



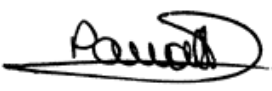




APPENDIX 11-5

APPORTIONING TECHNICAL REPORT

Sceirde Rocks Offshore Wind Farm Technical Appendix 11-5: Offshore Ornithology Connectivity and Apportioning

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Acronyms and abbreviations

Term	Definition
AA	Appropriate Assessment
AIR	Individuals in flight
AOB	Apparently Occupied Burrow
AON	Apparently Occupied Nest
AOS	Apparently Occupied Site
AOT	Apparently Occupied Territory
BDMPS	Biologically Defined Minimum Population Scales
EIA	Environmental Impact Assessment
HiDef	HiDef Aerial Surveying Limited
IND	Individuals
NIS	Natura Impact Statement
SD	Standard Deviation
SEA	Individuals on sea
SMP	Seabird Monitoring Programme
SPA	Special Protection Area

I Introduction

- 1 During the breeding season, many seabird species are central-place foragers, and most individuals recorded at-sea will be breeding adults associated with a breeding colony. A number of these breeding colonies are protected under the European Communities Regulations¹ as Special Protection Areas (SPAs). The marine ornithological assessment for the Sceirde Rocks Offshore Wind Farm Array Area and Offshore Export Cable(s) will focus on the qualifying interests of SPAs.
- 2 In this regard, the process of Appropriate Assessment (AA) applies and is further discussed in the Natura Impact Statement (NIS) (NPWS, 2020). The purpose of this Technical Appendix is to identify which colonies have 'connectivity' with the Offshore Array Area (OAA), addressed in Section 2, and to determine the proportions of birds detected in the OAA that are likely to be coming from each of these colonies ('apportioning', Section 3).
- 3 Connectivity is determined based on the seabird foraging ranges from identified breeding colonies (usually SPAs). The approach is based on advice from NatureScot (2023) as described in Section 2, and results in a 'long-list' of colonies requiring further consideration (Table 2 to Table 14).
- 4 Once connectivity has been determined, apportioning can be undertaken. Apportioning during the breeding season is addressed in Section 3, applying the methodologies discussed in Section 3.1; following NatureScot (2018) guidance.
- 5 Apportioning of non-breeding season impacts against these breeding seabird colonies was undertaken as discussed in Section 4, although currently there is no formal guidance in place to detail any recommended methodologies. Section 4.1 sets out the approach to non-breeding apportioning for species of interest, based on the Method Statement for the East Coast Phase One offshore projects in Ireland (GoBe, 2022).
- 6 The information provided by this Technical Appendix is primarily required to inform the NIS, however, Irish west coast regional breeding populations have also been defined for the purposes of Environmental Impact Assessment (EIA). The regional breeding populations used in this report have been taken from Furness (2015) and adjusted to make the values relevant to Irish populations as described in Section 4.1.
- 7 This Technical Appendix addresses the following species as SPA qualifying interests, recorded at the OAA (Technical Appendix 11-1: Offshore Ornithology Baseline, HiDef, 2024):
 - Manx shearwater (*Puffinus puffinus*);
 - Northern gannet (*Morus bassanus*), hereafter 'gannet';
 - European shag (*Gulosus aristotelis*), hereafter 'shag';
 - Black-legged kittiwake (*Rissa tridactyla*), hereafter 'kittiwake';
 - Common gull (*Larus canus*);
 - Great black-backed gull (*Larus marinus*);
 - Herring gull (*Larus argentatus*);
 - Lesser black-backed gull (*Larus fuscus*);
 - Common tern (*Sterna hirundo*);
 - Arctic tern (*Sterna paradisaea*);
 - Common guillemot (*Uria aalge*), hereafter 'guillemot';

¹ [European Communities \(Birds and Natural Habitats\) Regulations 2011 to 2021 - Unofficial Consolidation \(Updated to 28 July 2022\)\(1\).pdf \(npws.ie\)](#)

- Razorbill (*Alca torda*); and
- Atlantic puffin (*Fratercula arctica*), hereafter 'puffin'.

