OSPAR COMMISSION

Protecting and conserving the North-East Atlantic and its resources

Nomination proforma for the "North Atlantic Current and Evlanov Seamount" MPA in the OSPAR Maritime Area

(Region V, Wider Atlantic)

Biodiversity and Ecosystems Series

2020

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OSPAR Convention

The Convention for the Protection of the Marine Environment of the North-East Atlantic (the “OSPAR Convention”) was opened for signature at the Ministerial Meeting of the former Oslo and Paris Commissions in Paris on 22 September 1992. The Convention entered into force on 25 March 1998. The Contracting Parties are Belgium, Denmark, the European Union, Finland, France, Germany, Iceland, Ireland, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Convention OSPAR

La Convention pour la protection du milieu marin de l'Atlantique du Nord-Est, dite Convention OSPAR, a été ouverte à la signature à la réunion ministérielle des anciennes Commissions d'Oslo et de Paris, à Paris le 22 septembre 1992. La Convention est entrée en vigueur le 25 mars 1998. Les Parties contractantes sont l'Allemagne, la Belgique, le Danemark, l’Espagne, la Finlande, la France, l’Irlande, l’Islande, le Luxembourg, la Norvège, les Pays-Bas, le Portugal, le Royaume-Uni de Grande Bretagne et d’Irlande du Nord, la Suède, la Suisse et l’Union européenne.

Contents

Acknowledgements

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Executive Summary

The North Atlantic Current and Evlanov Seamount MPA (NACES MPA, the Site) represents a marine area of near pristine open ocean habitat that provides an important feeding ground for many species of seabirds. The Site encompasses a globally unique location; a region of year-round vigorous horizontal and vertical mixing where waters from the tropical/subtropical Atlantic encounter water from the subpolar Atlantic and from the Arctic Ocean, promoting enhanced primary productivity and diversity. It is bounded in the north by the Charlie-Gibbs Fracture Zone, to the west by the Flemish Cap and the Grand Banks of Newfoundland, to the east by the Mid-Atlantic Ridge and to the south by the Azores.

The available data on seabird distribution and habitat use collected over the last decade in the North East Atlantic and the lack of an OSPAR MPAs in areas beyond national jurisdiction with conservation objectives focusing on highly mobile species justified a systematic review to identify potentially important sites in the open ocean for seabirds. The review resulted in this nomination profoma, published as a Background Document, as the Site was identified as the most important foraging ground for seabirds within the OSPAR maritime area in terms of seabird species diversity and abundance. The Site includes important foraging grounds for three seabird species listed by OSPAR as threatened and/or declining (Black-legged Kittiwake, Thick-billed Murre, Audubon Shearwater) and for at least 19 additional seabird species, some of them on the IUCN Red-list, with seabirds present at the Site year round. Several other species and habitats listed by OSPAR are also known to occur at the Site.

In 2003, the OSPAR Commission agreed to establish a network of Marine Protected Areas (MPAs) with the aim that this should become an ecologically coherent network of well-managed sites. OSPAR agreed that the OSPAR Network of MPAs should comprise sites that are established as MPAs within the jurisdiction of OSPAR Contracting Parties as well as sites in the maritime area outside the jurisdiction of the Contracting Parties (area beyond national jurisdiction (ABNJ)). In the OSPAR Biodiversity and Ecosystems Strategy, OSPAR agreed to identify, on the basis of reports from Contracting Parties and observer organisations, possible components of the OSPAR Network in ABNJ in order to achieve the purposes of the network.

This Background Document makes available the information which has been compiled and evaluated within the OSPAR framework on the biodiversity and ecosystems of a section of the North Atlantic Current and Evlanov Seamount. This document also includes conservation objectives developed within the OSPAR framework for application to an MPA in the area of the North Atlantic Current and Evlanov Seamount. This

information forms the basis for future consideration at OSPAR on the adoption of a possible OSPAR Decision on the designation of an MPA and an OSPAR Recommendation on the management of an MPA.

Récapitulatif

L'Aire marine protégée (AMP) dans la région du courant Nord-Atlantique et du mont sous-marin Evlanov (AMP NACES, le Site) représente une zone marine d'habitat en pleine mer presque vierge qui constitue une importante aire d'alimentation pour de nombreuses espèces d'oiseaux de mer. Le site comprend un endroit unique au monde, une région où les eaux de l'Atlantique tropical/subtropical rencontrent celles de l'Atlantique subpolaire et de l'océan Arctique, ce qui favorise une productivité primaire et une diversité accrues. Elle est délimitée au nord par la zone de fracture Charlie-Gibbs, à l'ouest par le Bonnet Flamand (Flemish Cap) et les Grands Bancs de Terre-Neuve, à l'est par la dorsale médio-atlantique et au sud par les Açores.

Les données disponibles sur la distribution des oiseaux de mer et l'utilisation des habitats recueillies au cours de la dernière décennie dans l'Atlantique du Nord-Est et l'absence d'AMP OSPAR dans les zones au-delà de la juridiction nationale avec des objectifs de conservation axés sur les espèces très mobiles ont justifié un examen systématique pour identifier les sites potentiellement importants pour les oiseaux de mer en haute mer. Le résultat de cet examen et le présent formulaire de désignation, publié en tant que de document de fond. Le Site a été identifié comme la plus importante aire d'alimentation pour les oiseaux de mer dans la zone maritime OSPAR en termes de diversité et d'abondance des espèces d'oiseaux de mer. Le Site comprend d'importantes zones d'alimentation pour trois espèces d'oiseaux de mer figurant sur la liste OSPAR des espèces menacées et/ou en déclin (Mouette tridactyle, Guillemot de Brünnich, Puffin d'Audubon) et pour au moins 19 autres espèces d'oiseaux de mer, dont certaines figurent sur la liste rouge de l'UICN. Des oiseaux de mer sont présents sur le Site toute l'année.

La Commission OSPAR est convenue, en 2003, de créer un réseau d'AMP afin que celui-ci devienne un réseau de sites écologiquement cohérent et bien géré. OSPAR est convenue que le réseau OSPAR d'AMP devra englober les sites créés à titre d'AMP situés dans la juridiction des Parties contractantes OSPAR ainsi que les sites de la zone maritime situés au-delà de la juridiction des Parties contractantes (zones au-delà de la juridiction nationale (ABNJ)). OSPAR est convenue, dans sa Stratégie biodiversité et écosystèmes, de déterminer, en se fondant sur des rapports des Parties contractantes et d'organisations observatrices, des composantes éventuelles du réseau OSPAR situées dans des zones au-delà de la juridiction nationale afin de parvenir aux objectifs du réseau.

Le présent document de fond comporte les informations qui ont été recueillies et évaluées dans le cadre de travail d'OSPAR et portant sur la biodiversité et les écosystèmes dans la région du courant Nord-Atlantique et du mont sous-marin Evlanov. Ce document comporte également des objectifs de conservation développés au sein du cadre de travail d'OSPAR à appliquer à une AMP située dans la zone du courant Nord-Atlantique et du mont sous-marin Evlanov. Ces informations constituent la base d'un examen futur à OSPAR sur l'adoption d'une éventuelle décision OSPAR sur la création d'une AMP dans cette zone et d'une recommandation OSPAR sur la gestion d'une telle AMP.

A General information

Introduction and background

Within the North East Atlantic, a number of countries have made significant progress in identifying important sites for pelagic marine species in the coastal and inshore waters and designated these as Marine Protected Areas (MPAs) (JNCC 2017; Ramirez et al. 2017). A few countries have also begun designating MPAs in offshore areas within their Exclusive Economic Zones (JNCC 2017; Ramirez et al. 2017). In comparison, the identification and designation of MPAs within Areas Beyond National Jurisdiction (ABNJ) has been recognised as important and an ongoing gap in the global network of MPAs (Game et al. 2009; Scales et al. 2014). This is in part due to the existing gap in global governance models for the conservation and sustainable use of biodiversity beyond national jurisdiction. However, the few regional seas initiatives with ABNJ under their geographical coverage area, such as the OSPAR Convention, have been leading the way in protecting species and habitats in the high seas through area-based measures. In the North-East Atlantic, OSPAR has to date designated seven MPAs in ABNJ, with a particular focus on benthic habitats and communities (OSPAR 2017).

The Ecological Coherence Assessment of the OSPAR MPA network recognised the lack of ABNJ sites protecting seabirds as a significant gap (OSPAR 2013). Whilst the current network of ABNJ MPAs includes pelagic species as features of specific sites (e.g. seabirds in the Charlie Gibbs Fracture Zone and Milne Seamount MPAs), the boundaries and proposed management of the sites were based on the conservation objectives for benthic communities and habitats (OSPAR 2010a, b, c, d, e, f). In contrast to species of benthic communities, many pelagic species such as seabirds are highly mobile, ranging within and across ocean basins for foraging, migration and breeding (Eckert 2006; Egevang et al. 2010; Lascelles et al. 2012; Scales et al. 2014; Walli et al. 2009). However, despite their mobility, many pelagic species exhibit more spatially restricted movements during key life stages, often occurring predictably and consistently within defined areas, which makes the identification of 'hotspots' and subsequent site based conservation more feasible (Grecian et al. 2016; Lascelles et al. 2012; Queiroz et al. 2016; Ronconi et al. 2012; Young et al. 2015).

Compared to subsurface pelagic species, seabirds are easily accessible (particularly at colonies) for monitoring purposes. The large number of remote tracking studies on seabirds make them one of the best-known groups of marine animals in terms of at-sea distribution and habitat use. Tracking data can provide information on species distribution, and also insights into behaviour and how seabirds are utilising their environment. Approximately 40% of all seabird species globally have been the target of a tracking study and from these species about 60% have been studied from more than one colony (Birdlife International 2016b). Many species have also been studied for long periods of time - up to 20 years (e.g., Dias et al. 2011; Wakefield et al. 2015; Weimerskirch et al. 2014) - revealing patterns of spatial consistency in site use that justify the identification of stable 'hotspots', and thus the implementation of site-based conservation measures (Lascelles et al. 2012; Lascelles et al. 2016). Additionally, as apex predators, seabirds are established indicators of pelagic biodiversity and ecosystem health (Croxall et al. 2012; Einoder 2009; Furness and Camphuysen 1997; Harding et al. 2006; Mallory et al. 2006; Ronconi et al. 2012; Thompson et al. 2012; Weimerskirch et al. 2003).

Due to the advances of tracking technology in data quality and quantity over the last decades, seabird tracking data is now recognized as a key tool for the identification of marine Important Bird and Biodiversity Areas - IBAs (e.g. Dias et al. 2017; Lascelles et al. 2016; Soanes et al. 2016). Based on robust, standardised scientific criteria, marine IBAs have been extensively used to inform MPA designation and marine spatial planning processes around the world (e.g. Augé et al. 2015; Lascelles et al. 2012) and have formed the backbone of marine Special Protection Areas (SPAs) for birds across the EU, and the MPAs of many OSPAR Contracting Parties (Kukkala et al. 2016; Lascelles et al. 2016; Ramirez et al. 2017). Marine IBAs can also be important areas for other species and habitats: the current IBA network, delineated for seabirds, overlaps with the global distributions of approximately 80-100% of all cartilaginous fish, corals, lobsters, mangroves, seagrasses, and marine bony fish, demonstrating the role of seabirds as 'umbrella species' for other marine taxa (Butchart et al. 2015; Kukkala et al. 2016).

The quantity and quality of data on seabird distribution and habitat use collected over the last decade in the North East Atlantic and the lack of OSPAR MPAs in ABNJ focusing on highly mobile species, justified a systematic review of the importance of sites within the ABNJ of the OSPAR maritime area for seabirds. This review resulted in the present proforma that puts forward a proposal for an OSPAR MPA in ABNJ, using seabird density and diversity as the basis for its delineation.

Summary of Methodology & Results underpinning the nomination

The scientific case underpinning the identification of the North-Atlantic Current and Evlanov Seamount MPA (NACES MPA, the Site) as important to seabirds is based on analysis of seabird tracking data. Analysing seabird tracking data is a recognized tool for the identification of marine Important Bird and Biodiversity Areas, in this case the method published in Lascelles et al 2016 has been used. This approach for identifying Important Bird and Biodiversity Areas (IBAs) has been widely applied globally (e.g., Dias et al. 2018; Dias et al. 2017; Soanes et al. 2016).

Remote tracking data allows for observations of the movement of individual seabirds in vast and remote areas where it is unfeasible to directly observe animals through constant effort, e.g. through ship-based surveys. It is never possible to track all seabirds at a colony, and so representativeness of the data needs to be evaluated to enable inferences to be made at the population level (Lindberg & Walker 2007). Only representative samples were used in this analysis, in line with the IBA approach (Lascelles at al. 2016).

Data and analytical approaches were discussed and agreed at a scientific workshop held in Reykjavik in June 2016 where BirdLife International sought collaboration with marine scientists working with Atlantic seabirds and other taxonomic groups across the region (Annex 1). This included the sharing and compilation of tracking datasets for 23 species collected from 105 colonies, corresponding to 2,188 tracked seabird individuals - the first time this quantity of data had been brought together in any fora. The analysis used all available seabird tracking data that overlapped with the OSPAR maritime area (as identified with tracking data, including birds breeding in the South Atlantic). The data used in the analysis underpinning the nomination are available in the BirdLife Seabird Tracking Database by request to the data owners (www.seabirdtracking.org).

Broadly, the analytical approach followed two key steps: 1) identify IBAs for each individual species following standardized procedures (Dias et al. 2017; Lascelles et al. 2016), and 2) combine the layers for individual species to identify the areas of highest overall density of seabirds and species richness. A full description of the methodology is included in Annex 2, and a summary of the analytical steps are as follows:

a) The 'core-use area' (an area of intensive or most concentrated use) of each individual bird during a single breeding stage (e.g. incubation, winter) was identified using kernel density analysis (Wood et al. 2000) and selecting a threshold of 50% utilization distribution (e.g. Ramirez et al. 2008; Soanes et al. 2016); Figures A3.1-A3.21.

b) The 'core-use areas' of individual birds were then overlapped to identify areas of higher concentration of birds from the same region or Large Marine Ecosystem (LMEs: http://www.lme.noaa.gov). The number of birds using each grid cell (resolution = 0.2°) was then estimated based on the percentage of birds from each LME using the cell multiplied by the number of birds breeding in each LME (Annex 4, Figures A4.1-A4.21). These analyses were conducted separately for each year-quarter (based on the life-cycle of each individual population, and information provided by researchers).

c) Species maps were combined to produce: i) richness maps based on presence/absence (1/0), with OSPAR listed threatened and/or declining species and other threatened species given a higher weighting (3 and 2 respectively) and ii) overall density maps (i.e. density of all species combined). Both the richness and density maps were then combined for the final map (detailed methods described in Annex 2; see maps in Annex 5).

d) A boundary around the most important area for seabirds in the OSPAR ABNJ areas was then drawn around the 15% highest values (based on density and richness). The 15% value was selected because it provided good coverage of the Black-legged kittiwakes - an OSPAR listed seabird species recently uplisted to Vulnerable (IUCN Red List) due to rapid population declines (BirdLife International 2018), and also encompassed the Northwest Corner and several seamounts.

e) This boundary was then smoothed and simplified (Ramirez et al. 2008) following advice from OSPAR Heads of Delegation to exclude areas of overlap with extended continental shelf claims, and to aim for a simple shape that can support effective delivery of management outcomes. All IBA and OSPAR MPA criteria were checked against the final delineation.

f) It was also tested if including additional data for more individuals would alter the location of the IBA. Additional data was provided by SeaTrack on Black-legged Kittiwakes (details in Annex Tab. A2.4). There were no discernible differences in location, but the additional data did increase the estimates for the number of birds using the area, further confirming the importance of this area for Black-legged Kittiwakes.

The area with the highest abundance of seabirds and highest species richness forms the basis of the MPA. Seabird tracking data demonstrates 22 seabird species use the MPA (Table 1), with an estimated maximum of 2.9 to 5 million seabirds throughout different seasons. The number of birds estimated to be using the Site was extrapolated based on an understanding of the representativeness of the tracked individuals for the population to which they belong, as recommended by leading seabird experts who attended the workshop in 2016 (Annex 1). Within Europe, North America, and European Overseas Territories, seabird populations are some of the best studied in the world and the colony population estimates are robust, reducing errors in the extrapolated abundance estimates. The numbers of birds reported as using the Site are estimates based on best available scientific knowledge and the uncertainty is reflected in the range provided: maximum of 2.9 to 5 million seabirds (Table 3). Even within this margin of error, there is certainty that there are considerable numbers of seabirds regularly using the Site.

The identified Site qualifies as a globally Important Bird and Biodiversity Area. The complex oceanography of the Site creates higher primary productivity and concentrations of zooplankton and biomass that are likely to support the high levels of biodiversity and abundance of the Site. Species underpinning the nomination included OSPAR listed Threatened and /or Declining species (Black-legged Kittiwake *Rissa tridactyla*, Thick-billed Murre *Uria lomvia* and Audubon's Shearwater *Puffinus lherminieri baroli*), as well as seabirds that are globally and regionally threatened (IUCN Red List) and/or listed in the Convention of Migratory Species (CMS), the African Eurasian Waterbird Agreement (AEWA) and the EU Birds Directive.

Remote tracking enables behaviours to be inferred (Buchin et al. 2010) and there has been considerable effort in interpreting and validating foraging behaviour (e.g. Weimerskirch et al. 2005, Knell & Codling 2012, Bicknell et al. 2016, Bennison et al. 2018), which has led to major advances in the understanding of species' ecology (Nathan et al. 2008). Foraging sites are considered for the management and protection of seabird species (Lascelles et al. 2016) and tracking data have been widely used to inform conservation policy and management, including identifying MPAs (reviewed in Hays et al. 2019).

Seabird foraging at the Site has been identified via kernel density estimates and First Passage Time Analysis, widely considered the best approach for determining foraging behaviour (e.g. Bennison et al. 2018). Importantly the results show that birds from different colonies congregate in this area (e.g. Black-legged Kittiwakes coming from Norway, Iceland, UK, Faroe, Denmark; Thick-billed Murres from Canada, Greenland, Iceland; Atlantic Puffins from Iceland, UK, Ireland, and Long-tailed jaeger from Greenland, Norway, Sweden). Many of the seabirds using the Site are flying considerable distances, which is an energetically costly behaviour that they simply would not undertake if the benefit of resources (food) at the Site was not higher than the cost of traveling to the Site. The scientific case of the Site being an important stopover area for refuelling during migration and/or a wintering area has furthermore been confirmed by several, independent studies conducted by different teams of researchers working with various seabird species of the Atlantic (see references in Annex 8). Such studies have revealed that seabirds use this area to take advantage of the abundance of mesopelagic fishes and squids as an important and abundant food resource (Dias et al. 2012). The overall level of uncertainty around the conclusion that the Site is important for large numbers of foraging seabirds can be considered low, given the very large sample sizes (unique in this type of analysis), a robust and recognised approach, and expert elicitation.

The findings of the tracking data analysis underpinning the proposal, were validated based on preliminary and independent dataset, collected *in-situ* during a multi-disciplinary cruise carried out between 6th June to 2nd July 2017, under the auspices of the UK Natural Environment Research Council (NERC) -Cruise DY080 - *Distribution and Ecology of Seabirds in the Sub-Polar Frontal Zone of the Northwest Atlantic* (see details in Annex 6). Seabird foraging at the Site has been verified by single species studies (see details in Annex 8).

1. Proposed name of MPA

North Atlantic Current and Evlanov Seamount MPA (NACES MPA)

2. Aim of MPA (conservation objective)

Conservation vision[1]:

Maintenance and, where appropriate, restoration of seabird populations and the integrity of the various ecosystems and their processes that support those populations of the North Atlantic Current and Evlanov Seamount MPA (NACES MPA)[2].

Method to achieve the vision:

Cooperation between competent authorities, stakeholder participation, scientific progress and public learning are essential prerequisites to realize the vision and to establish a Marine Protected Area at this site subject to adequate regulations, good governance and sustainable utilization. Long-term research and monitoring provide a detailed understanding of the biodiversity, ecosystem processes and oceanography related to seabirds and any threats to them. Best available scientific knowledge and the precautionary principle form the basis for conservation.

General conservation objectives[3,4]:

1) To **protect and conserve** the seabirds of the North Atlantic Current and Evlanov Seamount MPA and the range of habitats and ecosystems, that support the seabirds using the Site.
2) To **prevent** loss of biodiversity, and promote its recovery where practicable, so as to maintain the natural richness and resilience of the ecosystems and habitats to enable populations of seabird species to maintain or recover natural population densities.
3) To **prevent** degradation of, and damage to, habitats and ecological processes, in order to maintain the structure and functions - including the productivity - of the ecosystems that support seabird populations in the North Atlantic Current and Evlanov Seamount MPA.
4) To **provide** a refuge for seabirds and to protect the area from human activities that would have negative impacts on seabird populations.
5) To **increase** ecological understanding of the ecosystem and inform the effective management of the North Atlantic Current and Evlanov Seamount MPA.

Specific conservation objectives[5]*:*

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[1] The conservation vision describes a desired long-term conservation condition and function for the ecosystems in the entire MPA. The vision aims to encourage relevant stakeholders to collaborate and contribute to reach objectives set for the area.

[2] Recognizing that species abundances and community composition will change over time due to natural processes.

[3] Conservation objectives are meant to realize the vision. Conservation objectives are related to the entire MPA or, if it is decided to subdivide, for a zone or subdivision of the area, respectively.

[4] It is recognised that climate change may have effects in the area, and that the MPA may serve as a reference site to study these effects.

[5] Specific Conservation Objectives shall relate to a particular feature and define the conditions required to satisfy the general conservation objectives. Each of these specific conservation objectives will have to be supported by more management orientated, achievable, measurable and time bound targets.

a. To maintain or restore populations of pelagic seabirds, particularly the OSPAR Listed and globally and/or regionally threatened seabirds (see **Table 1**), using the Site, by preventing, minimizing or mitigating:

   i) *direct* current and emerging pressures and human activities negatively affecting the seabirds, including fisheries (incidental by-catch), disturbance from shipping and extractive activities, and acute pollution, occurring in the North Atlantic Current and Evlanov Seamount MPA.

   ii) *indirect* current and emerging pressures and human activities negatively affecting the seabirds, including fisheries (prey removal), disturbance from shipping and extractive activities, and pollution, occurring in the North Atlantic Current and Evlanov Seamount MPA.

b. To conserve (and restore where appropriate) the ecosystems, including their biodiversity, processes and trophic linkages, in order to support the pelagic seabird species using the Site.

c. To prevent deterioration of the environmental quality of the North Atlantic Current and Evlanov Seamount MPA from levels characteristic of the ambient ecosystems, and where degradation from these levels occur, if applicable, to recover environmental quality to levels characteristic of the ambient ecosystems.

Table 1. *List of seabird species considered under the specific conservation objectives of the North Atlantic Current and Evlanov Seamount MPA.*

Common Name	***Scientific Name***	**Species listed as threatened and/or declining by OSPAR**
Audubon's Shearwater	*Puffinus lherminieri baroli*	**x**[6]
Black-legged Kittiwake	*Rissa tridactyla*	**x**
Thick-billed Murre	*Uria lomvia*	**x**
Cory's Shearwater	*Calonectris borealis*	
Great Shearwater	*Ardenna gravis*	
Manx Shearwater	*Puffinus puffinus*	
Sooty Shearwater	*Ardenna grisea*	
Northern Fulmar	*Fulmarus glacialis*	
Bermuda Petrel	*Pterodroma cahow*	
Bulwer's Petrel	*Bulweria bulwerii*	
Desertas Petrel	*Pterodroma deserta*	
Leach's Storm Petrel	*Hydrobates leucorhous*	
Zino's Petrel	*Pterodroma madeira*	
Arctic tern	*Sterna paradisaea*	
Sabine's gull	*Xema sabini*	
Great Skua	*Catharacta skua*	
Long-tailed Jaeger	*Stercorarius longicaudus*	
South Polar Skua	*Catharacta maccormicki*	
Atlantic Puffin	*Fratercula arctica*	
Common Murre	*Uria aalge*	
Little Auk	*Alle alle*	
Razorbill	*Alca torda*	

3. Status of the location

The proposed area has been designed to be located beyond the limits of national jurisdiction of the coastal states in the OSPAR Maritime Area and outside the areas of extended continental shelf claim submissions.

[6] OSPAR listed Little shearwater, *Puffinus assimilis baroli,* in 2010, the taxonomic grouping of the species has recently been reviewed and therefore the species is referred to as Audobons's shearwater, *Puffinus iherminieri baroli*, in this nomination proforma.

The international legal regime that is applicable to the Site is comprised of, inter alia, the United Nations Convention on the Law of the Sea (UNCLOS), the OSPAR Convention, the North East Atlantic Fisheries Commission, the International Commission for the Conservation of Atlantic Tunas, International Seabed Authority, International Maritime Organisation (IMO), conventions and other rules of international law. This regime contains, among other things, rights and obligations for states on the utilization, protection and preservation of the marine environment and the utilization and conservation of marine living resources and biodiversity as well as specifications of the competence of relevant international organizations.

4. Marine region

The site is within the OSPAR Region V; Wider Atlantic.

5. Biogeographic region

The Site is located at the dynamic interface between three different biogeographic provinces.

Under Dinter's (2001) classification of pelagic biogeography this includes the cool temperate waters province, the warm temperate waters and the cold Arctic waters and the Atlantic (Deep Sea) and North Atlantic Abyssal Province.

Spalding *et al*., (2012) the 'Pelagic Provinces of the World' classification identifies the Site as straddling the North Central Atlantic Province, The North Atlantic Current Province and the Subarctic Atlantic. The region falls within the Northern Coldwater Realm (North Atlantic Gyre), and the Atlantic Warm-water Realm (Western boundary).

Using Longhurst (2010) biogeographical provinces the Site is at the meeting point of the North Atlantic Drift Province, the Atlantic Arctic Province, the Gulf Stream Province and bordering the NW Atlantic Shelves Province.

6. Location

The coordinates of the Site are 41 N-53˚ N, 32˚ W-42˚ W and fully detailed in Annex 7.

The Site is located within the area beyond national jurisdiction within the OSPAR Maritime Area (Figure 1).

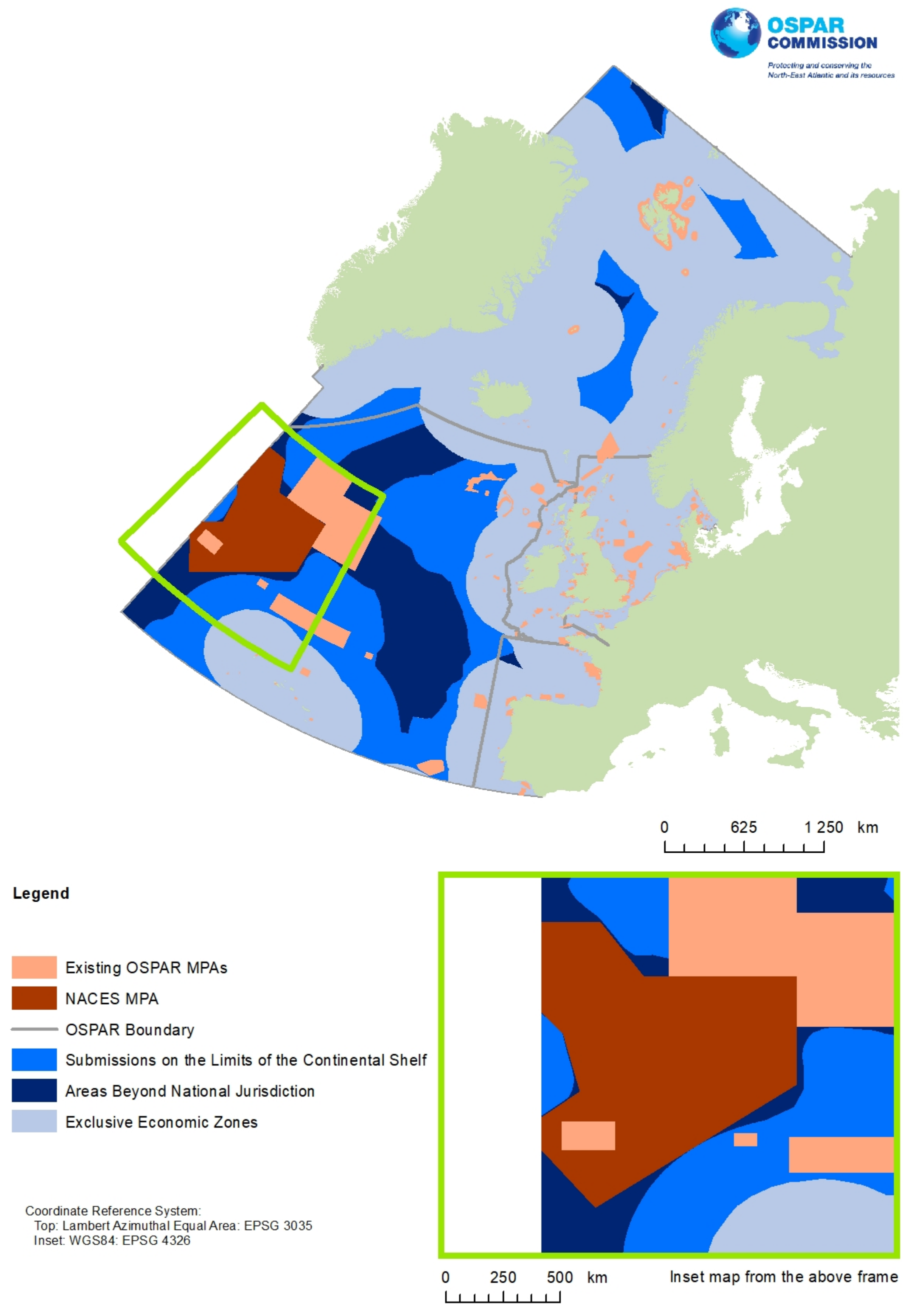


Figure 1. *Location of the Site within the OSPAR ABNJ and the existing network of OSPAR MPAs.*

7. Size

The NACES MPA covers 595 196 km^2.

8. Characteristics of the area

This section of the nomination proforma provides a general description of the Site. It provides information about features of direct relevance to the conservation objective as well as providing a broader context of the area used by the seabirds, e.g. by presenting information on non-seabird species occurring in the area as part of a description of the biodiversity.

Bathymetry

The Site is bounded in the north by the Charlie-Gibbs Fracture Zone (CGFZ), to the west by the Flemish Cap and the Grand Banks of Newfoundland, to the east by the Mid-Atlantic Ridge and to the south by the Azores (Figure 1).

The Site includes the Northwest Atlantic Mid-Ocean Canyon, a depositional-erosional feature that extends from the Labrador Sea to the Sohm Abyssal Plain (Heezen et al., 1969; Hesse et al., 1987). In the south-west the area is characterised by an abyssal plain, >4000 m deep. To the north and east the area shoals towards the CGFZ and Mid-Atlantic Ridge. Here the bathymetry is more complex, with narrow canyons and seamounts (Figure 2). There are 47 seamounts within the NACES MPA boundary that range in depth from ~4500m to ~1900m below sea level, including the Evlanov Seamount in the centre of the Site (Kim and Wessel 2011; Morato et al. 2016).

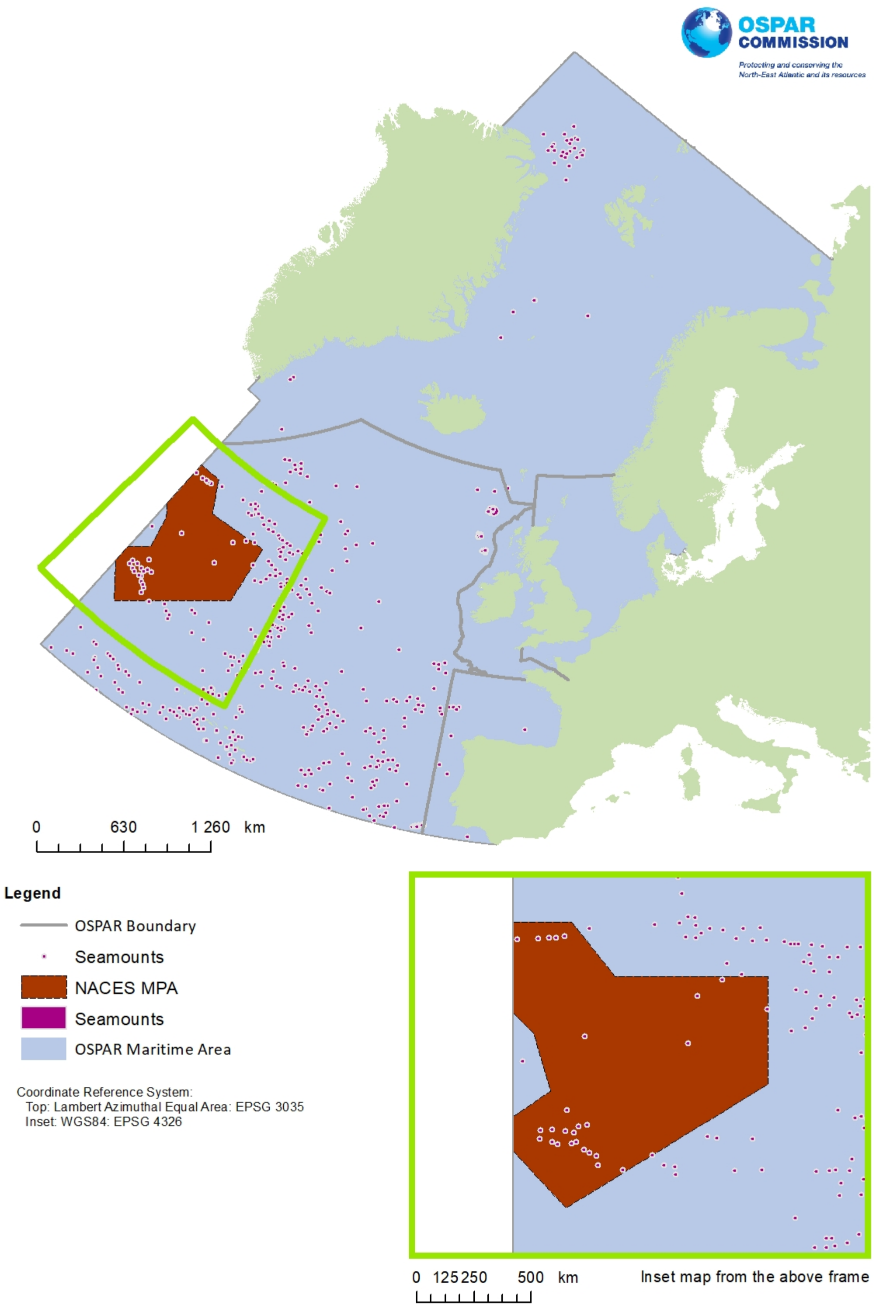


Figure 2. *Map of the NACES MPA with location of known bathymetric features (seamounts).*

Oceanography

The NACES MPA encompasses a globally unique location; a region of year-round vigorous horizontal and vertical mixing where waters from the tropical/subtropical Atlantic encounter water from the subpolar Atlantic and from the Arctic Ocean, promoting enhanced primary productivity and diversity.

The area lies across the Northwest Atlantic Mid-Ocean Canyon, a depositional-erosional feature that extends from the Labrador Sea to the Sohm Abyssal Plain (Heezen et al. 1969; Hesse et al. 1987). In the south-west the area is characterised by an abyssal plain, >4,000m deep.

The area is dominated by the formation zone of the North Atlantic Current (NAC), which grows out of the Gulf Stream extension. In this location, the Gulf Stream has carried warm tropical water to a higher latitude than any other western boundary current (Rossby 1996). After travelling along the eastern edge of the Grand Banks, the Gulf Stream turns eastwards at the 'North West Corner' (Dutkiewicz et al. 2001; Lazier 1994) and spreads into the broad frontal zone of the NAC.

The NAC is a transition zone and also part of the cold subpolar gyre (large-scale wind-driven cyclonic recirculation north of 47°N) and the warm, saline and nutrient-depleted anticyclonic subtropical gyre to the south. It has a wide banded structure with distinct water types that get progressively cooler and fresher from south to north separated by the three branches and their density fronts. The fronts are associated with vigorous vertical velocities (bringing nutrients to the surface) and some horizontal exchange, especially southward from the subpolar region (Dutkiewicz et al. 2001). Density contrasts across the fronts lead to instability and the development of eddies (Volkov 2005). These eddies may enhance and concentrate primary production and therefore represent an important habitat for oceanic higher predators such as seabirds (Bost et al. 2009; Godø et al. 2012; Haney 1986; Oschlies and Garcon 1998). The combination of localised high intensity mixing in the eddies results in patchy, but high surface productivity at fine scales (Vecchione et al. 2015). South of 52˚ N the eastward-flowing eddies ranging over the MPA potentially act as temporary barriers for dispersal of plankton and other pelagic fauna, and restricting their movement, and that of their associated predators, out of this zone (Priede et al. 2013; Vecchione et al. 2015).

As well as benefiting from mixing between the subpolar and tropical/subtropical water the NACES MPA uniquely receives influence from a remote third ocean; the Arctic. Arctic water that is very cold, very fresh and high in nutrients is carried in the North Atlantic by the East Greenland Current and the Labrador Current (Azetsu-Scott et al. 2012; Dickson et al. 2007). Much of this Arctic water leaves the shallow shelf along several pathways near the Flemish Cap and Grand Banks, joining the NAC circulation and bringing nutrient-rich waters into the Site all year round (Fratantoni and McCartney 2010). Below the Gulf Stream and the formation zone of the NAC branches, the deep western boundary current carrying cold, dense "overflows" moves southward following the seafloor topography. This, along with an intermediate layer of water from the Labrador Sea, also recirculates away from the boundary at the 'North West Corner' (Bower et al. 2009).

Subpolar frontal regions are known to be hotspots for higher predators, due to enhanced production at lower trophic levels caused by the mixing of different water masses (Hyrenbach et al. 2007; Polovina et al. 2001). Primary and secondary production is high in the SAF (Acha et al. 2015; Beaugrand et al. 2002) but the distribution of lower tropic level production and therefore higher predators may be more tightly constrained here than in other oceans due to bathymetric steering of the NAC branches. The globally unique oceanographic features of the Site mean that it straddles several biogeographical regions (Letessier et al. 2012), including the warm North Central Atlantic Province, Gulf Stream Province, North Atlantic Current Province and the cold Subarctic Atlantic Province (Spalding et al. 2012). Moreover, ecological theory suggests that diversity in the area will be high because the NAC zone is an ecotone - a transitional boundary between the different biomes (Beaugrand et al. 2002). Due to habitat complexity, ecotones often have higher diversity than any one of their constituent biogeographical regions.

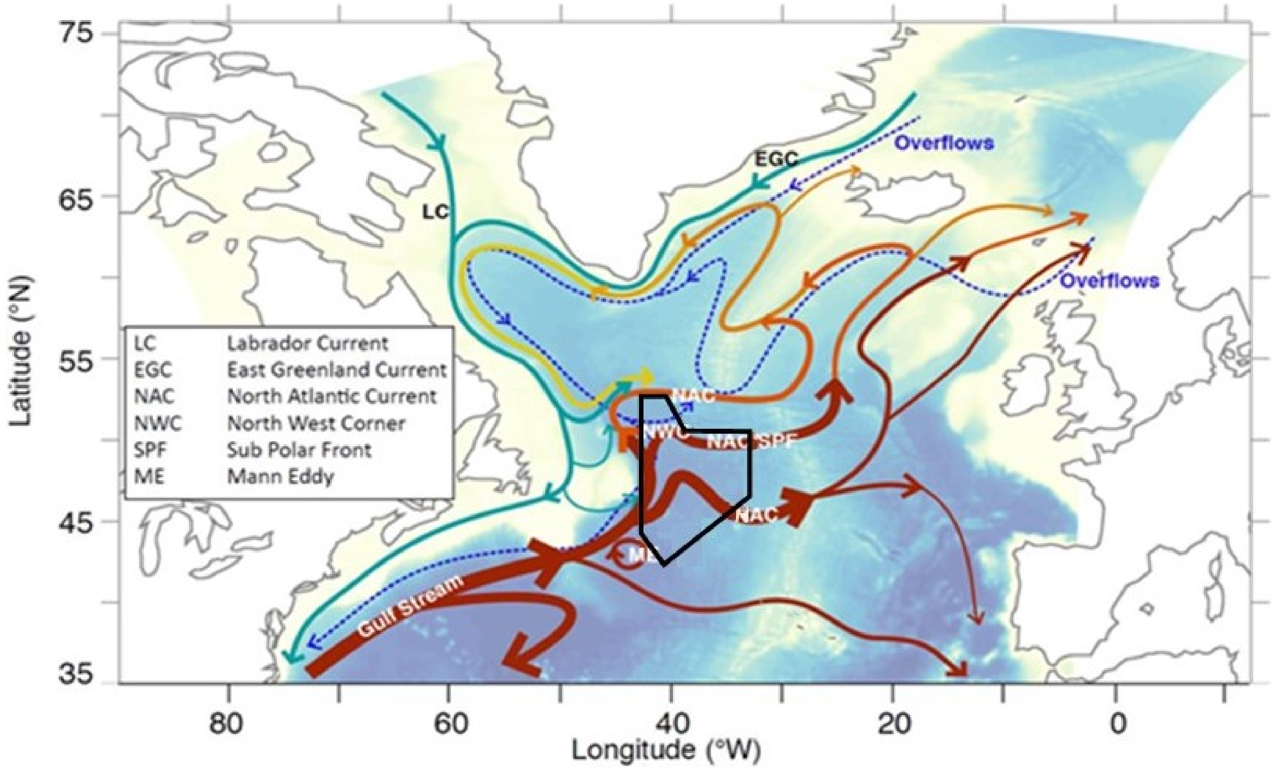


Figure 3. *Schematic diagram of the large-scale circulation of the northern North Atlantic (adapted from: Daniault et al. 2016). The NACES MPA encloses the three branches of the North Atlantic (NAC) that form as the Gulf Stream turns eastward at the North West Corner (NWC). The progressive change of colour from red to yellow indicates cooling and freshening (through interaction with the atmosphere) of the major water masses carried by the subpolar currents. The shallow, cold and fresh East Greenland Current (EGC) and Labrador Current (LC) carry nutrient-rich Arctic-origin water into the subpolar region. The dashed blue lines indicate the deep pathways of cold and dense overflow waters.*

Biodiversity

The MARECO/ECOMAR programme (Priede et al. 2013) produced the most complete study of the ecology of the Mid Atlantic Ridge and the CGFZ, but did not overlap with the entire extent of the NACES MPA. Therefore, information on most trophic level assemblages can only be inferred for the Site from adjacent areas. The available evidence suggests that there are concentrations of planktonic, mesopelagic fish and higher trophic predators (Table 2) within the NACES MPA.

As described above, the oceanography of this region is highly complex, with multiple frontal zones and persistent eddies. Fronts and high energy eddies are known to aggregate primary productivity and zooplankton, providing a temporally and spatially reliable foraging zone for higher trophic level predators such as seabirds (Scales et al. 2014). Prey availability can be further enhanced when these features occur over seamounts, as zooplankton can become entrained over the abrupt topography (the topographic blockage), and are then further restricted in their vertical migrations, thereby rendering them more accessible for mesopelagic fish and other top predators (Dias et al. 2016; Morato et al. 2016; Sweetman et al. 2013). Broad scale and remotely sensed studies of the region surrounding the MPA have demonstrated that the frontal zone and CGFZ is subject to large scale phytoplankton blooms during spring and summer

(Taylor and Ferrari 2011) with much higher chlorophyll concentrations than the adjacent waters (Gaard et al. 2008; Pelegrí et al. 2006; Vecchione et al. 2015).

In relation to zooplankton communities, the available evidence suggests that the MPA corresponds to a region with a high abundance of copepods, gelatinous zooplankton and euphausiids (Gaard et al. 2008; Letessier et al. 2011; Vecchione et al. 2015). Copepods, such as *Calanus finmarchicus* are found in high concentrations close to the Flemish Cap (Helaouet and Beaugrand, 2007, see Figure 1b for Flemish Cap location to the west of the MPA), the CGFZ/Subpolar front and the western boundary of the proposed area ~40˚ W (the 'North west Corner') whilst *C. hyperboreus* is relatively abundant in the subpolar frontal zone. Both species are important prey for gelatinous zooplankton, mesopelagic fish, and some seabird species (e.g. Little Auk, *Alle alle*) and are often associated with high seabird numbers in the North Atlantic as indicators of abundant food (Frederiksen et al. 2013; Karnovsky et al. 2008). Euphausiids are also abundant across the region and are important prey for mesopelagic fish, cetaceans and seabirds, including Thick-billed Murre, Little Auk and Black-legged Kittiwake (Mehlum and Gabrielsen 1993).

Mesopelagic fish are a major source of biomass in the oceans, and important prey for higher trophic predators, including seabirds (Gjøsaeter and Kawaguchi 1980; Harris et al. 2015; Paredes et al. 2014; Waap et al. 2017). Mesopelagic fish prey on gelatinous zooplankton, and they in turn are preyed on by larger fish, such as Redfish and the OSPAR listed Atlantic Bluefin Tuna and by squid, cetaceans, and seabirds (Granadeiro et al. 1998; Granadeiro et al. 2002; Waap et al. 2017). These small fish are particularly associated near fronts and eddies, such as those occurring within the MPA (Paredes et al. 2014). Within the areas investigated by MARECO/ECOMAR, mesopelagic species such as the Goiter Blacksmelt (*Bathylagus euryops*) and Lanternfish (Myctophids) were found in the highest abundance at the Subpolar Front and the CGFZ and with a tendency to be distributed in the upper surface layers (Sweetman et al. 2013). Cephalopods are also potentially concentrated within the region of the Site. Studies from the MARECO/ECOMAR programme indicating the highest diversity and abundance occurring south of the CGFZ (Vecchione et al. 2010). Abundant species included the oceanic cephalopod species *Teuthowenia megalops, Gonatus streenstrupi, Grimpotheuthis discovery*. The importance of cephalopods in the diet of some Atlantic seabirds is well documented, for example in Audubon's Shearwater, *Puffinus lherminieri baroli*, Cory's Shearwater, *Calonectris borealis*, Manx Shearwater, *Puffinus puffinus* and Bulwer's Petrel *Bulweria bulwerii* (Den Hartog and Clarke 1996; Neves et al. 2012; Petry et al. 2008; Waap et al. 2017) other species such as Desertas Petrel, *Pterodroma deserta* and Atlantic Puffin *Fratercula arctica* are also known to prey on squid (Harris et al. 2015; Ramos et al. 2016).

The broad region surrounding the MPA, including the CGFZ, the Mid-Atlantic Ridge, the Grand Banks and Labrador Current are known to be important foraging areas for apex predators, based on at-sea surveys, fishery records and tracking studies. For example, Northern Fulmars have been found to regularly commute from Orkney to forage on the mid-Atlantic ridge and in the Site (Edwards et al. 2013). Historical data and at-sea surveys have also consistently identified the region offshore of Newfoundland as high in seabird abundance and diversity (Bennison and Jessopp 2015; Boertmann and Mosbech 1998; Brooks 1934; Huettmann and Diamond 2006; Jespersen 1924; Jespersen 1930; McKittrick 1931; Priede et al. 2013; Sage 1968; Wynne-Edwards 1935). More recently, a research trip in 2006 (Boertmann 2014) found a dramatic and high density of seabirds beginning at 50˚ N in the area overlapping the proposed area. The ECOMAR surveys also found high seabird and cetacean abundance around transects over the Subpolar front and CGFZ (Priede et al. 2013) and information provided by researches engaged in this cruise during the OSPAR process of seeking views of other competent authorities and stakeholders also supports a high abundance of seabirds and cetaceans (Annexes Figures A8.4, A8.5, A8.16).

Telemetry studies have demonstrated that the mid-Atlantic region where the Site is located is used as a foraging, migratory and staging area for at least 25 pelagic species, including seabirds, elasmobranchs (e.g., Blue and Mako shark and the OSPAR listed Basking shark) and fish, and that an additional 17 pelagic species have been observed in the Site (Table 2; Annexes 6 & 8; Bogdanova et al. 2011; Dias et al. 2012c; Edwards et al. 2016; Egevang et al. 2010; Frederiksen et al. 2016; Frederiksen et al. 2012; Gilg et al. 2013; Hedd et al. 2012; Kopp et al. 2011; Queiroz et al. 2016; Sittler et al. 2011; Torres et al. 2015; Walli et al. 2009).

In addition, at least 10 cetacean species, including the OSPAR listed Blue Whale and 9 non-OSPAR listed species have been recorded in the MPA through at-sea surveys and tracking data. The nine non-OSPAR listed species includes medium and large baleen whales (Humpback, Fin and Sei), deep diving odontocetes (Sperm and Pilot whales) and dolphins (Common, Striped, Atlantic White-sided) (Doksæter et al. 2008; Prieto et al. 2014; Silva et al. 2014; Silva et al. 2013; Waring et al. 2008; Annexes Table A6.2, Figures A6.7; A8.11-12). The OSPAR listed Leatherback turtle also occurs in the area.

Table 2. *Summary of species observed at the Site, listed as features providing a general description of the area. Sources of scientific evidence to support high use or presence within the area are also listed. Where further tracking or observation data were provided on the occurrence of species in the proposed MPA during the 'seeking views' process, this has been noted in the table, with further details available in Annex 8.*

IUCN Red List status at European and Global level: DD=Data Deficient, LC=Least Concern, NT=Near Threatened, VU=Vulnerable, EN=Endangered, CR=Critically Endangered. * = OSPAR listed species.

	Species Common Name, Scientific Name, Red List status (European/Global)	Evidence			
		Tracking data	**Cruise DY080**	**Scientific literature**	**Views provided on draft nomination proforma**
Evidence of high use of the area in the Site	*Audubon's Shearwater, *Puffinus lherminieri baroli* (NT/LC)	x		x	x
	Cory's Shearwater *Calonectris borealis* (LC/LC)	x	x	x	x
	Great Shearwater *Ardenna gravis* (-/LC)	x	x	x	x
	Manx Shearwater, *Puffinus puffinus* (LC/LC)	x	x		
	Sooty Shearwater, *Ardenna grisea* (-/NT)	x	x		x
	Northern Fulmar, *Fulmarus glacialis* (EN, LC)	x	x	x	x
	Bermuda Petrel, *Pterodroma cahow* (-/EN)	x			
	Bulwer's Petrel, *Bulweria bulwerii* (LC/LC)	x	x		
	Desertas Petrel, *Pterodroma deserta* (VU/VU)	x		x	x
	Leach's Storm Petrel, *Hydrobates leucorhous* (LC/VU)		x	x	
	Zino's Petrel, *Pterodroma madeira* (EN/EN)	x			x
	Arctic tern, *Sterna paradisaea* (LC/LC)	x	x	x	x
	*Black-legged Kittiwake, *Rissa tridactyla* (VU/VU)	x		x	
	Sabine's gull, *Xema sabini* (LC/LC)	x			
	Great Skua, *Catharacta skua* (LC/LC)	x			
	Long-tailed Jaeger, *Stercorarius longicaudus* (LC/LC)	x		x	x

	South Polar Skua, *Catharacta maccormicki* (-/LC)	x	x	x	x
	Atlantic Puffin, *Fratercula arctica* (EN/VU)	x		x	
	Common Murre, *Uria aalge*, (NT/LC)	x			
	Little Auk, *Alle alle* (LC/LC)	x		x	
	Razorbill, *Alca torda* (NT/NT)	x			
	*Thick-billed Murre, *Uria lomvia* (LC/LC)	x			
Presence observed within Site (no evidence on use of the Site)	Wilson's storm petrel, *Oceanites oceanicus* (LC/LC)		x		
	Great Black-backed Gull, *Larus marinus* (LC/LC)		x		
	Arctic Jaegar, *Stercorarius parasiticus* (LC/LC)		x		
	Pomarine Jaegar, *Stercorarius pomarinus* (LC/LC)		x		
	Northern Gannet, *Morus bassanus* (LC/LC)		x		
	*****Blue Whale, *Balaenoptera musculus* (EN/EN)		x	x	
	Fin Whale, *Balaenoptera physalus* (NT/EN)		x	x	x
	Sei Whale, *Balaenoptera borealis* (EN/EN)	x	x	x	
	Humpback Whale, *Megaptera novaeangliae* (LC/LC)		x		
	Sperm Whale, *Physeter macrocephalus* (VU/VU)		x	x	x
	Pilot Whale *Globicephala spp* (DD/DD)		x	x	x
	Short-beaked Common Dolphin, *Delphinus delphis*. (DD/LC)		x	x	x
	Risso's Dolphin, *Grampus griseus* (DD/LC)		x		
	White-sided Dolphin, *Lagenorhynchus acutus* (LC/LC)		x	x	
	Striped Dolphin *Stenella coeruleoalba* (DD/LC)		x	x	x
	*****Leatherback Turtle, *Dermochelys coriacea* (LC/VU)	x		x	
	*****Basking Shark, *Cetorhinus maximus* (EN/VU)	x		x	

	*Atlantic Bluefin Tuna, *Thunnus thynnus* (NT/EN)	x	x	
	Blue Shark, *Prionace glauca*, (NT/NT)	x	x	x
	Shortfin Mako Shark, Isurus oxyrinchus, (VU/VU)	x	x	
Habitat types occurring within the Site				
	Seamounts, seamount-like features and associated communities		x	
	Abyssal plain		x	
	Mid-Ocean canyon		x	
	Oceanic fronts (Subpolar Front), seasonal and persistent eddies		x	

Species and habitats of special interest occurring at the North Atlantic Current and Evlanov Seamount MPA

A. Habitats

Threatened and/or declining Habitats

- Seamounts

Other features of interest

- Seamount-like features and associated communities
- Abyssal Plain and deep-sea trenches
- Mid-Ocean canyon
- Oceanic fronts (Subpolar front), seasonal and persistent eddies

B. Species

Threatened and/or declining Species[13]

- Black-legged Kittiwake (*Rissa tridactyla*)
- Thick-billed Murre (*Uria lomvia*)

- Audubon's Shearwater (*Puffinus lherminieri baroli*) - previously Little Shearwater
- Blue whale (*Balaenoptera musculus*) [7]
- Leatherback turtle (*Dermochelys coriacea*)[14]
- Bluefin tuna (*Thunnus thynnus*)[14]
- Basking Shark (*Centrophorus squamosus)* [14]

Other Species of special interest

- Seabirds from different functional groups, including Shearwaters, Fulmar, Petrels Storm-petrels, Gulls, Terns, Skuas and Alcids
- Cetaceans
- Sharks
- Mesopelagic fish and cephalopods

[7] Currently there is insufficient data to establish the importance of the area for these four OSPAR listed species.

B Selection criteria

a. Ecological criteria/considerations

1. Threatened and/or declining species and habitats

The NACES MPA includes the important foraging grounds of three OSPAR listed threatened and declining seabird species (OSPAR Agreement 2008-6, Table 1 and Annexes 3 and 4): the Black-legged Kittiwake, *Rissa tridactyla* (Annex 4 Figure A4.12), the Thick-billed Murre *Uria lomvia* (Annex 4 Figure A4.21) and the Audubon's Shearwater *Puffinus lherminieri baroli* (previously Little Shearwater) (Annex 4, Figure A4.1).

In addition to the seabirds described above, several other features included in the OSPAR list of threatened and/or declining species and habitats are known to occur within the site (see Table 2). Currently there is insufficient data to establish the importance of the area for these other OSPAR listed features, and thus they are not considered when establishing the delineation.

Black-legged Kittiwake
The Black-legged Kittiwake is listed by OSPAR in Regions I and II (OSPAR Agreement 2008-6). OSPAR has recommended the development of MPAs specifically for this species as a management measure (OSPAR 2009a).

The NACES MPA includes the foraging grounds for the Black-legged Kittiwake (Annex 3 Figure A3.12) tracked from seven different Large Marine Ecosystems across the OSPAR Maritime Area: Barents Sea, Faroe Plateau, Iceland Shelf and Sea, Norwegian Sea, West Spitsbergen, North Sea, and Celtic-Biscay Sea. The Site is an Important Bird and Biodiversity area for this species, being used by an estimated 1.3 million birds, especially during the non-breeding stage (Table 2, and Annex 4 Figure A4.12). Usage of the Site by the Black-legged Kittiwake was demonstrated to occur year-round to varying degrees with the highest densities between October and March (i.e. quarters 1 and 4, non-breeding period). High numbers (ca. 650,000 individuals) were also estimated to occur during quarter 3 (July-September, corresponding to the end of the breeding season and migration) (Table 2, Annex 4 Figure A4.12). The north-west sector of the Site (close to the oceanographic feature the 'North-west corner') appears to be the most important for this species throughout the year. Marked declines have been observed in Norway, Greenland and the UK (BirdLife International 2015; OSPAR 2009a; Thorvaldsen et al. 2015). The European population of Black-legged Kittiwake (which includes all OSPAR Regions) is currently estimated at 1.7 million to 2.2 million pairs (3.4 - 4.4 million mature individuals), and has been listed as 'Vulnerable' in the European Red List Assessment (BirdLife International 2015).

The most significant threats to this species are the impact of overfishing of forage fish, and declines in prey availability caused by human induced ecosystem changes and climate change; and the species may also be susceptible to incidental by-catch in fisheries (BirdLife International 2016a).

The Black-legged Kittiwake is a highly pelagic species, particularly in the non-breeding season when it usually remains out of sight of land (Burger et al. 2013). Oceanic prey species include mesopelagic fish such as myctophids and invertebrates, including squid, euphausiids, amphipods and polychaetes (Hatch 2013; Paredes et al. 2014). The Black-legged Kittiwake has been found to be associated with the presence and abundance of the copepod *C. finmarchicus* - a key species within the Atlantic trophic food web (Frederiksen et al. 2012), and occurring in high densities to the north and west of the MPA (Fort et al. 2012; Helaouët and Beaugrand 2007). Myctophid fish species are particularly abundant near fronts and high intensity eddies, which are present within the Site (Paredes et al. 2014).

Audubon's (Baroli) Shearwater

The Audubon's Shearwater- Baroli sub-species (*Puffinus lherminieri baroli*) was previously classified as the Little Shearwater (*Puffinus assimilis baroli*) and is now recognised within the *lherminieiri* complex as one of three sub-species (Carboneras et al. 2016). The species was included on the OSPAR List of threatened and/or declining species and habitats based on taxonomical information available at the time as Little shearwater (Agreement 2008-6). The species is Listed in OSPAR Region V (OSPAR Agreement 2008-6). OSPAR has recommended the development of MPAs specifically for this species as a management measure (OSPAR 2009b).

The foraging grounds of individuals tracked from colonies within the Canary Current LME overlap with the boundaries of the Site (Annex 3, Figure A3.1). The NACES MPA is an Important Bird and Biodiversity area for this species, with significant numbers (up to ~743 individuals) of birds estimated to use the area in July-September (Annex 4, Figure A4.1) in a relatively small area close to the north-east boundary with the Charlie-Gibbs Fracture Zone South MPA. Lower numbers (~278 individuals) are estimated to use the area during the transition between non-breeding and pre-breeding period of October-December (Table 2, Annex 4 Figure A4.1) and the lowest numbers (~60 individuals) estimated during chick rearing and start of migration (April-June). In Europe, the species is considered Near Threatened (BirdLife International 2015). Population estimates for this sub-species are 2,900-3,800 pairs, or 5,900-7,600 mature individuals (BirdLife International 2015). The global population of the Audubon's Shearwater is estimated to be more than 20,000 mature individuals. It was listed by OSPAR as a Threatened and Declining Species in 2003 based on the decline in population, the importance of the OSPAR region for its population, and its sensitivity to threats (including oil spills and predation).

Within the OSPAR area an estimated 15-22% of the *P. l. baroli* sub-species is estimated to breed - essentially the colonies in the Azores (OSPAR 2009b). The remaining population breeds in the islands of Madeira and Canaries. In comparison to many of the summer breeding seabird species, the Baroli Shearwater sub-species breeds in the Northern hemisphere winter and early spring. The *P. l. baroli* sub-species remains in the North Atlantic area almost year-round (Neves et al. 2012; OSPAR 2009b).

The Audubon's Shearwater (including all sub-species) is a surface feeder, diving to depths of ~14m and targeting small fish (e.g., *Phycidae spp*), cephalopods and crustaceans, during both the day and night (Neves et al. 2012; Paiva et al. 2016). Cephalopods have been found to be the most common prey during the breeding stage, and birds may target juvenile cephalopods - including deep water species when they move to the surface waters during twilight and night time (Neves et al. 2012). Within the Canary Current and OSPAR Region, the sub-species appears to forage in very deep oceanic areas and have large home ranges, with indications that birds from different colonies are segregating at sea and using different foraging strategies (Fagundes et al. 2016; Neves et al. 2012; Paiva et al. 2016). During the non-breeding season, individuals can range up to 2500km from the colony (Neves et al. 2012; Paiva et al. 2016), with previous research finding that birds breeding on the Azores and on Cima Islet in Madeira regularly disperse and forage within the Mid-Atlantic Ridge region (Fagundes et al. 2016; Paiva et al. 2016).

Thick-billed Murre

The Thick-billed Murre is listed as a threatened and/or declining species by OSPAR in Region I (OSPAR Agreement 2008-6), due to its regional importance in the North-East Atlantic, its population decline and its sensitivity (as a long-lived species with delayed reproduction) and susceptibility to threats such as hunting, oil spills, incidental by-catch in gill nets and loss of habitat and prey in relation to unsustainable fishing practices and climate change (Frederiksen et al. 2016; Irons et al. 2008; OSPAR 2009c).

Within the ABNJ of the OSPAR maritime area some of the most important foraging grounds overlap with the NACES MPA boundaries year-round (Annex 3 Figure A3.21). During spring, birds from Arctic Canada and Iceland use the Site, whilst birds from Arctic Canada, north-west Greenland and Iceland used the area during the non-breeding season (October-March) (Annex 3 Figure A3.21). Within the Site, significant numbers of Thick-billed Murres use the area, with ca. 144,000-161,000 birds in winter (quarters 1 and 4), ca. 50,000 in summer/autumn (quarter 3), and the lowest number (which corresponds to the breeding season) in spring/summer (quarter 2) ca. 13,000 (Table 2, Annex 4 Figure A4.21). In winter, spring, and autumn the highest concentrations are using the western boundary of the NACES MPA, closest to the Flemish Cap. In summer, Icelandic birds are concentrated within the centre of the Site corresponding to the Mid-Atlantic ridge (Table 2, Annex 4 Figure A4.21). An analysis of tracking data of 320 individuals from multiple colonies also demonstrated the use of the area corresponding to the NACES MPA during the non-breeding period (with highest use from birds tracked from colonies in Canada, Spitsbergen, north-west Greenland and Iceland) (Frederiksen et al. 2016).

The European population of Thick-billed Murre is listed as Least Concern (BirdLife International 2015) and is estimated at ca. 2.3 million mature individuals, with colonies across the OSPAR Region I (Faroe Islands, Greenland, Iceland, Norway, Svalbard and Jan Mayen, Russia (BirdLife International 2015). Despite its listing as Least Concern, significant declines of breeding populations have occurred in Svalbard, Norway, Iceland and Greenland (Descamps et al. 2013; Fauchald et al. 2015; Garðarsson et al. 2016).

During the breeding season, Thick-billed Murre feeds on a variety of fish species including capelin, sandeel and cod (Gaston 1985) as well as amphipods, and euphausiids (Mehlum and Gabrielsen 1993). During the non-breeding season, the diet includes forage fish (Capelin remaining an important species), squid, euphausiids (*Thysanoessa* spp, *Meganyctiphanes norvegica*) and amphipods (Falk and Durinck 1993; Orben et al. 2015; Renner et al. 2012). Thick-billed Murre are capable of extremely deep dives up to 200m and are able to forage during both day-time and night-time (Croll et al. 1992).

Flying is very energetically costly for Thick-billed Murre, making them susceptible to changes in prey distribution – particularly in the horizontal plane rather than vertically in the water column (Croll et al. 1992; Orben 2014). Adult survival has been linked to oceanographic conditions during winter with improved survival following winters with lower Arctic Oscillation indices, more ice and cooler sea surface temperatures (SST) (Smith and Gaston 2012).

Research from at-sea surveys and tracking suggests that Thick-billed Murres are broadly distributed across the North Atlantic during winter, from off west Greenland to offshore of Newfoundland and Labrador and south to the United States, and around Iceland, with birds from different colonies and sexes demonstrating differing migration strategies (Frederiksen et al. 2016; Gaston et al. 2011).

2. Important species and habitats

The available evidence demonstrates that the NACES MPA is used by numerous seabird species not listed by OSPAR. Studies based on tracking data (results of BirdLife International's analyses and published information) show that the Site is particularly important as foraging grounds for 19 non-OSPAR listed seabird species (Table 2, Annexes 3, 6 and 8). In addition, the existing scientific evidence and preliminary information from the recent NERC (DY080) research cruise has confirmed the use of the area by several non-OSPAR listed species, 14 of which are threatened at regional and/or global level (Table 2) and many are particularly vulnerable to human impacts (Croxall et al. 2012).

Seabird tracking data has also identified the high use by 18 non-OSPAR listed seabirds within the boundary of the NACES MPA, with the area qualifying as a marine Important Bird and Biodiversity area in each case. Seabirds from different functional groups were all found to be using the Site, including Shearwaters and Fulmar, Petrels and Storm-petrels, Gulls/Terns and Skuas and Alcids.

The seabird tracking analysis presented in the proforma indicates that the NACES MPA is consistently used by significant numbers of between 9-22 different seabird species in all seasons (Table 3, Annex 3 and 4). Leach's Storm Petrel was also noted to have high use of the area from literature and the research cruise. The highest number of birds (ca. 4.4 to 5 million individuals), using the Site is estimated to occur during winter between October-March, when the area is used by large numbers of Alcid species. Large numbers of birds (ca. 2.9 to 3.3 million individuals) are also using the Site during spring and summer (April-September), and this period also had the highest diversity of seabird species (n=21; Table 3, Annex 4).

