time-consuming. Confirming the importance of these areas might better be achieved by looking for corroborative evidence from existing sources of information. For example, many, recently collected, at-sea survey data exist that have not yet been stored in the ESAS database. Similarly, many data are now becoming available from studies of the movements of seabirds that have deployed tracking methods and data loggers.

The next step in identifying possible SPAs for seabirds in the offshore environment should be to compare the results of the ESAS analyses presented herein and in Kober *et al* (2010) with the results from other independent studies of seabird dispersion at sea. Any suite of areas with evidence of regular use by seabirds might then be used as the source from which any most suitable territories for SPA classification may be identified.

5 References

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Appendix 1
Supplementary information for the analysis

Table A 1. Factors for detection correction. If possible, factors were calculated for all three categories of sea state. If the available data did not allow for a calculation by seastate, only one factor was calculated for all sea states combined (centre column). [1)] refers to cases where insufficient data were available to calculate a factor, [2)] refers to cases where no factor was calculated because detection did not decrease with distance. (from Kober *et al* 2010).

species	transect width: 300m			transect width: 200m		
sea state:	-	1,2,3	4,5	-	1,2,3	4,5
northern fulmar	1.14	1.22	1.31	1[1]	1.37	1.21
Cory's shearwater		1[1]			1[1]	
great shearwater		1[1]			1[1]	
sooty shearwater		1[1]			1.78	
Manx shearwater	1[2]	1.15	1.33		1[2]	
Balearic shearwater		1[1]			1[1]	
European storm-petrel	1[2]	1.33	1.4		1[2]	
Leach's storm-petrel	1.32	1.4	1.68		1[1]	
northern gannet	1[2]	1.09	1.12	1[1]	1.21	1.17
great cormorant		1[1]			1[1]	
European shag	1[2]	1.26	1.1		1[1]	
pomarine skua	1.38	1.38	1.38		1[1]	
Arctic skua	1[2]	1.51	1.29		1[1]	
long-tailed skua	1.95	1.95	1.95		1[1]	
great skua	1[2]	1.2	1.53		1.45	
Sabine's gull	1.67	1.67	1.67		1[1]	
black-legged kittiwake	1[2]	1.24	1.26	1[1]	1.49	1.44
black-headed gull	1.76	1.58	1.93		1[1]	
little gull		1[1]		1[1]	1.42	1.09
Mediterranean gull		1[1]			1[1]	
great black-backed gull	1.22	1.15	1.26	1[1]	1.77	1.25
common gull	1.29	1.32	1.67	1[1]	1.74	1.9
eastern common gull		1[1]			1[1]	
lesser black-backed gull		1[1]		1[1]	1.96	1[2]
herring gull		1[1]		1[1]	1.84	1.06
Iceland gull		1.5			1[1]	
glaucous gull		1.5			1[1]	
little tern		1[1]			1[1]	
Sandwich tern		1[1]			1[1]	
common tern	1[1]	1.01	1.8	1[1]	1.01	1.8
roseate tern		1[1]			1[1]	
Arctic tern	1.21	1.8	2.24		1.37	
common guillemot	1.24	1.35	1.49	1[2]	1.28	1.31
razorbill	1.37	1.35	1.5	1[1]	1.01	1.3
little auk	1.82	1.82	1.82	1[1]	1.49	1.24
Atlantic puffin	1.36	1.52	1.66	1[1]	1.43	1.23
Groups of species						
small gull		1[1]				
herring/lesser black-backed gull		1[1]				
large gull		1[1]				
black-backed gull		1[1]				
gull		1[1]				
common/Arctic tern		1[1]				
tern		1[1]				
guillemot/razorbill		1[1]			1[2]	
auk	1[2]	1.09	1.44			

Table A 2. ICES-rescaling factors. Factors printed bold were used for rescaling (from Kober *et al* 2010).

species	season		
	breeding	**winter**	**other seasons**
northern fulmar	**-0.37**	**-0.45**	
Manx shearwater	1.06		128.35
European storm-petrel	1.98		
Leach's storm-petrel	2.16		
northern gannet	**-0.86**	**-.073**	
great cormorant	23.27	12.00	
European shag	1.16	1.34	
Arctic skua	-0.44		-0.51
great skua	**-0.64**	**-0.81**	
black-legged kittiwake	1.25	**-0.66**	
black-headed gull	84.10	16.01	
great black-backed gull	**-0.72**	**-0.21**	
Mediterranean gull			
common gull	47.80	5.40	
lesser black-backed gull	2.09	1.60	
herring gull	7.55	1.87	
Sandwich tern	63.95	555.27	
common tern	33.86		
Arctic tern	3.70		
common guillemot	1.21	2.73	1.11
razorbill	1.37	1.42	-0.66
Atlantic puffin	1.98	6.94	
all species		1.29	1.05

Table A 3. Relevant population thresholds for single species areas. For thresholds below 50 individuals a minimum default threshold of 50 individuals applies (*). For thresholds above 20,000 individuals a maximum default threshold of 20,000 individuals is used in agreement with the Ramsar guidelines (**). If population estimates were given as ranges, an arithmetic mean was chosen over a geometric mean, however, there was no case in which the outcome of the analysis would have been different when using a geometric mean (from Kober *et al* 2010).

species	population estimates			1% thresholds
	national	biogeographic	source	
Northern Fulmar *(glacialis)*		10,200,000	S	20,000**
Cory's Shearwater	-		-	50*
Great Shearwater		17,940,225	R	20,000**
Sooty Shearwater		20,000,000	B	20,000**
Manx Shearwater		1,125,000	S	11,300
European Storm-petrel	76,950		APEP06	770
Leach's Storm-petrel	144,141		APEP06	1,400
Northern Gannet		967,000	CSR5	9,700
Great Cormorant *(carbo)*		120,000	CSR5	1,200
European Shag *(aristotelis)*		201,795	WPE	2,000
Pomarine Skua		30,000	D	300
Arctic Skua		75,000	S	750
Long-tailed Skua		512,500	CSR5	5,100
Great Skua		48,000	CSR5	480
Mediterranean Gull	330		APEP06	50
Little Gull	-		-	50*
Black-legged Kittiwake		6,600,000	CSR5	20,000**
Black-headed Gull		4,250,000	CSR5	20,000**
Common Gull *(canus)*		1,725,000	CSR5	17,300
Lesser Black-backed Gull *(graellsii)*		550,000	CSR5	5,500
Herring Gull *(argentatus)*		2,200,000	CSR5	20,000**
Iceland Gull *(glaucoides)*		195,000	CSR5	2,000
Glaucous Gull *(hyperboreus)*		247,500	CSR5	2,500
Great Black-backed Gull		435,000	CSR5	4,400
Sandwich Tern	37,470		APEP06	380
Common Tern	35,514		APEP06	360
Arctic Tern	160,164		APEP06	1,600
Common Guillemot *(aalge)*		4,800,000	CSR5	20,000**
Razorbill *(islandica)*		1,380,000	CSR5	13,800
Little Auk *(alle)*		125,000,000	CSR5	20,000**
Atlantic Puffin *(grabae)*		13,500,000	CSR5	20,000**

APEP06: (Baker *et al* 2006)
B: (Brook 2004)
CSR5: (AEWA 2012)
D: (Furness 1996)
R: (Rowland 2006) plus Falkland number from (Woods and Woods 1997)
S: (Mitchell *et al* 2004)

Table A 4. Maximum foraging ranges for 12 species. For species not represented no maximum foraging range was obtained.

species	max range	location	reference
northern fulmar	580km	Norway	(Weimerskirch *et al* 2001)
Manx shearwater	330km	UK	(Guilford *et al* 2008),
northern gannet	590km	UK	(Hamer *et al* 2007)
great cormorant	35km	France	(Grémillet 1997)
European shag	17km	UK	(Ellie Owen, RSPB Fame project, personal communication, 14/06/2011)
black-legged kittiwake	238km	UK	(Ellie Owen, RSPB Fame project, personal communication, 14/06/2011)
black-headed gull	14km	Germany	(Brandl and Gorke 2012)
lesser black-backed gull	180.54km *	Netherlands	(Ens *et al* 2008)
herring gull	92.24km	Netherlands	(Ens *et al* 2008)
common guillemot	343km	UK	(Ellie Owen, RSPB Fame project, personal communication, 14/06/2011)
Razorbill	214km	UK	(Ellie Owen, RSPB Fame project, personal communication, 14/06/2011)
Atlantic puffin	64km	UK	(Harris and Wanless 2011)

*: mean of maximum ranges

Appendix 2
Hotspots within foraging range of colony SPAs

After only few areas were identified in Kober *et al* (2010), it was postulated that a colony-specific approach might help to identify additional suitable areas for species during the breeding season. The following methods were aimed at finding supplementary areas for breeding individuals from colony SPAs within their marine foraging ranges. It has already been established that these individuals occur in sufficient numbers on a regular basis in their colonies; hence hotspots in foraging ranges can be identified without renewed application of the SPA selection guidelines. This would potentially identify at least one marine area per colony SPA, and the most appropriate of these could then be selected.

For each colony SPA a potential foraging area for breeding individuals was delineated by a circular foraging range around each colony. A maximum foraging range was used to ensure that all potential foraging areas are included. Information about maximum foraging ranges for the individual species was obtained through peer reviewed and grey literature from tracking studies conducted anywhere in the world. Appendix 1, Table A 4, contains the foraging ranges used.

A foraging range defined by actual flight distance from colony, assuming that land would be avoided, was also tentatively applied using the Cost Path tool from ArcGIS Spatial Analyst. This method was not further pursued when the foraging range approaches were deemed to be unsuitable for SPA identification. Examples of results from analyses described in Appendix 2 show therefore only circular foraging ranges around colonies.

Within each of these potential foraging areas, hotspots were identified with help of the following methods.

Slope analysis

Slope analysis was used e.g. for the delineation of SPAs in the German offshore waters: Garthe *et al* (2003) calculated the spatial gradients of density changes (slope) and identified the steepest gradient around seabird concentrations. The seabird density isoline just outside the steepest gradient was then used as a boundary.

This approach was considered for application to the Getis-Ord surface but was not progressed because the identification of a suitable isoline and the selection of seabird concentrations both have subjective elements. To keep the process as objective and repeatable as possible, this approach was therefore deemed less suitable than other delineation methods.

