SEA678 Data Report for Offshore Seabird Populations.

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1. Introduction

The following report aims to summarise the availability, type and quality of the available data generated by all parties involved in research concerning the seasonal distribution of offshore seabird populations of SEA areas 6, 7 and 8 (Figure 2.1). The boundaries of this data report were extended into the waters of the Irish designated area (IDA) considering the potential for large-scale seabird migration through the region in space and time.

2. Study Area

The combined region of the four areas depicted in Figure 2.1 encompasses three broad oceanographic habitats: shallow shelf waters (<200m), deep oceanic waters (>1000m) and the sloped region (>200m & <1000m) that divides the other two habitats. The shelf waters extends from the Minch and the Hebrides Shelf of SEA 7, the Irish Sea, Cardigan Bay, the North Channel and the eastern section of St. George Channel of SEA 6, the Dover Strait, Bristol Channel and the English Channel in SEA 8, through to the Celtic Sea, the Irish Shelf, Malin Shelf and Porcupine Bank of the IDA. An offshore shallow water region is located over the Hatton-Rockall region in SEA 7 and the IDA.

The sloped habitats are located along the edge of the Hatton and Rockall Banks and the continental shelf edge to the west of the Hebrides Shelf, Malin Shelf and Irish Shelf, the Goban Spur (GS) and the Porcupine Bank and Porcupine Seabight, and the waters associated with offshore bathymetric features such as the George Bligh Bank (GBB), Rosemary Bank (RB), Anton Dohrn Seamount (ADS) and Hebrides Terrace Seamount. The oceanic deepwater habitat to the west of the continental shelf is characterised by the Rockall Trough, the Hatton-Rockall Basin, the North and South Feni Ridges and the western edge of the Iceland Basin. Figure 2.2 highlights some of the oceanographic and bathymetric features located within the study area, which may directly or indirectly influence seabird distribution.

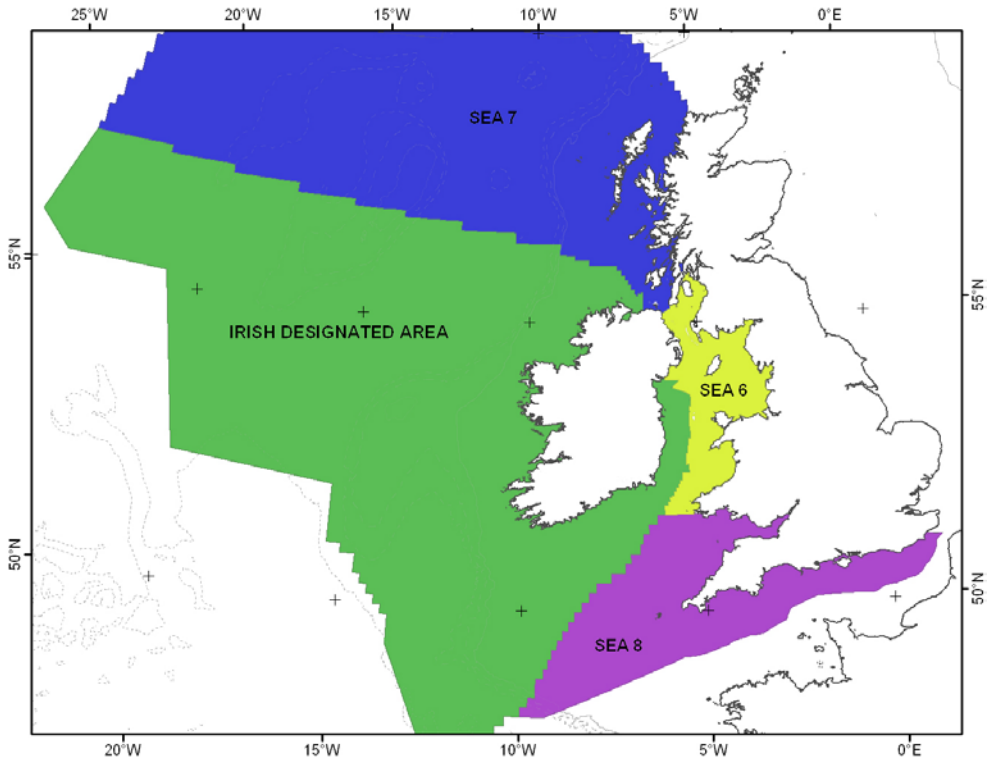

Figure 2.1. Regional boundaries of SEA areas 6, 7 & 8 and the Irish designated area (IDA).

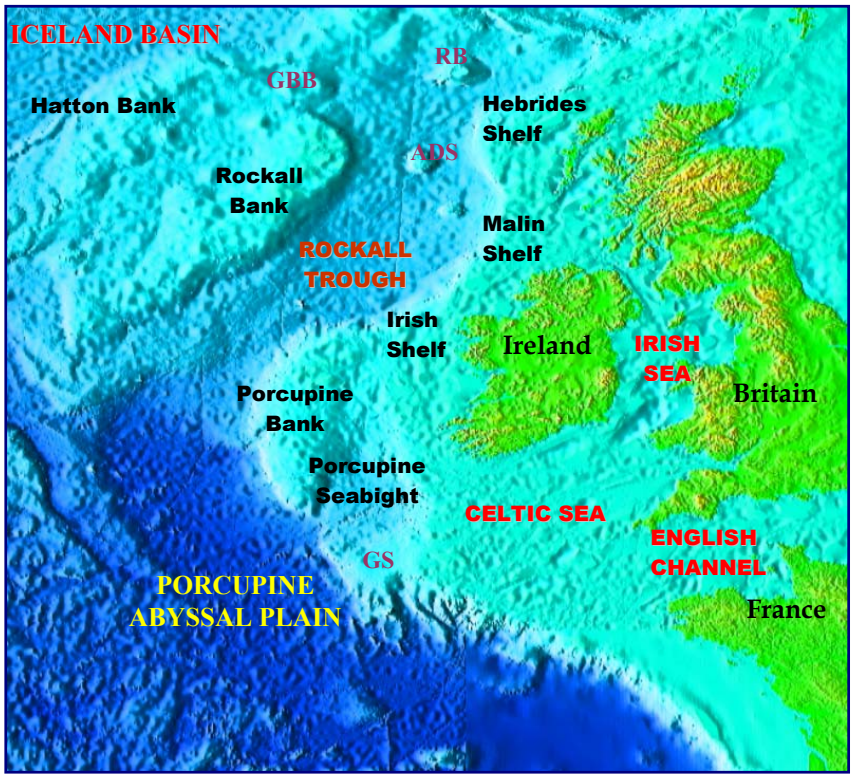

Figure 2.2. Oceanographic & bathymetric features located within the study area (GBB – George Bligh Bank, RB – Rosemary Bank, ADS – Anton Dohrn Seamount, GS – Goban Spur).

3. Previous Research

The following section briefly highlights the publications relating to the offshore seabird populations that routinely inhabit the waters of SEA areas 6, 7 & 8 and the IDA. The books, reports, papers and notes listed have been produced by a variety of institutions employing an array of survey methods ranging from a series of casual observations to multi-year research programmes.

Although early publications referred to the general features of at-sea behaviour (Dare, 1982; Hope Jones & Rees, 1985) and the movements of offshore seabird populations in British and Irish waters based on land-based seawatches and ringing recoveries (Lockley, 1947; Lockley, 1953; Lockley, 1974; Lockley, 1983; Harris, 1984; Furness, 1987; Hutchinson, 1989; Brooke, 1990), specific studies attempting to accurately chart their seasonal offshore distribution based on *in situ* observations were limited before 1990 (Gibbs, 1969; Evans, 1981; Eades, 1982; Bourne, 1986; Harrison *et al.*, 1989; *see* Craig & Hummel, 1993). Subsequent to these early studies, much of the research that focused on the seasonal distribution and vulnerable concentrations of those seabird populations utilising the offshore waters of SEA areas 6, 7 & 8 and the IDA was conducted by the Joint Nature Conservation Committee (JNCC) in Aberdeen, Scotland. Irish (Coastal & Marine Resource Centre (CMRC)) and Dutch institutions (Royal Netherlands Institute for Sea Research (NIOZ), Instituut Bos en NatuurOnderzoek (now merged into Alterra WUR)) have expanded on these pioneering studies to also make significant contributions to the current level of understanding of this diverse and inadequately studied group of birds (van der Meer & Leopold, 1995; Mackey *et al.*, 2004).

3.1 European Seabirds at Sea (ESAS)

The data collected by those European institutions involved in offshore seabird and cetacean research during standard ship-based and aerial surveys contribute to the European Seabirds at Sea (ESAS) database, which is maintained and updated by the JNCC. The effort-related and seabird distribution/density maps depicted in section 6 were generated from the ship-based survey records stored within the ESAS database. As such, the most relevant publications to the current study, which are summarised below, are those that have contributed or have drawn from the ESAS database.

Tasker *et al.* (1990) and Webb *et al.* (1995) investigated the monthly variations in the distribution of seabirds to the south and west of Britain and used vulnerability indices to produce monthly vulnerability maps. Earlier work by Harrison *et al.* (1989) investigated seabird distribution and movements of moulting auks to the west of Scotland and in the northern Irish Sea, in an effort to identify areas supporting important seabird concentrations. Stone *et al.* (1995) produced the first comprehensive seasonal atlas of seabird distribution of northwest European waters. The vast study area covered by Stone *et al.* (1995) was sub-divided into ten sections to aid analysis, of which areas 1, 2, 7, 8, 9 & 10 encompass the current report's area of interest. Webb *et al.* (1990) went further and subdivided the waters to the west of Britain and Ireland into 50 standard areas. Apart from Area 10, all the standard areas defined by Webb *et al.* (1990) are relevant to the current data report. Aspinall & Tasker (1992) looked specifically at the importance of the Solent region for breeding and offshore seabird populations. McSorley *et al.* (2003) supported proposals to expand existing Special Protection Areas (SPAs) seaward by examining the use of waters adjacent to the colonies of Grassholm, Skomer and Skokholm by seabirds during the breeding season. Earlier investigations by Stone *et al.* (1992) looked at diurnal movements, foraging ranges and densities of seabird concentrations around Skomer, Skokholm and Grassholm during the breeding season. A Geographical Information System (G.I.S.) mapping routine was used by Skov *et al.* (1995) to highlight the seasonal Important Bird Areas (IBAs) for seabirds in the English Channel (SEA area 8) and the North Sea.

Pollock *et al.* (1997) and Pollock *et al.* (2000) looked at the seasonal distribution patterns of seabird and cetacean populations in the waters around Ireland and the waters north and west of Scotland respectively. Between 1999 and 2003, Cronin & Mackey's (2002), Mackey's (2003), Mackey *et al.*'s (2003) and Mackey *et al.*'s (2004) research expanded upon the results of Pollock *et al.* (1997), by targeting the offshore seabird and cetacean populations of Ireland's Atlantic Margin out to the Porcupine-Rockall-Hatton region. Other reports investigating offshore distribution (Bloor *et al.*, 1996; Taylor & Reid, 2001) and the dispersion and vulnerability (Skov *et al.*, 2002) of seabird and cetacean populations, concentrated their survey effort on locations outside the SEA region (i.e. Faroese and Shetland waters). However, some of the data are relevant to the northeast section of SEA area 7.

Reid *et al.* (2001) reported on the seabird populations to the north and west of Scotland, looking more specifically at the relative importance of slope and shelf habitats. An oceanographic approach was also applied by Evans (1990) and Begg & Reid (1997) when looking at the spatial variation of various seabird species in relation to European waters, and a shallow sea tidal mixing front in the Irish Sea respectively. O'Brien *et al.* (1999) utilised the ESAS database to examine spatio-temporal variability in seabird densities determined from ferry crossings of the Irish Sea and the English Channel. Wright & Begg (1997) investigated the relationships between at-sea concentrations of Common Guillemots and sandeel distribution and colony

location during the breeding season in Scottish waters. Relatively important locations for both Common Guillemots and the local sandeel fishery were also identified and compared.

Other reports have analysed only non-ship-based ESAS data (e.g. aerial surveys: Barton *et al.*, 1994; Dean *et al.*, 2003; Dean *et al.*, 2004) to investigate seabird, seaduck, diver and grebe distribution, and as such, are not represented in the effort and distribution maps depicted in this report.

3.2 Non-ESAS Publications

The following references are examples of reports and papers that used alternative methods to examine offshore and inshore seabird distribution, at-sea movements and behaviour within the study area. Although essential to the overall understanding of resident and migrant seabird populations, the data from such studies have not contributed to the ESAS database and as such, have no relevance to the maps produced in this report:
Ringing recoveries: Forsyth (1993), Swann (2002), O'Donnell (2003);
Non-effort related sightings: Dare (1982); Eades (1982); Bourne (1986);
Offshore non-snap shot transect surveys: Pollock (1994);
Satellite tags: Hamer *et al.* (2001);
Intrusive seabird sampling: Halley *et al.* (1995);
Land-based seawatches: Pettitt (1969), Hutchinson (1981), Davenport (1984), Fox & Aspinall (1985), Madden & Ruttledge (1993), Jones (2002); &
Inshore small boat-based transect surveys: Rogan *et al.* (2003).

3.3 Breeding Seabird Populations

For information regarding the historic and current status of British and Irish breeding seabird populations, it is suggested that readers consult Cramp *et al.* (1974), Furness (1987), Benn *et al.* (1989), Lloyd *et al.* (1991), Walsh *et al.* (1993), Walsh *et al.* (1994), Thompson *et al.* (1996), Hagemeijer & Blair (1997), Thompson *et al.* (1997), Mead (2000) and Mitchell *et al.* (2004).

4. Methods

The European Seabirds at Sea (ESAS) dataset (Version 3.1) was used to generate all effort-related and seabird distribution/density maps in sections 5 and 6. The ESAS database, which is maintained and updated by the JNCC, includes sightings data collected from northwest European waters between 1979 and 2003. Although other studies have utilized ESAS aerial survey data (Tasker *et al.*, 1990; Webb *et al.*, 1990; Barton *et al.*, 1994; Skov *et al.*, 1995; Stone *et al.*, 1995; Pollock *et al.*, 1997; Pollock *et al.*, 2000; Reid *et al.*, 2001), the current study has drawn from data generated solely from standard ship-based surveys using 200m and 300m transect strip-widths. The primary ship-based survey method is outlined by Tasker *et al.* (1984) and Webb & Durinck (1992).

The method generally consists of a strip-transect survey (Buckland *et al*., 2001) conducted by a single experienced scientific observer from various European institutions (e.g. JNCC, CMRC, NIOZ). The observer records survey effort, environmental conditions (e.g. glare, water depth, wind strength, swell height), positional data, and sightings of the various species encountered in a 90° arc to one side of the vessel's trackline. Surveys were conducted year-round on "vessels of opportunity" (e.g. international research vessels, naval vessels, fishing and fishery protection vessels), which were scheduled to be at sea in the study area for a period of days or weeks, and whose hosts were able to provide a spare berth for one or more observers. Only data collected in sea conditions no greater than Beaufort Force 6 were analysed.
The effort-related and seabird distribution data gathered during full surveys form the basis of the respective survey effort and seabird density plots generated using ArcGIS (Version 8.1). These are displayed as ¼ International Council for the Exploration of the Sea (ICES) area units, each measuring 15' latitude x 30' longitude. These area blocks are the units of coverage used by the JNCC and other international research groups as a standard means of displaying survey effort and seabird relative abundance and density, thereby allowing the direct comparison of international research results.

4.1 Survey Effort

The full survey effort (km^2) for each ¼ ICES square depicted in Figures 5.1 and 5.2 was calculated by multiplying the total number of kilometres of trackline surveyed, using the standard full survey method, by 0.2 or 0.3 to account for the respective 200m and 300m transect strip-widths.

4.2 Species Density Maps

The seasonal distribution of all commonly encountered coastal and offshore seabird species is represented using species density maps (Figures 6.1-6.12 & 6.14-6.26). Densities (number of birds/km^2) were calculated by dividing the number of birds recorded in transect by the transect area surveyed. Each density value was then multiplied by the appropriate correction factor listed in Stone *et al.* (1995) to compensate for variations in species visibility. Seabirds deemed to be associated with the survey vessel and neighbouring fishing vessels, were not included in density analyses. The underlying grey shaded region on each species density map represents the combined study area depicted in Figure 2.1.

4.4 Relative Abundance Map

To highlight the limitations of a species density plot, a map depicting the annual relative abundance of the Long-tailed Skua has been included (Figure 6.13). Relative abundances for each ¼ ICES square were calculated by dividing the number of birds recorded, both in and out of the 200m and 300m transect strips, by the number of kilometres of trackline covered during full survey (i.e. number of birds/km). Correction factors are not applicable to relative

abundance analysis. Seabirds deemed to be associated with the survey vessel and neighbouring fishing vessels, were not included in the relative abundance analysis. The underlying grey shaded region on each species density map represents the combined study area depicted in Figure 2.1.

4.4 Seasonal Definition

The seasons were initially based on seasonal daylight levels and average sea surface temperatures for the west of Ireland (Bowyer & Ward, 1995; Boelens *et al*., 1999). The breeding season was allocated an extra month (i.e. July) to allow for the coastal distribution patterns that are characteristic of the period between April and July. Table 4.1 outlines the months designated to each season.

Table 4.1. Months designated for each season.

Season	Months
Winter	January, February, March
Breeding	April, May, June, July
Post-breeding	August, September
Autumn	October, November, December

4.5. Bathymetric Contours

Bathymetric contours in all associated survey effort, relative abundance and density maps are represented in the following manner:

_____200m isobath	___ _ _ ___ 500m isobath
__ __ __ __ __ __1000m isobath	---------- 4000m isobath

5. Survey Summary

Full ship-based surveys were conducted in the study area between July 1980 and August 2003. Approximately 83% of all the survey effort conducted was achieved by the JNCC, 11% by the CMRC based in Cork, and the remaining 6% was driven by various Dutch institutions (e.g. NIOZ & Instituut Bos en NatuurOnderzoek).

Figure 5.1 outlines the full transect survey effort achieved for SEA areas 6, 7 and 8 and the waters of the Irish designated area. The map represents a total of 105,235km^2 of survey area, approximately 65% of which were obtained during the breeding and post-breeding period (April - September) (Figures 5.2b & 5.2c). The limited level of survey effort achieved during autumn and winter months (October - March) (Figures 5.2a & 5.2d), was largely due to reduced sea-going opportunities, poor climatic conditions and the relative low number of available daylight hours.

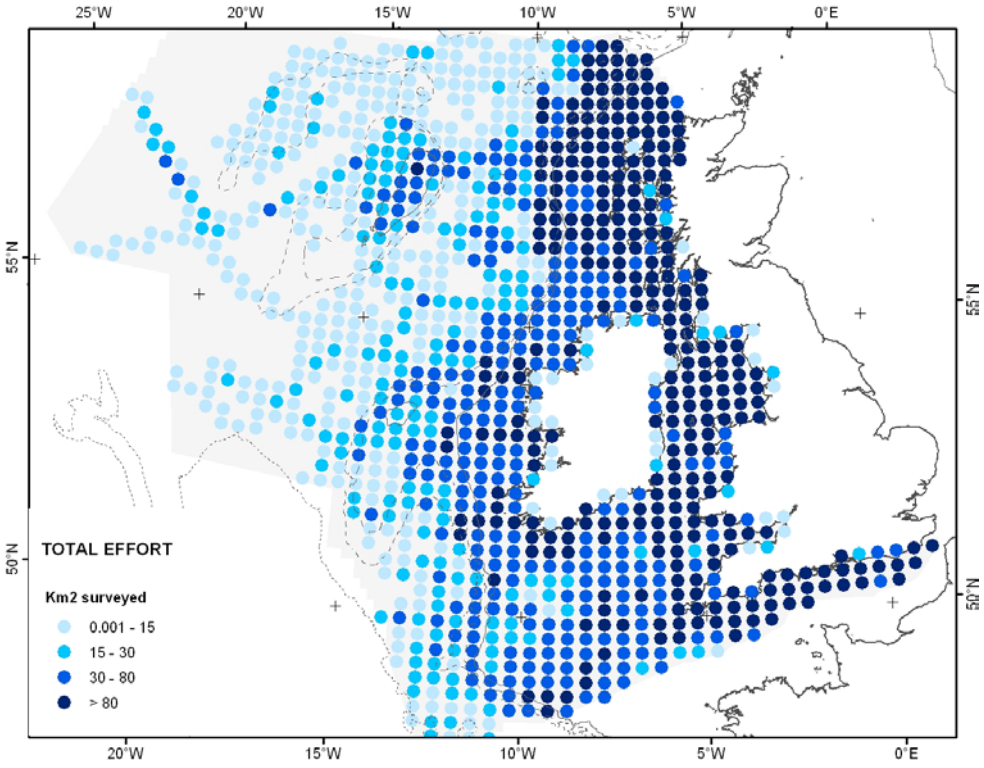

Figure 5.1. Total full survey effort (km^2 surveyed) conducted during ship-based surveys in SEA areas 6, 7 and 8 and the IDA, 1980-2003.