A description of the use of the NACES MPA by species family groups is provided in the subsequent pages.

Table 3. *Seabird species and estimated maximum number of individuals (max inds) using the NACES MPA based on analysis of tracking data and divided by year quarters. * = OSPAR listed threatened and declining species. See also Annex 3 and 4, Table A2.2. Leach's Storm Petrel was also noted to have high use of the area from literature and the research cruise.*

Species name	**Biogeographic population** (max mature birds)	**Q1**	**Q2**	**Q3**	**Q4**
		Jan-March (max ind)	**April-June** (max ind)	**July-Sept** (max ind)	**Oct-Dec** (max ind)
*Audubon's Shearwater	4,084		62	743	278
Cory's Shearwater	503,430	69,685	20,358	40,085	59,442
Great Shearwater	8,000,000		1,564,472	1,819,681	
Manx Shearwater	982,510		71,827	167	
Sooty Shearwater	600,000		368,627	338,562	
Northern Fulmar	756,210	154,024	70,506	86,893	154,024
Bermuda Petrel	142			65	22
Bulwer's Petrel	100,000			1,418	
Desertas Petrel	340		12	53	13
Zino's Petrel	160	15	21	21	15
*Black-legged Kittiwake	3,822,882	1,327,050	63,650	664,577	1,366,342
Sabine's gull	3,000		375		
Arctic Tern	165,000			65,529	82,500
Great Skua	10,800	1,1964	1,309	2,618	2,945
Long-tailed Jaeger	72,856	27,766	34,765	46,131	4,482
South Polar Skua	1,542		999	1,054	
Atlantic Puffin	5,121,612	936,713	506,057	257,030	1,079,091
Common Murre	1,392,408		71,406	35,703	
Little Auk	7,000,000	2,333,333	129,630		1,555,556
Razorbill	626,944		26,123		
*Thick-billed Murre	2,589,888	156,867	50,625	13,619	144,309
Total		**5,031,734**	**2,980,824**	**3,373,948**	**4,449,020**

Shearwaters and Fulmar

The NACES MPA is frequently used by five species of shearwaters - Audubon's Shearwater (see above – OSPAR listed species), Cory's Shearwater, Manx Shearwater, Great Shearwater and Sooty Shearwater, and also by the Northern Fulmar. The available evidence on the ecology of these species and their foraging grounds in the high-seas suggests that shearwaters are probably utilising the high abundance of mesopelagic fishes and cephalopods available here, including by shifting their daily activity patterns to respond to the higher abundance of these prey during the night period (Dias et al. 2012c). Tracking studies with Manx Shearwaters and Cory's Shearwaters have shown that the area is also intensively used as a stopover during their long distance migration between the breeding areas (located in the North Atlantic) and non-breeding areas located in the South Atlantic (Dias et al. 2012a; Guilford et al. 2009), with some birds detouring more than 5,000 km from their main migratory pathway to spend between 15 and 31 days foraging in the region of the NACES MPA before heading south (Dias et al. 2012a; Annex 8 Figures A8.1-2), showing the importance of the site as refuelling area. Recent at-sea surveys (June 2017) also confirmed the use of the Site by 4 shearwater species (Annex 6 Figure A6.4).

Cory's shearwaters are north Atlantic breeders (Azores and Canary Current LMEs); high numbers of birds visit the area all-year round, but the Site is particularly important during the non-breeding season (quarters 1 and 4, with ca. 69,000 and 59,000 birds, respectively), and late breeding (quarter 3, with maximum abundances reaching 40,000 individuals; Table 3, Annex 4 Figure A4.2).

A very high number of Northern Fulmars (coming from the North Sea LME) was also estimated to use the area all year round, with maximum abundances of more than 70,000 (reaching more than 150,000 during the winter months – quarters 1 and 4; Table 3, Annex 4 Figure A4.6). During the DY080 survey large numbers of birds were found in the northern sector of the MPA (Annex 6 Figure A6.4), particularly north of the Subpolar Front (a finding consistent with Boertmann 2014). The Manx Shearwater is also a North Atlantic breeder; birds from colonies located in the Celtic-Biscay Shelf and from the Iceland Shelf and Sea LMEs visit the area especially during the quarter 2 (breeding period), with an estimated maximum abundance of ca. 70,000 individuals within the MPA (Table 3, Annex 4 Figure A4.4).

The Site is also used by important numbers of Sooty and Great Shearwaters, migrant species breeding in South Atlantic Islands (studied individuals were tracked from the Falkland and Tristan da Cunha archipelagos, respectively), that visit the Site as a wintering area during April-September. The highest use by Great Shearwaters occurred in Quarter 3 (July-September) when an estimated 1.8 million birds used the area, whilst 1.5 million birds were estimated to use the site during Quarter 2 (April-June) (Table 3, Annex 4 Figure A4.3). The evidence of use is further supported by birds tagged during the DY080 research cruise. Ten birds, tagged with GPS transmitters at the end of June 2017, moved from the shelf area into the NACES MPA area during July/August (Annex 8 Figure A8.4). The Sooty Shearwater demonstrated the highest usage during Quarter 2 (ca. 360,000 individuals estimated) and Quarter 3 (ca. 330,000 individuals) (Table 3, Annex 4 Figure A4.5).

Petrels and Storm-petrels

The NACES MPA is an important foraging area for several species of small petrels and storm-petrels, all highly pelagic and mostly nocturnal species (Dias et al. 2015; Dias et al. 2016; Ramírez et al. 2013) that are also probably feeding upon mesopelagic species that are highly abundant at the sea surface of deep waters during the night (Dias et al. 2016; Waap et al. 2017). Tracking data have shown the occurrence of three globally threatened species of gadflies – including the Endangered Bermuda Petrel *Pterodroma cahow* and Zino's Petrel *Pterodroma madeira,* and the Vulnerable Desertas Petrel, and of the Bulwer's Petrel. At-sea surveys conducted in June 2017 (DY080 NERC research cruise) also revealed the presence of storm petrels (Wilson's Storm-petrel, Leach's Storm-petrels and several unidentified Hydrobatidae/Oceanitidae sp.; see Annex 6 Table A6.1 and Figure A6.4).

Small petrels are usually able to fly very long distances to find food, even during the breeding period, when restricted by colony attendance (e.g. Dias et al. 2016). Very recent studies, carried out with more accurate devices (GPS loggers) deployed on Desertas petrels, revealed that most birds travel more than 2,000km from the colony, located in Desertas (Madeira), to forage in the NACES MPA during the incubation period (Granadeiro and Catry *in prep*; see Annex 8 Figure A8.5). The fact that these birds travel such long distances during a single incubation trip to target the waters of the NACES MPA indicates the value of the area for this Vulnerable species. BirdLife International's analyses and other studies (e.g. Ramírez et al. 2013) also suggest that the area is particularly important during the breeding season of these species (especially quarter 3: July-September; Table 3 and Annex 4 Figure A4.9).

The Endangered and very rare Bermuda Petrel, breeding on Nonsuch Island (January-June) in Bermuda, has a population estimate of 250 individuals after being re-discovered in the 1950s (BirdLife International 2016a). Tracking studies have indicated that these birds are capable of dispersing across the North Atlantic, with some individuals recorded off Ireland (Madeiros et al. 2013). The analysis of existing tracking data indicated that the birds used the site and surrounding area as foraging grounds from Spring (April) through to winter (December). High use of the NACES MPA occurred during the non-breeding summer period (July-September, quarter 3), particularly in the southern section, suggesting that this site is an important foraging ground for the global population of this species (Annex 4 Figure A4.7).

Both Zino's Petrel and Bulwer's Petrel occur more marginally in the Site, with usage predominantly in the eastern sector (Annex 4 Figures A4.8 and 4.10).

Alcids

The NACES MPA is an important foraging ground for at least 5 auk species, including the Thick-billed Murre (OSPAR-listed- see section above), the Atlantic Puffin, Common Murre, Little Auk and Razorbill (Table 3 and Annex 3 Figures A3.17-A3.21). The highest abundance of auk species within the boundaries of the NACES MPA appears to be in the winter months when large numbers of Atlantic Puffin and Little Auk use the area (Table 3, Annex 4 Figures A4.17-A4.21).

Atlantic Puffins, which breed across much of the OSPAR maritime area (Greenland, Iceland, Faroes, UK, Norway and France) are currently experiencing dramatic population declines in many of their major colonies. Lack of breeding success has been linked to climatic changes and human pressure on forage fish (e.g. Sand eel) in shelf waters surrounding their colonies (BirdLife International 2017). Major mortality of adult puffins is occurring in the Atlantic during the winter, which suggests that stable food supplies are critically important during this time (Harris et al. 2015). The species is known to be highly dispersive during winter and can use several wintering sites (Fayet et al. 2016). Studies from birds wintering off the Faroe Islands found their diet included small mesopelagic fish (Lanternfish etc), crustaceans including Euphausiids, and juveniles of larger species (Forkbeards, Goby, Lumpsucker etc) and squid (Falk et al. 1992; Harris et al. 2015).

The Atlantic Puffin, tracked from the Iceland Shelf and Sea LME and the Celtic-Biscay Shelf LMEs use the NACES MPA year-round, with birds from the North Sea LME using the area in winter and summer/autumn (Annex 4 Figure A4.17).

Little Auks have a pan-Arctic breeding distribution, with the largest colonies found in east and north-west Greenland and in Spitsbergen (Stempniewicz 2001). Given the extremely large population size this species is considered an important component in marine ecosystems in relation to transfer of energy and organic matter (Fort et al. 2010a; Karnovsky and Hunt 2002; Mehlum and Gabrielsen 1995). The species has high energy demands (Fort et al. 2010b; Harding et al. 2006) and feeds almost exclusively on zooplankton, *Calanus* copepods in summer (Fort et al. 2010b), and Krill species (e.g., *Meganyctiphanes norvegica*, and *Thysanoessa raschii*) amphipods (*Themisto* spp.) and young capelin (*Mallotus villosus*) in winter (Rosing-Asvid et al. 2013). Existing studies have already highlighted the importance of the region offshore of Newfoundland for this species, estimating that millions of Little Auks are over-wintering in this area (Fort et al. 2013; Mosbech et al. 2012). Post-breeding Little Auks from Greenland move to staging areas in the Davis Strait and the Greenland Sea where they are likely to be moulting (Mosbech et al. 2012), before leaving in October to fly ~2,000-3,000 km to the waters around the NACES MPA where many spend three to four months (Fort et al. 2013). During the summer/autumn (July-September), Little Auks are not present within the Site or the mid-Atlantic region, as they complete chick-rearing and depart for their moulting/staging grounds (Fort et al. 2013)(Table 3). Based on the available tracking data, the most important winter foraging grounds for this species coincide with the boundaries of the NACES MPA and the region of the Charlie Gibbs Fracture Zone and western boundary of the OSPAR region (quarter 1, Annex 3 Figure A3.19), Within the boundaries of the MPA the highest densities in winter of Little Auk (ca. 1.2-2.3 million mature individuals) occurs in the north-west of the site (quarter 1), with a move to the eastern boundary over the Mid-Atlantic ridge during spring (Annex 4 Figure A4.19).

The highest diversity of alcids in the NACES MPA occurs in spring and summer months (April-September) when the Common Murre and Razorbill tracked from colonies in the Iceland Sea and Shelf LME are also present. For these two species from this LME the mid-Atlantic provides more marginal foraging grounds than shelf waters and offshore areas closer to colonies (Annex 3 Figures A3.18 and A3.20). Within the boundary of the NACES MPA the two species appear to use a patchy and more spatially restricted areas within the boundary of the NACES MPA. In spring (April-June, quarter 2) Razorbills (ca. 25,000-26,000 mature individuals) are concentrated in the south (close to the Milne Seamount MPA) and the north-eastern boundary (Table 3; Annex 4 Figure A4.20). The Common Murre use the Site in both spring and summer, with the highest numbers in April-June (ca. 71,000 mature individuals) (Table 3; Annex 4 Figure A4.18).

Skuas, jaegers, terns and gulls

The NACES MPA is an important site for trans-equatorial migrants from the southern and northern hemispheres, such as the South Polar Skua, and the Long-tailed Jaeger and the Arctic Tern, respectively (Egevang et al. 2010; Gilg et al. 2013; Sittler et al. 2011; van Bemmelen et al. 2017; Weimerskirch et al. 2015; Annex 3 Figures A3.11-A3.16; Annex 8 Fig. A8.6-8). The Site is used as a main staging site by Long-tailed Jaegers from Sweden, Greenland and Svalbard for one to three weeks in their southbound and northbound migrations (Gilg et al. 2013; Sittler et al. 2011; van Bemmelen et al. 2017; Annex 8 Figure A8.7); and for one week (birds tracked from the Netherlands) to one month (birds tracked from Greenland and Iceland) for Arctic Terns (Annex 8 Figure A8.6). The Site is also used as an important wintering ground for South Polar Skuas (Annex 8 Figure A8.8).

Although studies of at-sea foraging behaviour of these species in high-seas foraging grounds are scarce, de Korte (1985) has shown that Long-tailed Jaegers arrived in their breeding grounds in spring with maximum fat reserves, suggesting the importance of the North Atlantic foraging grounds associated with the Site as a refuelling site. The staging area probably also allows the Long-tailed Jaegers to restore fat reserves after the demanding breeding season before heading to the southern hemisphere (Sittler et al. 2011). Similarly, activity level of South Polar Skuas during the non-breeding season was reported to be low, suggesting that they spend little time trying to find food (less than 20% of their daytime in flight) possibly because of the good quality of the foraging grounds (Weimerskirch et al. 2015). Isotopic similarity indicated that South Polar Skuas feed on the same prey as terns and shearwaters or, more likely, they kleptoparasite these birds (Weimerskirch et al. 2015). Long-tailed Jaegers possibly also feed by kleptoparasitism, and are often associated with the Sabine's Gull *Xema sabini* and Arctic Tern (both species occurring in the MPA) during both migration periods and on wintering grounds (Gilg et al. 2013). They can likely also feed by themselves through surface pecking, because they are not deep divers and rely on mechanisms that bring zooplankton or fish to the surface (van Bemmelen et al. 2017).

Great Skuas are endemic to the Northeast Atlantic, breeding in colonies from western Scotland to Svalbard, Norway. Birds coming from the Iceland Shelf and Sea LME used the MPA all year-round, ranging from a maximum of 2,945 mature individuals during quarter 4 to 1,309 mature individuals during quarter 2 (**Error! Reference source not found.** 3 and Annex 4 Figure A4.14). The use of the Site as a wintering area for Great Skuas is also in accordance with data presented in Magnusdottir *et al.*, (2012) for Icelandic and Norwegian birds.

Arctic Terns occupied the Site before departing to their wintering region during summer/autumn quarter 3 (July-September, with ca. 65,000 mature individuals) and quarter 4 (October-December, with ca. 82,500 mature individuals) (**Error! Reference source not found.** 3, Annex 4 Figure A4.11). High numbers of Long-tailed Jaegers used the area all year-round (with ca. 27,766 (January-March), 34,765 (April-June), and 46,131 (July-September)) but with decreased numbers and only for the Greenland LME (there was no overlap during this quarter with birds tracked from Norwegian Sea and Barents Sea LME) during quarter 4 (October-December), when birds are in their wintering grounds (maximum of 4,482 mature individuals) (Table 3, Annex 4 Figure A4.15). The MPA was used by ca. 1,054 mature individuals of South Polar Skua from South Shetland Islands LME as their main wintering ground (April-September) (Table 3, Annex 4 Figure A4.16). The Site was also occupied by the Sabine’s Gull during April-June (maximum of 375 mature individuals) (Table 2, Annex 4 Figure A4.13).

The presence of skuas, jaegers, terns, and gulls in the NACES MPA has also been confirmed by the recent NERC at-sea survey (DY080- see Annex 6 Table A6.1 and Figure A6.4), carried out during June 2017, supporting the evidence collected using tracking data. The at-sea survey showed that the Site is used by the Arctic (*Stercorarius parasiticus*) and Pomarine (*S. pomarinus*) jaegers, and by Great Black-backed Gull (*Larus marinus*), species that lack tracking data.

Importance of deep oceanic habitat for the pelagic ecosystem
Life in open ocean pelagic systems is intrinsically linked to the deep-sea and the seafloor through downward flux of organic matter and upwelling of nutrients from the depth of the ocean. The deep-sea is the largest habitat on Earth and accommodates a very high biodiversity (Brandt et al. 2007; Danovaro et al. 2008; Grassle 1996; Ramirez-Llodra et al. 2011; Woolley et al. 2016). The pelagic zone is usually subdivided by amount of sunlight (photic and aphotic) or depth: epipelagic (0-200m); mesopelagic (200-2,000m), bathypelagic (2,000-4,000m), abyssopelagic (4,000-6,000). These different zones and the seafloor (benthos) are linked by biological processes including remineralization and sequestration of nutrients and carbon (Figure 4).

Diurnal vertical migration (DVM) of organisms, such as zooplankton and other mesopelagic fauna, is a pattern of movement from deep ocean depths to surface waters at dusk, returning to deeper waters at dawn (see diagram Figure 4). In terms of biomass, this is the largest daily migration on Earth (Hays 2003). This migration is an important basis of the marine food web, particularly in open ocean areas such as this Site, by making deep-dwelling organisms available as prey to predators such as seabirds (Regular et al. 2010). Peak seabird foraging is at dawn and dusk, corresponding with DVM. Studies have shown that seabirds are able to alter their feeding behaviour, including time, and dive depth in response to prey availability as a result of DVM. For example, Cory’s Shearwaters have been found to alter their foraging strategy in relation to oceanographic variables, most like to fully exploit the DVM prey (Dias et al. 2012c), and Thick-billed Murres alter their dive depth to exploit amphipods and sand lace (Elliott and Gaston 2014). DVM occurs at different depths, with different depth-tired populations (van Haren 2007). DVM also links the water column and the benthos (pelagic-benthic coupling) as many holoplankton organisms perform diel and ontogenetic migrations covering the whole water column, connecting sea surface and sea floor. At certain depths, due to a downward migration, these species may come close to the sediment and provide a food source for benthic invertebrates. Benthic organisms often reproduce via planktonic larvae (meroplankton), which may seasonally contribute in high abundances to the zooplankton community. Thus, the water column and the seafloor are closely linked and the integrity of this link is crucial of the sustaining marine biodiversity and ecosystem functioning.

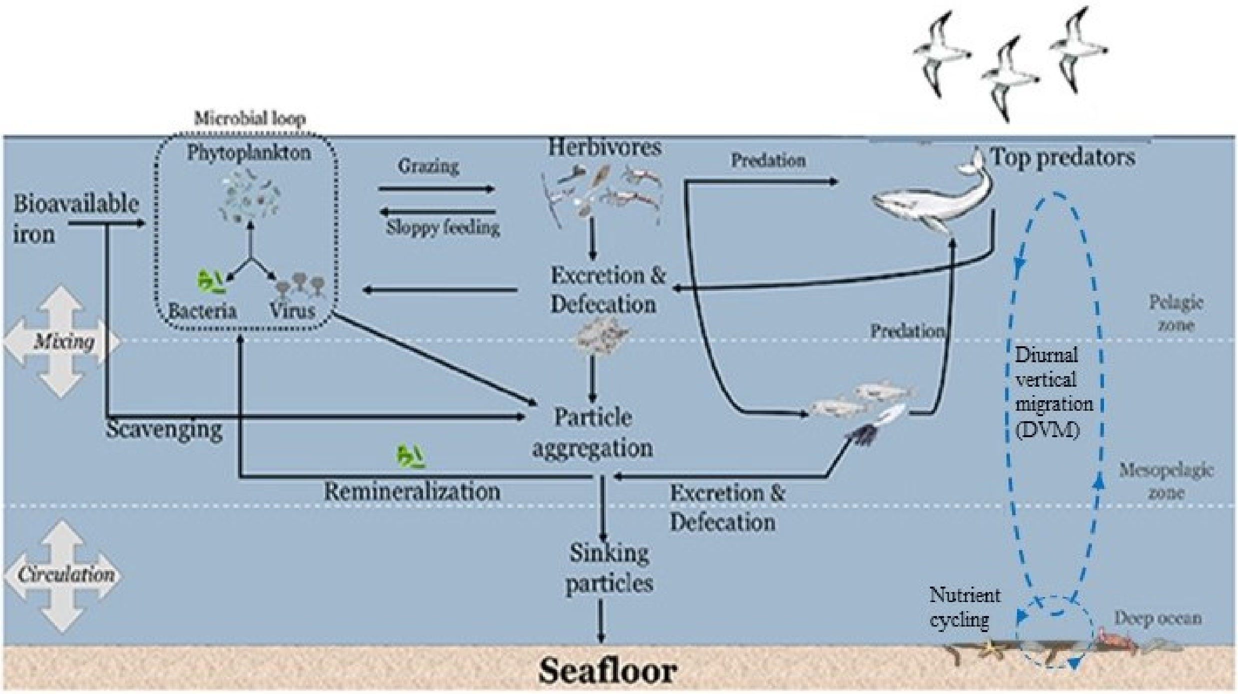


Figure 4. *Simplified conceptual diagram of the linkages between the seafloor, water column (including diurnal vertical migration), and top predators. Figure adapted from: (Ratnarajah et al. 2018).*

Equally important as the *downward* coupling between water column and seafloor is *upward* benthic-pelagic coupling that links the seafloor to the water column. Through resuspension and diffusion, organic matter and nutrients (e.g. phosphorus, nitrogen, sulfur) from the seafloor (re-)enter the overlaying water column and thereby the functional linkages and trophic webs of the demersal and pelagic waters (e.g. Dale et al. 2017, Griffiths et al. 2017, Mussap and Zavatarelli 2017). Thus, organic and inorganic seafloor sediments exert an important feedback on biochemical processes of the water column. The upward coupling from seafloor to water column is an integral part of the marine biochemical cycles of the marine environment and crucial to the functioning of marine ecosystems (Dale et al. 2017, Griffiths et al 2017). Scientific evidence even suggests that pelagic seabirds foraging at the sea surface specifically target areas with strong upward benthic-pelagic coupling as the superjacent waters provide increased prey availability (Wakefield at al. 2012).

Life in the deep aphotic pelagic zones mostly depends on energy flux from the upper water layers. It is characterized by a stable environment, to which zooplankton, other pelagic invertebrates, of which many are gelatinous, and mesopelagic fish are specifically adapted (Ramirez-Llodra et al. 2011). Abyssal plains and deep-sea trenches, like the Atlantic Mid-Ocean Canyon, which extends to about 5,400m within the NACES MPA. Seamounts, like the Evlanov Seamount in the Site, rise more than 1,000m above the surrounding seabed (Morato et al. 2015), where upwelling of nutrients supports increased biological productivity that in turn supports high abundance of animals such as sessile filter feeders, fishes, sharks, turtles, marine mammals and seabirds (Clark et al. 2012). Mesopelagic fauna show a marked spatial variability closely linked to bathymetry, and are the dominant component of food webs in deep, open oceanic water (Pusch et al. 2004). Seamounts trap the downwardly migrating organisms and induce mid-oceanic upwelling phenomena (e.g. Rogers 2018). There is growing evidence that pelagic seabirds target seamounts for foraging, likely targeting profitable prey resources associated with these features (e.g. Dias et al. 2016; Scheffer et al. 2016).

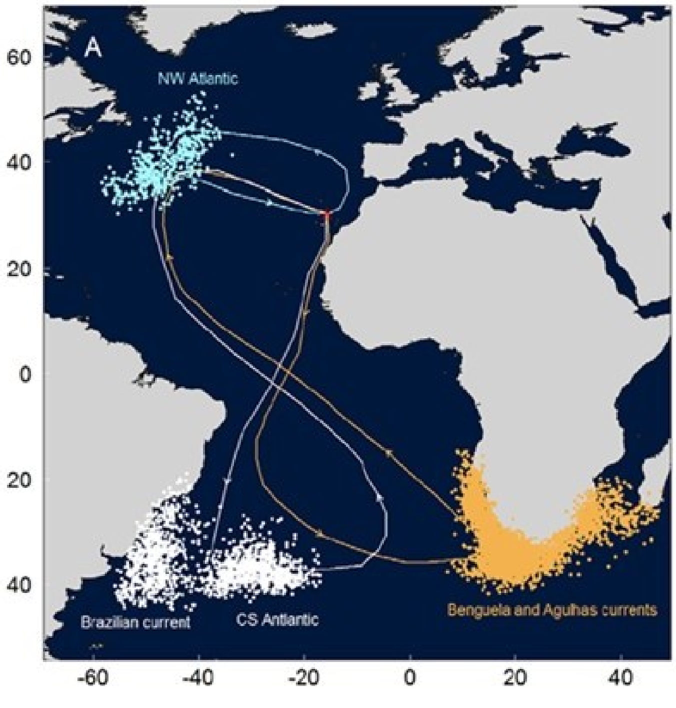
Further oceanographic and biological research is required within the MPA to fully understand the nature of the linkages between the seafloor, the complex oceanography and the diversity of lower and higher trophic levels. With the current available evidence and taking the ecosystem approach into account information on the sea floor is included in this proforma to illustrate the interconnectedness of the ecosystems in the area, including the link between the benthic and pelagic systems for ecosystem functioning.

3. Ecological significance

The NACES MPA is a unique site in the high seas of the North East Atlantic, encompassing an area of complex oceanography and high species richness and density of pelagic seabirds using this area year-round, and consistently between years (Annex 3).

Foraging ground for high trophic level predators

The NACES MPA is an Important Bird and Biodiversity Area (IBBA) and the most important pelagic foraging ground in the Area Beyond National Jurisdiction of the OSPAR maritime area for at least 22 seabird species. The Site is used by an estimated 2.9-5 million seabirds (Table 3, Annex 4 Figures A4.1-A4.21). Long term datasets from around the Atlantic (OSPAR Marine Area, Canada and South Atlantic) demonstrates that the Site is used by species across different seasons and years (Annexes 3, 4, 6, 7 and 8). The analysis of seabird tracking data, and previously published findings, support that the Site is used as a foraging ground by several pelagic species and by individuals from different colonies, during the same time periods (Figure 5, Annex 3). The highest concentrations of seabirds occurred during the winter period (October-March), when large numbers of deep diving Alcids (e.g. Little Auk, Atlantic Puffin, Thick-billed Murre) and Black-legged Kittiwake and Northern Fulmar use the area. Significant numbers of seabirds also use the Site during spring and summer- ca. 2.9-3 million individuals.



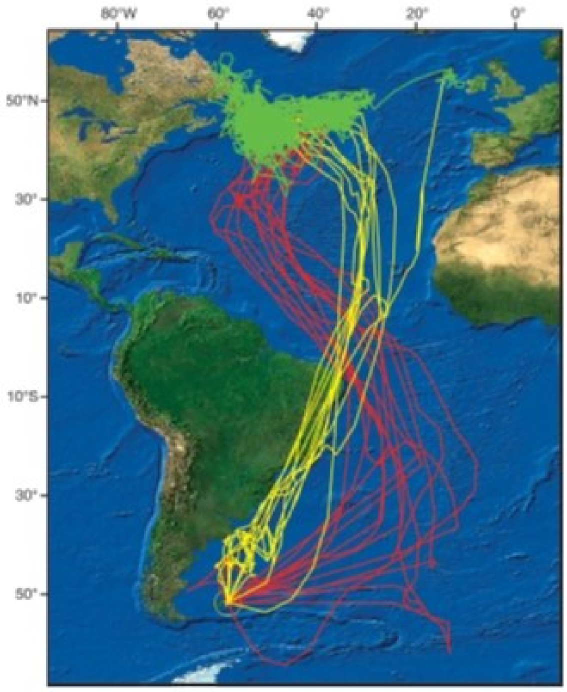


***Figure 5**. Example tracks of seabirds migrating to the proposed MPA: A) Cory's Shearwater from the Selvagem Grande colony (Madeira Archipelago, Portugal), with the wintering areas in the NW Atlantic shown in blue (Dias et al. 2012b),*

and B) Sooty Shearwaters that breed in the Falklands Islands and complete trans-equatorial migration to the proposed MPA (main staging and non-breeding areas shown in green) (Hedd et al. 2012).

The Site is also used by at least 10 cetacean species, although further research is needed to understand intensity and type of use of the site by the species (foraging/residency/migration corridors), and thus at present these features are not taken into account in the delineation of the NACES MPA. Overall, the Site appears to be used by at least 42 different high trophic level species, including some of the smallest seabirds, up to the giant Blue Whale and representing a wide range of feeding ecologies and ecological niches- from krill specialists to those foraging on mesopelagic fish and squid and jellyfish.

The available evidence suggests that the ecosystems at the Site correspond to a region with a high abundance of prey species for high trophic level predators, including prey species such as copepods, gelatinous zooplankton and euphausiids (Gaard et al. 2008; Letessier et al. 2011; Vecchione et al. 2015). The copepod *C. finmarchicus,* a key species within the Atlantic trophic food web (Frederiksen et al. 2013), occurs in high densities within the NACES MPA (Fort et al. 2012; Helaouët and Beaugrand 2007). Euphausiids are also abundant across the region and are important prey for mesopelagic fish and seabirds such as Thick-billed Murre, Little Auk and Black-legged Kittiwake (Mehlum and Gabrielsen 1993).

Mesopelagic fish -species such as the Goiter Blacksmelt (*Bathylagus euryops*) have been found to be the one of the abundant fish in the Mid-Atlantic Ridge region, with highest abundance at the Subpolar Front and the CGFZ (Sweetman et al. 2013). These fish prey on gelatinous zooplankton and copepods. They in turn are preyed on by larger fish, and top predators such as seabirds (Granadeiro et al. 2002; Waap et al. 2017). Another abundant mesopelagic group of fish- the Lanternfish (Myctophids) have been found in high abundance across the Subpolar Front boundary. These small fish are particularly associated near fronts and eddies, such as those occurring within the NACES MPA (Paredes et al. 2014). Myctophids are key prey for squid, cetaceans and seabirds (Harris et al. 2015; Paredes et al. 2014; Waap et al. 2017). Cephalopods are also potentially concentrated within the boundary and broader region of the MPA, with studies from the MARECO/ECOMAR programme indicating the highest diversity and abundance occurring south of the CGFZ (Vecchione et al. 2010).

Despite the lack of detailed information on the trophic dynamics within the broad mid-Atlantic region and the boundary of the MPA, the importance of this area as a foraging and staging ground for seabirds suggests that the complex oceanographic and biological conditions provides a reliable source of food during key life stages and energetically demanding periods.

Seabird use during non-breeding period

Many Atlantic seabirds use the ecosystems of the ABNJ during both the breeding and non-breeding period. However, high seas areas are known to be particularly relevant for seabirds during their non-breeding stage, both as a staging area during migration and as a final non-breeding destination (e.g. Bogdanova et al. 2011; Dias et al. 2011; Egevang et al. 2010; Fort et al. 2013; Frederiksen et al. 2012; Harris et al. 2010).

The non-breeding (winter) period is an important stage of a seabirds life-cycle, when they typically recover from the energetically demanding breeding period and prepare for the subsequent breeding season. The winter period is also when adult survival is most at risk, and it has been suggested to account for the highest mortality of Atlantic seabirds (Daunt et al. 2006; Fort et al. 2010a; Harris et al. 2010). Winter "seabird wrecks", when thousands of birds die from starvation due to unfavourable conditions on non-breeding foraging grounds, are well documented along the Atlantic coast (Fort et al. 2015; Fort et al. 2009; Frederiksen et al. 2012). Protecting seabird species in high sea areas is therefore critical for their long-term persistence.

As described above, the Site was found to be extremely important as a key staging area for highly migratory seabirds, including both Northern and Southern Hemisphere breeders. For many of the long-distance migrants the Site is likely used during both the outward and return journeys and plays an important role as stopovers, in restoring fat reserves before migration is resumed.

Biogeographic ecotone and persistent frontal zone
The NACES MPA is situated within the subpolar frontal zone, and is considered an ecotone: representing a transition zone between cold, polar seas and the warmer central Atlantic waters (Beaugrand et al. 2002). The region is therefore ecologically important, providing habitat for both cold and warm adapted species at the extreme end of their ranges (Acha et al. 2015; Beaugrand et al. 2002).

Previous studies have indicated the importance of the Subpolar Front and the CGFZ in relation to heightened primary productivity, copepod and euphausiid biomass and biodiversity and meso-pelagic fish (Pelegrí et al. 2006; Priede et al. 2013). Fonts and high energy eddies are known to aggregate primary productivity and zooplankton, providing a temporally and spatially reliable foraging zone for higher trophic level predators such as seabirds (Scales et al. 2014). Productivity can be further enhanced when these features occur over seamounts, as zooplankton can become entrained over the abrupt topography (the topographic blockage), and are then further restricted in their vertical migrations, thereby rendering them more accessible for mesopelagic fish and other top predators (Morato et al. 2016; Sweetman et al. 2013). The frontal zone is stable throughout the year, suggesting that the NACES MPA provides a stable and predictable source of food for seabirds (and other predators), including during the challenging winter period.

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4. High natural biological diversity

Based on the analysis of seabird tracking data the Site was found to have globally important concentrations of seabirds (qualifying as an IBA) and the highest seabird species richness within the Area Beyond National Jurisdiction of the OSPAR maritime area (Annex 5). The NACES MPA had the highest seabird diversity during spring and summer, when 22 seabird species were present during the same season. Species richness was also high during quarter 4, with 12-15 seabird species using the Site.

As an indication of the biodiversity of the ecosystems at the site, in addition to seabird diversity, existing research indicates that at least 10 cetacean species (Doksæter et al. 2008; Waring et al. 2008; Annex 6), three elasmobrach species (Blue, Mako and Basking sharks) and one seaturtle species (Leatherback turtle) occur at the Site.

As a depiction of the diverse bathymetry influencing the hydrodynamic conditions in the area, 47 seamounts occur within the Site, eight of which are 1,000m or higher (Figure 2). Seamounts are generally considered as habitats supporting a high level of seafloor biodiversity, including cold-water coral and sponge reef habitats, due to upwelling and eddies close to the slopes of the seamounts.

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5. Representativity

Pelagic foraging hotspot
The NACES MPA is the most important high seas foraging ground in the OSPAR maritime area for seabird species. The Site contains a significant proportion of the North Atlantic seabird populations and has the highest species diversity and abundance of seabirds across the entire Area Beyond National Jurisdiction of the OSPAR maritime area (Annex 4). Although important pelagic areas have been identified for individual

species in the Atlantic previously, there has not been a multi-species analysis on this scale. The multi-species use of the area suggests that the inclusion of the NACES MPA would allow the OSPAR MPA network to achieve greater representatively for multiple seabird species.

The 2013 Ecological Coherence Assessment (OSPAR, 2013) found that seabirds are currently not well represented in OSPAR MPAs in the Area Beyond National Jurisdiction. The current OSPAR MPA network includes protected Sites close to land and seabird breeding colonies, which are of high importance during the seabird breeding season. However, a gap remains for sites during non-breeding periods. Protecting areas for all life-history stages is important to ensure representativity and ensure long term persistence of migratory species. The NACES MPA would increase the ecological coherence and representativity of the existing MPA network for seabirds with the inclusion of important foraging grounds of North Atlantic breeding seabirds at multiple points in their life stages and representing birds from colonies around the OSPAR maritime area. The NACES MPA also adds important staging and foraging grounds for South Atlantic and Caribbean breeding seabird species (e.g. Bermuda Petrel, Sooty Shearwater, Great Shearwater and South Polar Skua), an element which is not currently found in any of the OSPAR MPAs in the Area Beyond National Jurisdiction.

Productive frontal zone and deep ocean
The NACES MPA is globally unique in its oceanography, situated at a convergence zone between the cool, polar seas and the warm, central Atlantic. Within the boundary of the NACES MPA successive frontal zones fork out as the Subpolar Front meanders across the mid-Atlantic. The unique oceanographic conditions and complex bathymetry likely driving both primary and secondary diversity and abundance. It is therefore a unique pelagic ecosystem, and a habitat type (highly productive frontal zone) that is not well captured within the current OSPAR MPA network.

6. Sensitivity

The sensitivity of the seabirds included in Table 1 is considerable. All seabird species are long-lived and slow reproducing (1-3 eggs once a year), meaning their populations are vulnerable to mortality events and slow to recover. The threatened seabird populations are particularly sensitive to human activities and threats (Table 4). The top threats impacting seabirds using the Site are fisheries (incidental by-catch (n=11); overexploitation of prey species (n=9)), followed by changes associated with changing oceanographic conditions (prey availability (n=12); habitat (n=1), extreme weather (n=1)); infrastructure and development (oil spills and surface pollutants (n=9); light pollution/ship strikes (n=7); energy production and mining n=3)).

Illustrating the sensitivity of seabirds to threats, it could be noted that of the 82 seabird species that occur within the European region, 24 are threatened or near threatened (BirdLife International 2015). In the boreal Northeast Atlantic (ca. 55–70°N), many seabird species have had repeated breeding failures and experienced high adult mortality over the last decade, which has resulted in pronounced declines in species such as Atlantic Puffin, Black-legged Kittiwake and Northern Fulmar (Burthe et al. 2012; Cordes et al. 2015; Durant et al. 2003; Grosbois and Thompson 2005; Miles et al. 2015; OSPAR 2017; Wanless et al. 2005). The 2017 OSPAR Intermediate Assessment 2017 concluded that seabirds in the OSPAR region were in trouble, with significant reductions in abundance and continued breeding failures.

The NACES MPA includes the important foraging grounds for seven seabird species, which are considered to be globally or regionally threatened or near-threatened according to IUCN Red List criteria: the Atlantic Puffin (Globally Vulnerable and Endangered in Europe), Bermuda Petrel (globally Endangered), Northern Fulmar (Endangered in Europe), Desertas Petrel (globally Vulnerable) and Zino's Petrel (globally Endangered). An additional three species (Audubon's Shearwater, Razorbill and Common Murre) are considered 'Near

Threatened' within Europe (Table). Protection of foraging grounds, ensuring undisturbed access to food sources during critical life stages, is an important means to protect seabirds.

Large MPAs can help mitigate the impacts of climate change by maintaining biogeochemical cycles. Through protecting the entire ecosystem, populations and processes are more resilient to an increase in climate stress. For example the mesopelagic fish, which are a prey item to seabirds, play a significant role in the active flux of organic carbon from the ocean surface to the deep sea (Davison et al. 2013; St John et al. 2016). Their large, vertical daily migrations provide a potentially important scenario where it is thought their gut carbonates are produced mainly during their time at greater depths but released primarily near the surface, driving an upward alkalinity pump that is currently acting to counter surface ocean acidification (Roberts et al. 2017). Protecting mesopelagic fish could have significant ecological and biogeochemical effects (Roberts et al. 2017).

Table 4. *Details of the known/likely threats at-sea to all species identified as using the MPA. Table is ordered by OSPAR list of threatened and/or declining species (*), IUCN threatened species, and Least Concern species. BirdLife International (2018) IUCN Red List for birds. http://datazone.birdlife.org/species/search and Dias et al. in prep.*

Species common name	**Known/likely threats at sea**
*Audubon's Shearwater	Incidental by-catch in pelagic and demersal longline fishing gear and other gears Oil spills and surface pollutants Light pollution/ship strikes
*Black-legged Kittiwake	Climate/oceanographic induced changes to food availability Human induced changes to ecosystem functioning (over-exploitation of prey species) Oil spills and surface pollutants
*Thick-billed Murre	Incidental by-catch in gillnets (Note- depth of dives includes 200 m) Climate induced changes to food availability Oil spills and surface pollutants Human induced changes to ecosystem functioning (over-exploitation of prey species)
Atlantic Puffin	Incidental by-catch in gillnets and longlines Climate/oceanographic induced changes to food availability Human induced changes to ecosystem functioning (over-exploitation of prey species) Extreme weather events Habitat displacement – collision with energy production and mining infrastructure Oil spills and surface pollutants
Bermuda Petrel	Climate/oceanographic induced changes to food availability Light pollution/ship strikes
Common Murre	Incidental by-catch in gillnets and other fishing gear. Human induced changes to ecosystem functioning (over-exploitation of prey species) Oil spills and surface pollutants Climate/oceanographic induced changes to food availability
Desertas Petrel	Climate/oceanographic induced changes to habitat Light pollution/ship strikes
Northern Fulmar	Incidental by-catch in demersal longline fishing gear and other gears

	Oil spills and surface pollutants Climate/oceanographic induced changes to food availability Light pollution/ship strikes Human induced changes to ecosystem functioning (over-exploitation)
Razorbill	Incidental by-catch in gillnets and other fishing gear Human induced changes to ecosystem functioning (over-exploitation of prey species) Climate/oceanographic induced changes to food availability Habitat displacement and disturbance - Energy production and mining Oil spills and surface pollutants
Zino's Petrel	Climate/oceanographic induced changes to food availability Light pollution/ship strikes
Sooty Shearwater	Incidental by-catch in gillnets, trawl, and longline fishing gear Human induced changes to ecosystem functioning (over-exploitation of prey species) Climate/oceanographic induced changes to food availability
Arctic Tern	Human induced changes to ecosystem functioning (over-exploitation of prey species) Climate/oceanographic induced changes to food availability
Bulwer's Petrel	Incidental by-catch in longlines and other pelagic fishing gear Oil spills and surface pollutants
Cory's Shearwater	Incidental by-catch in longlines and other pelagic fishing gear Light pollution/ship strikes
Great Shearwater	Incidental by-catch in longlines and other pelagic fishing gear
Great Skua	Human induced changes to ecosystem functioning (over-exploitation of prey species)
Little Auk	Incidental by-catch in gillnets and other fishing gear Climate/oceanographic induced changes to food availability Habitat displacement and disturbance - Energy production and mining Oil spills and surface pollutants
Long-tailed Jaeger	Climate/oceanographic induced changes to food availability
Manx Shearwater	Light pollution/ship strikes
Sabine's Gull	Currently no threats documented in literature
South Polar Skua	Currently no threats documented in literature

7. Naturalness

The general area has a high degree of naturalness, with species and habitats/biotope types still in a very natural state as a result of the lack of human-induced disturbance or degradation. However, the pelagic waters of the Site are assumed not to be pristine, given that both shipping and fishing activities take place within and in the areas surrounding the Site.

b. Practical criteria/considerations

1. Potential for restoration

Many seabird populations that use the NACES MPA have declined markedly in recent times (Paleczny et al. 2015). This implies that the number of birds using the Site is probably lower than it would have been prior to the onset of human activity impacts. The potential for improving the status of the seabirds defined in the conservation objectives of the Site is therefore high and realising this restoration potential of the seabirds is contingent in part on appropriate protection of remote foraging sites, including at the Site.

In addition to restoration of the protected features at the site due to any identified adverse impacts from human activities, the NACES MPA also aims to protect the ecosystems and biological diversity in the area against any future adverse impacts of human activities.

Currently, there are activities occurring that have potential negative impacts on the features at the Site. However, further data on the activities within the Site are needed to determine whether the features need to be maintained or restored through appropriate management action.

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2. Degree of acceptance

OSPAR Commission agreed to develop this nomination proforma in a transparent, wide and inclusive manner by seeking views on a draft version of the proforma from other competent authorities are relevant stakeholders. Early versions of the nomination proforma were also presented at several international meetings and other competent authorities were invited to provide views and input. Information and views from other competent authorities presented in this section of the nomination proforma are summaries of views provided by these actors through the process of OSPAR seeking their views, as well as through information exchange during meetings under the collective arrangement.[8]

The process of seeking views was run between June-October 2018. The aim of the process was to gather as much information as possible to inform a decision on the designation of the proposed NACES MPA and any recommendations on its future management. Views were invited on the following questions;

(i) Can you provide any additional information of relevance on the 22 species of seabirds and habitats and ecosystems that support the seabird species present in the proposed MPA?

(ii) Can you provide any additional information on current and/or potential future human activities at the site, including their intensity, type and timing?

(iii) Can you provide additional indicative information about potential future management actions within the site to deliver the proposed conservation objectives for the site?

Views were provided in response to the process from several competent authorities, other regional stakeholders as well as members of the scientific community. Competent authorities generally noted a low level of activity in the area or none at all, and that further considerations would be needed to inform their potential future processes in respect to any actions. The scientific community expressed a strong support for the nomination proforma identifying an important Site for seabirds.

[8] The text in the nomination proforma has been drafted by the OSPAR task group responsible for developing the nomination proforma based on information provided by other organisations. Thus, the information in the nomination proforma should not be read as official statements by other organisations, but rather as a summary compilation by OSPAR of the information and views provided. The official responses to the seeking views process and other contributions are archived at the OSPAR Secretariat.

OSPAR presented an early draft of the nomination proforma to the 2018 meeting under the collective arrangement, with a view to invite dialogue on the ongoing work, invite contributions of relevant information and inform of the timelines for further work. A more developed version of the nomination proforma was again presented by OSPAR to the 2019 meeting under the collective arrangement, inviting dialogue with other competent authorities in particular on the sections in the nomination proforma describing human activities and potential management action. Ongoing work and early versions of the nomination proforma were presented for discussion at the collective arrangement meetings with the aim to ensure early involvement of all relevant stakeholders and awareness of the proposal to support a successful potential future designation and management

Fishing

The extent and intensity of fishing effort within the proposed MPA appears to be less commercially important than adjacent areas.

The **North East Atlantic Fisheries Commission (NEAFC**) regulates (pelagic and bottom) fisheries in the ABNJ in accordance with applicable provisions of *The NEAFC Scheme of Control and Enforcement*[9]. In accordance with NEAFC regulations, regulated bottom fishing only takes place in areas previously fished (spatial information available through ODIMS[10]). The Chair of the Permanent Committee on Management and Science (PECMAS) communicated that there had been very little, if any, fishing activity by vessels regulated by NEAFC at the proposed Site during in past years. PECMAS informed that a limited number of transit voyages crossing the Site by NEAFC regulated fishing vessels had taken place in those past years. In this respect it is furthermore relevant to note that NEAFC has regulations in place for the protection of vulnerable marine ecosystems[11] (spatial information available in ODIMS[12]). NEAFC PECMAS pointed out that the information on fisheries included in the nomination proforma reflected the expertise of the authors and that authorities regulating fisheries, such as NEAFC, have more detailed information. In this regard, PECMAS informed of the perspective of NEAFC that not only is ICES advice on the science underpinning a nomination proforma important, but ICES' views on the human activity and potential impacts in the area are also needed. All NEAFC decisions on fisheries management are based on science and build on input from ICES.

The **International Commission for the Conservation of Atlantic Tunas (ICCAT)** have noted the ongoing work of OSPAR in developing a nomination proforma, and contributed by providing information on fishing activities regulated by ICCAT. The Executive Secretary of ICCAT informed that several fleets, particularly longliners, traditionally operate in the region of the NACES MPA and nearby (at a coarse spatial scale). The primary target of these fleets are temperate tuna species (Northern Albacore, Bigeye Tuna and Atlantic Bluefin tuna), and Swordfish. These fisheries also capture non-target pelagic species, including sharks, and billfish (blue and white marlins). However, overall catches within the low, representing just 1-6% of the total North Atlantic annual catches (ICAAT). It is estimated that between 2.5 to 5 million hooks are deployed annually by longline operations within the Site. This is much lower than in the early 1990's when fishing effort was much greater (EFFDIS estimates, information provided by ICCAT). All current ICCAT management regulations affecting North Atlantic fish stocks apply for all fishing operations within the Site. There has been no systematic monitoring of seabird by-catch within the fleets operating in the Site. In conclusion, there is a spatial overlap of ICCAT regulated human activities and the Site, at a coarse spatial scale. Closure of fishing in such an area would have negative impacts on the fleets operating in the area as well as diminished information becoming

[9] https://www.neafc.org/mcs/scheme

[10] https://odims.ospar.org/layers/geonode:vme_bottom_fishing_areas

[11] https://www.neafc.org/system/files/Rec.19-2014_as_amended_by_09_2015_and_10_2018_fulltext-and-map.pdf

[12] https://odims.ospar.org/layers/geonode:ices_eg_VME_Dataset_PublicRecords

available from the area e.g. from observer programmes. Based on currently available information on seabird-fisheries interactions at the Site ICCAT concluded that a complete closure would not be warranted. ICCAT would continue to collect data and share information from the Site.

The North Atlantic Salmon Conservation Organisation (NASCO) noted the ongoing work in OSPAR on developing the nomination proforma and provided information in relation to human activities regulated by the organisation. Under the terms of the NASCO Convention, fishing for Atlantic salmon is prohibited in the identified site, among other areas of the North Atlantic. In addition, information provided to NASCO regularly from surveillance flights and other MCS operations shows that no IUU fishing for Atlantic salmon in the identified site or elsewhere on the high seas in recent years has been detected. The last time IUU fishing for Atlantic salmon was known to occur in the North Atlantic was in the early 1990s, and NASCO took decisive action to eliminate it.

The North Atlantic Marine Mammal Commission (NAMMCO) Scientific Committee has emphasised that there is little information to make an assessment of the importance of the Site for cetaceans, with a particular lack of data for the winter period. If the area is important for birds, this could indicate a level of productivity that may also make it an important area for cetaceans. However, this is not necessarily the case and there is currently no available evidence to indicate this. This conclusion with supporting further details was communicated by the Executive Secretary through a letter to OSPAR.

Science

The NACES MPA has a very high level of support from the scientific community, including seabird, turtle, cetacean and shark ecologists working across the Atlantic from 12 different countries (Annex 1). This has been achieved via the expert workshop held in Iceland in June 2016 and regular information exchanges throughout the identification process and the recent NERC DY080 research cruise. Independent scientists provided views on the draft nomination proforma, and all statements supported the scientific case and the proposed delineation.

Shipping

Major shipping lines between Canada, USA and Europe pass through the MPA. The degree of acceptance by shipping actors and regulators, including IMO, of the proposal is currently not known but input is being sought.

Tourism

No known tourism activities present at the Site.

Offshore mining and extraction

There are no known exploration or exploitation plans at the site as of yet. Oil and gas activities occur in nearby waters (Canadian Jeanne d'Arc basin). The degree of acceptance by extraction actors and regulators, including ISA, of the proposal is currently not known but input would be welcomed.

Cable laying

The degree of acceptance by actors involved in cable laying and regulation is currently not known but input would be welcomed.

3. Potential for success of management measures

Considering the OSPAR Convention is legally binding only to the Contracting Parties of the OSPAR Convention, and the mandate of the OSPAR Commission is limited to certain human activities within the mandate of

OSPAR, effective conservation of the ecosystems and biological diversity at the Site will require collaborative management encompassing all relevant actors and competent authorities with a competency in the region. To date, OSPAR has taken the collective decision to designate seven MPAs in ABNJ of the OSPAR maritime area and has developed channels for disseminating information.

OSPAR and NEAFC have adopted a multilateral agreement, the collective arrangement (OSPAR Agreement 2014-09), which supports successful management of the OSPAR designated Marine Protected Areas in the Area Beyond National Jurisdiction. The collective arrangement establishes a forum for information exchange and dialogue between different competent authorities. The availability of this established mode for interaction between OSPAR and other competent authorities enables successful management of the Site.

Programmes and measures carefully designed and effectively implemented by OSPAR Contracting Parties, individually and/or collectively, and in accordance with the OSPAR Convention, e.g. with regards to awareness raising, information building, marine science or new developments, are expected to be successful in contributing to achieve the general as well as specific conservation objectives set for the NACES MPA.

A research and monitoring plan could be a useful tool in the dialogue and collaboration with relevant actors and competent authorities.

A limited number of human activities are known to occur at the Site, the intensity of the activities are currently low and the activities are typically regulated and/or licensed. The potential for success of management appears to be greater at such a Site compared to for example a coastal site with many different regulated and un-regulated human activities take place.

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4. Potential damage to the area by human activities

Human uses of the Site

Due to its remote location in an area beyond national jurisdiction and in deep, open ocean, the NACES MPA is not easily accessible. The waters within and surrounding the Site are therefore only exposed to a limited range of human uses at present. The main human uses for the wider region surrounding the Site include fishing, shipping and activities associated with extractive industries such as oil and gas. The activities could potentially be causing damage to the area and the seabirds using it as foraging grounds. The specific actions that are known to occur within the area and the surrounding North Atlantic region are described below.

Human activities known to occur at the Site

Fishing

Fishing appears to be less commercially important within the Site compared to adjacent areas. Areas immediately surrounding the Site, to the west (Grand Banks), east, and south appear to be intensively fished. The remoteness of the Site could partly be a reason for the apparent lower fishing activity, but with potential changes in species distribution or fishing patterns, these resources have the potential to be targeted in the future within the boundaries of the Site.

In the last two years there has been very little if any, fishing activity by NEAFC vessels (PECMAS/NEAFC information provided).

ICCAT does have several fleets operating in the region of the proposed MPA. ICCAT catch statistics are documented in grid cells of 5x5 degrees latitude and longitude, nine of which overlap with the NACES MPA boundary (Figure 6).

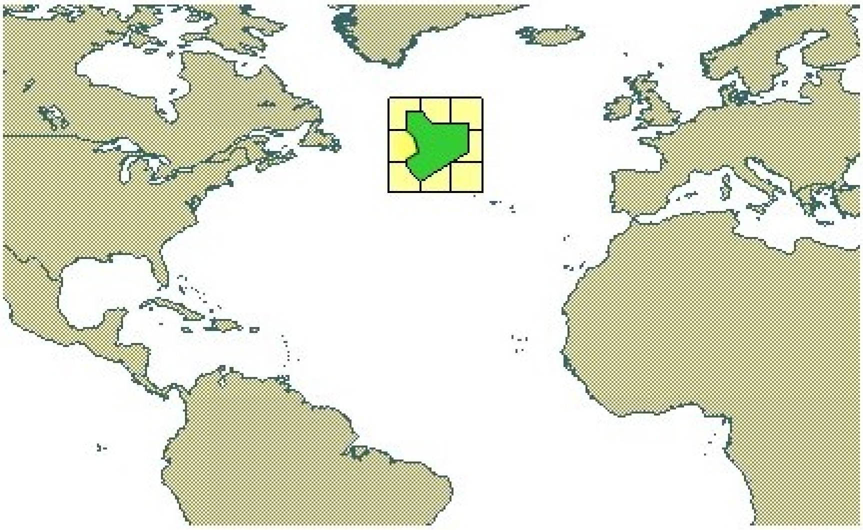

Figure 6. *Geographical overlap of the ICCAT 5x5 lat lon grids with the Site. (source: ICCAT)*

The primary target of ICCAT fleets are temperate tuna species (Northern Albacore, Bigeye Tuna and Atlantic Bluefin tuna), and Swordfish (Figure 7). Capture non-target pelagic species, including sharks and blue- and white marlins, have been documented in these fisheries. The fisheries also have the potential to capture seabirds, however this is poorly documented in the region as there has been no systematic recording of incidental by-catch.

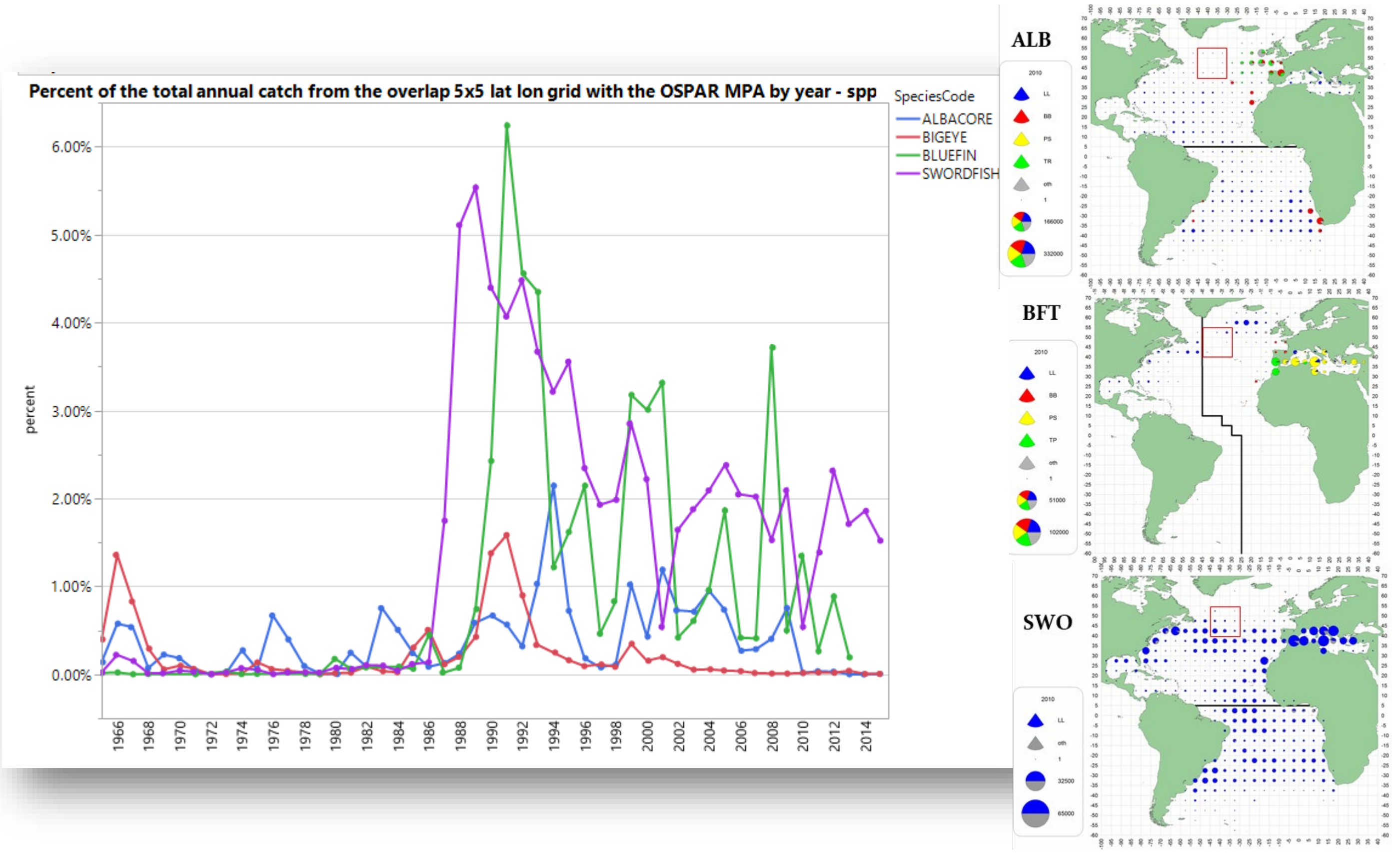

Figure 7. *Percent of total annual catch inside the nine 5x5 lat lon grid that overlap with the Site by year and species for the period 1965-2015. The tree panels on the right illustrate spatial distribution of catches in 2010 for Swordfish, Bluefin tuna and Albacore with an indication of the nine grid cells spatially overlapping with the Site. (source: ICCAT)*

The ICCAT fleet deploys an estimated 2.5-5 million hooks annually at the Site, however it should be noted that the fishing effort has shifted between geographical areas over the past decades (Figure 8).

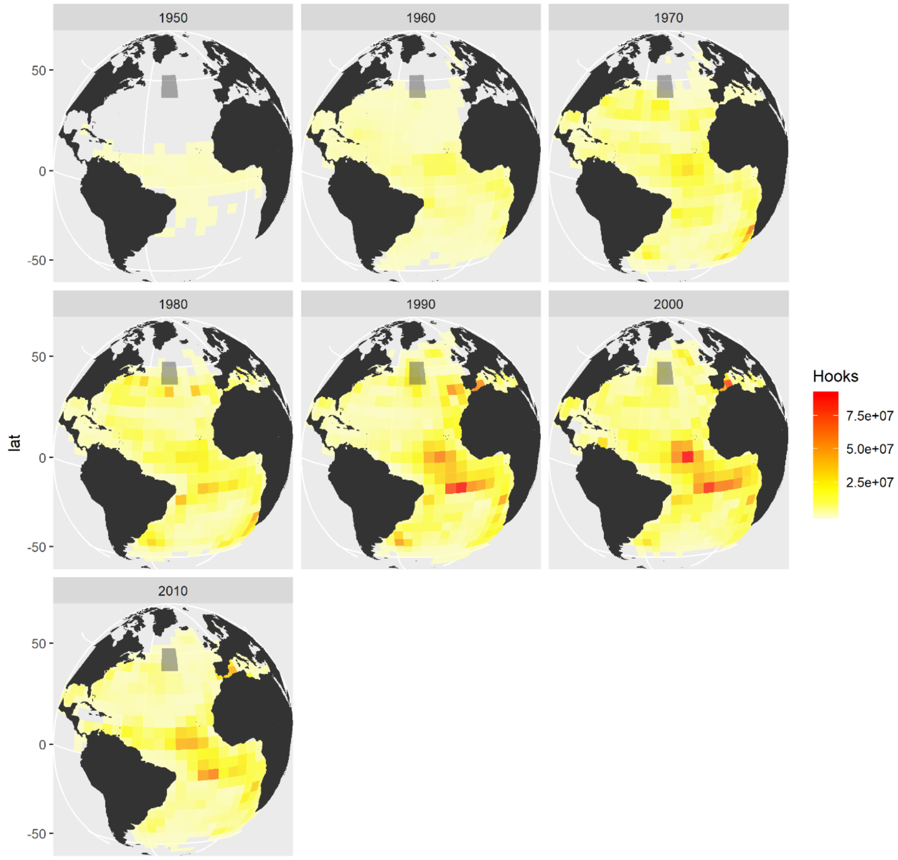

Figure 8. *Total effort (hooks) inside the 5x5 lat lon grids by decade. Grey shaded area identifies the Site (source: ICCAT)*

The ICCAT fleet catches from within the catch statistics grid cells which overlap with the Site vary between years, and have in the past comprised 1-6% of the total North Atlantic annual catches (Figure 9).

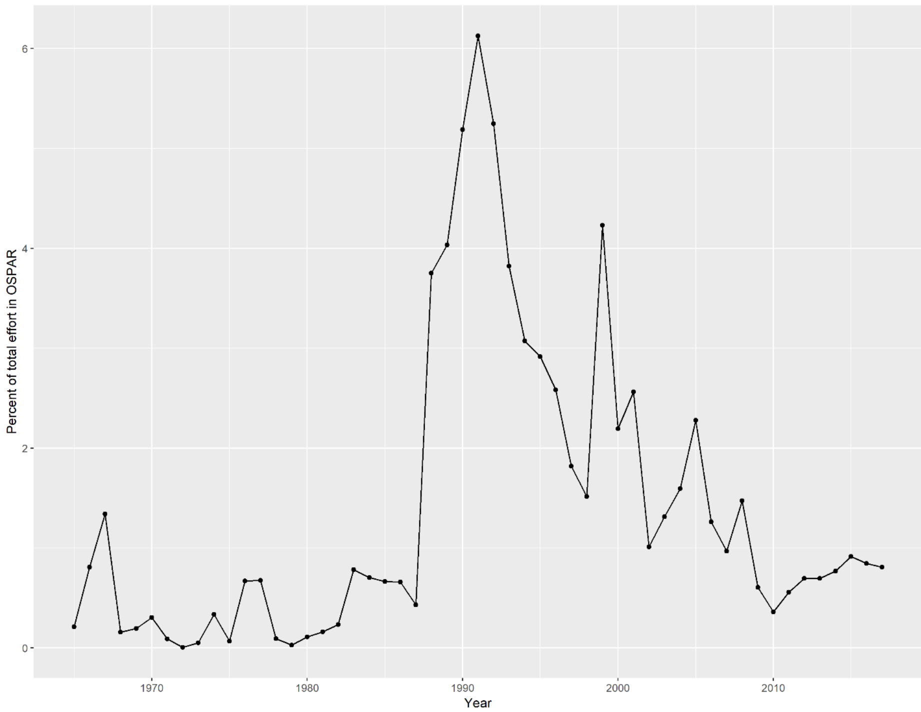

Figure 9. *Percent of annual longline fishing effort inside the 5x5 degree latitude longitude grids that overlap with the Site. Fishing effort distribution estimated from ICCAT TASK II data (note: data before 2000 may be incomplete) (source: ICCAT)*

Potential threats to seabirds from fishing activities at the Site

It is well known that seabirds are vulnerable to incidental by-catch from fisheries. In particular, large to medium Procellariforms are incidentally by-caught or fatally injured by long-line, gillnet and trawl fisheries in unsustainable numbers in many areas (e.g. Anderson et al. 2011; Žydelis et al. 2013). Incidental by-catch is a known threat to 11 species of seabird using the Site (Table 4), including the three most abundant bird species Great Shearwaters, Cory's Shearwater and Northern Fulmars (e.g. Anderson et al. 2011; Dunn 2007; Fangel et al. 2015). Any fisheries in the area may therefore cause significant incidental by-catch.

However, there is a major knowledge gap for the North East Atlantic on incidental by-catch rates and spatial-temporal occurrence because this information has not been documented. Efforts for monitoring seabird incidental by-catch have mostly focused on pelagic longlines and Albatross species in the South Atlantic (e.g Yeh et al. 2013). However, there have been studies on the incidental by-catch risk to other species, including Cory's Shearwaters, Great Shearwaters and Sooty Shearwaters (e.g. Ramos et al. 2013). The dge gap on seabird incidental by-catch is even larger for other gear types. In demersal longlining, the hooks are much smaller and pose a threat to smaller seabird species. Demersal fisheries operating in the shelf waters off Ireland are known to catch Great Shearwaters and Northern Fulmar and Black-legged Kittiwake, potentially in very large numbers (Anderson et al. 2011; Dunn 2007; Reid et al. 2008).

Systematic collection of seabird incidental by-catch data is needed to more accurately assess the threat posed to the seabird species (as in Table 1 and Table 4) at the Site and understand the overall impact this threat poses to the populations.