Maximum curvature

Maximum curvature is a tool that has been applied in the delineation of boundaries for inshore SPAs (O'Brien *et al* in press). Firstly all grid cells in the study area are ranked from high to low density. The cumulative numbers of birds captured by successive numbers of cells are plotted against each other. Identifying the point of maximum curvature of the resulting graph identifies in an objective, formulaic way the point at which adding further cells to an area begins to capture relatively fewer birds within that area. This law of diminishing returns, as it were, defines the threshold density around which a site boundary may be drawn.

While this method represents an objective way for the identification and delineation of hotspots, its applicability depends very much on the degree of aggregation displayed by the birds. It is also highly sensitive to the size of the area to which it is applied (Webb *et al* 2009). In this analysis maximum curvature selected areas so large that they were deemed to be inappropriate and did not effectively identify the most suitable, or most important, areas for the protection of seabirds (Figure A 1).

Top x% of Getis-Ord Gi*

This method involved the same analytical steps applied on a UK-wide scale before application of the SPA selection guidelines (2.5 Analysis under Stages 1.1-1.3), including choosing the top 1% grid cells within each foraging range. By default, it selected at least one area per foraging range, and protected precisely 1% (or 6km^2 where this is more than 1% of the foraging range area) of the foraging range for each colony. When the selected areas from all foraging ranges were considered they formed a fairly incoherent scatter, which was inappropriate for the design of protected areas. In most cases only a single grid cell made up each of the areas. It is therefore difficult to test if these hotspots are present on a regular basis because so little data would fall within each area (albeit this was not a requirement in this case), which meant that the evidence base for individual hotspots was weak. For these reasons this method was concluded to be unfit for the purpose. For an example of the outcome refer to Figure A 1.

Preference areas

This method was conceptually different from all methods described above in that it did not necessarily identify the most aggregated and high density areas on the seabird distribution maps. Instead it aimed to identify areas which were preference areas, regardless of the seabird density at that location. Preference areas were defined as areas where seabirds occurred in higher numbers than could have been expected if they would have distributed randomly around their colonies. This recognised the possibility that locations, which are actively selected by seabirds and which might therefore represent ecologically important regions, could have remained unnoticed because the methods used so far focussed only on aggregated and high density areas (e.g. a foraging area further away from the breeding colonies which would have been overshadowed by the high density areas just around the colonies due to the central place foraging distribution).

To identify preference areas the following method was adopted: within foraging ranges around each colony a typical central place foraging distribution was generated by modelling randomly moving individuals originating from the colony (individuals moved to a random distance between 0 and maximum foraging range, at a random angle). The number of individuals modelled around each colony equalled

the known colony size. This distribution can be seen as what would be expected if individuals showed no preference. This theoretical expected distribution was then compared with the actual observed seabird densities. Preference areas were defined as those locations where observed densities were significantly higher than expected ones.

While this theoretical approach was very interesting, its parameterisation proved to be impossible with the available data. The theoretical seabird density only modelled the distribution of breeding individuals from a given colony, whereas the observed densities would also include non-breeding individuals and individuals from colonies whose foraging range overlapped. The overlap of large foraging ranges in particular caused considerable problems. Hence, theoretical and observed densities were not truly comparable and, in absence of appropriate solutions, this approach had to be abandoned.

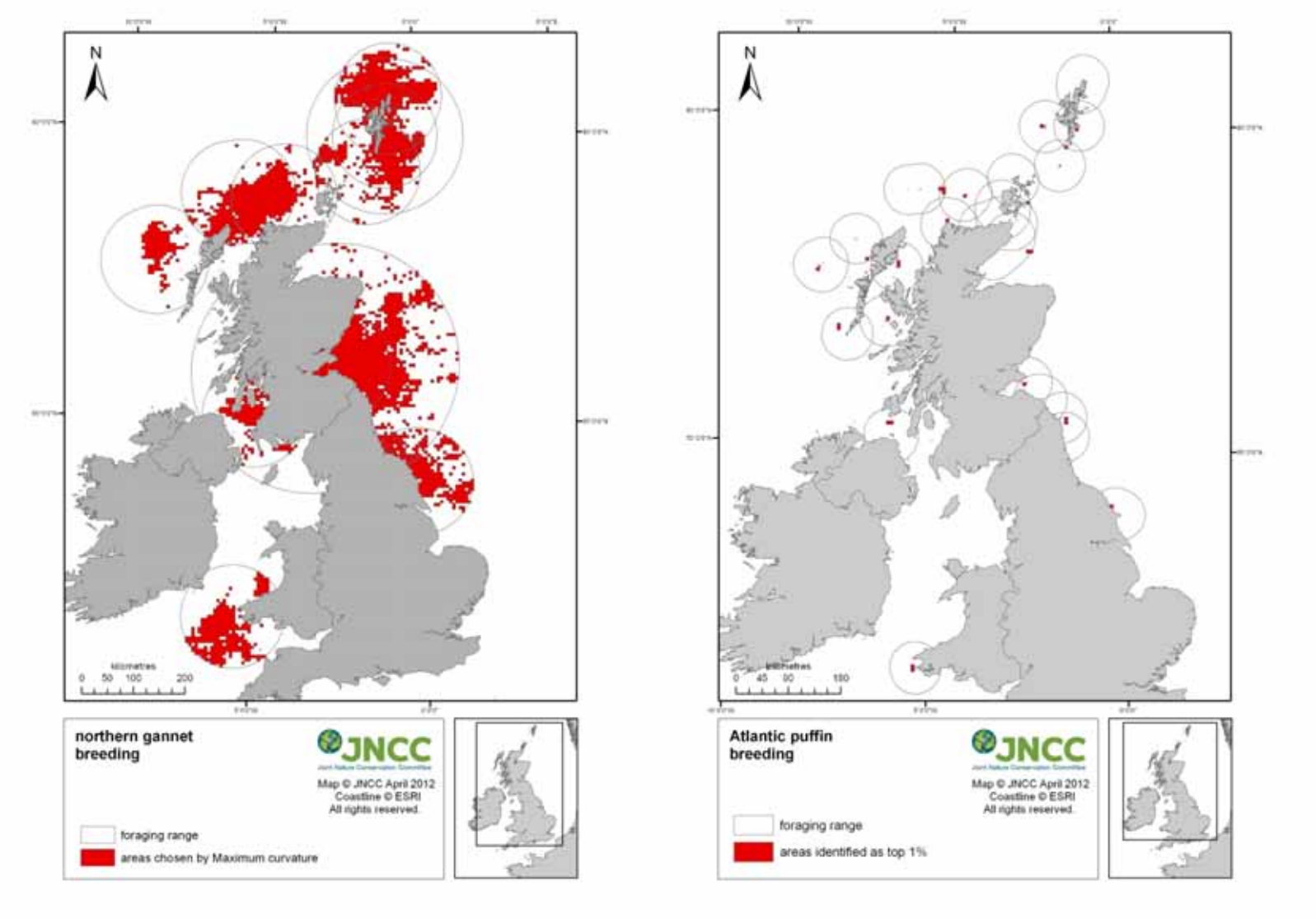

Figure A 1. Examples of the application of Maximum curvature (left) and top 1% Getis-Ord Gi* in foraging range (right). Areas selected are indicated in red.

Appendix 3
Characteristics of areas

The following tables contain information about the different areas identified. Details included are the size of the area, based on which guideline it was identified, overlap with other protection areas, and the number of additional species. But although additional species were present in qualifying number, there is no evidence that this occurs on a regular basis or that this is also a population hotspot for these species.

Table A 5. Characteristics of area 1, northern fulmar during breeding, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Northern fulmar, breeding **area 1**
Size: 504km^2 **near-qualifying (exceeding population threshold) to be considered under Stage 1.4**

Overlap with other protection sites:-

species present	season	number of individuals	% of population
northern fulmar	**breeding**	**40,755**	**0.40**
	winter	621	<0.01
sooty shearwater	summer	4	<0.01
European storm-petrel	breeding	243	0.32
northern gannet	breeding	616	0.05
	winter	208	0.02
Arctic skua	breeding	10	0.01
great skua	breeding	188	0.46
	winter	2	0.01
black-legged kittiwake	breeding	453	0.01
	winter	267	<0.01
great black-backed gull	breeding	5	<0.01
	winter	10	<0.01
herring gull	winter	58	<0.01
glaucous gull	winter	3	<0.01
Arctic tern	breeding	6	<0.01
common guillemot	breeding	53	<0.01
	winter	106	<0.01
	additional season	58	<0.01
razorbill	winter	4	<0.01
little auk	winter	1	<0.01
Atlantic puffin	breeding	113	<0.01
	winter	122	<0.01
all species	**breeding**	**42,446**	
	winter	9,431	
	summer	**22,388**	

Table A 6. Characteristics of area 2, northern fulmar during winter, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Northern fulmar, winter **area 2**

Size: 252km^2 **to be considered under Stage 1.4**

Overlap with other protection sites: -

species	season	number of individuals	% of population
northern fulmar	breeding	68	<0.01
	winter	6,723	0.07
sooty shearwater	summer	26	<0.01
northern gannet	breeding	229	0.02
	winter	94	0.01
great skua	breeding	8	0.02
	winter	2	<0.01
black-legged kittiwake	breeding	26	<0.01
	winter	387	<0.01
great black-backed gull	breeding	3	<0.01
	winter	1	<0.01
common gull	breeding	<1	<0.01
	winter	2	<0.01
lesser black-backed gull	breeding	1	<0.01
	winter	<1	<0.01
herring gull	breeding	10	<0.01
	winter	10	<0.01
common tern	breeding	<1	<0.01
Arctic tern	breeding	39	0.02
common guillemot	breeding	54	<0.01
	winter	183	<0.01
	additional season	537	0.01
razorbill	breeding	<1	<0.01
	winter	<1	<0.01
	additional season	123	0.01
little auk	winter	46	0.12
Atlantic puffin	breeding	130	<0.01
	winter	105	<0.01
all species	breeding	593	
	winter	6,248	
	summer	4,514	

Table A 7. Characteristics of area 3, Manx shearwater during breeding, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Manx shearwater, breeding **area 3**