The coastal and shelf habitats associated with Hebrides Shelf, the Western Isles, through the North Channel, Irish Sea, St George's Channel and the Bristol Channel, and across the northern sector of the Celtic Sea and the English Channel have received substantial levels of survey effort (i.e. >80km^2) during the 23-year study period. More recently, surveys have concentrated on investigating the offshore seabird populations of Irish Atlantic Margin. As a result, moderately high levels of survey effort (i.e. >30km^2) have been achieved over the Irish Shelf, Malin Shelf, the southern sector of the Celtic Shelf out to the Goban Spur and the north of the Porcupine Seabight, and across the northern sector of the Rockall Trough and the Anton Dohrn Seamount to Rockall and across the Rockall Bank. Low to moderate

(i.e. <30km^2) levels of survey effort were also achieved over the Lousy Bank, Rosemary Bank, George Bligh Bank, Hatton Bank, Hatton-Rockall Basin, the southern and central sectors of the Rockall Trough and the Porcupine Bank, the Porcupine Seabight down to the slope-related waters of the Goban Spur.

With the aims of the various studies in mind, it is not surprising to note that the waters associated with many of the important seabird colonies to the west of Britain and, to a lesser extent, around the Irish coast have received high levels of survey effort. These include the many island and coastal colonies to the west and northwest of Scotland (e.g. St Kilda, Flannan Isles, Ailsa Craig, Rhum, Handa, North Rona, Sula Sgeir), in and along the Irish Sea (e.g. the Calf of Man, Bardsey), off southwest Wales (e.g. Skokholm, Skomer and Grassholm) and off southwest England (e.g. Lundy, Isles of Scilly). Greater than 80km^2 was also achieved in close proximity to important breeding colonies along Ireland's east coast (e.g. Lambay Island, Rockabill and Lady's Island Lake, the Saltees), west coast (e.g. the Cow & Bull Rocks, the Skelligs, the Blasket Islands, the Cliffs of Moher, the Stags of Broadhaven) and north coast (e.g. Horn Head, Rathlin Island, Copeland Islands).

Figure 5.2 highlights the seasonal differences in the spatial coverage. The most spatially extensive surveys were achieved during the breeding season (April-July), where the effort extended from the English Channel, over the Porcupine Bank, Porcupine Seabight and the Goban Spur, the Irish and Celtic Seas, north to the Western Isles, west to the Rockall and Hatton Banks, and the southern sector of the Rockall-Hatton region beyond the eastern shelf of the Iceland Basin (Figure 5.2b). The Rockall Bank was also comprehensively surveyed during the post-breeding season, together with the surrounding waters of the Western Isles, the length of the continental shelf and shelf edge, the Irish and Celtic Sea Fronts and the deepwater regions of the Rockall Trough and west of the Goban Spur (Figure 5.2c).

Autumn and winter surveys were generally restricted to shelf water habitats. Offshore autumn surveys in slope and deepwater habitats were confined to the general area northwest and west of the Hebrides Shelf, with lower levels of effort attained in the Porcupine Seabight-Goban Spur region and west of the Malin Shelf-Irish shelf region (Figure 5.2d). In addition to the area covered during autumn surveys, winter effort extended to the Porcupine Bank and across the northern sector of the Rockall Trough to the Rockall Bank and George Bligh Bank (Figure 5.2a). Surveys along the Larne-Fleetwood, Dublin-Hollyhead and Rosslare-Pembroke Dock ferry routes were conducted during all seasons (Figures 5.2a-d).

Although a vast amount of survey coverage has been achieved within SEA area 6, 7 & 8 and the IDA, there is a need for an ongoing survey programme to ensure that any long-term trends and short-term fluctuations in offshore seabird distribution and abundance may be detected and assessed. Emphasis when planning future surveys should be placed on those regions where spatial and temporal gaps exist in survey effort (*see* Figure 5.2).

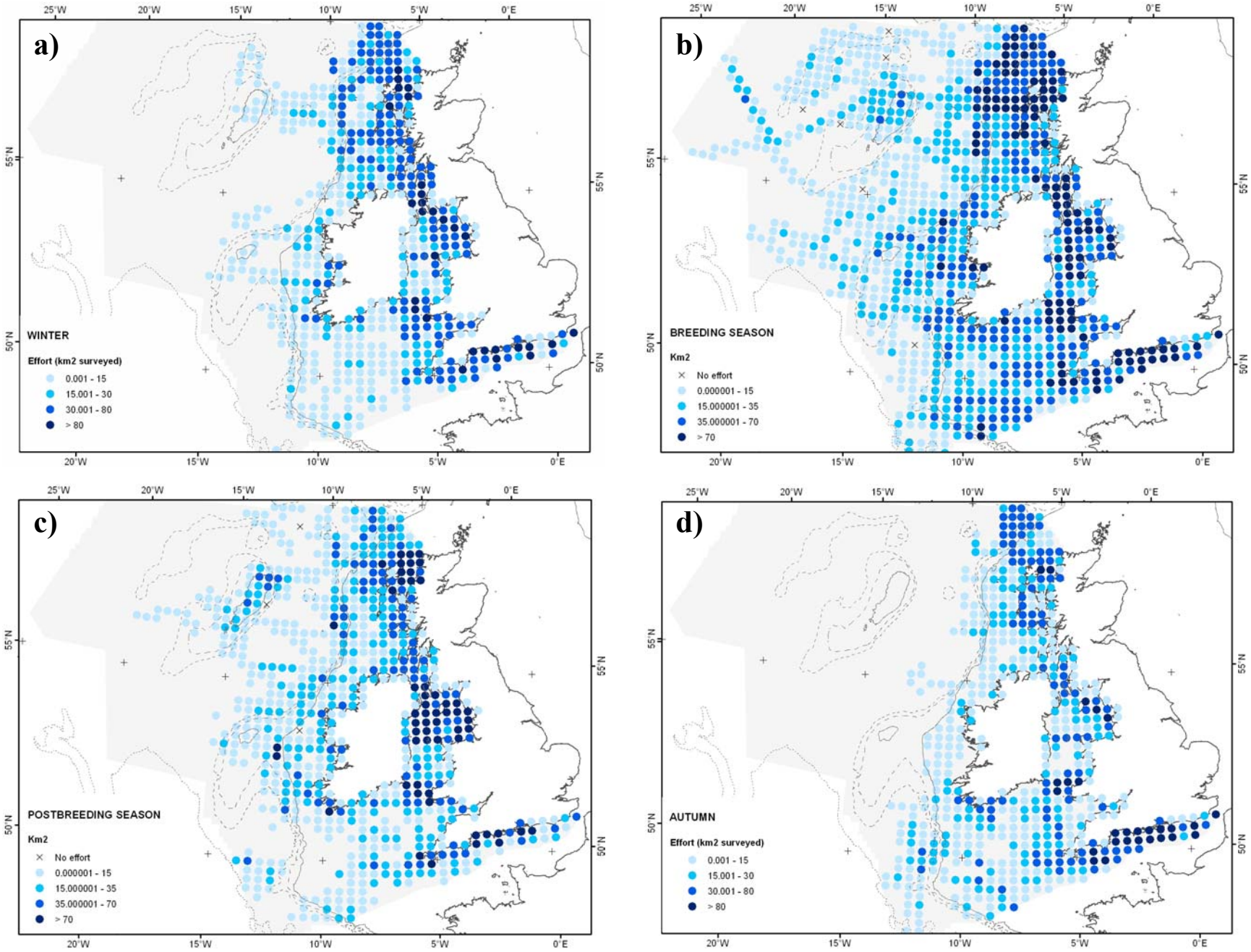

Figure 5.2. Seasonal full survey effort (km^2 surveyed) conducted from ship-based surveys in SEA areas 6, 7 & 8 and the IDA, 1980-2003.

6. Species Distribution and Density

This section summarises the seasonal distribution and density (birds/km^2) of the 25 seabird species regularly recorded in the coastal and offshore regions of SEA areas 6, 7 and 8 and the IDA between July 1980 and August 2003. To avoid repetition, all general comments regarding the following density/distribution maps have not been specifically referenced. Unless stated otherwise, greater detail regarding the maps and the related descriptive comments is discussed in one of the following reports: Tasker *et al.* (1990); Stone *et al.* (1995); Webb *et al.* (1995); Pollock *et al.* (1997); Pollock *et al.* (2000); Mackey (2003); Mackey *et al.* (2003); Mackey *et al.* (2004). Uncorrected total numbers of each species recorded during standard ship-based surveys in SEA areas 6, 7 and 8 and the IDA between 1980 and 2003 are listed in the Appendix (Section 10).

The maps represent only those records collected during standard strip transect surveys using 300m and 200m strip widths (Tasker *et al.*, 1984; Webb & Durinck, 1992). Sightings data recorded within the transect area may be analysed to determine spatial and temporal variations in population densities. Although seabird records collected outside the transect area can be included in relative abundance (birds/km) and general distribution analyses, they cannot be not considered for density analyses. As such, caution must be applied when interpreting the following density maps for the general distribution of offshore seabird populations. Figure 6.13 has been included to highlight the differences between density and relative abundance plots. Seasonal relative abundance and general sighting plots are available in some of the reports listed in section 3 (e.g. Stone *et al.*, 1995; Pollock *et al.*, 1997; Mackey *et al.*, 2003). Variations in the monthly relative abundance of commonly encountered seabird species of the Irish Atlantic Margin were plotted on histograms by Mackey *et al.* (2004). Caution must also be applied when comparing the following seasonal density maps, as the upper limit for each colour-coded density value can vary significantly between species. The locations of important British and Irish seabird breeding colonies referred to in the following text are depicted in Webb *et al.* (1990), Lloyd *et al.* (1991), Pollock *et al.* (1997), Pollock *et al.* (2000) and Boelens *et al.* (1999).

Seabird species that were occasionally recorded at the northern (Cory's Shearwater (*Calonectris diomedea*), Wilson's Petrel (*Oceanites oceanicus*)) or southern (e.g. Little Auk (*Alle alle*), Brünnich's Guillemot (*Uria lomvia*)) extremes of their distribution were not included in the following analysis. Other species that were rarely encountered during annual migrations through the study area (e.g. Sabine's Gull (*Larus sabini*)) were also omitted from the following analysis.

Northern Fulmar *Fulmarus glacialis*

The Northern Fulmar is a common resident along British and Irish coastlines, whose breeding range has expanded rapidly in the northeast Atlantic during the last century (Lloyd *et al.*, 1991; IRBC, 1998). This highly pelagic seabird was the most frequently recorded and the most widespread species, where it was recorded throughout most of the study area during all seasons (Figure 6.1). Although the sighting frequency of the Northern Fulmar decreased south of 50°N, they remained relatively widespread at southern latitudes west of 11°W during the breeding season. This general pattern was observed by Evans (1981) Bourne (1986), Stone *et al.* (1995), Pollock (1997) and Mackey *et al.* (2004). Investigations into seabird distribution around the Faroe and Shetland Islands also reported the numerical dominance of the Northern Fulmar (Bloor *et al.*, 1996; Taylor & Reid, 2001; Skov *et al.*, 2002).

Reid *et al.* (2001) also reported relatively high numbers of Northern Fulmar in an analysis of habitat associations along the Atlantic Frontier, north and west of Scotland. Although Northern Fulmars were routinely recorded over shelf, slope and deepwater habitats, Reid *et al.* (2001) also reported that over 75% of Northern Fulmars were recorded over slope/oceanic waters; the only commonly recorded seabird species to display an overall preference for non-shelf habitats. This relationship is illustrated in Figure 6.1, particularly during the breeding season and winter.

Great Shearwater *Puffinus gravis*
The Great Shearwater (cover plate) is a summer transequatorial migrant that breeds exclusively on islands in the South Atlantic (e.g. Tristan de Cunha). Offshore sightings of this long-distance migrant in British and Irish waters are generally recorded between July and November (Figure 6.2). Although Stone *et al.* (1995) reported low concentrations over the shelf waters of the Celtic Sea and west of Ireland, the Great Shearwater was generally observed in varying concentrations over the Rockall Trough and the Rockall Bank during the postbreeding period (Mackey *et al*., 2004) and along the continental slope north of the Western Isles (Pollock *et al.*, 2000), west of Ireland and the Goban Spur-Porcupine Seabight region and off Cornwall particularly during August (Webb *et al.*, 1995; Mackey *et al.*, 2004). The winter records represent single birds observed close to the shelf break west of the Western Isles in January and February (Pollock *et al.*, 2000).

Sooty Shearwater *Puffinus griseus*
The Sooty Shearwater is a passage migrant that breeds on islands in the southern Pacific and Atlantic Oceans. The Sooty Shearwater was routinely recorded in varying concentrations between July and November, although occasional records were also noted between January and December (Figure 6.3). The distribution of this highly pelagic species was more widespread over the Rockall and Porcupine Banks, the Rockall Trough and north of the Western Isles than the co-transequatorial migrant, the Great Shearwater, particularly during the postbreeding season (*compare* Figures 6.2 & 6.3). Peak numbers were recorded during August in close proximity to the island of Rockall (Mackey *et al.*, 2004), in the Minch (Stone *et al.*, 1995) and over the Wyville-Thomson Ridge (Pollock *et al.*, 2000). Pollock *et al.*, (1997) reported highest numbers off the southwest Irish coast during September and October.

Manx Shearwater *Puffinus puffinus*
The Manx Shearwater is a common local breeder and passage migrant that are regularly recorded between March and October (IRBC, 1998). The breeding distribution of this long distance migrant is largely restricted to northwestern Europe, where the largest concentrations are located along the west coasts of Britain and Ireland (Mitchell *et al.*, 2004). It comes as no surprise then that the Manx Shearwater was the most numerous and frequently encountered shearwater species in the study area. It was also the third most numerous seabird species recorded throughout the study period. Highest concentrations were recorded during the breeding and postbreeding seasons in close proximity to the important breeding colonies off Britain (Rhum, Skokholm and Skomer) and Ireland (Blasket Islands, Great Skellig and Puffin Island (Co. Kerry), Cruagh (Co. Galway), Copeland Island (Co. Down)) (Figure 6.4). Variable concentrations were also observed within foraging distance of these breeding colonies (~450km: Coulson, 2002). While low densities were recorded over the deep waters of the Rockall Trough, moderate to high densities were observed over the Rockall Bank during breeding and postbreeding seasons. The relatively high numbers reported by Mackey *et al.* (2003) in close association with the offshore island of Rockall during late May, may have related to immature non-breeding birds. The majority of the European Manx Shearwater population spend the winter/autumn months at sea off the South American coast (Brooke,

1990). As such, winter and autumn records are limited and were restricted to occasional sightings to the west of Scotland, over the Irish Sea, along the northern slope of the Porcupine Seabight and close to the Irish coastline. Most of these records probably relate to birds returning early to breeding colonies in March and those birds departing late for southern wintering grounds during October.

European Storm-petrel *Hydrobates pelagicus*
The European Storm-petrel is the smallest seabird breeding in Britain and Ireland. Although difficult to census, it is estimated that approximately 14% to 52% of the world's breeding population are located along British and Irish coastlines (Mitchell *et al.*, 2004). The vast majority of European Storm-petrels were recorded during the breeding and postbreeding seasons (Figure 6.5). The highest densities were observed during the breeding season over the shelf waters of the Celtic Sea and the Goban Spur, and also closely associated with the Scottish (e.g. Sula Sgeir, North Rona) and Irish breeding colonies (e.g. Blasket Islands and Great Skellig (Co. Kerry), the Cow and Bull Rocks (Co. Cork)). Interestingly, relatively low concentrations were recorded in close proximity to other sizeable colonies (e.g. Illaunmaster and Stags of Broadhaven (Co. Mayo), Skokholm). Reduced sighting frequency and lower concentrations were observed throughout the Irish Sea, over the Rockall and Porcupine Banks and beyond the continental slope between April and June.

Although the sighting frequency of European Storm-petrels over the Irish Sea and the Rockall Bank remained low during the postbreeding period, they were more prominent over the Porcupine Bank and the deep waters of the Rockall Trough particularly west of Ireland. Higher concentrations were also recorded between August and September close to the colonies at the Isles of Scilly and the Treshnish Isles. Low to moderate concentrations remained over the shelf waters of the English Channel, west and southwest of Ireland, over the Minch and west and northwest of Scotland during autumn. No European Storm-petrels were recorded in transect within the study area during winter. The lower autumn-winter sighting frequency period may be due in part to the reduced likelihood of sighting this tiny, dark-coloured seabird during the relatively poor climatic conditions.

Leach's Storm-petrel *Oceanodroma leucorhoa*
Leach's Storm-petrel is a scarce local breeder and passage migrant whose European breeding colonies are concentrated on remote islands off western Scotland, (e.g. St Kilda, North Rona and the Flannans) and off the west coast of Ireland (e.g. Stags of Broadhaven) (Mitchell *et al.*, 2004). The highest densities of Leach's Storm-petrel were recorded during the breeding and postbreeding period along the slope waters of the Hebrides Shelf, the Rosemary Bank and the Ymir Ridge, northwest of their Western Isles breeding colonies (Figure 6.6). Occasional sightings were also recorded over the deep waters of the Rockall Trough and the Rockall Bank. Autumn records were limited to the eastern edge of the Porcupine Seabight, west of Britain and east of the Solent. Leach's Storm-petrel was not recorded in transect in the study area between January and March.