Light pollution from fishing activities can also pose an indirect threat on seabirds, particularly small petrels (Procellariiformes). These birds forage at night on vertically migrating bioluminescent prey and are therefore attracted to light of any kind (Imber 1975). This attraction to anthropogenic light sources at night can cause them to collide with ships and other structures, often causing serious injury or mortality (Black 2005, Montevecchi 2005, Rodríguez et al. 2017). This generally occurs during periods of poor visibility caused by fog or other precipitation because the moisture droplets in the air refract the light and greatly increase the illuminated area. During cruise DY080 at least 13 instances of light induced ship strikes occurred in the proposed MPA over a two-week period, all involving Leach's Petrels (Annex 6 Figure A6.6).

Shipping/transport routes

The Site is situated within the great circle shipping route between Canada, the USA and Europe. The southern section of the NACES MPA is quite intensively crossed by vessel traffic (Figure 10), particularly in the south-eastern sector as ships move into and out of the Gulf of St Lawrence on their way across the Atlantic.

Shipping activities can cause disturbance to seabirds through displacement from foraging grounds and resting habitats (e.g. Schwemmer et al. 2011). Light pollution on ships at night can cause seabirds to collide with vessels (e.g. Merkel and Johansen 2011). There is also a higher risk of marine pollution in shipping lanes, both from accidental spills and operational discharges, which can pose a large risk to seabirds (Table 4).

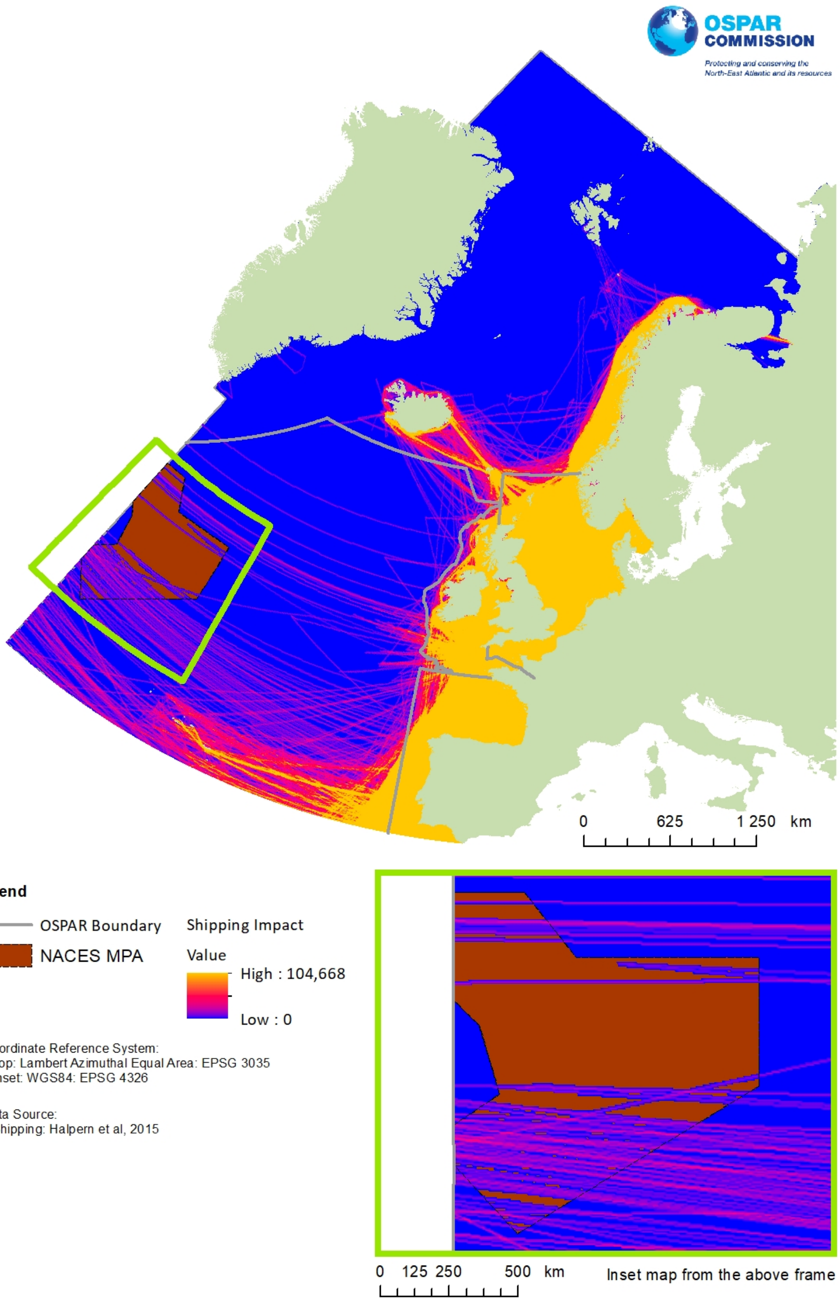

Figure 10. *Shipping activity within the NACES MPA. Shipping data from Halpern et al. 2015.*

Extractive industries

The NACES MPA does not overlap any current direct oil and gas activity or extractive mining activities, or current exploration licenses (Figure 11). The Jeanne d'Arc Basin off the Newfoundland coast contains the Hibernia oil field, with the Hebron oil platform currently operational[13]. The oil field is located in close proximity to the Flemish Cap, which itself is not distant from the western boundary of the NACES MPA. The complex oceanography of this region means that any oil spill occurring on the Grand Banks and Flemish Cap could potentially move into the NACES MPA.

[13] Jeanne d'Arc Region:Significant Discovery Areas http://www.cnlopb.ca/pdfs/maps/jdasda.pdf?lbisphpreq=1

Extractive industries, such as offshore hydrocarbon drilling and production platforms can impact seabirds through attraction and collision with the structure, incineration in the flare, and the intermittent presence of oil on the water (which can cause oiling of the birds and lead to mortality, or ingestion of contaminated prey) (Wiese et al. 2001).

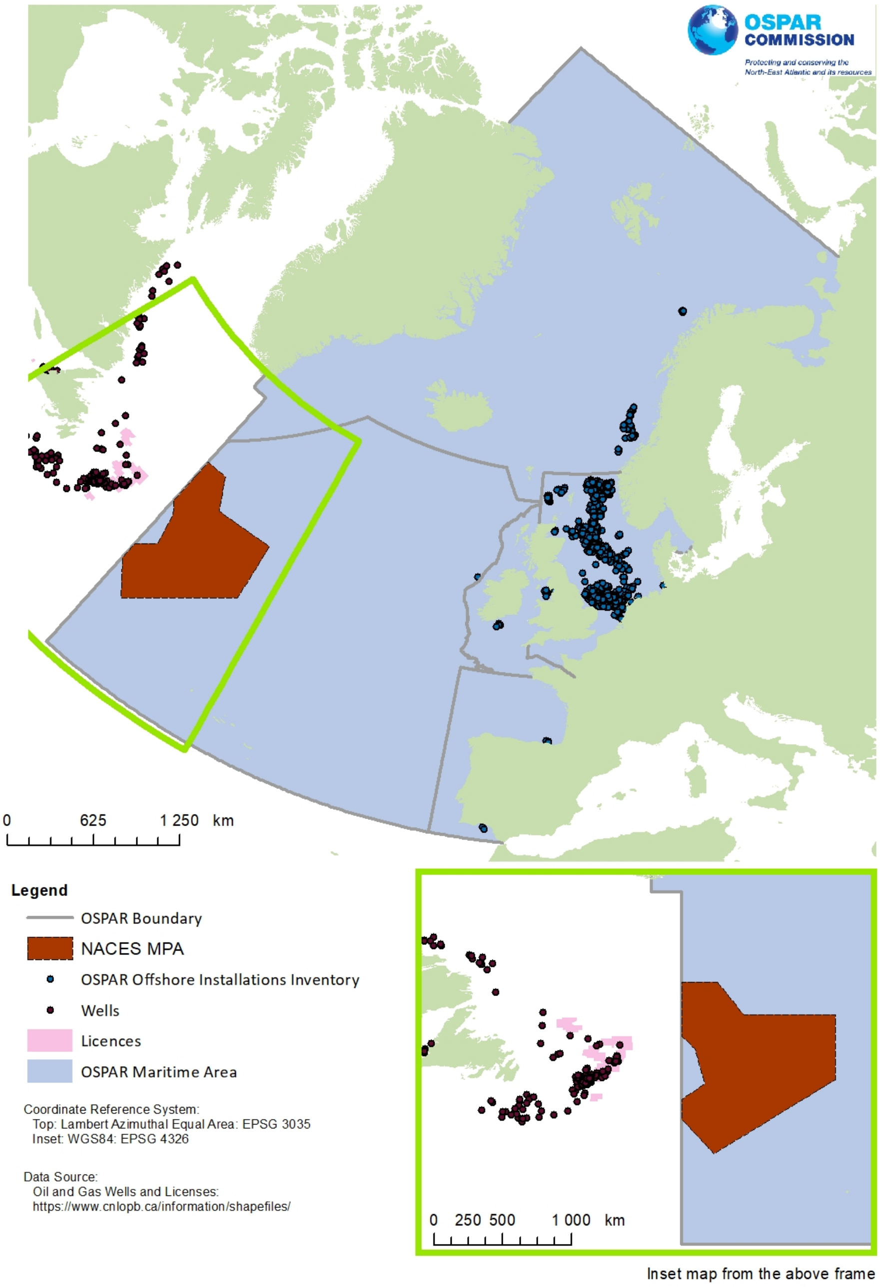

Figure 11. *Oil and gas licences and wells off Newfoundland and Labrador, Canada to the west of the NACES MPA boundary. Data source: Canada-Newfoundland and Labrador Offshore Petroleum Board http://www.cnlopb.ca/information/shapefiles.php*

5. Scientific value

The NACES MPA is a unique site in the North East Atlantic, oceanographically as well as ecologically. It demonstrates a high abundance and diversity of seabirds, and non-seabird taxa, including cetaceans, turtles, elasmobranchs and fish are also known to occur at the site. The Site encompasses important foraging areas for threatened seabird species.

The NACES MPA encloses a globally unique location; a region of year-round vigorous horizontal and vertical mixing where waters from the tropical/subtropical Atlantic encounter water from the subpolar Atlantic and from the Arctic Ocean, promoting enhanced primary productivity and diversity.

The interaction between the unique oceanographic setting, the deep bathymetry and the ecology- from benthic, mesopelagic and pelagic species- remains poorly understood, and offers excellent opportunities for innovative scientific research.

Due to the knowledge gaps associated with the area, a Research and Monitoring Plan (see section C) is proposed to enable an evaluation of the attributes of the NACES MPA relative to its specific objectives, and to improve understanding of these attributes. In addition, it could include identification of a number of elements for scientific research consistent with the objectives of the MPA, and a monitoring plan that will help evaluate the extent to which these objectives are being achieved.

C. Proposed management and protection status

1. Proposed management

A management plan should be developed. Management of the NACES MPA should be based on the best available scientific knowledge, seeking a sound balance between use and preservation, respecting that any protective measures shall not prevent sustainable use, provided that this is not contrary to the conservation objectives.

Threatened and/or declining species

With respect to the three OSPAR listed seabird species using the Site, a number of measures that refer to the designation of an MPA and proposed management actions have been agreed by OSPAR through adoption of OSPAR Recommendations. The Recommendations recognise that protection of the listed bird species would require management measures to be taken at breeding sites as well as measures which would contribute to protection of other life stages. Management actions taken at the Site would be to protect the marine habitats of species.

The 'OSPAR Recommendation 2011/5 on furthering the protection and conservation of the Black-legged kittiwake' notes, among other issues, that the species is particularly sensitive to decline in the availability of key prey species and recommends management action to be taken by each Contracting Party and measures to be taken by Contracting Parties acting collectively within the framework of the OSPAR Commission. Measures of relevance in relation to the proposed conservation objectives referred to in this nomination proforma include:

- §3.1 c. consider whether any sites within its jurisdiction justify selection as Marine Protected Areas for the protection of populations of and critical habitats for the Black-legged kittiwake;

- §3.1 d. in accordance with OSPAR Recommendation 2003/3 as amended by OSPAR Recommendation 2010/2, report to the OSPAR Commission on sites selected for inclusion as components of the OSPAR Network of Marine Protected Areas and develop appropriate management plans and measures that include the conservation of the Black-legged kittiwake;

- §3.1 e. promote monitoring and assessment programmes for the Black-legged kittiwake and contribute to the development of a data collation strategy;

- §3.1 f. raise awareness of the status and threats to the Black-legged kittiwake among management authorities, users of the marine environment and the general public;

- §3.2 c. bring to the attention of relevant competent authorities the status of and threats to the Black-legged kittiwake.

The 'OSPAR Recommendation 2011/3 on furthering the protection and conservation of the Little shearwater' notes among other issues the significant loss of suitable breeding habitat in Region V for the species, and recommends management action to be taken by each Contracting Party and measures to be taken by Contracting Parties acting collectively within the framework of the OSPAR Commission. Measures of relevance in relation to the proposed conservation objectives referred to in this nomination proforma include:

- §3.1 c. consider whether any sites within its jurisdiction justify selection as Marine Protected Areas for the protection of populations of and critical habitats for the Little shearwater;

- §3.1 d. in accordance with OSPAR Recommendation 2003/3 as amended by OSPAR Recommendation 2001/2, report to the OSPAR Commission on sites selected for inclusion as components of the OSPAR Network of Marine Protected Areas and develop appropriate management plans and measures that include the conservation of the Little shearwater;

- §3.1 e. promote monitoring and assessment programmes for the Little shearwater and contribute to the development of a data collation strategy;

- §3.2 a. (i) regular reporting at-sea sightings in the Bay of Biscay and ore northern waters, including any information on identification of main feeding areas where possible;

- §3.2 c. bring to the attention of relevant competent authorities the status of and threats to the Little shearwater, and the need for (ii) further research on possible effects of light pollution.

The 'OSPAR Recommendation 2011/7 on furthering the protection and conservation of the Thick-billed murre' notes among other issues the significant decline suffered by the species and its particular vulnerability to climate change, and recommends management action to be taken by each Contracting Party and measures to be taken by Contracting Parties acting collectively within the framework of the OSPAR Commission. Measures of relevance in relation to the proposed conservation objectives referred to in this nomination proforma include:

- §3.1 c. consider whether any sites within its jurisdiction justify selection as Marine Protected Areas for the protection of populations of and critical habitats for the Thick-billed murre;

- §3.1 d. in accordance with OSPAR Recommendation 2003/3 as amended by OSPAR Recommendation 2010/2, report to the OSPAR Commission on sites selected for inclusion as components of the OSPAR Network of Marine Protected Areas and develop appropriate management plans and measures that include the conservation of the Thick-billed murre;

- §3.1 e. promote monitoring and assessment programmes for the Thick-billed murre and contribute to the development of a data collation strategy;

- §3.1 g. support, promote and cooperate with the Arctic Council Conservation of Arctic Flora and Fauna (CAFF) 'Circumpolar Murre Banding Programme';

- §3.2 a. develop and implement a monitoring and assessment strategy and data collection tools to promote and coordinate the collection of information on distribution, status of, threats to and impacts on the species … (iii) regular reporting on mortality of this species through fisheries bycatch (including where possible data on geographical location of bycatch, and types of gear involved), oil pollution and hunting.

The Arctic Council has an International Murre Conservation Strategy and Action Plan, which includes this species (CAFF 1996). The CAFF Action Plan and the OSPAR recommended measures include the identification and designation of MPAs for this species (CAFF 1996; OSPAR 2009c).

Human activities

Cooperation with other competent authorities is a prerequisite for achieving the conservation objectives of the NACES MPA. OSPAR could draw to the attention of relevant competent organisations instances where human activities may constitute a threat to seabirds at the Site and with achieving the conservation objectives. An ongoing dialogue between OSPAR and other competent authorities could support effective management of the Site in the long term, by bringing the conservation objectives of the NACES MPA to the attention of a wide audience. An ongoing dialogue could be enabled through the forum of the collective arrangement (OSPAR Agreement 2014-09). Activities associated with any extractive industry could have a negative impact on seabirds, including through direct mortality (collision with infrastructure), and reduced access to food resources, including through disturbance, displacement, and increased in water turbidity (e.g., sediment plumes (Miller et al. 2018)). OSPAR could bring this to the attention of competent authorities.

The following actual or potential pressures from human activities within the boundary of the NACES MPA or the broader region might need management action:

a. Fishing using fixed and mobile gears
    - including possible seabird by-catch or collision due to light pollution
b. Vessel traffic
    - including possible discharges, pollution, noise, light
c. Seabed mining or other extractive activities
    - including possible discharges, pollution, noise
    - including acute pollution events at the site, especially during the winter season.
d. Cable laying
    - It is unlikely that cable laying activities would constitute a sustained and major threat to the seabird species, no particular management actions appear to be needed at present.
e. Marine scientific research
    - It is unlikely that marine scientific research would constitute a sustained and major threat to seabird species. Seabirds would most likely be impacted from marine research activities associated with vessel traffic (as detailed above), and disturbance (e.g., exploration) of the seafloor and resultant increased water turbidity.

Research and monitoring plan

A Research and Monitoring plan could be established which would identify scientific research and monitoring activities to inform the management of the Site, guide scientists and coordinate research. This could include Best Practices to minimise any impacts to seabirds at the Site. The plan could build on the OSPAR code of conduct for responsible marine research in the deep seas and high seas of the OSPAR Maritime Area (Agreement 2008-1).

The research and monitoring activities which could be described in a Research and Monitoring plan could include:

1. Scientific research pursuant to MPA objectives to;
    a. evaluate the attributes of the MPA relative to its specific objectives, and to enhance understanding of these attributes;
    b. provide new information about the features within the MPA.
2. Long-term monitoring of the protected features to determine any trends over time to;
    a. inform management activities undertaken within the MPA;
    b. inform management activities undertaken at other locations affecting the protected features;
    c. inform whether the status of the protected features are changing;
    d. inform evaluations of whether the MPA conservation objectives are being achieved.
3. Other data- and information collection consistent with the specific MPA objectives to;

a. inform management actions on human activities taking place at the Site or in its vicinity.

An activity could be a regular multi-disciplinary research cruise to the Site. Such a cruise could cover the following activities;

1. monitoring of oceanography and/climatic changes;
2. collection of information on trophic dynamics and predator/prey distribution;
3. monitoring of both adult and non-breeding seabirds (tagging).

A Research and Monitoring Plan could also outline the mode by which OSPAR could engage with other competent organisations with an aim to increase the knowledgebase of any interactions between human activities and seabirds at the Site. Such interactions could for example aim to explore if monitoring of multi-taxa incidental bycatch in fisheries (through on-board observer programmes and log book reporting) could provide information on potential interactions between pelagic species and fisheries at the Site. Bycatch observer programmes on board fishing vessels could be a source of scientific information on interactions between fishing vessels and seabirds at the site, which could form a knowledge basis for further action. Another example could include interactions with other competent authorities to collect information on interactions between seabirds and shipping vessels crossing the site and any ballast discharge within the site could provide relevant information for future action, and OSPAR could bring this to the attention of the competent authorities.

2. Any existing or proposed legal status

I National legal status (e.g., nature reserve, national park):

Not applicable as the area is beyond national jurisdiction.

II Other international legal status (e.g., NATURA 2000, Ramsar):

None

Presented by

Contracting Party: BDC

Date: 16/11/2020

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Annexes of the nomination proforma for the "North Atlantic Current and Evlanov Seamount" MPA in the OSPAR Maritime Area (Region V, Wider Atlantic)

List of Annexes

Annex 1. List of collaborators participating in the identification of the North Atlantic Current and Evlanov Seamount MPA

The list includes data providers, providers of technical advice & participants in 2016 BirdLife workshop in Reykjavik Iceland

Name	Affiliation	Country- affiliation of institute/organisation	Direct data providers	Attendance at workshop
Arnthor Gardarsson	University of Iceland	Iceland	*	*
Aevar Petersen	Independent researcher, affiliation with Aarhus University	Denmark	*	
Ana Bertoldi Carneiro	BirdLife International	UK		*
Anders Mosbech	National Environmental Research Institute, Department of Arctic Environment	Denmark	*	
Andrew Westgate	University of North Carolina Wilmington	US	*	
Antony Gaston	National Wildlife Research Centre (Ottawa, ON)	Canada	*	
Annette Fayet	University of Oxford	UK	*	
April Hedd	Memorial University of Newfoundland	Canada	*	
Ben Lascelles	BirdLife International	UK		
Benjamin Metzger	BirdLife Malta	Malta	*	
Bergur Olsen	Faroe Marine Research Institute	Faroe Islands	*	
Børge Moe	Norwegian Institute for Polar Research	Norway	*	*
Bruna Campos	BirdLife International	Belgium		*
Carsten Egevang	Greenland Institute of Natural Resources	Greenland/Denmark	*	
Carolina Hazin	BirdLife International	UK		*
Claire Lacey	SMRU	UK	*	
David Gremillet	Centre d'Ecologie Fonctionnelle et Evolutive - CNRS	France	*	
David Simms	Marine Biological Association of the United Kingdom	UK	*	
Deryk Shaw	Fair Isle Bird Observatory	UK	*	
Ellen Magnusdottir	University of Iceland	Iceland	*	
Erpur Snær Hansen	South Iceland Nature Research Centre	Iceland	*	*
Euan Dunn	Royal Society for Protection of Birds	UK		*

Name	Affiliation	Country- affiliation of institute/organisation	Direct data providers	Attendance at workshop
Ewan Wakefield	University of Glasgow	UK	*	*
Flemming Merkel	Aarhus University	Denmark	*	
Francis Daunt	Centre for Ecology & Hydrology, NERC	UK	*	
Francis Zino		Portugal	*	
Greg Robertson	Environment Canada Centre	Canada	*	
Guilherme Bortolotto De Oliviera	SMRU	UK	*	
H. Grant Gilchrist	National Wildlife Research Centre in Ottawa (Environment Canada)	Canada	*	
Hallvard Strøm	Norwegian Institute for Polar Research	Norway		
Hans-Ulrich Peter	Friedrich Schiller University Jena Institute of Ecology	Germany	*	
Hólmfríður Arnardóttir	Fuglavernd (BL Iceland)	Iceland		*
Ib K Petersen	Aarhus University	Denmark		
Ingvar Sigurosson	South Iceland Nature Research Centre	Iceland	*	
Iain Stenhouse	Biodiversity Research Institute	USA	*	
Ian Cleasby	University of Sheffield	UK	*	
Ivan Ramirez	BirdLife International	UK	*	
Jacob González-Solís	University of Barcelona	Spain	*	
Jaime Albino Ramos	University of Coimbra	Portugal	*	
Jan Esefeld	Friedrich Schiller University Jena	Germany	*	
Jannie Fries Linnebjerg	Lund University	Sweden	*	
Janos Hennicke	NABU (BirdLife Germany)	Germany		*
Jeremy Madeiros	Department	Bermuda/UK	*	
Jerome Fort	LIENSs - CNRS UMR	France	*	
Jez Blackburn	British Trust for Ornithology	UK	*	
Joel Bried	University of the Azores	Azores/Portugal	*	
Johannes Krietsch	Max Planck Institute for Ornithology	Germany	*	
Johannes Lang	Institut für Tierökologie und Naturbildung	Germany	*	
Jóhannis Danielsen	University of the Faroe Islands	Faroe Islands		*
Jonathan Green	University of Liverpool	UK	*	
Jose Manuel Arcos	SEO/BirdLife, Spain	Spain	*	
Jose Pedro Granadeiro	Department of Animal Biology, University of Lisbon	Portugal	*	*

Name	Affiliation	Country- affiliation of institute/organisation	Direct data providers	Attendance at workshop
Justine Dossa	BirdLife International	Senegal	*	
Keith C. Hamer	University of Leeds	UK	*	
Laura McFarlane Tranquilla	Memorial University of Newfoundland	Canada	*	
Lorraine Chivers	Independent research	UK	*	
Louise Soanes	University of Liverpool	UK	*	
Mandy Shailer	Department of Environment and Natural Resources, Bermuda Government	Bermuda/UK	*	
Manuel Biscoito	Museu de História Natural do Funchal	Portugal	*	
Marguerite Tarzia	BirdLife International	UK		*
Maria Bogdanova	Centre for Ecology & Hydrology, NERC	UK	*	
Maria Dias	BirdLife International	UK	*	*
Mark Jessopp	University College Cork	Ireland	*	
Mark Mallory	Acadia University	Canada	*	
Matthias Kopp	FSU Jena	Germany	*	
Michael P. Harris	Centre for Ecology & Hydrology	UK	*	
Mike James	Department of Fisheries & Oceans, Canada	Canada	*	
Morten Frederiksen	Aarhus University	Denmark	*	*
Nadya Ramirez-Martinez	SMRU	UK	*	
Niels Martin Schmidt	Aarhus University	Denmark	*	
Nuno Quieroz	Marine Biological Association of the United Kingdom	UK	*	
Nuno Simão	University of Durham	UK		
Oliver Padget	University of Oxford	UK	*	
Olivier Gilg	University of Bourgogne, CNRS	France	*	
Paloma Carvalho	University of Manitoba	Canada		
Paul Thompson	University of Aberdeen	UK	*	
Paulo Catry	ISPA, Instituto Universitário	Portugal	*	
Peter Ryan	Percy FitzPatrick Institute of African Ornithology, University of Cape Town	South Africa	*	
Penny Holliday	National Oceanography Centre	UK		
Phil Atkinson	British Trust for Ornithology	UK	*	
Rachel Davies	School of Biology, University of Leeds	UK	*	

Name	**Affiliation**	**Country- affiliation of institute/organisation**	**Direct data providers**	**Attendance at workshop**
Richard Cuthbert	Royal Society for the Protection of Birds (RSPB)	UK	*	
Richard Phillips	British Antarctic Survey	UK	*	
Robert W Furness	University of Glasgow	UK	*	
Robert van Bemmelen	Wageningen University	Netherlands	*	
Robert Ronconi	Acadia University, Nova Scotia	Canada	*	
Robin Freeman	School of Biology, University of Leeds	UK	*	
Rui Prieto	University of the Azores	Portugal	*	
Roland Gauvain	Alderney Wildlife Trust	UK	*	
Sarah Wanless	Centre for Ecology & Hydrology, NERC	UK	*	
Signe Christensen-Dalsgaard	Norwegian University of Science and Technology	Norway	*	
Scott Eckert	Principia College	US	*	
Þorkell Lindberg Þórarinsson	Northeast Iceland Nature Research Centre	Iceland	*	*
Thierry Boulinier	CNRS	France	*	
Tim Guilford	University of Oxford	UK	*	*
Tycho Anker-Nilssen	Norwegian Institute for Nature Research (NINA)	Norway		
Vegard Brathen	Norwegian Institute for Nature Research (NINA)	Norway	*	
Veronica Neves	University of the Azores	Azores/Portugal	*	
Vitor Paiva	MARE - Marine and Environmental Sciences Centre, University of Coimbra	Portugal	*	*
William Montevecchi	Memorial University of Newfoundland	Canada	*	
Yann Kolbeinsson	Northeast Iceland Nature Research Centre	Iceland	*	
Yuri Krasnov	Murmansk Marine Biological Institute, Russian Academy of Science	Russia	*	

Annex 2. Methodology

Identification of the most important areas for seabirds is OSPAR high-seas region

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August 2017, and updated February 2019

This document presents the methodological steps undertaken to identify the boundaries of marine Important Bird and Biodiversity Areas (IBAs) as candidate sites for a Marine Protected Area within the OSPAR Maritime Area that are beyond the Exclusive Economic Zones (EEZ) of Contracting Parties (i.e. beyond 200 nautical miles). A marine IBA is any area that meets the criteria to be considered of key conservation importance as foraging ground, resting area or migratory corridor for a seabird species (Fishpool & Evans 2001, Lascelles et al. 2016). Examples of marine IBAs are foraging and rafting areas around breeding colonies, non-breeding concentrations, migratory bottlenecks and feeding areas for pelagic species (BirdLife International 2010). Within the area of analysis (the OSPAR ABNJ), the latter three are of particular relevance.

The possible criteria that can be applied to identify marine IBAs are:

- Global Criterion A1: Sites known or thought regularly to hold significant numbers of a globally threatened species, or other species of global conservation concern (i.e. classified as Vulnerable, Endangered or Critically Endangered; BirdLife International 2017);
- Global Criterion A4: Sites holding >1% of the global or, in some cases, biogeographic population of a seabird. For European species, the 1% was calculated based on the total number of mature individuals breeding in Europe (BirdLife International 2015). For species breeding outside of Europe (e.g. Sooty Shearwater, Great Shearwater, Bermuda Petrel), the 1% was based on the global population.
- European Criterion B1: The site is known or thought to hold ≥ 1% of a distinct population of a seabird species.
- European Criterion B2. Species with an unfavourable conservation status in Europe. The site is one of the most important for a species with an unfavourable conservation status in Europe and for which the site-protection approach is thought to be appropriate.
- European Criterion B3. Species with a favourable conservation status in Europe. The site is one of the most important in the country for a species with a favourable conservation status in Europe but concentrated in Europe and for which the site-protection approach is thought to be appropriate.

Definitions:

Quarter 1 (Q1): Jan-Mar, Quarter 2 (Q2): Apr-Jun, Quarter 3 (Q3): Jul-Sep, Quarter 4 (Q4): Oct-Dec.

Resolution for the spatial analyses: 0.2 degrees.

Area of analysis: The geographic area of focus for the analysis was the OSPAR Maritime Area that are Beyond National Jurisdiction (ABNJ). The final boundaries of the proposed MPA were then delimited by excluding areas located within current extended continental shelf claims and simplifying the final shape (Figure A2.1).

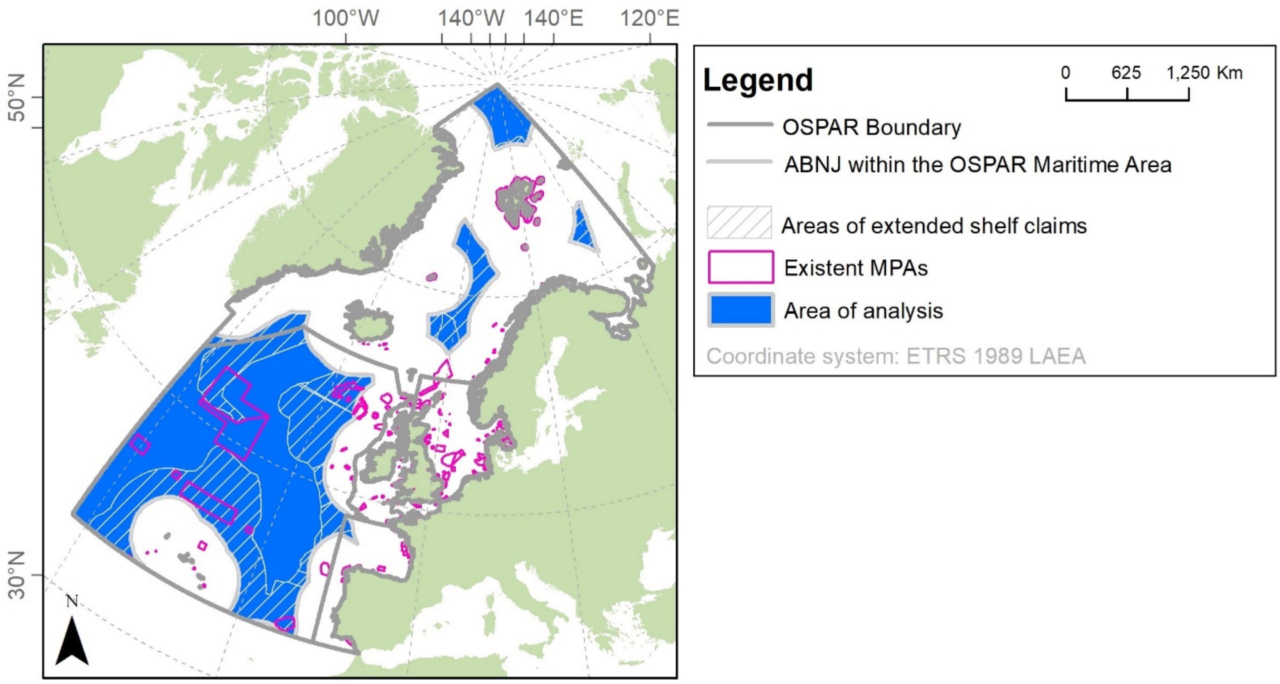

***Figure A2.1**: Geographic area of focus for the analysis. (OSPAR Maritime Area beyond the Exclusive Economic Zones of Contracting Parties).*

1. Data compilation

The identification of IBAs requires the compilation of information about the distribution of the species and their abundance. For IBAs located in pelagic seas, the main sources of data are: 1) tracking data (i.e., locations of birds collected by tracking their movements with bird-borne devices - GPS, PTT or GLS) and 2) colonies' location and abundance[14].

An extensive search was conducted in order to identify and compile all potentially relevant tracking datasets (i.e. those potentially overlapping with the area of analysis) (Table 1). Many different researcher teams, working across many seabird colonies, were contacted and invited to upload their tracking data into the BirdLife International's Seabird Tracking Database (www.seabird.org), or to provide authorization to use the data previously stored in the database. All the data were therefore formatted following the procedures required by the Seabird Tracking Database (details here). The Table A2.1 lists all tracking datasets which were available for the present analysis, and the percentage of overlap of the tracking positions and the area of analysis. Data for 23 species from 105 colonies were compiled, corresponding to 2188 individual birds

[14] Note- at sea survey data is used when available to help support the identification of sites.

(collected by 66 seabird researchers; Table A2.1). Species overlapping less than 2% with the studied area were excluded from further analyses (Northern Gannet *Morus bassanus* and Scopoli's Shearwater *Calonectris diomedea*).

Following advices from the scientific community after a workshop held in June in Reykjavik, Iceland, it was decided to combine data from individual colonies into Large Marine Ecosystems (LME; http://www.lme.noaa.gov/). Population size for LME were obtained directly from scientists, literature review, European Red List of Birds Assessment (BirdLife International 2015), or IBA factsheets. To meet the IBA criteria, tracked birds of non-threatened species were checked against the 1% threshold (i.e. LME represents ≥ 1% of the global [for species breeding outside Europe] or biogeographic population [EU number of mature individuals for European species]). For Black-legged Kittiwakes *Rissa tridactyla* and Thick-billed Murres *Uria lomvia* a modified version of the LME classification was used, following (Frederiksen et al. 2012; Frederiksen et al. 2016). For Long-tailed Jaegers, Norwegian Sea and Barents Sea LMEs had to be combined in order to obtain more accurate population estimates.

2. Data analysis per species

The analyses followed the procedures described in Lascelles et al. (2016) and are summarized in the following paragraphs. All the analyses were carried out using R (R Core Team 2016) and the scripts provided by Lascelles et al. (2016) as well as customized scripts.

2.1 The data were combined in data groups, i.e., unique combinations of species/LME/ breeding stages (e.g. Atlantic Puffin *Fratercula arctica* from Iceland Shelf and Sea during incubation). Breeding stages were provided by scientists or obtained from literature (**Error! Reference source not found.**). The next steps were carried out for each data group individually.

2.2 The “core use area” of each individual bird was estimated by doing a kernel density analysis (KDE) and selecting the 50% utilization distribution (UD) area (step *batchUD* in Lascelles et. all 2016). For PTT and GPS data, the smoothing factor (*h* value) used in the kernel analysis was calculated specifically for each data group combination to reflect the scale of the interaction of the birds with the environment, based on a First Passage Time Analysis; for GLS data, a value of 186 km was used, which corresponds approximately to the accuracy of the device.

2.3 The proportion of the tracked birds using each 0.2°cell was estimated by counting the overlap of all individual kernels estimated in 2.2 (step *polyCount* in Lascelles et al. 2016).

2.4 The total number of birds using each 0.2°cell was estimated by multiplying the size of the overall LME population (Table 2) by the proportion of the tracked population which had a core-use area in this grid cell. For example, we estimated that a cell overlapping with the core area of 20% of the birds tracked from an LME containing 10,000 birds, would be used by 2,000 birds.

3. Combination of usage maps of several species

3.1. Creation of density maps:

a. One of the outputs from the IBA script (Lascelles et al. 2016; see point 2.) is a kernel density map, representing the percentage of a species' population of each LME using the area, during a given breeding stage. These maps were exported as raster images and resampled in order to obtain compatible extents between data groups (resolution was already the same: 0.2°);
b. In order to standardise the different breeding stages (incubation, chick-rearing, winter, etc.) for the different species during the annual cycle, breeding stages were associated to year quarters. Each year quarter was represented by 6 fortnights. The final "species/LME/quarter" raster maps were estimated as a weighted average of the bird distribution during the breeding stages associated with its respective year quarter (see **Error! Reference source not found.**). For example, if during Q1 (Jan-Mar) four fortnights were coded as "winter" and two as "pre-breed", the final raster would be the result of the equation: (raster winter*4 + raster pre-breed*2)/6. If more than 50% of the year quarter was represented by a breeding stage that did not overlap with the area of analysis or when there was no available tracking data to produce density distributions, the whole year quarter for the respective species was considered non-existent (i.e. non-existent quarters can be a result of lack of data but also lack of overlap);
c. A set of maps were then produced revealing the density use by the seabird community:

- Quarterly density maps of each species: raster images of each species during each year quarter, after combining all the maps for each LME that overlapped with the area of analysis. The combination was done by weighing the percentage of the population in each LME (i.e. LME population size). An example of this map is provided in

Figure ***A2.2***.

- Quarterly density maps for all species combined. All single species raster-maps for each year quarter (after combining populations from different LMEs) were combined (i.e., summed up) and divided by the total number of species occurring in the area of analysis during the respective year quarter, to create a weighted average of the proportion of the populations expected to be find in each cell (Figure A2.3).

- Density map for all species and year quarters combined: all single species raster-maps (independent of year quarter, and after combining populations from different LMEs) were combined and divided by the total number of species occurring in the area of analysis (Figure A2.4).

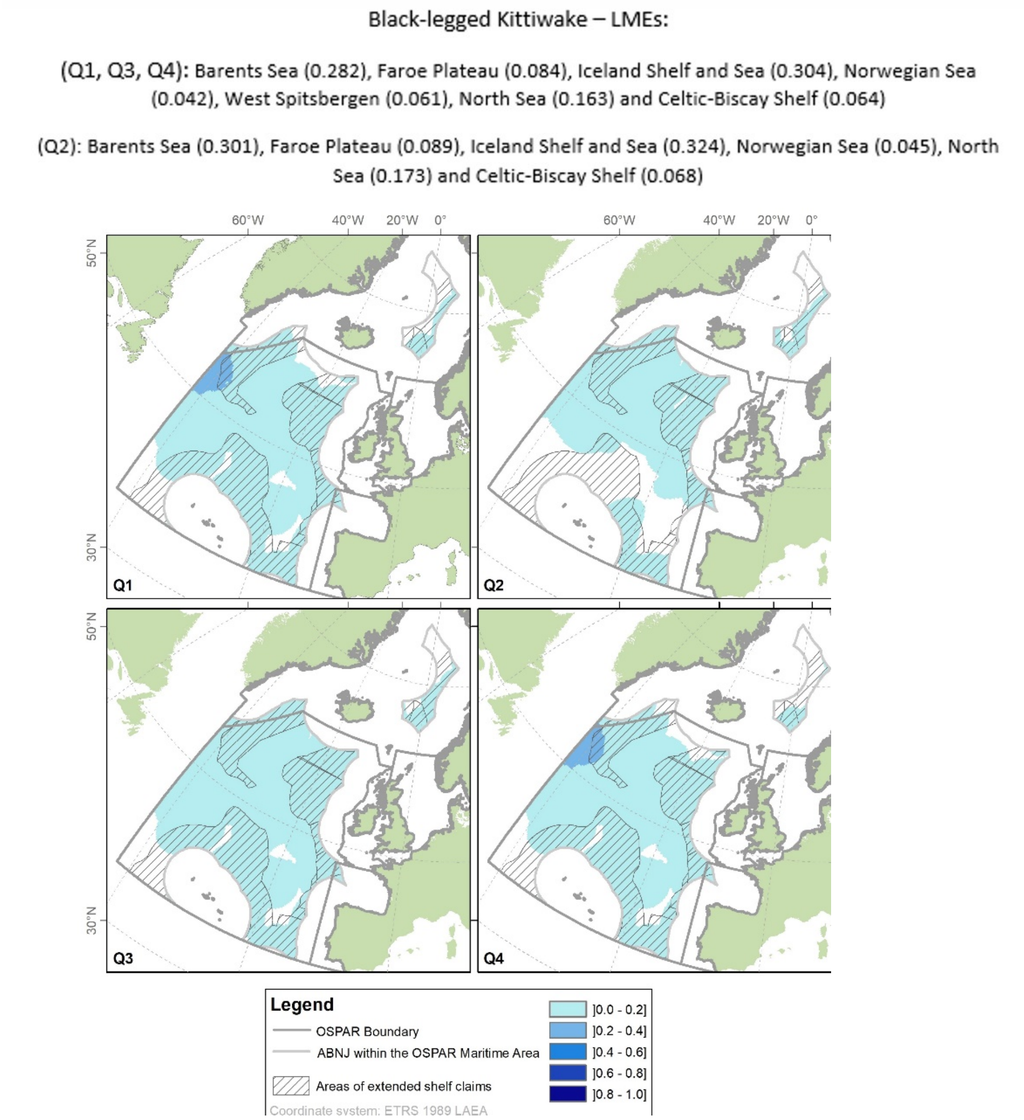

Figure A2.2: *Example of a quarterly density map (Black-legged Kittiwake). Values represent percentage of birds (total population – i.e., all LME combined) using each 0.2°cell.*

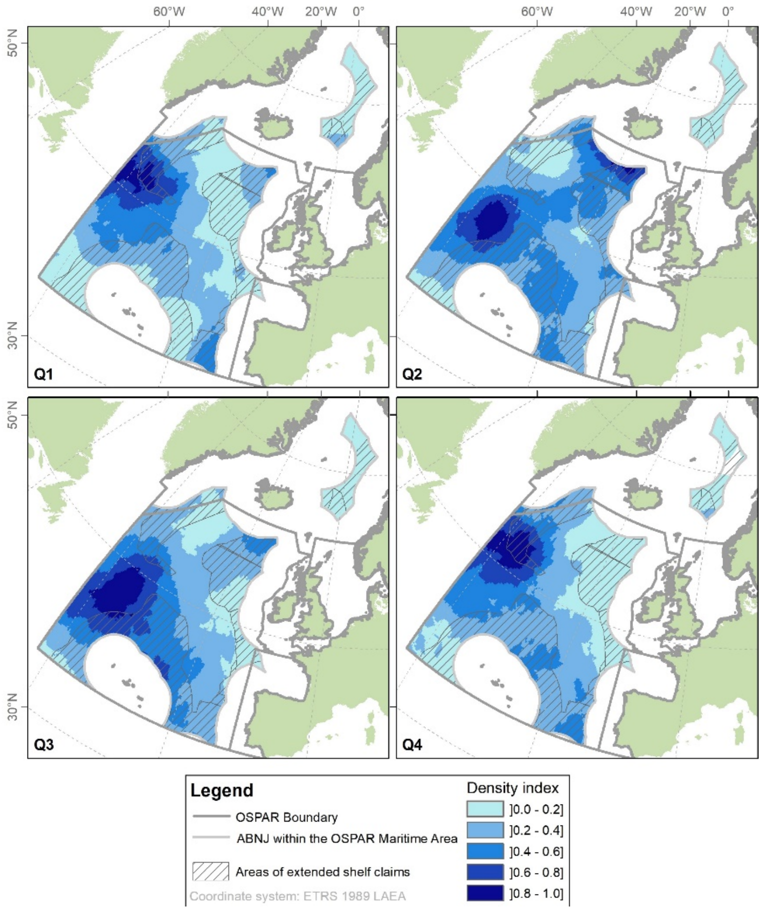

***Figure A2.3**: Quarterly density maps of all the species combined. (in order to facilitate the comparison of the relative importance of the areas within each quarter, and only for mapping purposes, the average densities were standardized to obtain values varying between 0 and 1, by dividing by the maximum value of each quarter)*

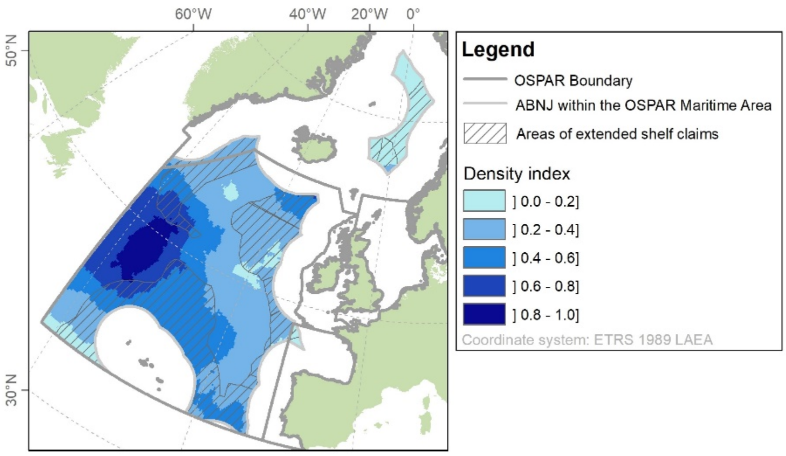

***Figure A2.4:** Density map for all species and year quarters combined. (in order to facilitate the comparison of the relative importance of the areas, and only for mapping purposes, the average density index values were standardized to obtain values varying between 0 and 1, by dividing by the maximum value)*

3.2. Creation of richness maps:

In the same manner as for the density maps, a series of maps reflecting the richness of the area (number of seabird species) were produced:

- Richness quarterly maps: computed using the kernel density maps returned from the IBA scripts, following the resampling and standardization of the different breeding stages (see details in Density maps section). Single species maps (independent of LME of origin) were converted into a presence/absence raster by recoding all cells with values higher than 0 to value 1. Prioritisation was given to identifying an important area for OSPAR listed priority species or globally and European threatened species (i.e. classified as Vulnerable, Endangered or Critically Endangered; BirdLife International 2015, BirdLife International 2017). Therefore, a higher weight was given to OSPAR species (3x, i.e., the presence of an OSPAR species contributed 3x to the final map) and globally or European threatened species (2x). For all the other species a value of 1 was assumed (i.e. presence). Finally, all single species maps were overlapped using the function sum, returning a raster image per quarter with the total sum (inflated number of species; higher weights to OSPAR listed priority species or globally and European threatened species) occurring in each cell (Figure A2.5).

- Richness map for all year quarters combined. All single species maps (independent of LME of origin and year quarter) were combined into a single map, and cells with values higher than 0 were recoded to value 1. A higher weight was given to OSPAR species (3x) and globally or European threatened species (2x). For all the other species a value of 1 was assumed (i.e. presence). In a second step, single species maps were overlapped using the function sum, returning a raster image with the total sum (inflated number of species; higher weights to OSPAR listed priority species or globally and European threatened species) occurring in each cell (Figure A2.6).

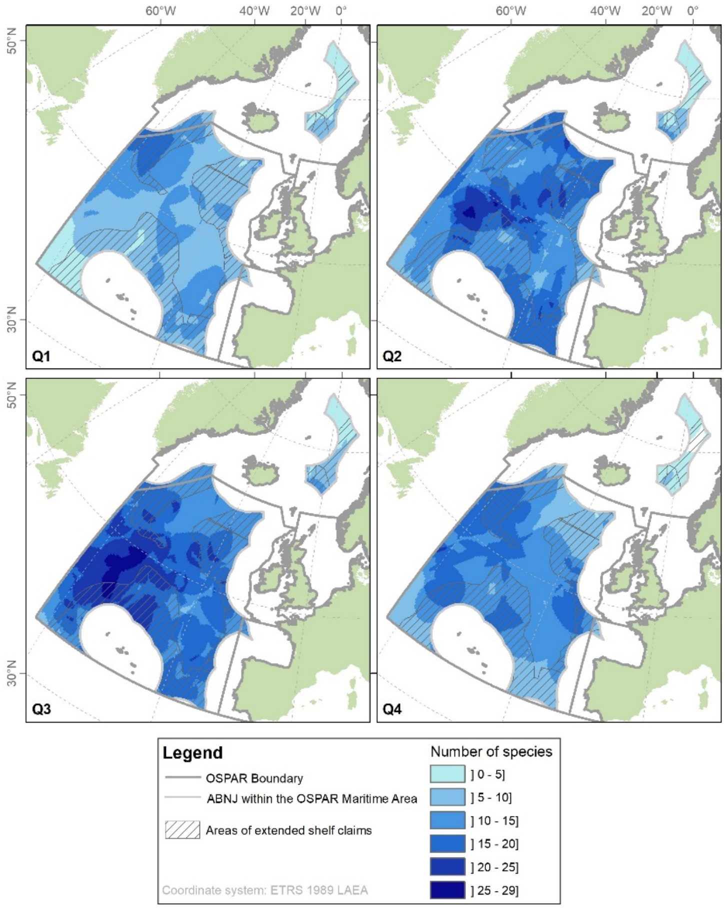

***Figure A2.5**: Number of species occurring in each 0.2° cell in each year quarter (richness quarterly maps). Note that values correspond to "inflated numbers (i.e. OSPAR and threatened species count 3x and 2x for the count, respectively; see methods above)*

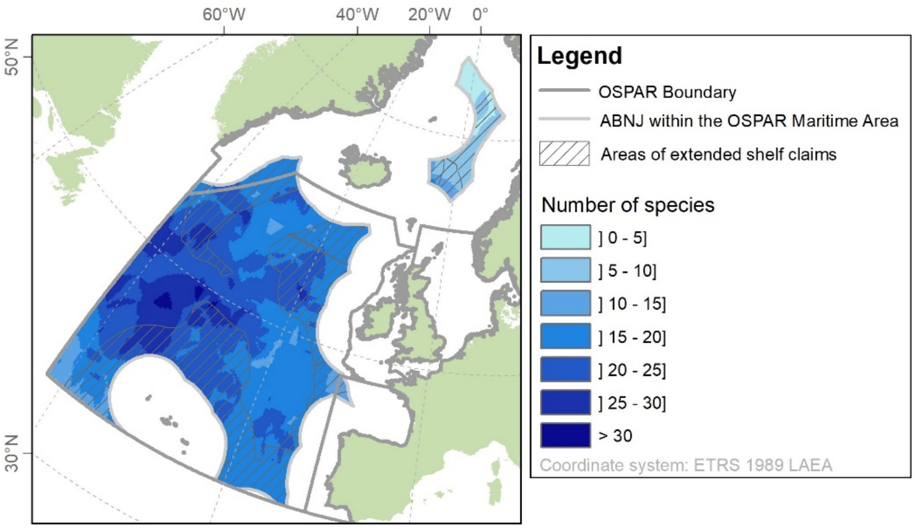

***Figure A2.6:** Inflated richness map for all year quarters combined*

3.3. Final maps

The identification of the most relevant sites for seabirds in the OSPAR ABNJ was done by combining the maps reflecting the density of use (see 2.1) and richness (2.2). The final raster maps reflect thus an index of specie's use*richness, in which the presence of OSPAR priority listed species or globally and European threatened species (European Red List of Birds) accounted more for the final result (i.e. a higher weight to OSPAR species (3x) and globally or European threatened species (2x)).

- Density and richness quarterly maps. Quarterly density and richness (i.e. inflated richness) raster-maps were multiplied and then standardized to obtain values varying between 0 and 1 (by dividing by the maximum value) (Figure A2.7).

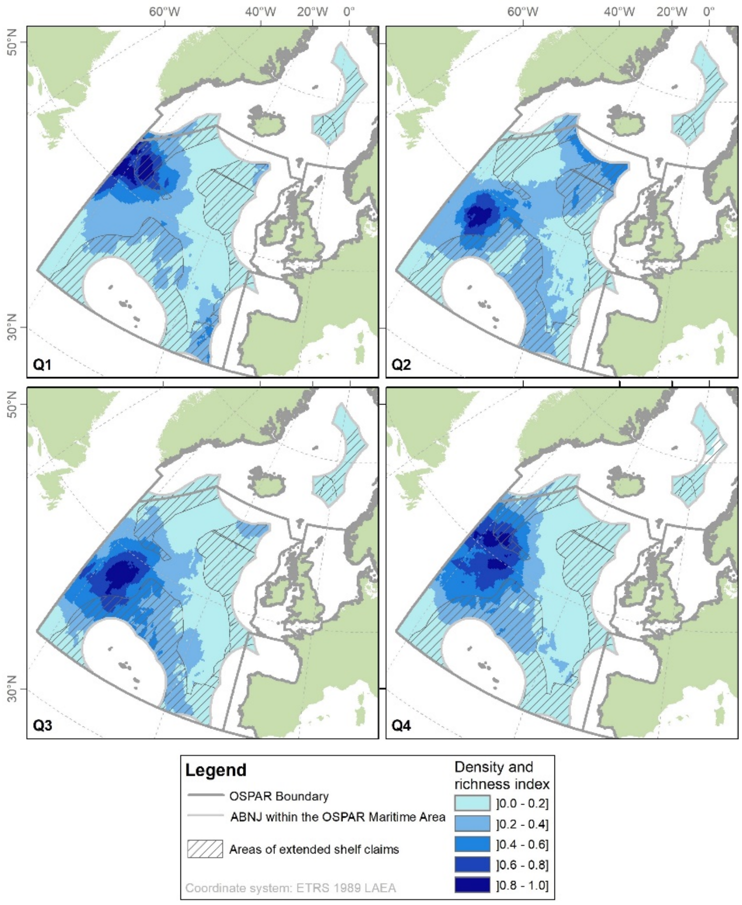

Figure A2.7: *Quarterly density and richness maps combined*

- Density and richness for all year quarters combined. The density map for all species and year quarters combined and the richness map (i.e. inflated richness) for all year quarters combined were multiplied and then standardised to obtain values varying between 0 and 1 (by dividing by the maximum value (Figure A2.8).

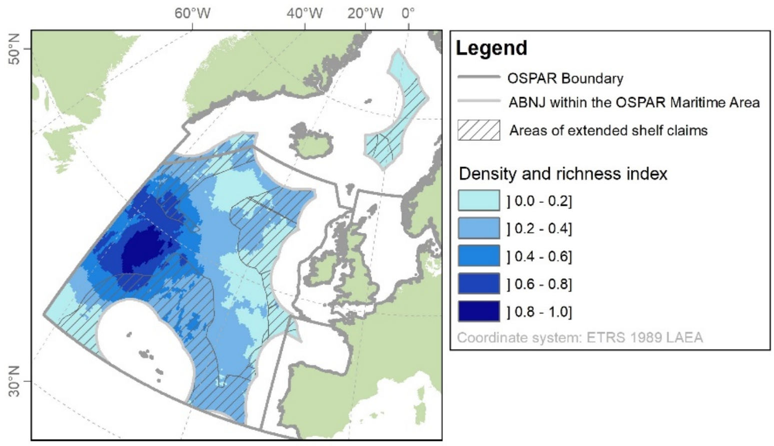

Figure A2.8: *Density and richness maps combined for all year quarters*

Finally, the boundary of the 15% highest values were identified and exported as shapefiles (Figure A2.9). This boundary encompasses the 15% most important area for seabirds within the area of analysis.

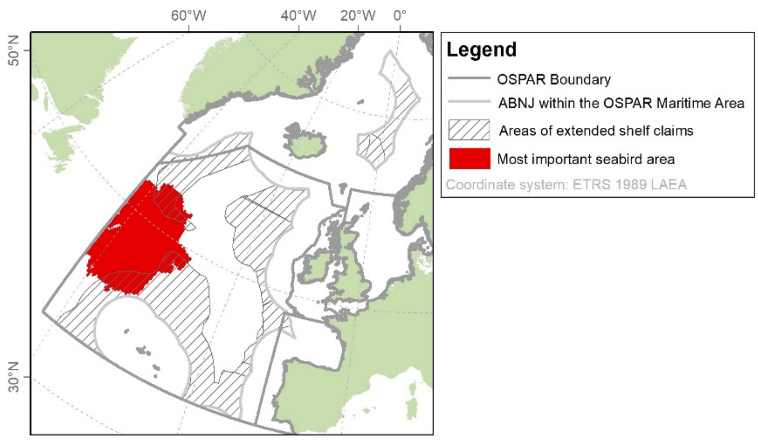

Figure A2.9*: 15% most important areas for seabirds for all year-quarters combined*

3.4. Proposed MPA

The final boundary was defined by simplifying the borders of the shapefile obtained in the previous step (to reduce the number of vertices) and excluding the areas that overlapped extended shelf claims. The area of the NACESMPA was estimated after projecting the map in the European Lambert Azimuthal Equal Area (Figure A2.10).

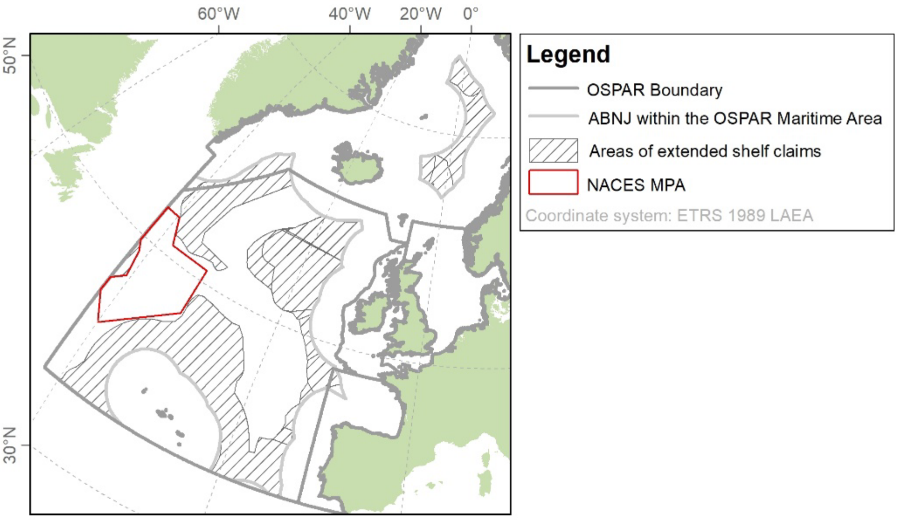

Figure A2.10: *Proposed NACES MPA*

4. Additional analysis to test if additional data from more individuals would alter the location of the Important Bird and Biodiversity Area:

4.1 Additional data for 525 Black-legged Kittiwakes from colonies in the North East Atlantic were obtained from the SeaTrack project – an initiative of several Northern European countries to map important wintering areas and migration routes of seabirds in North Atlantic Waters (www.seapop.no/en/seatrack). These additional data (n=525) were combined with the previous data for this species used in the original analyses (n=302), totalling 827 individuals (see Table A2.4). The outputs from the original analyses used for the proforma (Black-legged Kittiwake, n=302) were then compared with the outputs from the analyses using the additional SeaTrack data combined with the original data included in the proforma (Black-legged Kittiwake, n=827) to evaluate if there were any differences (Figures A2.11 and A2.12).

4.2 The outputs from the analyses including the additional data (Figure A2.11) confirm the importance of the area for the OSPAR-listed Black-legged Kittiwake, with the northern extent of the proposed area shown to be used by even more birds. Figure A2.12 shows the number of mature individuals by quantiles for each quarter and in terms of broad locations there is no discernible difference between the two outputs (Figure A2.12). Thus, including any further data – to the significant quantity already included in the analyses – is expected to further confirm the area as important, and not result in any substantial changes to the site.

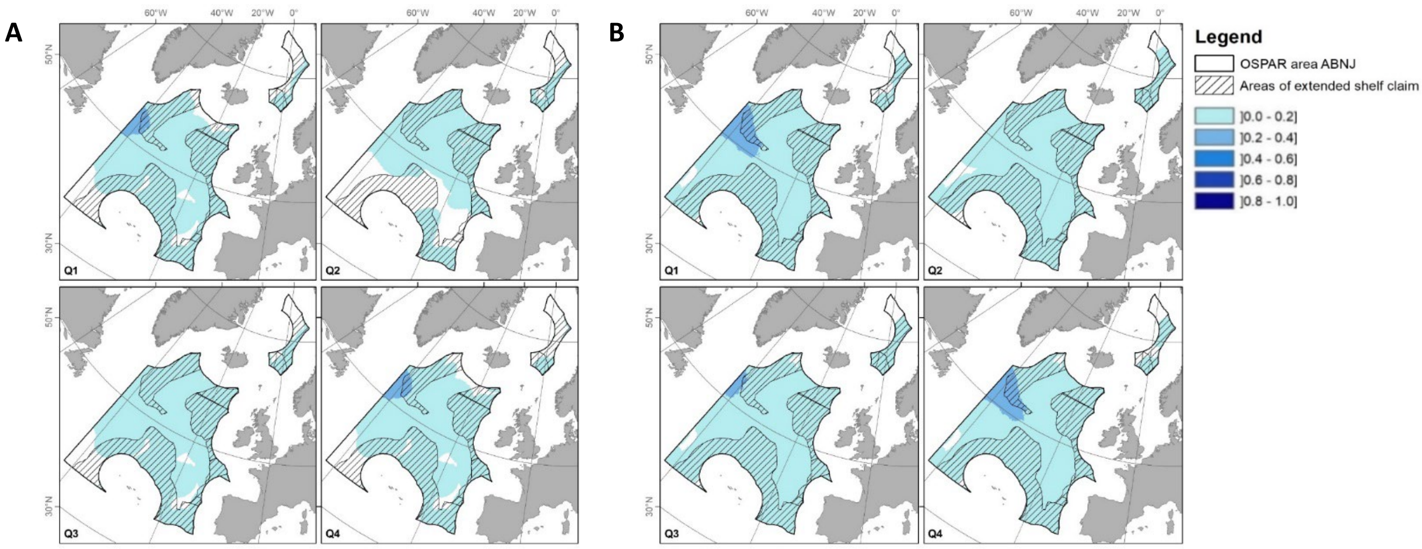

***Figure A.11**. Comparison of important foraging areas identified for Black-legged Kittiwake using additional data provided by SeaTrack.*

A: Maps from original data analysed in NACES MPA proforma (n= 302; Figure extracted from Annex 3, Figure A3.12). The proportion of birds in each Large Marine Ecosystems (LME) is indicated when birds from more than one LME used the [proposed] area.

LME: (Quarters 1, 3 and 4) Barents Sea (0.282), Faroe Plateau (0.084), Iceland Shelf and Sea (0.304), Norwegian Sea (0.042), West Spitsbergen (0.061), North Sea (0.163) and Celtic-Biscay Shelf (0.064) (Q2) Barents Sea (0.301), Faroe Plateau (0.089), Iceland Shelf and Sea (0.324), Norwegian Sea (0.045), North Sea (0.173) and Celtic-Biscay Shelf (0.068). Usage indicated by proportion of the LME populations using area.

B: Includes additional data received from SeaTrack (n=827).

LME: (Quarters 1, 3 and 4) Barents Sea (0.282), Faroe Plateau (0.084), Iceland Shelf and Sea (0.304), Norwegian Sea (0.042), West Spitsbergen (0.061), North Sea (0.163) and Celtic-Biscay Shelf (0.064) (Q2) Barents Sea (0.364), Faroe Plateau (0.108), Iceland Shelf and Sea (0.392), Norwegian Sea (0.054) and Celtic-Biscay Shelf (0.082).

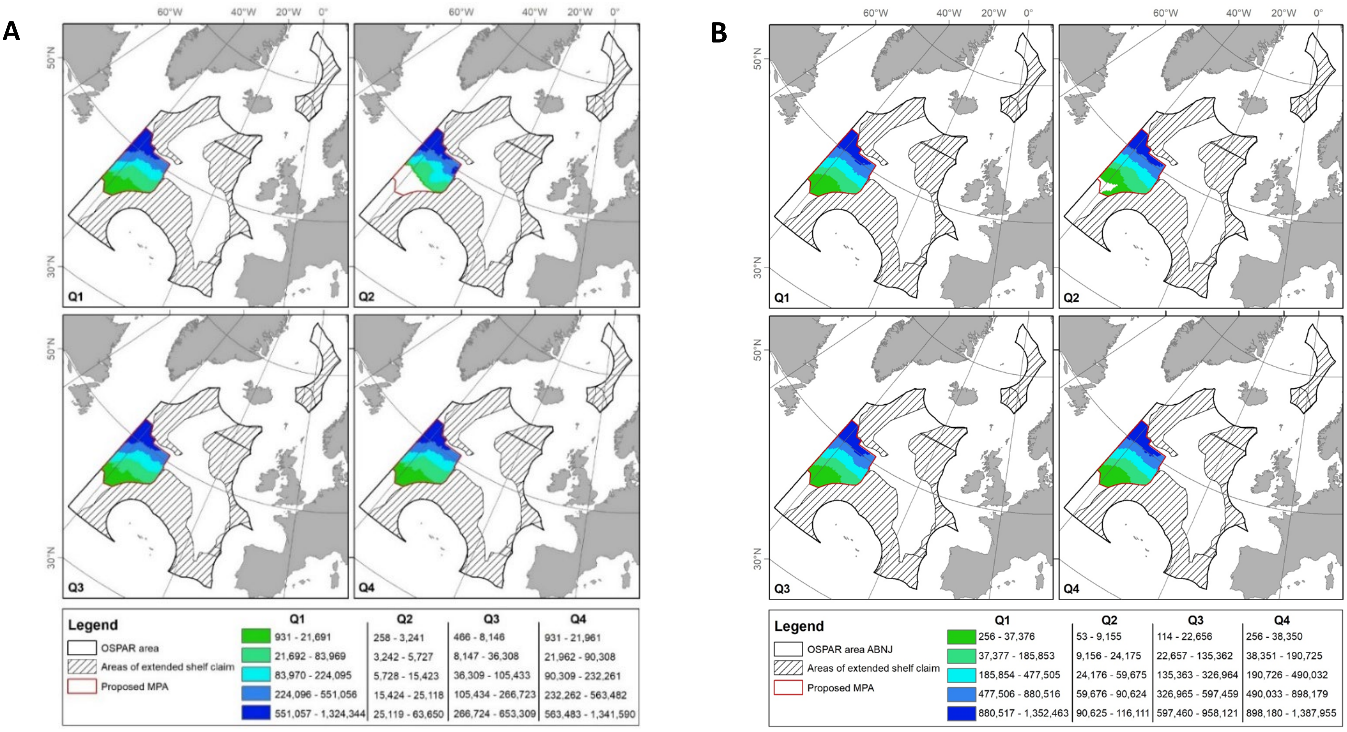

***Figure A2.12.** Comparison of the number of mature individuals of Black-legged Kittiwake for each year quarter, using additional data provided by SeaTrack. Note, the figure displays an approximation of the final boundary of the NACES MPA, but does not change the validity of the findings.*

A: Number of mature individuals of Black-legged Kittiwake in the NACES MPA for each year quarter, from the original data analysed in NACES MPA proforma (n=302; Figure extracted from Annex 5, Figure A5.12).