Size: 972km^2 **meets Stage 1.2**

Overlap with other protection sites: -

species present	season	number of	% of population
northern fulmar	breeding	116	<0.01
	winter	293	<0.01
Manx shearwater	**breeding**	**51,792**	**4.60**
	additional season	10	<0.01
European storm-petrel	breeding	24	0.03
northern gannet	breeding	2,393	0.21
	winter	789	0.07
great cormorant	breeding	5	<0.01
European shag	breeding	1	<0.01
Arctic skua	additional season	1	<0.01
great skua	breeding	3	0.01
	winter	3	0.01
black-legged kittiwake	breeding	1,428	0.02
	winter	328	<0.01
little gull	winter	2	
great black-backed gull	breeding	16	<0.01
	winter	39	0.01
lesser black-backed gull	breeding	2,710	0.49
	winter	669	0.12
herring gull	breeding	264	0.01
	winter	655	0.02
Arctic tern	breeding	2	<0.01
common guillemot	breeding	1,848	0.02
	winter	915	0.01
	additional season	50	<0.01
razorbill	breeding	390	0.02
	winter	568	0.03
Atlantic puffin	breeding	1,674	0.01
	winter	10	<0.01
all species	**breeding**	**62,667**	
	winter	4,244	
	summer	**59,735**	

Table A 8. Characteristics of area 4, Manx shearwater during breeding, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Manx shearwater, breeding **area 4**
Size: 276km^2 **meets Stage 1.2**

Overlap with other protection sites: -

species present	season	number of individuals	% of population
northern fulmar	breeding	18	<0.01
	winter	26	<0.01
Manx shearwater	**breeding**	**12,999**	**1.16**
European storm-petrel	breeding	7	0.01
northern gannet	breeding	243	0.02
	winter	112	0.01
great skua	winter	1	<0.01
black-legged kittiwake	breeding	41	<0.01
	winter	23	<0.01
little gull	winter	1	
great black-backed gull	breeding	15	<0.01
	winter	5	<0.01
common gull	winter	2	<0.01
lesser black-backed gull	breeding	590	0.11
	winter	102	0.02
herring gull	breeding	62	<0.01
	winter	58	<0.01
common guillemot	breeding	681	0.01
	winter	235	<0.01
	additional season	132	<0.01
razorbill	breeding	24	<0.01
	winter	150	0.01
	additional season	5	<0.01
Atlantic puffin	breeding	505	<0.01
	winter	8	<0.01
all species	breeding	15,184	
	winter	721	
	summer	14,372	

Table A 9. Characteristics of area 5, Manx shearwater during breeding, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Manx shearwater, breeding **area 5**

Size: 36km^2 **to be considered under Stage 1.4**

Overlap with other protection sites: -

species	season	number of individuals	% of population
northern fulmar	breeding	2	<0.01
northern fulmar	winter	56	<0.01
Manx shearwater	breeding	2,347	0.21
European storm-petrel	breeding	7	0.01
northern gannet	breeding	43	<0.01
	winter	9	<0.01
great skua	breeding	<1	<0.01
	winter	<1	<0.01
black-legged kittiwake	breeding	5	<0.01
	winter	42	<0.01
great black-backed gull	breeding	<1	<0.01
	winter	1	<0.01
lesser black-backed gull	breeding	92	0.02
	winter	7	<0.01
herring gull	breeding	2	<0.01
	winter	6	<0.01
common guillemot	breeding	101	<0.01
	winter	6	<0.01
	additional season	163	<0.01
razorbill	breeding	15	<0.01
	winter	3	<0.01
	additional season	<1	<0.01
Atlantic puffin	breeding	17	<0.01
	winter	1	<0.01
all species	breeding	2,631	
	winter	121	
	summer	2,698	

Table A 10. Characteristics of area 6, Manx shearwater during breeding, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Manx shearwater, breeding **area 6**

Size: 180km^2 **near-qualifying (exceeding population threshold) to be considered under Stage 1.4**

Overlap with other protection sites: -

species present	season	number of individuals	% of population
northern fulmar	breeding	34	<0.01
	winter	418	<0.01
Manx shearwater	**breeding**	**12,039**	**1.07**
European storm-petrel	breeding	12	0.02
northern gannet	breeding	159	0.01
	winter	81	0.01
Arctic skua	breeding	32	0.04
	additional season	6	0.01
great skua	breeding	3	0.01
	winter	3	0.01
black-legged kittiwake	breeding	408	<0.01
	winter	99	<0.01
great black-backed gull	breeding	27	0.01
	winter	8	<0.01
lesser black-backed gull	breeding	22	<0.01
	winter	21	<0.01
herring gull	breeding	10	<0.01
	winter	161	0.01
Arctic tern	breeding	40	0.03
common guillemot	breeding	190	<0.01
	winter	27	<0.01
	additional season	4,084	0.05
razorbill	breeding	34	<0.01
	winter	61	<0.01
	additional season	997	0.05
Atlantic puffin	breeding	3	<0.01
	winter	139	<0.01
all species	breeding	13,013	
	winter	942	
	summer	18,130	

Table A 11. Characteristics of area 7, northern gannet during breeding, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Northern gannet, breeding **area 7**
Size: 4,207km^2 **meets Stage 1.2**

Overlap with other protection sites:
- SPA colony extension of 4km for St. Kilda

species present	season	number of individuals	% of population
northern fulmar	breeding	3,474	0.03
	winter	4,967	0.03
sooty shearwater	summer	30	<0.01
Manx shearwater	breeding	739	0.07
European storm-petrel	**breeding**	**985**	**1.28**
Leach's storm-petrel	breeding	74	0.05
northern gannet	**breeding**	**51,784**	**4.47**
	winter	7,214	0.62
European shag	breeding	10	<0.01
pomarine skua	additional season 1	1	<0.01
Arctic skua	breeding	19	0.03
	additional season	1	<0.01
great skua	breeding	167	0.41
	winter	40	0.10
black-legged kittiwake	breeding	1,067	0.01
	winter	2,569	0.03
great black-backed gull	breeding	96	0.02
	winter	28	0.01
lesser black-backed gull	breeding	57	0.01
	winter	179	0.03
herring gull	breeding	49	<0.01
	winter	116	<0.01
glaucous gull	winter	1	<0.01
Arctic tern	breeding	1	<0.01
common guillemot	breeding	3,554	0.04
	winter	1,095	0.01
	additional season	39	<0.01
razorbill	breeding	1,338	0.07
	additional season	3	<0.01
little auk	winter	6	0.02
Atlantic puffin	breeding	7,728	0.06
	winter	875	0.01
all species	**breeding**	**71,172**	
	winter	16,785	
	summer	**63,643**	

Table A 12. Characteristics of area 8, northern gannet during breeding, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Northern gannet, breeding **area 8**
Size: 324km^2 **to be considered under Stage 1.4**

Overlap with other protection sites: -

species	season	number of individuals	% of population
northern fulmar	breeding	37	<0.01
	winter	195	<0.01
sooty shearwater	summer	<1	<0.01
Manx shearwater	breeding	143	0.01
European storm-petrel	breeding	63	0.08
northern gannet	breeding	1,489	0.13
	winter	134	0.01
great skua	breeding	1	<0.01
black-legged kittiwake	breeding	54	<0.01
	winter	4	<0.01
little gull	breeding	3	
	winter	17	
	additional season	118	
great black-backed gull	breeding	1	<0.01
	winter	3	<0.01
lesser black-backed gull	breeding	<1	<0.01
common guillemot	breeding	250	<0.01
	winter	63	<0.01
	additional season	6	<0.01
razorbill	breeding	49	<0.01
Atlantic puffin	breeding	979	0.01
	winter	99	<0.01
all species	breeding	3,067	
	winter	467	
	summer	2,413	

Table A 13. Characteristics of area 9, northern gannet during breeding, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Northern gannet, breeding **area 9**

Size: 107km^2 **to be considered under Stage 1.4**

Overlap with other protection sites: -

- SPA colony extension of 2km for Noss

species	season	number of individuals	% of population
northern fulmar	breeding	699	0.01
	winter	429	<0.01
Manx shearwater	breeding	<1	<0.01
European storm-petrel	breeding	10	0.01
northern gannet	breeding	1,598	0.14
	winter	149	0.01
great cormorant	winter	<1	<0.01
European shag	breeding	19	0.01
	winter	3	<0.01
Arctic skua	breeding	8	0.01
great skua	breeding	26	0.06
	winter	5	0.01
black-legged kittiwake	breeding	152	<0.01
	winter	18	<0.01
great black-backed gull	breeding	5	<0.01
	winter	3	<0.01
common gull	winter	<1	<0.01
herring gull	winter	7	<0.01
Arctic tern	breeding	18	0.01
common guillemot	breeding	10,063	0.12
	winter	268	<0.01
	additional season	21	<0.01
razorbill	breeding	274	0.01
	winter	27	<0.01
	additional season	15	<0.01
little auk	winter	21	0.06
Atlantic puffin	breeding	1,520	0.01
	winter	47	<0.01
all species	breeding	14,393	
	winter	1,030	
	summer	3,220	

Table A 14. Characteristics of area 10, northern gannet during breeding, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Northern gannet, breeding **area 10**

Size: 1,136km^2 **to be considered under Stage 1.4**

Overlap with other protection sites: -

- SPA colony extension of 2km for Forth Islands
- SPA colony extension of 1km for St.Abb's Head to Fast Castle

Bordering other protection sites:

- SPA Firth of Forth

species	season	number of	% of population
northern fulmar	breeding	122	<0.01
	winter	203	<0.01
sooty shearwater	summer	20	<0.01
Manx shearwater	breeding	103	0.01
	additional season	8	<0.01
European storm-petrel	breeding	<1	<0.01
northern gannet	breeding	7,915	0.68
	winter	901	0.08
great cormorant	breeding	7	0.01
	winter	5	<0.01
European shag	breeding	485	0.24
	winter	641	0.32
pomarine skua	additional season 1	6	0.02
	additional season 2	7	0.02
Arctic skua	breeding	20	0.03
	additional season	45	0.06
great skua	breeding	8	0.02
	winter	7	0.02
black-legged kittiwake	breeding	9,237	0.11
	winter	2,027	0.02
black-headed gull	winter	1	<0.01
great black-backed gull	breeding	7	<0.01
	winter	385	0.09
Mediterranean gull	all year	<1	
common gull	breeding	9	<0.01
	winter	126	0.01
lesser black-backed gull	breeding	235	0.04
	winter	27	<0.01
herring gull	breeding	1,688	0.06
	winter	4,181	0.16
Sandwich tern	breeding	7	0.02
common tern	breeding	5	0.01
Arctic tern	breeding	78	0.05
common guillemot	breeding	15,362	0.18
	winter	13,622	0.16
	additional season	12,097	0.14
razorbill	breeding	843	0.04
	winter	1,613	0.08
	additional season	1,126	0.06
little auk	winter	95	0.25
Atlantic puffin	**breeding**	**37,260**	0.28
	winter	493	<0.01
all species	**breeding**	**73,414**	
	winter	**24,388**	
	summer	**52,153**	