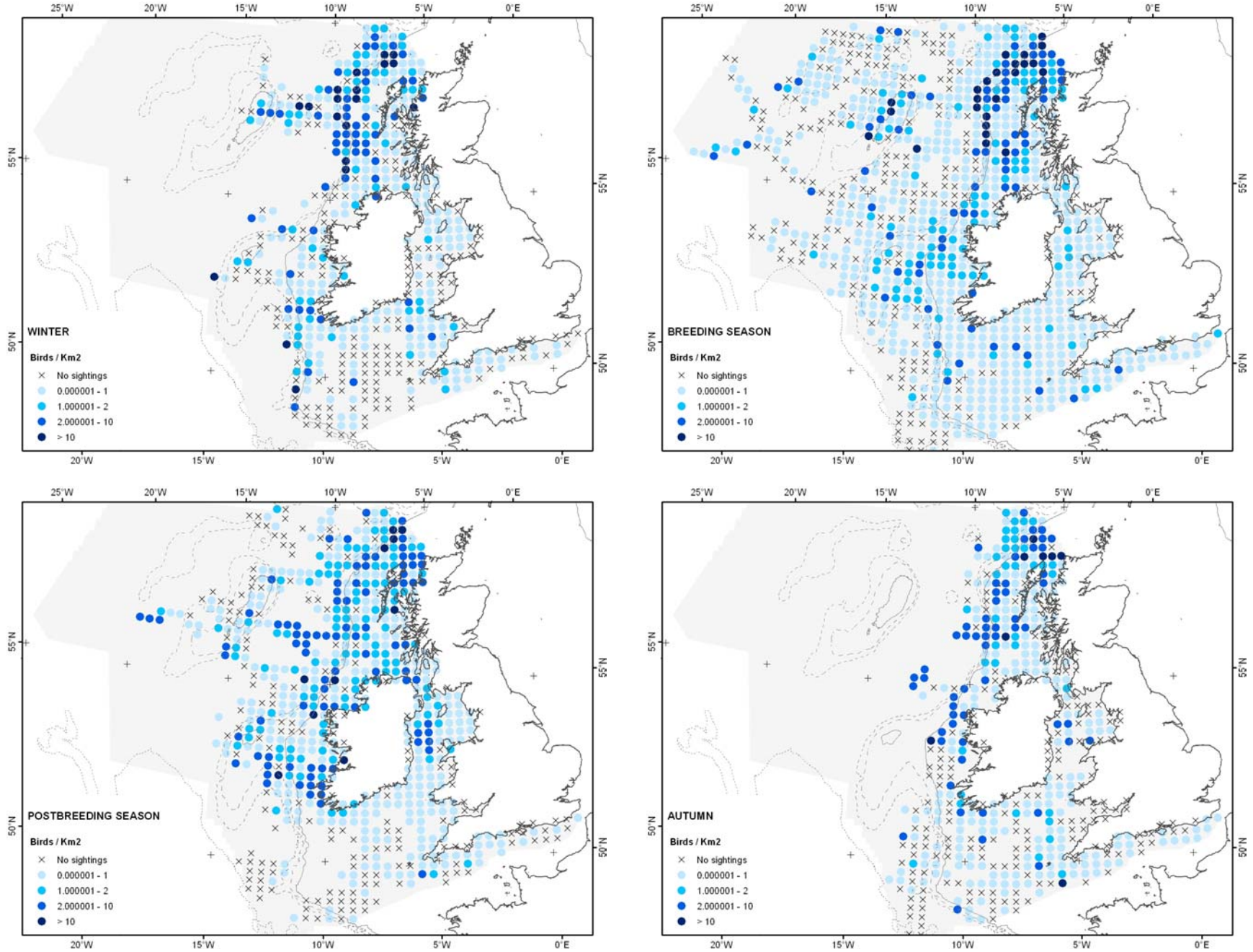

Figure 6.1. Seasonal distribution and density of the Northern Fulmar within SEA areas 6, 7 & 8 and the IDA, 1980-2003.

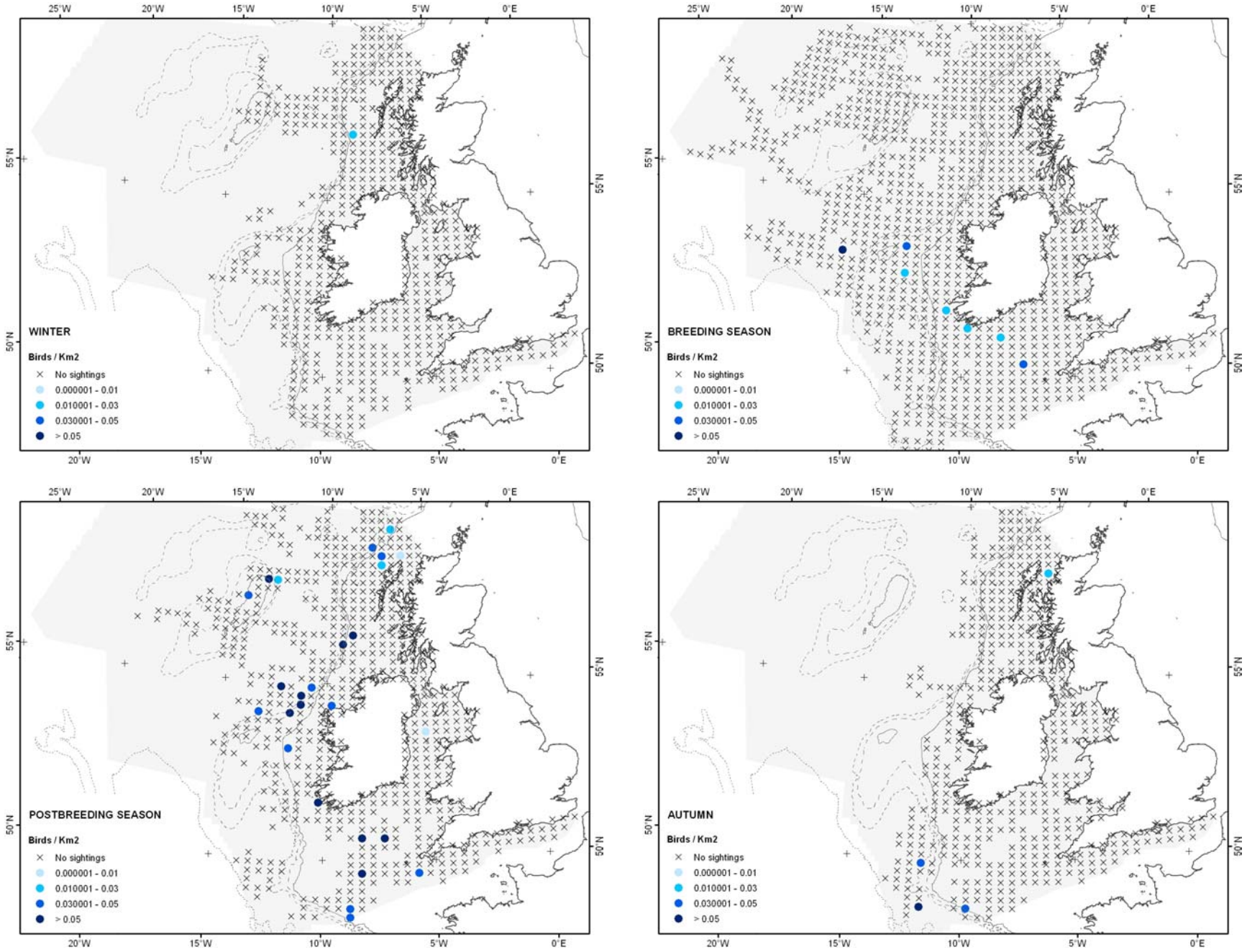

Figure 6.2. Seasonal distribution and density of the Great Shearwater within SEA areas 6, 7 & 8 and the IDA, 1980-2003.

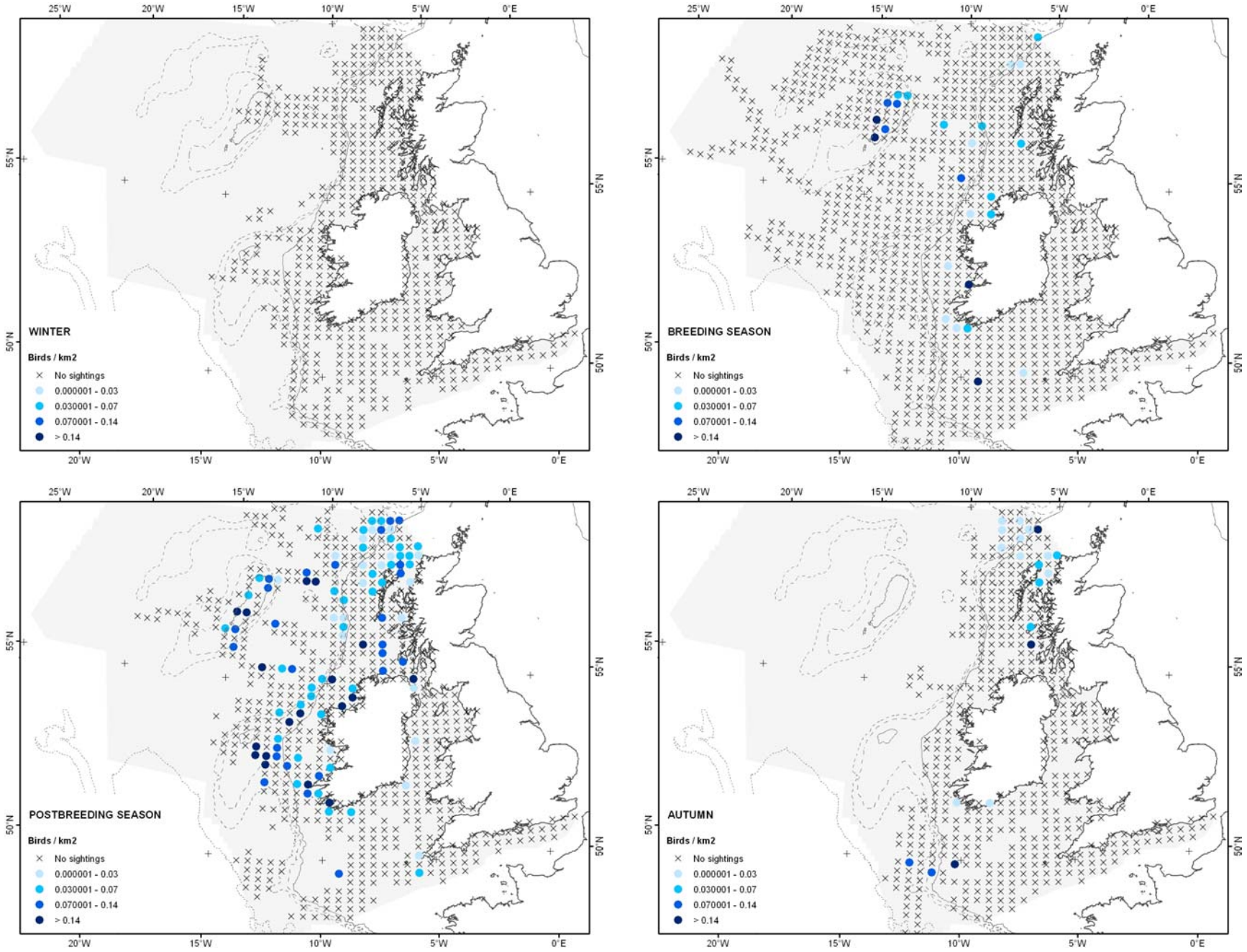

Figure 6.3. Seasonal distribution and density of the Sooty Shearwater within SEA areas 6, 7 & 8 and the IDA, 1980-2003.

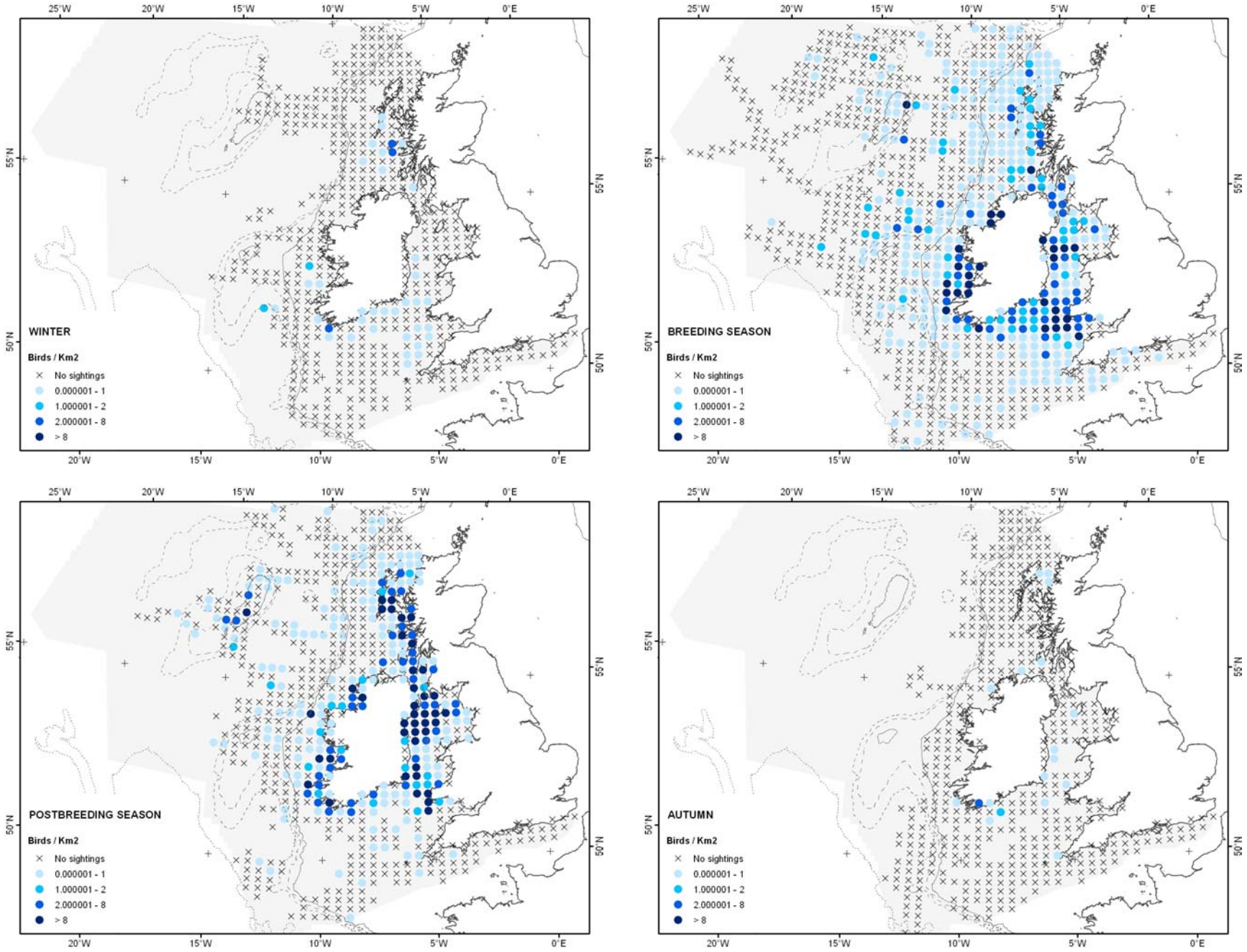

Figure 6.4. Seasonal distribution and density of the Manx Shearwater within SEA areas 6, 7 & 8 and the IDA, 1980-2003.

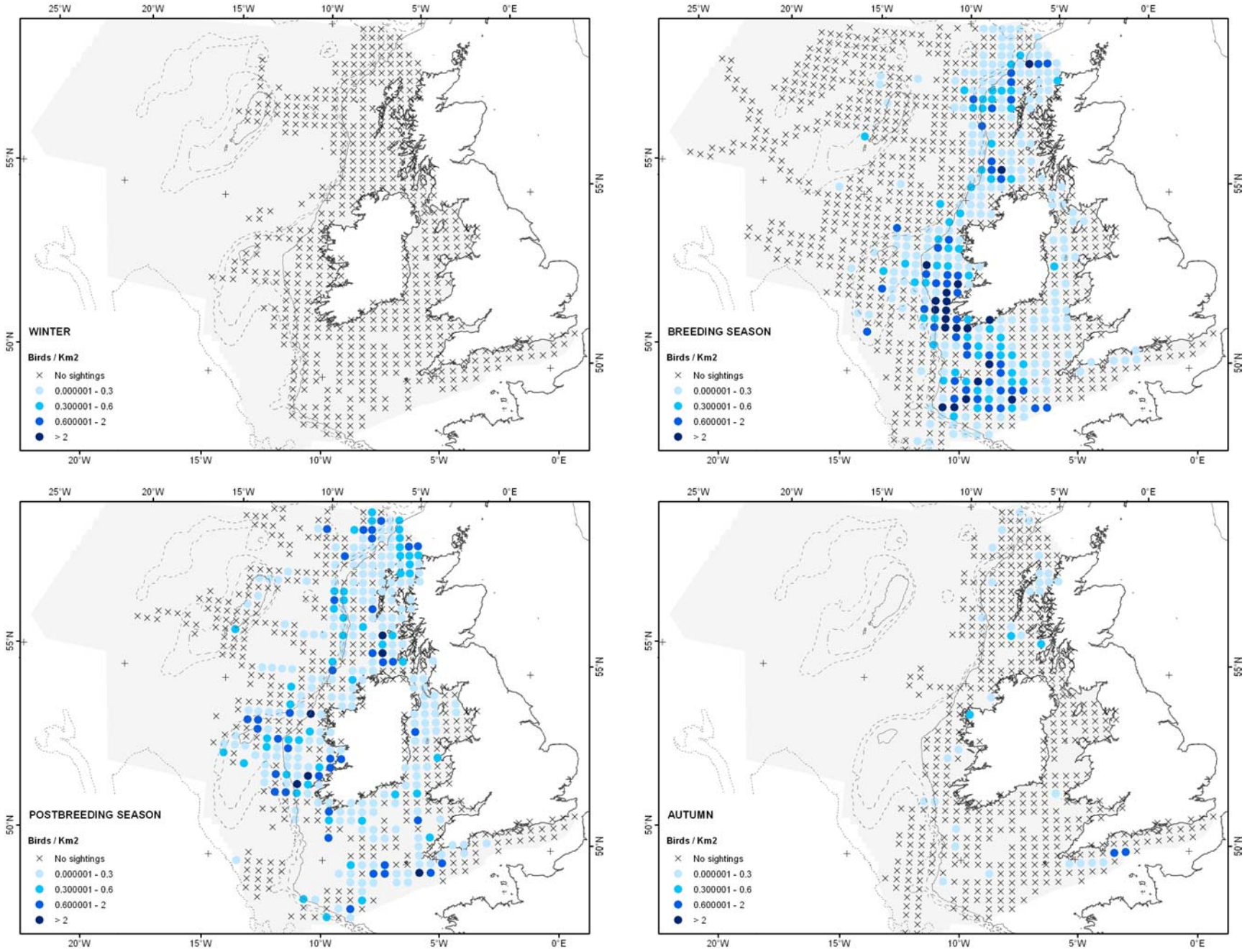

Figure 6.5. Seasonal distribution and density of the European Storm-petrel within SEA areas 6, 7 & 8 and the IDA, 1980-2003.