B: Number of mature individuals of Black-legged Kittiwake in the NACES MPA for each year quarter, including additional data received from SeaTrack (n=827).

The NACES MPA qualifies as a global marine IBA (Important Bird and Biodiversity Area), following the methods and criteria detailed in Lascelles et al. (2016). Legends based on the quantiles of number of mature individuals within the NACES MPA

Table A2.1. List of all datasets provided by the researchers. (more details in http://seabirdtracking.org/), and respective LME where each dataset was included (See Table A2.2), type of device used (GPS, PTT or GLS), sample sizes and percentage of overlap with the OSPAR ABNJ region.

Species	Country	Colony	LME	Device	N birds	% overlap	Tracking data contributors
Arctic Tern *Sterna paradisaea*	Greenland	Sand Island	Greenland Sea	GLS	9	14.80	Carsten Egevang
Atlantic Puffin *Fratercula arctica*	Iceland	Flatey	Iceland Shelf and Sea	GLS	6	36.66	Aevar E Petersen
	Iceland	Grimsey	Iceland Shelf and Sea	GLS	15	21.16	Erpur S. Hansen , Thorkell Lindberg Thorarinsson, Vegard Brathen
	Iceland	Heimaey	Iceland Shelf and Sea	GLS	1	46.50	Erpur S. Hansen , Thorkell Lindberg Thorarinsson
	Iceland	Papey	Iceland Shelf and Sea	GLS	6	35.99	Erpur S. Hansen , Thorkell Lindberg Thorarinsson, Vegard Brathen
	Iceland	Storhofdi	Iceland Shelf and Sea	GLS	7	55.40	Aevar E Petersen
	Ireland	Skellig Michael	Celtic-Biscay Shelf	GLS	30	39.30	Mark Jessopp
	United Kingdom	Isle of May	North Sea	GLS	40	1.40	Sarah Wanless, Francis Daunt
	United Kingdom	Skomer	Celtic-Biscay Shelf	GLS	41	22.69	Annette Fayet, Tim Guilford
Audubon's Shearwater *Puffinus lherminieri baroli*	Portugal	Vila	Azores	GLS	4	52.70	Veronica Rodrigues Costa Neves, Jacob González-Solís
	Cape Verde	Ilheu de Cima	Cape Verde	GLS	21	0.10	Jacob González-Solís
	Portugal	Cima Islet	Canary Current	GLS	14	28.00	Vitor Paiva
	Portugal	Selvagens	Canary Current	GLS	9	8.70	Vitor Paiva
	Cape Verde	Raso	Cape Verde	GLS	9	0.30	Jacob González-Solís
Bermuda Petrel *Pterodroma cahow*	Bermuda	Nonsuch Island	Bermuda	GLS	11	16.30	Jeremy Lee Madeiros, Mandy Shailer
Black-legged Kittiwake *Rissa tridactyla*	Canada	Prince Leopold Island	Arctic Canada	GLS	2	2.60	Morten Frederiksen
	Norway	Bear Island	Barents Sea	GLS	17	17.30	Morten Frederiksen
	Russian Federation	Cape Krutik	Barents Sea	GLS	11	18.00	Morten Frederiksen
	Norway	Hjelmsoya	Barents Sea	GLS	3	6.40	Morten Frederiksen
	Norway	Hornoya	Barents Sea	GLS	20	10.80	Morten Frederiksen
	United Kingdom	Rathlin	Celtic-Biscay Shelf	GLS	5	9.10	Morten Frederiksen
	Faroe Islands	Faroe Islands	Faroe Plateau	GLS	10	12.10	Morten Frederiksen
	Greenland	Kippaku	West Greenland Shelf	GLS	25	0.60	Morten Frederiksen
	Iceland	Hafnarholmi	Iceland Shelf and Sea	GLS	14	13.90	Morten Frederiksen
	Denmark	Bulbjerg	North Sea	GLS	13	6.90	Morten Frederiksen
	United Kingdom	Fair Isle	North Sea	GLS	15	3.80	Morten Frederiksen

Species	Country	Colony	LME	Device	N birds	% overlap	Tracking data contributors
	United Kingdom	Isle of May	North Sea	GLS	48	8.70	Morten Frederiksen, Francis Daunt, Michael P. Harris, Sarah Wanless
	Norway	Anda	Norwegian Sea	GLS	12	9.70	Morten Frederiksen
	Norway	Halten	Norwegian Sea	GLS	8	15.10	Morten Frederiksen
	Norway	Rost	Norwegian Sea	GLS	46	6.60	Morten Frederiksen
	United Kingdom	Skomer	Celtic-Biscay Shelf	GLS	7	5.90	Morten Frederiksen
	Norway	Grumant	West Spitsbergen	GLS	16	32.30	Morten Frederiksen
	Norway	Kongsfjorden	West Spitsbergen	GLS	30	30.60	Morten Frederiksen
Bulwer's Petrel *Bulweria bulwerii*	Portugal	Vila	Azores	GLS	12	0.70	Jacob González-Solís
	Spain	M Clara	Canary Current	GLS	33	0.90	Jacob González-Solís
	Cape Verde	Ilheu de Cima	Cape Verde	GLS	15	0.00	Jacob González-Solís
	Portugal	Selvagens	Canary Current	GLS	15	6.02	Francis Zino, Manuel Biscoito
	Cape Verde	Raso	Cape Verde	GLS	12	0.30	Jacob González-Solís
Common Murre *Uria aalge*	Canada	Funk Island	Labrador - Newfoundland	GLS	17	0.00	Laura McFarlane Tranquilla, Greg Robertson, April Hedd, William Montevecchi
	Canada	Gannet Islands	Labrador - Newfoundland	GLS	16	0.00	Laura McFarlane Tranquilla, Greg Robertson, April Hedd, William Montevecchi
	Canada	Gull Island	Labrador - Newfoundland	GLS	15	0.00	Laura McFarlane Tranquilla, Greg Robertson, April Hedd, William Montevecchi
	Iceland	Grimsey	Iceland Shelf and Sea	GLS	10	6.60	Thorkell Lindberg Thórarinsson, Yann Kolbeinsson
	Iceland	Langanes	Iceland Shelf and Sea	GLS	3	0.90	Thorkell Lindberg Thórarinsson, Yann Kolbeinsson
	Iceland	Latrabjarg	Iceland Shelf and Sea	GLS	7	20.60	Thorkell Lindberg Thórarinsson, Yann Kolbeinsson
Cory's Shearwater *Calonectris borealis*	Portugal	Corvo	Azores	GPS	73	23.30	Vitor Paiva, Ivan Ramirez, Jaime Ramos
	Portugal	Vila	Azores	GLS	27	21.40	Jacob González-Solís
	Spain	M Clara	Canary Current	GLS	20	1.60	Jacob González-Solís
	Spain	Veneguera	Canary Current	GLS	98	3.20	Jacob González-Solís
	Portugal	Cima Islet	Canary Current	GPS	28	9.10	Vitor Paiva, Jaime Ramos
	Portugal	Selvagens	Canary Current	GLS	103	4.50	Paulo Catry, Jose Pedro Granadeiro, Maria Ana Dias
	Portugal	Berlengas	Iberian Coastal	GLS	23	10.40	Paulo Catry, Jose Pedro Granadeiro, Vitor Paiva, Jaime Ramos
	Portugal	Berlengas	Iberian Coastal	GPS	101	8.50	Vitor Paiva, Jaime Ramos, Ivan Ramirez
Desertas Petrel	Portugal	Bugio	Canary Current	GLS	39	13.40	Ivan Ramirez, Vitor Paiva, Francis Zino, Manuel Biscoito

Species	Country	Colony	LME	Device	N birds	% overlap	Tracking data contributors
Pterodroma deserta							
Great Shearwater *Ardenna gravis*	High Seas	At-Sea	Tristan Gough	PTT	24	2.50	Robert Alfredo Ronconi
	Saint Helena, Ascension and Tristan da Cunha	Gough Island	Tristan Gough	GLS	32	14.20	Jacob González-Solís, Peter Ryan, Richard Cuthbert
	Saint Helena, Ascension and Tristan da Cunha	Inaccessible Island	Tristan Gough	PTT	16	5.00	Robert Alfredo Ronconi
Great Skua *Catharacta skua*	Iceland	Breidamerkursandur	Iceland Shelf and Sea	GLS	11	19.30	Robert W Furness, Aevar E Petersen, Ellen Magnusdottir
	Norway	Bear Island	Barents Sea	GLS	5	23.30	Robert W Furness, Aevar E Petersen, Ellen Magnusdottir
	United Kingdom	Foula	North Sea	GLS	4	5.80	Robert W Furness, Aevar E Petersen, Ellen Magnusdottir
Little Auk *Alle alle*	Greenland (to Denmark)	Kap Hoegh	Greenland Sea	GLS	18	30.49	David Gremillet, Jerome Fort
	Greenland (to Denmark)	Thule	Canadian Eastern Arctic - West Greenland	GLS	17	0.04	Anders Mosbech
Long-tailed Jaeger *Stercorarius longicaudus*	Sweden	Ammarnas	Norwegian Sea + Barents Sea	GLS	23	14.40	Rob van Bemmelen
	Greenland (to Denmark)	Hochstetter Forland	Greenland Sea	GLS	1	9.80	Rob van Bemmelen, Olivier Gilg
	Greenland (to Denmark)	Karupelv	Greenland Sea	GLS	2	13.80	Johannes Lang
	Greenland	North East Greenland	Greenland Sea	PTT	4	16.70	Olivier Gilg
	Greenland (to Denmark)	Zackenberg	Greenland Sea	GLS	5	14.60	Niels Martin Schmidt
	Norway	Kongsfjorden	Norwegian Sea + Barents Sea	GLS	7	9.70	Borge Moe
Manx Shearwater *Puffinus puffinus*	United Kingdom	Lundy	Celtic-Biscay Shelf	GLS	24	3.90	Oliver Padget, Tim Guilford
	Iceland	Heimaey	Iceland Shelf and Sea	GLS	21	15.50	Jacob González-Solís
	United Kingdom	Copeland	Celtic-Biscay Shelf	GLS	33	5.00	Oliver Padget, Tim Guilford
	United Kingdom	Rum	Celtic-Biscay Shelf	GLS	14	8.70	Oliver Padget, Tim Guilford
	United Kingdom	Ramsey	Celtic-Biscay Shelf	GLS	11	4.10	Oliver Padget, Tim Guilford
	United Kingdom	Skomer	Celtic-Biscay Shelf	GLS	78	4.10	Oliver Padget, Tim Guilford
Northern Fulmar *Fulmarus glacialis*	United Kingdom	Eynehallow	North Sea	GLS	72	13.10	Paul Thomson
Northern Gannet *Morus bassanus*	France	Ile Rouzic	Celtic-Biscay Shelf	GLS	20	0.50	David Gremillet, Justine Dossa
	France	Ile Rouzic	Celtic-Biscay Shelf	GPS	21	0.00	David Gremillet
	United Kingdom	Les Etacs	Celtic-Biscay Shelf	GPS	17	0.00	Louise Soanes, Jonathan Green, Phil Atkinson, Roland Gauvain

Species	Country	Colony	LME	Device	N birds	% overlap	Tracking data contributors
	United Kingdom	Bass Rock	North Sea	GPS	78	0.00	Keith Hamer, Ewan Wakefield, Rachel Davies, Ian Cleasby
	United Kingdom	Ailsa Craig	Celtic-Biscay Shelf	GPS	16	0.00	Keith Hamer, Ewan Wakefield
	United Kingdom	Sule Skerry	North Sea	GPS	2	0.00	Keith Hamer, Jez Blackburn
Razorbill *Alca torda*	Iceland	Grimsey	Iceland Shelf and Sea	GLS	4	1.60	Thorkell Lindberg Thórarinsson, Yann Kolbeinsson
	Iceland	Langanes	Iceland Shelf and Sea	GLS	10	1.80	Thorkell Lindberg Thórarinsson, Yann Kolbeinsson
	Iceland	Latrabjarg	Iceland Shelf and Sea	GLS	6	2.20	Thorkell Lindberg Thórarinsson, Yann Kolbeinsson
Sabine's Gull *Xema sabini*	Greenland (to Denmark)	Sand Island	Greenland Sea	GLS	8	5.80	Iain Stenhouse, Carsten Egevang
Scopoli's Shearwater *Calonectris diomedea*	Spain	Pantaleu	Mediterranean Sea	GLS	24	1.40	Jacob González-SolísJacob González-Solís
	Spain	Chafarinas	Mediterranean Sea	GLS	1	0.20	Jacob González-SolísJacob González-Solís
	Spain	Chafarinas	Mediterranean Sea	PTT	9	0.10	Jose Manuel Arcos
	Malta	Filfla	Mediterranean Sea	GLS	10	1.40	Benjamin Metzger
	Malta	Gharb	Mediterranean Sea	GLS	4	1.90	Benjamin Metzger
	Malta	Hal Far	Mediterranean Sea	GLS	12	1.00	Benjamin Metzger
Sooty Shearwater *Ardenna grisea*	Falkland Islands (Malvinas)	Kidney Island	Patagonian Shelf	GLS	18	20.00	April Hedd, William Montevecchi
South Polar Skua *Stercorarius maccormicki*	Antarctica	King George Island	South Shetland Islands	GLS	32	14.50	Hans-Ulrich Peter, Jan Esefeld, Johannes Krietsch, Matthias Kopp
Thick-billed Murre *Uria lomvia*	Canada	Prince Leopold Island	Arctic Canada	GLS	19	0.10	Laura McFarlane Tranquilla, H. Grant Gilchrist, Mark Mallory, William Montevecchi
	Canada	Coats Island	Hudson Bay Complex	GLS	21	0.00	Laura McFarlane Tranquilla, H. Grant Gilchrist, Mark Mallory, William Montevecchi
	Canada	Digges Islands	Hudson Bay Complex	GLS	10	0.50	Laura McFarlane Tranquilla, H. Grant Gilchrist, Mark Mallory, William Montevecchi
	Canada	Gannet Islands	Atlantic Canada	GLS	11	2.60	Laura McFarlane Tranquilla, H. Grant Gilchrist, Mark Mallory, William Montevecchi
	Greenland (to Denmark)	Innaq	NW Greenland Shelf	GLS	7	4.10	Flemming Merkel
	Greenland (to Denmark)	Kippaku	NW Greenland Shelf	GLS	71	2.30	Morten Frederiksen
	Greenland (to Denmark)	Kitsissut Avaaliit	SW Greenland Shelf	GLS	7	1.40	Jannie Fries Linnebjerg, Morten Frederiksen
	Greenland (to Denmark)	Parker Snow Bay	NW Greenland Shelf	GLS	3	0.00	Anders Mosbech
	Greenland (to Denmark)	Saunders Island	NW Greenland Shelf	GLS	19	0.00	Anders Mosbech

Species	Country	Colony	LME	Device	N birds	% overlap	Tracking data contributors
	Iceland	Grimsey	Iceland Shelf and Sea	GLS	9	6.30	Thorkell Lindberg Thórarinsson, Yann Kolbeinsson
	Iceland	Langanes	Iceland Shelf and Sea	GLS	3	1.70	Thorkell Lindberg Thórarinsson, Yann Kolbeinsson
	Iceland	Latrabjarg	Iceland Shelf and Sea	GLS	6	3.30	Thorkell Lindberg Thórarinsson, Yann Kolbeinsson
	Canada	Minarets	Arctic Canada	GLS	14	7.40	H. Grant Gilchrist, Laura McFarlane Tranquilla, Mark Mallory, William Montevecchi
Zino's Petrel *Pterodroma madeira*	Portugal	Madeira	Canary Current	GLS	12	26.20	Frank Zino, Manuel Biscoito

Table A2.2. *Final list of species and LME considered, with an estimate of the number of birds. The analysis was performed only when the LME population size (i.e. LME N mature individuals) accounted for more than 1% of the biogeographic (EU mature individuals) or global population estimates and when the number of birds (i.e. N birds) in the LME was higher than 5.*

Species	N birds	LME	LME N mature individuals	EU mature individuals[1]	EU Red List Status[1]	1%th	more1%th	Reference s for population estimates
Arctic Tern	9	Greenland Sea	165000	1470000	LC	14700	1.00	European Red List (value for all Greenland: 65000-100000)
Atlantic Puffin	71	Celtic-Biscay Shelf	559496	10575000	EN	105750	1.00	Harris and Wanless 2011; checked by Sarah Wanless
Atlantic Puffin	33	Iceland Shelf and Sea	3920000	10575000	EN	105750	1.00	checked by Erpur Hansen
Atlantic Puffin	40	North Sea	642116	10575000	EN	105750	1.00	Harris and Wanless 2011; checked by Sarah Wanless
Audubon's Shearwater	4	Azores	2636	6750	NT	67.5	1.00	European Red List
Audubon's Shearwater	23	Canary Current	4084	6750	NT	67.5	1.00	European Red List
Bermuda Petrel	11	Bermuda	142	142	EN	1.42	1.00	BirdLife International 2016
Black-legged Kittiwake	14	Iceland Shelf and Sea	1161808	3935000	VU	39350	1.00	Garðarsson et al. (2013)
Black-legged Kittiwake	76	North Sea	622580	3935000	VU	39350	1.00	Frederiksen et al. (2012)
Black-legged Kittiwake	66	Norwegian Sea	160000	3935000	VU	39350	1.00	Frederiksen et al. (2012)
Black-legged Kittiwake	51	Barents Sea	1079800	3935000	VU	39350	1.00	Frederiksen et al. (2012)
Black-legged Kittiwake	10	Faroe Plateau	320000	3935000	VU	39350	1.00	Frederiksen et al. (2012)
Black-legged Kittiwake	46	West Spitsbergen	234000	3935000	VU	39350	1.00	Frederiksen et al. (2012)

Species	N birds	LME	LME N mature individuals	EU mature individuals[1]	EU Red List Status[1]	1%th	more1%th	Reference s for population estimates
Black-legged Kittiwake	25	West Greenland Shelf	206696	3935000	VU	39350	1.00	Frederiksen et al. (2012)
Black-legged Kittiwake	2	Arctic Canada	242000	3935000	VU	39350	1.00	Frederiksen et al. (2012)
Black-legged Kittiwake	12	Celtic-Biscay Shelf	244694	3935000	VU	39350	1.00	Frederiksen et al. (2012)
Bulwer's Petrel	37	Cape Verde	6000	102200	LC	1022	1.00	Ramos et al. 2015; Catry et al. 2015
Bulwer's Petrel	59	Canary Current	100000	102200	LC	1022	1.00	assumed 45000 pairs in Deserta (http://www.spea.pt/fotos/editor2/2_airo23.pdf) and numbers from European Red List (5000 in Madeira, 1000 in Canaries)
Bulwer's Petrel	13	Azores	120	102200	LC	1022	0.00	European Red List
Common Murre	20	Iceland Shelf and Sea	1392408	2705000	NT	27050	1.00	Garðarsson et al. 2016 (in press)
Common Murre	48	Labrador - Newfoundland	1392408	2705000	NT	27050	1.00	
Cory's Shearwater	100	Azores	376000	505500	LC	5055	1.00	European Red List. LME: checked by Maria Dias
Cory's Shearwater	249	Canary Current	127430	505500	LC	5055	1.00	Ramos et al. 2013 (DOI: 10.1111/ddi.12088). LME: checked by Maria Dias
Cory's Shearwater	124	Iberian Coastal	2250	505500	LC	5055	0.00	Iberian Coast: 1025 in Berlenga (Lecoq et al. 2011) +100 in Galiza (Munilla et al. 2016; http://dx.doi.org/10.1371/journal.pone.0147222). LME: checked by Maria Dias.
Desertas Petrel	72	Canary Current	340	340	VU	3.4	1.00	LME: checked by Vitor Paiva
Great Shearwater	72	Tristan Gough	8000000	8000000	LC	80000	1.00	Pers. Comm. Peter Ryan (under 2M each for Nightingale and Inaccessible, and 980000 for Gough)
Great Skua	5	Barents Sea	132	33550	LC	335.5	0.00	Furness 1987
Great Skua	11	Iceland Shelf and Sea	10800	33550	LC	335.5	1.00	European Red List
Great Skua	4	North Sea	14300	33550	LC	335.5	1.00	Furness 1987
Little Auk	18	Greenland Sea	7000000	45600000	LC	456000	1.00	Boertmann & Mosbech 1998
Little Auk	17	Canadian Eastern Arctic - West Greenland		45600000	LC	456000		
Long-tailed Jaeger	12	Greenland Sea	21000	72850	LC	728.5	1.00	European Red List. All Greenland combined - not only Greenland Sea (west part); 1000-20000

Species	N birds	LME	LME N mature individuals	EU mature individuals[1]	EU Red List Status[1]	1%th	more1%th	Reference s for population estimates
Long-tailed Jaeger	30	Norwegian Sea + Barents Sea	51856	72850	LC	728.5	1.00	European Red List (values from Finland, Norway, Svalbard, Russia, Sweden)
Manx Shearwater	21	Iceland Shelf and Sea	20000	734500	LC	7345	1.00	Tim Guilford pers. comm. / checked by Erpur Hansen
Manx Shearwater	160	Celtic-Biscay Shelf	962510	734500	LC	7345	1.00	Tim Guilford pers. comm. for UK, plus European Red List values for Rep. Ireland and France
Northern Fulmar	72	North Sea	756210	6880000	EN	68800	1.00	Checked by Ewan Wakefield
Razorbill	20	Iceland Shelf and Sea	626944	999500	NT	9995	1.00	Garðarsson et al. 2016 (in press).
Sabine's Gull	8	Greenland Sea	3000	3100	LC	31	1.00	European Red List (value for all Greenland: 1000-2000)
Sooty Shearwater	18	Patagonian Shelf	600000	20000000	NT	200000	1.00	IBA factsheet (http://datazone.birdlife.org/site/factsheet/20858)
South Polar Skua	32	South Shetland Islands	1542	18000	LC	180	1.00	Ritz et al. (2006), Carneiro et al. (2016)
Thick-billed Murre	100	NW Greeland Shelf	856200	2380000	LC	23800	1.00	Frederiksen et al. (2016)
Thick-billed Murre	7	SW Greenland Shelf	37600	2380000	LC	23800	0.00	Frederiksen et al. (2016)
Thick-billed Murre	18	Iceland Shelf and Sea	653688	2380000	LC	23800	1.00	Garðarsson et al. 2016 (in press). Info supplied by him
Thick-billed Murre	33	Arctic Canada	1080000	2380000	LC	23800	1.00	Frederiksen et al. (2016)
Thick-billed Murre	45	Hudson Bay Complex	2000000	2380000	LC	23800	1.00	Frederiksen et al. (2016)
Thick-billed Murre	11	Atlantic Canada	16352	2380000	LC	23800	0.00	Frederiksen et al. (2016)
Zino's Petrel	12	Canary Current	160	145	EN	1.45	1.00	Checked by Frank Zino

1. For species breeding in Europe; for all the other species, global population estimates and Global Red List classification were used

Table A2.3: Breeding stages in each year quarter, for each species and LME (January-June). NA: data not available, NO: no overlap between data and target area.

Arctic Tern	Q1	Q2

Greenland Sea	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	winter	winter	winter	winter	winter	winter	winter	winter	migration	migration	incubation	incubation
N locations	NO	NO	NO	NO	NO	NO	NO	NO	1508	1508	NA	NA
N birds	NO	NO	NO	NO	NO	NO	NO	NO	9	9	NA	NA
Atlantic Puffin	Q1						Q2					
Celtic-Biscay Shelf	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	winter	winter	winter	winter	pre-breed	pre-breed	incubation	incubation	incubation	chick-rearing	chick-rearing	chick-rearing
N locations	35669	35669	35669	35669	1195	1195	1074	1074	1074	3777	3777	3777
N birds	70	70	70	70	65	65	17	17	17	52	52	52
Atlantic Puffin	Q1						Q2					
North Sea	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	winter	winter	winter	winter	migration	pre-breed	pre-laying	incubation	incubation	incubation	chick-rearing	chick-rearing
N locations	10656	10656	10656	10656	2591	NA	NA	NA	NA	NA	1121	1121
N birds	40	40	40	40	40	NA	NA	NA	NA	NA	40	40
Atlantic Puffin	Q1						Q2					
Iceland Shelf & Sea	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	winter	winter	winter	winter	migration	migration	pre-breed	pre-breed	pre-breed	pre-laying	incubation	incubation
N locations	8618	8618	8618	8618	520	520	1700	1700	1700	73	179	179
N birds	34	34	34	34	21	21	22	22	22	8	12	12
Audubon's Shearwater	Q1						Q2					
Canary Current	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	pre-breed	incubation	incubation	incubation	incubation	chick-rearing	chick-rearing	chick-rearing	chick-rearing	chick-rearing	migration	winter
N locations	2238	1625	1625	1625	1625	2919	2919	2919	2919	2919	1240	4883
N birds	20	23	23	23	23	23	23	23	23	23	22	22
Bermuda Petrel	Q1						Q2					
Bermuda	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	incubation	incubation	incubation	incubation	incubation	chick-rearing	chick-rearing	chick-rearing	chick-rearing	chick-rearing	chick-rearing	chick-rearing
N locations	151	151	151	151	151	NO	NO	NO	NO	NO	NO	NO
N birds	7	7	7	7	7	NO	NO	NO	NO	NO	NO	NO

Black-legged Kittiwake			Q1						Q2			
Faroe Plateau	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	winter	winter	winter	winter	winter	winter	pre-laying	pre-laying	pre-laying	incubation	incubation	chick-rearing
N locations	3314	3314	3314	3314	3314	3314	884	884	884	208	208	542
N birds	10	10	10	10	10	10	10	10	10	10	10	10
Black-legged Kittiwake			Q1						Q2			
Iceland Shelf & Sea	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	winter	winter	winter	winter	winter	winter	pre-laying	pre-laying	pre-laying	pre-laying	incubation	incubation
N locations	6119	6119	6119	6119	6119	6119	1706	1706	1706	1706	NA	NA
N birds	14	14	14	14	14	14	14	14	14	14	NA	NA
Black-legged Kittiwake			Q1						Q2			
Norwegian Sea	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	winter	winter	pre-laying	pre-laying	pre-laying	pre-laying	pre-laying	pre-laying	pre-laying	incubation	incubation	chick-rearing
N locations	20668	20668	9468	9468	9468	9468	9468	9468	9468	198	198	2350
N birds	66	66	65	65	65	65	65	65	65	10	10	60
Black-legged Kittiwake			Q1						Q2			
Barents Sea	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	winter	winter	winter	winter	winter	winter	winter	pre-laying	pre-laying	pre-laying	incubation	incubation
N locations	18332	18332	18332	18332	18332	18332	18332	1135	1135	1135	NA	NA
N birds	51	51	51	51	51	51	51	50	50	50	NA	NA
Black-legged Kittiwake			Q1						Q2			
North Sea	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	winter	winter	winter	winter	winter	winter	migration	pre-breeding	pre-laying	incubation	incubation	chick-rearing
N locations	22467	22467	22467	22467	22467	22467	6211	2307	2081	1702	1702	4873
N birds	76	76	76	76	76	76	76	76	76	48	48	76
Black-legged Kittiwake			Q1						Q2			
Celtic-Biscay Shelf	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	winter	winter	winter	winter	winter	winter	migration	pre-breeding	pre-laying	incubation	incubation	chick-rearing
N locations	3401	3401	3401	3401	3401	3401	944	300	300	267	267	607
N birds	12	12	12	12	12	12	12	10	10	10	10	12

Black-legged Kittiwake	Q1						Q2					
West Spitsbergen	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	winter	winter	winter	winter	winter	winter	winter	winter	pre-laying	pre-laying	pre-laying	incubation
N locations	14587	14587	14587	14587	14587	14587	14587	14587	NA	NA	NA	NA
N birds	46	46	46	46	46	46	46	46	NA	NA	NA	NA
Bulwer's Petrel	Q1						Q2					
Canary Current	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	winter	winter	winter	winter	winter	winter	winter	migration	pre-breed	pre-breed	incubation	incubation
N locations	NO	NO	NO	NO	NO	NO	NO	1356	2786	2786	3349	3349
N birds	NO	NO	NO	NO	NO	NO	NO	43	46	46	48	48
Common Murre	Q1						Q2					
Iceland Shelf & Sea	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	winter	winter	winter	winter	migration	pre-breed	pre-laying	incubation	incubation	incubation	chick-rearing	chick-rearing
N locations	5668	5668	5668	5668	301	NA	538	1415	1415	1415	228	228
N birds	20	20	20	20	20	NA	20	20	20	20	19	19
Cory's Shearwater	Q1						Q2					
Azores	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	winter	winter	winter	winter	migration	migration	pre-breed	pre-breed	pre-breed	pre-laying exodus	incubation	incubation
N locations	8190	8190	8190	8190	3047	3047	2851	2851	2851	1045	8322	8322
N birds	23	23	23	23	27	27	27	27	27	23	45	45
Cory's Shearwater	Q1						Q2					
Canary Current	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	winter	winter	winter	winter	migration	migration	pre-breed	pre-breed	pre-breed	pre-breed	pre-laying exodus	incubation
N locations	58244	58244	58244	58244	22081	22081	20081	20081	20081	20081	3777	10785
N birds	221	221	221	221	221	221	165	165	165	165	135	125
Desertas Petrel	Q1						Q2					
Canary Current	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	winter	winter	winter	winter	winter	winter	winter	winter	winter	migration	pre-breed	pre-breed
N locations	17763	17763	17763	17763	17763	17763	17763	17763	17763	3564	2403	2403
N birds	39	39	39	39	39	39	39	39	39	39	37	37

Great Shearwater	Q1						Q2					
Tristan Gough	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	incubation	chick-rearing	chick-rearing	chick-rearing	chick-rearing	chick-rearing	chick-rearing	migration	migration	migration	winter	winter
N locations	NO	NO	NO	NO	NO	NO	NO	13357	13357	13357	13357	13357
N birds	NO	NO	NO	NO	NO	NO	NO	69	69	69	54	54
Great Skua	Q1						Q2					
Iceland Shelf & Sea	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	winter	winter	winter	winter	migration	migration	migration	migration	incubation	incubation	chick-rearing	chick-rearing
N locations	3024	3024	3024	3024	1560	1560	1560	1560	600	600	1078	1078
N birds	11	11	11	11	11	11	11	11	11	11	11	11
Little Auk	Q1						Q2					
Greenland Sea	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	winter	winter	winter	winter	winter	winter	migration	migration	pre-laying	pre-laying	pre-laying	incubation
N locations	4470	4470	4470	4470	4470	4470	1664	1664	62	62	62	NA
N birds	18	18	18	18	18	18	18	18	12	12	12	NA
Long-tailed Jaeger	Q1						Q2					
Greenland Sea	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	winter	winter	winter	winter	winter	migration	migration	migration	migration	pre-breed	pre-breed	incubation
N locations	4361	4361	4361	4361	4361	1812	1812	1812	1812	164	164	NA
N birds	12	12	12	12	12	8	8	8	8	7	7	NA
Long-tailed Jaeger	Q1						Q2					
Norwegian + Barents	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	winter	winter	winter	migration	migration	migration	migration	migration	migration	pre-breed	incubation	incubation
N locations	NO	NO	NO	13323	13323	13323	13323	13323	13323	679	NA	NA
N birds	30	30	30	30	30	30	30	30	30	19		
Manx Shearwater	Q1						Q2					
Celtic-Biscay Shelf	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	winter	winter	winter	winter	winter	migration	pre-breed	pre-breed	exodus	incubation	incubation	incubation
N locations	NO	NO	NO	NO	NO	NO	8875	8875	7047	11184	11184	11184
N birds	NO	NO	NO	NO	NO	NO	144	144	139	148	148	148

Manx Shearwater	Q1						Q2					
Iceland Shelf & Sea	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	winter	winter	winter	winter	migration	migration	migration	pre-breed	pre-breed	pre-laying exodus	incubation	incubation
N locations	NO	NO	NO	NO	2279	2279	2279	1938	1938	725	1111	1111
N birds	NO	NO	NO	NO	21	21	21	20	20	19	21	21
Northern Fulmar	Q1						Q2					
North Sea	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	winter	winter	winter	winter	winter	winter	pre-breed	pre-laying exodus	pre-laying exodus	incubation	incubation	incubation
N locations	31438	31438	31438	31438	31438	31438	1044	3813	3813	3238	3238	3238
N birds	68	68	68	68	68	68	53	55	55	54	54	54
Razorbill	Q1						Q2					
Iceland Shelf & Sea	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	winter	winter	winter	winter	migration	migration	pre-breed	pre-breed	pre-breed	pre-laying	incubation	incubation
N locations	5059	5059	5059	5059	629	629	1734	1734	1734	NO	162	162
N birds	19	19	19	19	19	19	20	20	20	NO	16	16
Sabine's Gull	Q1						Q2					
Greenland Sea	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	winter	winter	winter	winter	winter	migration	migration	migration	staging	migration	incubation	incubation
N locations	NO	NO	NO	NO	NO	1029	1029	1029	NO	1029	NA	NA
N birds	NO	NO	NO	NO	NO	8	8	8	NO	8	NA	NA
Sooty Shearwater	Q1						Q2					
Patagonian Shelf	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	incubation	chick-rearing	chick-rearing	chick-rearing	chick-rearing	chick-rearing	migration	winter	winter	winter	winter	winter
N locations	NO	NO	NO	NO	NO	NO	1007	4980	4980	4980	4980	4980
N birds	NO	NO	NO	NO	NO	NO	18	18	18	18	18	18
South Polar Skua	Q1						Q2					
South Shetland Is	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	breeding	breeding	breeding	breeding	breeding	breeding	migration	migration	migration	migration	winter	winter
N locations	NO	NO	NO	NO	NO	NO	4975	4975	4975	4975	5688	5688

N birds	NO	NO	NO	NO	NO	NO	32	32	32	32	32	32

Thick-billed Murre	Q1						Q2					
Arctic Canada	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	winter	winter	winter	winter	winter	winter	winter	winter	winter	pre-laying	pre-laying	pre-laying
N locations	10446	10446	10446	10446	10446	10446	10446	10446	10446	NO	NO	NO
N birds	32	32	32	32	32	32	32	32	32	NO	NO	NO
Thick-billed Murre	Q1						Q2					
NW Greenland Shelf	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	winter	winter	winter	winter	winter	winter	winter	winter	pre-laying	pre-laying	pre-laying	incubation
N locations	33455	33455	33455	33455	33455	33455	33455	33455	NO	NO	NO	NA
N birds	100	100	100	100	100	100	100	100	NO	NO	NO	NA
Thick-billed Murre	Q1						Q2					
Iceland Shelf & Sea	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	winter	winter	winter	winter	winter	winter	winter	winter	pre-laying	pre-laying	pre-laying	incubation
N locations	4762	4762	4762	4762	4762	4762	4762	4762	494	494	494	130
N birds	18	18	18	18	18	18	18	18	18	18	18	14
Zino's Petrel	Q1						Q2					
Canary Current	Jan_1st	Jan_2nd	Feb_1st	Feb_2nd	Mar_1st	Mar_2nd	Apr_1st	Apr_2nd	May_1st	May_2nd	Jun_1st	Jun_2nd
Stage	non-breeding	non-breeding	non-breeding	non-breeding	non-breeding	non-breeding	breeding	breeding	breeding	breeding	breeding	breeding
N locations	3278	3278	3278	3278	3278	3278	1764	1764	1764	1764	1764	1764
N birds	11	11	11	11	11	11	11	11	11	11	11	11

Table A2.4: *Breeding stages in each year quarter, for each species and LME (July-December).* NA: data not available, NO: no overlap between data and target area.

Arctic Tern	Q3						Q4					
Greenland Sea	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	chick-rearing	chick-rearing	chick-rearing	migration	staging	migration	migration	migration	migration	winter	winter	winter
N locations	NA	NA	NA	1508	268	1508	1508	1508	1508	NO	NO	NO

N birds	NA	NA	NA	9	9	9	9	9	9	NO	NO	NO
Atlantic Puffin			Q3						Q4			
Celtic-Biscay Shelf	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	chick-rearing	chick-rearing	chick-rearing / exodus	exodus / winter	winter	winter	winter	winter	winter	winter	winter	winter
N locations	3777	3777	3400	3631	35669	35669	35669	35669	35669	35669	35669	35669
N birds	52	52	71	70	70	70	70	70	70	70	70	70
Atlantic Puffin			Q3						Q4			
North Sea	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	chick-rearing	chick-rearing	migration	migration	winter	winter	winter	winter	winter	winter	winter	winter
N locations	1121	1121	2591	2591	10656	10656	10656	10656	10656	10656	10656	10656
N birds	40	40	40	40	40	40	40	40	40	40	40	40
Atlantic Puffin			Q3						Q4			
Iceland Shelf & Sea	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	incubation	chick-rearing	chick-rearing	chick-rearing	chick-rearing	migration	migration	winter	winter	winter	winter	winter
N locations	179	3181	3181	3181	3181	520	520	8618	8618	8618	8618	8618
N birds	12	35	35	35	35	21	21	34	34	34	34	34
Audubon's Shearwater			Q3						Q4			
Canary Current	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	winter	winter	winter	winter	winter	winter	winter	winter	migration	pre-breed	pre-breed	pre-breed
N locations	4883	4883	4883	4883	4883	4883	4883	4883	4883	4883	4883	4883
N birds	22	22	22	22	22	22	22	22	22	22	22	22
Bermuda Petrel			Q3						Q4			
Bermuda	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	migration	migration	non-breeding	non-breeding	non-breeding	non-breeding	non-breeding	migration / pre-breed	pre-breed	pre-breed	pre-laying	pre-laying exodus
N locations	1565	1565	1565	1565	1565	1565	1565	1565	500	500	500	500
N birds	11	11	11	11	11	11	11	11	9	9	9	9
Black-legged Kittiwake			Q3						Q4			
Faroe Plateau	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd

Stage	chick-rearing	chick-rearing	chick-rearing	winter	winter	winter	winter	winter	winter	winter	winter	winter
N locations	542	542	542	3314	3314	3314	3314	3314	3314	3314	3314	3314
N birds	10	10	10	10	10	10	10	10	10	10	10	10
Black-legged Kittiwake			Q3						Q4			
Iceland Shelf & Sea	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	chick-rearing	chick-rearing	chick-rearing	winter	winter	winter	winter	winter	winter	winter	winter	winter
N locations	762	762	762	6119	6119	6119	6119	6119	6119	6119	6119	6119
N birds	14	14	14	14	14	14	14	14	14	14	14	14
Black-legged Kittiwake			Q3						Q4			
Norwegian Sea	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	chick-rearing	chick-rearing	chick-rearing	winter	winter	winter	winter	winter	winter	winter	winter	winter
N locations	2350	2350	2350	20668	20668	20668	20668	20668	20668	20668	20668	20668
N birds	60	60	60	66	66	66	66	66	66	66	66	66
Black-legged Kittiwake			Q3						Q4			
Barents Sea	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	chick-rearing	chick-rearing	chick-rearing	winter	winter	winter	winter	winter	winter	winter	winter	winter
N locations	129	129	129	18332	18332	18332	18332	18332	18332	18332	18332	18332
N birds	15	15	15	51	51	51	51	51	51	51	51	51
Black-legged Kittiwake			Q3						Q4			
North Sea	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	chick-rearing	chick-rearing	migration	migration	winter	winter	winter	winter	winter	winter	winter	winter
N locations	4873	4873	6211	6211	22467	22467	22467	22467	22467	22467	22467	22467
N birds	76	76	76	76	76	76	76	76	76	76	76	76
Black-legged Kittiwake			Q3						Q4			
Celtic-Biscay Shelf	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	chick-rearing	chick-rearing	migration	migration	winter	winter	winter	winter	winter	winter	winter	winter
N locations	607	607	944	944	3401	3401	3401	3401	3401	3401	3401	3401
N birds	12	12	12	12	12	12	12	12	12	12	12	12

Black-legged Kittiwake	Q3						Q4					
West Spitsbergen	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	incubation	chick-rearing	chick-rearing	winter	winter	winter	winter	winter	winter	winter	winter	winter
N locations	NA	NA	NA	14587	14587	14587	14587	14587	14587	14587	14587	14587
N birds	NA	NA	NA	46	46	46	46	46	46	46	46	46
Bulwer's Petrel	Q3						Q4					
Canary Current	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	incubation	chick-rearing	chick-rearing	chick-rearing	chick-rearing	migration	winter	winter	winter	winter	winter	winter
N locations	3349	4457	4457	4457	4457	1356	NO	NO	NO	NO	NO	NO
N birds	48	47	47	47	47	43	NO	NO	NO	NO	NO	NO
Common Murre	Q3						Q4					
Iceland Shelf & Sea	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	chick-rearing	migration	winter	winter	winter	winter	winter	winter	winter	winter	winter	winter
N locations	228	301	5668	5668	5668	5668	5668	5668	5668	5668	5668	5668
N birds	19	20	20	20	20	20	20	20	20	20	20	20
Cory's Shearwater	Q3						Q4					
Azores	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	incubation	incubation	chick-rearing	chick-rearing	chick-rearing	chick-rearing	chick-rearing	chick-rearing	migration	migration	winter	winter
N locations	8322	8322	152193	152193	152193	152193	152193	152193	3047	3047	8190	8190
N birds	45	45	86	86	86	86	86	86	27	27	23	23
Cory's Shearwater	Q3						Q4					
Canary Current	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	incubation	incubation	chick-rearing	chick-rearing	chick-rearing	chick-rearing	chick-rearing	chick-rearing	migration	migration	winter	winter
N locations	10785	10785	106058	106058	106058	106058	106058	106058	22081	22081	58244	58244
N birds	125	125	249	249	249	249	221 + 28	221 + 28	221	221	221	221
Desertas Petrel	Q3						Q4					
Canary Current	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	pre-laying exodus	incubation	incubation	incubation	incubation	chick-rearing	chick-rearing	chick-rearing	chick-rearing	migration	winter	winter

N locations	1424	5139	5139	5139	5139	4556	4556	4556	4556	3564	17763	17763
N birds	38	38	38	38	38	39	39	39	39	39	39	39

Great Shearwater	Q3						Q4					
Tristan Gough	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	winter	winter	winter	migration	migration	migration	pre-breeding	pre-breeding	pre-breeding	incubation	incubation	incubation
N locations	7764	7764	7764	13357	13357	13357	NO	NO	NO	NO	NO	NO
N birds	54	54	54	69	69	69	NO	NO	NO	NO	NO	NO
Great Skua	Q3						Q4					
Iceland Shelf & Sea	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	chick-rearing	chick-rearing	migration	migration	migration	migration	winter	winter	winter	winter	winter	winter
N locations	1078	1078	1560	1560	1560	1560	3024	3024	3024	3024	3024	3024
N birds	11	11	11	11	11	11	11	11	11	11	11	11
Little Auk	Q3						Q4					
Greenland Sea	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	incubation	chick-rearing	chick-rearing	moult	moult	moult	migration	migration	winter	winter	winter	winter
N locations	NA	NA	NA	285	285	285	1664	1664	4470	4470	4470	4470
N birds	NA	NA	NA	18	18	18	18	18	18	18	18	18
Long-tailed Jaeger	Q3						Q4					
Greenland Sea	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	incubation	chick-rearing	chick-rearing	migration	migration	migration	migration	winter	winter	winter	winter	winter
N locations	NA	226	226	1812	1812	1812	1812	4361	4361	4361	4361	4361
N birds	NA	6	6	8	8	8	8	12	12	12	12	12
Long-tailed Jaeger	Q3						Q4					
Norwegian + Barents	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	chick-rearing	chick-rearing	migration	migration	migration	winter	winter	winter	winter	winter	winter	winter
N locations	1150	1150	13323	13323	13323	NO	NO	NO	NO	NO	NO	NO
N birds	19	19	30	30	30	30	30	30	30	30	30	30
Manx Shearwater	Q3						Q4					

Celtic-Biscay Shelf	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	chick-rearing	chick-rearing	chick-rearing	chick-rearing	chick-rearing	pre-migration	migration	winter	winter	winter	winter	winter
N locations	35293	35293	35293	35293	35293	NA	NO	NO	NO	NO	NO	NO
N birds	159	159	159	159	159	NA	NO	NO	NO	NO	NO	NO

Manx Shearwater			Q3						Q4			
Iceland Shelf & Sea	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	incubation	chick-rearing	chick-rearing	chick-rearing	chick-rearing	chick-rearing	migration	migration	winter	winter	winter	winter
N locations	1111	3146	3146	3146	3146	3146	2279	2279	NO	NO	NO	NO
N birds	21	21	21	21	21	21	21	21	NO	NO	NO	NO
Northern Fulmar			Q3						Q4			
North Sea	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	chick-rearing	chick-rearing	chick-rearing	chick-rearing	winter	winter	winter	winter	winter	winter	winter	winter
N locations	8418	8418	8418	8418	31438	31438	31438	31438	31438	31438	31438	31438
N birds	59	59	59	59	68	68	68	68	68	68	68	68
Razorbill			Q3						Q4			
Iceland Shelf & Sea	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	incubation	chick-rearing	chick-rearing	chick-rearing	chick-rearing	migration	migration	winter	winter	winter	winter	winter
N locations	162	NO	NO	NO	NO	629	629	5059	5059	5059	5059	5059
N birds	16	NO	NO	NO	NO	19	19	19	19	19	19	19
Sabine's Gull			Q3						Q4			
Greenland Sea	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	chick-rearing	chick-rearing	chick-rearing	migration	migration	staging	staging	migration	migration	winter	winter	winter
N locations	NA	NA	NA	1029	1029	NO	NO	1029	1029	NO	NO	NO
N birds	NA	NA	NA	8	8	NO	NO	8	8	NO	NO	NO
Sooty Shearwater			Q3						Q4			
Patagonian Shelf	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	winter	winter	winter	winter	migration	migration	pre-breeding	pre-breeding	pre-laying	incubation	incubation	incubation
N locations	4980	4980	4980	4980	1007	1007	NO	NO	NO	NO	NO	NO

N birds	18	18	18	18	18	18	NO	NO	NO	NO	NO	NO
South Polar Skua			Q3						Q4			
South Shetland Is	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	winter	winter	winter	winter	migration	migration	migration	migration	breeding	breeding	breeding	breeding
N locations	5688	5688	5688	5688	4975	4975	4975	4975	NO	NO	NO	NO
N birds	32	32	32	32	32	32	32	32	NO	NO	NO	NO

Thick-billed Murre			Q3						Q4			
Arctic Canada	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	incubation	incubation	chick-rearing	chick-rearing	moult	moult	moult	winter	winter	winter	winter	winter
N locations	NA	NA	NO	NO	NO	NO	NO	10446	10446	10446	10446	10446
N birds	NA	NA	NO	NO	NO	NO	NO	32	32	32	32	32
Thick-billed Murre			Q3						Q4			
NW Greenland Shelf	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	incubation	chick-rearing	chick-rearing	moult	moult	moult	winter	winter	winter	winter	winter	winter
N locations	NA	NO	NO	NO	NO	NO	33455	33455	33455	33455	33455	33455
N birds	NA	NO	NO	NO	NO	NO	100	100	100	100	100	100
Thick-billed Murre			Q3						Q4			
Iceland Shelf & Sea	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	incubation	chick-rearing	chick-rearing	moult	moult	moult	winter	winter	winter	winter	winter	winter
N locations	130	596	596	577	577	577	4762	4762	4762	4762	4762	4762
N birds	14	18	18	18	18	18	18	18	18	18	18	18
Zino's Petrel			Q3						Q4			
Canary Current	Jul_1st	Jul_2nd	Aug_1st	Aug_2nd	Sep_1st	Sep_2nd	Oct_1st	Oct_2nd	Nov_1st	Nov_2nd	Dec_1st	Dec_2nd
Stage	breeding	breeding	breeding	breeding	breeding	breeding	non-breeding	non-breeding	non-breeding	non-breeding	non-breeding	non-breeding
N locations	1764	1764	1764	1764	1764	1764	3278	3278	3278	3278	3278	3278
N birds	11	11	11	11	11	11	11	11	11	11	11	11

Table A2.4. *Details of the datasets used in the original analyses and additional datasets received from SeaTrack. Details Large Marine Ecosystem (LME) of the respective dataset; minimum and maximum years of the tracking data; sample sizes; and percentage of overlap with the OSPAR ABNJ region. All tracking data is from GLS devices.*

Country	Colony	LME	NACES MPA				NACES MPA + ADDITIONAL DATA			
			Min years	Max years	N birds	% overlap	Min years	Max years	N birds	% overlap
Canada	Prince Leopold Island	Arctic Canada	2008	2009	2	2.57	2008	2009	2	2.57
Norway	Bear Island	Barents Sea	2009	2011	17	17.34	2009	2017	57	14.89
Russian Federation	Cape Krutik	Barents Sea	2009	2010	11	18.04	2009	2017	58	21.78
Norway	Hjelmsoya	Barents Sea	2009	2011	3	6.39	2009	2011	3	6.39
Norway	Hornoya	Barents Sea	2008	2010	20	10.76	2008	2017	69	19.28
United Kingdom	Rathlin	Celtic-Biscay Shelf	2009	2010	5	9.09	2009	2010	5	9.09
Faroe Islands	Faroe Islands	Faroe Plateau	2009	2010	10	12.11	2009	2017	31	13.30
Greenland	Kippaku	West Greenland Shelf	2008	2011	25	0.56	2008	2011	25	0.56
Iceland	Hafnarholmi	Iceland Shelf and Sea	2009	2011	14	13.88	2009	2011	14	13.88
Denmark	Bulbjerg	North Sea	2009	2011	13	6.91	2009	2011	13	6.91
United Kingdom	Fair Isle	North Sea	2009	2010	15	3.81	2009	2010	15	3.81
United Kingdom	Isle of May	North Sea	2007	2010	48	8.71	2007	2017	83	10.16
Norway	Anda	Norwegian Sea	2009	2011	12	9.73	2009	2017	66	15.33
Norway	Halten	Norwegian Sea	2009	2011	8	15.12	2009	2011	8	15.12
Norway	Rost	Norwegian Sea	2008	2011	46	6.61	2008	2017	97	10.67
Norway	Runde and Alesund	Norwegian Sea	NA	NA	NA	NA	2015	2017	25	14.08
Norway	Sklinna	Norwegian Sea	NA	NA	NA	NA	2014	2017	36	15.78
United Kingdom	Skomer	Celtic-Biscay Shelf	2009	2010	7	5.92	2009	2010	7	5.92
Norway	Grumant	West Spitsbergen	2009	2011	16	32.35	2009	2011	16	32.35
Norway	Kongsfjorden	West Spitsbergen	2008	2011	30	30.62	2008	2017	64	36.76
Russian Federation	Franz Josef Land	Barents Sea	NA	NA	NA	NA	2013	2017	51	49.69
Iceland	Langanes and Skjalfandi	Iceland Shelf and Sea	NA	NA	NA	NA	2014	2017	27	22.98
Russian Federation	Cape Sakhanin	Barents Sea	NA	NA	NA	NA	2015	2017	6	5.31
Svalbard and Jan Mayen	Alkefjellet	Barents Sea	NA	NA	NA	NA	2015	2017	20	58.47
Svalbard and Jan Mayen	Isfjorden	Barents Sea	NA	NA	NA	NA	2009	2017	29	48.86

Annex 2 References

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Annex 3. Maps of important foraging areas of individual species

Maps determined by analysis of tracking data. The proportion of birds in each LME is indicated when birds from more than one LME used the Site.

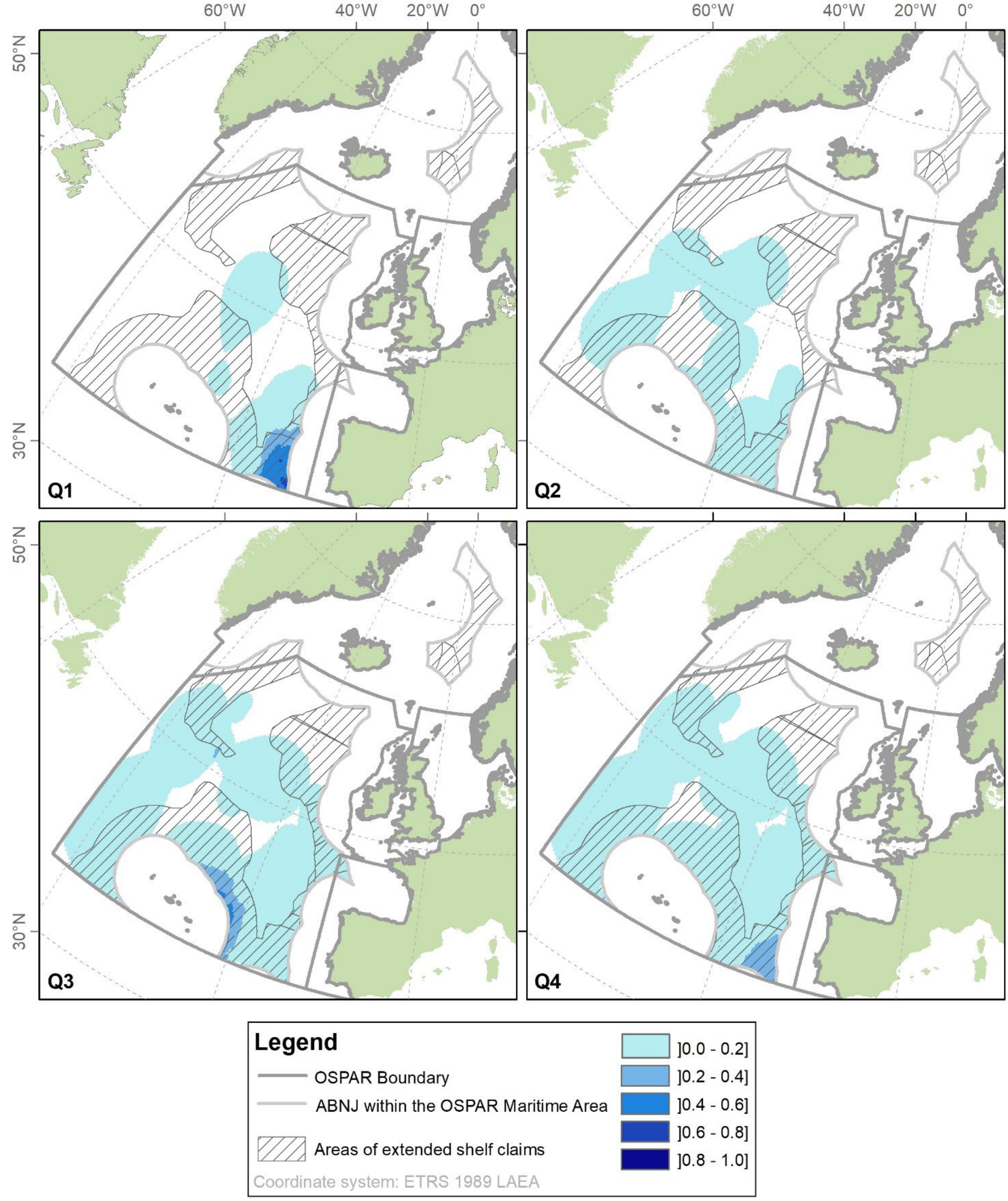

Figure A3.1. *Important foraging areas identified for* ***Audubon's Shearwater*** *(Puffinus lherminieri baroli)*

(European Red List Status: Near Threatened. OSPAR Listed Species). Usage identified by year quarter, based on tracking data from the Canary Current Large Marine Ecosystem.

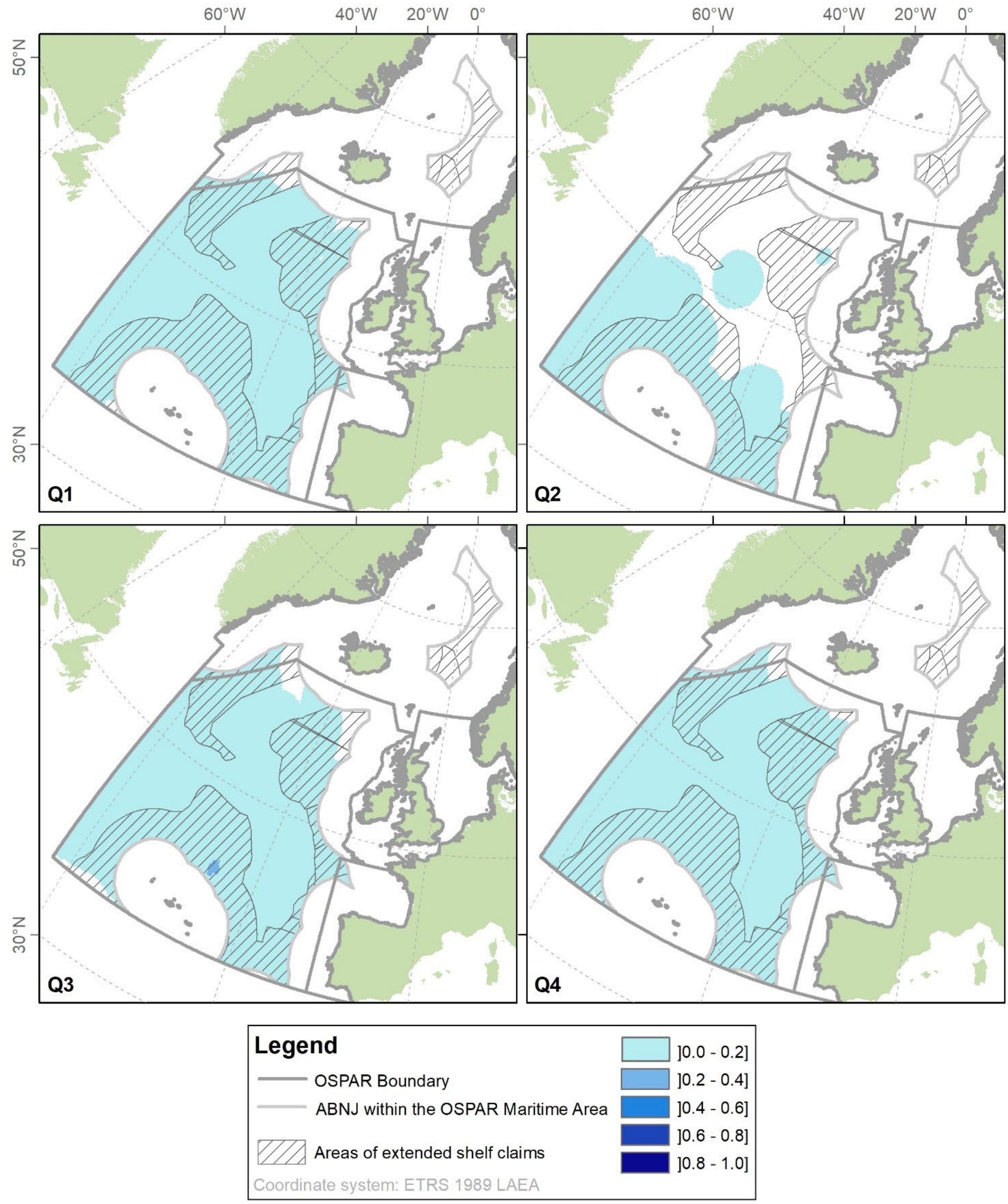

Figure A3.2. *Important foraging areas identified for* ***Cory's Shearwater*** *(Calonectris borealis)*

(Global Red List Status: Least Concern). Usage identified by year quarter, based on tracking data from the Azores (0.747) and Canary Current (0.253) Large Marine ecosystems. Usage indicated by proportion of the LME populations using area.

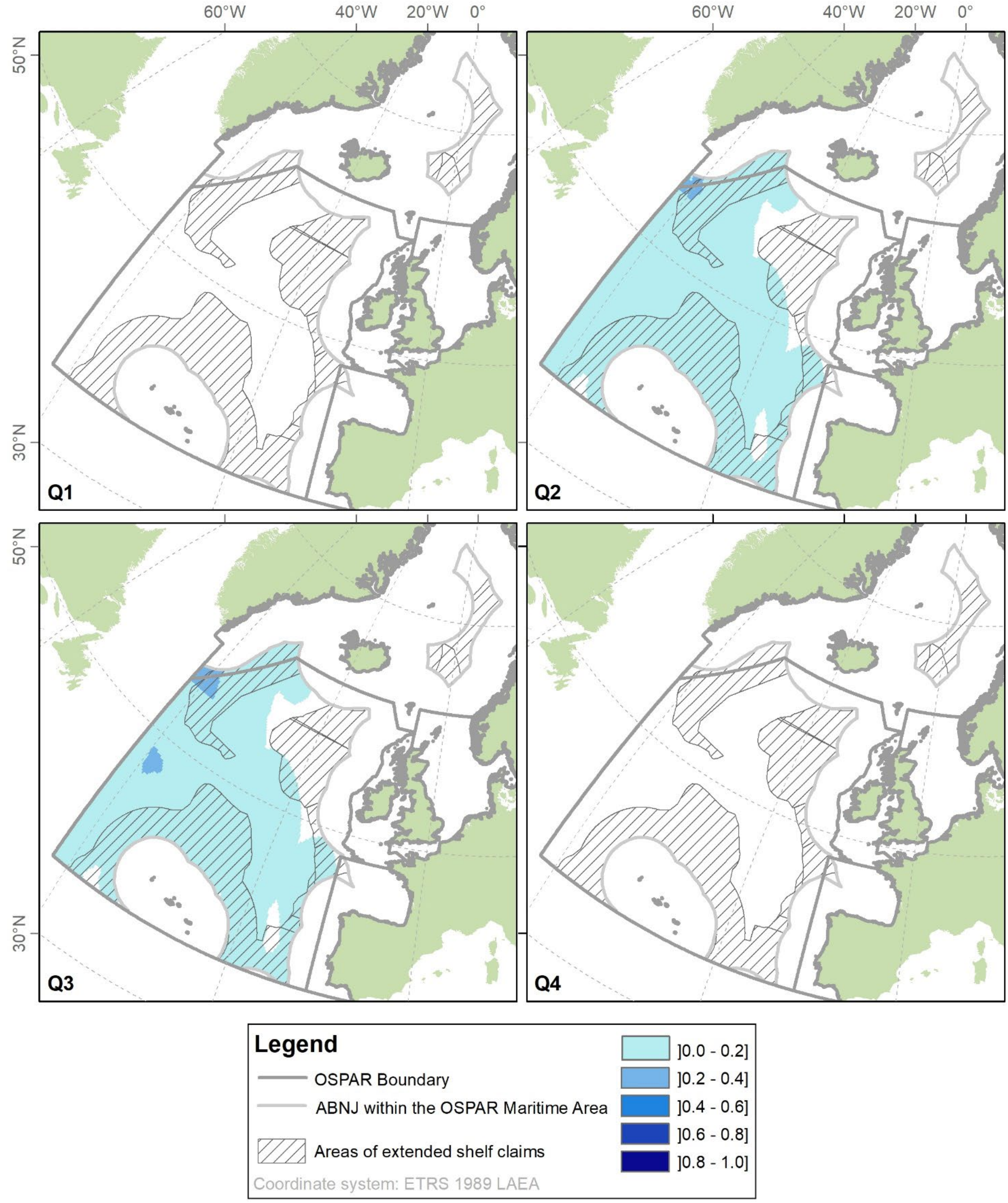

Figure A3.3. *Important foraging areas identified for* ***Great Shearwater*** *(Ardenna gravis)*

(Global Red List Status: Least Concern). Usage identified by year quarter, based on tracking data from the Tristan Gough Large Marine Ecosystem.