Table A 15. Characteristics of area 11, northern gannet during breeding, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Northern gannet, breeding **area 11**

Size: 572km^2 **to be considered under Stage 1.4**

Overlap with other protection sites:

- SPA colony extension of 2km for Ailsa Craig

species	season	number of individuals	% of population
northern fulmar	breeding	407	<0.01
	winter	50	<0.01
Manx shearwater	breeding	2,627	0.23
European storm-petrel	breeding	<1	<0.01
northern gannet	breeding	5,276	0.46
	winter	149	0.01
great cormorant	breeding	<1	<0.01
	winter	6	0.01
European shag	breeding	116	0.06
	winter	4	<0.01
Arctic skua	breeding	27	0.04
great skua	breeding	<1	<0.01
	winter	<1	<0.01
black-legged kittiwake	breeding	1,614	0.02
	winter	350	<0.01
black-headed gull	breeding	2	<0.01
great black-backed gull	breeding	7	<0.01
	winter	23	0.01
	winter	1	<0.01
common gull	winter	65	<0.01
lesser black-backed gull	breeding	1,046	0.19
	winter	10	<0.01
herring gull	breeding	5,930	0.22
	winter	914	0.03
common guillemot	breeding	1,600	0.02
	winter	1,023	0.01
	additional season	2,257	0.03
razorbill	breeding	144	0.01
	winter	687	0.04
	additional season	9	<0.01
Atlantic puffin	breeding	11	<0.01
	winter	5	<0.01
all species	breeding	18,809	
	winter	3,381	
	summer	19,149	

Table A 16. Characteristics of area 12, northern gannet during winter, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Northern gannet, winter **area 12**

Size: 324km^2 **to be considered under Stage 1.4**

Overlap with other protection sites: -

species	season	number of individuals	% of population
northern fulmar	breeding	26	<0.01
	winter	13	<0.01
Manx shearwater	breeding	1	<0.01
European storm-petrel	breeding	2	<0.01
northern gannet	breeding	32	<0.01
	winter	2,144	0.18
great cormorant	breeding	27	0.02
European shag	winter	1	<0.01
great skua	winter	12	0.03
great black-backed gull	breeding	28	0.01
	winter	273	0.06
common gull	winter	<1	<0.01
lesser black-backed gull	breeding	97	0.02
	winter	18	<0.01
herring gull	breeding	138	0.01
	winter	149	0.01
black-legged kittiwake	breeding	10	<0.01
	winter	132	<0.01
common guillemot	breeding	10	<0.01
	winter	8	<0.01
	additional season	<1	<0.01
razorbill	winter	3	<0.01
Atlantic puffin	breeding	<1	<0.01
all species	breeding	371	
	winter	2,743	
	summer	354	

Table A 17. Characteristics of area 13, European shag during breeding, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

European shag, breeding **area 13**
Size: 160km^2 **meets Stage 1.2**

Overlap with other protection sites: -

species present	season	number of	% of population
northern fulmar	breeding	55	<0.01
	winter	171	<0.01
northern gannet	breeding	15	<0.01
	winter	26	<0.01
great cormorant	breeding	23	0.02
	winter	3	<0.01
European shag	**breeding**	**4,606**	**2.28**
	winter	1,968	0.98
Arctic skua	breeding	29	0.04
	additional season	2	<0.01
great skua	breeding	4	0.01
black-legged kittiwake	breeding	633	0.01
	winter	655	0.01
great black-backed gull	breeding	62	0.01
	winter	80	0.02
	winter	10	<0.01
lesser black-backed gull	breeding	2	<0.01
	winter	3	<0.01
herring gull	breeding	130	<0.01
	winter	340	0.01
common guillemot	breeding	4,227	0.05
	winter	2,076	0.02
	additional season	6,457	0.08
razorbill	breeding	168	0.01
	winter	280	0.01
	additional season	143	0.01
little auk	winter	31	0.08
Atlantic puffin	breeding	74	<0.01
	winter	44	<0.01
all species	breeding	10,029	
	winter	6,196	
	summer	12,278	

Table A 18. Characteristics of area 14, European shag during winter, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

European shag, winter **area 14**
Size: 164km^2 **meets Stage 1.2**

Overlap with other protection sites: -

species present	season	number of individuals	% of population
northern fulmar	breeding	119	<0.01
	winter	517	<0.01
sooty shearwater	summer	3	<0.01
Manx shearwater	breeding	1	<0.01
northern gannet	breeding	33	<0.01
	winter	14	<0.01
great cormorant	breeding	15	0.01
European shag	**breeding**	**2,488**	**1.23**
	winter	**3,179**	**1.58**
Arctic skua	breeding	3	<0.01
	additional season	1	<0.01
great skua	breeding	8	0.02
black-legged kittiwake	breeding	467	0.01
	winter	119	<0.01
great black-backed gull	breeding	76	0.02
	winter	30	0.01
lesser black-backed gull	breeding	2	<0.01
	winter	3	<0.01
herring gull	breeding	144	0.01
	winter	181	0.01
common guillemot	breeding	5,344	0.06
	winter	2,057	0.02
	additional season	416	<0.01
razorbill	breeding	322	0.02
	winter	173	0.01
	additional season	179	0.01
little auk	winter	23	0.06
Atlantic puffin	breeding	132	<0.01
	winter	125	<0.01
all species	breeding	9,159	
	winter	6,208	
	summer	4,281	

Table A 19. Characteristics of area 15, European shag during winter, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

European shag, winter **area 15**

Size: 34km^2 **to be considered under Stage 1.4**

Overlap with other protection sites: -

species	season	number of individuals	% of population
northern fulmar	breeding	3	<0.01
	winter	7	<0.01
sooty shearwater	summer	<1	<0.01
European storm-petrel	breeding	<1	<0.01
northern gannet	breeding	11	<0.01
	winter	3	<0.01
great cormorant	breeding	<1	<0.01
	winter	<1	<0.01
European shag	breeding	<1	<0.01
	winter	1,967	0.97
Arctic skua	breeding	<1	<0.01
	additional season	19	0.03
great skua	breeding	1	<0.01
	winter	<1	<0.01
black-legged kittiwake	breeding	258	<0.01
	winter	12	<0.01
black-headed gull	winter	<1	<0.01
great black-backed gull	breeding	8	<0.01
	winter	8	<0.01
common gull	breeding	<1	<0.01
	winter	17	<0.01
lesser black-backed gull	breeding	1	<0.01
	winter	<1	<0.01
herring gull	breeding	101	<0.01
	winter	142	0.01
Iceland gull	winter	<1	<0.01
Sandwich tern	breeding	<1	<0.01
common tern	breeding	<1	<0.01
Arctic tern	breeding	1	<0.01
common guillemot	breeding	104	<0.01
	winter	550	0.01
	additional season	440	0.01
razorbill	breeding	34	<0.01
	winter	16	<0.01
	additional season	362	0.02
little auk	winter	<1	<0.01
Atlantic puffin	breeding	7	<0.01
	winter	4	<0.01
all species	breeding	530	
	winter	3,392	
	summer	1,196	

Table A 20. Characteristics of area 16, great skua during breeding, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Great skua, breeding **area 16**
Size: 3,455km^2 **meets Stage 1.2**

Overlap with other protection sites:

- SPA colony extension of 2km for Foula

species present	season	number of	% of population
northern fulmar	breeding	8,468	0.08
	winter	5,991	0.03
Manx shearwater	breeding	10	<0.01
European storm-petrel	breeding	263	0.34
northern gannet	breeding	821	0.07
	winter	644	0.06
great cormorant	breeding	1	<0.01
	winter	3	<0.01
European shag	**breeding**	**13,969**	**6.92**
	winter	12	0.01
Arctic skua	breeding	221	0.30
great skua	**breeding**	**1,620**	**3.97**
	winter	324	0.80
black-legged kittiwake	breeding	639	0.01
	winter	1,306	0.02
great black-backed gull	breeding	241	0.06
	winter	50	0.01
common gull	breeding	2	<0.01
lesser black-backed gull	breeding	130	0.02
herring gull	breeding	10	<0.01
	winter	41	<0.01
glaucous gull	winter	4	<0.01
common tern	breeding	1	<0.01
Arctic tern	breeding	575	0.36
common guillemot	breeding	11,292	0.13
	winter	9,018	0.11
	additional season	1,695	0.02
razorbill	breeding	534	0.03
	winter	505	0.03
	additional season	73	<0.01
little auk	winter	30	0.08
Atlantic puffin	breeding	15,726	0.12
	winter	412	<0.01
all species	**breeding**	**54,524**	
	winter	**21,304**	
	summer	**35,569**	

Table A 21. Characteristics of area 17, great skua during breeding, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Great skua, breeding **area 17**

Size: 216km^2 **near-qualifying (not exceeding population threshold) to be considered under Stage 1.4**

Overlap with other protection sites: -

species	season	number of individuals	% of population
northern fulmar	breeding	872	0.01
	winter	133	<0.01
sooty shearwater	summer	<1	<0.01
European storm-petrel	breeding	217	0.28
northern gannet	breeding	161	0.01
	winter	41	<0.01
Arctic skua	breeding	11	0.01
long-tailed skua	additional season 1	1	<0.01
great skua	breeding	88	0.22
	winter	<1	<0.01
black-legged kittiwake	breeding	14	<0.01
	winter	19	<0.01
great black-backed gull	breeding	1	<0.01
	winter	5	<0.01
common gull	winter	1	<0.01
lesser black-backed gull	breeding	84	0.02
	winter	1	<0.01
herring gull	winter	9	<0.01
glaucous gull	winter	<1	<0.01
Arctic tern	breeding	<1	<0.01
common guillemot	breeding	71	<0.01
	winter	42	<0.01
	additional season	122	<0.01
razorbill	winter	1	<0.01
little auk	winter	1	<0.01
Atlantic puffin	breeding	9	<0.01
	winter	10	<0.01
all species	breeding	1,528	
	winter	412	
	summer	1,210	

Table A 22. Characteristics of area 18, black-legged kittiwake during breeding, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Black-legged kittiwake, breeding **area 18**