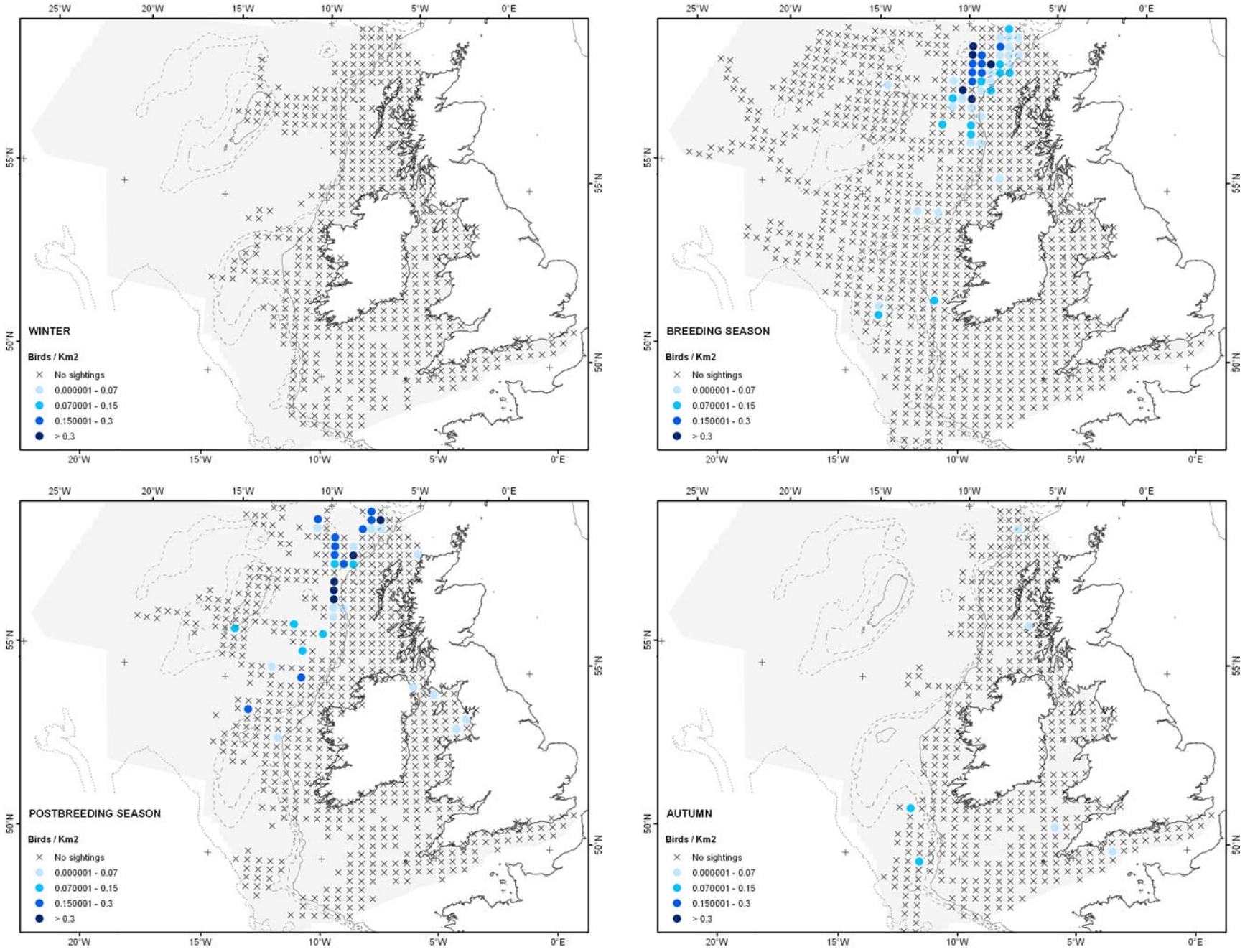

Figure 6.6. Seasonal distribution and density of the Leach's Storm-petrel within SEA areas 6, 7 & 8 and the IDA, 1980-2003.

Northern Gannet *Morus bassanus*
The Northern Gannet is the largest of Europe's seabirds. This prominent species, widely known for its spectacular diving behaviour, breeds on both mainland cliffs and remote islands off Scotland (e.g. St Kilda, Sula Sgeir, Ailsa Craig) and Ireland (e.g. Little Skellig (Co. Kerry), Bull Rock (Co. Cork)) (Lloyd *et al.*, 1991). British and Irish colonies support approximately 67.5% of the world's growing breeding population (Mitchell *et al.*, 2004). The Northern Gannet was the second most numerous and frequently encountered seabird species throughout the 23-year study period in SEA areas 6, 7 and 8 and the IDA. It was widely distributed over shelf and slope habitats in all seasons (Figure 6.7). Offshore encounters in the Rockall-Hatton region, which were limited to breeding and postbreeding seasons, probably involved juvenile and non-breeding adults. The highest densities of Northern Gannets were recorded in close proximity to or within foraging distance (~450km: Coulson, 2002) of the major gannetries of St Kilda, Sula Sgeir, Grassholm, Ailsa Craig, Little Skellig (Co. Kerry) and the Bull Rock (Co. Cork). The relatively high winter densities are due to the concentration of birds close to breeding colonies as they return from African wintering grounds in February and March (Tasker *et al.*, 1990).

Great Cormorant *Phalacrocorax carbo*
The Great Cormorant has a worldwide distribution, with close to a quarter of the nominate European subspecies, *P.c.carbo*, population breeding in Britain and Ireland (Mitchell *et al.*, 2004). The limited number of records of Great Cormorants reflects the under-representation of coastal seabird species during offshore surveys. Great Cormorants were observed along most coastlines within the study area (Figure 6.8). No variation in seasonal distribution was apparent for this resident species. Highest concentrations were associated with the relatively large breeding colonies, which are scattered along most coastlines (Mitchell *et al.*, 2004).

European Shag *Phalacrocorax aristotelis*
The European Shag is a resident breeder whose colonies are widespread along the British and Irish coastlines within the SEA areas 6, 7 & 8 and the IDA (Lloyd *et al.*, 1991). British and Irish breeding populations account for approximately 45% of the world's population (Mitchell *et al.*, 2004). Like the Great Cormorant, the European Shag is generally associated with inshore waters. The constant presence of European Shags along British and Irish coastlines throughout the year reflects its resident status (Figure 6.9). The clustered coastal distribution of sightings also reflects the distribution of European Shag breeding colonies, which are concentrated along the western Scottish coast, throughout the Western Isles and along the west coast of Ireland.

Pomarine Skua *Stercorarius pomarinus*
The Pomarine Skua is a long-distance passage migrant that is frequently encountered during its return migration to Arctic breeding and feeding grounds (April-June) and during its outward migration to southern wintering grounds (August-October) (Furness, 1987; IRBC, 1998). It is the largest of the three small skua species that are routinely recorded in the current study area. The majority of the 557 Pomarine Skuas recorded in the study area between 1980 and 2003 were observed offshore over the Rockall Trough and the Rockall-Hatton region (Figure 6.10) during recent Irish surveys: 63% of all Pomarine Skua sightings were recorded in 2002 (Mackey *et al.*, 2003: Mackey *et al.*, 2004). The majority of breeding season records coincided with return migrations, while most of the postbreeding and autumn records were observed during the outward migration. Coastal, shelf and slope-related sightings were recorded between April and December from the Goban Spur through the Porcupine region and the Irish Sea and further north to the Minch and the Hebrides Shelf. No Pomarine Skuas were recorded in transect throughout the study area between January and March.

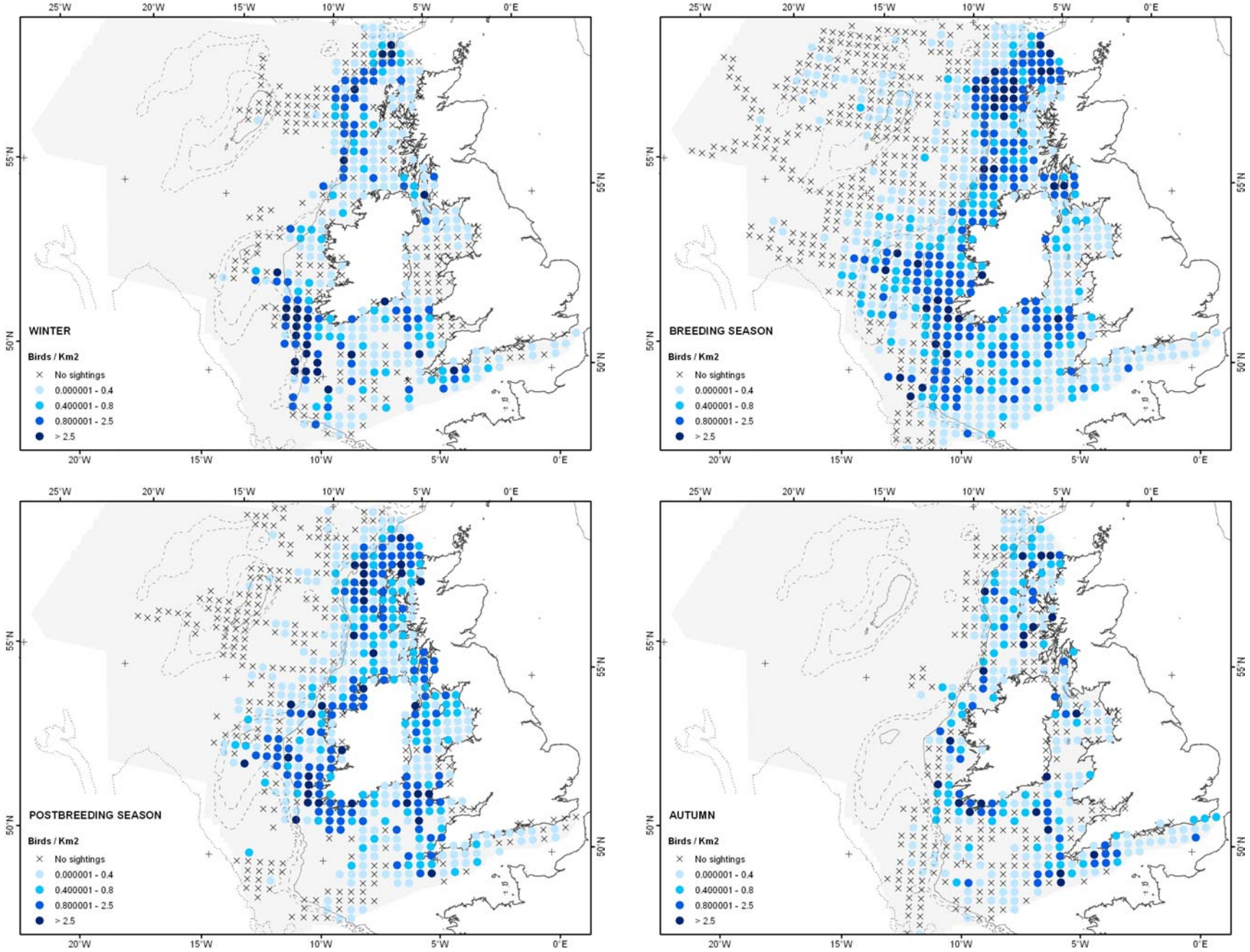

Figure 6.7. Seasonal distribution and density of the Northern Gannet within SEA areas 6, 7 & 8 and the IDA, 1980-2003.

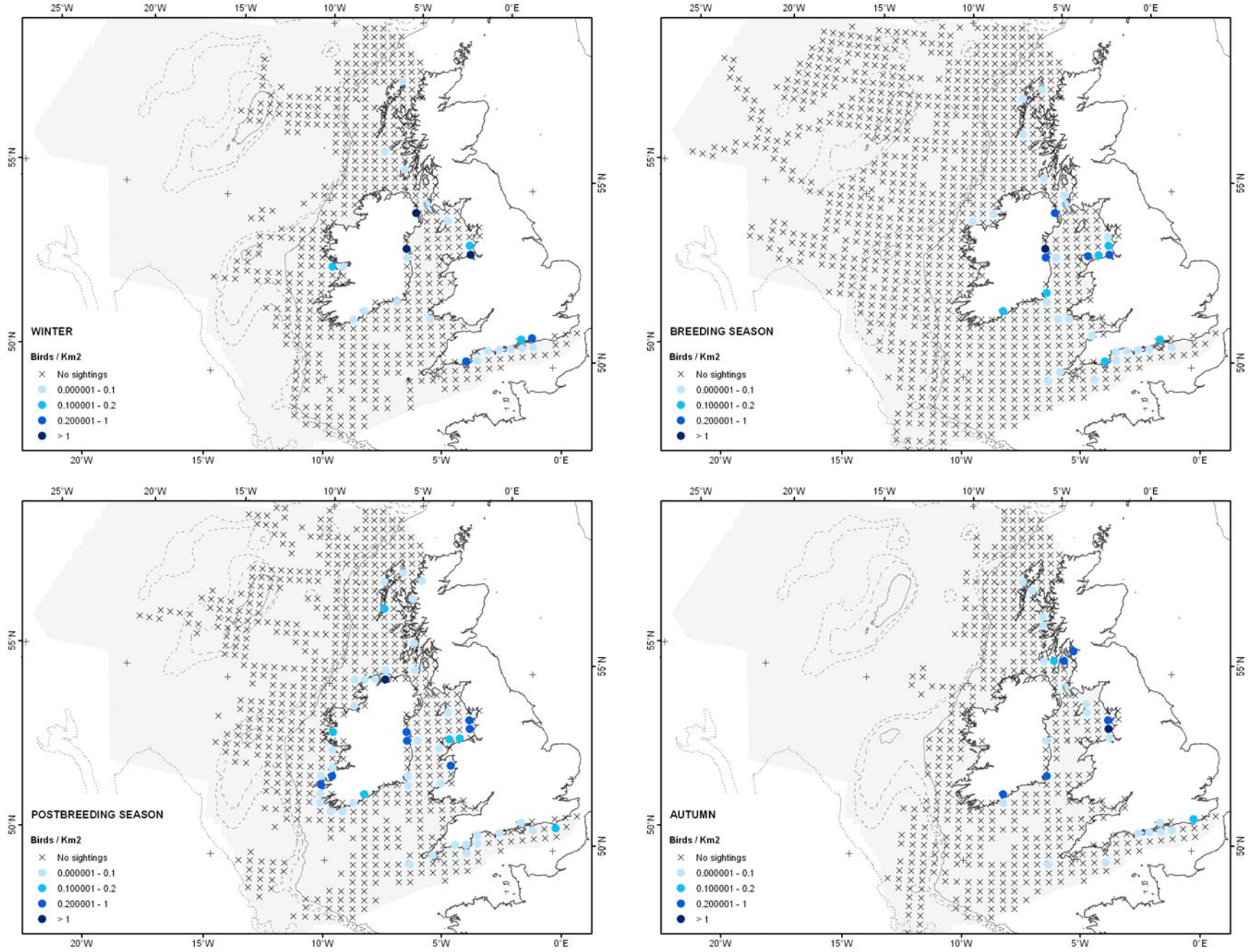

Figure 6.8. Seasonal distribution and density of the Great Cormorant within SEA areas 6, 7 & 8 and the IDA, 1980-2003.

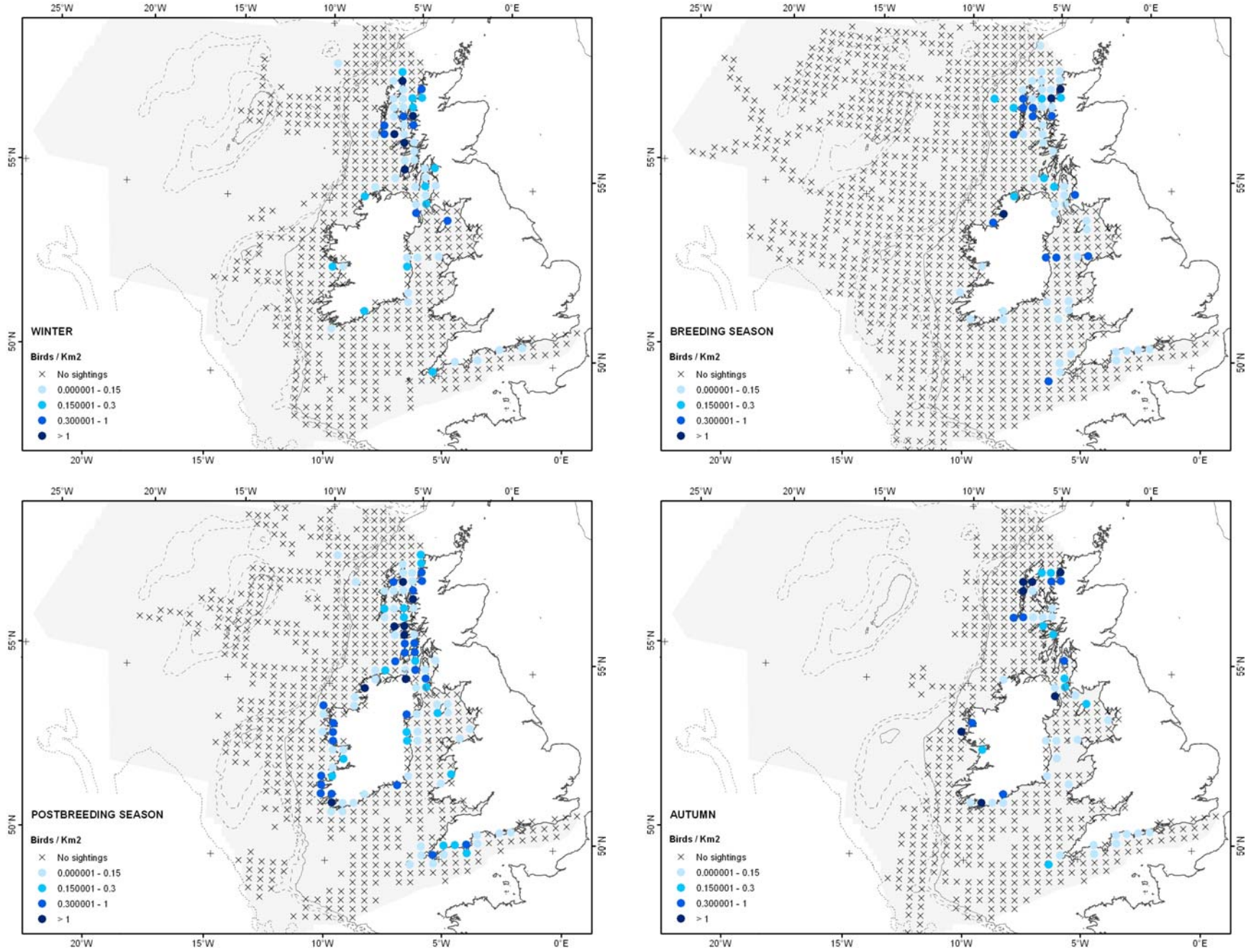

Figure 6.9. Seasonal distribution and density of the European Shag within SEA areas 6, 7 & 8 and the IDA, 1980-2003.

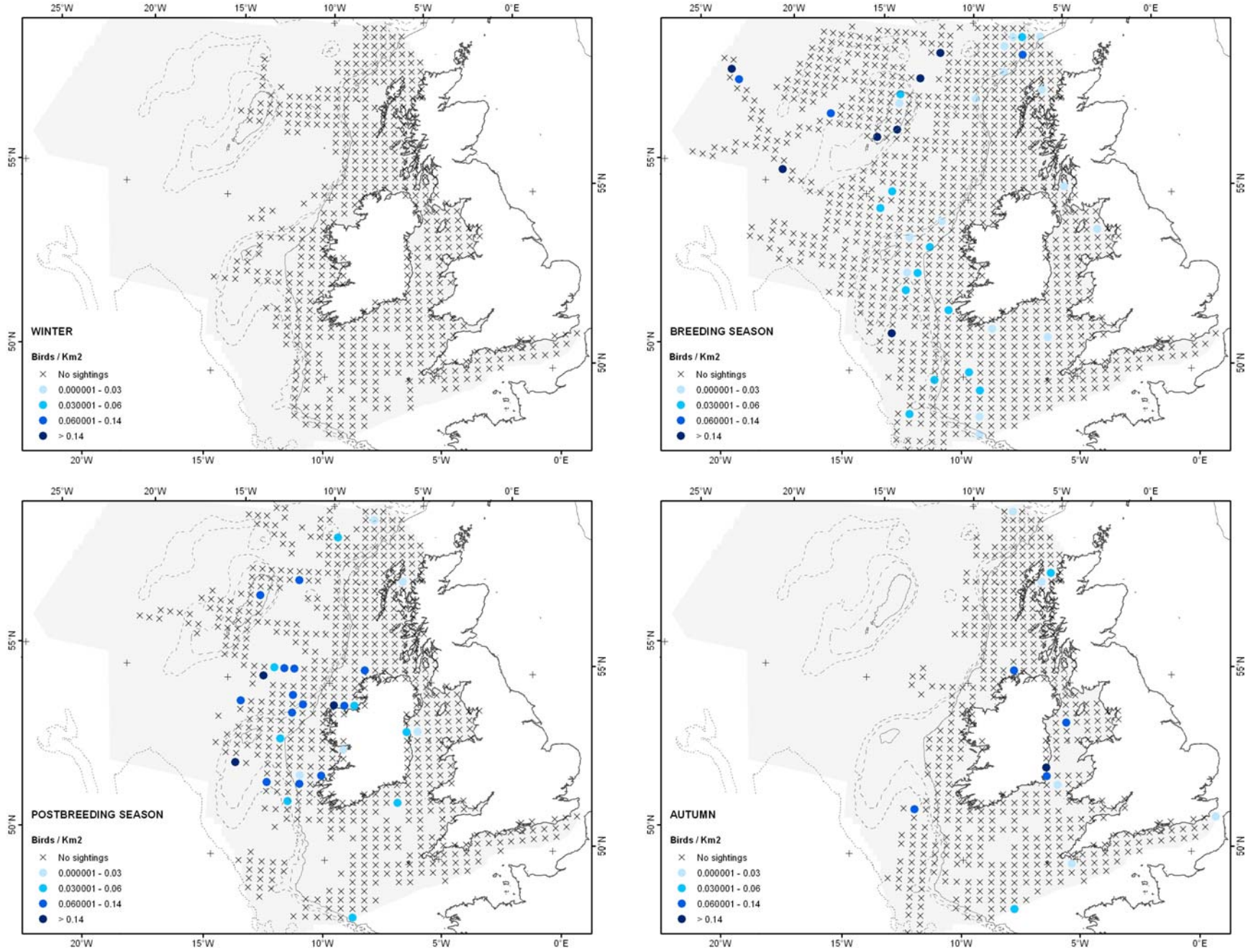

Figure 6.10. Seasonal distribution and density of the Pomarine Skua within SEA areas 6, 7 & 8 and the IDA, 1980-2003.