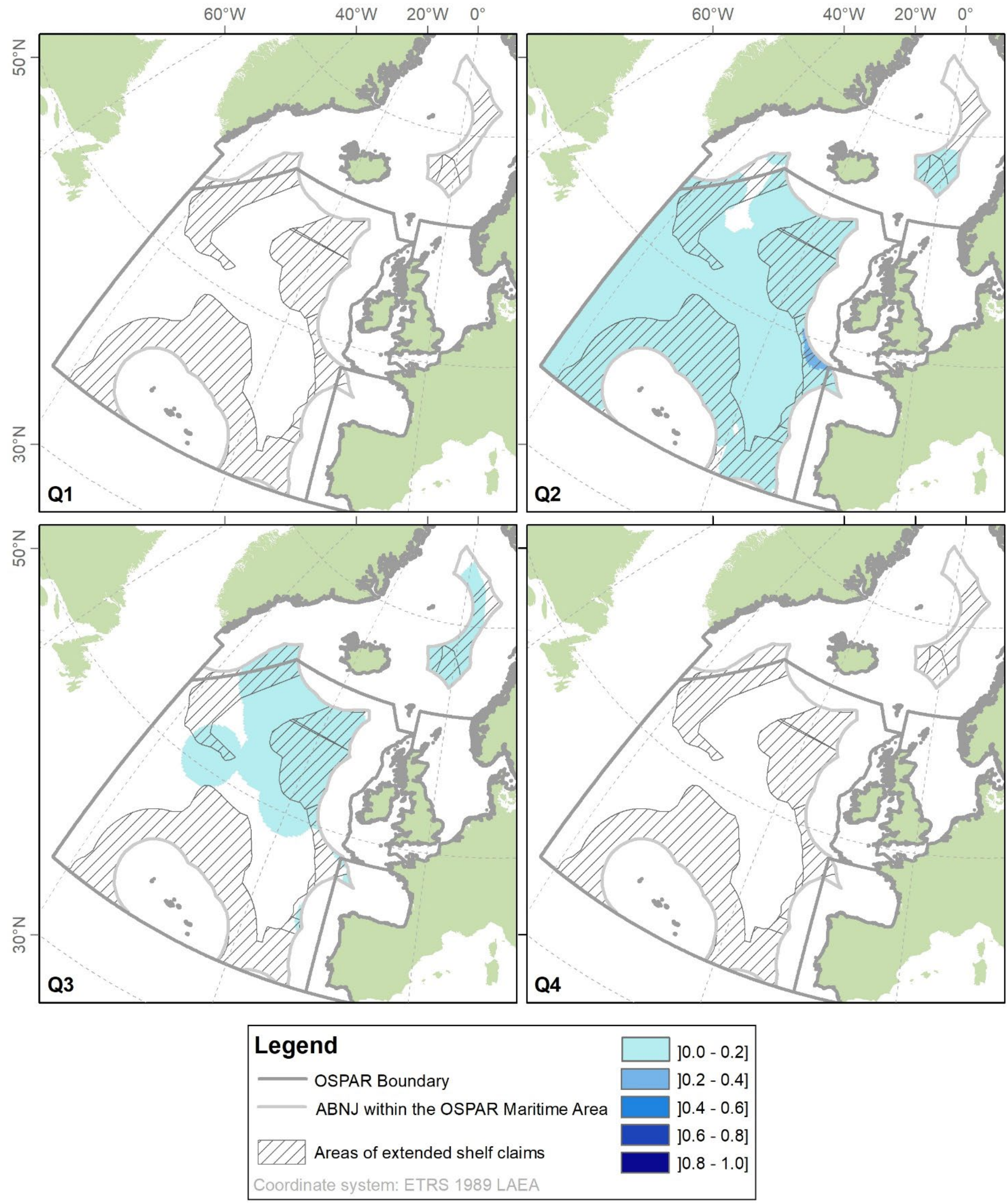

Figure A3.4. *Important foraging areas identified for **Manx Shearwater** (Puffinus puffinus)*

(Global Red List Status: Least Concern). Usage identified by year quarter, based on tracking data from the Celtic-Biscay Shelf (0.980) and Iceland Shelf and Sea (0.020). Usage indicated by proportion of the LME populations using area.

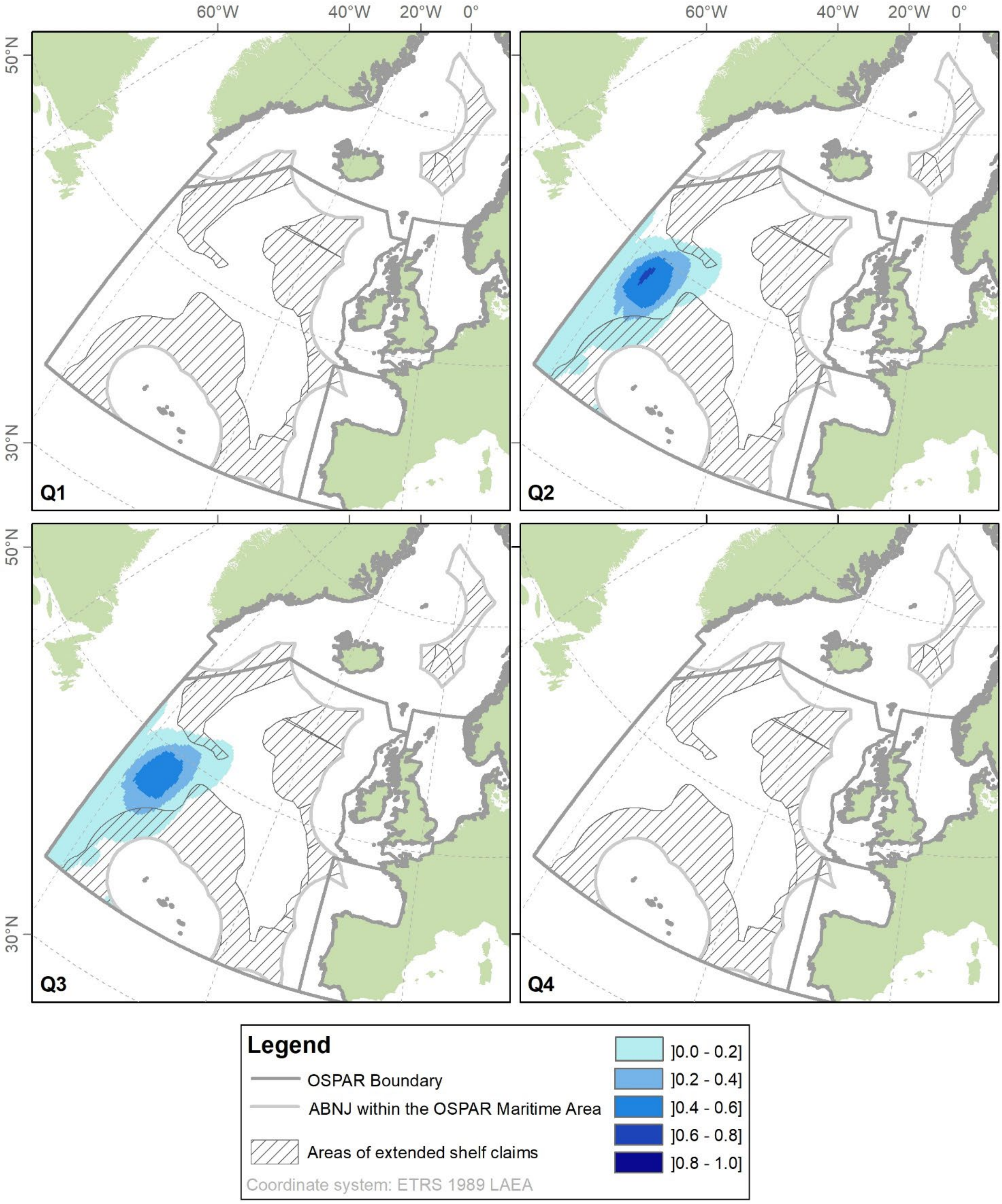

Figure A3.5. *Important foraging areas identified for* ***Sooty Shearwater*** *(Ardenna grisea)*

(Global Red List Status: Near Threatened). Usage identified by year quarter, based on tracking data from the Patagonian Shelf Large Marine Ecosystem.

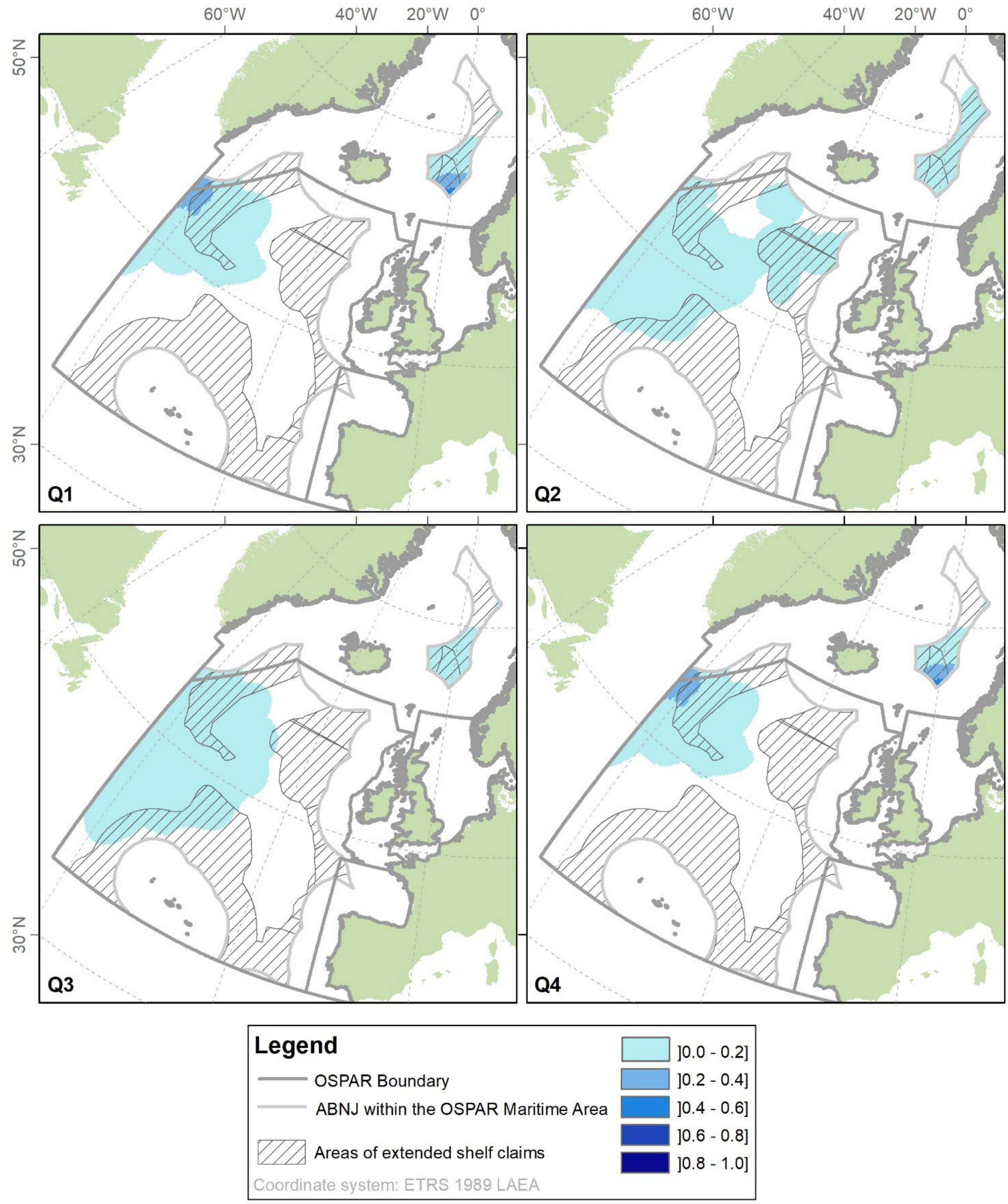

Figure A3.6. *Important foraging areas identified for* ***Northern Fulmar*** *(Fulmarus glacialis)*

(European Red List Status: Endangered). Usage identified by year quarter, based on tracking data from the North Sea Large Marine Ecosystem.

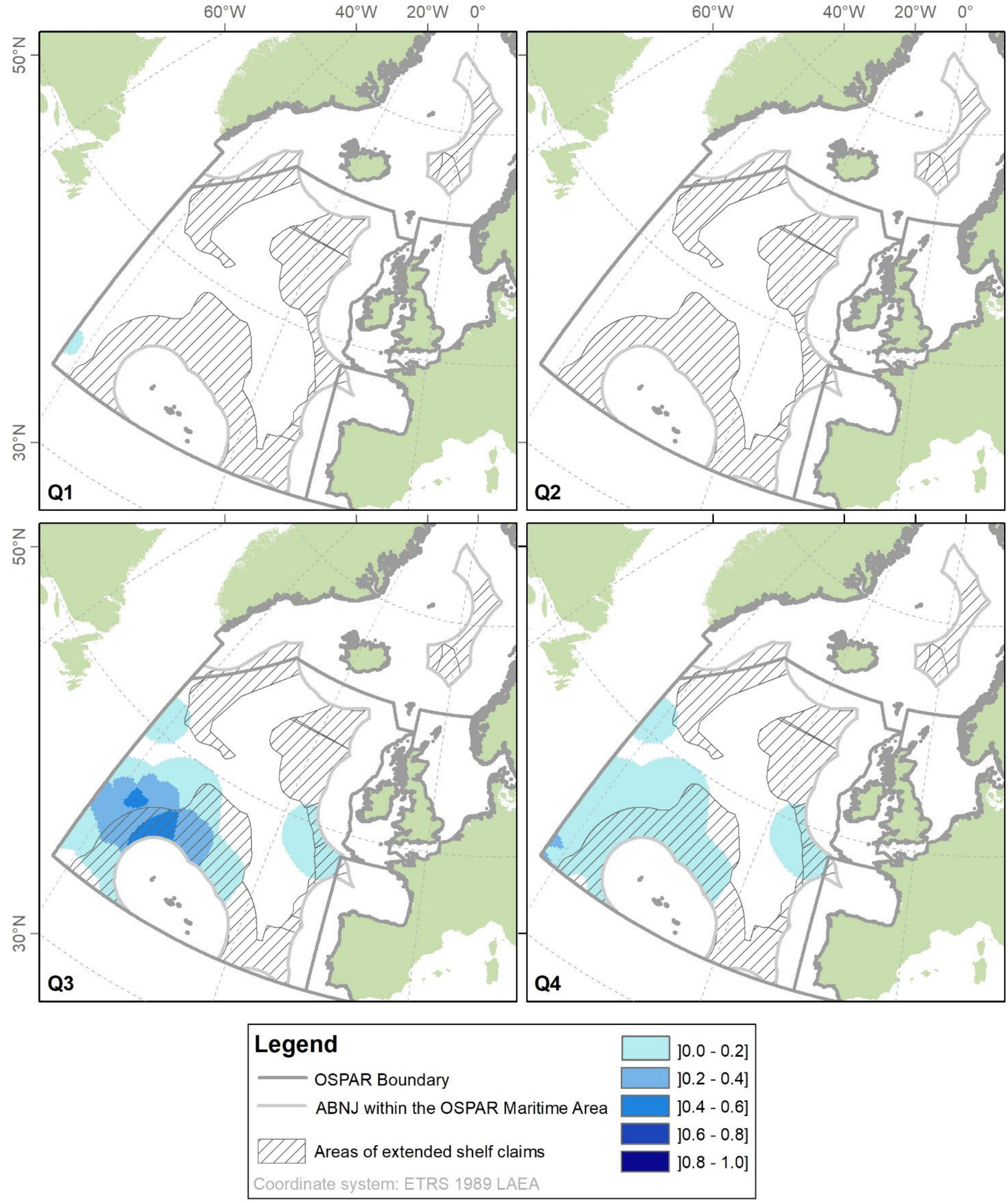

Figure A3.7. *Important foraging areas identified for* ***Bermuda's Petrel*** *(Pterodroma cahow)*

(Global Red List Status: Endangered). Usage identified by year quarter, based on tracking data from the Bermuda Large Marine Ecosystem.

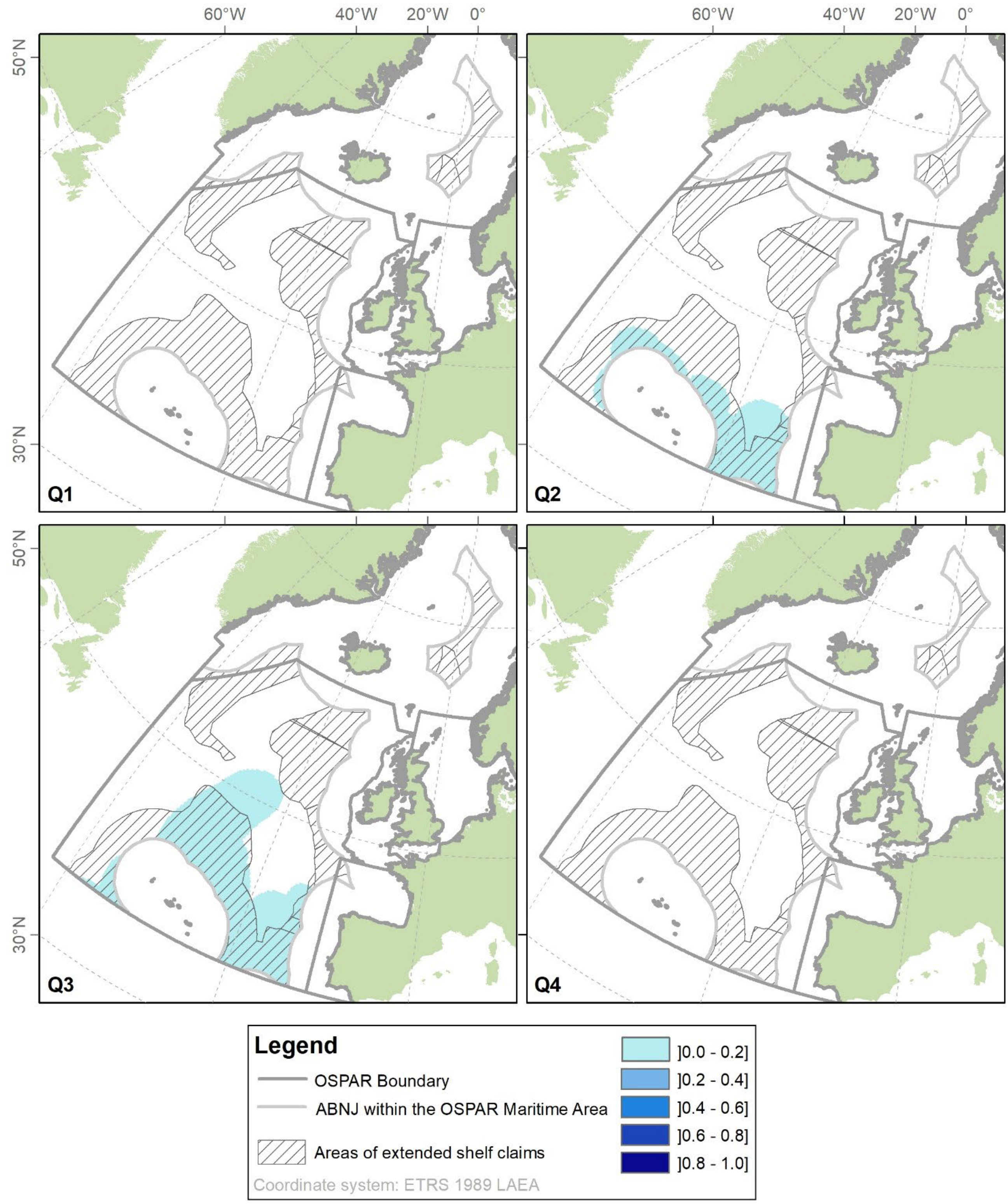

Figure A3.8. *Important foraging areas identified* ***for Bulwer's Petrel*** *(Bulweria bulwerii)*

(Global Red List Status: Least Concern). Usage identified by year quarter, based on tracking data from the Canary Current Large Marine Ecosystem

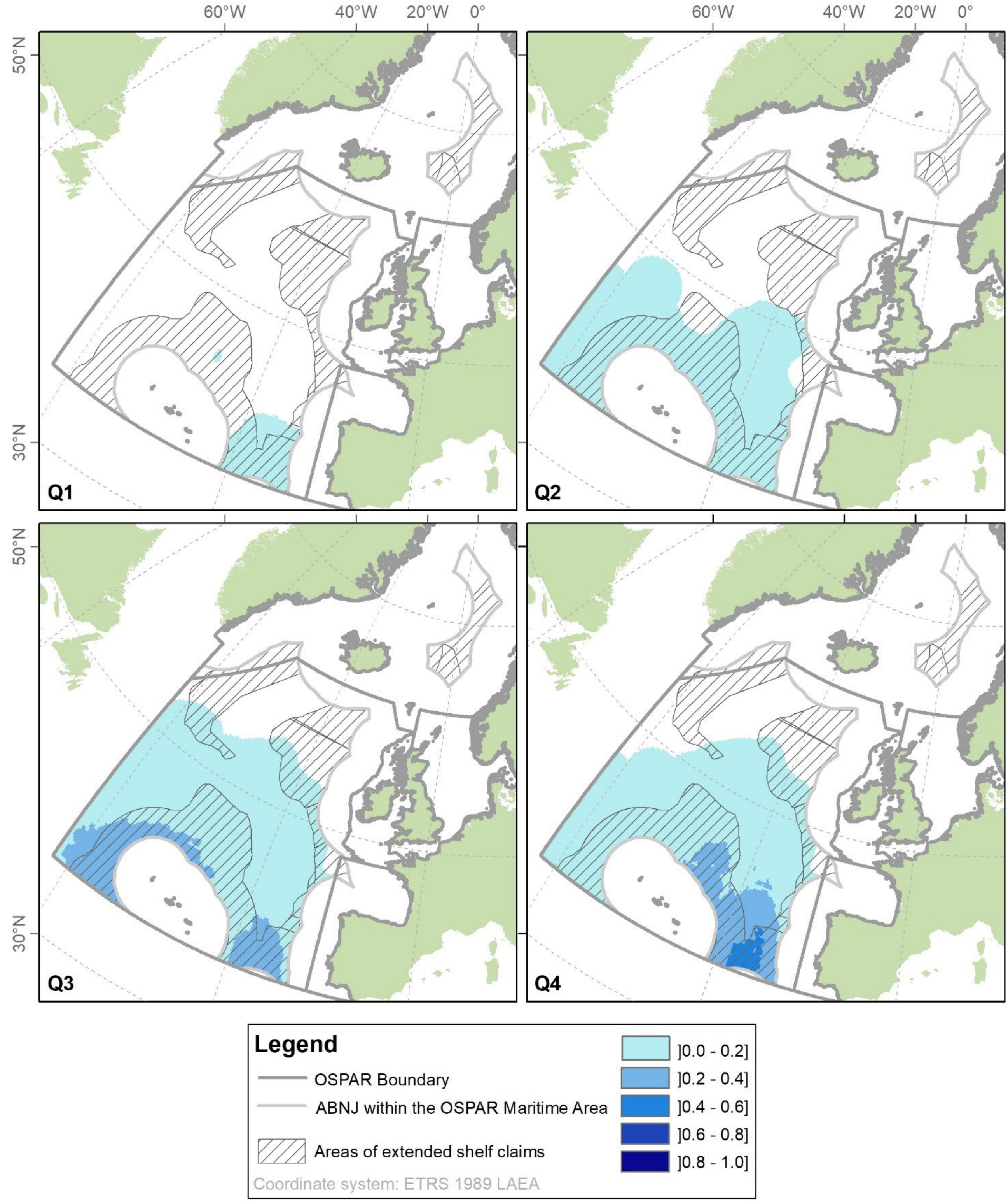

Figure A3.9. *Important foraging areas identified for **Desertas Petrel** (Pterodroma deserta)*

(European Red List Status: Vulnerable). Usage identified by year quarter, based on tracking data from the Canary Current Large Marine Ecosystem.

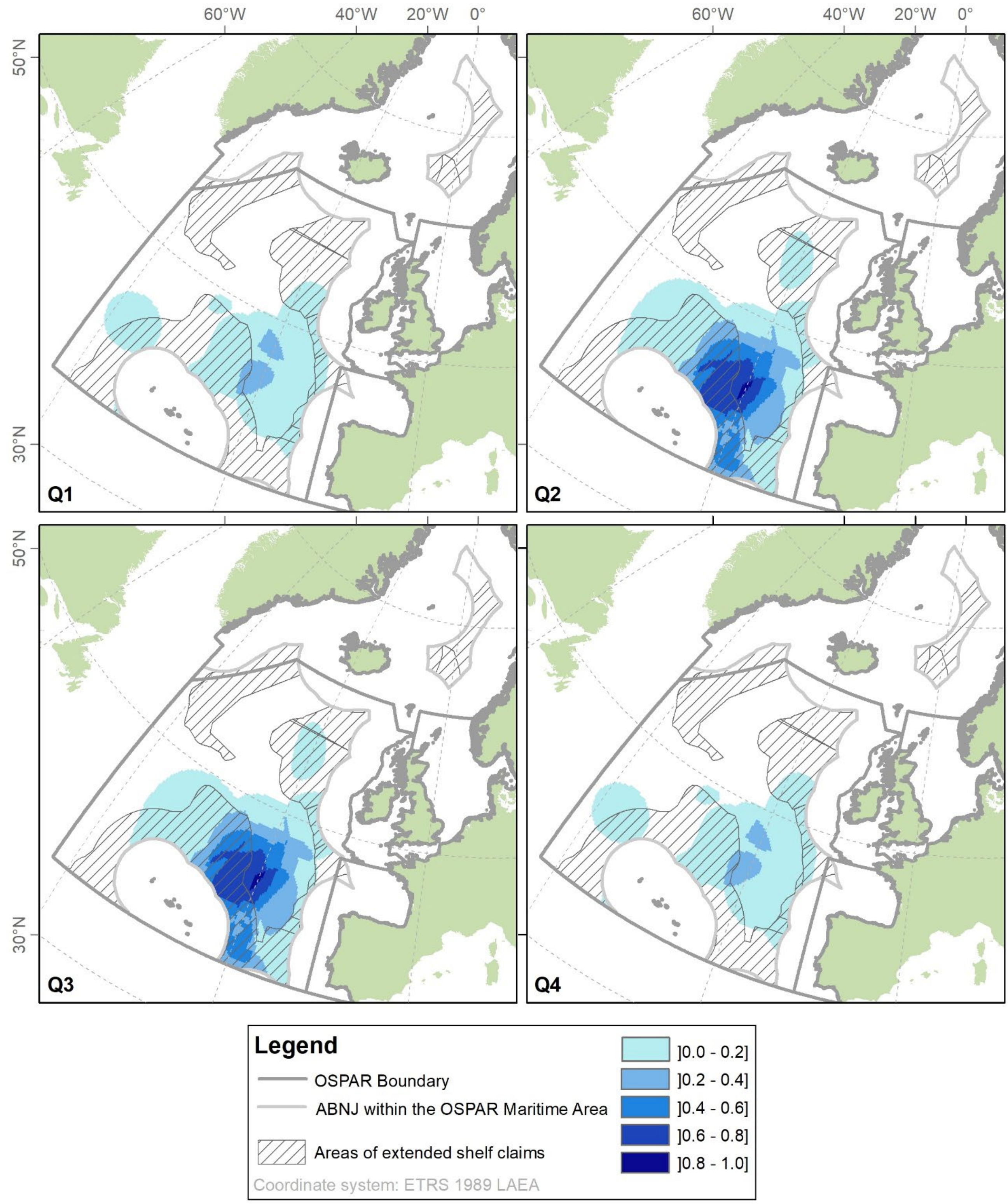

***Figure A3.10.** Important foraging areas identified for **Zino's Petrel** (Pterodroma madeira)*

(Global Red List Status: Endangered). Usage identified by year quarter, based on tracking data from the Canary Current Large Marine Ecosystem.

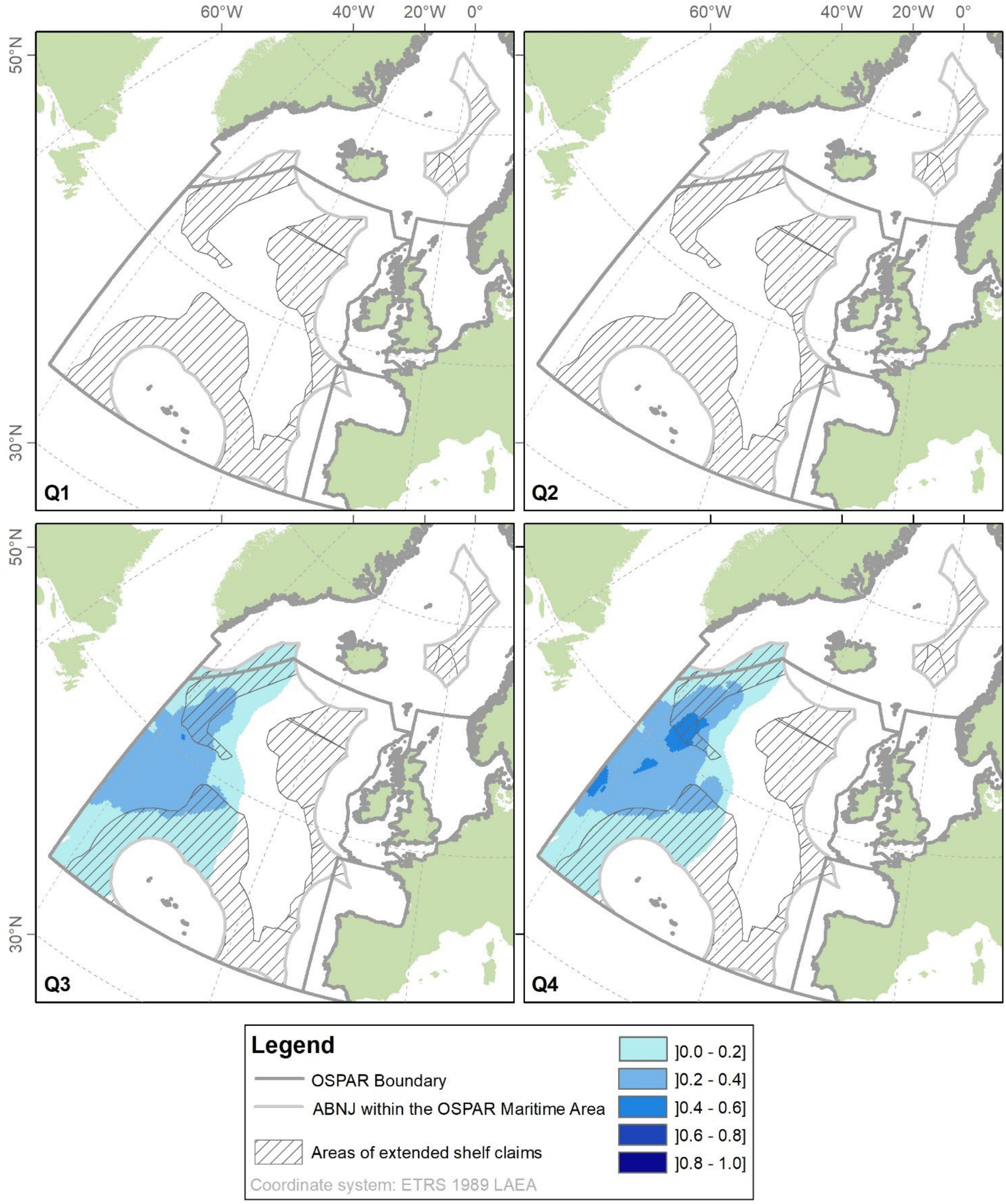

Figure A3.11*. Important foraging areas identified for* ***Arctic Tern*** *(Sterna paradisaea)*

(Global Red List Status: Least Concern). Usage identified by year quarter, based on tracking data from the Greenland Large Marine Ecosystem.

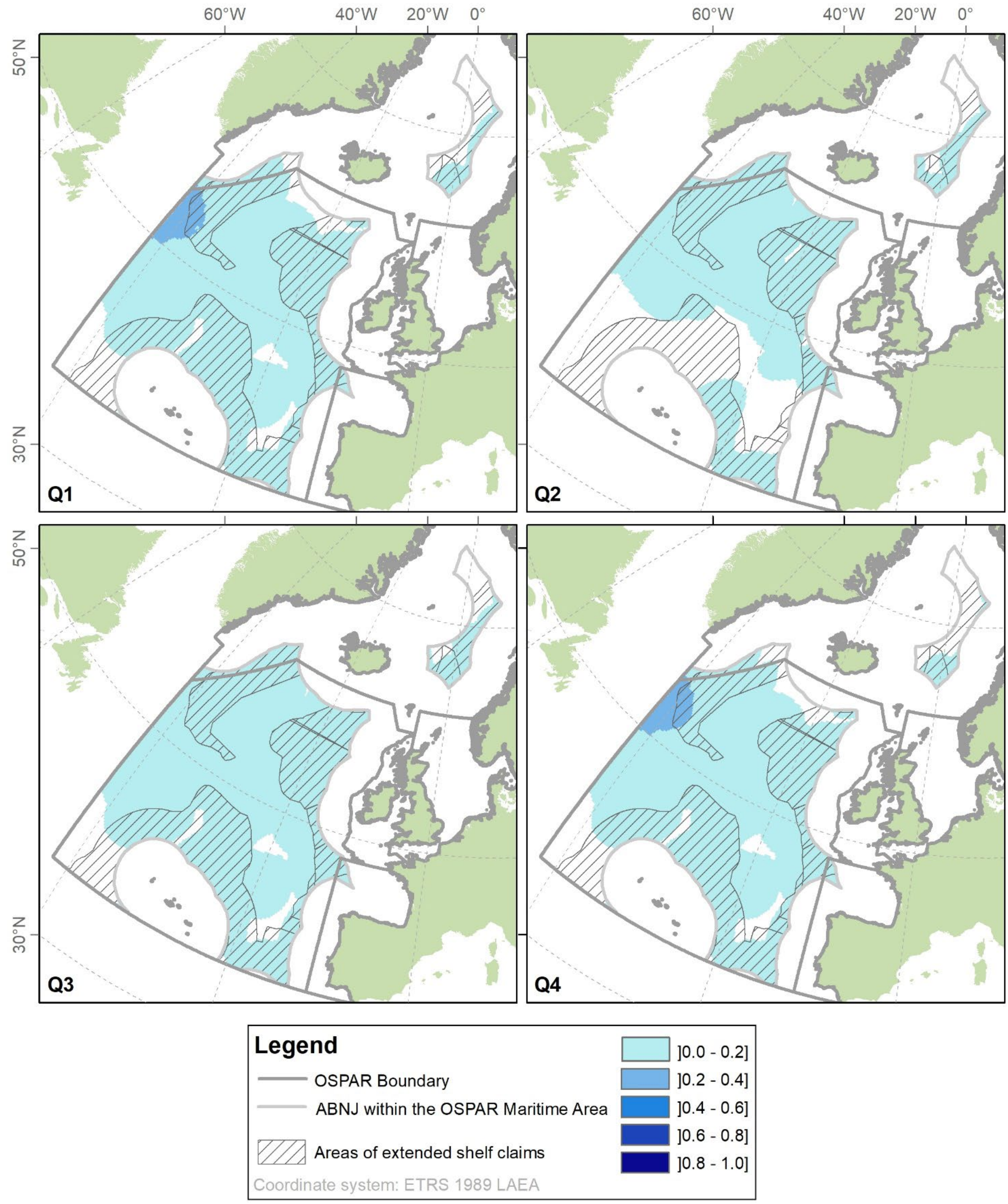

Figure A3.12. *Important foraging areas identified for **Black-legged Kittiwake** (Rissa tridactyla)*

(European Red List status: Vulnerable. OSPAR Listed Species) Usage identified by year quarter, based on tracking data from the following Large Marine Ecosystems: (Quarters 1, 3 and 4) Barents Sea (0.282), Faroe Plateau (0.084), Iceland Shelf and Sea (0.304), Norwegian Sea (0.042), West Spitsbergen (0.061), North Sea (0.163) and Celtic-Biscay Shelf (0.064) (Q2) Barents Sea (0.301), Faroe Plateau (0.089), Iceland Shelf and Sea (0.324), Norwegian Sea (0.045), North Sea (0.173) and Celtic-Biscay Shelf (0.068). Usage indicated by proportion of the LME populations using area.

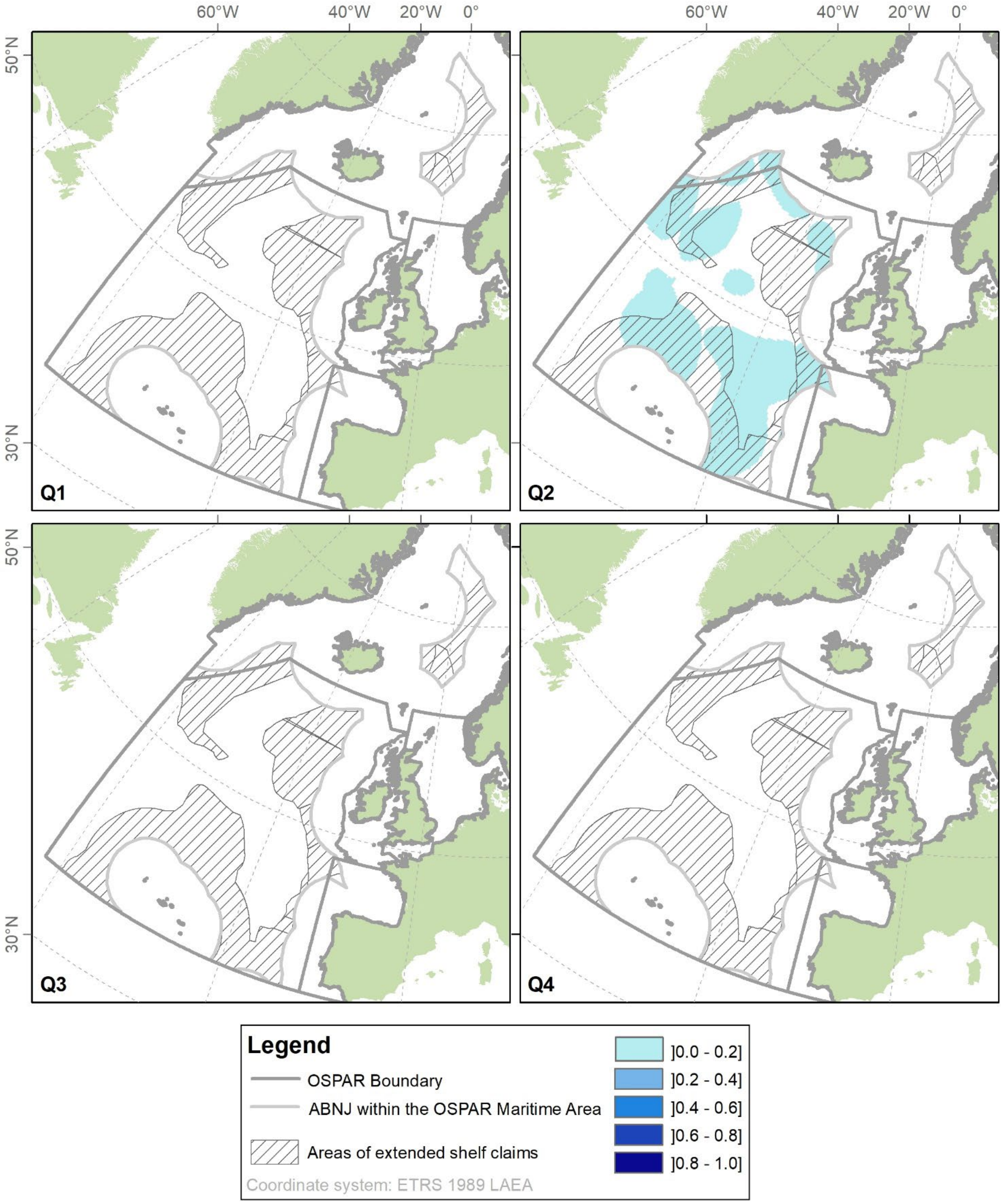

Figure A3.13. *Important foraging areas identified for* ***Sabine's Gull*** *(Xema sabini)*

(Global Red List Status: Least Concern). Usage identified by year quarter, based on tracking data from the Greenland Sea Large Marine Ecosystem

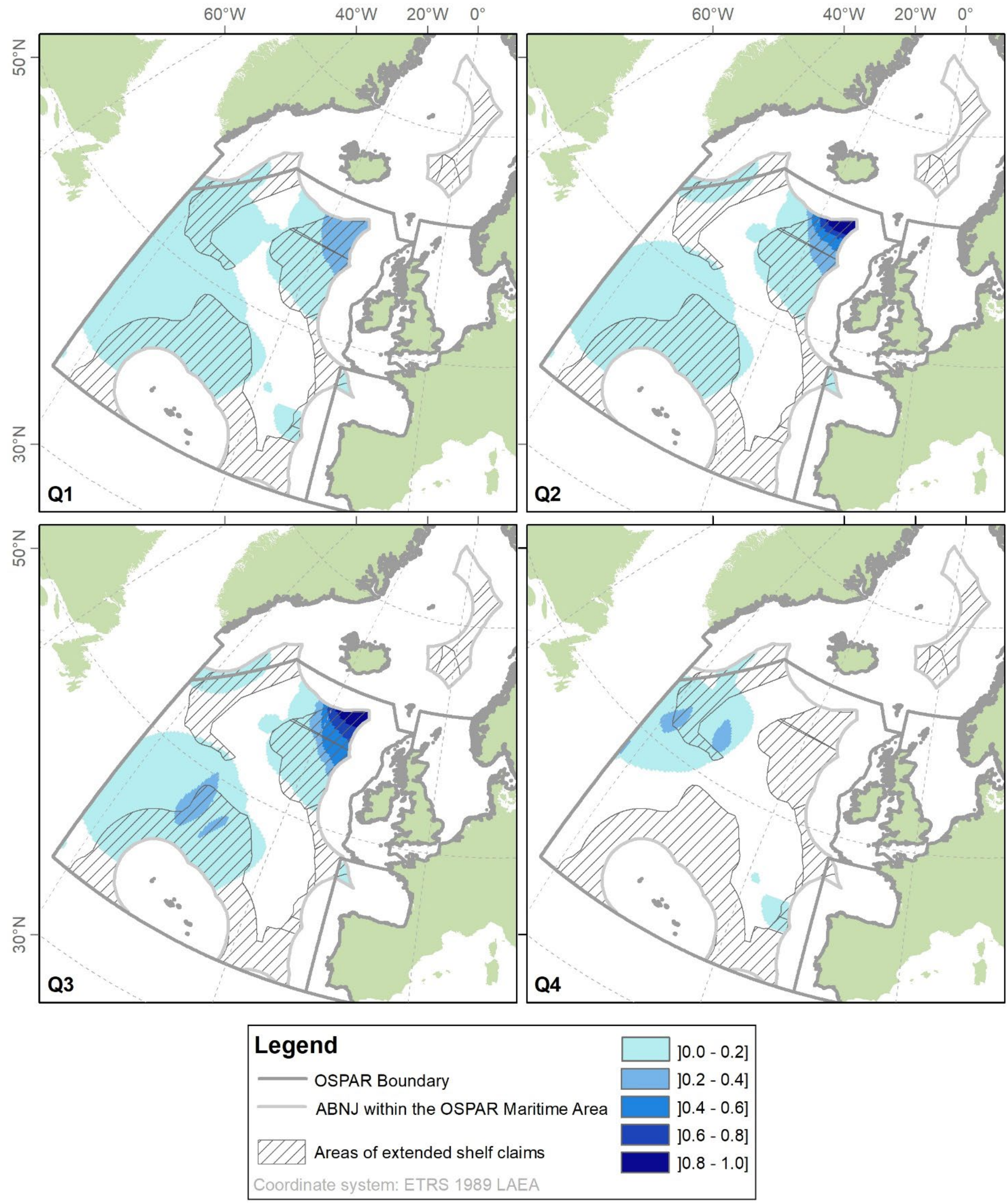

***Figure A3.14.** Important foraging areas identified for **Great Skua** (Stercorarius skua)*

(Global Red List Status: Least Concern). Usage identified by year quarter, based on tracking data from the Iceland Shelf and Sea.

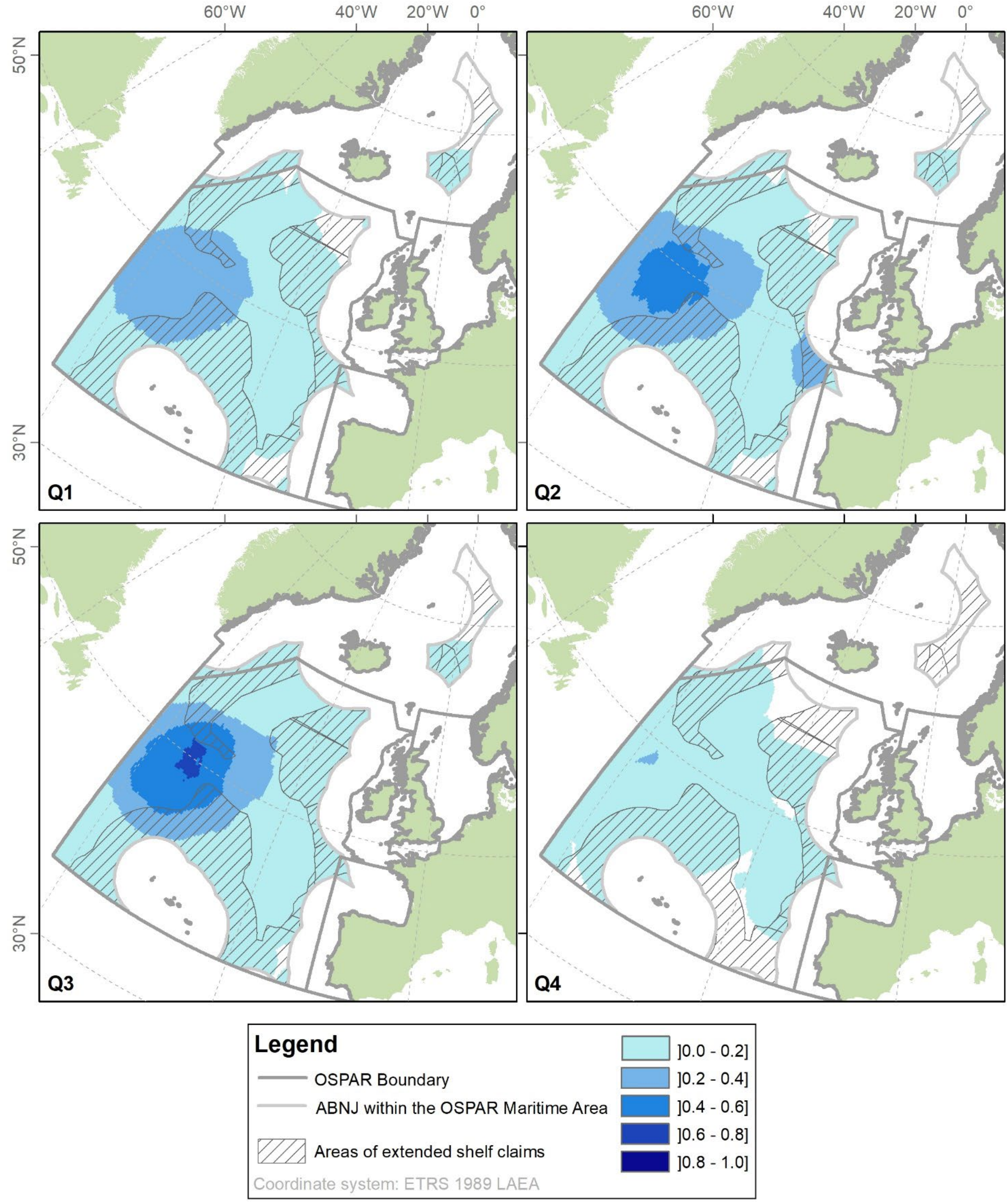

Figure A3.15. *Important foraging areas identified for* ***Long-tailed Jaeger*** *(Stercorarius longicaudus)*

(Global Red List Status: Least Concern). Usage identified by year quarter, based on tracking data from the Greenland Sea (0.288) and Norwegian Sea + Barents Sea (0.712). Usage indicated by proportion of the LME populations using area.

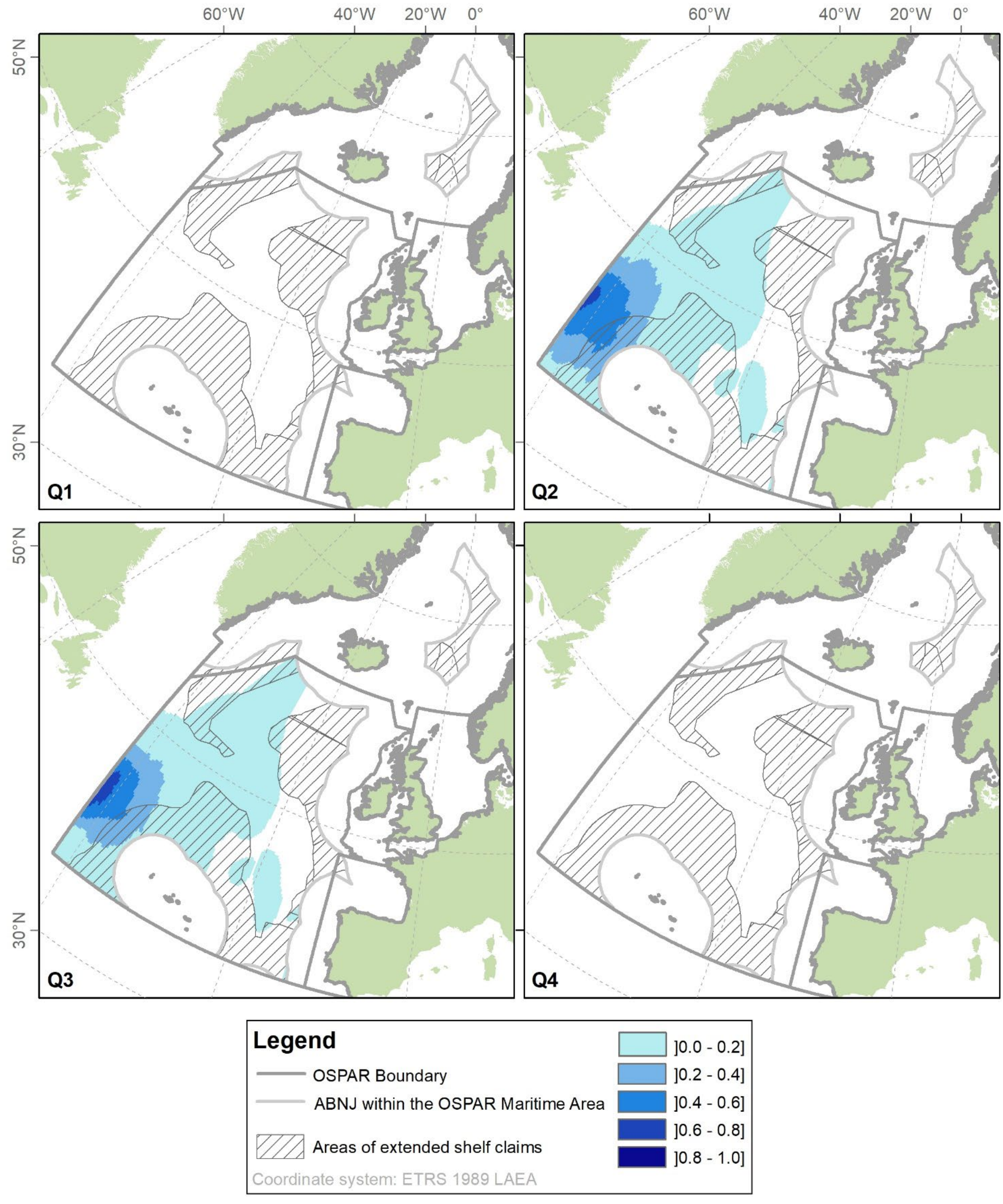

***Figure A3.16.** Important foraging areas identified for **South Polar Skua** (Catharacta maccormicki)*

(Global Red List Status: Least Concern). Usage identified by year quarter, based on tracking data from the South Shetland Islands Large Marine Ecosystem.

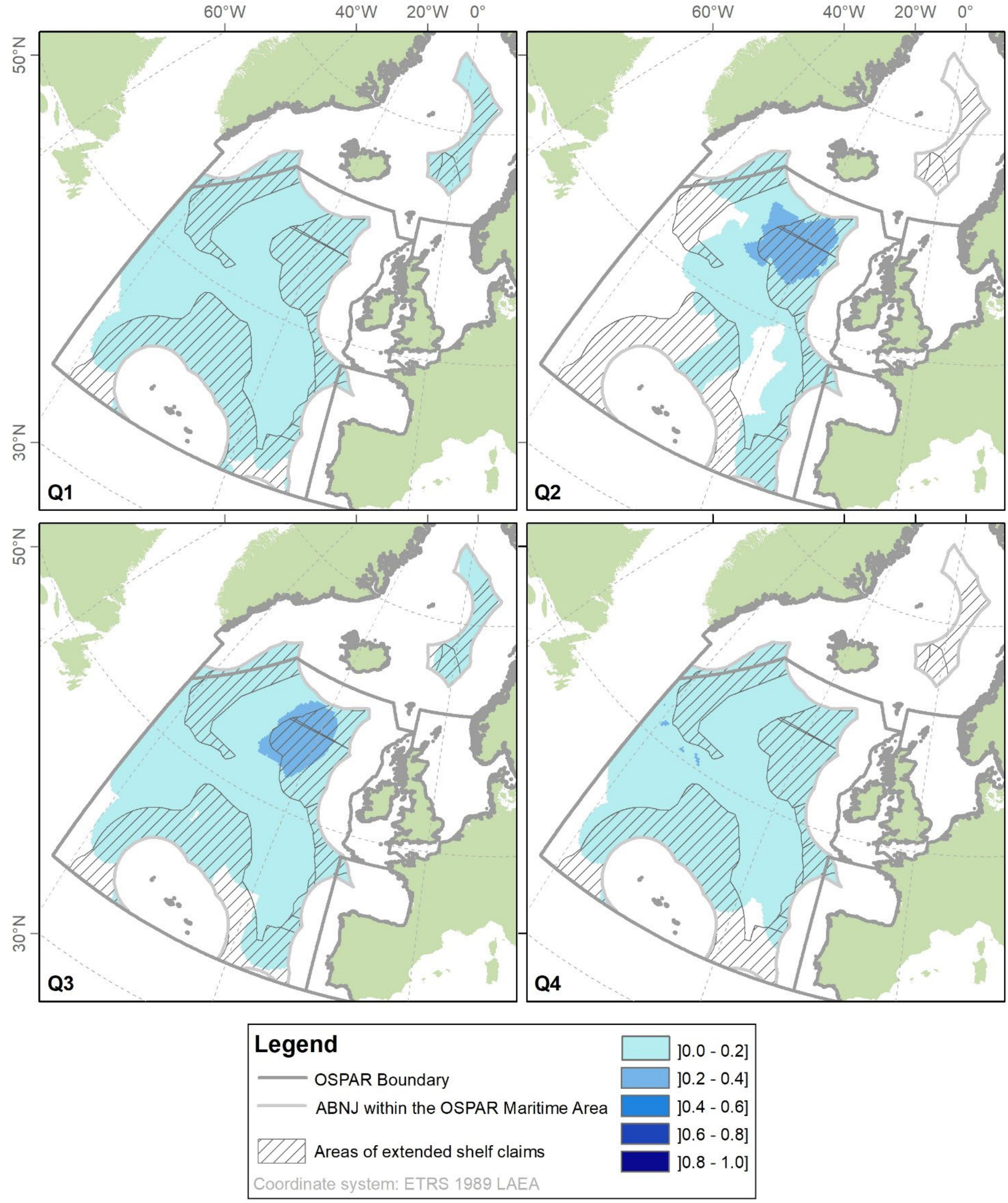

Figure A3.17. *Important foraging areas identified for* ***Atlantic Puffin*** *(Fratercula arctica)*

(European Red List Status: Endangered; Global Red List Status: Vulnerable). Usage identified by year quarter, based on tracking data from the following Large Marine Ecosystems: (Quarters 1, 3 and 4) Celtic-Biscay Shelf (0.109), Iceland Shelf and Sea (0.765) and North Sea (0.125) (Q2) Celtic-Biscay Shelf (0.124) and Iceland Shelf and Sea (0.875). Usage indicated by proportion of the LME populations using area.

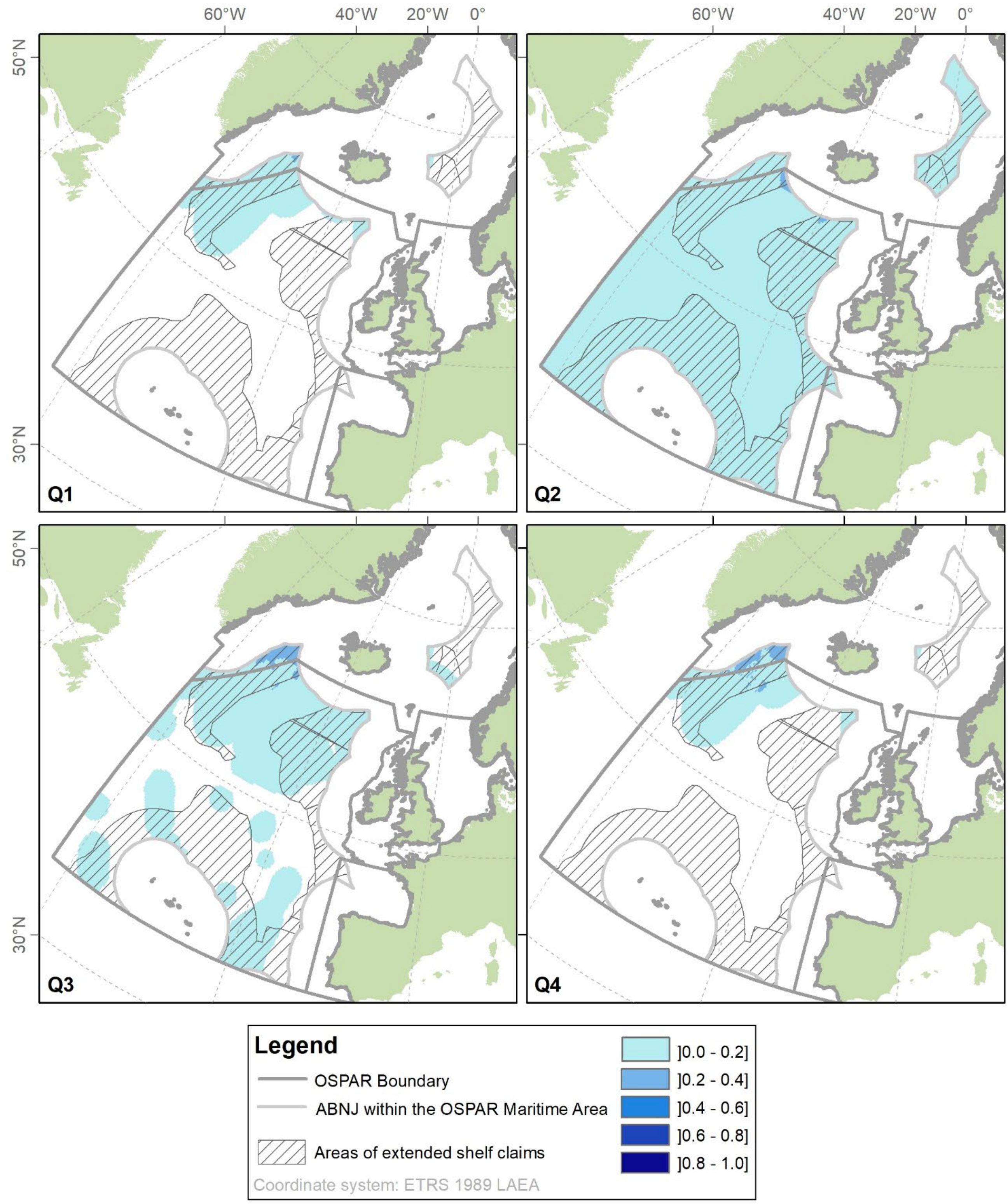

***Figure A3.18**. Important foraging areas identified for **Common Murre** (Uria aalge)*

(Global Red List Status: Least Concern). Usage identified by year quarter, based on tracking data from the Iceland Shelf and Sea Large Marine Ecosystem.

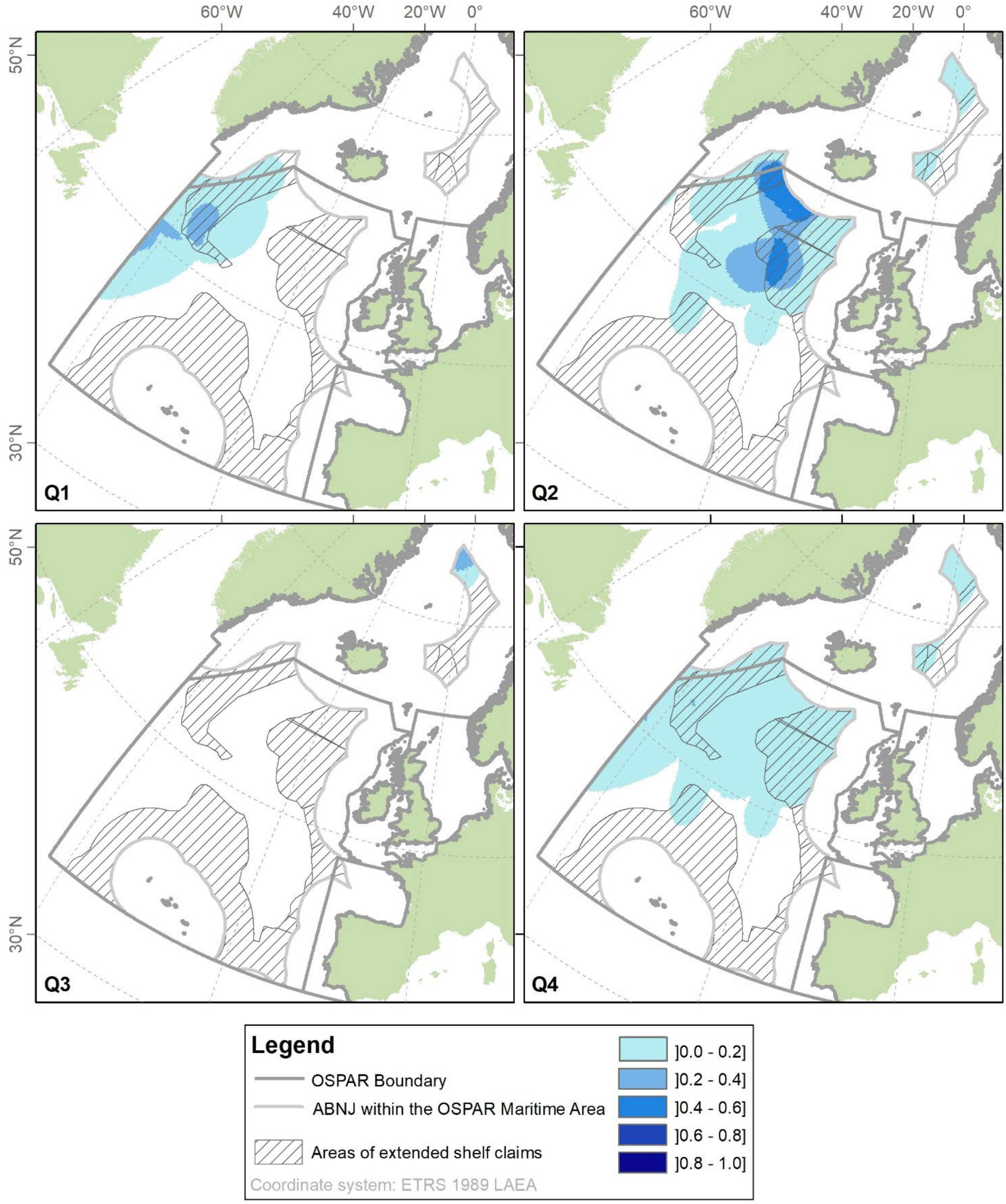

Figure A3.19. *Important foraging areas identified for* ***Little Auk*** *(Alle alle)*

(Global Red List Status: Least Concern). Usage identified by year quarter, based on tracking data from the Greenland Sea Large Marine Ecosystem.

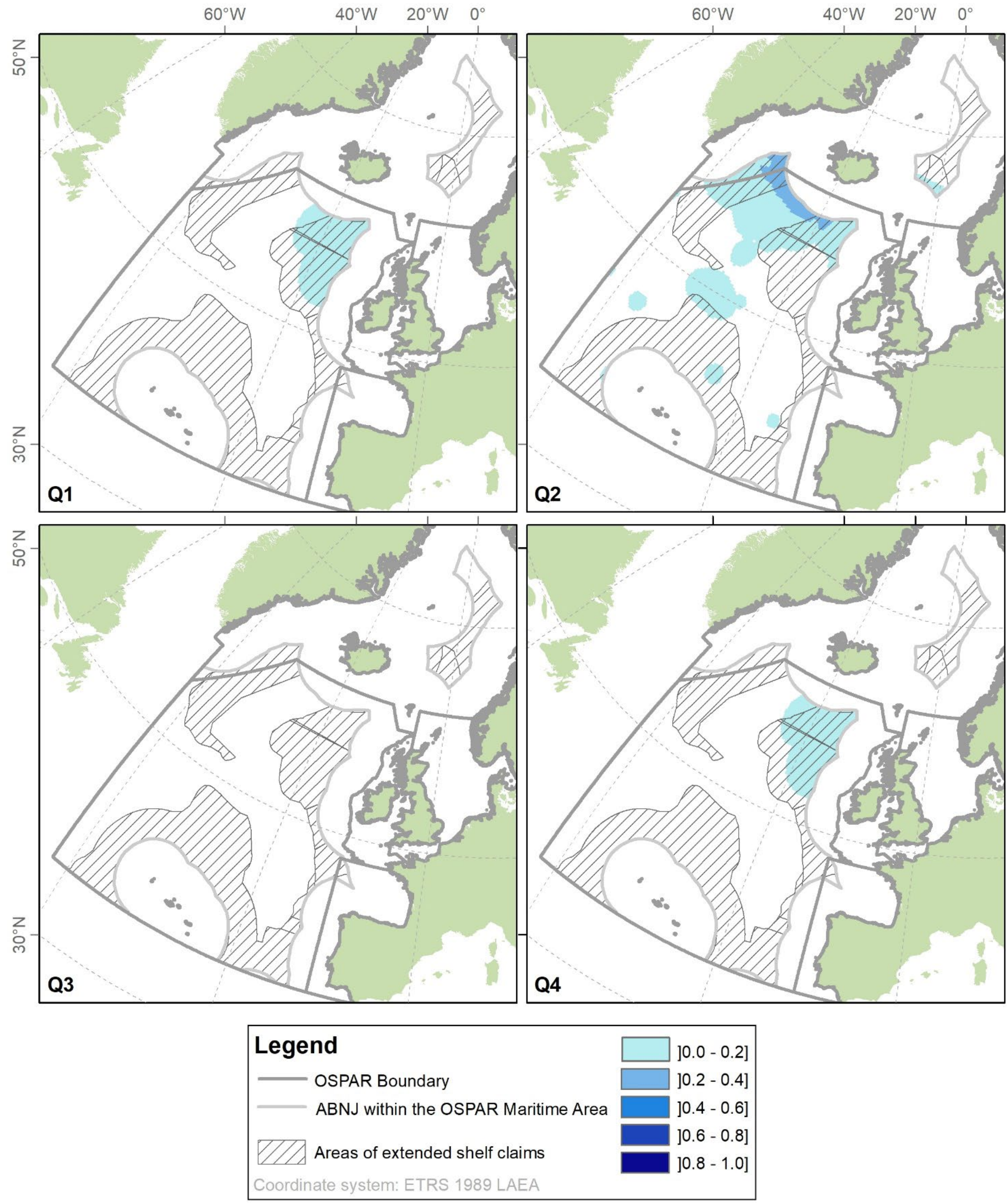

Figure A3.20. *Important foraging areas identified for* ***Razorbill*** *(Alca torda)*

(Global Red List Status: Near Threatened). Usage identified by year quarter, based on tracking data from the Iceland Shelf and Sea Large Marine Ecosystem.