Size: 108km^2 **to be considered under Stage 1.4**

Overlap with other protection sites: -

species	season	number of individuals	% of population
northern fulmar	breeding	19	<0.01
	winter	69	<0.01
sooty shearwater	summer	20	<0.01
Manx shearwater	breeding	1	<0.01
European storm-petrel	breeding	<1	<0.01
northern gannet	breeding	43	<0.01
	winter	14	<0.01
great cormorant	breeding	<1	<0.01
	winter	<1	<0.01
European shag	breeding	<1	<0.01
	winter	3	<0.01
pomarine skua	additional season 1	<1	<0.01
	additional season 2	<1	<0.01
Arctic skua	breeding	<1	<0.01
	additional season	7	0.01
great skua	breeding	1	<0.01
	winter	3	0.01
black-legged kittiwake	breeding	3,167	0.04
	winter	125	<0.01
black-headed gull	winter	<1	<0.01
little gull	additional season	<1	
great black-backed gull	breeding	65	0.02
	winter	89	0.02
common gull	breeding	<1	<0.01
	winter	120	0.01
lesser black-backed gull	breeding	15	<0.01
	winter	<1	<0.01
herring gull	breeding	937	0.04
	winter	791	0.03
Iceland gull	winter	<1	<0.01
Sandwich tern	breeding	<1	<0.01
common tern	breeding	<1	<0.01
Arctic tern	breeding	<1	<0.01
common guillemot	breeding	964	0.01
	winter	528	0.01
	additional season	2,188	0.03
razorbill	breeding	195	0.01
	winter	99	0.01
	additional season	438	0.02
little auk	winter	11	0.03
Atlantic puffin	breeding	5	<0.01
	winter	8	<0.01
all species	breeding	5,432	
	winter	1,872	
	summer	6,926	

Table A 23. Characteristics of area 19, black-legged kittiwake during breeding, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Black-legged kittiwake, breeding **area 19**
Size: 288km^2 **to be considered under Stage 1.4**

Overlap with other protection sites: -

species	season	number of individuals	% of population
northern fulmar	breeding	892	0.01
	winter	269	<0.01
sooty shearwater	summer	4	<0.01
Manx shearwater	breeding	3	<0.01
European storm-petrel	breeding	<1	<0.01
northern gannet	breeding	122	0.01
	winter	30	<0.01
European shag	winter	<1	<0.01
Arctic skua	breeding	38	0.05
	additional season	27	0.04
great skua	breeding	8	0.02
	winter	1	<0.01
black-legged kittiwake	breeding	8,236	0.10
	winter	106	<0.01
great black-backed gull	breeding	1	<0.01
	winter	2	<0.01
common gull	breeding	<1	<0.01
	winter	<1	<0.01
lesser black-backed gull	breeding	<1	<0.01
	winter	1	<0.01
herring gull	breeding	10	<0.01
	winter	23	<0.01
Sandwich tern	breeding	<1	<0.01
common tern	breeding	<1	<0.01
Arctic tern	breeding	15	0.01
common guillemot	breeding	474	0.01
	winter	259	<0.01
	additional season	3,504	0.04
razorbill	breeding	47	<0.01
	winter	26	<0.01
	additional season	923	0.05
little auk	winter	9	0.02
Atlantic puffin	breeding	99	<0.01
	winter	555	<0.01
all species	breeding	9,949	
	winter	1,437	
	summer	13,771	

Table A 24. Characteristics of area 20, black-legged kittiwake during breeding, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Black-legged kittiwake, breeding **area 20**
Size: 102km^2 **to be considered under Stage 1.4**

Bordering other protection sites:
- Ythan Estuary, Sands of Forvie and Meikle Loch SPA

species	season	number of individuals	% of population
northern fulmar	breeding	45	<0.01
	winter	170	<0.01
sooty shearwater	summer	32	<0.01
Manx shearwater	breeding	<1	<0.01
northern gannet	breeding	74	0.01
	winter	13	<0.01
great cormorant	breeding	<1	<0.01
	winter	<1	<0.01
European shag	breeding	<1	<0.01
	winter	5	<0.01
pomarine skua	additional season 1	<1	<0.01
	additional season 2	<1	<0.01
Arctic skua	breeding	3	<0.01
	additional season	5	0.01
great skua	breeding	3	0.01
	winter	3	0.01
black-legged kittiwake	breeding	4,199	0.05
	winter	141	<0.01
black-headed gull	breeding	<1	<0.01
	winter	1	<0.01
little gull	winter	<1	
great black-backed gull	breeding	3	<0.01
	winter	10	<0.01
common gull	breeding	3	<0.01
	winter	2	<0.01
lesser black-backed gull	breeding	4	<0.01
	winter	1	<0.01
herring gull	breeding	67	<0.01
	winter	117	<0.01
Sandwich tern	breeding	2	<0.01
common tern	breeding	1	<0.01
Arctic tern	breeding	15	0.01
common guillemot	breeding	1,166	0.01
	winter	420	<0.01
	additional season	1,684	0.02
razorbill	breeding	47	<0.01
	winter	20	<0.01
	additional season	179	0.01
little auk	winter	<1	<0.01
Atlantic puffin	breeding	32	<0.01
	winter	11	<0.01
all species	breeding	5,696	
	winter	923	
	summer	6,397	

Table A 25. Characteristics of area 21, black-legged kittiwake during breeding, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Black-legged kittiwake, breeding **area 21**

Size: 72km^2 **to be considered under Stage 1.4**

Overlap with other protection sites: -

species	season	number of individuals	% of population
northern fulmar	breeding	25	<0.01
	winter	16	<0.01
sooty shearwater	summer	<1	<0.01
Manx shearwater	breeding	45	<0.01
northern gannet	breeding	628	0.05
	winter	15	<0.01
pomarine skua	additional season 1	2	0.01
	additional season 2	2	0.01
Arctic skua	breeding	7	0.01
great skua	breeding	<1	<0.01
	winter	1	<0.01
black-legged kittiwake	breeding	3,123	0.04
	winter	271	<0.01
little gull	additional season	2	
great black-backed gull	winter	3	<0.01
common gull	breeding	<1	<0.01
	winter	1	<0.01
lesser black-backed gull	breeding	43	0.01
	winter	2	<0.01
herring gull	breeding	119	<0.01
	winter	5	<0.01
Arctic tern	breeding	<1	<0.01
common guillemot	breeding	1,260	0.01
	winter	367	<0.01
	additional season	2,052	0.02
razorbill	breeding	53	<0.01
	winter	82	<0.01
	additional season	52	<0.01
little auk	winter	14	0.04
Atlantic puffin	breeding	5,789	0.04
	winter	22	<0.01
all species	breeding	11,092	
	winter	802	
	summer	8,998	

Table A 26. Characteristics of area 22, common gull during winter, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Common gull, winter **area 22**

Size: 36km^2 **to be considered under Stage 1.4**

Bordering other protection sites:

- Solent and Southampton Waters SPA

species	season	number of individuals	% of population
northern fulmar	breeding	<1	<0.01
northern gannet	breeding	<1	<0.01
	winter	<1	<0.01
great cormorant	breeding	<1	<0.01
	winter	<1	<0.01
European shag	winter	<1	<0.01
Arctic skua	additional season	<1	<0.01
black-legged kittiwake	breeding	<1	<0.01
	winter	2	<0.01
little gull	winter	<1	
black-headed gull	breeding	3	<0.01
	winter	182	<0.01
great black-backed gull	breeding	5	<0.01
	winter	6	<0.01
Mediterranean gull	all year	<1	
common gull	breeding	12	<0.01
	winter	105	0.01
lesser black-backed gull	breeding	1	<0.01
	winter	<1	<0.01
herring gull	breeding	8	<0.01
	winter	13	<0.01
Sandwich tern	breeding	4	0.01
	winter	<1	<0.01
common tern	breeding	18	0.05
common guillemot	breeding	3	<0.01
	winter	3	<0.01
razorbill	winter	<1	<0.01
	additional season	<1	<0.01
all species	breeding	54	
	winter	313	
	summer	52	

Table A 27. Characteristics of area 23, common gull during winter, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Herring gull, breeding **area 23**

Size: 1,090km^2 **to be considered under Stage 1.4**

Overlap with other protection sites: -

- SPA colony extension of 2km for Ailsa Craig

species	season	number of individuals	% of population
northern fulmar	breeding	489	<0.01
	winter	103	<0.01
Manx shearwater	breeding	3,005	0.27
European storm-petrel	breeding	2	<0.01
northern gannet	breeding	6,013	0.52
	winter	402	0.03
great cormorant	breeding	<1	<0.01
	winter	26	0.02
European shag	breeding	170	0.08
	winter	135	0.07
Arctic skua	breeding	39	0.05
great skua	breeding	<1	<0.01
	winter	3	0.01
black-legged kittiwake	breeding	1,906	0.02
	winter	1,286	0.02
black-headed gull	breeding	6	<0.01
	winter	15	<0.01
great black-backed gull	breeding	21	<0.01
	winter	53	0.01
common gull	breeding	<1	<0.01
	winter	266	0.02
lesser black-backed gull	breeding	1,446	0.26
	winter	37	0.01
herring gull	breeding	9,430	0.36
	winter	2,477	0.09
common guillemot	breeding	2,544	0.03
	winter	2,100	0.02
	additional season	3,264	0.04
razorbill	breeding	256	0.01
	winter	1,028	0.05
	additional season	74	<0.01
Atlantic puffin	breeding	31	<0.01
	winter	5	<0.01
all species	**breeding**	**25,358**	
	winter	8,017	
	summer	**25,689**	

Table A 28. Characteristics of area 24, Arctic tern during breeding, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Arctic tern, breeding **area 24**
Size: 199km^2 **to be considered under Stage 1.4**

Overlap with other protection sites:
- SPA colony extension of 2km for North Caithness Cliffs