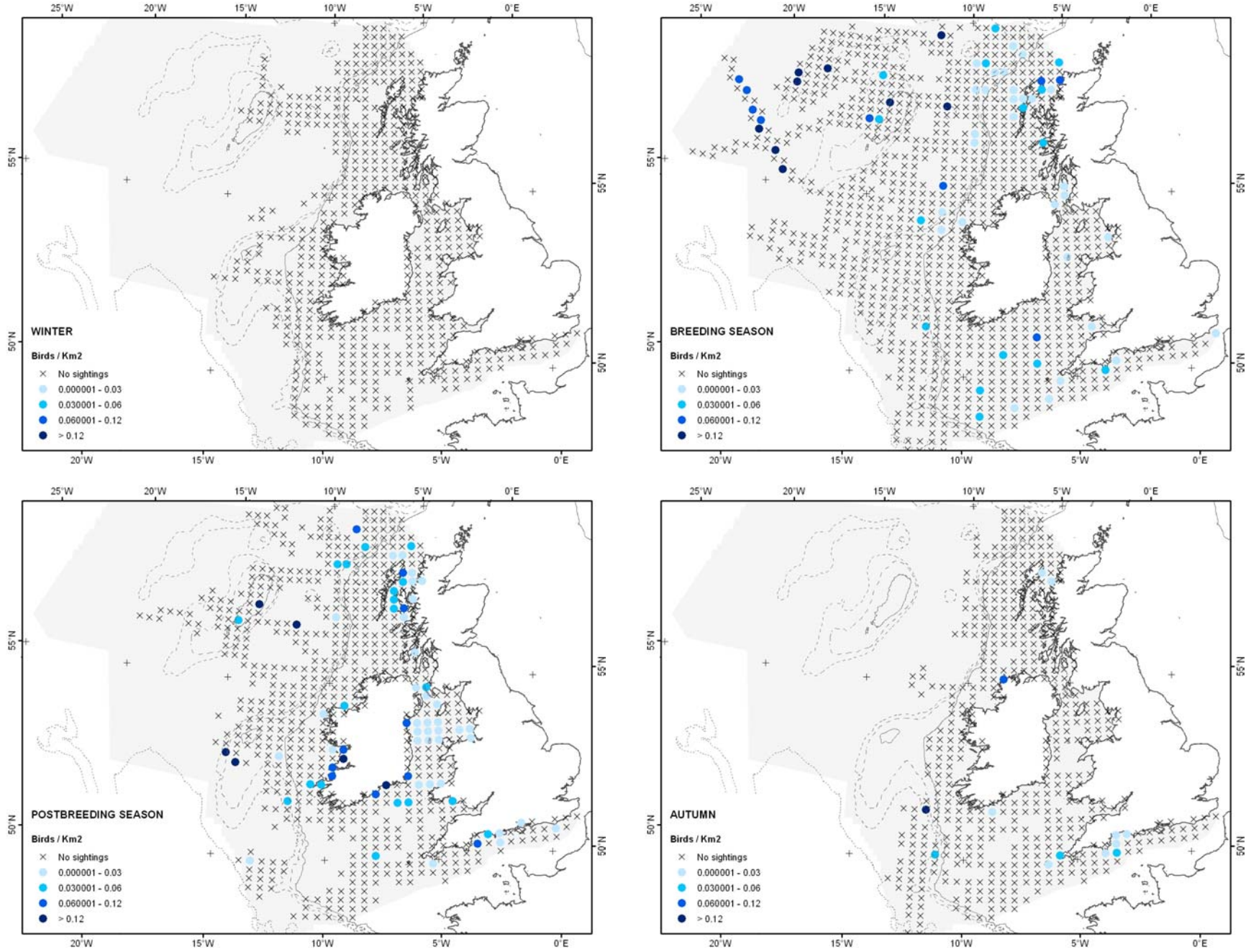

Figure 6.11. Seasonal distribution and density of the Arctic Skua within SEA areas 6, 7 & 8 and the IDA, 1980-2003.

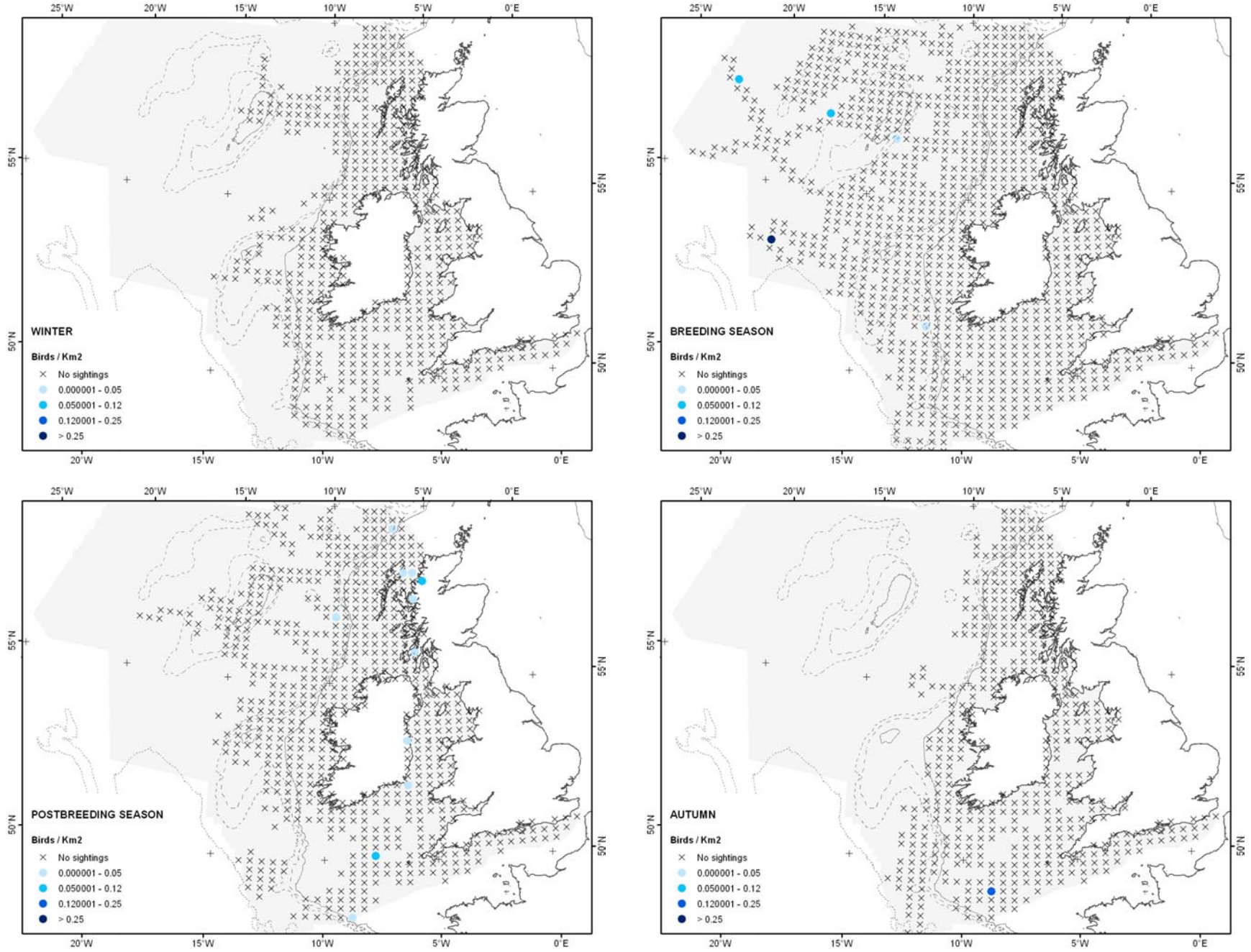

Figure 6.12. Seasonal distribution and density of the Long-tailed Skua within SEA areas 6, 7 & 8 and the IDA, 1980-2003.

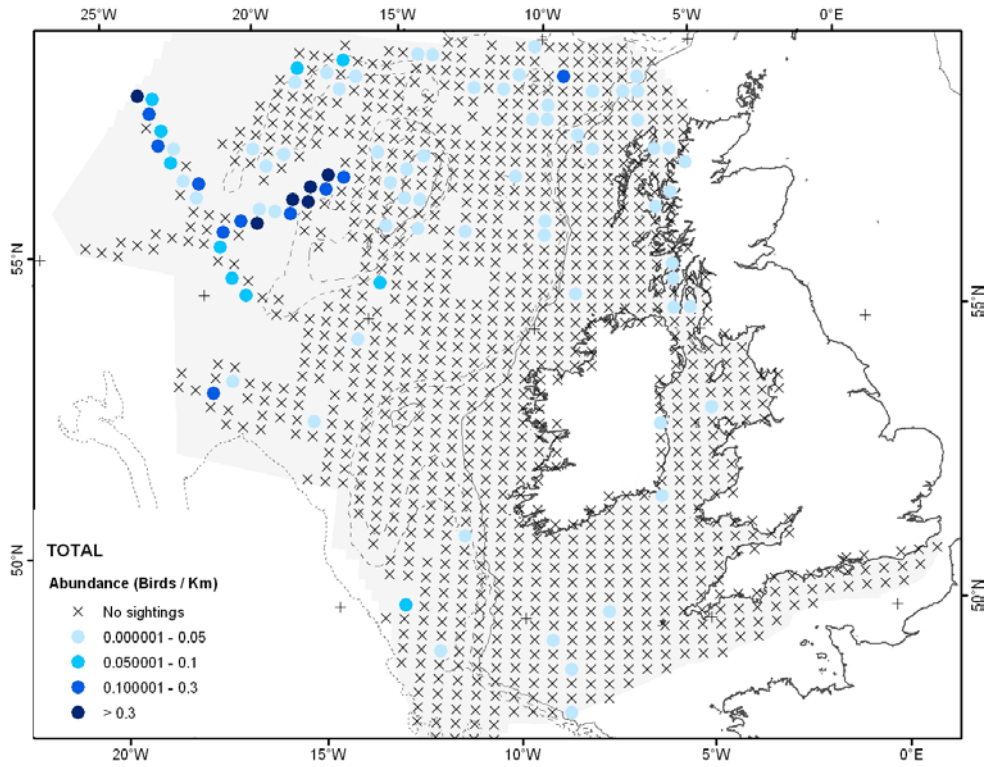

Figure 6.13. Overall relative abundance of the Long-tailed Skua within SEA areas 6, 7 & 8 and the IDA, 1980-2003.

Arctic Skua *Stercorarius parasiticus*

The Arctic Skua is the only small skua species that breeds in Britain, where colonies are located on mainland Scotland, the Western Isles, the Orkney Islands and the Shetland Islands (Lloyd *et al.*, 1991). Arctic Skuas are commonly encountered in coastal and inshore habitats during periods of migration, where they frequently employ kleptoparasitic feeding strategies (i.e. piracy) to rob the regurgitated offerings of gulls and terns (Olsen & Larsson, 1997). This relative preference for coastal regions when migrating was apparent particularly during the postbreeding season (Figure 6.11). Coastal and shelf sightings were generally of small numbers of birds, with clusters of records over the Minch, in close association with the Western Isles and Sutherland breeding grounds. Additional "shallow water" records were collected over the Irish and Celtic Seas, the English Channel and close to various locations along the Irish coastline. The highest densities of Arctic Skuas were recorded during seasonal offshore movements over the Porcupine Bank and the Rockall-Hatton region, where kleptoparasitic attacks on Black-legged Kittwakes were frequently observed (Mackey *et al.*, 2003). No Arctic Skuas were recorded in transect throughout the study area during winter months.

Long-tailed Skua *Stercorarius longicaudus*

The smallest of the three small skua species routinely encountered offshore over British and Irish waters, the Long-tailed Skua rarely approaches coastal regions during their pelagic migrations between southern wintering grounds and northern breeding grounds (Furness, 1987). The Long-tailed Skua was the least numerous of all seabird species discussed in this report. Figure 6.12 highlights this relatively low encounter rate for all seasons, with very few birds recorded in transect. Long-tailed Skuas display a relative hesitancy to approach vessels at sea, which may, in part, explain why so few birds were recorded in transect. The abundance plot

depicted in Figure 6.13 includes all Long-tail Skua sighting records (i.e. inside and outside the transect strip width). It provides a more credible image of the total distribution of this rarely encountered skua west of Britain and Ireland. It also illustrates the Long-tailed Skua's preference for offshore habitats during periods of migration. Approximately 71% of all Long-tailed Skua sightings in the study area were recorded in a three-week period in 2002, which coincided with the return migration over the Rockall-Hatton region (Mackey *et al.*, 2003). Coastal and shelf-related sightings were rare and generally limited to the west of Scotland, although occasional sightings were recorded over the Irish Sea and east of the Goban Spur.

Great Skua *Stercorarius skua*

The Great Skua, also known as the "bonxie", is a large aggressive skua species that feeds extensively by predation, kleptoparasitism and scavenging (Furness, 1987). This highly successful species is endemic to Europe, where over half the population breeds in the northern isles of Scotland (Hagemeijer & Blair, 1997). The Great Skua has recently been recorded breeding in western Ireland (Newton *et al.*, 2002; Mitchell *et al.*, 2004). The Great Skua was the most numerous, frequently encountered and widespread skua species recorded during the 23-year study period (Figure 6.14). It was also the only skua species to be recorded in transect during winter, where it was frequently recorded over the English Channel and along continental slope west and southwest of Ireland. A similar distribution pattern was observed during autumn, however a greater number of birds were recorded over the Celtic Sea and around the Western Isles breeding colonies. Breeding and postbreeding distributions concentrated along the continental slope, with the greatest densities occurring over the Porcupine Bank, the shelf waters east and northeast of the Goban Spur and the slope waters west of the Western Isles. Variable concentrations occurred over the Rockall Bank during the same period, while breeding season surveys in the vicinity of the Hatton Bank also recorded variable densities.

Black-headed Gull *Larus ridibundus*

The Black-headed Gull is a common resident species whose breeding population has spread throughout Europe during the last century (Hagemeijer & Blair, 1997). It is a small gull that breeds in similar numbers inland as on the coast (Mitchell *et al.*, 2004), and is rarely encountered during offshore surveys of British and Irish waters (Pollock *et al.*, 1997; Mackey *et al.*, 2004). The majority of Black-headed Gulls were encountered as survey vessels approached or departed port regions scattered along all coastlines within the study area (Figure 6.15). Offshore records were restricted to rare observations west of the Western Isles and over the Celtic Sea. As is often the case, the distributions of coastal seabird species, such as those of Black-headed and Mew Gulls, are inadequately assessed using offshore survey methods.

Mew Gull *Larus canus*

Formerly referred to as the Common Gull, the Mew Gull is a resident, medium-sized gull species that also feeds and breeds in terrestrial and inshore habitats (Lloyd *et al.*, 1991). The greatest concentrations of Mew Gulls occurred along southern and western British coastal waters (interestingly, away from northern breeding colonies) and over the English Channel (Figure 6.16). Low to moderate densities were also occasionally reported from western Irish coastal locations (e.g. Galway Bay). The Mew Gull displayed a greater tendency to move offshore when compared with the distribution of the Black-head Gull (*compare* Figures 6.15 & 6.16). Low concentrations were regularly recorded along the Irish Sea ferry routes, particularly during winter.

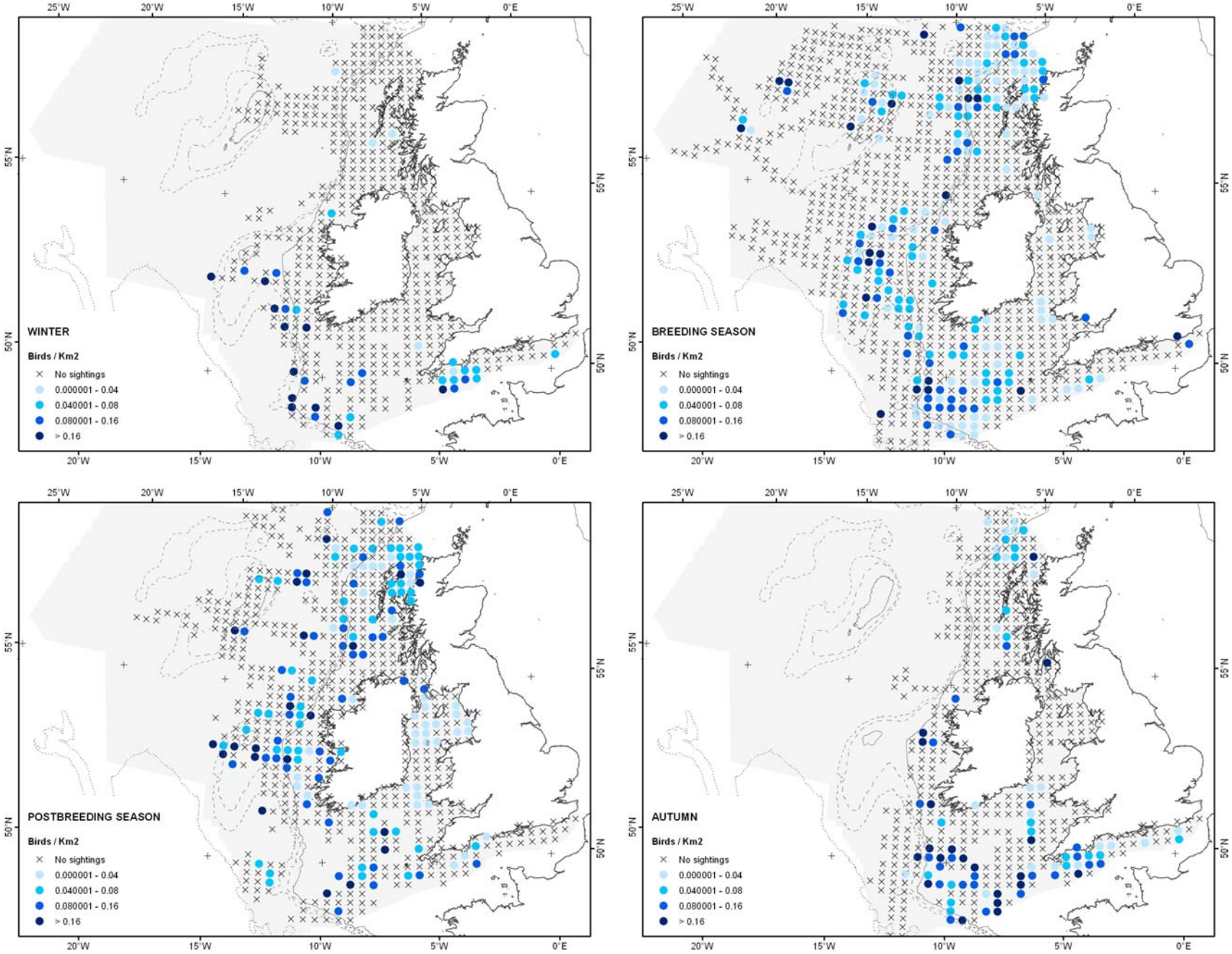

Figure 6.14. Seasonal distribution and density of the Great Skua within SEA areas 6, 7 & 8 and the IDA, 1980-2003.