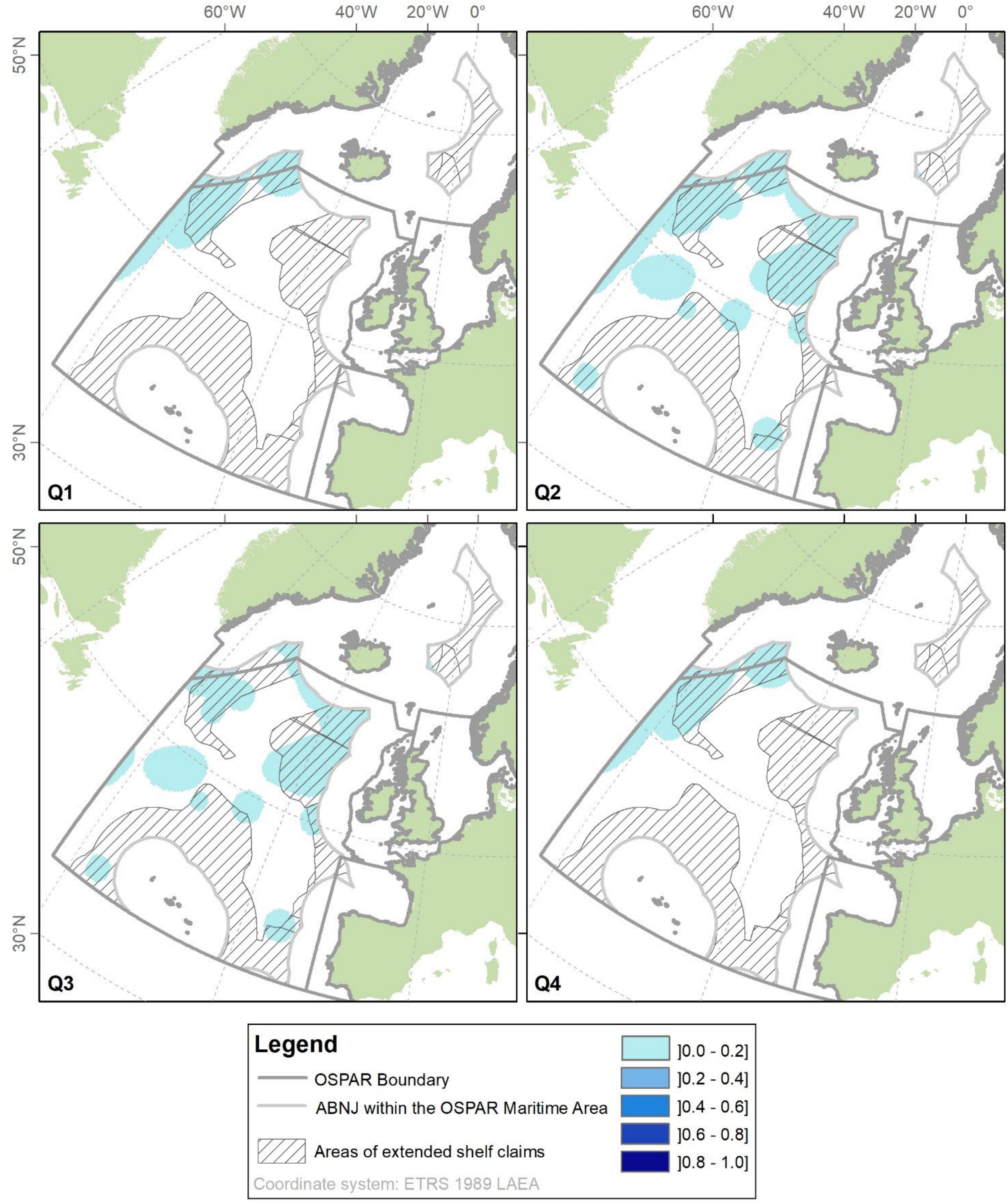

Figure A3.21. *Important foraging areas identified for* ***Thick-billed Murre*** *(Uria lomvia)*

(European Red List Status: Least Concern. OSPAR Listed Species). Usage identified by year quarter, based on tracking data from the following Large Marine Ecosystems: (Quarters 1 and 4) Arctic Canada (0.417), NW Greeland Shelf (0.331) and Iceland Shelf and Sea (0.252) (Q2) Arctic Canada (0.623) and Iceland Shelf and Sea (0.377) (Q3) Iceland Shelf and Sea. Usage indicated by proportion of the LME populations using area.

Annex 4. Maps with the estimated number of individuals in the North Atlantic Current and Evlanov Seamount MPA

The North Atlantic Current and Evlanov Seamount (NACES) MPA qualify as a global marine IBA (Important Bird and Biodiversity Area) candidate for all the species mapped below, following the methods and criteria detailed in Lascelles et al. (2016). Legends based on the quantiles of number of mature individuals within the Site.

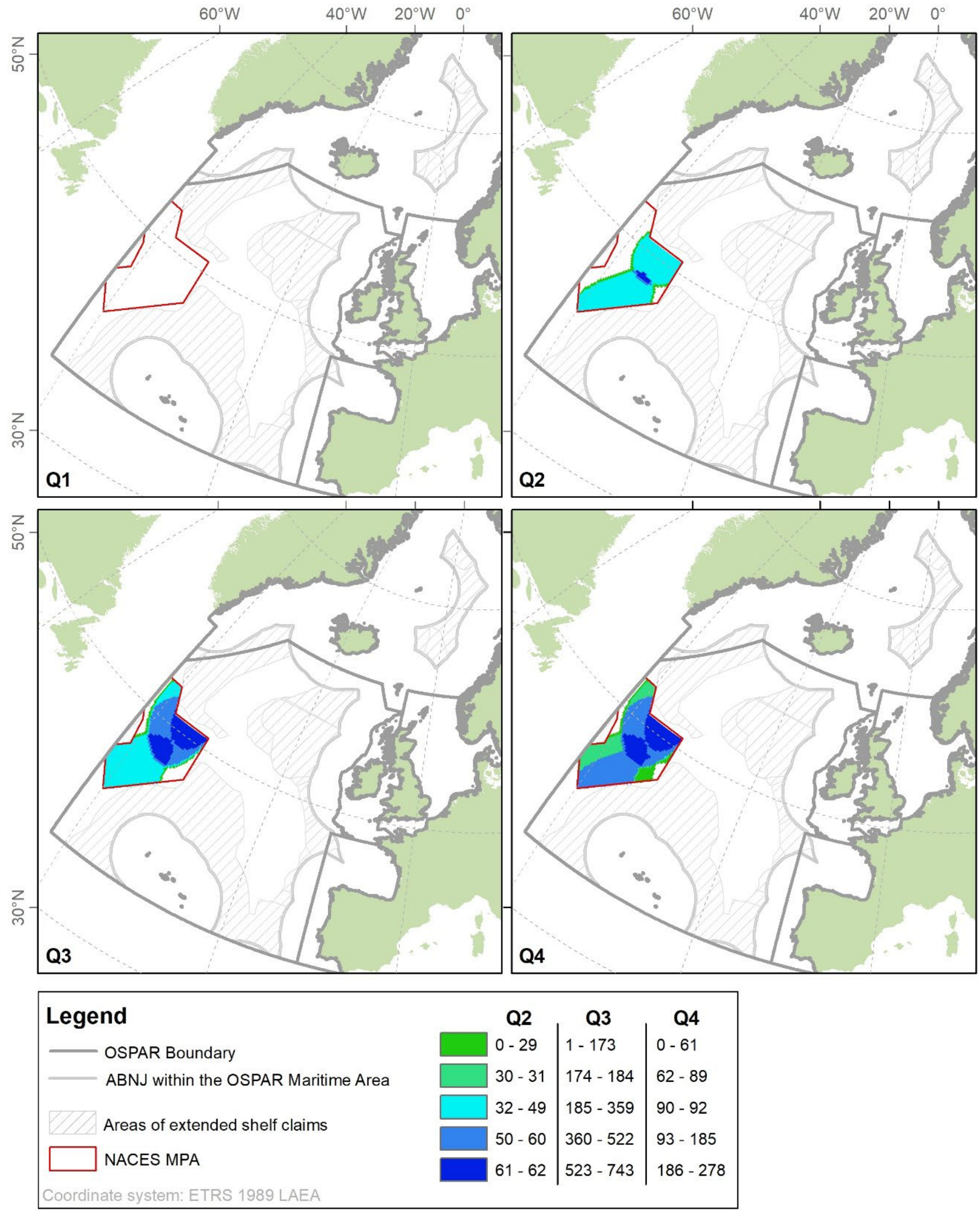

Figure A4.1. *Number of mature individuals of* ***Audubon's Shearwater*** *(Puffinus lherminieri baroli) in the NACES MPA for each year quarter.*

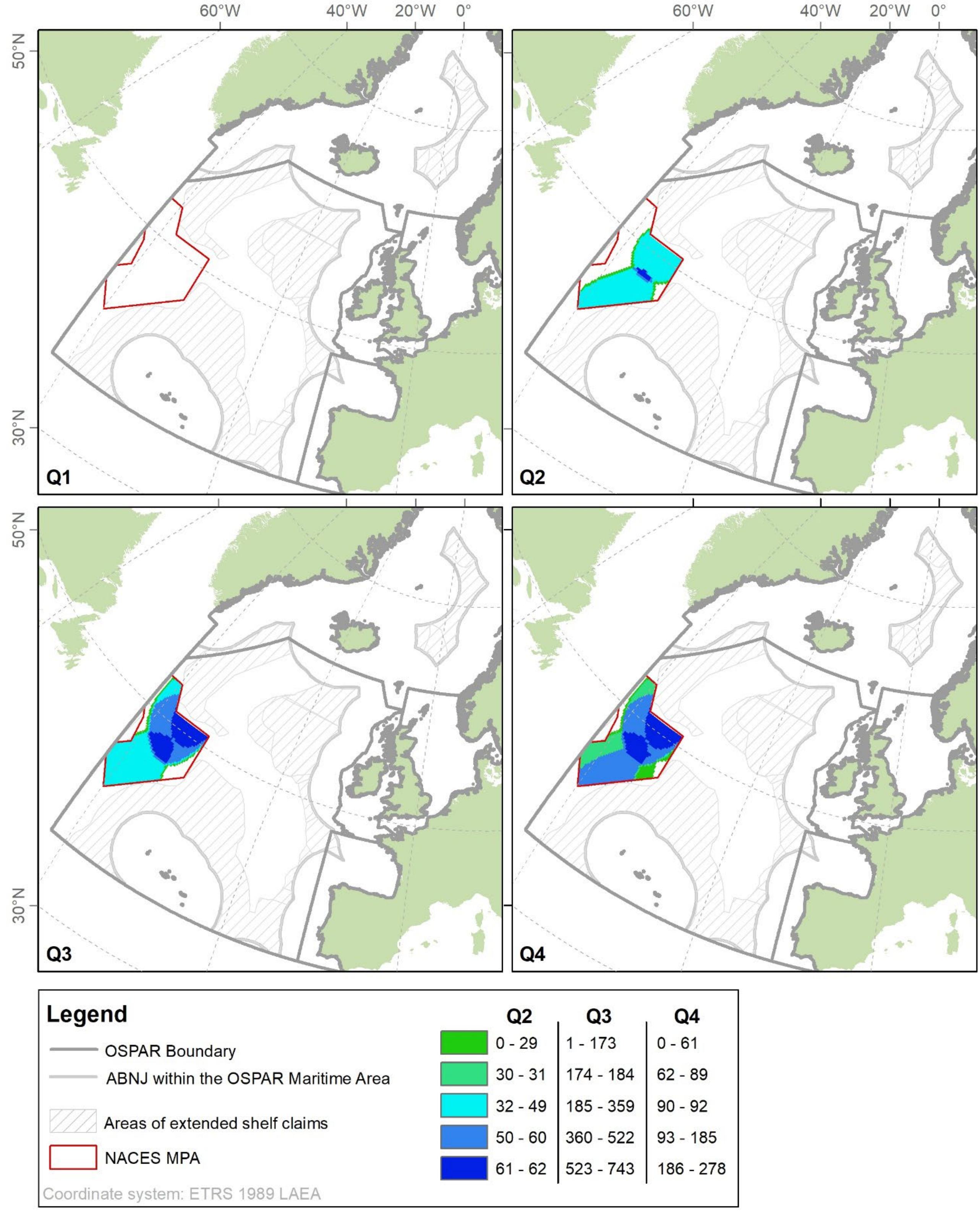

Figure A4.2. *Number of mature individuals of* ***Cory's Shearwater*** *(Calonectris borealis) in the NACES MPA for each year quarter.*

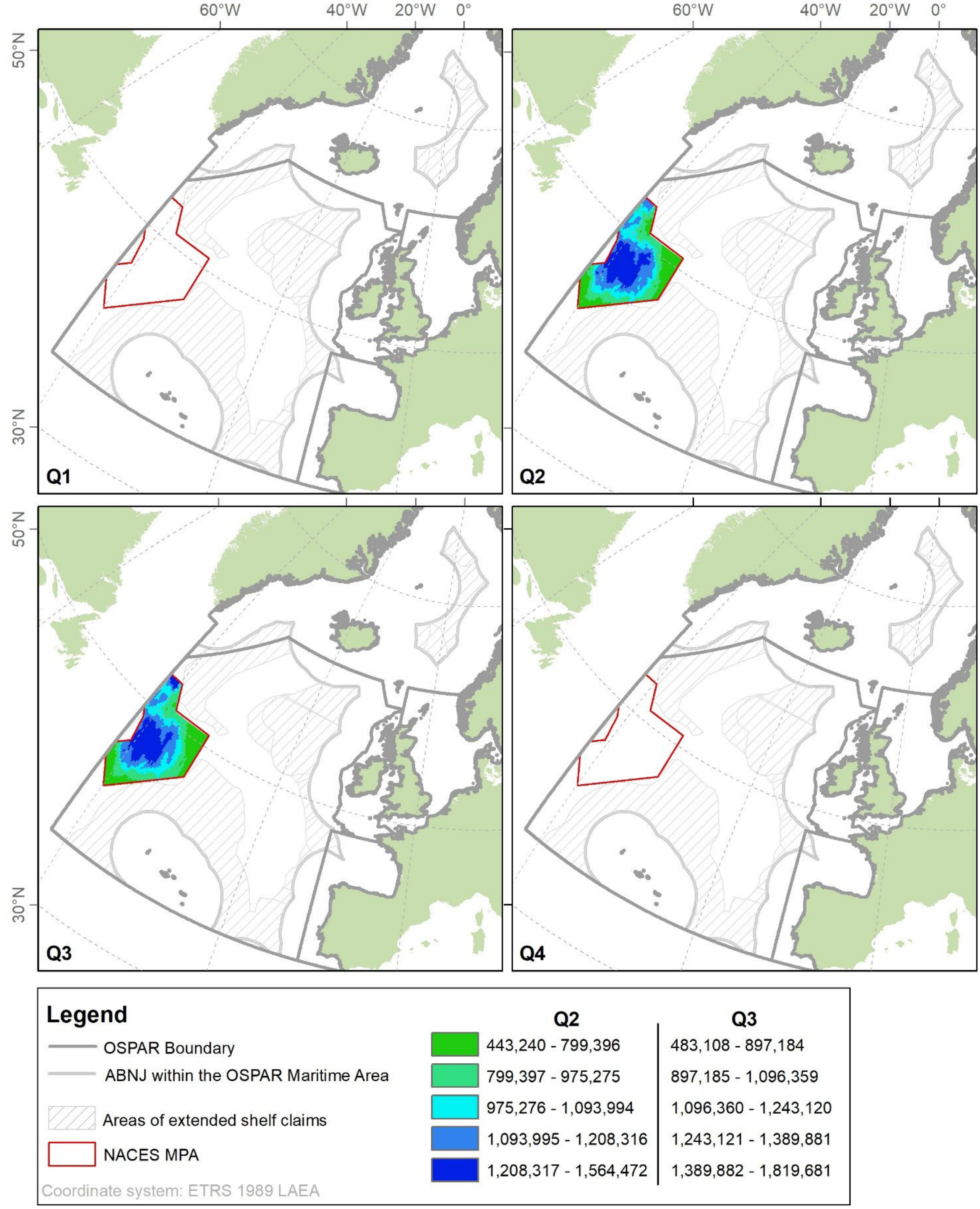

Figure A4.3. *Number of mature individuals of* ***Great Shearwater*** *(Ardenna gravis) in the NACES MPA for each year quarter.*

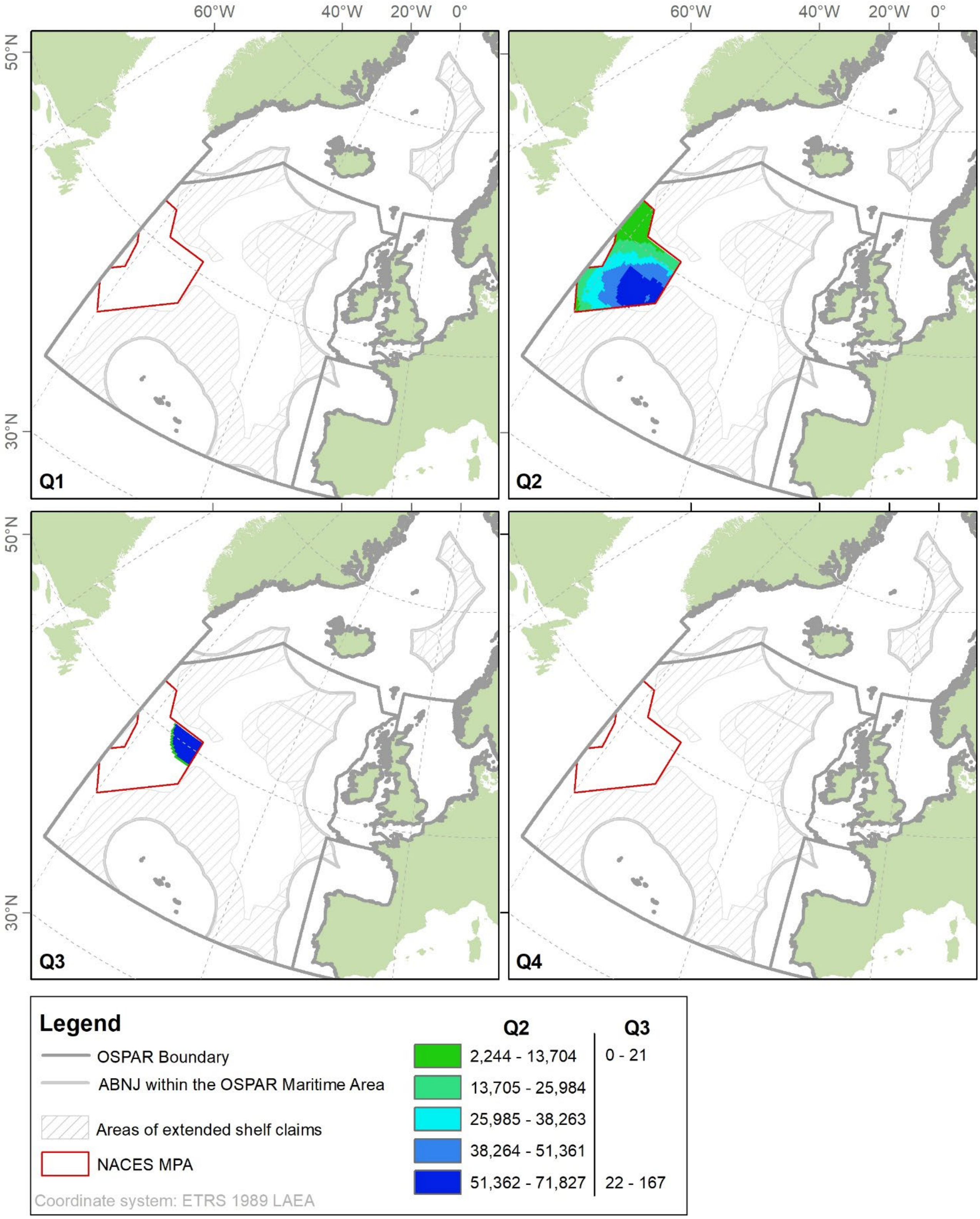

Figure A4.4 *Number of mature individuals of* ***Manx Shearwater*** *(Puffinus puffinus) in the NACES MPA for each year quarter.*

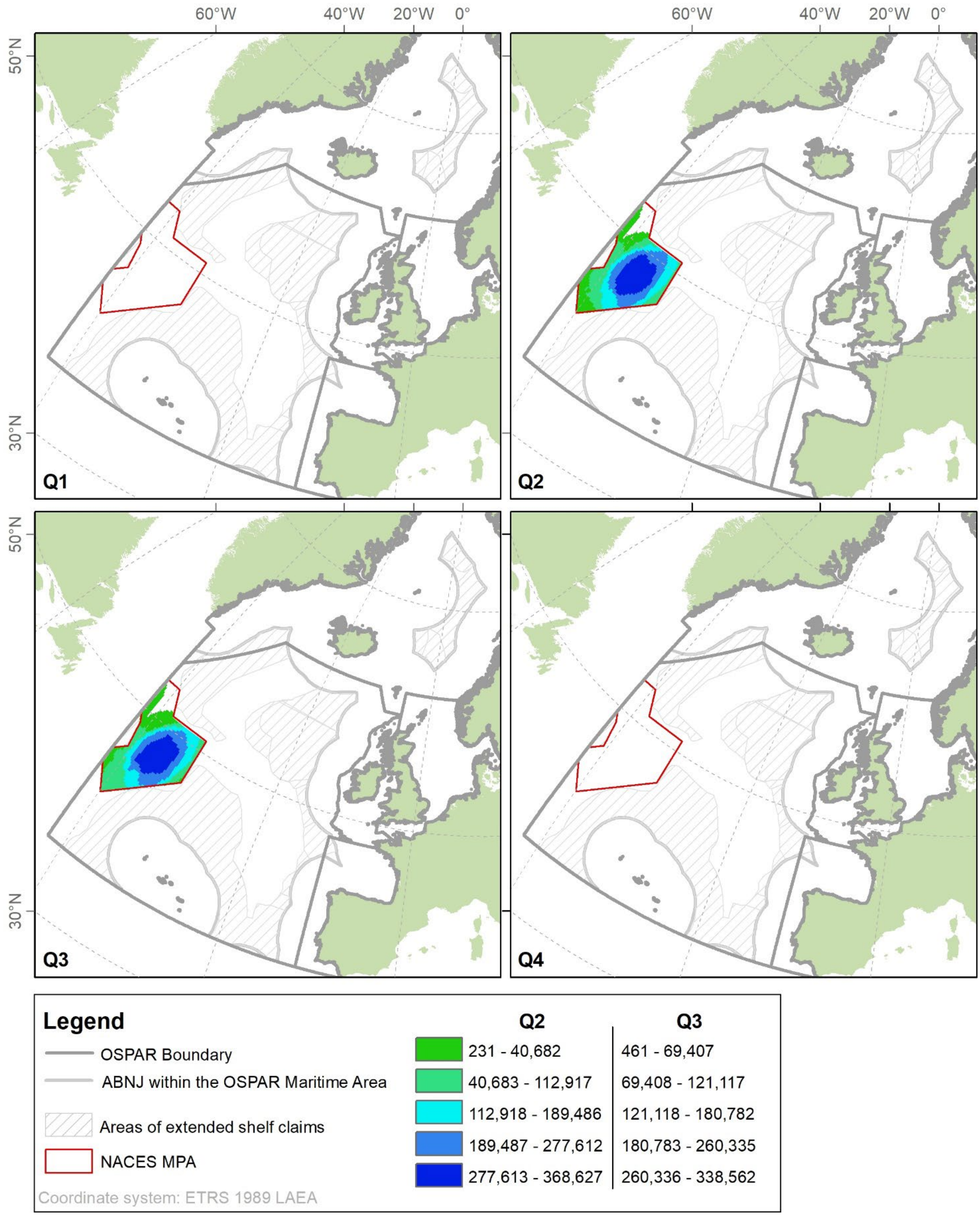

Figure A4.5 *Number of mature individuals of* ***Sooty Shearwater*** *(Ardenna grisea) in the NACES MPA for each year quarter.*

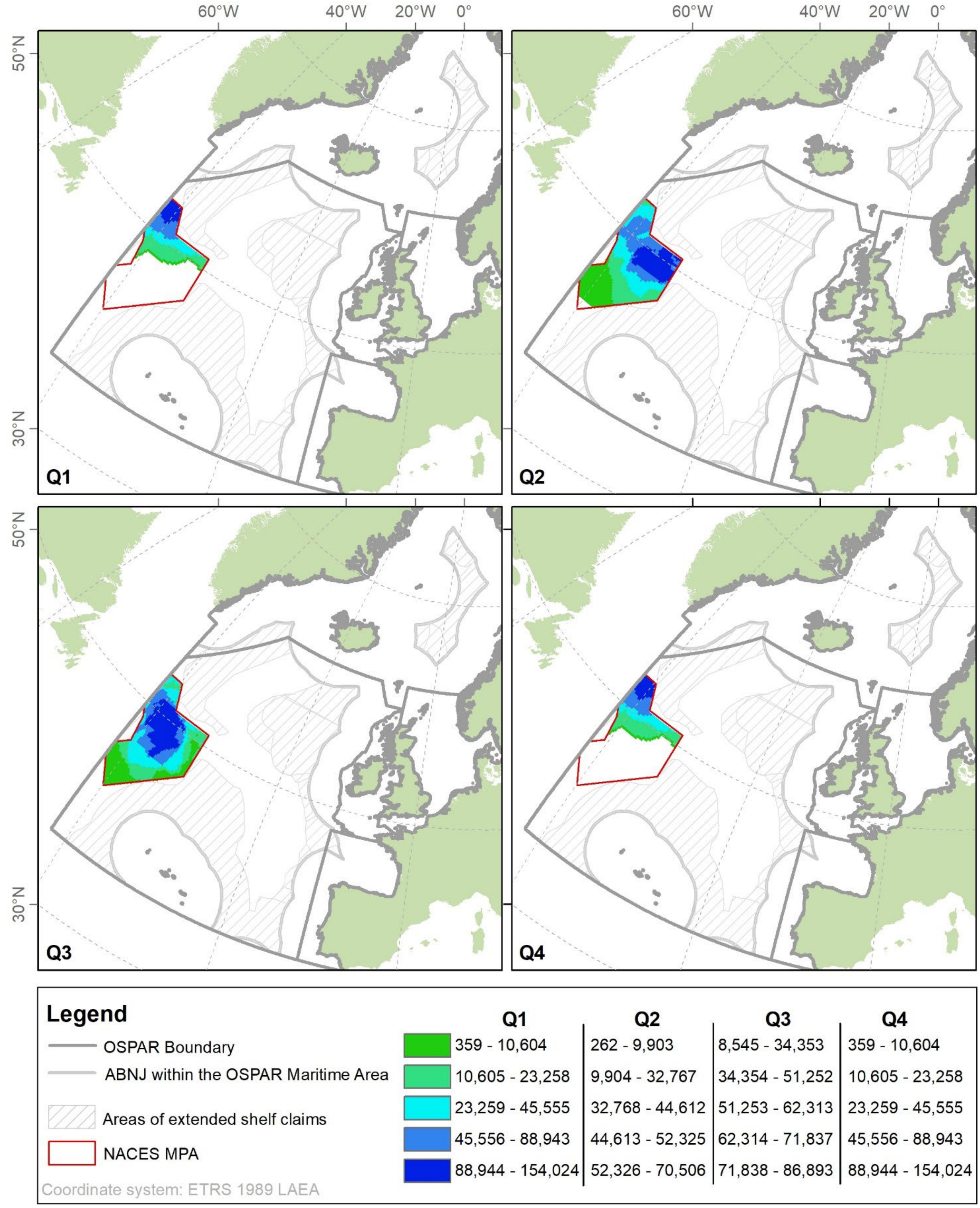

Figure A4.6. *Number of mature individuals of* ***Northern Fulmar*** *(Fulmarus glacialis) in the NACES MPA for each year quarter*

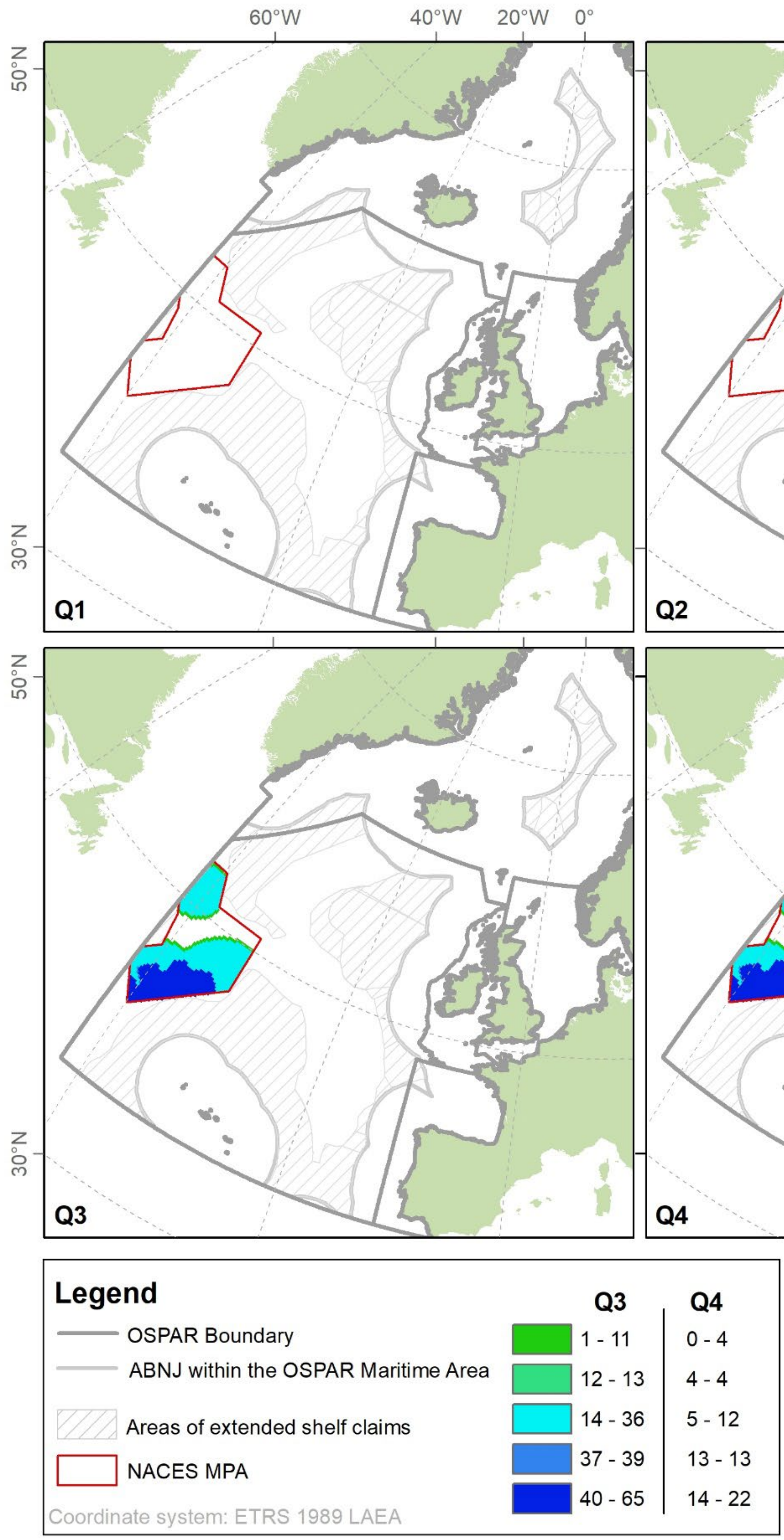

Figure A4.7. *Number of mature individuals of* ***Bermuda Petrel*** *(Pterodroma cahow) in the NACES MPA for each year quarter.*

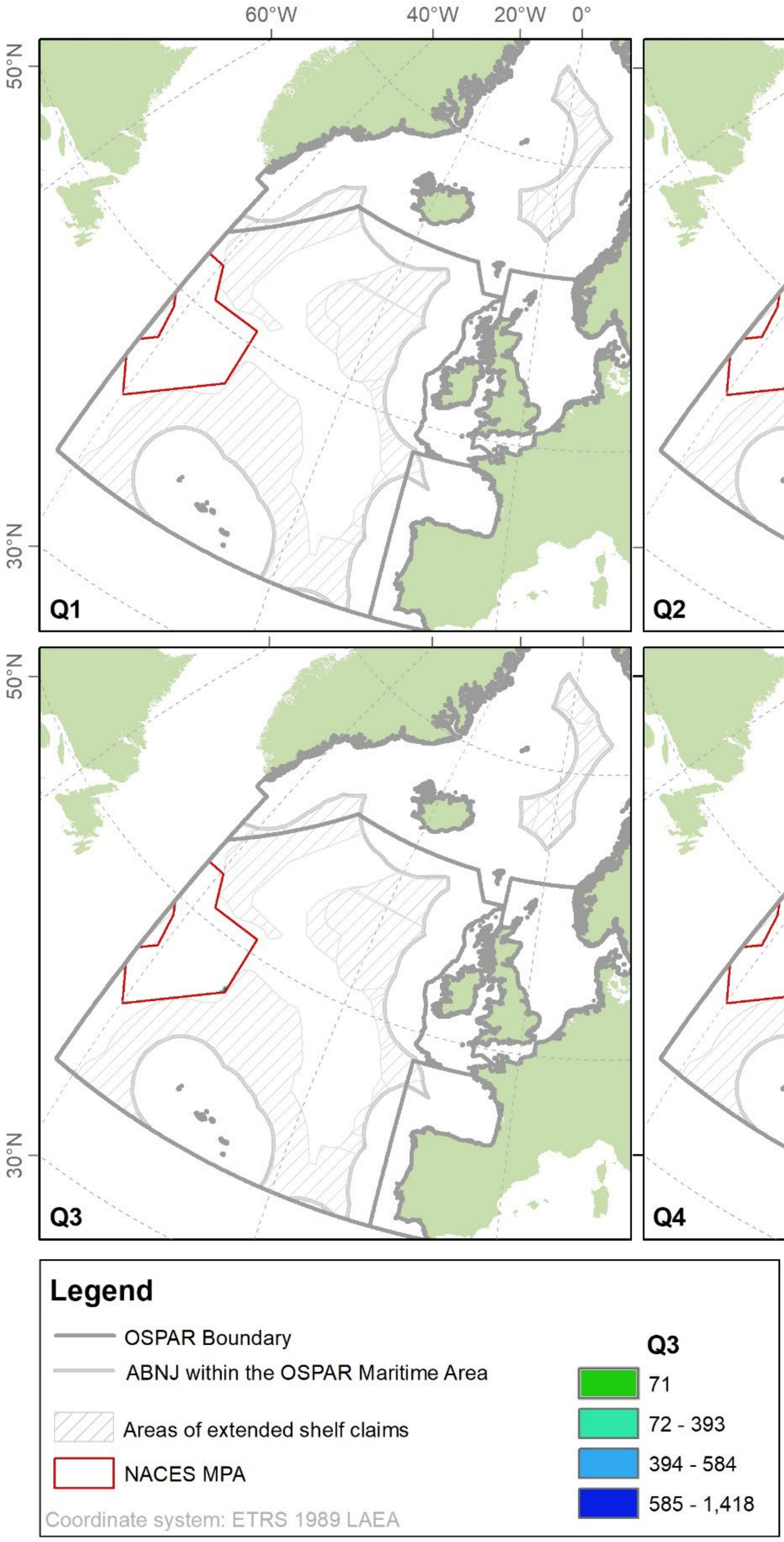

Figure A4.8. *Number of mature individuals of **Bulwer's Petrel** (Bulweria bulwerii) in the NACES MPA for each year quarter. Note, birds are located at the eastern boarder during Q3.*

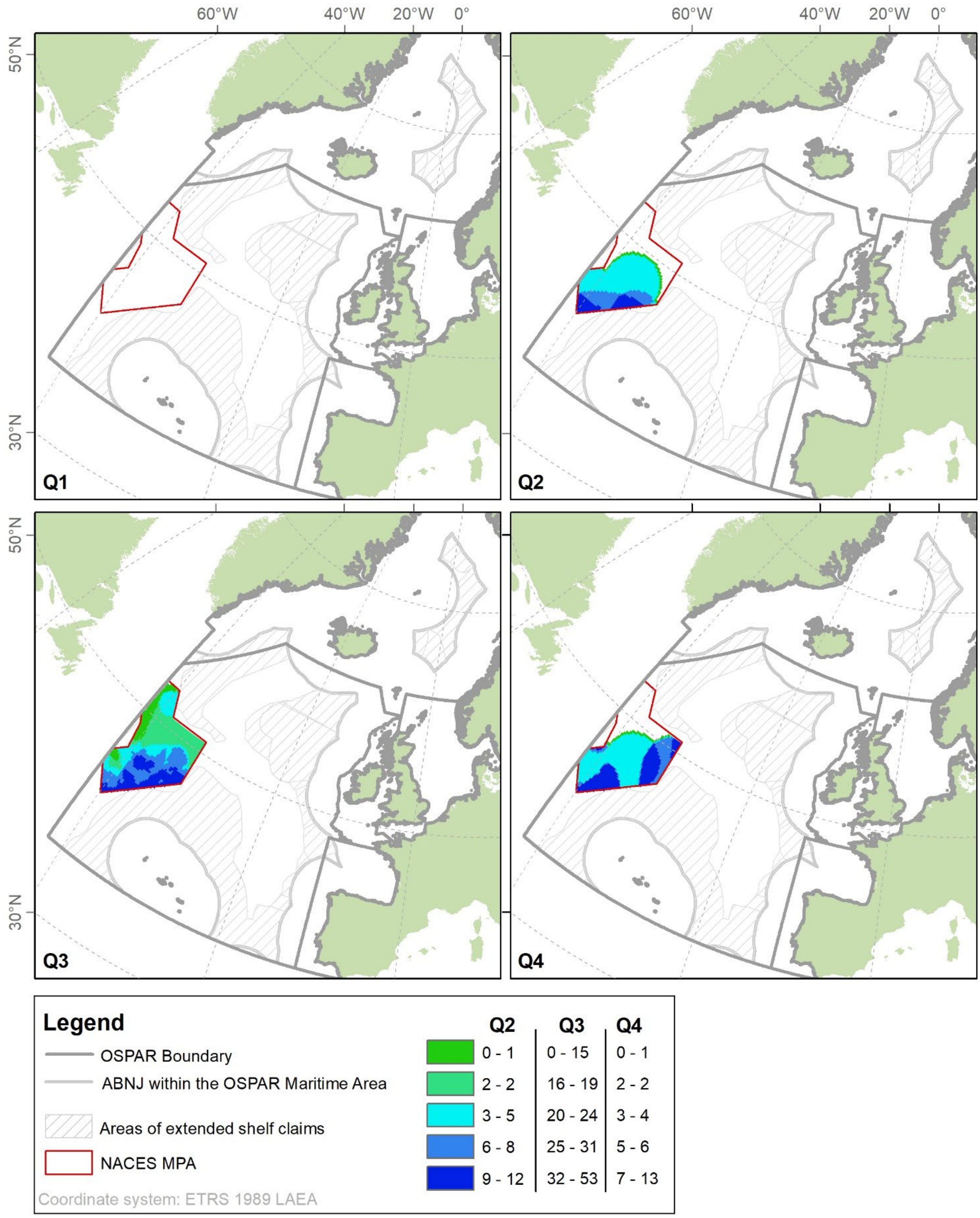

Figure A4.9. *Number of mature individuals of* ***Desertas Petrel*** *(Pterodroma deserta) in the NACES MPA for each year quarter.*

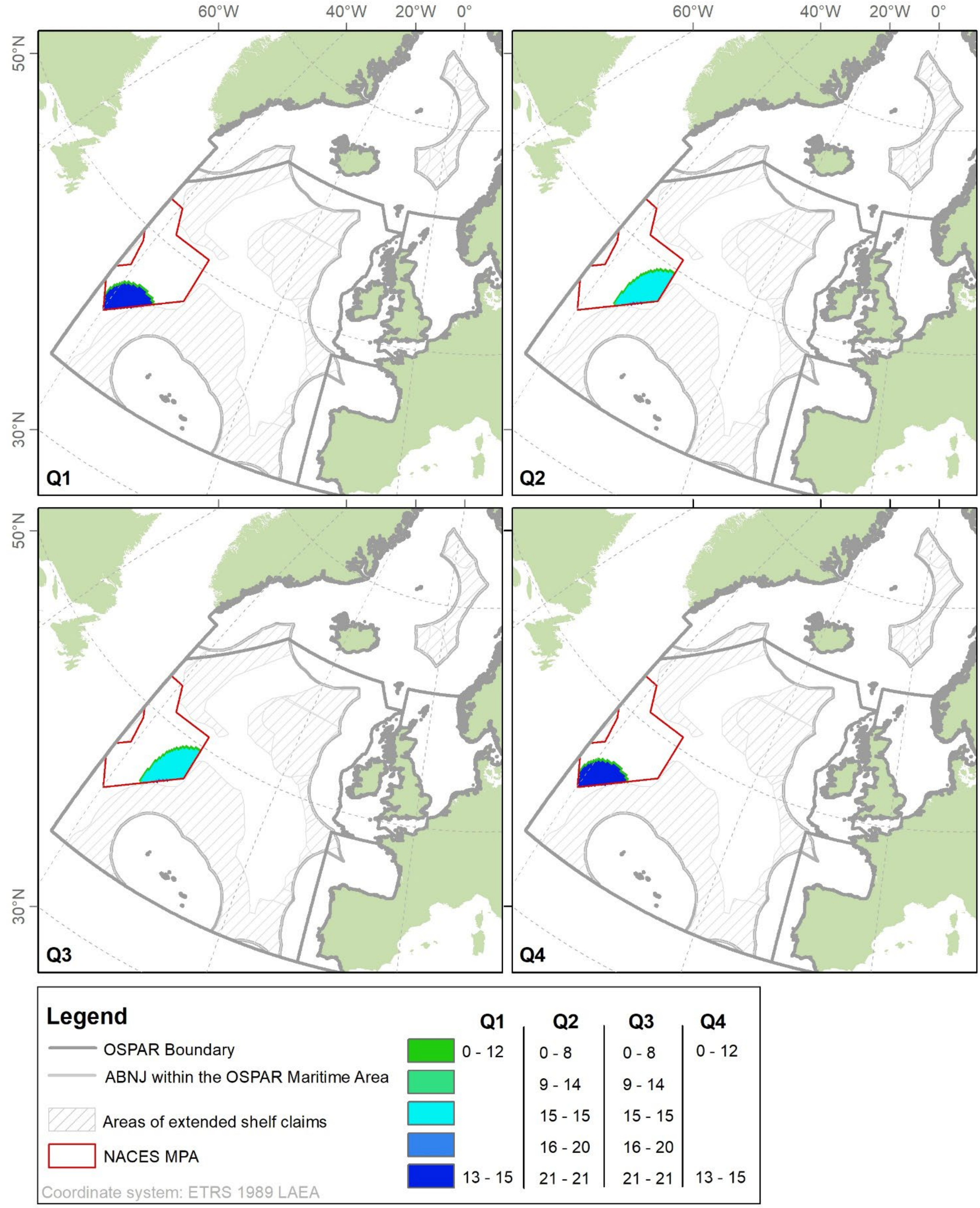

Figure A4.10. *Number of mature individuals of* ***Zino's Petrel*** *(Pterodroma madeira) in the NACES MPA for each year quarter.*

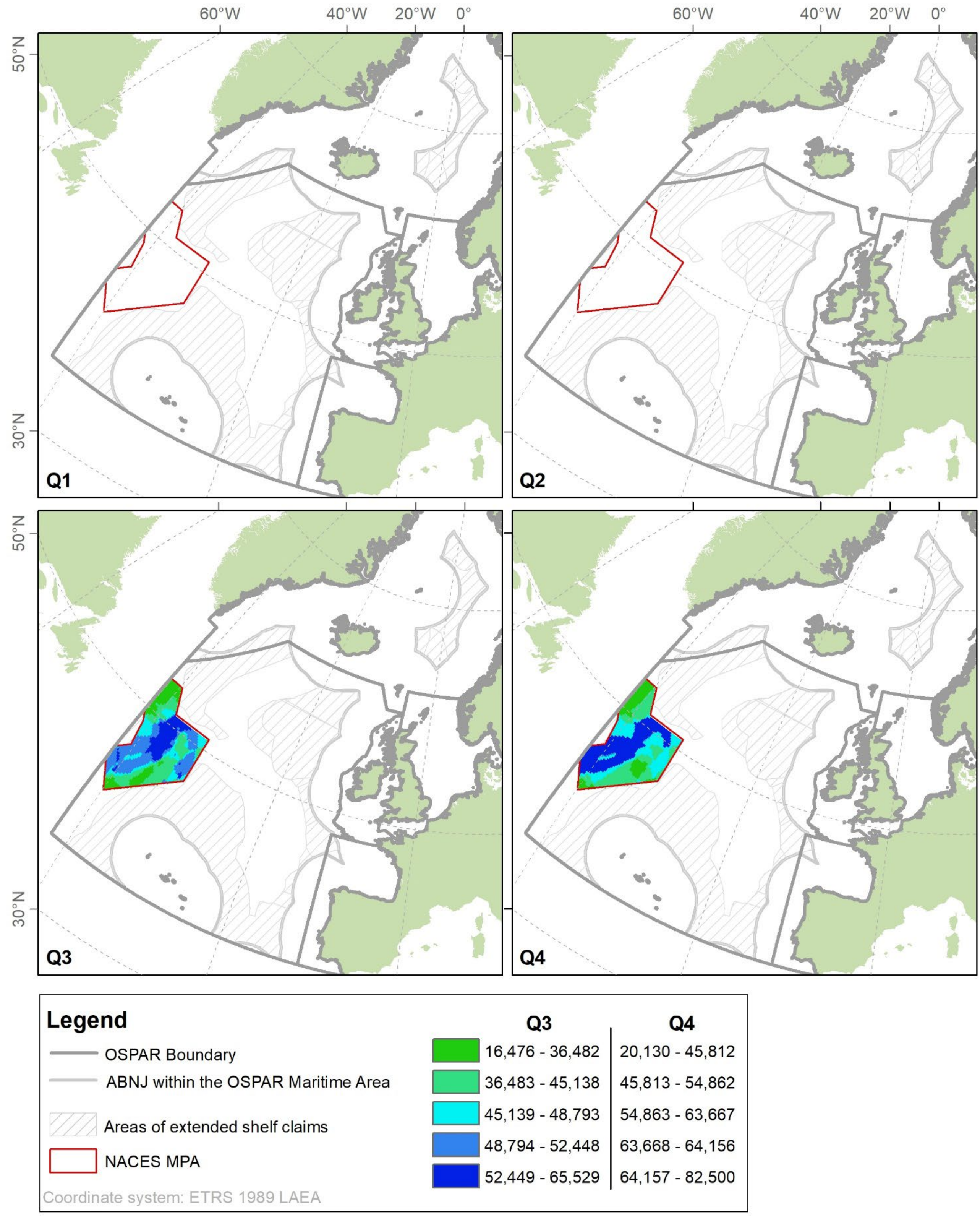

Figure A4.11. *Number of mature individuals* ***of Arctic Terns*** *(Sterna paradisaea) in the NACES MPA for each year quarter.*

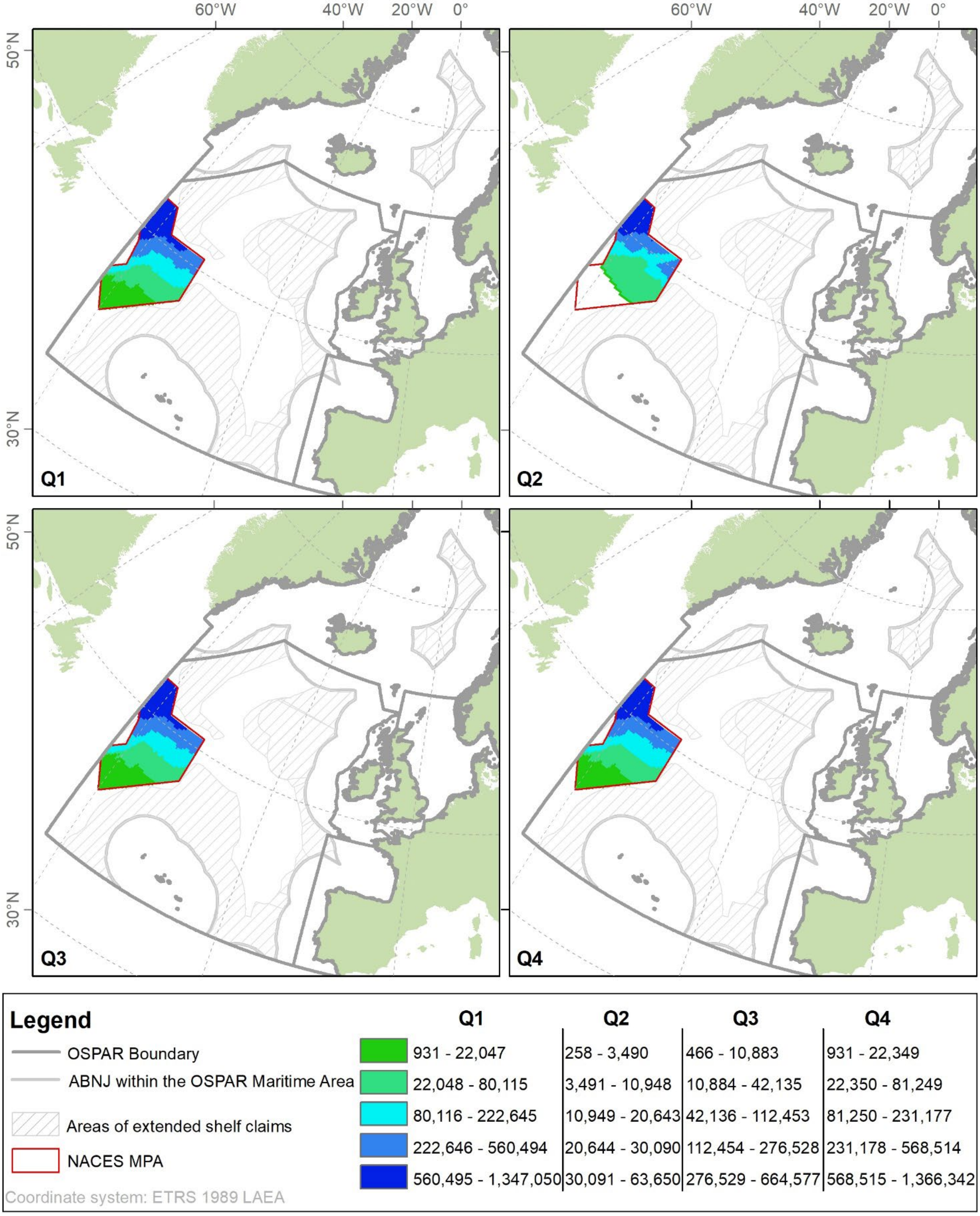

Figure A4.12. *Number of mature individuals of* ***Black-legged Kittiwake*** *(Rissa tridactyla) in the NACES MPA for each year quarter*

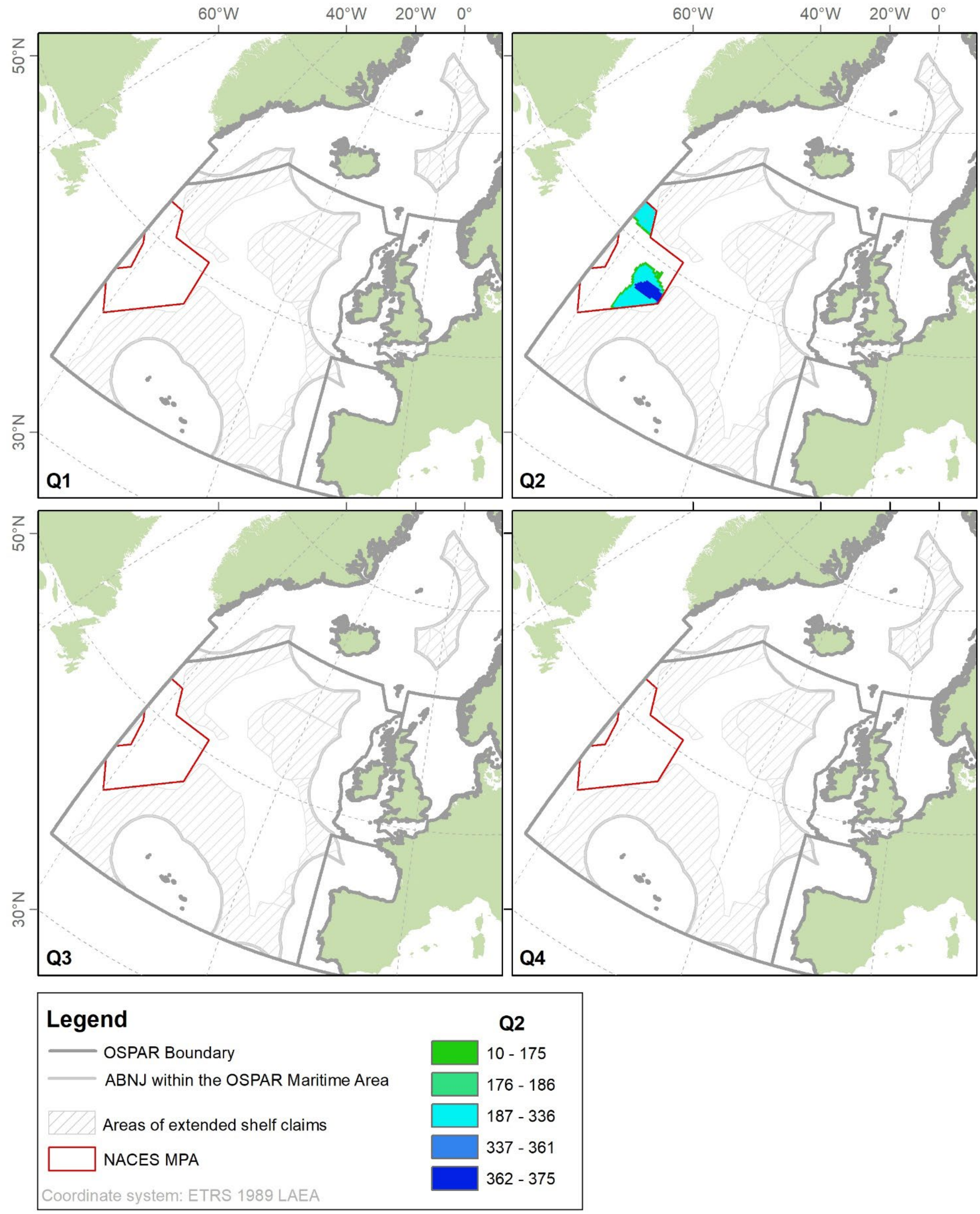

***Figure A4.13.** Number of mature individuals of **Sabine's Gull** (Xema sabini) in the NACES MPA for each year quarter.*

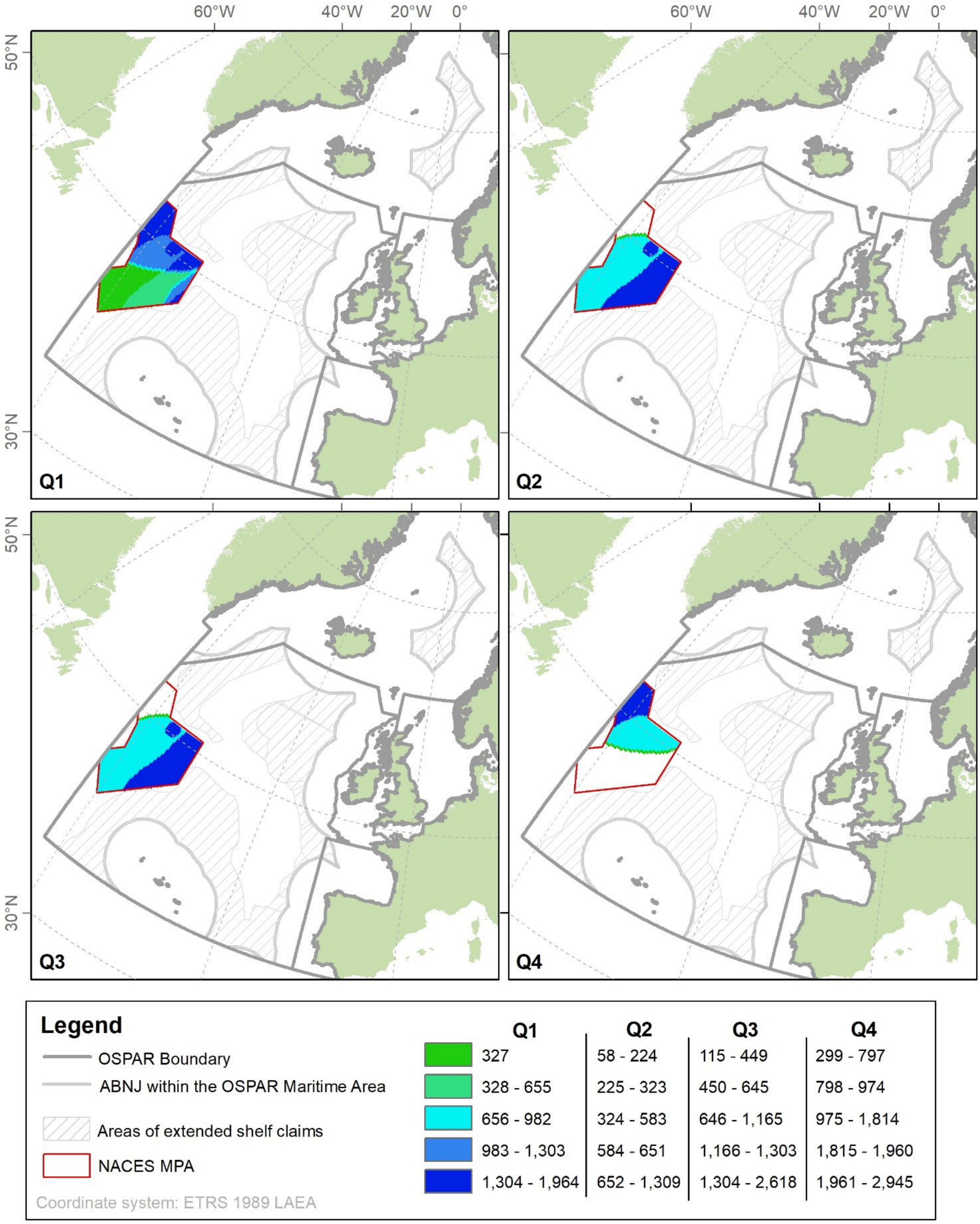

Figure A4.14. *Number of mature individuals of **Great Skua** (Stercorarius skua) in the NACES MPA for each year quarter*

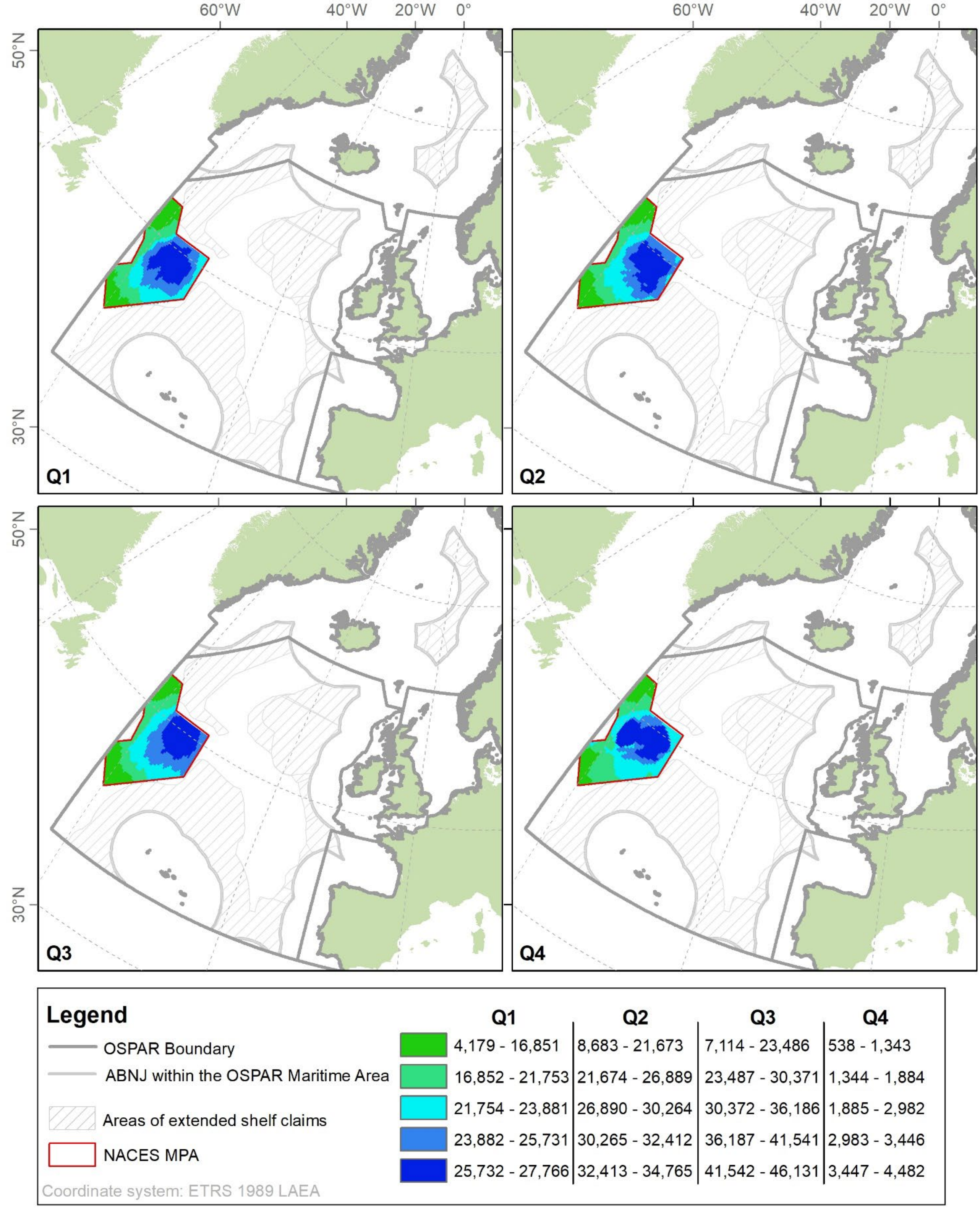

Figure A4.15. *Number of mature individuals of* ***Long-tailed Jaeger*** *(Stercorarius longicaudus) in the NACES MPA for each year quarter.*

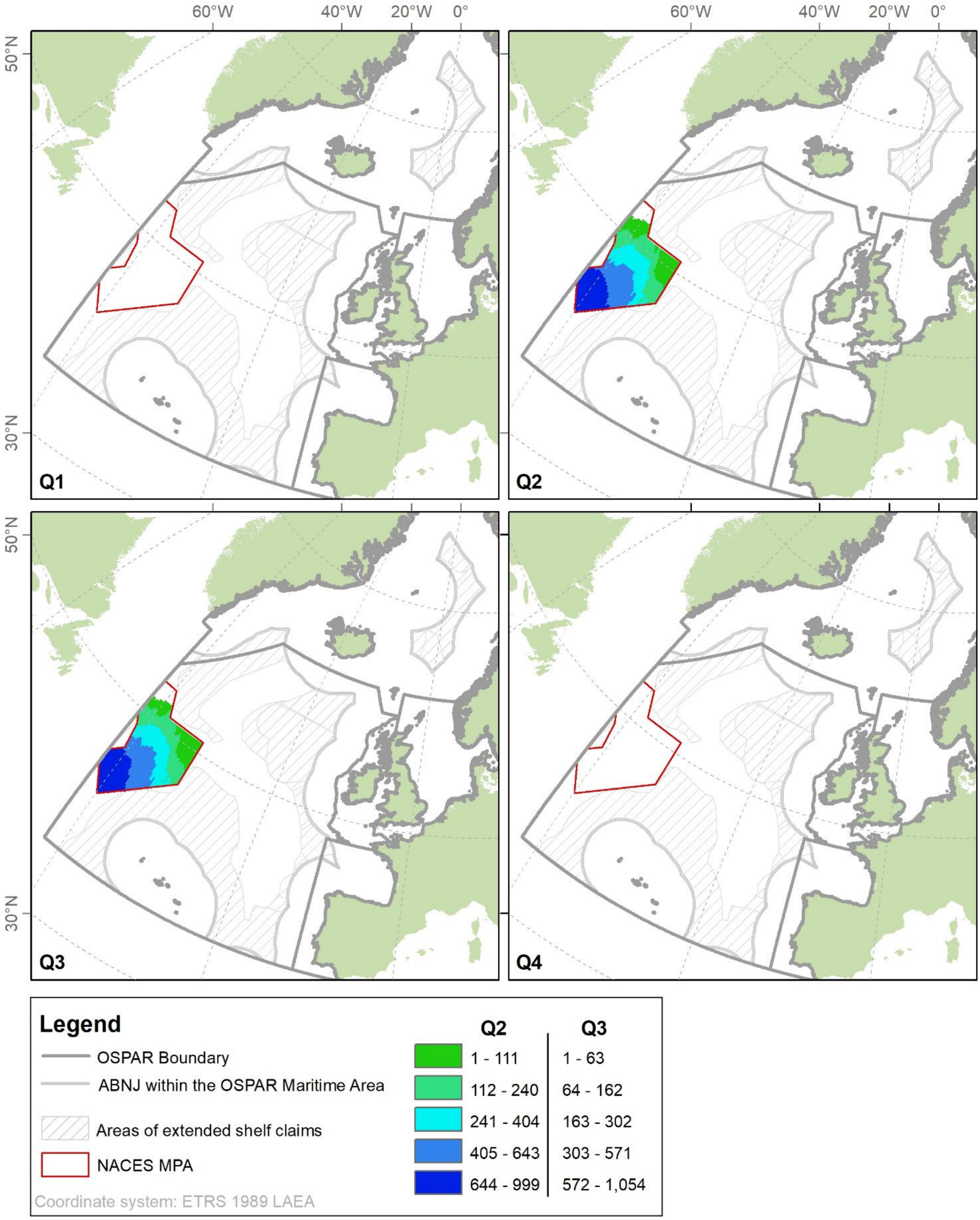

Figure A4.16. *Number of mature individuals of* ***South Polar Skua*** *(Catharacta maccormicki) in the NACES MPA for each year quarter.*