Bordering other protection sites:
- Switha SPA
- Pentland Firth Islands SPA

species	season	number of individuals	% of population
northern fulmar	breeding	110	<0.01
	winter	139	<0.01
sooty shearwater	summer	4	<0.01
Manx shearwater	breeding	<1	<0.01
European storm-petrel	breeding	8	0.01
Leach's storm-petrel	breeding	1	<0.01
northern gannet	breeding	43	<0.01
	winter	16	<0.01
great cormorant	breeding	3	<0.01
	winter	1	<0.01
European shag	breeding	73	0.04
	winter	56	0.03
pomarine skua	additional season 1	<1	<0.01
Arctic skua	breeding	19	0.03
great skua	breeding	78	0.19
	winter	25	0.06
black-legged kittiwake	breeding	389	<0.01
	winter	326	<0.01
great black-backed gull	breeding	45	0.01
	winter	18	<0.01
common gull	breeding	9	<0.01
	winter	1	<0.01
lesser black-backed gull	breeding	3	<0.01
	winter	<1	<0.01
herring gull	breeding	3	<0.01
	winter	29	<0.01
Sandwich tern	breeding	1	<0.01
common tern	breeding	10	0.03
Arctic tern	breeding	692	0.43
common guillemot	breeding	6,088	0.07
	winter	928	0.01
	additional season	217	<0.01
razorbill	breeding	404	0.02
	winter	156	0.01
	additional season	83	<0.01
little auk	winter	<1	<0.01
Atlantic puffin	breeding	405	<0.01
	winter	26	<0.01
all species	breeding	8,389	
	winter	1,697	
	summer	2,022	

Table A 29. Characteristics of area 25, Arctic tern during breeding, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Arctic tern, breeding **area 25**

Size: 108km^2 **to be considered under Stage 1.4**

Overlap with other protection sites: -

species	season	number of individuals	% of population
northern fulmar	breeding	32	<0.01
	winter	25	<0.01
Manx shearwater	breeding	14	<0.01
European storm-petrel	breeding	<1	<0.01
northern gannet	breeding	226	0.02
	winter	13	<0.01
great cormorant	breeding	2	<0.01
	winter	<1	<0.01
European shag	winter	5	<0.01
pomarine skua	additional season 1	<1	<0.01
	additional season 2	<1	<0.01
Arctic skua	breeding	32	0.04
	additional season	1	<0.01
long-tailed skua	additional season 1	<1	<0.01
great skua	breeding	<1	<0.01
	winter	6	0.02
black-legged kittiwake	breeding	592	0.01
	winter	15	<0.01
black-headed gull	breeding	<1	<0.01
great black-backed gull	breeding	55	0.01
	winter	1	<0.01
lesser black-backed gull	breeding	6	<0.01
	winter	4	<0.01
herring gull	breeding	11	<0.01
	winter	10	<0.01
Sandwich tern	breeding	15	0.04
Arctic tern	breeding	471	0.29
common guillemot	breeding	1,448	0.02
	winter	104	<0.01
	additional season	458	0.01
razorbill	breeding	31	<0.01
	winter	4	<0.01
	additional season	43	<0.01
little auk	winter	2	0.01
Atlantic puffin	breeding	1,317	0.01
	winter	66	<0.01
all species	breeding	4,253	
	winter	250	
	summer	2,646	

Table A 30. Characteristics of area 26, common guillemot during breeding, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Common guillemot, breeding **area 26**
Size: 643km^2 **meets Stage 1.2**

Overlap with other protection sites:
- SPA colony extension of 2km for North Caithness Cliffs

species present	season	number of individuals	% of population
northern fulmar	breeding	564	0.01
	winter	511	<0.01
Manx shearwater	breeding	2	<0.01
European storm-petrel	breeding	2	<0.01
Leach's storm-petrel	breeding	5	<0.01
northern gannet	breeding	167	0.01
	winter	72	0.01
great cormorant	breeding	1	<0.01
	winter	4	<0.01
European shag	breeding	118	0.06
	winter	70	0.03
Arctic skua	breeding	52	0.07
great skua	breeding	137	0.34
	winter	18	0.04
black-legged kittiwake	breeding	1,095	0.01
	winter	1,278	0.02
great black-backed gull	breeding	134	0.03
	winter	37	0.01
common gull	breeding	5	<0.01
	winter	1	<0.01
lesser black-backed gull	breeding	12	<0.01
	winter	3	<0.01
herring gull	breeding	7	<0.01
	winter	132	<0.01
common tern	breeding	2	0.01
Arctic tern	breeding	251	0.16
common guillemot	**breeding**	**28,356**	**0.33**
	winter	8,085	0.09
	additional season	2,751	0.03
razorbill	breeding	904	0.05
	winter	380	0.02
	additional season	603	0.03
little auk	winter	20	0.05
Atlantic puffin	breeding	755	0.01
	winter	460	<0.01
all species	**breeding**	**32,569**	
	winter	11,074	
	summer	6,489	

Table A 31. Characteristics of area 27, common guillemot during breeding, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Common guillemot, breeding **area 27**

Size: 206km **to be considered under Stage 1.4**

Overlap with other protection sites: -

- SPA colony extension of 2km for East Caithness Cliffs

species	season	number of individuals	% of population
northern fulmar	breeding	139	<0.01
	winter	433	<0.01
sooty shearwater	summer	2	<0.01
Manx shearwater	breeding	2	<0.01
European storm-petrel	breeding	<1	<0.01
northern gannet	breeding	39	<0.01
	winter	16	<0.01
great cormorant	breeding	20	0.02
	winter	2	<0.01
European shag	breeding	795	0.39
	winter	721	0.36
Arctic skua	breeding	2	<0.01
	additional season	1	<0.01
great skua	breeding	18	0.04
	winter	<1	<0.01
black-legged kittiwake	breeding	1,266	0.02
	winter	297	<0.01
great black-backed gull	breeding	106	0.03
	winter	155	0.04
common gull	winter	<1	<0.01
lesser black-backed gull	breeding	<1	<0.01
	winter	<1	<0.01
herring gull	breeding	938	0.04
	winter	260	0.01
common tern	breeding	<1	<0.01
Arctic tern	breeding	1	<0.01
common guillemot	breeding	9,040	0.11
	winter	2,023	0.02
	additional season	1,205	0.01
razorbill	breeding	557	0.03
	winter	89	<0.01
	additional season	489	0.03
little auk	winter	1	<0.01
Atlantic puffin	breeding	274	<0.01
	winter	79	<0.01
all species	breeding	13,201	
	winter	4,034	
	summer	5,347	

Table A 32. Characteristics of area 28, common guillemot during winter, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Common guillemot, winter **area 28**

Size: 56km^2 **to be considered under Stage 1.4**

Bordering other protection sites:

- SPA Lewis Peatlands

species	season	number of individuals	% of population
northern fulmar	breeding	41	<0.01
	winter	71	<0.01
sooty shearwater	summer	2	<0.01
Manx shearwater	breeding	8	<0.01
European storm-petrel	breeding	16	0.02
northern gannet	breeding	93	0.01
	winter	53	<0.01
European shag	breeding	51	0.03
	winter	<1	<0.01
Arctic skua	breeding	2	<0.01
great skua	breeding	1	<0.01
	winter	<1	<0.01
black-legged kittiwake	breeding	9	<0.01
	winter	7	<0.01
great black-backed gull	breeding	102	0.02
	winter	16	<0.01
lesser black-backed gull	winter	41	0.01
herring gull	breeding	2	<0.01
	winter	68	<0.01
Iceland gull	winter	1	<0.01
common tern	breeding	1	<0.01
Arctic tern	breeding	17	0.01
common guillemot	breeding	1,226	0.01
	winter	642	0.01
	additional season	78	<0.01
razorbill	breeding	726	0.04
	winter	12	<0.01
	additional season	7	<0.01
little auk	winter	<1	<0.01
Atlantic puffin	breeding	248	<0.01
	winter	11	<0.01
all species	breeding	2,543	
	winter	928	
	summer	573	

Table A 33. Characteristics of area 29, common guillemot during winter, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Common guillemot, winter **area 29**

Size: 252km^2 **to be considered under Stage 1.4**

Overlap with other protection sites: -

species	season	number of individuals	% of population
northern fulmar	breeding	221	<0.01
	winter	201	<0.01
sooty shearwater	summer	517	<0.01
Manx shearwater	breeding	4	<0.01
European storm-petrel	breeding	<1	<0.01
northern gannet	breeding	67	0.01
	winter	35	<0.01
great cormorant	breeding	1	<0.01
	winter	<1	<0.01
European shag	breeding	27	0.01
	winter	32	0.02
pomarine skua	additional season 1	<1	<0.01
	additional season 2	<1	<0.01
Arctic skua	breeding	17	0.02
	additional season	<1	<0.01
great skua	breeding	35	0.08
	winter	36	0.09
black-legged kittiwake	breeding	5,966	0.07
	winter	1,440	0.02
great black-backed gull	breeding	60	0.01
	winter	51	0.01
common gull	breeding	<1	<0.01
	winter	<1	<0.01
lesser black-backed gull	breeding	8	<0.01
	winter	2	<0.01
herring gull	breeding	287	0.01
	winter	281	0.01
glaucous gull	winter	<1	<0.01
common tern	breeding	<1	<0.01
common guillemot	breeding	3,054	0.04
	winter	4,941	0.06
	additional season	6,517	0.08
razorbill	breeding	316	0.02
	winter	602	0.03
	additional season	1,538	0.08
little auk	winter	22	0.06
Atlantic puffin	breeding	59	<0.01
	winter	36	<0.01
all species	breeding	10,638	
	winter	8,164	
	summer	15,302	

Table A 34. Characteristics of area 30, common guillemot during winter, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Common guillemot, winter **area 30**

Size: 85km^2 **to be considered under Stage 1.4**

Overlap with other protection sites:

- SPA colony extension of 2km for Forth Islands

Bordering other protection sites:

- SPA Firth of Forth

species	season	number of individuals	% of population
northern fulmar	breeding	4	<0.01
	winter	4	<0.01
Manx shearwater	breeding	114	0.01
	additional season	<1	<0.01
northern gannet	breeding	174	0.02
	winter	3	<0.01
great cormorant	breeding	1	<0.01
	winter	7	0.01
European shag	breeding	9	<0.01
	winter	34	0.02
great skua	breeding	<1	<0.01
	winter	<1	<0.01
black-legged kittiwake	breeding	112	<0.01
	winter	28	<0.01
black-headed gull	winter	200	<0.01
little gull	winter	<1	
	additional season	2	
great black-backed gull	breeding	10	<0.01
	winter	7	<0.01
common gull	breeding	1	<0.01
	winter	85	<0.01
lesser black-backed gull	breeding	41	0.01
	winter	3	<0.01
herring gull	breeding	399	0.02
	winter	140	0.01
Sandwich tern	breeding	7	0.02
common tern	breeding	11	0.03
Arctic tern	breeding	<1	<0.01
common guillemot	breeding	234	<0.01
	winter	1,423	0.02
	additional season	73	<0.01
razorbill	breeding	15	<0.01
	winter	120	0.01
	additional season	34	<0.01
little auk	winter	1	<0.01
Atlantic puffin	breeding	168	<0.01
	winter	19	<0.01
all species	breeding	1,301	
	winter	2,070	
	summer	1,085	