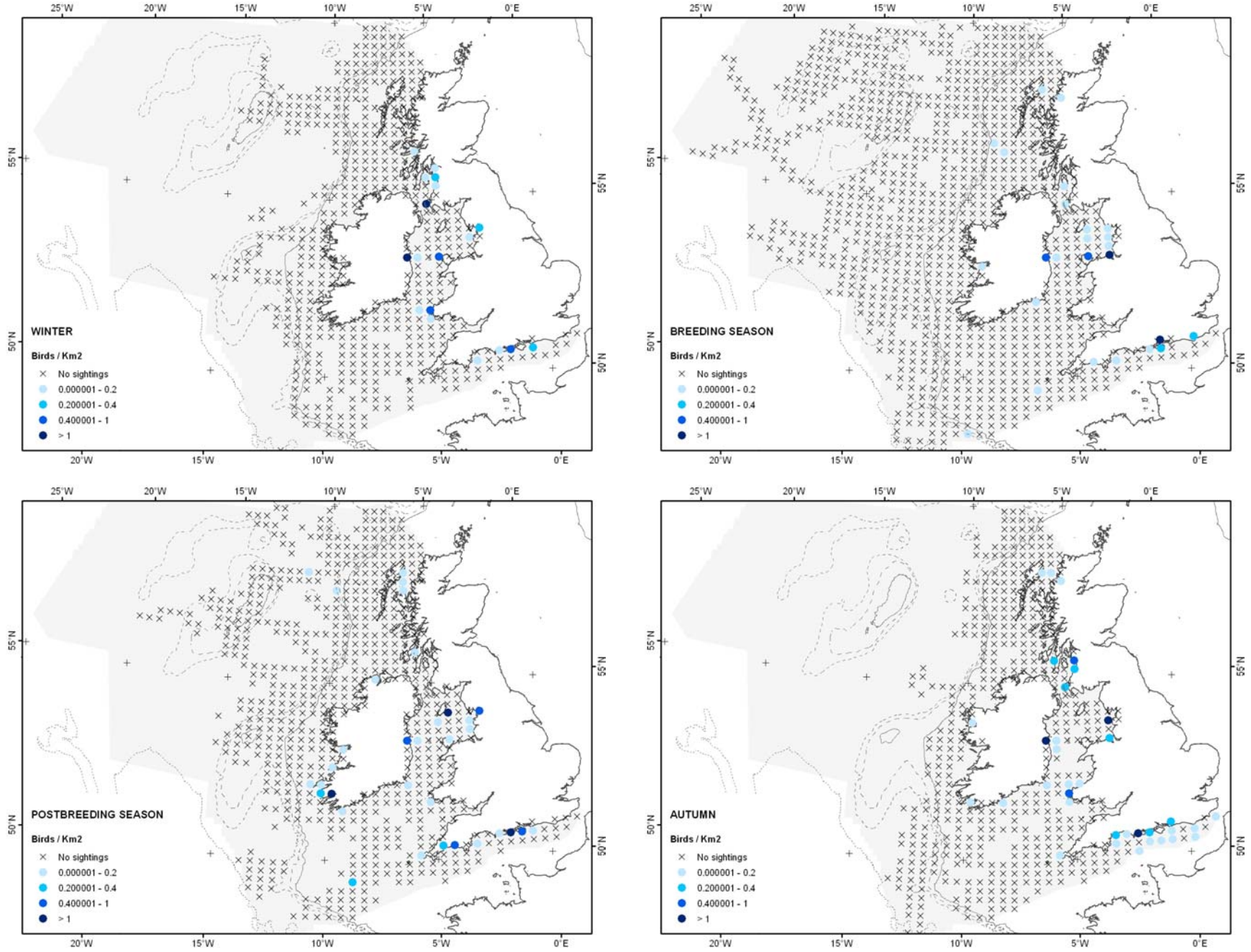

Figure 6.15. Seasonal distribution and density of the Black-headed Gull within SEA areas 6, 7 & 8 and the IDA, 1980-2003.

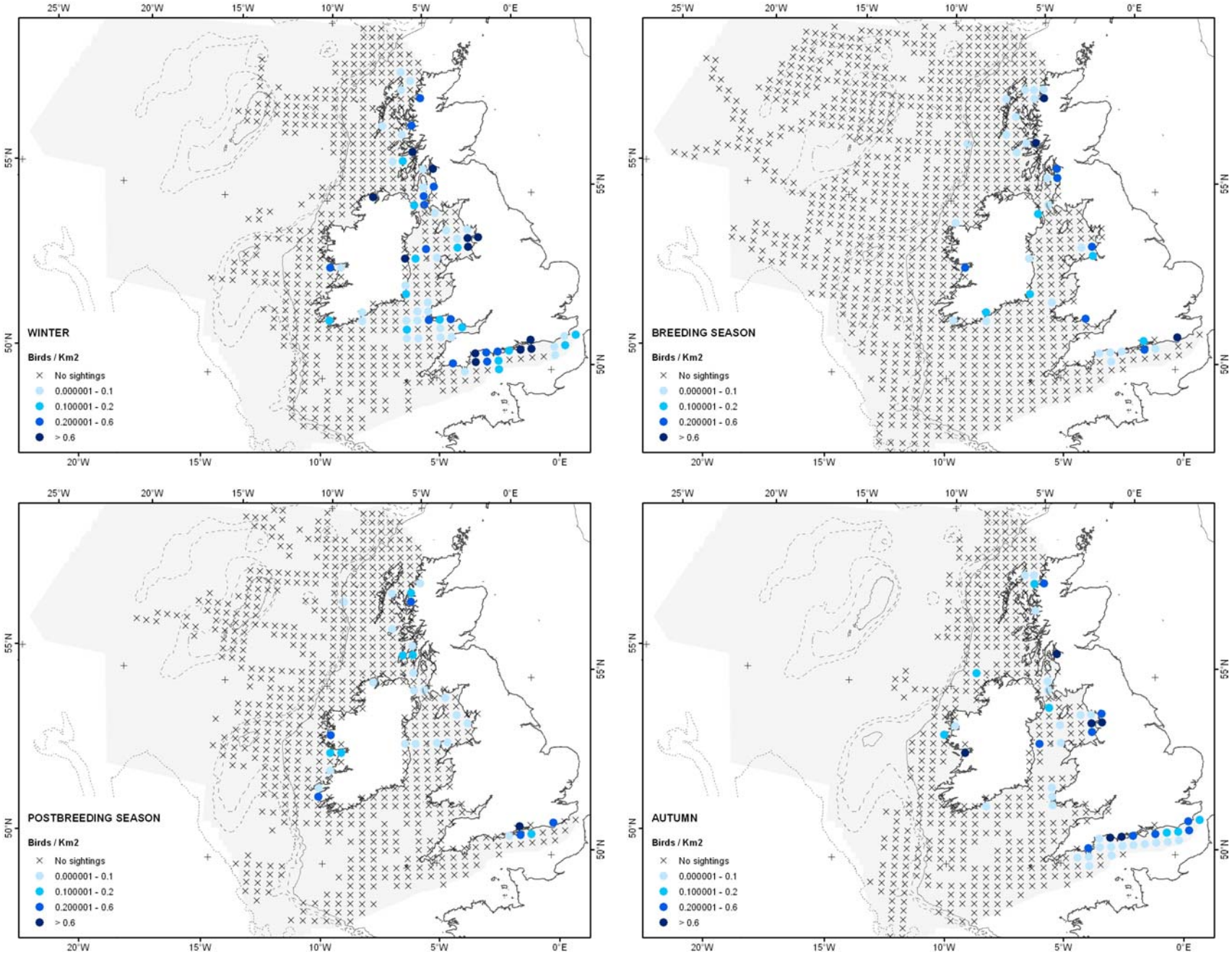

Figure 6.16. Seasonal distribution and density of the Mew Gull within SEA areas 6, 7 & 8 and the IDA, 1980-2003.

Herring Gull *Larus argentatus*

Although Irish coastal populations of Herring Gulls have decreased significantly since the late 1970s and early 1980s (Creme *et al.*, 1997; Hagemeijer & Blair, 1997), it remains the commonest and the most widespread of the three large gull species breeding in Britain and Ireland (Mitchell *et al.*, 2004). The distribution pattern of this resident gull was consistent through the seasons (Figure 6.17), where it was regularly recorded along all British coastlines. The Herring Gull was frequently encountered in low to moderate densities along most Irish coasts throughout the seasons. The largest concentrations were observed in association with the breeding colonies located along the western Scottish coast, the Isle of Man, the southern English coastline and in Belfast Lough. Herring Gulls were also regularly encountered over the Irish Sea and the English Channel. Offshore encounters were recorded during autumn, winter and the breeding season, where they extended into the relatively shallow waters of the Malin and Hebrides Shelves and the Celtic Sea. The majority of slope-related records were observed west of the Western Isles.

Lesser Black-backed Gull *Larus fuscus*

The Lesser Black-backed Gull is the smallest of the three large gull species breeding in Britain and Ireland, and its local breeding population belongs to the nominate *L.f. graellsii*. Although most birds migrate south towards the Iberian Peninsula and northwest Africa outside of the breeding season, increasing numbers have been recorded overwintering in Britain and Ireland (Hagemeijer & Blair, 1997; IRBC, 1998). Although constantly present in coastal habitats throughout the year, the Lesser Black-backed Gull also displayed a relatively pelagic existence between January and September (Figure 6.18). They were most widespread during the breeding season, when they were recorded in variable concentrations over the English Channel and most shelf and continental slope locations west of Britain and Ireland. Breeding and postbreeding season records extended further west to the deep waters of the Rockall Trough, the Rockall-Hatton region and the sloped region of the Porcupine Seabight. The winter distribution of the Lesser Black-backed Gull displayed a more southerly trend, reflecting the outward movement to Iberian and African wintering grounds. The autumn distribution was generally coastal apart from those gulls recorded over the English Channel, the St George's Channel and along the Hebrides Shelf.

Great Black-backed Gull *Larus marinus*

The Great Black-backed Gull is the largest and most aggressive gull species breeding in Britain and Ireland. It is a coastal resident that feeds largely by predation (small seabirds and terrestrial vertebrates) and by scavenging for offal from the back of fishing vessels (Hudson, 1982). The seasonal distribution of the Great Black-backed Gull was very similar to that of the other large, resident gull species breeding in Britain and Ireland, the Herring Gull (*compare* Figures 6.17 & 6.19). However, the Great Black-backed Gull was slightly more widespread, routinely extending its range over the Irish Shelf and beyond the Hebrides Shelf, particularly during winter and the breeding season. The relatively high winter concentrations may be due to an influx of northern breeding Great Black-backed Gulls (Cramp *et al.*, 1974). Apart from the Hebrides Shelf, offshore sightings beyond the continental shelf were restricted to rare sightings over the Rockall, Hatton and Porcupine Banks during the breeding season, and autumn records over the Rockall Trough.

Black-legged Kittiwake *Rissa tridactyla*

The Black-legged Kittiwake is a small, cliff-nesting gull species that breeds along much of the British and Irish coastlines (Hagemeijer & Blair, 1997; Lloyd *et al.*, 1991). It is the most pelagic of the local gull species especially during the winter when birds disperse to the Bay of Biscay, the North Sea and westward to the northern Atlantic (Lloyd *et al.*, 1991; Hagemeijer & Blair, 1997). The Black-legged Kittiwake was the fifth most numerous seabird species recorded throughout the study period. This elegant gull was regularly encountered along coastal and over shelf, slope and deepwater habitats (Figure 6.20). Its widespread distribution, while not as extensive as that of the Northern Fulmar, was similar to that displayed by the Northern Gannet (*compare* Figures 6.1, 6.7 & 6.20). Highest winter densities were recorded over the Irish Shelf and along the continental slope from the Hebrides Shelf down to the eastern slope of the Porcupine Seabight, with variable densities extending across the northern sector of the Rockall Trough to the Rockall Bank and along the northern slope of the Porcupine Bank. The most widespread distribution was observed during the breeding season, where feeding flocks were observed as far as the eastern slope of the Iceland Basin (Mackey *et al.*, 2003). The least widespread distribution was recorded during the postbreeding season, where the greatest concentrations were noted within the vicinity of breeding colonies along Irish and Scottish coasts. Similar concentrations were observed during autumn, however higher numbers were encountered over the shelf waters of the Celtic Sea and along the length of continental slope within the study area.

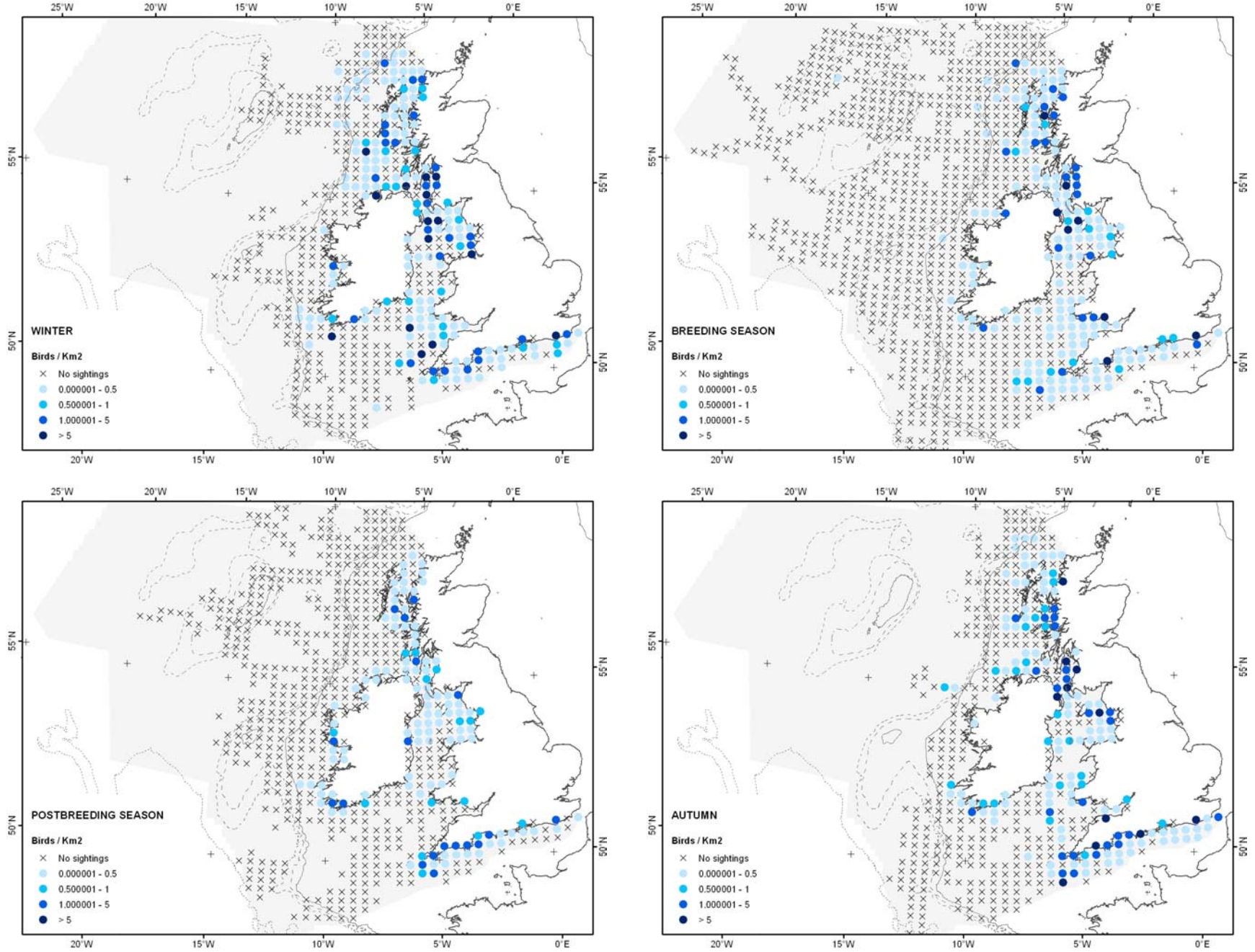

Figure 6.17. Seasonal distribution and density of the Herring Gull within SEA areas 6, 7 & 8 and the IDA, 1980-2003.

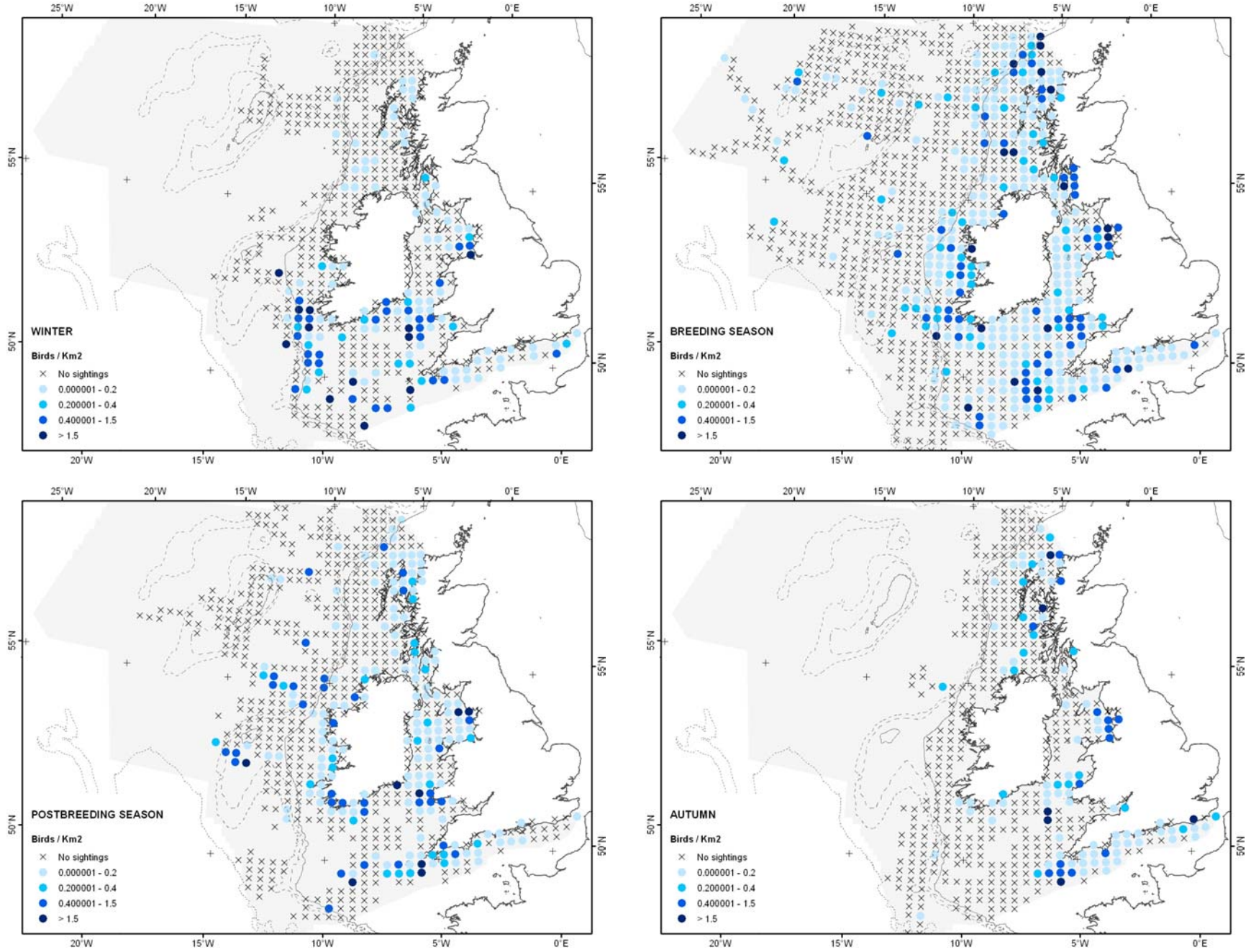

Figure 6.18. Seasonal distribution and density of the Lesser Black-backed Gull within SEA areas 6, 7 & 8 and the IDA, 1980-2003.