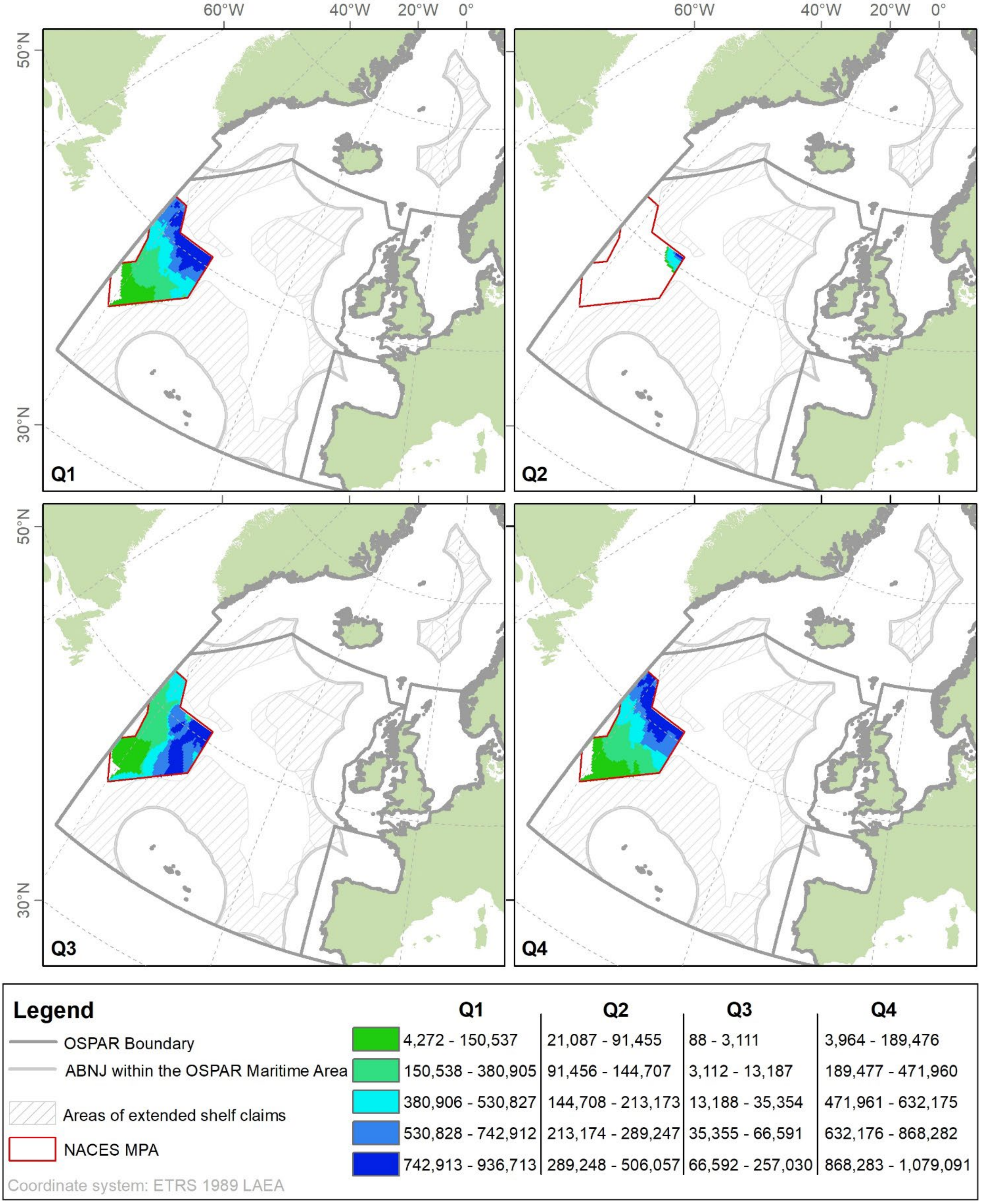

Figure A4.17. *Number of mature individuals of* ***Atlantic Puffin*** *(Fratercula arctica) in the NACES MPA for each year quarter.*

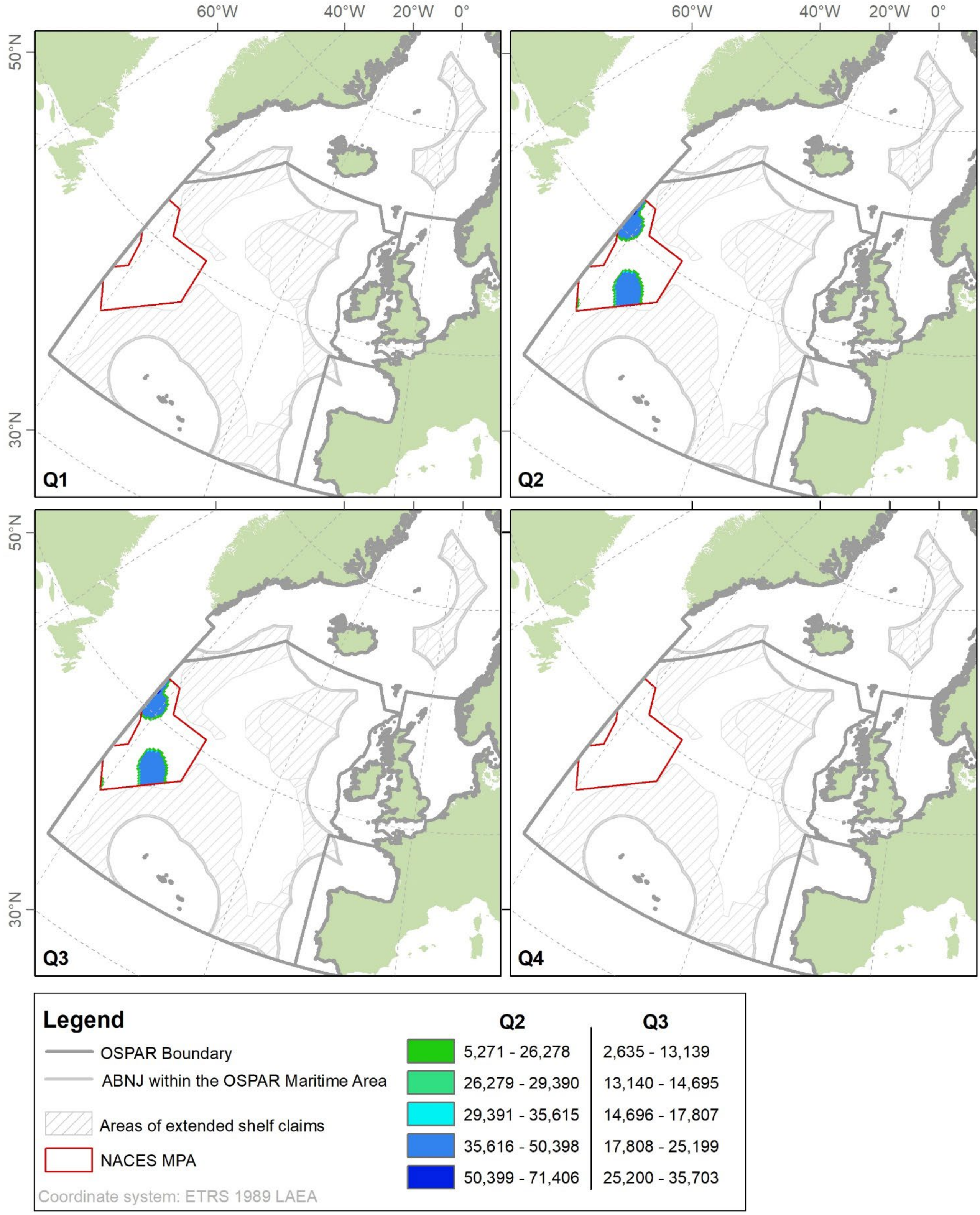

Figure A4.18. *Number of mature individuals of **Common Murre** (Uria aalge) in the NACES MPA for each year quarter.*

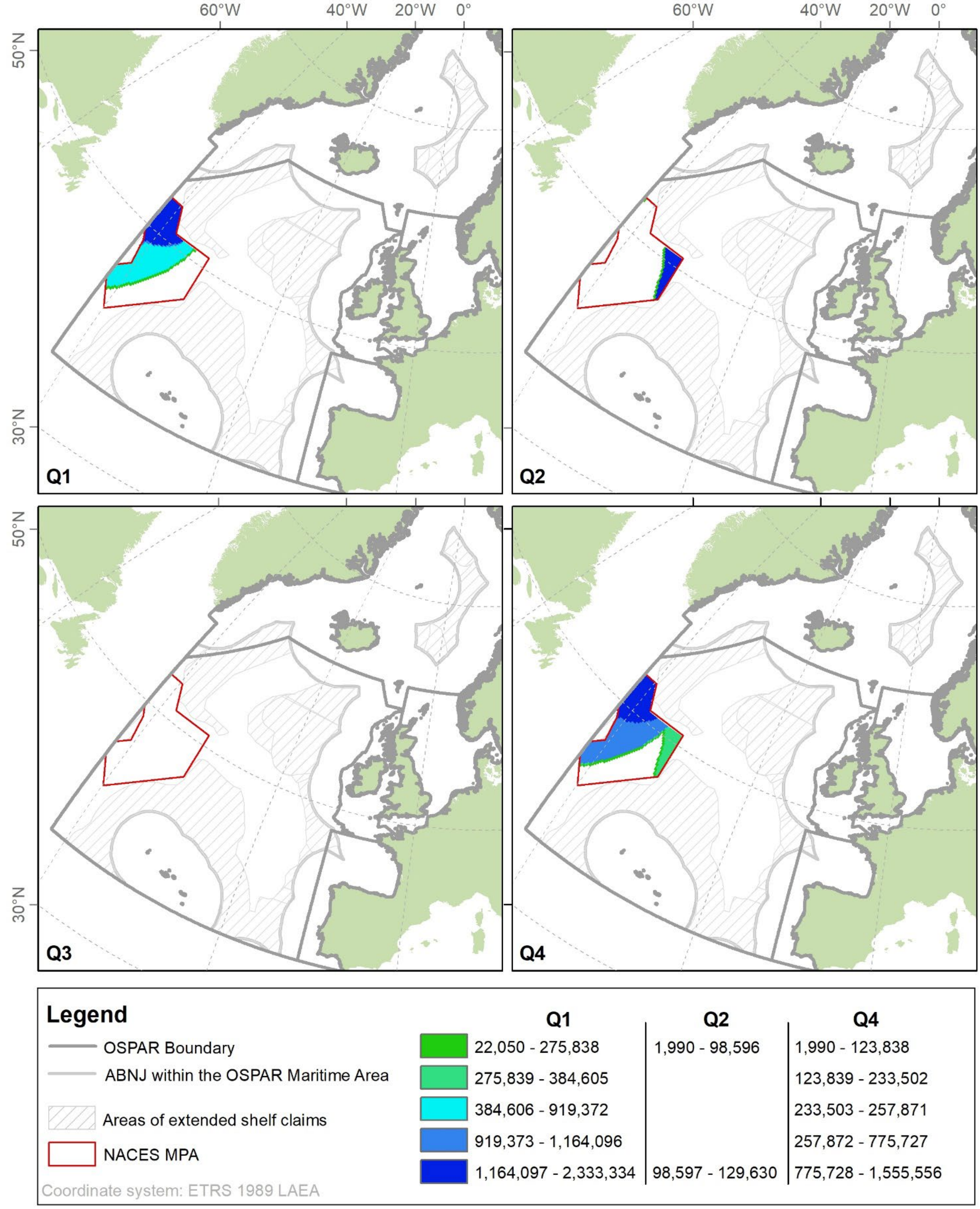

Figure A4.19. *Number of mature individuals of **Little Auk** (Alle alle) in the NACES MPA for each year quarter.*

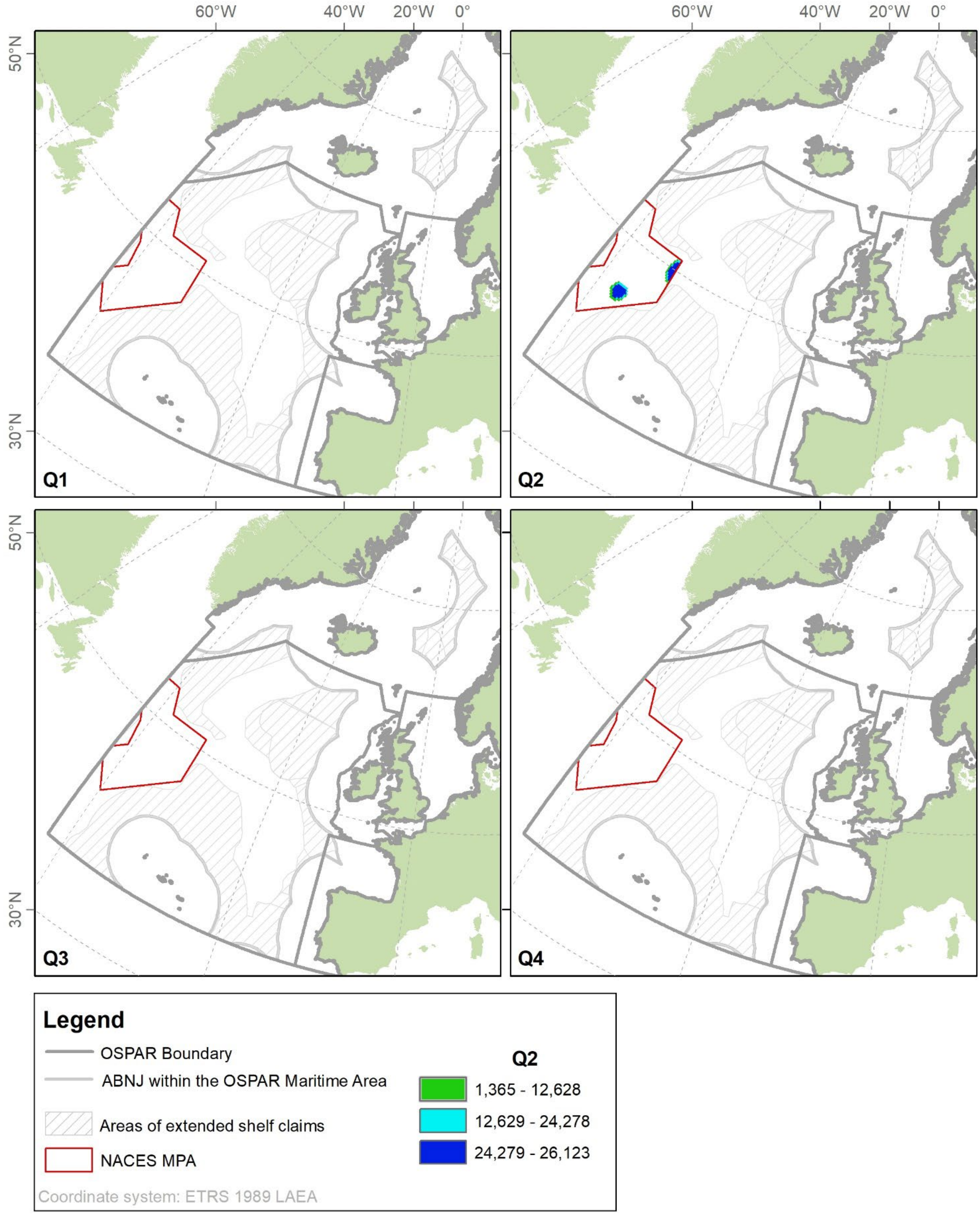

Figure A4.20. *Number of mature individuals of* ***Razorbill*** *(Alca torda) in the NACES MPA for each year quarter*

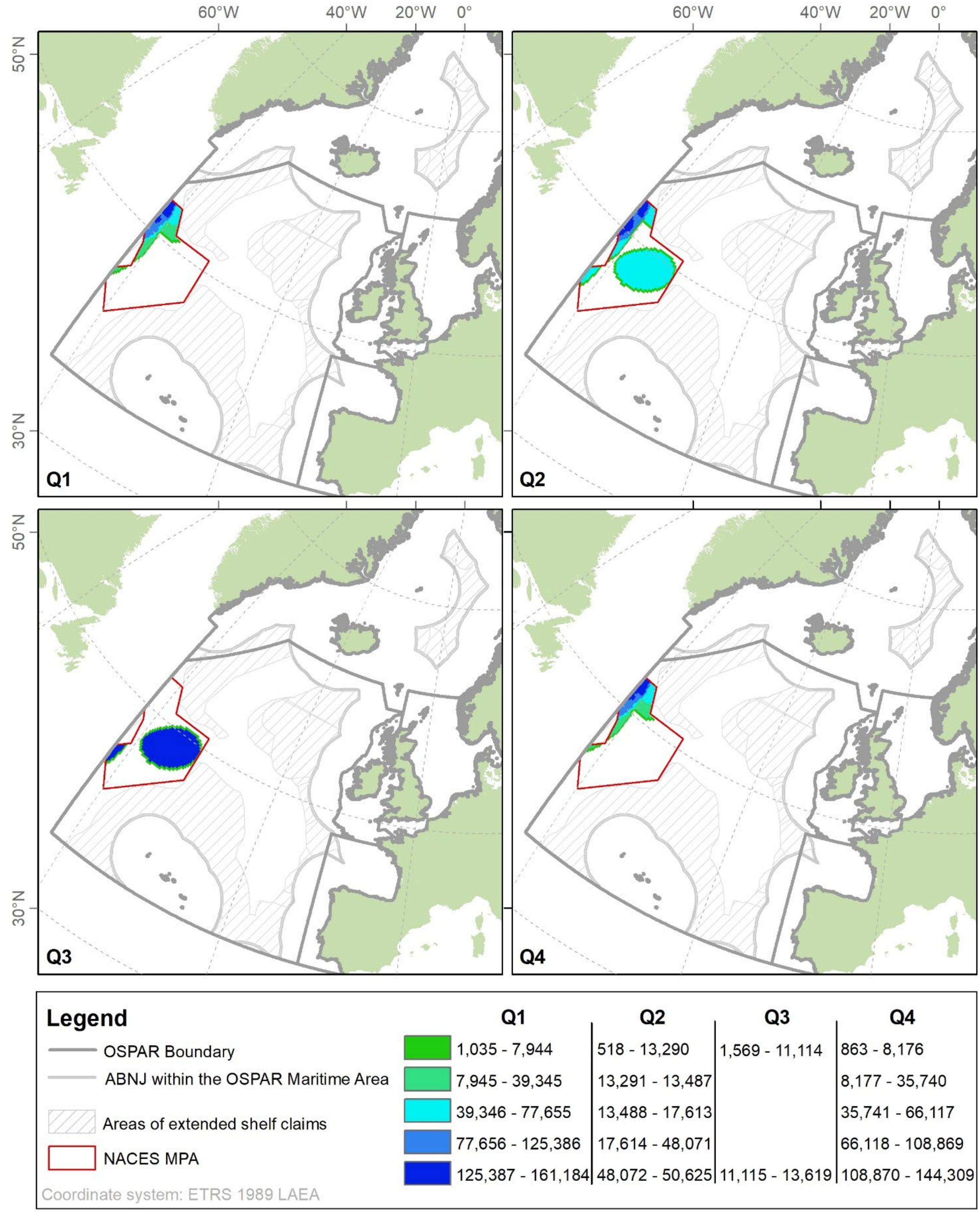

Figure A4.21*. Number of mature individuals of* ***Thick-billed Murre*** *(Uria lomvia) in the NACES MPA for each year quarter.*

Annex 5. Combined maps (richness and density)

Maps produced after merging the species' individual maps shown in Annex 3

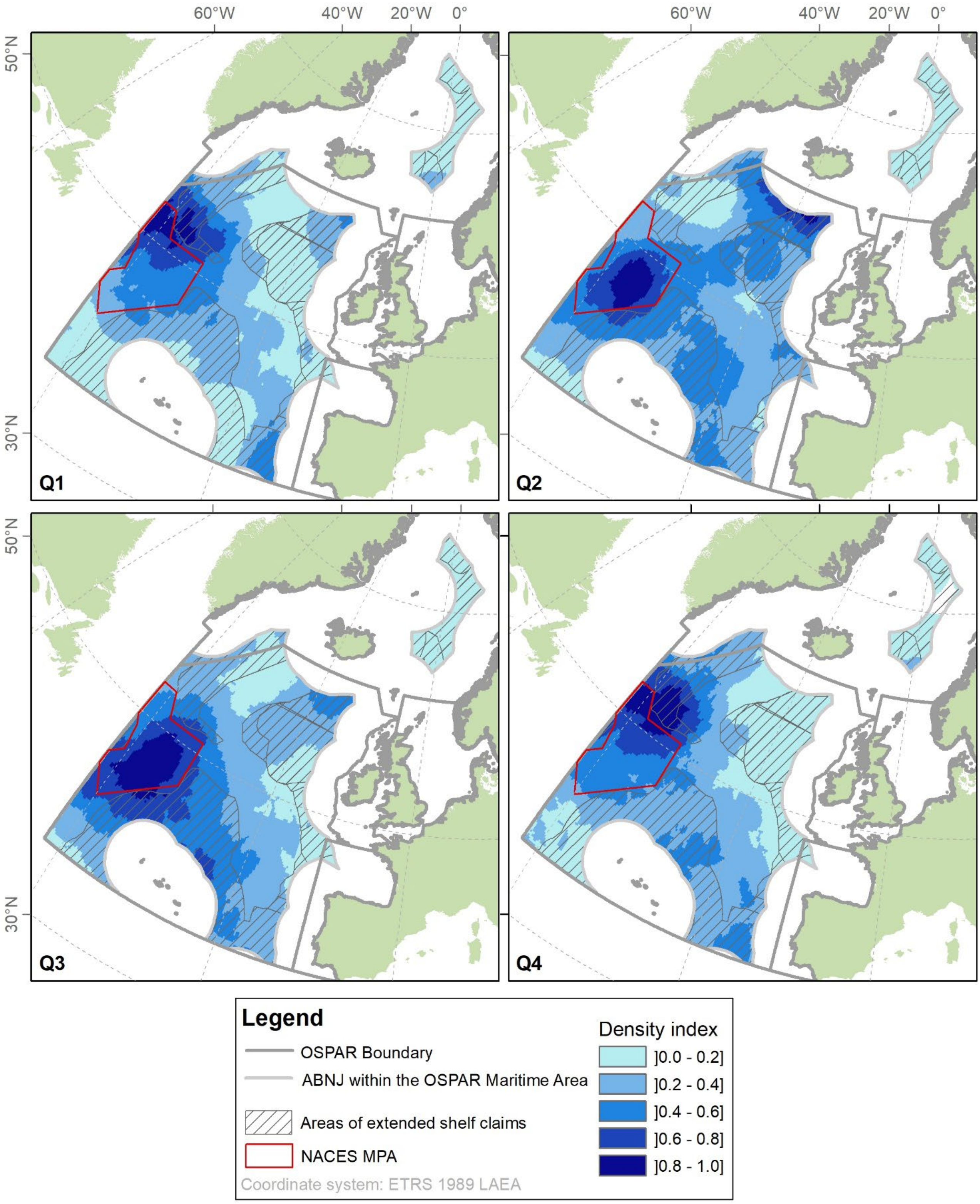

Figure A5.1 *Map indicating seabird species* ***density (usage)*** *across the OSPAR ABNJ* ***for each year quarter****, with the boundary of the NACES MPA.*

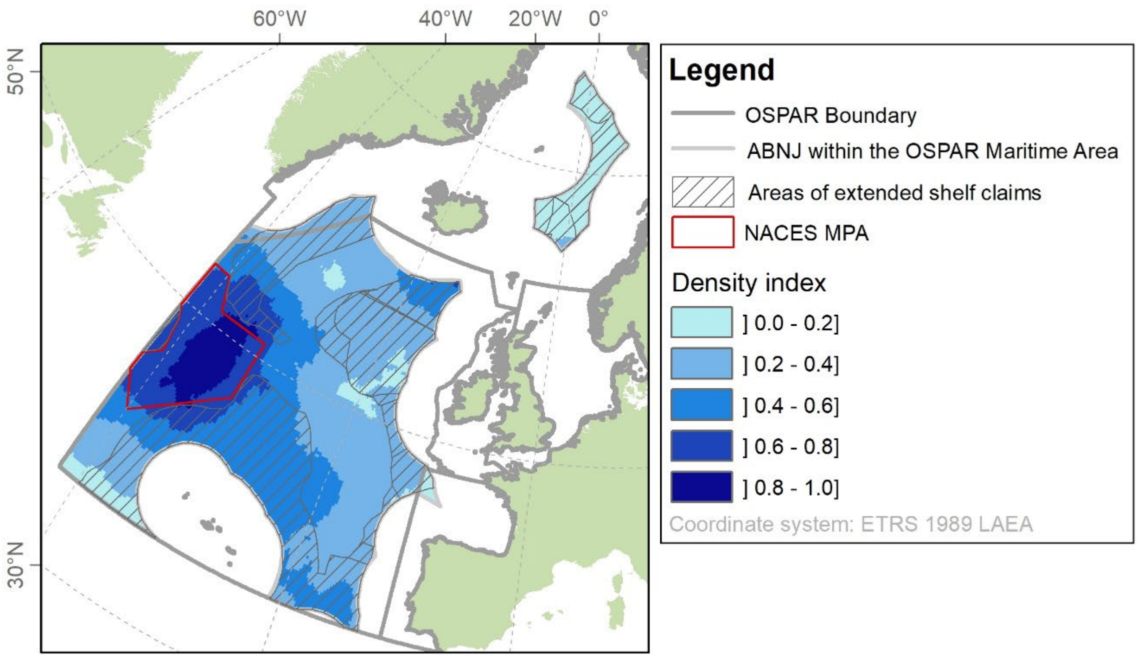

Figure A5.2 *Map indicating seabird species* ***density (usage)***, ***all year quarters combined***, *with the boundary of the NACES MPA.*

The darker areas represent the most relevant sites considering density for seabirds in high-seas of the OSPAR area- regardless of season.

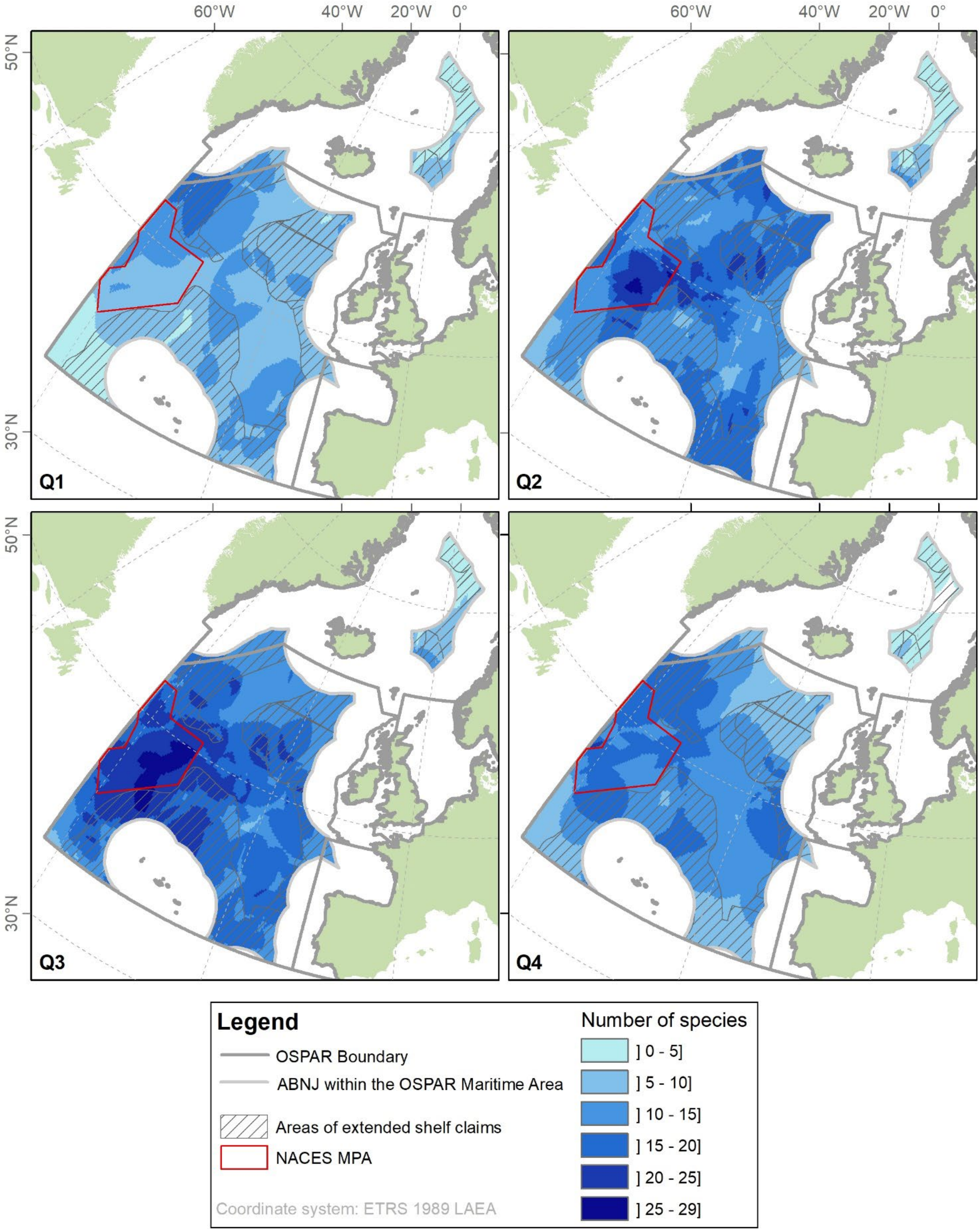

Figure A5.3. *Map indicating seabird* ***species richness*** *across the OSPAR ABNJ area* ***for each year quarter****, with the boundary of the NACES MPA.*

OSPAR priority species and threatened non-OSPAR species accounted more for the final result (i.e. a higher weight to OSPAR species (3x) and threatened non-OSPAR species (2x)). For all the other species a value of 1 was assumed.

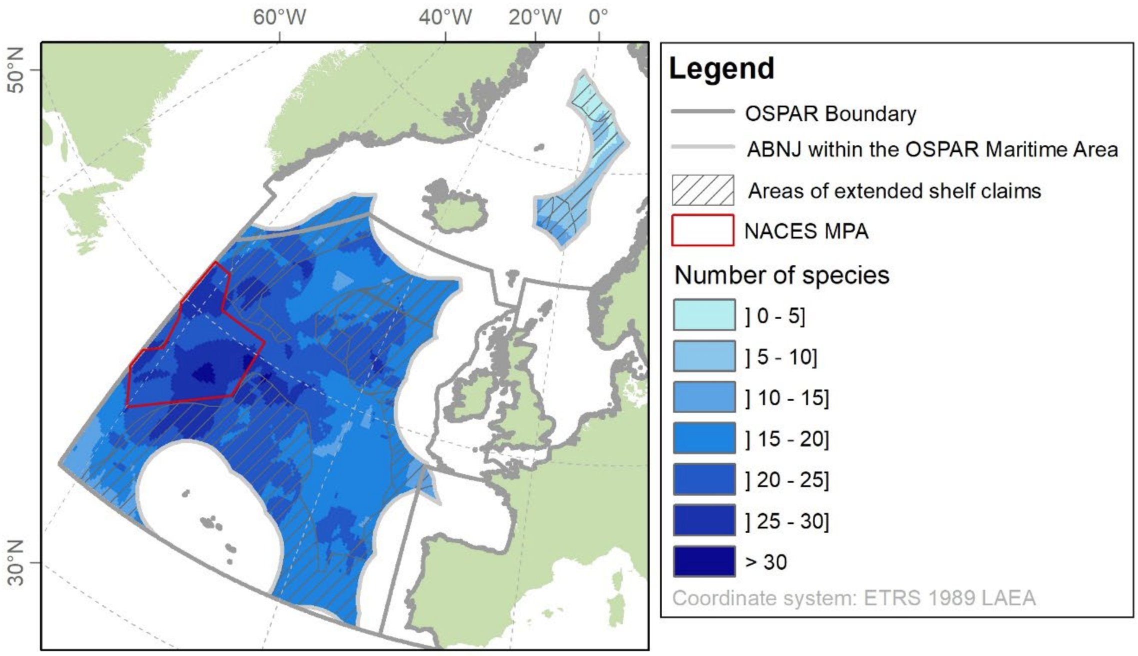

Figure A5.4. *Map indicating seabird* ***species richness*** *across the OSPAR ABNJ area,* ***all year quarters combined****, with the boundary of the NACES MPA.*

Scale indicates total number of seabird species occurring in OSPAR ABNJ area regardless of season. OSPAR priority species and globally threatened species accounted more for the final result (i.e. a higher weight to OSPAR species (3x) and globally threatened species (2x)). For all the other species a value of 1 was assumed.

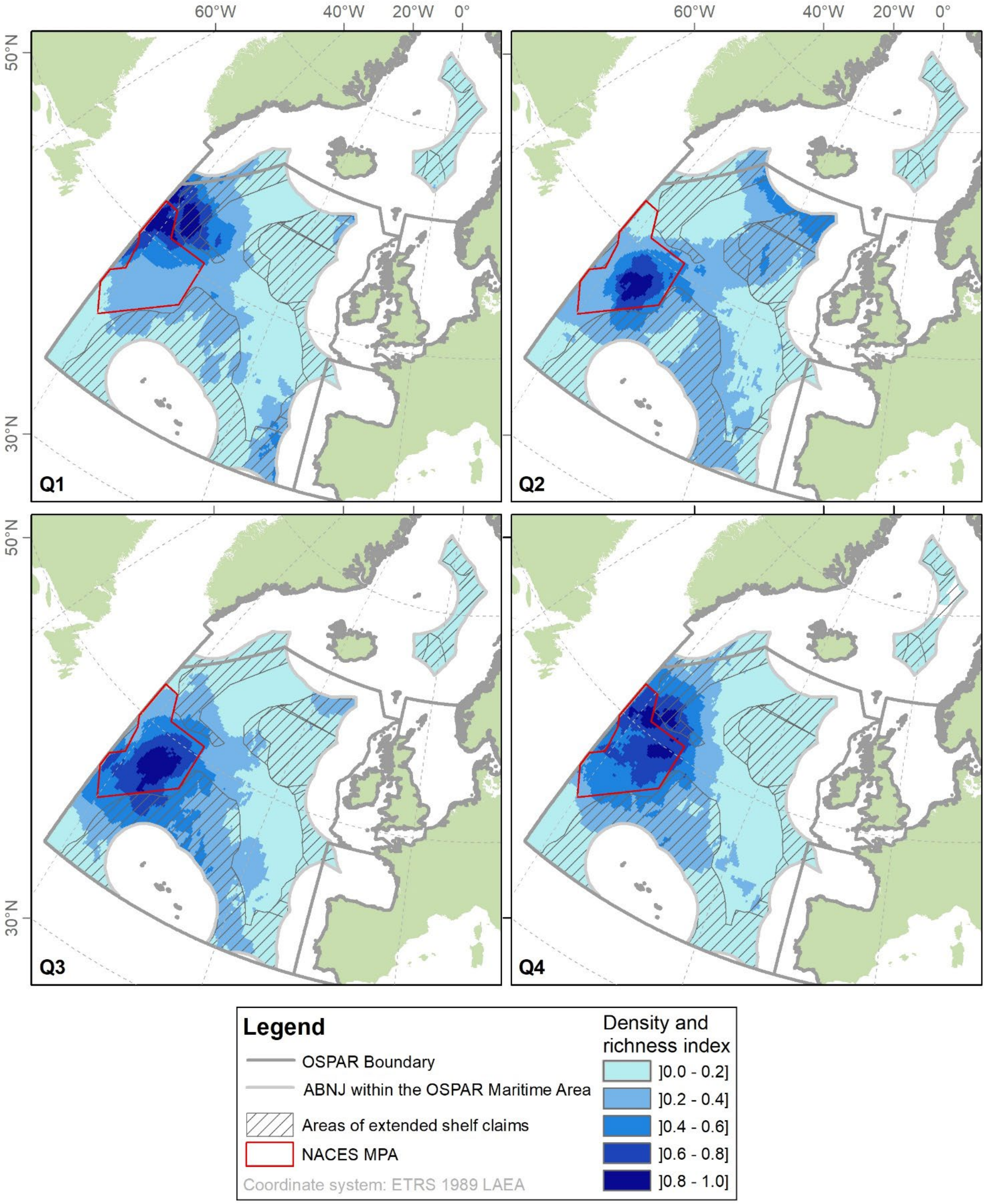

Figure A5.5. *Map indicating the combined weighting of seabird species* ***density (usage) and species richness for each year quarte****r, with the boundary of the NACES MPA.*

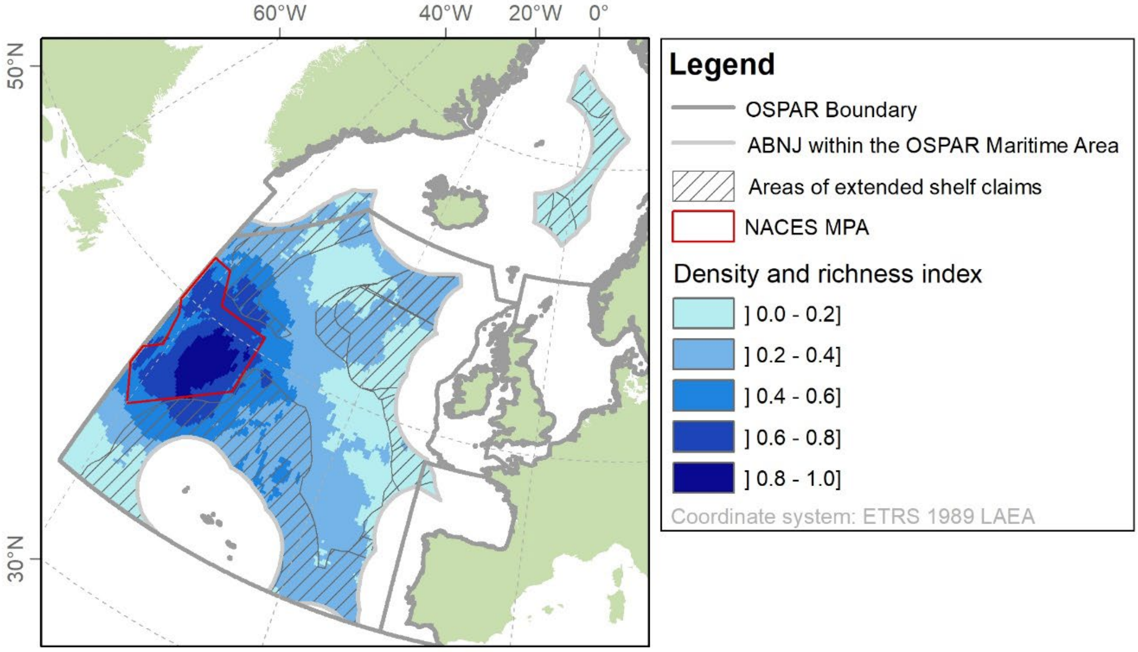

Figure A5.6. *Map indicating the combined weighting of seabird species* ***density (usage) and species richness****, all year quarters combined, with the boundary of the NACES MPA.*

The darker areas represent the most relevant sites considering density and richness for seabirds in the OSPAR ABNJ area- regardless of season.

Annex 6. Brief description and preliminary results of the oceanographic Cruise DY080

Distribution and Ecology of Seabirds in the Sub-Polar Frontal Zone of the Northwest Atlantic

Author: Ewan Wakefield, with contributions from Paloma Carvalho, Rob Ronconi, Claire Lacey, Nadya Ramirez Martinez and Guilherme Bortolotto.

July 2017

Important note: The information included below is to form the basis of a number of scientific publications(in preparation).

Cruise DY080 (**Distribution and Ecology of Seabirds in the Sub-Polar Frontal Zone of the Northwest Atlantic**) was carried out between the **6th of June and the 2nd of July, 2017** under the auspices of the UK Natural Environment Research Council, with Dr Ewan Wakefield of the Institute of Biodiversity Animal Health and Comparative Medicine, University of Glasgow, acting as Principal Scientist. Participating institutes included GEOMAR, the Sea Mammal Research Unit, Environment Canada, the University of Rhode Island, ISPA - Instituto Universitário, the Centre for Ecology, Fisheries and Aquaculture Science and BirdLife International.

The objectives of the cruise were:

1. To estimate the distribution, abundance and behaviour of seabirds and cetaceans in the seabird hotspot identified by BirdLife and Ewan Wakefield, centred on the sub-polar front, south of the Charlie Gibbs Fracture Zone.
2. To map major frontal features and nutrient regimes within the off-shelf study area and along the survey track.
3. To refine non-lethal methods of sampling seabirds at sea.
4. To estimate the diet, stable isotope and contaminant loading, faecal nutrient and moult status of seabirds within the study areas, with particular focus on the cephalopod component of seabird diet.
5. To determine the comparative habitat use of great shearwaters on and off-shelf and the timing of their movements between these areas.
6. To estimate rates of primary production within the study area, phytoplankton community structure, the identity of the nutrients limiting productivity, and the effects of seabird faeces on phytoplankton growth.
7. To estimate the vertical distribution and biomass of mesopelagic nekton within the study areas.

The cruise departed from Southampton, UK and disembarked in St Johns, Newfoundland. The principal area of interest was covered in series of survey lines running approximately N-S though the seabird hotspot area, aligned along the major sea surface temperature and salinity gradients in the region, as well as core distributions of different seabird species (Figure A6.1). Broadly speaking, the planned cruise track was followed. However, the northern portion of line 4 was modified such that a transient eddy and associated phytoplankton bloom detected using satellite images could be sampled (line 4b). In addition, sampling was carried out more intensively on the southern section of line 5 in order to characterise a second mesoscale eddy apparent from satellite images. During the early days of the cruise high winds and seas disrupted data collection, while during the latter half of the cruise, fog frequently reduced the seabird and cetacean survey transect width.

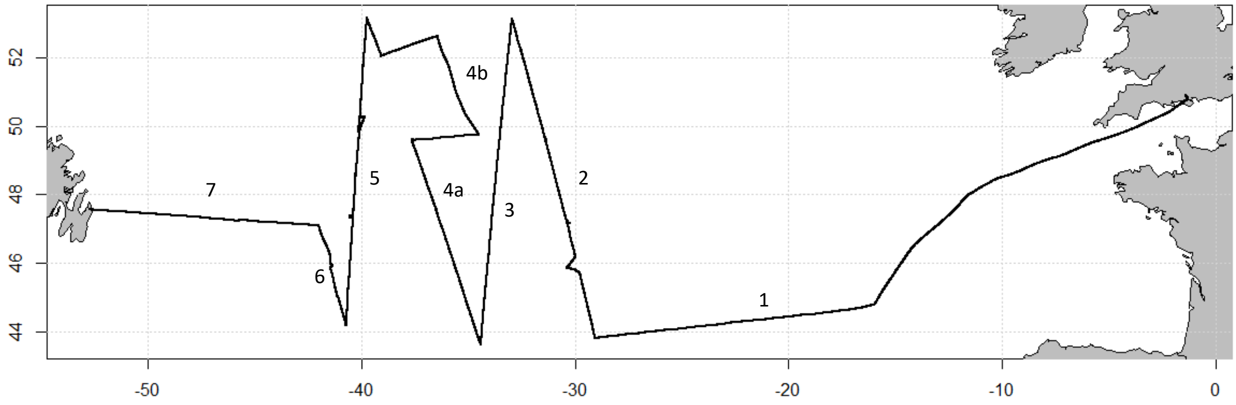

Figure A6.1. *Track of cruise DY080, June 6th – July 2nd 2017 (numbers indicate survey lines).*

Underway data collection (visual seabird and cetacean survey; passive acoustic cetacean survey; logging of surface seawater and atmospheric indices; and acoustic survey of nekton) was carried out as conditions allowed throughout the cruise (Figs. A7.2 and A7.3). CTD casts were made to 500 m at the beginning and end of lines 2 - 6 and at dawn and dusk between these stations. Water samples were collected only during CTD casts at ends of each line. Vertical plankton hauls, from 200m to the surface, were generally carried out immediately after each evening CTD cast. On-deck phytoplankton incubation experiments, to examine nutrient limitation, were carried out on lines 1 - 5.

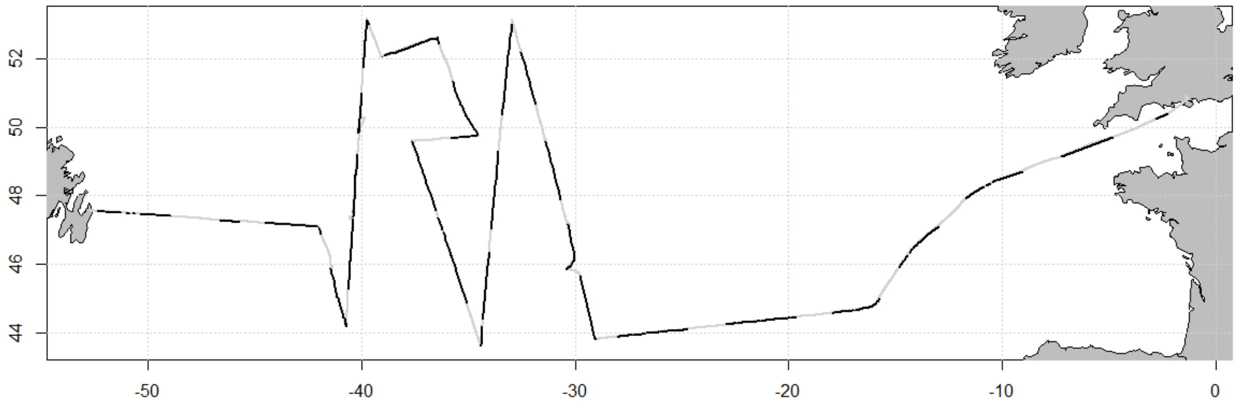

Figure A6.2 *Seabird visual survey effort during cruise DY080.*

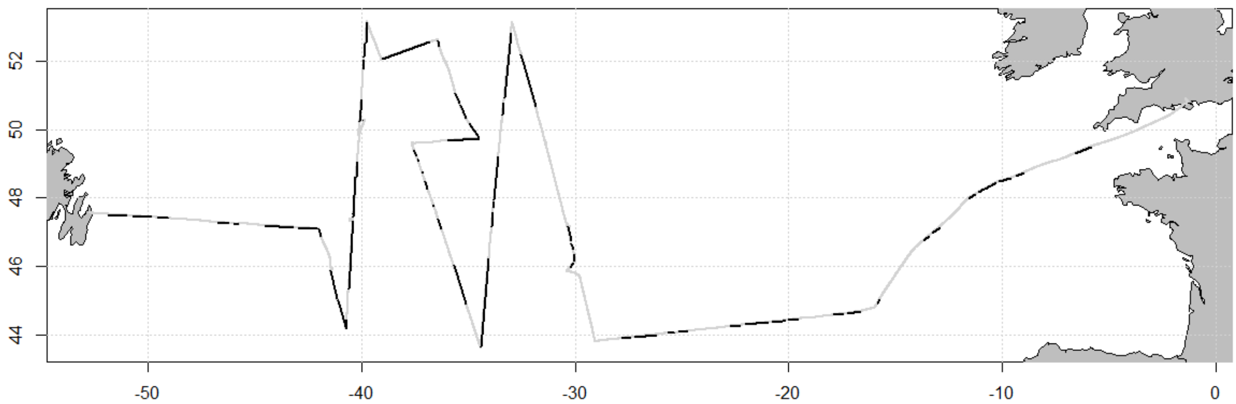

Figure A6.3 *Cetacean visual survey effort during cruise DY080.*

When conditions allowed, efforts were made to capture seabirds (using non-lethal methods) in order to obtain diet and tissue samples. Generally speaking, the ship hove to late in the afternoon each day on lines 2 – 6 for this purpose. Unfortunately, high sea states and fog largely precluded capturing seabirds using the Discovery’s Fast Rescue Boat, as had been intended. Rather, birds were attracted to the ship using bait and caught using a cast net. Samples were obtained from 13 northern fulmars and 14 great shearwaters in this manner and GPS tags were deployed on ten of the latter. In addition, 19 Leach’s petrels were caught and sampled after dark, using either a tape lure, a mist net or the ship’s lights. Visual point transect surveys were carried out of seabirds and cetaceans during daytime seabird catching sessions.

Data from the cruise are currently being analysed and results will appear in due course in the scientific literature. Preliminary results confirm that the oceanography of the MPA area is dominate by a series of banded fronts, broadly aligned in the zonal direction, following the course of the North Atlantic Current downstream of the Northwest Corner. In addition, a number of large eddies were identified, one of which may be an undescribed, permanent feature of the region. A total of 16 seabird species were recorded in the proposed MPA, the commonest species being great shearwaters, northern fulmars and Cory’s shearwaters (Table A7.1 – please note that these counts have not yet been corrected for variability due to weather, etc.). The latter were noticeably zoned by latitude – fulmars in the north, great shearwater at mid-latitudes and Cory’s shearwaters to the south. In addition, relatively high numbers of Leach’s petrels were encountered in the west of the MPA (Fig. A7.4). Analytical work currently being carried out aims to estimate the true density of these species in the MPA and to determine the causes of the distribution patterns. It looks likely that the latter reflect the distribution of major fronts and water masses in the region: That is, habitat partitioning is marked within the MPA implying that the relatively high species diversity there is likely to be due its high diversity of habitats. Tracks of the great shearwaters tagged on the Flemish Cap confirm that birds move from the North American continental shelf to the MPA area in mid-summer.

Nutrient and phytoplankton sampling indicate that the entire MPA area was iron-limited during the cruise. Results of bioassays undertaken during the cruise suggest that seabird guano may alleviate iron stress in the phytoplankton community. More analysis is require to confirm this important result, which if correct would underline the crucial role that seabirds play in recycling nutrients in the ecosystem of the MPA.

Table A6.1. *Bird species recorded in the proposed MPA area during cruise DY080 (June 6th – July 2nd 2017). Species ordered by raw, uncorrected, counts.*

Species/taxon		Raw count
Great Shearwater	*Ardenna gravis*	2664
Northern Fulmar	*Fulmarus glacialis*	666
Cory's Shearwater	*Calonectris borealis*	251
Leach's Petrel	*Oceanodroma leucorhoa*	190
Sooty Shearwater	*Ardenna grisea*	123
Skua sp.	*Stercorarius sp.*	21
Storm petrel sp.	*Hydrobatidae/Oceanitidae sp.*	17
Arctic Tern	*Sterna paradisaea*	10
Manx Shearwater	*Puffinus puffinus*	9
South Polar Skua	*Stercorarius maccormicki*	6
Long-tailed Skua	*Stercorarius longicaudus*	3
Arctic Skua	*Stercorarius parasiticus*	3
Wilson's Petrel	*Oceanites oceanicus*	3
Common/Arctic tern		2
Guillemot	*Uria aalge*	1
Bulwer's Petrel	*Bulweira bulwerii*	1
Dark petrel sp.		1
Northern Gannet	*Morus bassanus*	1
Great Black-backed Gull	*Larus marinus*	1
Pomarine Skua	*Stercorarius pomarinus*	1

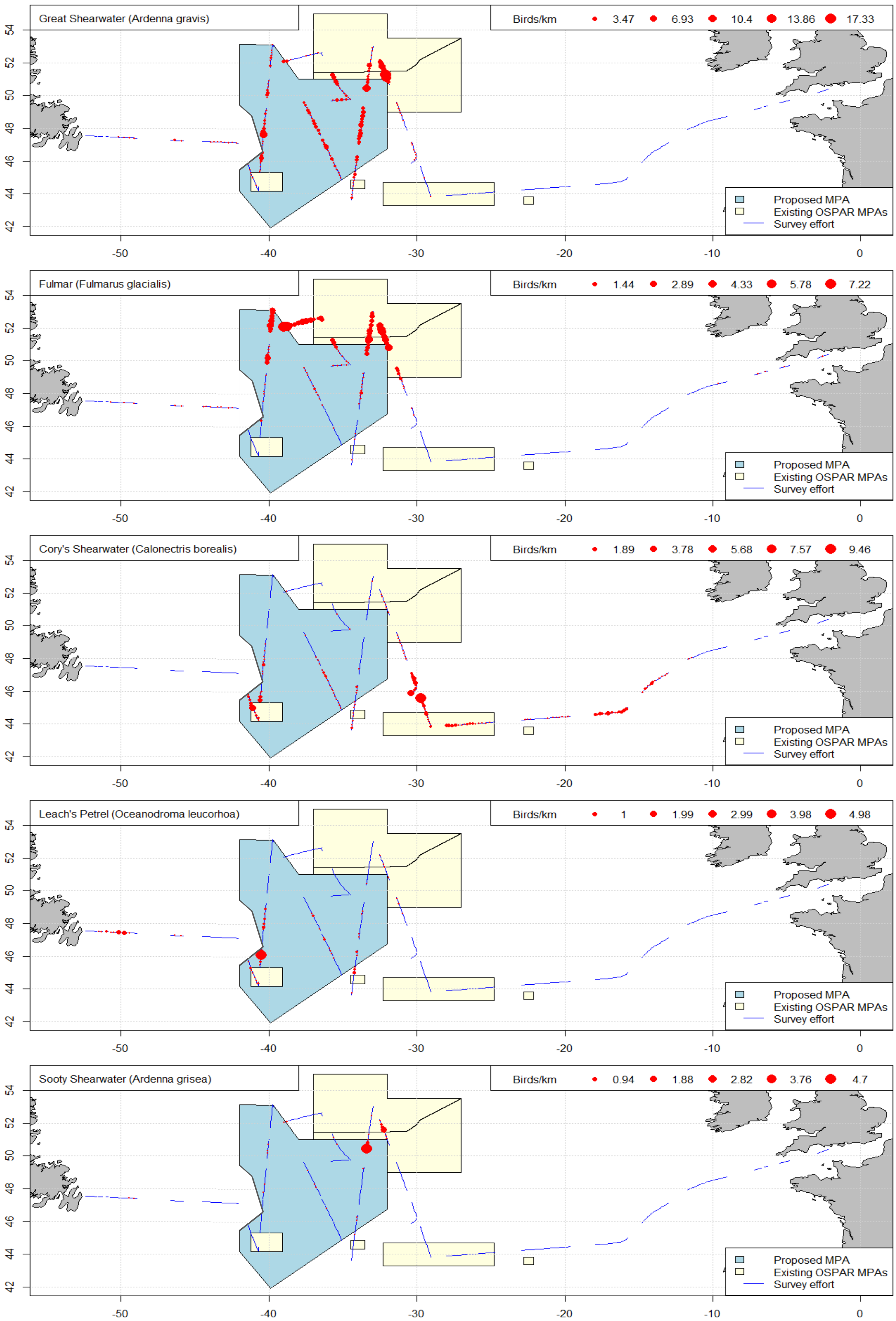

Figure A5.4 *Density of bird species along the transect (the values presented are still preliminary and have not yet been corrected for variability due to weather or other confounding factors).*

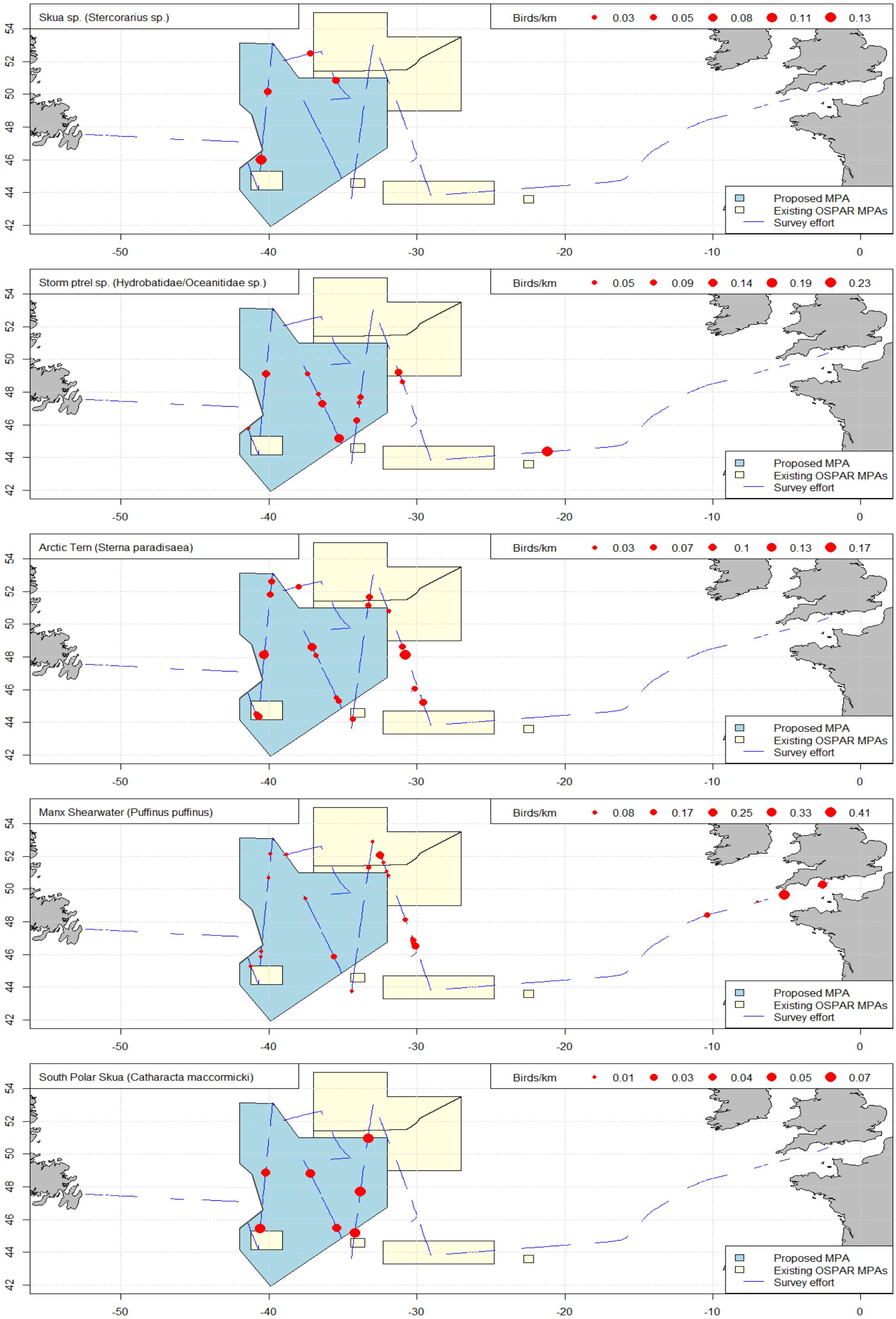

Figure A5.44 (cont.) *Density of bird species along the transect (the values presented are still preliminary and have not yet been corrected for variability due to weather or other confounding factors).*

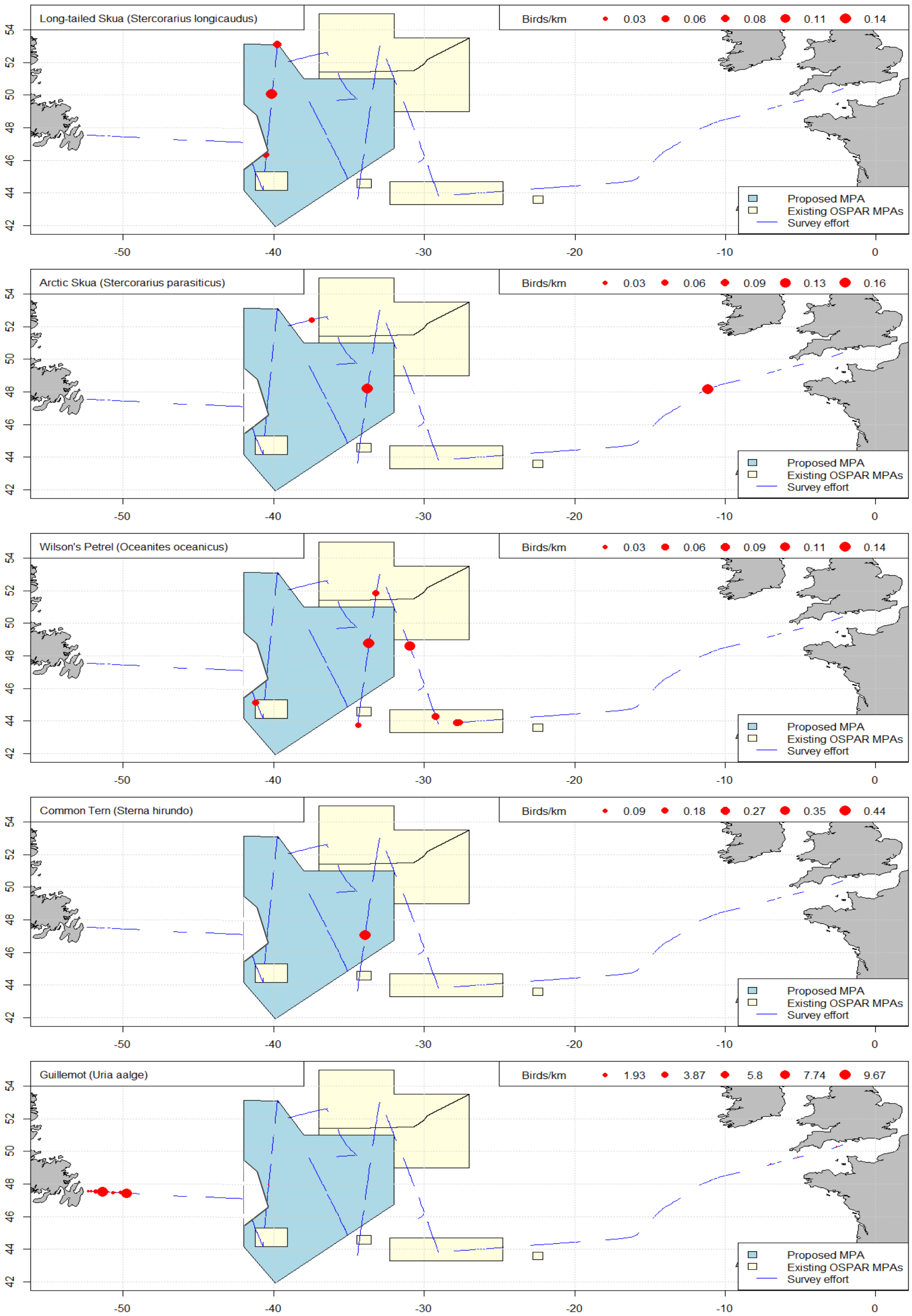

Figure A5.4 (cont.) *Density of bird species along the transect (the values presented are still preliminary and have not yet been corrected for variability due to weather or other confounding factors).*

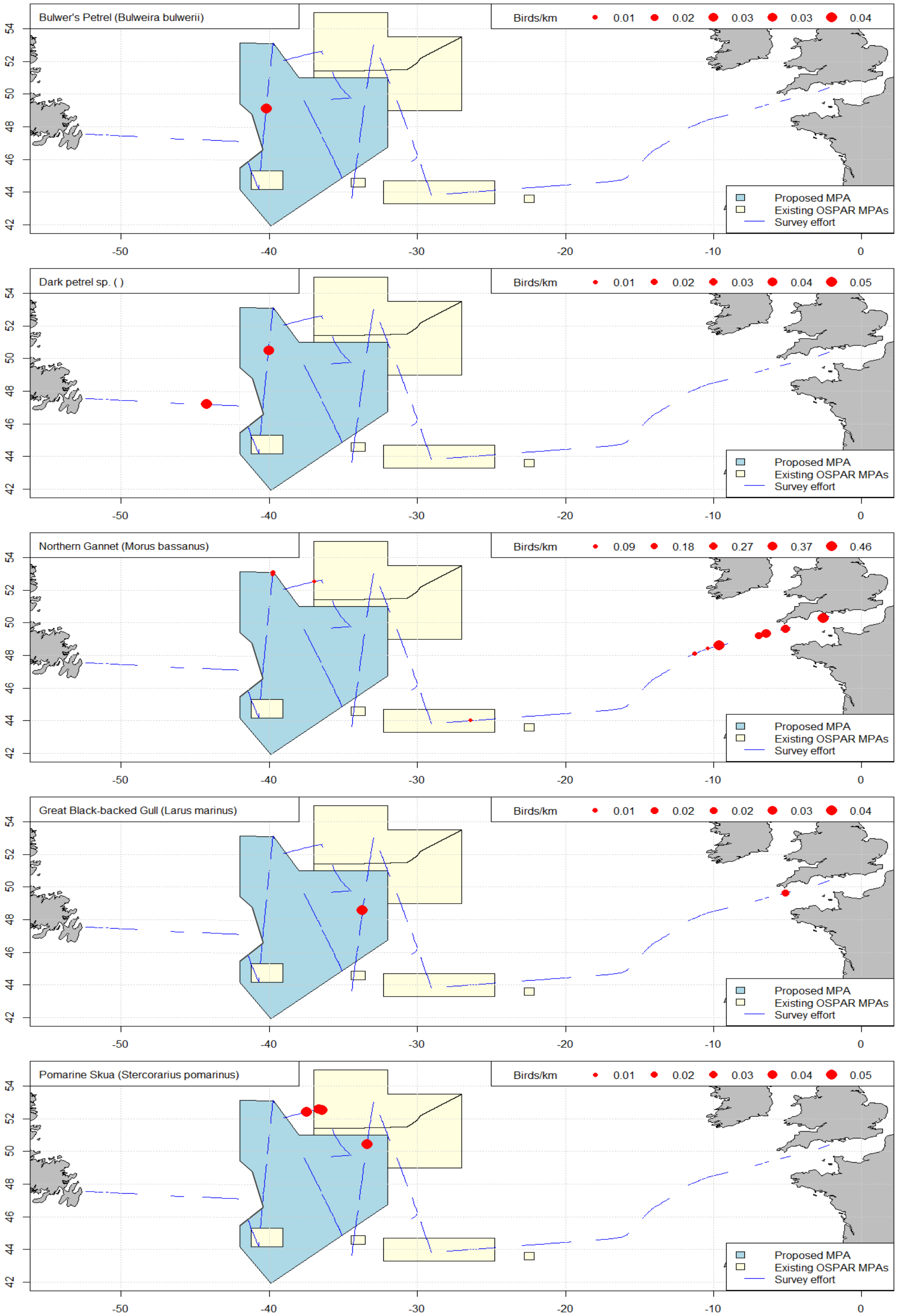

Figure A5.4 (cont.) *Density of bird species along the transect (the values presented are still preliminary and have not yet been corrected for variability due to weather or other confounding factors).*

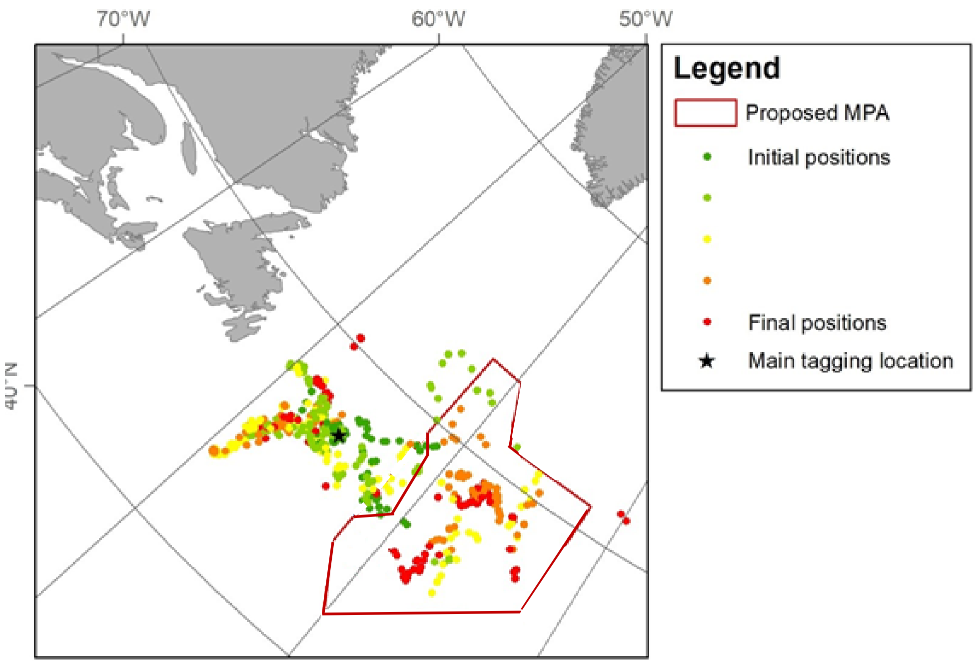

Figure A6.5 *Movements of the Great Shearwaters Ardenna gravis caught at sea and tagged during the DY080 cruise. Most birds moved eastwards, towards the direction of the MPA.*

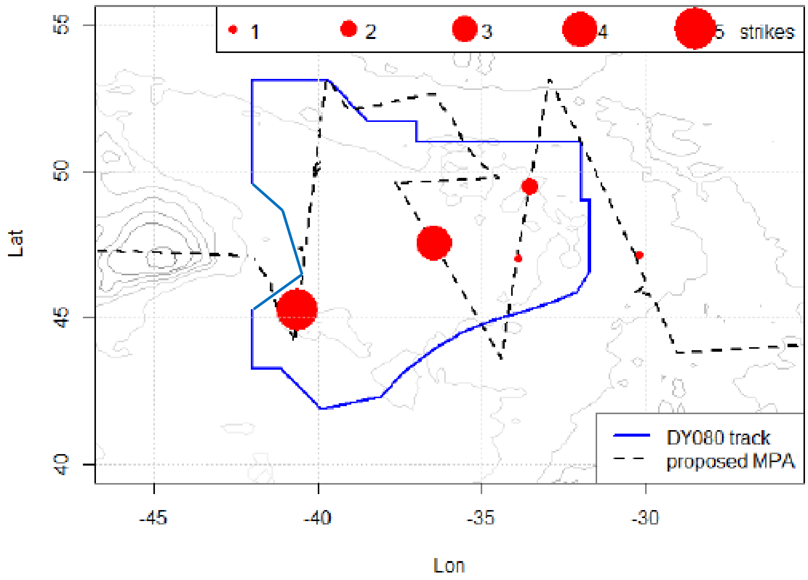

Figure A6.6 *Locations of night time ship strikes by Leach's Petrels during cruise DY080, June 2017*

Table A6.2. *Cetacean sightings*

Species	Total cruise		Within MPA boundary	
	Number of sightings	**Total number of animals**	**Number of sightings**	**Total number of animals**
Baleen whales				
Blue whale, Balaenoptera musculus (EN)	5	7	2	3
Fin whale, *Balaenoptera physalus* (EN)	39	70	13	37
Sei whale, Balaenoptera borealis (EN)	7	10	1	1
Humpback whale, Megaptera novaeangliae (LC)	37	40	5	5
Blue, fin or sei whale	46	51	13	16
Humpback whale or sperm whale	3	3	1	1
Unidentified "large" whale	21	22	1	1
Odontocetes				
Sperm whale, *Physeter macrocephalus* (VU)	7	8	3	3
Pilot whale Globicephala spp (DD)	7	159	6	139
Common dolphin, Delphinus spp. (DD/LC)	34	391	15	131
Risso's dolphin, *Grampus griseus* (LC)\	1	10	1	10
Striped dolphin *Stenella coeruleoalba (LC)*	3	157	3	157
White-sided dolphin, Lagenorhynchus acutus (LC)	3	28	3	28
"Patterned" dolphin	6	26	3	13
Unidentified dolphin	20	109	15	97
Total	250	1102	87	644

Cetacean data collected by the Sea Mammal Research Unit (University of St Andrews, Scotland) supported by funding from the Marine and Freshwater Research Institute (Reykjavik, Iceland).