Table A 35. Characteristics of area 31, common guillemot during winter, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Common guillemot, winter **area 31**

Size: 556km^2 **to be considered under Stage 1.4**

Overlap with other protection sites:

- SPA colony extension of 2km for Forth Islands

species	season	number of individuals	% of population
northern fulmar	breeding	32	<0.01
	winter	75	<0.01
sooty shearwater	summer	20	<0.01
Manx shearwater	breeding	321	0.03
	additional season	8	<0.01
northern gannet	breeding	4,394	0.38
	winter	403	0.03
great cormorant	breeding	8	0.01
	winter	25	0.02
European shag	breeding	601	0.30
	winter	1,085	0.54
pomarine skua	additional season 1	1	<0.01
	additional season 2	2	0.01
Arctic skua	breeding	1	<0.01
	additional season	43	0.06
great skua	breeding	6	0.02
	winter	5	0.01
black-legged kittiwake	breeding	3,073	0.04
	winter	513	0.01
black-headed gull	winter	1	<0.01
little gull	breeding	4	
	winter	18	
	additional season	114	
great black-backed gull	breeding	7	<0.01
	winter	371	0.09
common gull	breeding	6	<0.01
	winter	219	0.01
lesser black-backed gull	breeding	150	0.03
	winter	6	<0.01
herring gull	breeding	1,131	0.04
	winter	3,508	0.13
Sandwich tern	breeding	10	0.03
common tern	breeding	5	0.01
Arctic tern	breeding	70	0.04
common guillemot	breeding	4,626	0.05
	winter	11,143	0.13
	additional season	8,450	0.10
razorbill	breeding	444	0.02
	winter	1,313	0.07
	additional season	582	0.03
little auk	winter	116	0.31
Atlantic puffin	**breeding**	**30,720**	0.23
	winter	461	<0.01
all species	**breeding**	**45,630**	
	winter	19,242	
	summer	**34,540**	

Table A 36. Characteristics of area 32, common guillemot during winter, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Common guillemot, winter **area 32**

Size: 1,116km^2 **to be considered under Stage 1.4**

Overlap with other protection sites: -

species	season	number of individuals	% of population
northern fulmar	breeding	127	<0.01
	winter	1,652	0.02
sooty shearwater	summer	6	<0.01
Manx shearwater	breeding	12	<0.01
	additional season	2	<0.01
European storm-petrel	breeding	16	0.02
northern gannet	breeding	1,525	0.13
	winter	209	0.02
great cormorant	breeding	<1	<0.01
European shag	breeding	<1	<0.01
	winter	1	<0.01
pomarine skua	additional season 1	21	0.07
	additional season 2	21	0.07
Arctic skua	breeding	103	0.14
	additional season	42	0.06
long-tailed skua	additional season 1	3	<0.01
	additional season 2	10	<0.01
great skua	breeding	17	0.04
	winter	22	0.05
black-legged kittiwake	breeding	5,478	0.07
	winter	1,763	0.02
black-headed gull	breeding	<1	<0.01
	winter	<1	<0.01
little gull	winter	1	
	additional season	37	
great black-backed gull	breeding	25	0.01
	winter	38	0.01
common gull	breeding	1	0.00
	winter	26	<0.01
lesser black-backed gull	breeding	11	<0.01
	winter	2	<0.01
herring gull	breeding	184	0.01
	winter	157	0.01
Sandwich tern	breeding	1	<0.01
common tern	breeding	2	<0.01
Arctic tern	breeding	169	0.11
common guillemot	**breeding**	**27,874**	0.33
	winter	15,334	0.18
	additional season	19,491	0.23
razorbill	breeding	811	0.04
	winter	6,353	0.33
	additional season	3,793	0.19
little auk	winter	67	0.18
Atlantic puffin	breeding	3,698	0.03
	winter	1,325	0.01
all species	**breeding**	**40,061**	
	winter	**26,712**	
	summer	**34,274**	

Table A 37. Characteristics of area 33, Atlantic puffin during breeding, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Atlantic puffin, breeding **area 33**
Size: 1,647km^2 **meets Stage 1.2**

Overlap with other protection sites:
- SPA colony extension of 2km for Forth Islands

Bordering other protection sites:
- SPA Firth of Tay & Eden estuary
- SPA Firth of Forth

species present	season	number of individuals	% of population
northern fulmar	breeding	136	<0.01
	winter	232	<0.01
sooty shearwater	summer	21	<0.01
Manx shearwater	breeding	3,386	0.30
	additional season	17	<0.01
northern gannet	breeding	7,398	0.64
	winter	675	0.06
great cormorant	breeding	11	0.01
	winter	46	0.04
European shag	breeding	872	0.43
	winter	2,341	1.16
pomarine skua	additional season 1	41	0.14
	additional season 2	41	0.14
Arctic skua	breeding	43	0.06
	additional season	89	0.12
great skua	breeding	22	0.05
	winter	11	0.03
black-legged kittiwake	breeding	9,035	0.11
	winter	2,617	0.03
black-headed gull	breeding	23	<0.01
	winter	6	<0.01
little gull	breeding	11	
	winter	**96**	
	additional season	176	
great black-backed gull	breeding	30	0.01
	winter	461	0.11
common gull	breeding	22	<0.01
	winter	398	0.02
lesser black-backed gull	breeding	289	0.05
	winter	19	<0.01
herring gull	breeding	1,820	0.07
	winter	4,487	0.17
Sandwich tern	breeding	13	0.03
common tern	breeding	6	0.02
Arctic tern	breeding	240	0.15
common guillemot	breeding	16,833	0.20
	winter	16,563	0.19
	additional season	**23,203**	**0.27**
razorbill	breeding	1,333	0.07
	winter	3,885	0.20
	additional season	3,083	0.16
little auk	winter	211	0.56
Atlantic puffin	**breeding**	**56,732**	**0.42**
	winter	740	0.01
all species	**breeding**	**98,276**	
	winter	**32,647**	
	summer	**78,572**	

Table A 38. Characteristics of area 34, Atlantic puffin during breeding, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Atlantic puffin, breeding **area 34**

Size: 287km^2 **to be considered under Stage 1.4**

Overlap with other protection sites:

- SPA colony extension of 2km for Foula

species	season	number of individuals	% of population
northern fulmar	breeding	670	0.01
	winter	2,838	0.03
European storm-petrel	breeding	2	<0.01
northern gannet	breeding	66	0.01
	winter	27	<0.01
European shag	breeding	575	0.28
	winter	<1	<0.01
Arctic skua	breeding	11	0.01
great skua	breeding	178	0.44
	winter	45	0.11
black-legged kittiwake	breeding	45	<0.01
	winter	51	<0.01
great black-backed gull	breeding	6	<0.01
	winter	2	<0.01
lesser black-backed gull	breeding	3	<0.01
herring gull	breeding	<1	<0.01
	winter	<1	<0.01
glaucous gull	winter	<1	<0.01
Arctic tern	breeding	16	0.01
common guillemot	breeding	2,648	0.03
	winter	2,315	0.03
	additional season	99	<0.01
razorbill	breeding	40	<0.01
	winter	44	<0.01
	additional season	8	<0.01
Atlantic puffin	breeding	5,560	0.04
	winter	16	<0.01
all species	breeding	9,820	
	winter	4,974	
	summer	5,552	

Table A 39. Characteristics of area 35, Atlantic puffin during breeding, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Atlantic puffin, breeding **area 35**

Size: 541km^2 **to be considered under Stage 1.4**

Bordering other protection sites:

- SPA North Harris Mountains

species	season	number of individuals	% of population
northern fulmar	breeding	82	<0.01
	winter	220	<0.01
sooty shearwater	summer	7	<0.01
Manx shearwater	breeding	3,286	0.29
European storm-petrel	breeding	44	0.06
northern gannet	breeding	393	0.03
	winter	109	0.01
great cormorant	breeding	1	<0.01
	winter	11	0.01
European shag	breeding	203	0.10
	winter	167	0.08
pomarine skua	additional season 2	<1	<0.01
Arctic skua	breeding	1	<0.01
great skua	breeding	<1	<0.01
	winter	<1	<0.01
black-legged kittiwake	breeding	155	<0.01
	winter	76	<0.01
great black-backed gull	breeding	38	0.01
	winter	9	<0.01
common gull	breeding	3	<0.01
lesser black-backed gull	breeding	43	0.01
herring gull	breeding	51	<0.01
	winter	11	<0.01
common tern	breeding	<1	<0.01
Arctic tern	breeding	35	0.02
common guillemot	breeding	4,358	0.05
	winter	429	0.01
	additional season	112	<0.01
razorbill	breeding	693	0.04
	winter	31	<0.01
	additional season	19	<0.01
little auk	winter	6	0.02
Atlantic puffin	breeding	11,195	0.08
	winter	39	<0.01
all species	**breeding**	**20,588**	
	winter	1,095	
	summer	10,158	

Table A 40. Characteristics of area 36, Atlantic puffin during breeding, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Atlantic puffin, breeding **area 36**

Size: 898km^2 **to be considered under Stage 1.4**

Overlap with other protection sites:

- SPA colony extension of 2km for Shiant Isles

species	season	number of individuals	% of population
northern fulmar	breeding	854	0.01
	winter	1,430	0.01
sooty shearwater	summer	376	<0.01
Manx shearwater	breeding	218	0.02
European storm-petrel	breeding	166	0.22
northern gannet	breeding	320	0.03
	winter	36	<0.01
great cormorant	breeding	1	<0.01
	winter	<1	<0.01
European shag	breeding	246	0.12
	winter	31	0.02
pomarine skua	additional season 1	2	0.01
	additional season 2	7	0.02
Arctic skua	breeding	24	0.03
	additional season	9	0.01
great skua	breeding	36	0.09
	winter	<1	<0.01
black-legged kittiwake	breeding	1,576	0.02
	winter	613	0.01
black-headed gull	breeding	11	<0.01
	winter	<1	<0.01
great black-backed gull	breeding	278	0.07
	winter	34	0.01
common gull	breeding	<1	<0.01
	winter	<1	<0.01
lesser black-backed gull	breeding	131	0.02
	winter	<1	<0.01
herring gull	breeding	27	<0.01
	winter	134	0.01
common tern	breeding	6	0.02
Arctic tern	breeding	3	<0.01
common guillemot	breeding	4,405	0.05
	winter	2,104	0.02
	additional season	5,134	0.06
razorbill	breeding	2,075	0.11
	winter	328	0.02
	additional season	2,946	0.15
little auk	winter	1	<0.01
Atlantic puffin	breeding	18,520	0.14
	winter	5,490	0.04
all species	**breeding**	**29,273**	
	winter	10,519	
	summer	**24,653**	