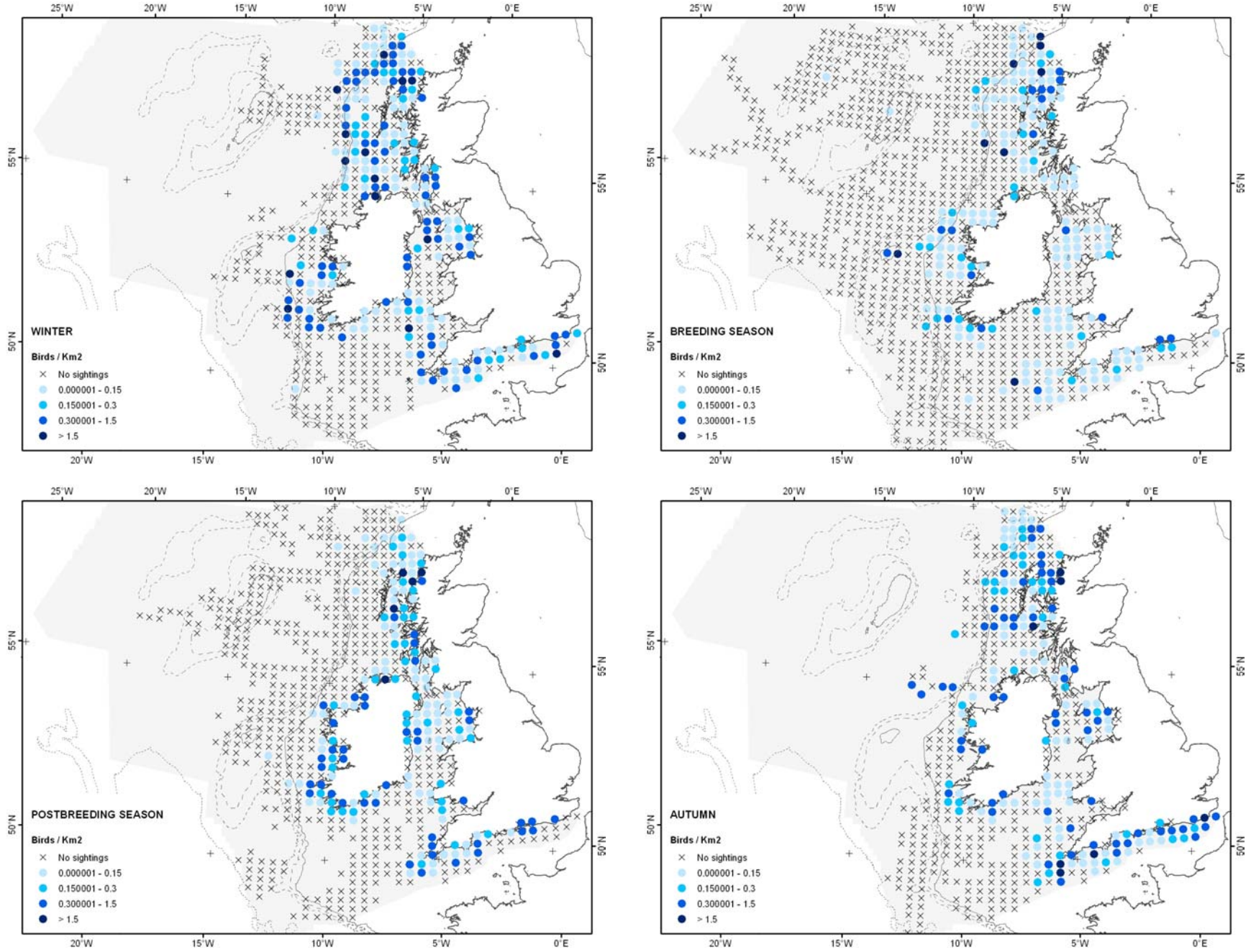

Figure 6.19. Seasonal distribution and density of the Great Black-backed Gull within SEA areas 6, 7 & 8 and the IDA, 1980-2003.

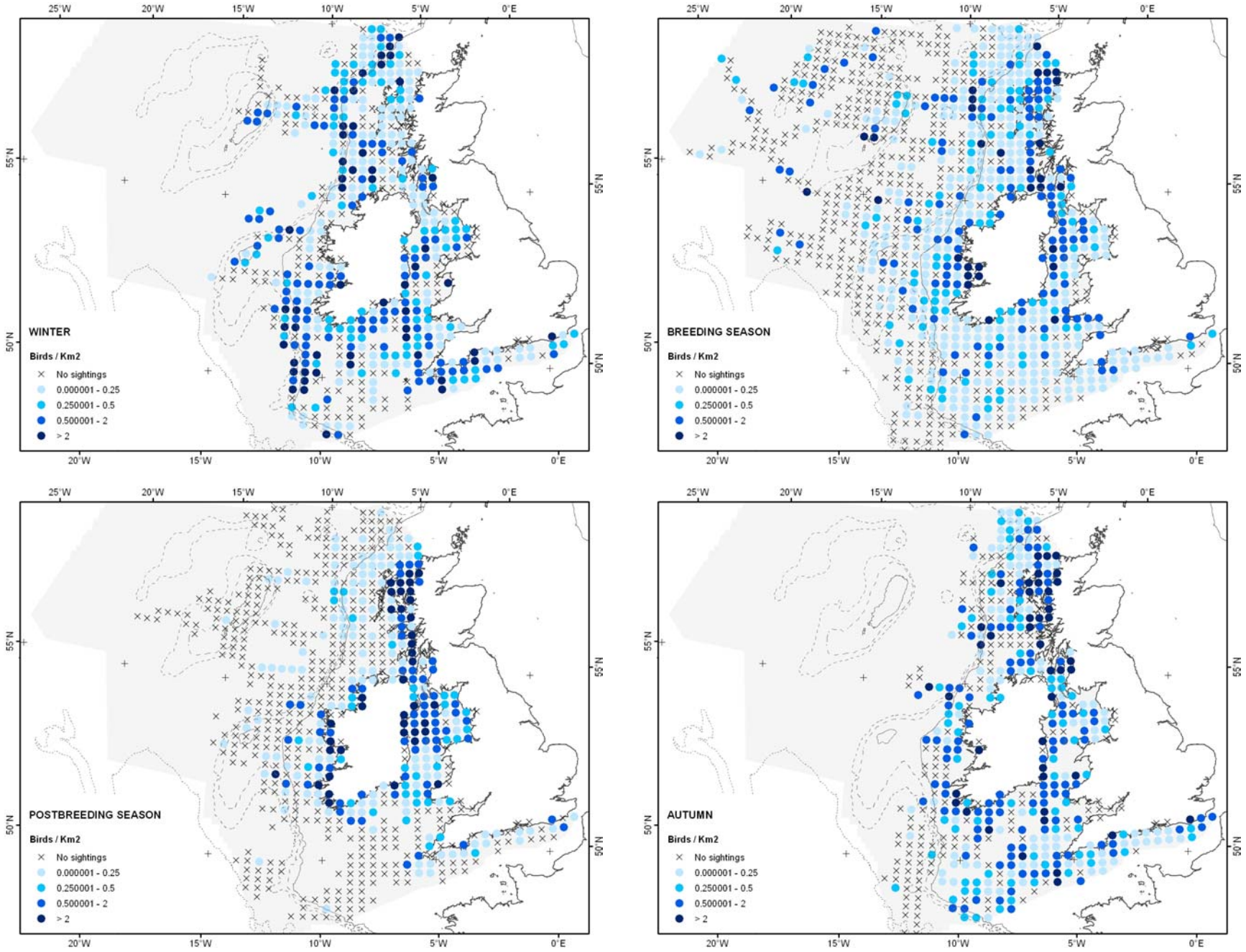

Figure 6.20. Seasonal distribution and density of the Black-legged Kittiwake within SEA areas 6, 7 & 8 and the IDA, 1980-2003.

Common Tern *Sterna hirundo*
The Common Tern is a summer visitor that breeds at coastal and inland locations (Mitchell *et al.*, 2004). The decline in breeding numbers observed in England and Ireland has been offset by increases at Scottish colonies (Lloyd *et al.*, 1991). Highest densities of Common Terns were generally observed in coastal habitats, in close proximity to both British and Irish breeding colonies (Figure 6.21). The only offshore sightings recorded in transect occurred west of the Malin Shelf during the breeding and postbreeding seasons. The sole autumn encounter recorded in transect occurred north of Cornwall. No Common Terns were recorded in transect during winter.

Arctic Tern *Sterna paradisaea*
The Arctic Tern travels vast distances during their annual migration between Arctic and European breeding grounds and their Antarctic pack ice wintering grounds. Some individuals are thought to circle the Antarctic during an annual round trip of 40,000-50,000km (Berthold, 2001). Predictably, the Arctic Tern was the most pelagic tern observed during the 23-year study period, with regular offshore sightings over the northern sector of the Rockall Trough and over the Rockall-Hatton region (Figure 6.22). The highest densities were recorded southwest of the Hatton Bank during May 2002 (Mackey *et al.*, 2003). The highest coastal records were distributed close to Western Isle and western Irish breeding colonies. Arctic Terns were also recorded in transect over the Minch during autumn. No Arctic Terns were recorded in transect between January and March.

Black Guillemot *Cepphus grylle*
The Black Guillemot is the least pelagic of the auk species that inhabit British and Irish waters. Feeding mainly on the bottom, it prefers sheltered and inshore waters throughout the year. The highest British and Irish breeding densities of this small auk are located along the west coast of mainland Scotland, the Shetland and Orkney Islands and the Western Isles (Mitchell *et al.*, 2004). Apart from a curious postbreeding season record north of the Rosemary Bank, the Black Guillemot was recorded in close association with coastal habitats (Figure 6.23). This small auk species was recorded during all seasons, with the highest densities observed in various locations near the Western Isles breeding colonies. Highest Irish densities were observed in Clew Bay (Co. Mayo), Donegal Bay (Co. Donegal), Bantry Bay (Co. Cork) and Kenmare River (Co. Kerry). As is the case with all coastal seabirds, numbers of this highly vulnerable species recorded in the present study are underestimated due to the project's focus on offshore areas.

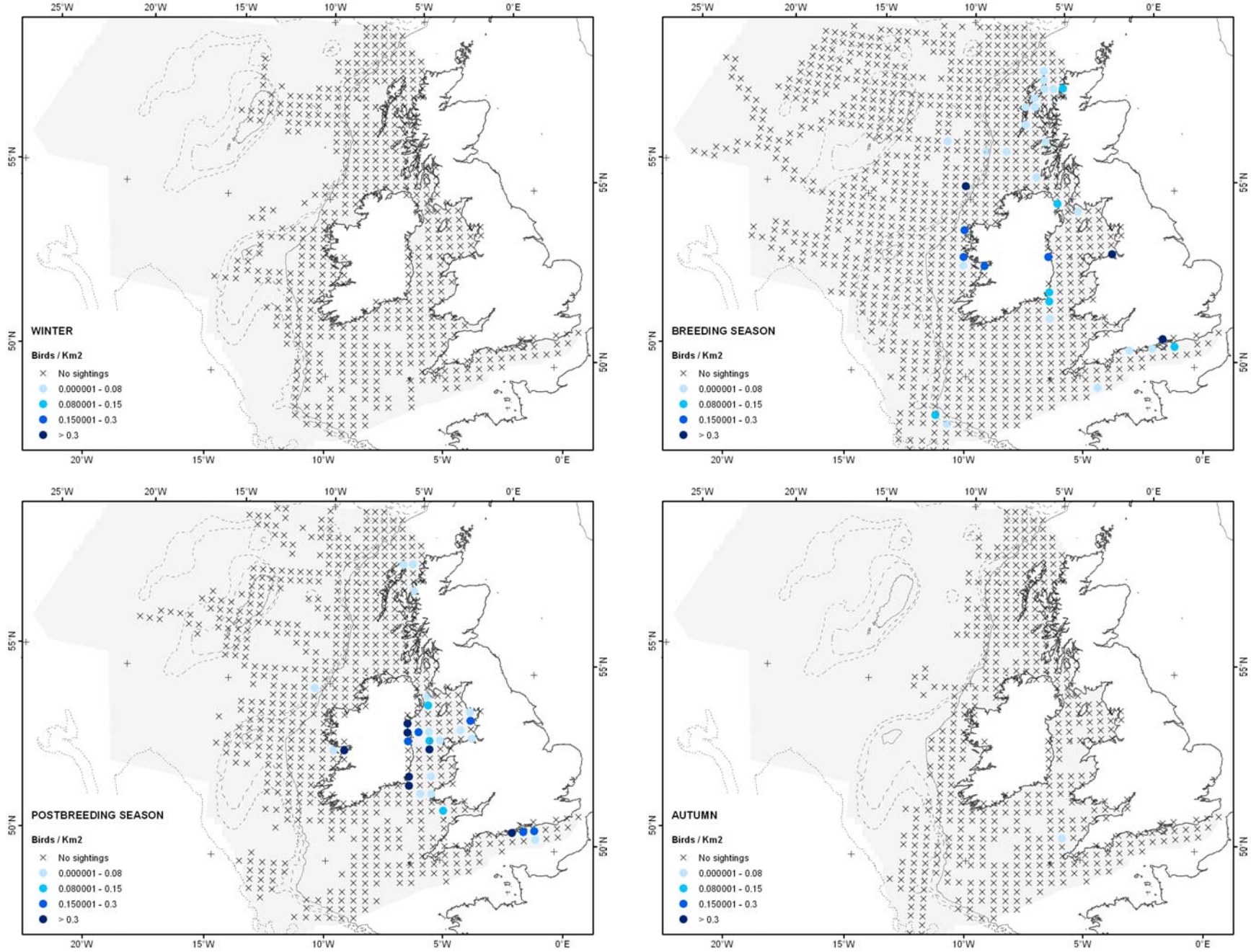

Figure 6.21. Seasonal distribution and density of the Common Tern within SEA areas 6, 7 & 8 and the IDA, 1980-2003.

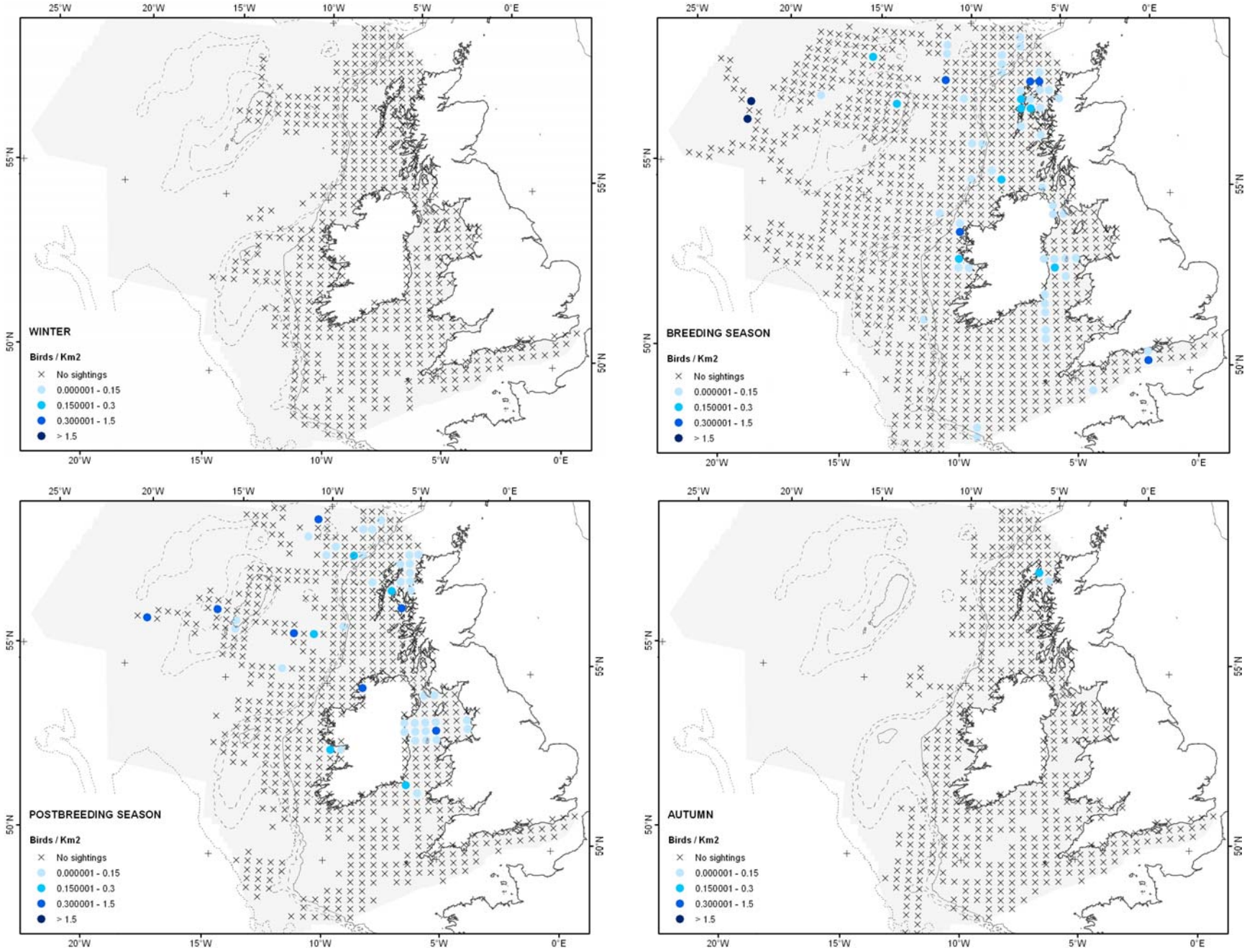

Figure 6.22. Seasonal distribution and density of the Arctic Tern within SEA areas 6, 7 & 8 and the IDA, 1980-2003.