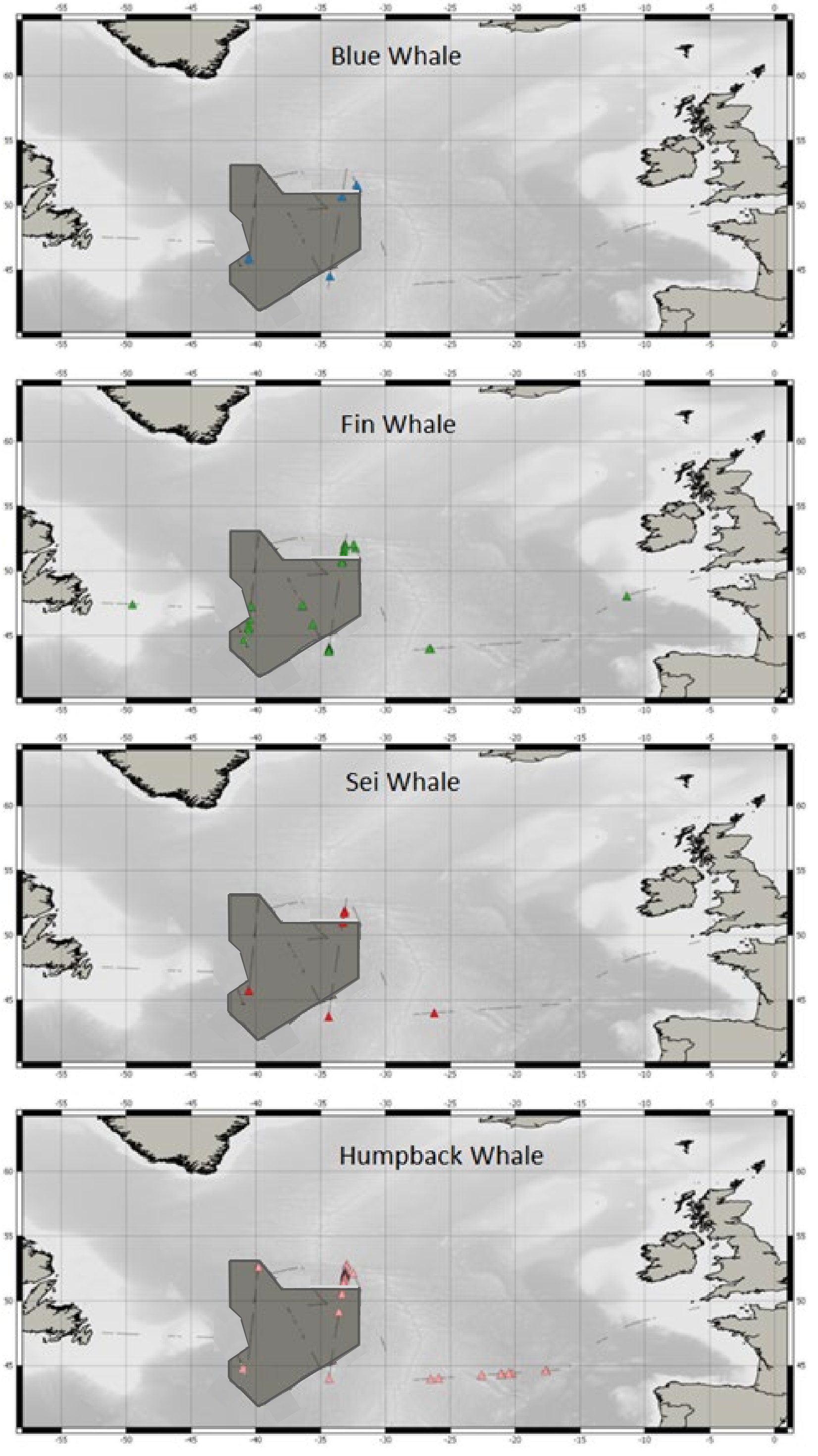

Figure A6.7 *Cetaceans sightings along the DY080 transect and within the MPA.*

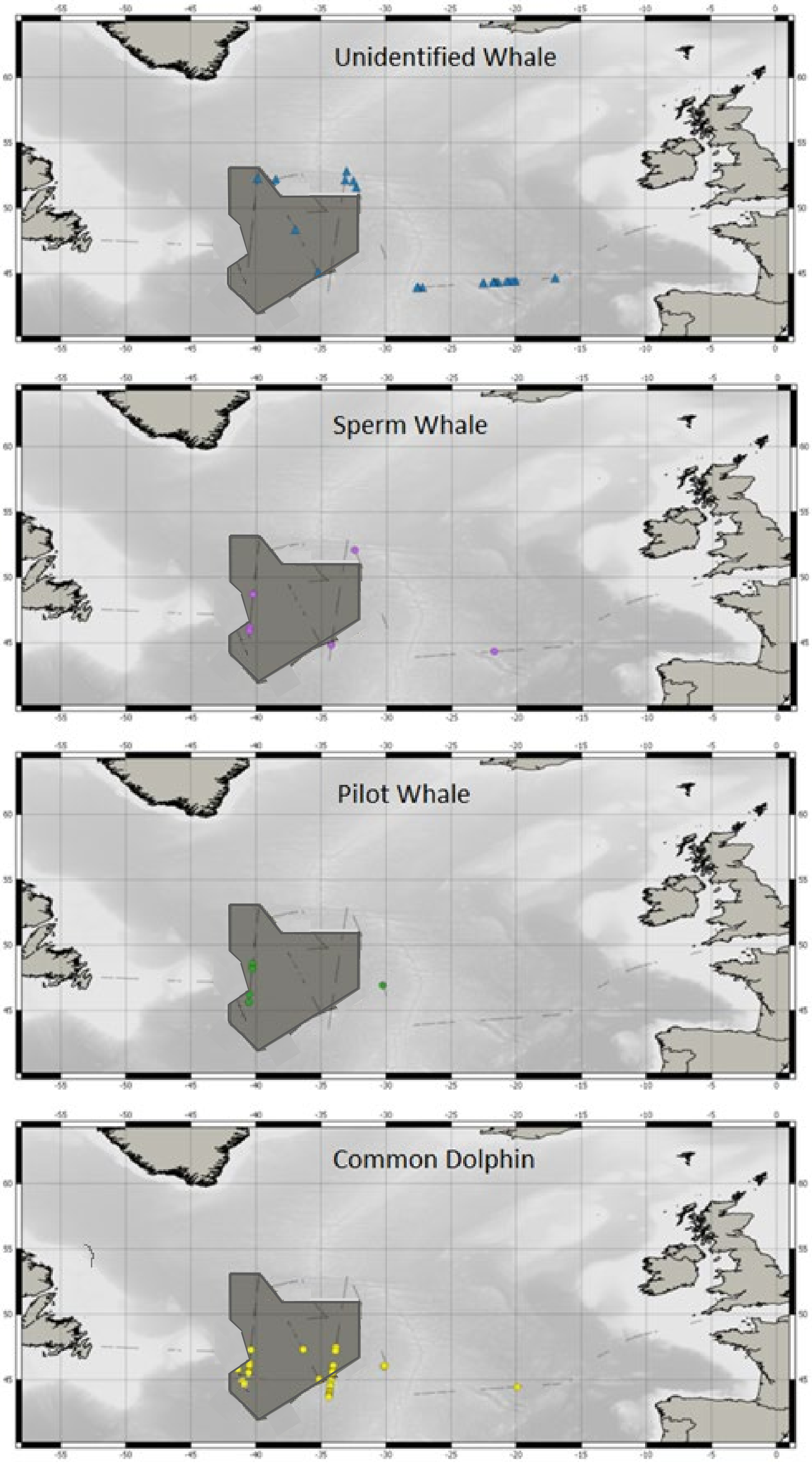

Figure A6.7 (cont.) *Cetaceans sightings along the DY080 transect and within the MPA.*

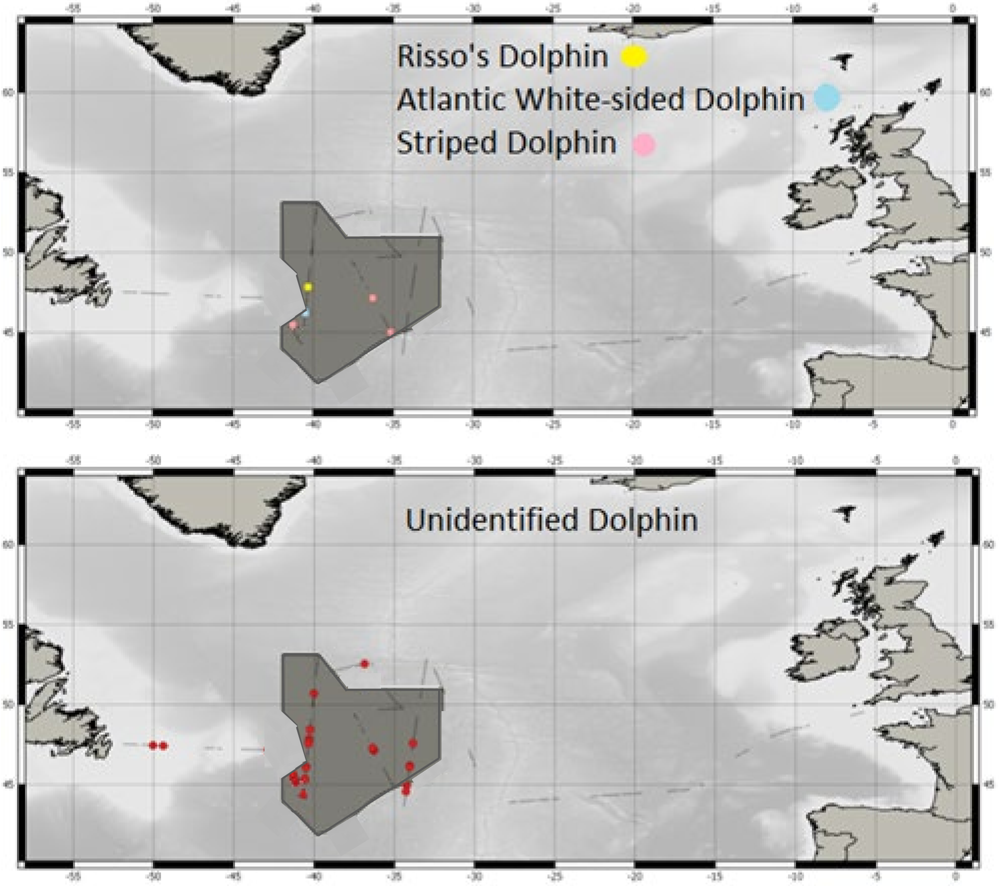

Figure A6.7 (cont.) *Cetaceans sightings along the DY080 transect and within the MPA.*

Annex 7. Geographic coordinates of North Atlantic Current and Evlanov Seamount MPA- boundary

Longitude	Latitude
-39.681	53.122
-37.979	50.996
-31.998	50.994
-31.999	46.765
-39.916	41.911
-42.000	44.180
-42.000	45.492
-40.506	46.504
-41.173	48.762
-42.001	49.588
-42.000	53.118
-39.681	53.122

Annex 8. Evidence of species use and occurance in North Atlantic Current and Evlanov Seamount MPA from published literature

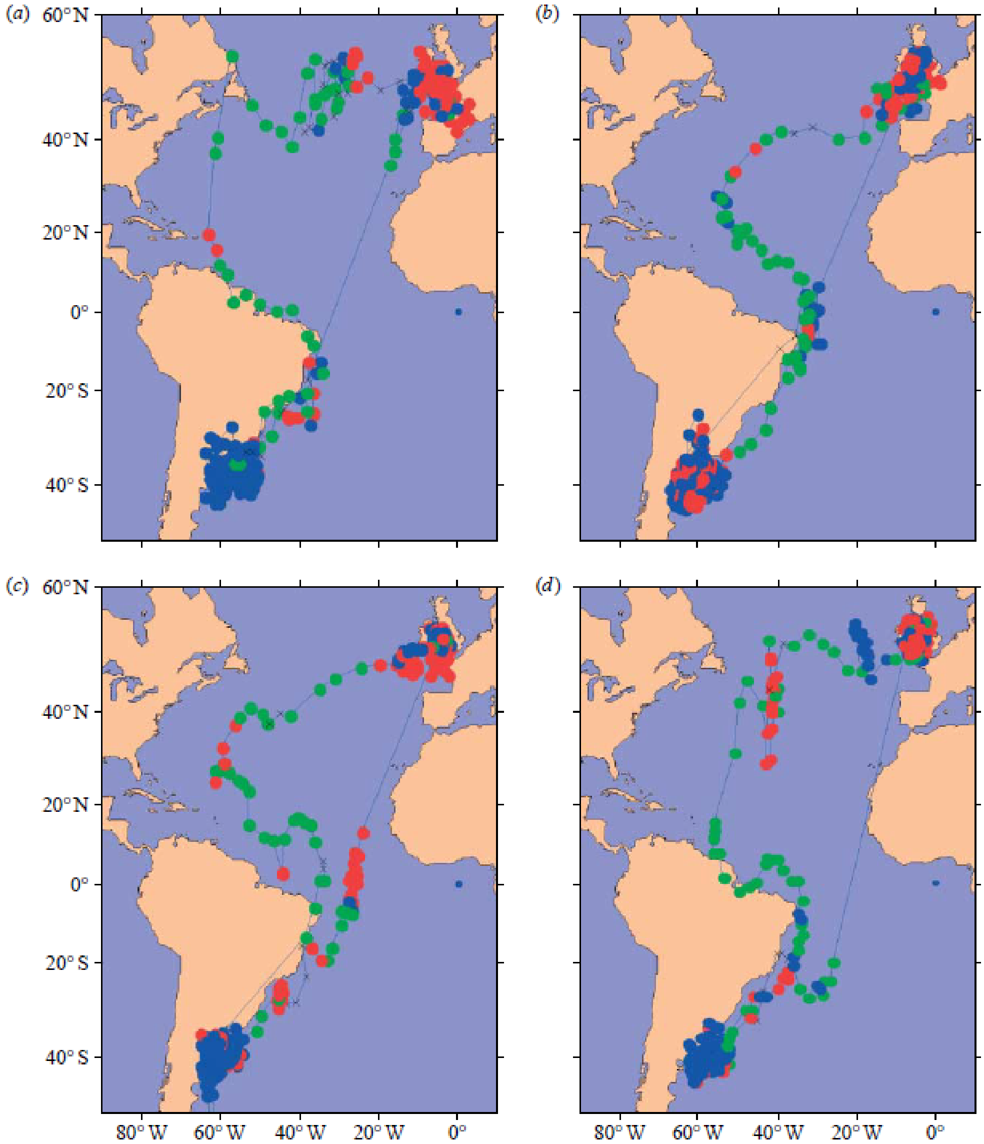

Figure A8.1 *Maps showing the migratory movements of* ***Manx Shearwater*** *(Puffinus puffinus)*

Colours represent different behaviours classification (based on Bayesian machine learning techniques; red: summer feeding; blue: winter feeding; green: migration. “Summer feeding” behaviour during migratory periods reveals the potential role of stopovers as refuelling areas (including in the area – see panel d). From Guilford et al. (2009)[15]

[15] Guiolford et al. (2009). Proc. R. Soc. B (2009) 276, 1215–1223. DOI: 10.1098/rspb.2008.1577

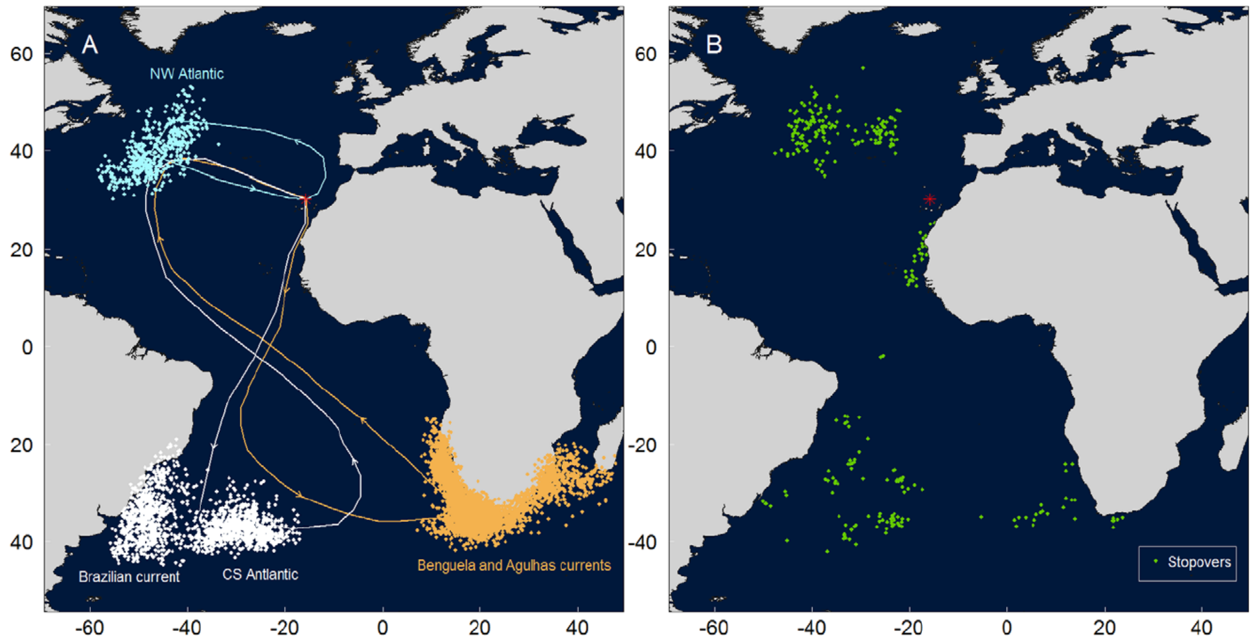

Figure A8.2 *Maps showing the migratory movements of* ***Cory's Shearwater*** *(Calonectris borealis).*

Birds tracked from the most important colony, located in Selvagem, Madeira (red asterisk). A: main wintering destinations; B: stopover locations. From Dias et al. (2012)[16]

[16] Dias et al. (2012). PLoS ONE 7(11): e49376. doi:10.1371/journal.pone.0049376

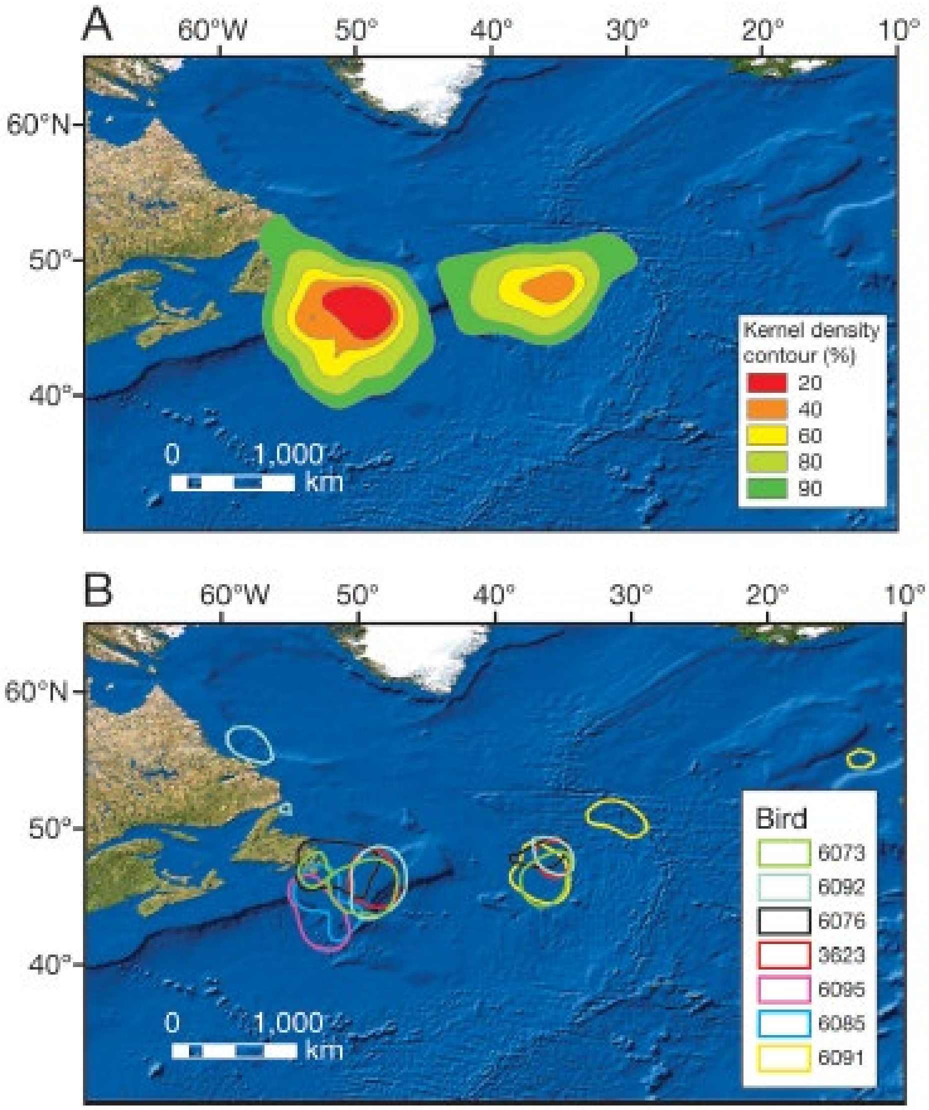

Figure A8.3. *Kernel density distributions of wintering* ***Sooty Shearwater*** *(Ardenna grisea), tracked from the Falkland Islands. From Hedd et al. (2012)*[17]

[17] Hedd et al (2012). MEPS 449, 277–290 doi: 10.3354/meps09538

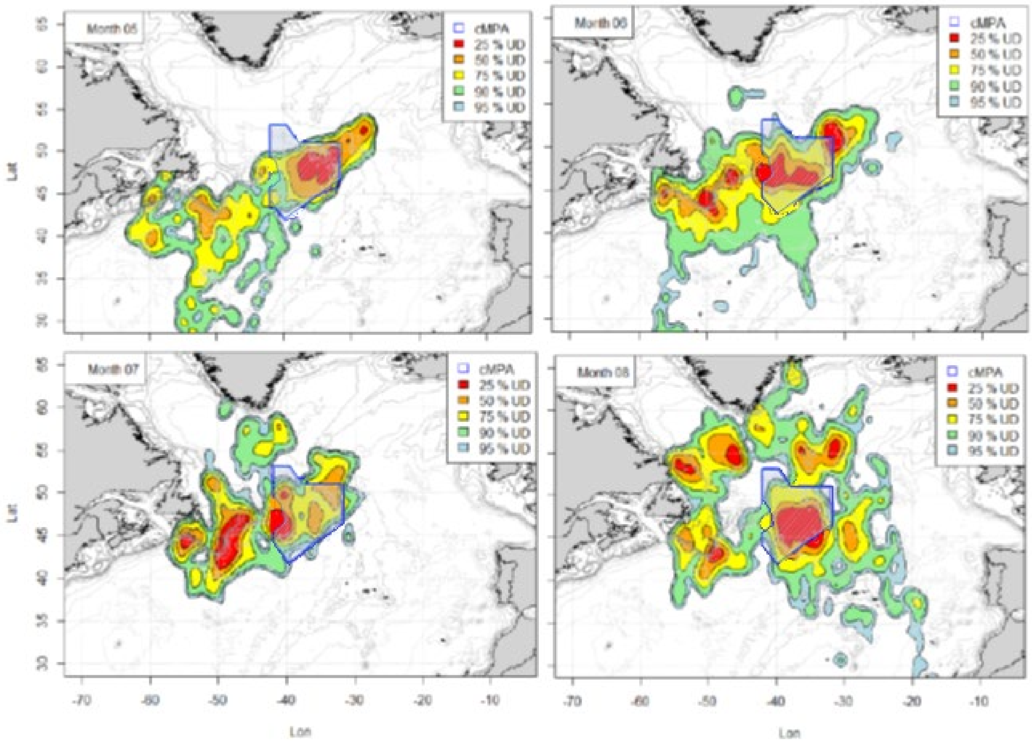

Figure A8.4. *Utilisation distribution of* ***Great Shearwaters*** *tracked from Gough Island during the boreal summer of 2017 (n=22).*

Information provided by Ewan Wakefield, University of Glasgow, during the Seeking Views process.

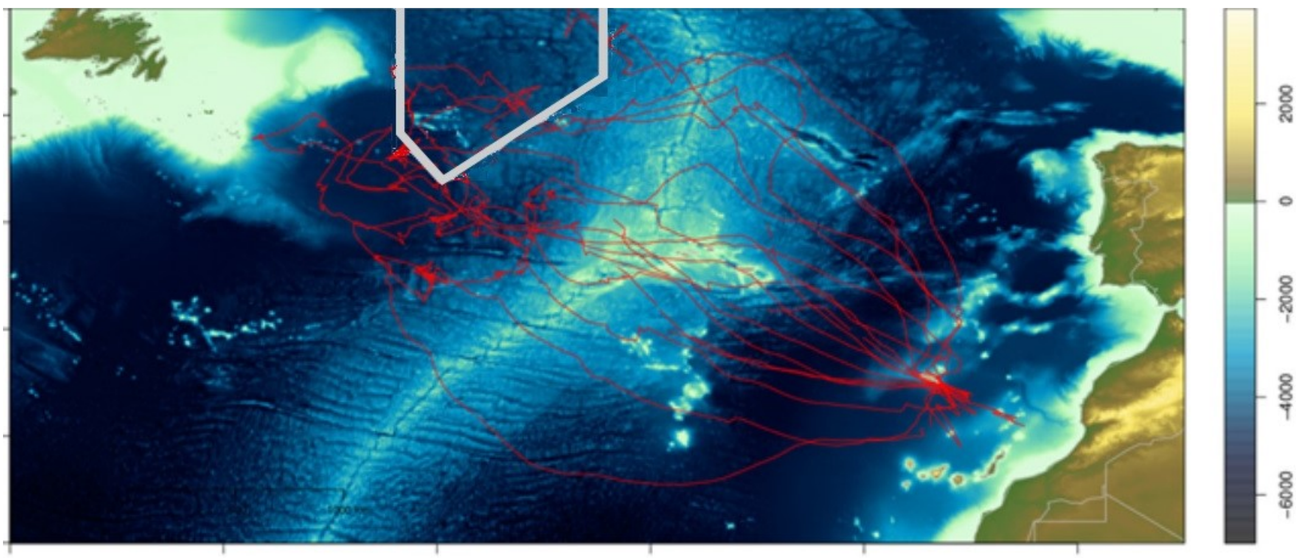

Figure A8.5 *Foraging movements of* ***Desertas Petrel*** *(Pterodroma deserta) tracked from the colony located in Bugio (Desertas, Madeira), during the incubation period. Based on GPS data collected by J.P Granadeiro and P. Catry (in prep).* ***Important note: The information included in this figure will form the basis of a scientific publication (in preparation).***

Note, additional data (2016-2018) for Desertas Petrels *Pterodroma deserta* (Vulnerable), and Zino's Petrel *Pterodroma madeira* (Endangered) also reaffirms this area as important for these globally threatened species (information provided during seeking views process, detailed below).

17 Desertas Petrels were tracked using GPS during their incubation stage in 2016 and 2017. The results show that the tracked birds fly 8-10,000km from Bugio Island (Madeira) on 2-3 week trips to feed in the area of the

proposed MPA. This is new data that supplements the tracking data of Desertas Petrels (2008-2013) analysed as part of the NACES proforma, and reaffirms the proposed Site as important for this vulnerable species.

4 Zino's Petrels were tracked with GPS in 2018 during the incubation stage. These birds also forage within the Site. This information represents new data and supplements the tracking data for Zino's Petrel (2007-2010) analysed as part of the NACES nomination proforma, reaffirming that the proposed Site is important for this endangered species.

This additional data will be stored in the Seabird Tracking Database, and will form part of a forthcoming publication.

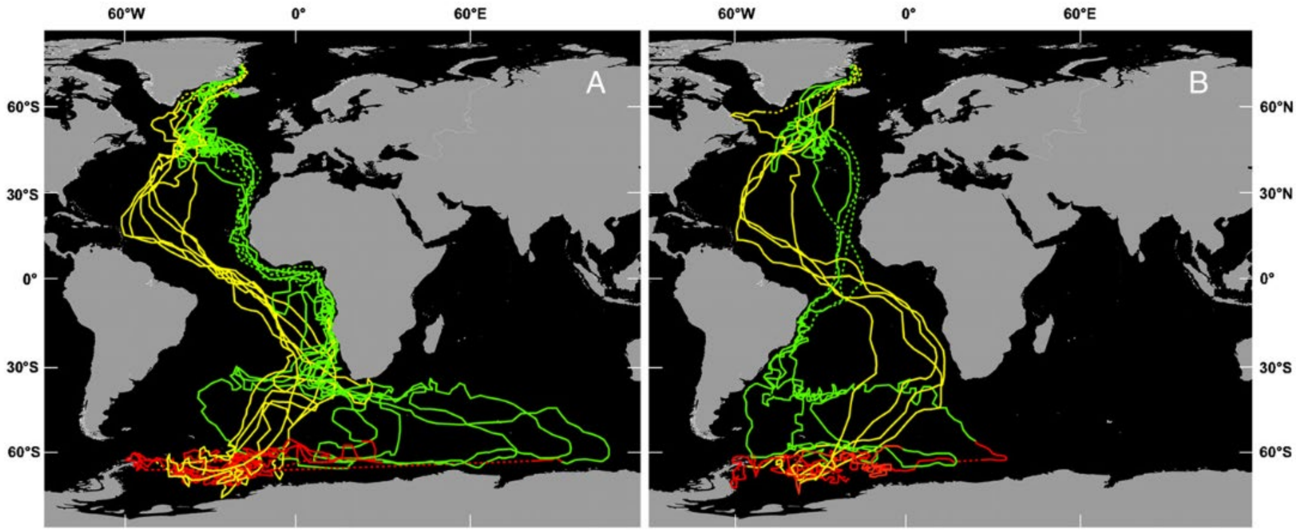

Figure A8.6 *Migratory movements of* ***Arctic Tern*** *(Sterna paradisaea)*

Birds tracked from breeding colonies in Greenland (n = 10 birds) and Iceland (n = 1 bird), showing the use of the MPA as a staging area. From Egevang et al. (2010)[18]

[18] Egevang et al. (2010). PNAS 107, 2078–2081. doi:10.1073/pnas.0909493107

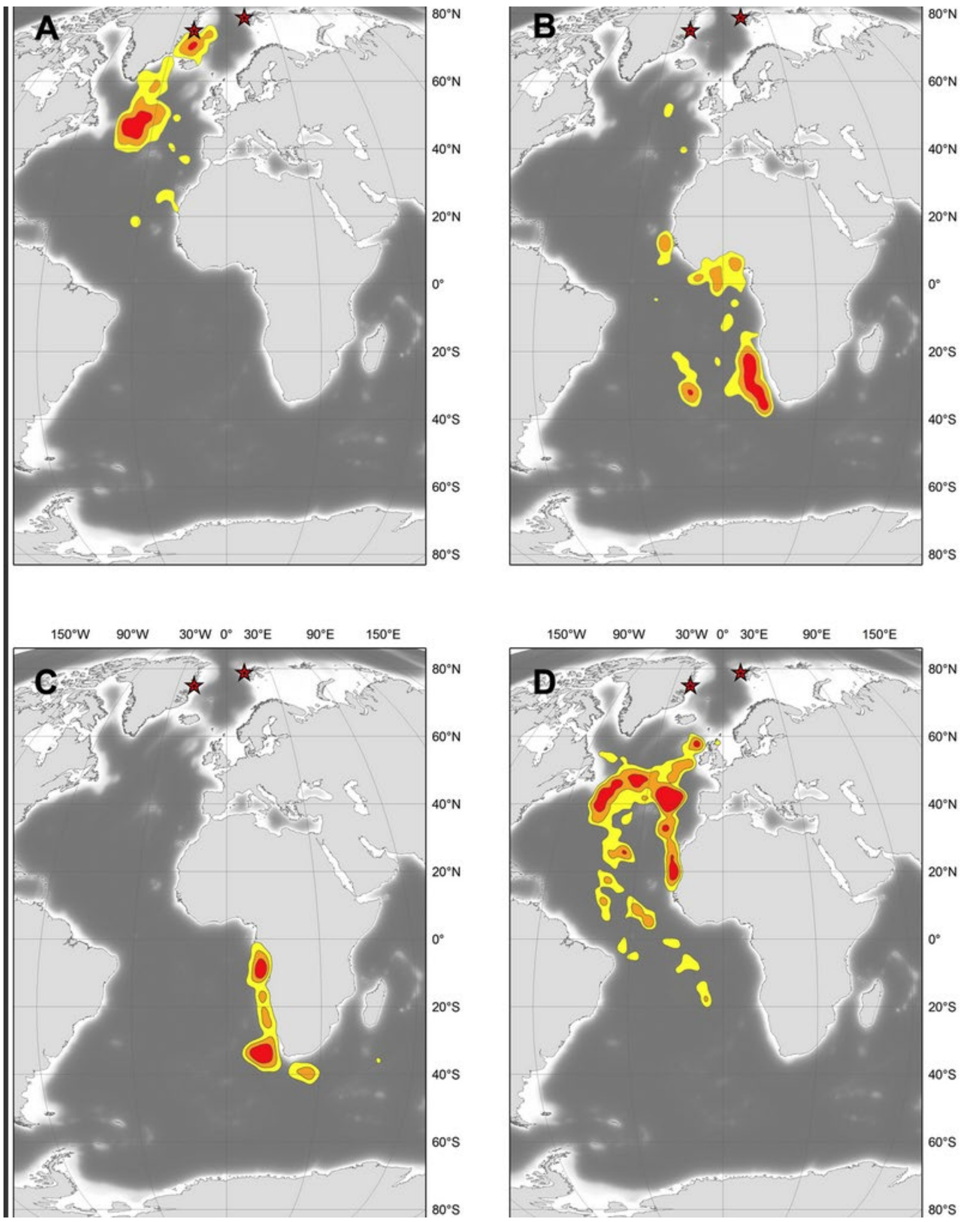

Figure A8.7 *Kernel density distribution estimated for the* ***Long-tailed Jaeger*** *(Stercorarius longicaudus) along the annual cycle(a) from release to September 10th, (b) between October 10th and November 31st, (c) December and January and (d) after April 10th. Contours represent densities of 25% (red), 50% (orange) and 75% (yellow). From Gilg et al. (2013)[19]*

[19] Gilg et al. (2013). PLoS ONE 8(5): e64614. doi:10.1371/journal.pone.0064614

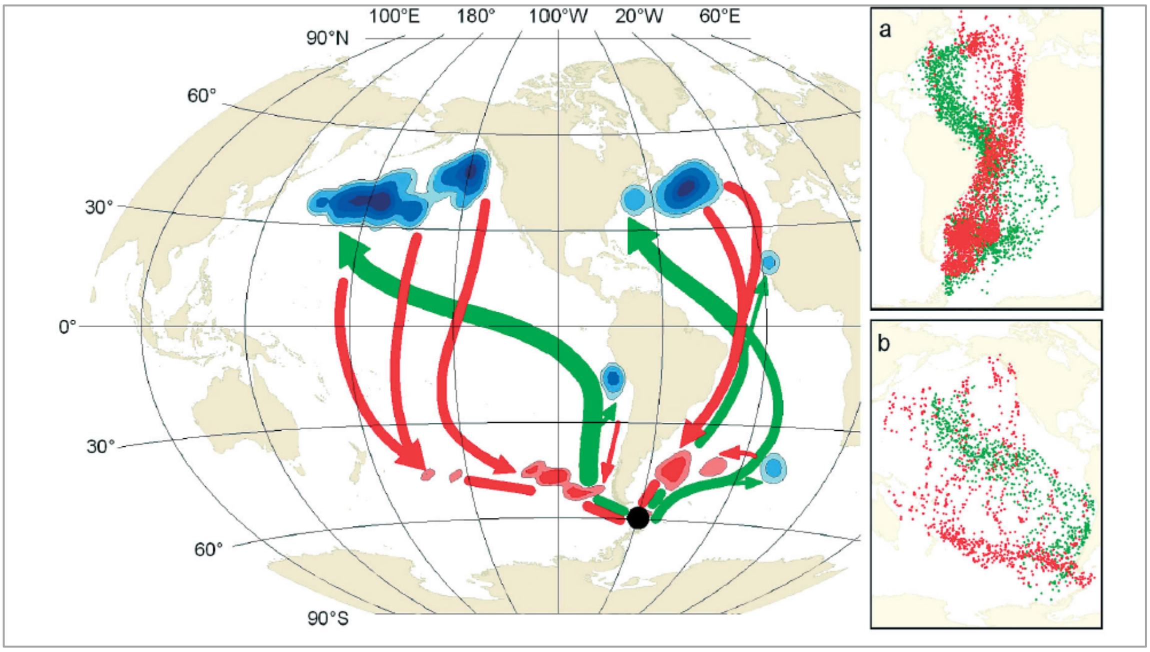

Figure A8.8 *Wintering areas and migration routes of* ***South Polar Skua*** *(Catharacta maccormicki) tracked from the colonies located in King George Island (back dot).*

Wintering areas represented in blue. From Kopp et al. (2011)[20]

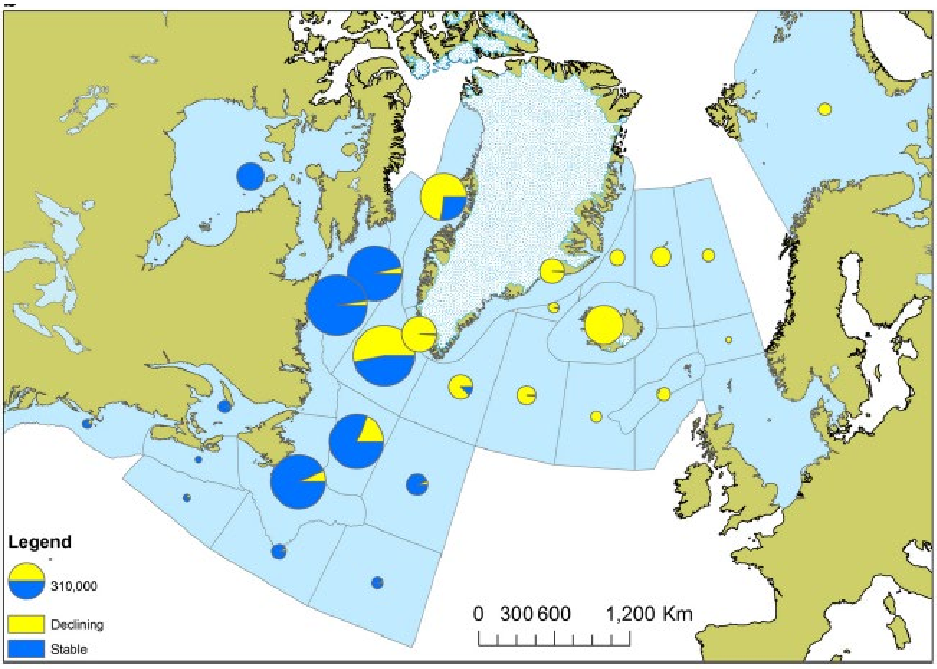

Figure A8.9 *Map showing the estimated number of adult* ***Thick-billed Murre*** *(Uria lomvia) (OSPAR-listed species) in different Atlantic sectors.*

Note the declining trend within the area where the NACES MPA is located. From Frederiksen et al. (2016)[21]

[20] Kopp et al. (2011). MEPS 435: 263–267. doi: 10.3354/meps09229

[21] Frederiksen et al. (2016) Biol Cons 200 26–35. http://dx.doi.org/10.1016/j.biocon.2016.05.011

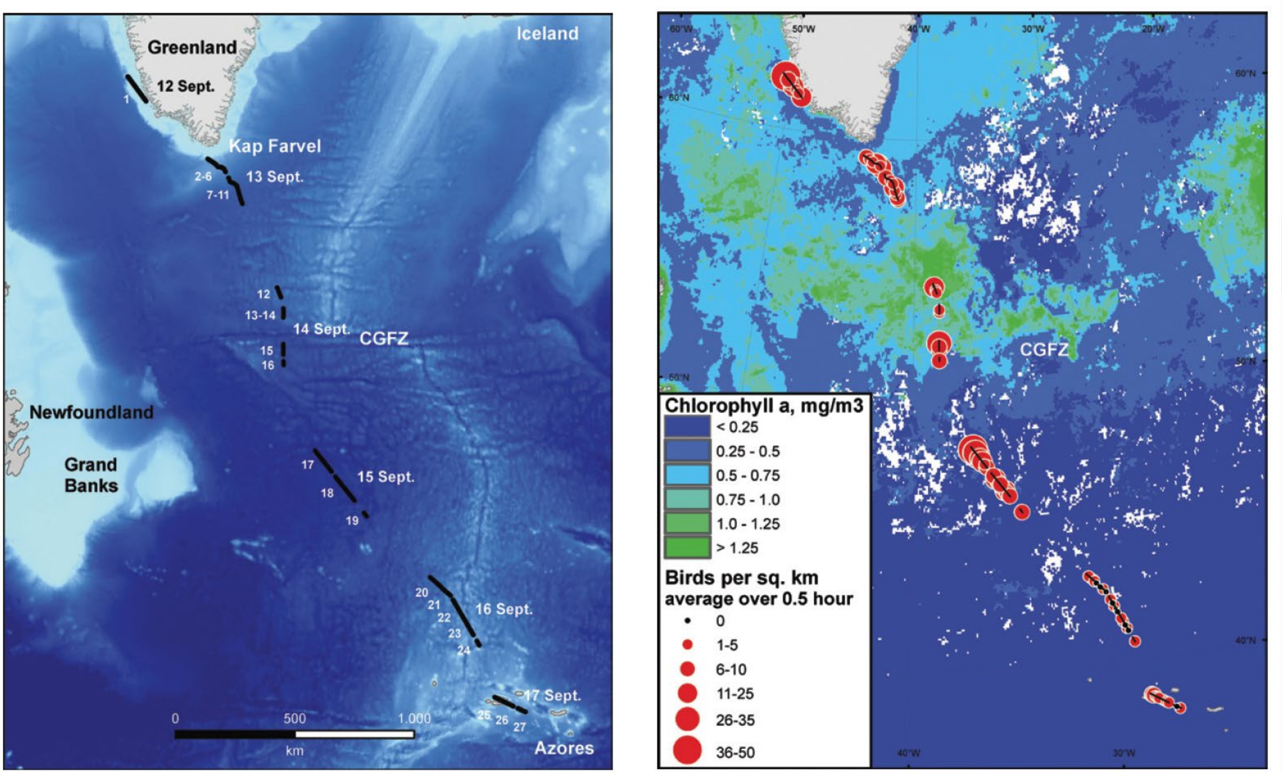

Figure A8.10 At sea survey in 2006 across MPA area (dates 15-19 Sept). Left panel: The seabird-at-sea transect between Greenland and the Azores. Sub-transect numbers and dates are shown. CGFZ is the Charlie–Gibbs fracture zone. Right panel: **Densities of seabirds (all species combined)** along the transect. Densities are aggregated over 30 min periods, to provide a better overview. From Boertmann (2014)[22]

[22] Boertmann (2014). Dansk Ornitologisk Forenings Tidsskrift 108: 199-206

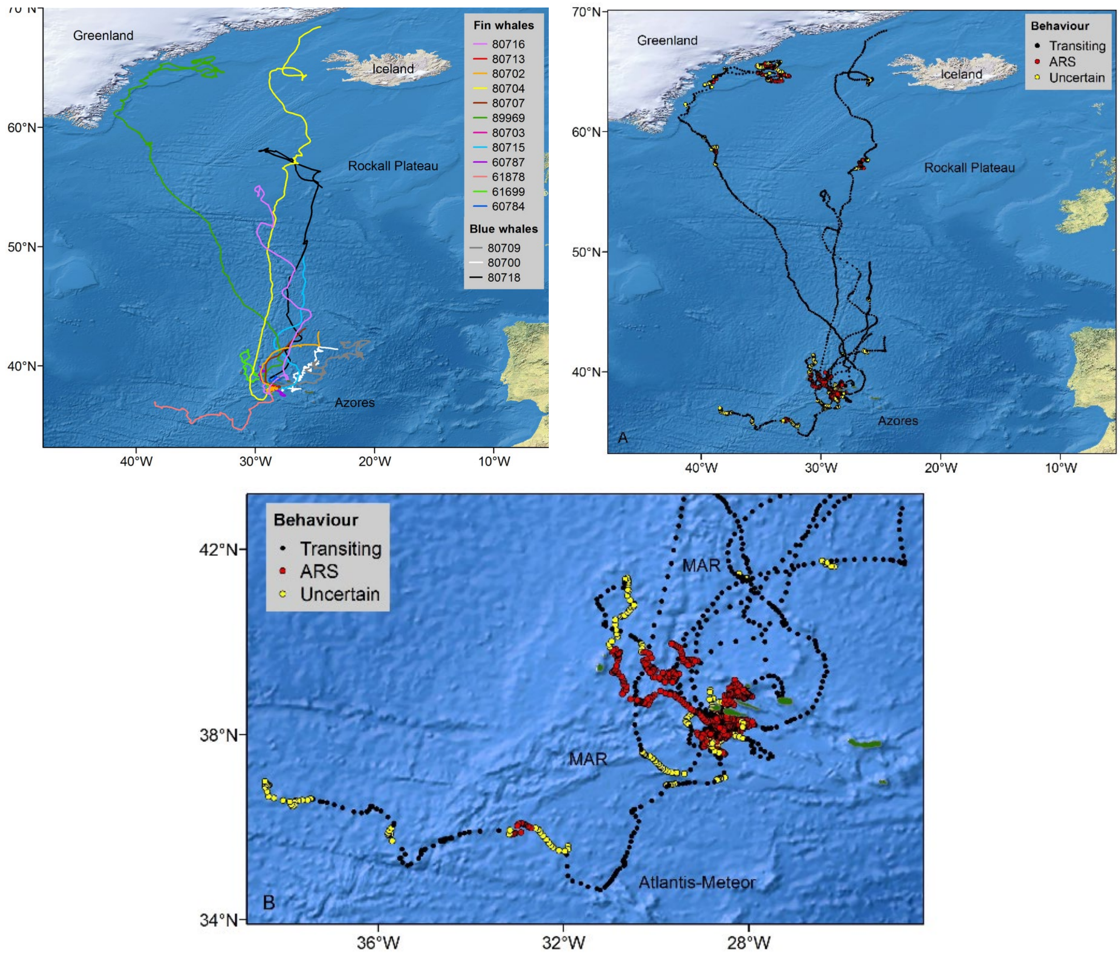

Figure A8.11. *Top left: Movements of* ***Fin Whales*** *(Balaenoptera physalus) and* ***Blue Whales*** *(Balaenoptera musculus) tagged in the Azores. Top right: Derived locations of Fin whales (based on hierarchical switching state-space models) showing inferred behavioural modes (transiting, area restricted movement and uncertain behaviour). Bottom: Details of the tracks at middle latitudes, showing the location of the Mid-Atlantic Ridge (MAR) and the Atlantis-Meteor seamount complex. From Silva et al. (2013)*[23]

[23] Silva et al. (2013). PLOS ONE 8, e76507. doi:10.1371/journal.pone.0076507

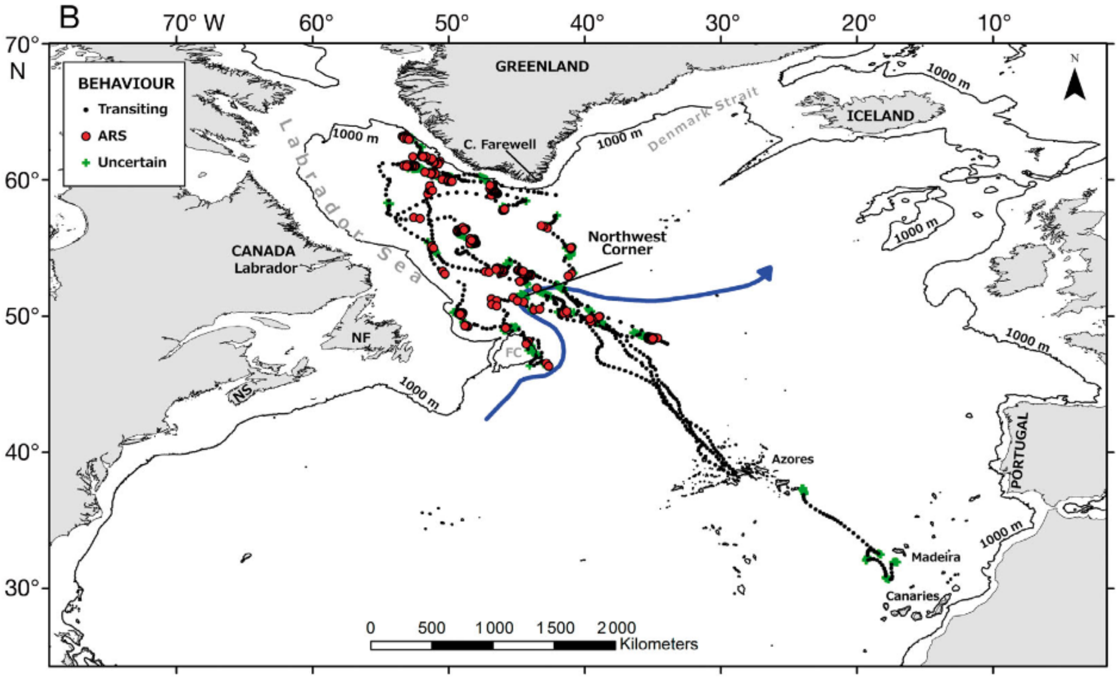

***Figure A8.12** Hierarchical switching state-space model-derived locations of **Sei Whale** (Balaenoptera borealis) showing inferred behavioural modes.*

The thick, blue line is a schematic representation of the main branch of the North Atlantic Current, showing the quasi-stationary large meander known as the 'Northwest Corner' and referred to in the text. ARS: area-restricted search; NS: Nova Scotia; NF: Newfoundland; FC: Flemish Cap. From: Prieto et al. (2014)[24]

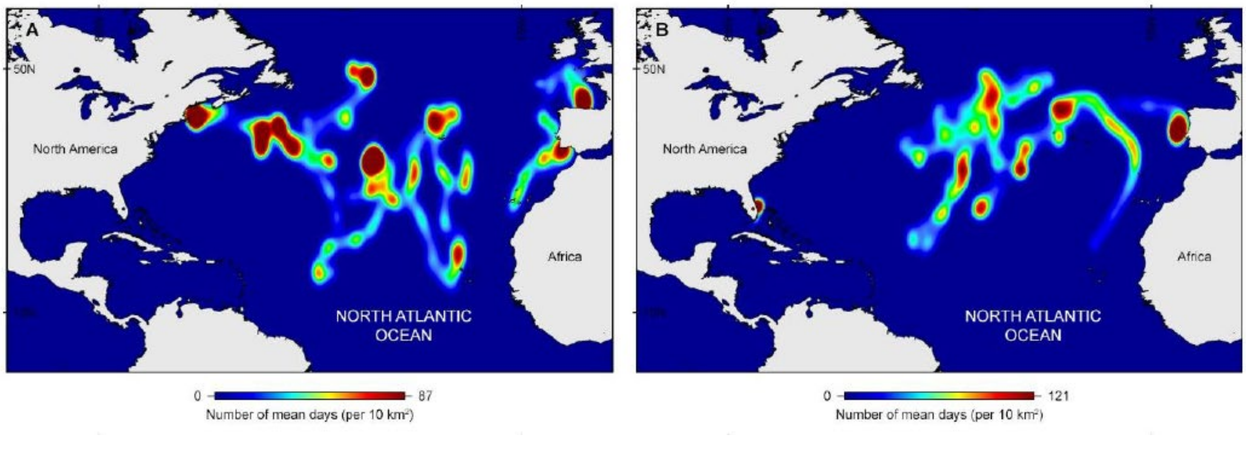

***Figure A8.13.** High species-specific space-use areas calculated for A) **Blue Shark** (Prionace glauca) and B) **Shortfin Mako Shark** (Isurus oxyrinchus).*

The kernel smoothing parameter was kept constant to enable the visual comparison of residence probabilities.From Queiroz et al. (2016)[25]

[24] Prieto et al. (2014). Endangered Species Research 26, 103–113. doi:10.3354/esr00630

[25] Queiroz et al (2016). PNAS 113, 1582–1587. doi:10.1073/pnas.1510090113

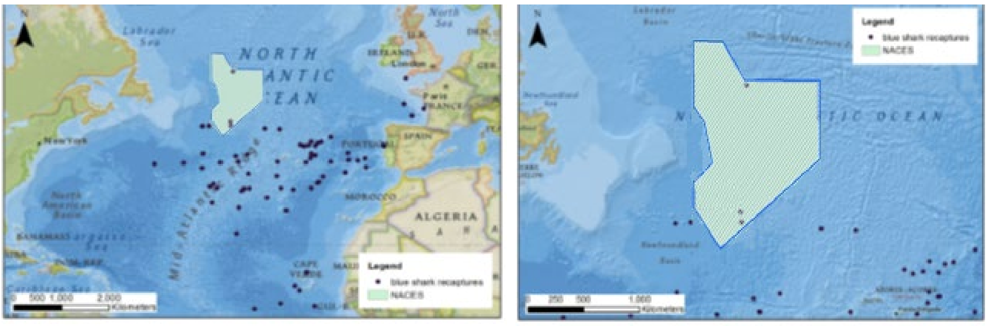

Figure A8.14 *Blue Shark angler-led tag-and-recapture data in the North Atlantic Ocean. Provided by Lucy Mead, University of Edinburgh, during the Seeking Views process. Individuals were tagged off the southeast coast of the UK.*

The information provided also noted that the area is likely an important transitory habitat for movement between the aggregation hotspots of the Mid-Atlantic Ridge and the Azores.
Note, the figure reflects and earlier delineation of the NACES MPA and not the final boundary.

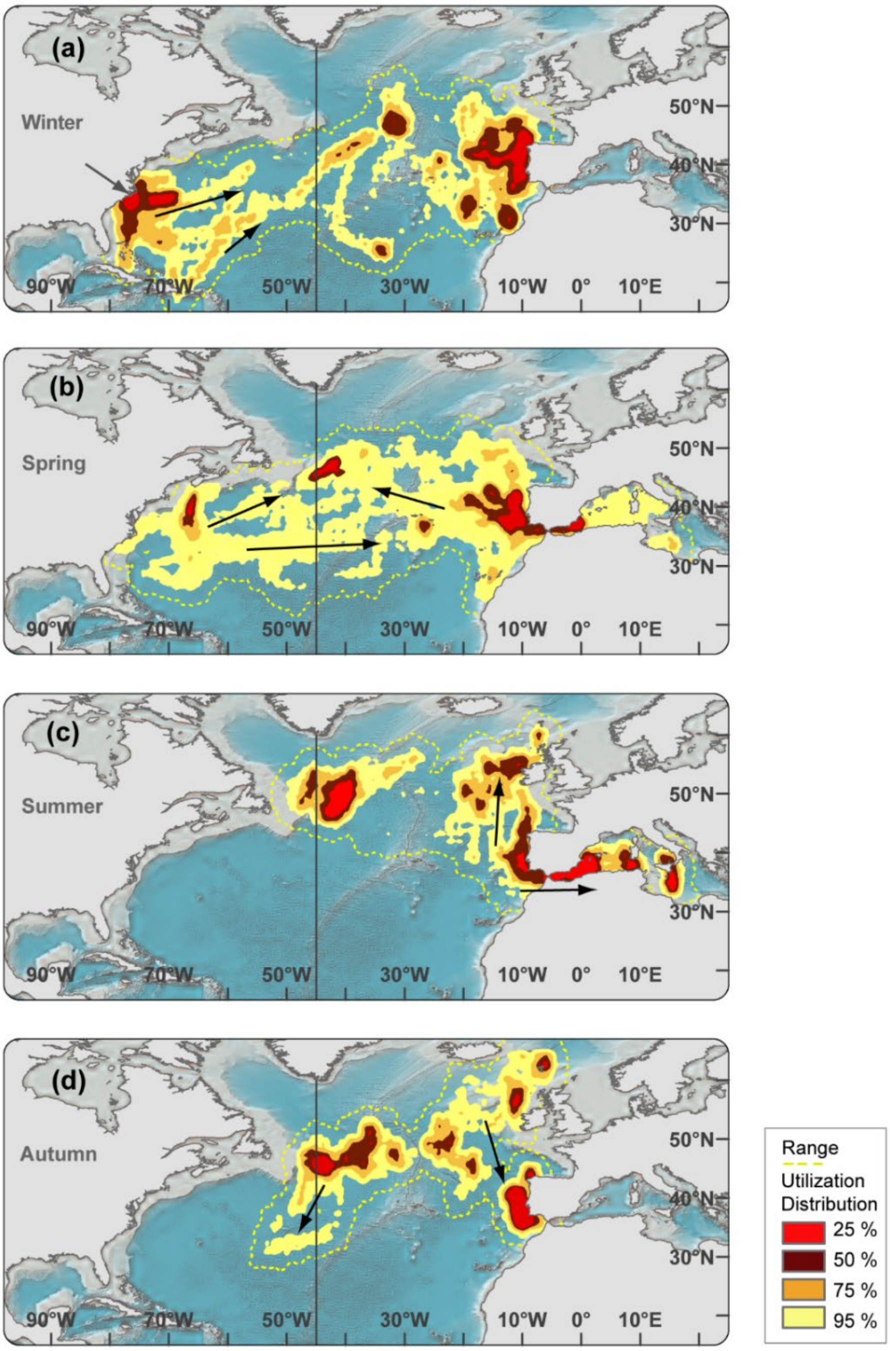

Figure A8.15 *Atlantic Bluefin Tuna Thunnus thynnus (OSPAR-listed species; Global Red List Status: Endangered) foraging area hotspot analysis across seasons. From Walli et al. (2009)*[26]

Transatlantic surveys of seabirds, cetaceans and turtles, July 2013 and July 2018.

Information provided by Ewan Wakefield, University of Glasgow, during the Seeking Views process.

http://eprints.gla.ac.uk/171090/1/171090.pdf

Suggested citation: Wakefield, E.D. 2018. Transatlantic surveys of seabirds, cetaceans, and turtles, July 2013 and July 2018. University of Glasgow, UK 34p.

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[26] Walli et al. (2009). PLOS ONE 4, e6151. doi:10.1371/journal.pone.0006151

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