Table A 41. Characteristics of area 37, Atlantic puffin during breeding, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Atlantic puffin, breeding **area 37**

Size: 666km^2 **to be considered under Stage 1.4**

Bordering other protection sites:
- SPA Farne Islands
- SPA Northumbria Coast

species	season	number of individuals	% of population
northern fulmar	breeding	96	<0.01
	winter	1,470	0.01
sooty shearwater	summer	37	<0.01
Manx shearwater	breeding	33	<0.01
European storm-petrel	breeding	<1	<0.01
northern gannet	breeding	834	0.07
	winter	99	0.01
great cormorant	breeding	10	0.01
	winter	<1	<0.01
European shag	breeding	<1	<0.01
	winter	274	0.14
pomarine skua	additional season 1	2	0.01
	additional season 2	2	0.01
Arctic skua	breeding	55	0.07
	additional season	10	0.01
long-tailed skua	additional season 1	6	<0.01
	additional season 2	7	<0.01
great skua	breeding	9	0.02
	winter	33	0.08
black-legged kittiwake	breeding	3,051	0.04
	winter	272	<0.01
black-headed gull	breeding	4	<0.01
great black-backed gull	breeding	541	0.13
	winter	97	0.02
common gull	breeding	1	<0.01
	winter	4	<0.01
lesser black-backed gull	breeding	78	0.01
	winter	66	0.01
herring gull	breeding	89	<0.01
	winter	196	0.01
Sandwich tern	breeding	113	0.30
common tern	breeding	<1	<0.01
Arctic tern	breeding	828	0.52
common guillemot	breeding	7,099	0.08
	winter	2,853	0.03
	additional season	7,371	0.09
razorbill	breeding	188	0.01
	winter	80	<0.01
	additional season	558	0.03
little auk	winter	5	0.01
Atlantic puffin	breeding	12,553	0.09
	winter	474	<0.01
all species	**breeding**	**25,618**	
	winter	5,617	
	summer	**20,910**	

Table A 42. Characteristics of area 38, Atlantic puffin during breeding, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Atlantic puffin, breeding **area 38**

Size: 72km^2 **to be considered under Stage 1.4**

Overlap with other protection sites: -

species	season	number of individuals	% of population
northern fulmar	breeding	12	<0.01
	winter	10	<0.01
Manx shearwater	breeding	593	0.05
European storm-petrel	breeding	<1	<0.01
northern gannet	breeding	34	<0.01
	winter	28	<0.01
great cormorant	breeding	<1	<0.01
	winter	<1	<0.01
European shag	breeding	<1	<0.01
great skua	breeding	<1	<0.01
black-legged kittiwake	breeding	110	<0.01
	winter	14	<0.01
black-headed gull	winter	<1	<0.01
little gull	winter	<1	
great black-backed gull	breeding	2	<0.01
	winter	1	<0.01
common gull	winter	<1	<0.01
lesser black-backed gull	breeding	182	0.03
	winter	45	0.01
herring gull	breeding	7	<0.01
	winter	11	<0.01
common guillemot	breeding	357	<0.01
	winter	60	<0.01
	additional season	64	<0.01
razorbill	breeding	143	0.01
	winter	25	<0.01
	additional season	9	<0.01
Atlantic puffin	breeding	718	0.01
	winter	<1	<0.01
all species	breeding	2,157	
	winter	195	
	summer	1,371	

Table A 43. Characteristics of area 39, Atlantic puffin during winter, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Atlantic puffin, winter **area 39**

Size: 936km^2 **to be considered under Stage 1.4**

Overlap with other protection sites: -

species	season	number of individuals	% of population
northern fulmar	breeding	1,211	0.01
	winter	1,457	0.01
sooty shearwater	summer	6	<0.01
Manx shearwater	breeding	28	<0.01
European storm-petrel	breeding	8	0.01
northern gannet	breeding	731	0.06
	winter	87	0.01
European shag	winter	<1	<0.01
Arctic skua	breeding	39	0.05
	additional season	20	0.03
great skua	breeding	17	0.04
	winter	33	0.08
black-legged kittiwake	breeding	9,255	0.11
	winter	402	<0.01
great black-backed gull	breeding	26	0.01
	winter	19	<0.01
common gull	breeding	<1	<0.01
lesser black-backed gull	breeding	8	<0.01
	winter	1	<0.01
herring gull	breeding	55	<0.01
	winter	30	<0.01
common tern	breeding	<1	<0.01
Arctic tern	breeding	10	0.01
common guillemot	breeding	19,426	0.23
	winter	1,235	0.01
	additional season	9,398	0.11
razorbill	breeding	1,651	0.08
	winter	185	0.01
	additional season	5,326	0.27
little auk	winter	108	0.29
Atlantic puffin	breeding	483	<0.01
	winter	2,933	0.02
all species	**breeding**	**32,953**	
	winter	6,434	
	summer	**27,949**	

Table A 44. Characteristics of area 40, Atlantic puffin during winter, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

Atlantic puffin, winter **area 40**
Size: 1,080km^2 **to be considered under Stage 1.4**

Overlap with other protection sites: -

species	season	number of individuals	% of population
northern fulmar	breeding	518	0.01
	winter	1,037	0.01
sooty shearwater	summer	39	<0.01
Manx shearwater	breeding	29	<0.01
European storm-petrel	breeding	14	0.02
northern gannet	breeding	980	0.08
	winter	69	0.01
pomarine skua	additional season 1	41	0.14
	additional season 2	41	0.14
Arctic skua	breeding	71	0.09
	additional season	101	0.13
long-tailed skua	additional season 1	121	0.02
	additional season 2	366	0.07
great skua	breeding	21	0.05
	winter	74	0.18
black-legged kittiwake	breeding	10,412	0.12
	winter	591	0.01
black-headed gull	breeding	8	<0.01
little gull	additional season	<1	<0.01
great black-backed gull	breeding	3	<0.01
	winter	21	<0.01
common gull	breeding	1	<0.01
	winter	2	<0.01
lesser black-backed gull	breeding	39	0.01
	winter	14	<0.01
herring gull	breeding	669	0.03
	winter	155	0.01
Sandwich tern	breeding	6	0.01
common tern	breeding	1	<0.01
Arctic tern	breeding	22	0.01
common guillemot	**breeding**	**28,462**	**0.33**
	winter	2,685	0.03
	additional season	**22,969**	**0.27**
razorbill	breeding	1,295	0.07
	winter	881	0.05
	additional season	6,069	0.31
little auk	winter	2	<0.01
Atlantic puffin	breeding	1,241	0.01
	winter	3,776	0.03
all species	**breeding**	**43,831**	
	winter	9,675	
	summer	**44,680**	

Table A 45. Characteristics of area 41, all species during breeding, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

All species, breeding **area 41**

Size: 180km^2 **near-qualifying (exceeding population threshold) to be considered under Stage 1.4**

Overlap with other protection sites: -

species present	season	number of individuals	% of population
northern fulmar	breeding	35	<0.01
	winter	57	<0.01
Manx shearwater	breeding	48	<0.01
Leach's storm-petrel	breeding	<1	<0.01
northern gannet	breeding	1,366	0.12
	winter	50	<0.01
pomarine skua	additional season 1	3	0.01
	additional season 2	4	0.01
Arctic skua	breeding	12	0.02
	winter	2	<0.01
black-legged kittiwake	breeding	3,962	0.05
	winter	1,250	0.01
little gull	additional season	3	
great black-backed gull	winter	11	<0.01
common gull	breeding	4	<0.01
	winter	2	<0.01
lesser black-backed gull	breeding	77	0.01
	winter	3	<0.01
herring gull	breeding	196	0.01
	winter	38	<0.01
common guillemot	breeding	5,143	0.06
	winter	787	0.01
	additional season	2,513	0.03
razorbill	breeding	128	0.01
	winter	133	0.01
	additional season	129	0.01
little auk	winter	15	0.04
Atlantic puffin	breeding	11,162	0.08
	winter	40	<0.01
all species	**breeding**	**22,131**	
	winter	2,386	
	summer	13,958	

Table A 46. Characteristics of area 42, all species during summer, based on top 1% Getis-Ord Gi*. The estimated numbers of all species present are indicated, along with their season of occurrence. Species meeting or exceeding population thresholds are in bold (refer to Table A 3 for qualifying thresholds).

All species, summer **area 42**

Size: 180km^2 **near-qualifying (not exceeding population threshold) to be considered under Stage 1.4**

Overlap with other protection sites: -

species	season	number of individuals	% of population
northern fulmar	breeding	39	<0.01
	winter	58	<0.01
sooty shearwater	summer	<1	<0.01
Manx shearwater	breeding	48	<0.01
northern gannet	breeding	1,029	0.09
	winter	48	<0.01
European shag	winter	<1	<0.01
pomarine skua	additional season 1	3	0.01
	additional season 2	3	0.01
Arctic skua	breeding	12	0.02
	additional season	<1	<0.01
great skua	breeding	<1	<0.01
	winter	2	<0.01
black-legged kittiwake	breeding	4,036	0.05
	winter	1,246	0.01
little gull	additional season	3	
great black-backed gull	breeding	<1	<0.01
	winter	12	<0.01
common gull	breeding	4	<0.01
	winter	12	<0.01
lesser black-backed gull	breeding	72	0.01
	winter	2	<0.01
herring gull	breeding	191	0.01
	winter	45	<0.01
Arctic tern	breeding	<1	<0.01
common guillemot	breeding	3,180	0.04
	winter	808	0.01
	additional season	2,274	0.03
razorbill	breeding	154	0.01
	winter	168	0.01
	additional season	126	0.01
little auk	winter	16	0.04
Atlantic puffin	breeding	11,640	0.09
	winter	49	<0.01
all species	**breeding**	**20,406**	
	winter	2,464	
	summer	13,690	