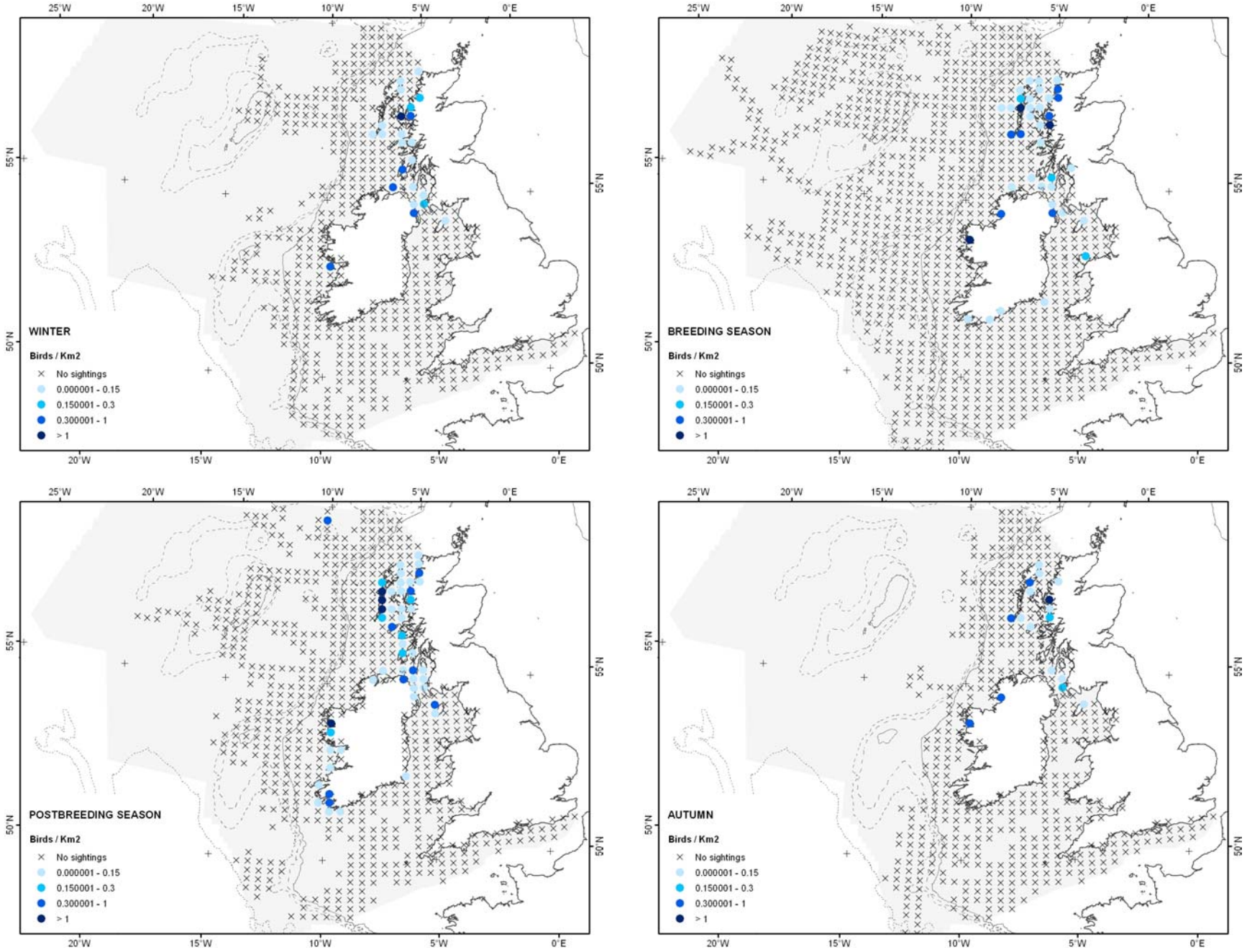

Figure 6.23. Seasonal distribution and density of the Black Guillemot within SEA areas 6, 7 & 8 and the IDA, 1980-2003.

Common Guillemot *Uria aalge*
The Common Guillemot is the largest of the four auk species that breed in Britain and Ireland. The most widespread of all auk species, its population size has continued to fluctuate in response to a combination of human-related and natural events (Hagemeijer & Blair, 1997). The main stronghold of the local breeding population is located in Shetland, Orkney and Scotland (Mitchell *et al.*, 2004). The Common Guillemot was the fourth most numerous seabird species recorded throughout the study period. Apart from the Celtic Sea, the Common Guillemot was recorded over most shelf-related locations surveyed within the study area (Figure 6.24). Although the vast majority of Common Guillemots were recorded east of the continental slope, it was also encountered beyond the Hebrides Shelf and dispersed over the Rockall Trough and the Rockall-Hatton region during the breeding season. In contrast, postbreeding distributions were strictly associated with coastal and shelf waters. Highest densities were observed during both breeding and postbreeding seasons either close to, or within foraging range of their British and Irish cliff-based colonies. Common Guillemot densities decreased during winter and autumn, particularly over the Irish Sea and west of Scotland. However, they remained widespread in low concentrations over much of the shelf-related range inhabited during the breeding season.

Razorbill *Alca torda*
The Razorbill is a medium sized auk endemic to the North Atlantic (Hagemeijer & Blair, 1997). Typically a cliff-breeder the Razorbill is commonly observed feeding and breeding in close association with Common Guillemots. Winter movements of Razorbills away from local breeding colonies appears to be age related, with immature birds travelling as far south as Iberia, Morocco and the western Mediterranean (Hagemeijer & Blair, 1997). Winter adult recoveries have generally been observed from the North Sea, Irish Sea and the Bay of Biscay (Lloyd *et al.*, 1991). The distribution of Razorbills throughout the study area was largely restricted to coastal and shelf-related waters, although occasional offshore sightings were recorded beyond the Hebrides Shelf and over the Rockall-Hatton region during the breeding season (Figure 6.25). The Razorbill was less widespread than the closely related Common Guillemot (*compare* Figures 6.24 & 6.25). Apart from breeding season records along the Hebrides Shelf slope, the Razorbill was absent from slope water habitats. Highest densities were recorded over the Irish Sea and in association with Northern Irish, Scottish and Irish breeding colonies. Low to moderate densities were consistently recorded throughout the year over both the English Channel and St George's Channel.

Atlantic Puffin *Fratercula arctica*
The Atlantic Puffin is the smallest and most pelagic of the four auk species that breed in Britain and Ireland. Over 80% of the British and Irish breeding population are located in Scotland, where substantial increases have been recently noted (Mitchell *et al.*, 2004). The Atlantic Puffin lived up to its reputation as a pelagic auk species throughout the study, as it was occasionally encountered at low to moderate levels over the Rockall Trough, the Rockall-Hatton region and the Porcupine Bank, particularly during the breeding and postbreeding periods (Figure 6.26). Highest densities were observed during the breeding season around the vast colonies located on the islands of St Kilda and the surrounding waters of the Hebrides Shelf. Isolated pockets of high density were also recorded around other Western Isles colonies, Skomer, Skokholm and the Cliffs of Moher (Co. Clare). Apart from the Celtic Sea, the Atlantic Puffin was widespread over the continental shelf, west of Britain, where it was recorded in low to moderate densities throughout the Irish Sea, and along the Malin and Irish Shelves between April and September. Atlantic Puffins were sparsely distributed during winter and autumn, but were more widespread

in low concentrations over the Celtic Shelf, west of the Goban Spur between October and December.

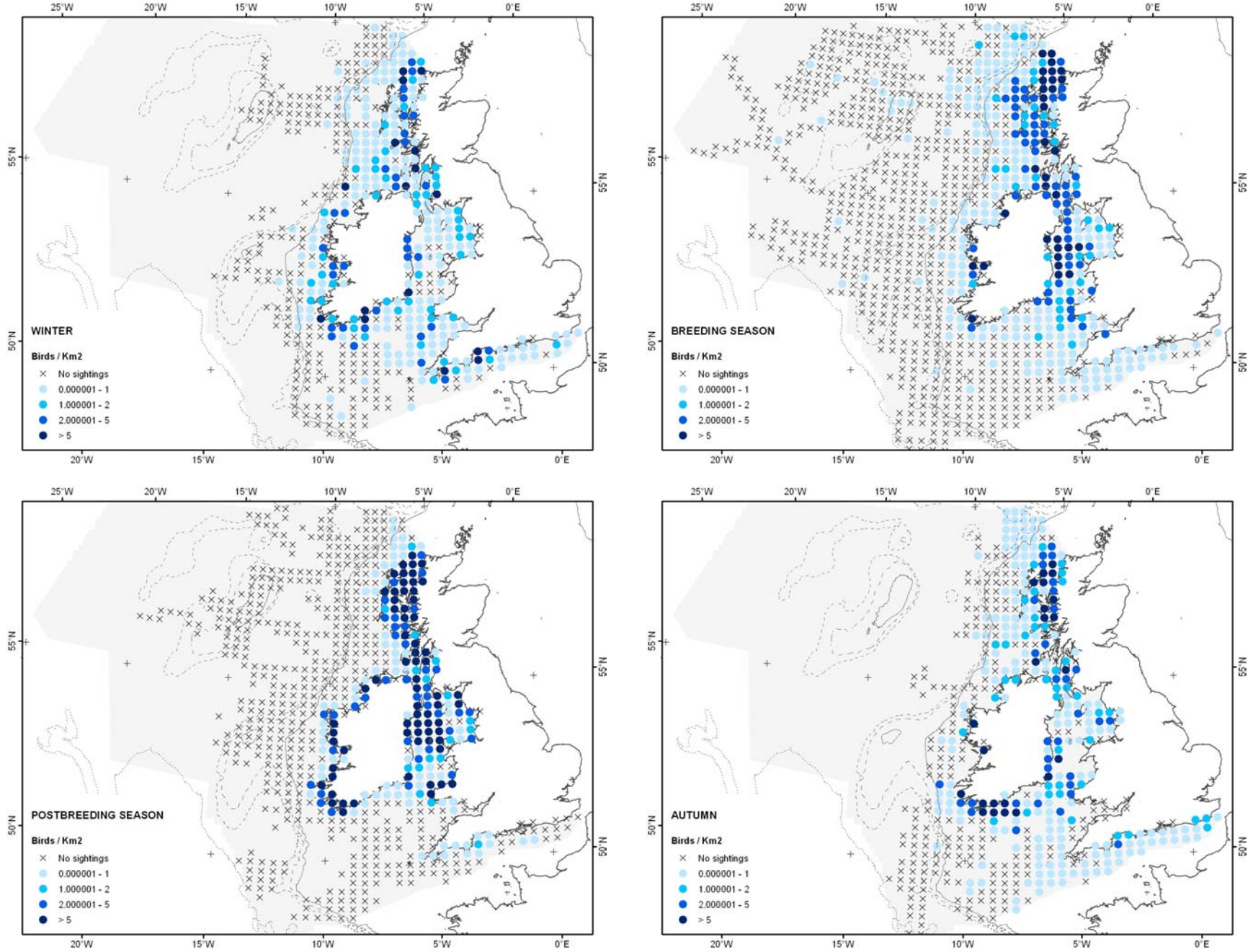

Figure 6.24. Seasonal distribution and density of the Common Guillemot within SEA areas 6, 7 & 8 and IDA, 1980-2003.

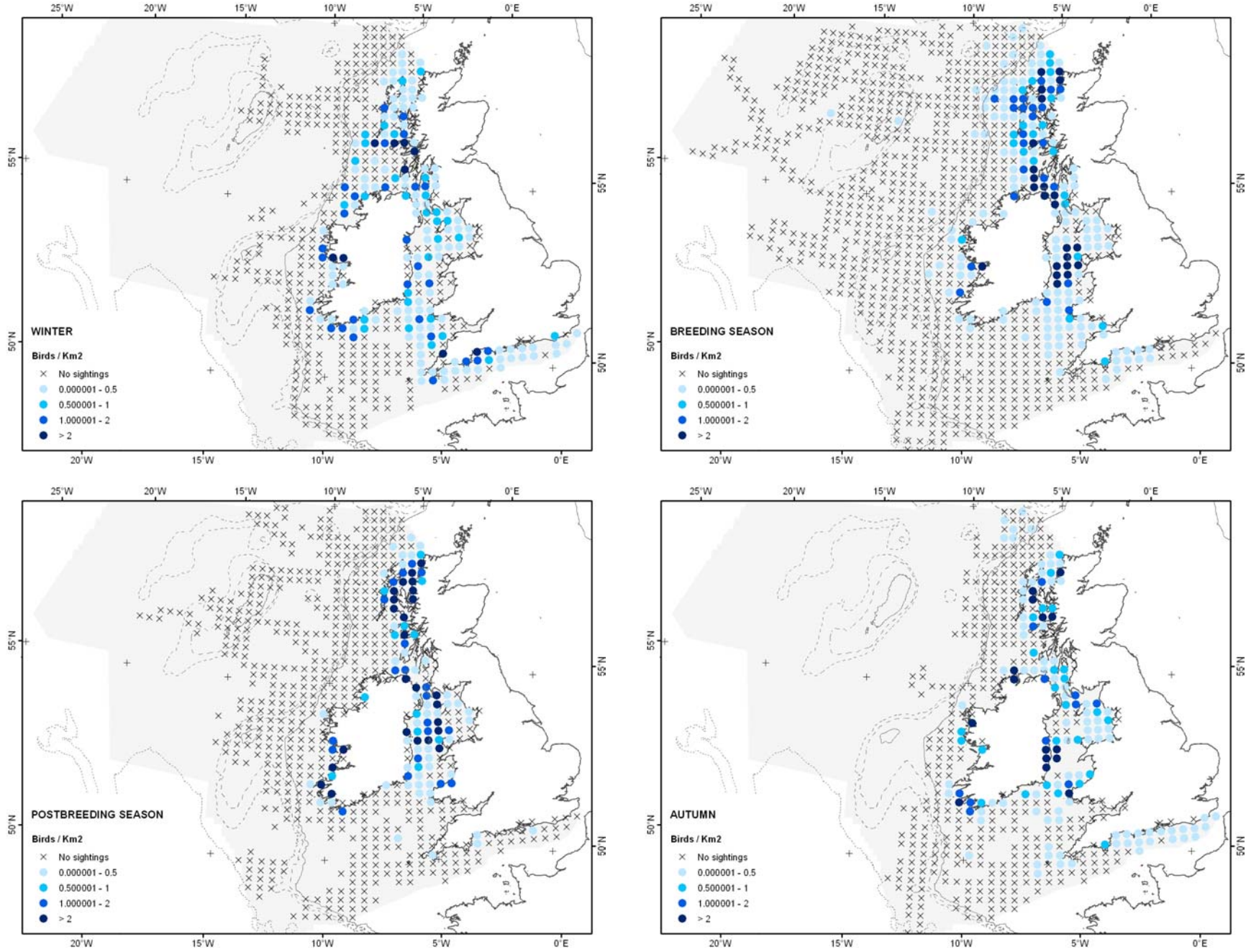

Figure 6.25. Seasonal distribution and density of the Razorbill within SEA areas 6, 7 & 8 and the IDA, 1980-2003.

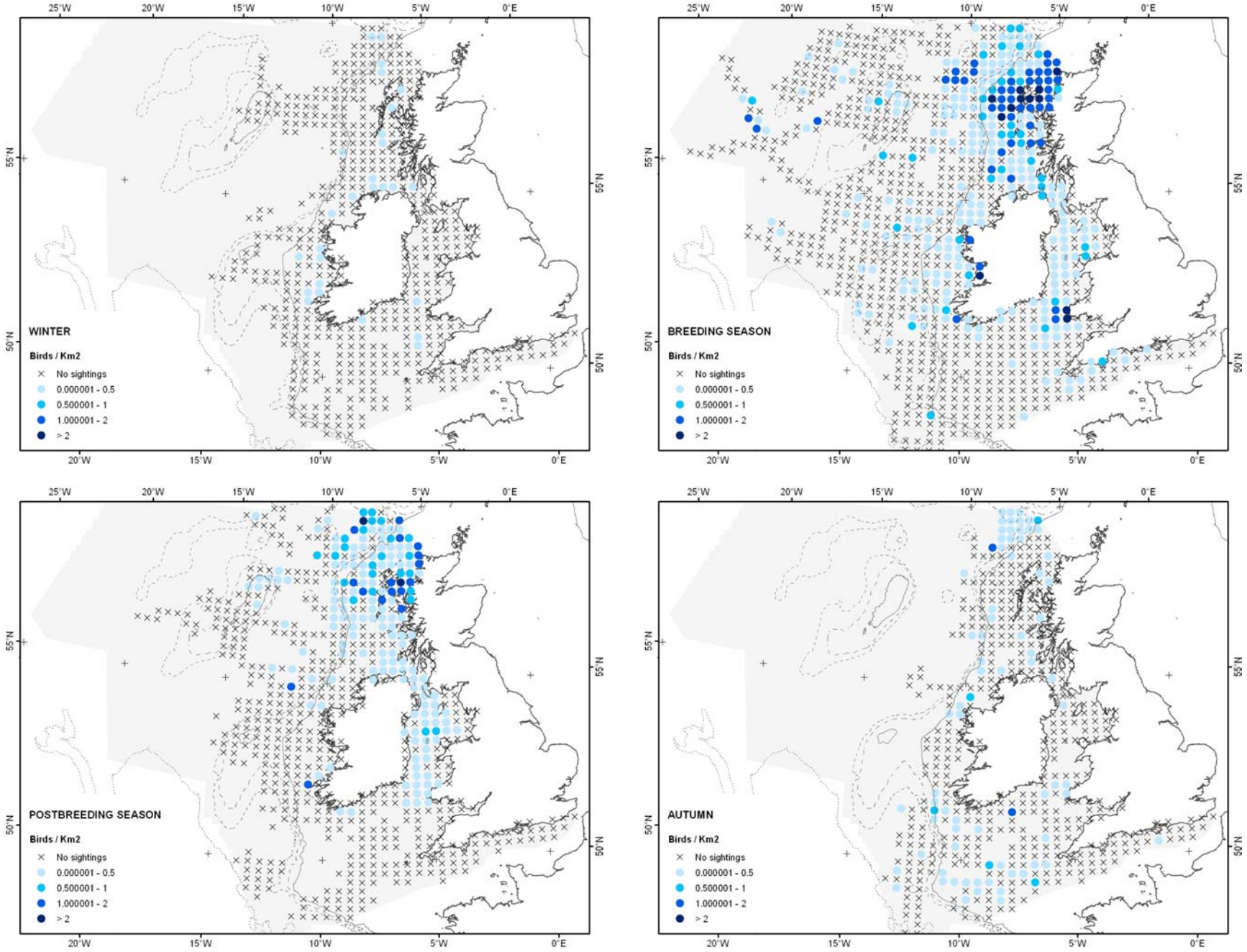

Figure 6.26. Seasonal distribution and density of the Atlantic Puffin within SEA areas 6, 7 & 8 and the IDA, 1980-2003.

7. Bibliography

Please Note:
The "Quality" value assigned to each reference in the associated Endnote bibliography file strictly refers to the relevance of each publication to the offshore seabird surveys summarised in the current data report, and not to their standard or worth. As such, 5 = Highly relevant, 3 = Relevant, 1 = Vaguely relevant.

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8. Photographic Credit

9. Addresses of Relevant Organisations

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10. Appendix

Total numbers of the commonly encountered seabird species recorded during full ship-based surveys in SEA areas 6, 7 & 8 and the IDA, July 1980– August 2003.

Common Name	Latin Name	Uncorrected Total
Northern Fulmar	*Fulmarus glacialis*	357,661
Great Shearwater	*Puffinus gravis*	5,654
Sooty Shearwater	*Puffinus griseus*	2,730
Manx Shearwater	*Puffinus puffinus*	187,354
European Storm-petrel	*Hydrobates pelagicus*	23,460
Leach's Storm-petrel	*Oceanodroma leucorhoa*	1,232
Northern Gannet	*Morus bassanus*	196,334
Great Cormorant	*Phalacrocorax carbo*	1,812
European Shag	*Phalacrocorax aristotelis*	7,046
Pomarine Skua	*Stercorarius pomarinus*	557
Arctic Skua	*Stercorarius parasiticus*	833
Long-tailed Skua	*Stercorarius longicaudus*	380
Great Skua	*Stercorarius skua*	3,785
Black-headed Gull	*Larus ridibundus*	11,561
Mew Gull	*Larus canus*	8,764
Lesser Black-backed Gull	*Larus fuscus*	36,721
Herring Gull	*Larus argentatus*	56,019
Great Blacked-backed Gull	*Larus marinus*	24,360
Black-legged Kittiwake	*Rissa tridactyla*	126,324
Common Tern	*Sterna hirundo*	1,747
Arctic Tern	*Sterna paradisaea*	1,233
Common Guillemot	*Uria aalge*	136,934
Razorbill	*Alca torda*	34,015
Black Guillemot	*Cepphus grylle*	1,132
Atlantic Puffin	*Fratercula arctica*	28,504