- 8 Red-throated diver was not recorded in the Array Area or the 4km buffer during baseline surveys, although the species was recorded in the wider 10km buffer area (see Technical Appendix 11-1: Offshore Ornithology Baseline for more details). The nearest SPA for this species is Blacksod Bay/Broad Haven SPA (Site Code: 4037), which is approximately 96km from the Array Area at its nearest point. SNCB guidance states that “for non-breeding red-throated diver, a pragmatic displacement buffer of at least 10 km is recommended for use in site characterisation, impact assessments and post-consent monitoring where a plan or project is within 10km of a SPA designated for non-breeding red-throated diver. Where a plan or project is further than 10km from a SPA designated for non-breeding red-throated diver, a standard displacement buffer of 4km should continue to be used” (SNCBs, 2022). As there are no SPAs for red-throated diver within 10km of the Array Area, a buffer of 4km around the Array Area is appropriate for displacement assessment. However, as no red-throated diver were recorded within the Array Area or the 4km buffer during baseline surveys, no disturbance impacts from the Sceirde Rocks Project on red-throated diver SPA are anticipated. Based on this, this species was not included in either breeding or non-breeding apportioning.
- 9 Additionally, SNCB guidance states that for great northern diver “a standard displacement buffer of 4km should be used (in line with the Joint SNCB Interim Displacement Advice Note, 2017)” (SNCBs, 2022). The nearest SPA for great northern diver is Inner Galway Bay SPA (Site Code: 4031), which is approximately 56km from the Array Area at the nearest point. As the Array Area and 4km buffer is more than 4km from this SPA, this species was also not included in the apportioning.

2 Connectivity in the breeding season

- 11 This Technical Appendix presents the long-list of seabird colonies for each species where connectivity is identified between the colony in question and the OAA.
- 12 Determination of connectivity is based on mean maximum foraging distance (hereafter ‘mean max’) for each species, plus one standard deviation (SD) as calculated by Woodward *et al.* (2019). This information is presented in Table 1 and used to determine the colony long-lists presented in Section 2.1.

Table 1 Species-specific foraging ranges as per Woodward *et al.* (2019)

Species	Mean max (km)	SD (km)	Mean max + 1 SD (km)
Manx shearwater	1,346.8	1,018.7	2,365.5
Gannet	315.2	194.2	509.4
Shag	13.2	10.5	23.7
Kittiwake	156.1	144.5	300.6
Common gull	50.0	n/a	50.0
Great black-backed gull	73.0	n/a	73.0
Herring gull	58.8	26.8	85.6
Lesser black-backed gull	127.0	109.0	236.0
Common tern	18.0	8.9	26.9
Arctic tern	25.7	14.8	40.5
Guillemot	73.2	80.5	153.7
Razorbill	88.7	75.9	164.6
Puffin	137.1	128.3	265.4

2.1 Colony long-lists and breeding populations for each species

- 13 The species-specific colony long-lists are presented in Table 2 to Table 14 below. These tables list the colonies (SPA and non-SPA) which were found to be within the mean max + 1SD foraging range (Table 1) of the Array Area and are presented in alphabetical order. At-sea distances were measured “around the coast” rather than direct distance, from the edge of the Array Area to the points of colony sub-sites found in the Seabird Monitoring Programme (SMP)² and Seabirds Count census databases. The distance to the sub-site with the largest count was used in further analysis (Section 3). Note that inland colonies

² [Seabird Monitoring Programme | JNCC \(bto.org\)](https://jncc.bto.org/)

were included in these lists when present within mean max foraging range + 1SD and distances to such colonies were calculated using straight line distances across land.

- 14 Once the colony long-lists had been created, the colony counts for each site were collated. The most up to date counts for each colony subsite were taken from the SMP database and the Seabirds Count³ census database. Where colony counts were available for both sub-sites and the 'whole' colony, the whole colony count was used unless the sub-site counts were more recent by 10 or more years. Sites with counts less than 5 Apparently Occupied Nests / Territories / Sites (AON / AOT / AOS) were removed if older than 2006.
- 15 Puffin counts made as individuals are equal to Apparently Occupied Burrows (AOB) in late surveys only (i.e., after May 1st). Both the SMP database and the Seabirds Count census data contained surveys later than this date. Counts should therefore follow a precautionary conversion of 1.5 IND = 1 AOB, as explained by Burnell *et al.* (2023). Consequently, puffin counts recorded as individuals in flight (AIR)/individuals on seas (SEA)/individuals (IND) were multiplied by 1.5 to convert counts to AOB (Burnell *et al.*, 2023) before being corrected following the rules below.
- 16 Once the counts had been collated for all species, each count was converted to a count of IND using the following rules:
 - Counts measured as AON, AOS, AOB and AOT were converted into IND by multiplying the counts by 2 for all species other than guillemot and razorbill.
 - For guillemot and razorbill, counts measured in IND were converted into the number of breeding adults expressed as IND by multiplying the counts by 1.34 (Harris, 1989).
- 17 Counts for subsites were then combined to produce colony counts. If the counts from subsites were recorded in different years, the range of years was presented as the 'Count year' in Table 2 to Table 14.
- 18 Species-specific long-lists of colonies are also presented visually through maps in Annex A – Connectivity maps.

³ [Seabirds Count | JNCC - Adviser to Government on Nature Conservation](#)

2.1.1 Manx shearwater

Table 2 Manx shearwater colony long-list and associated breeding population (SPA colonies for which Manx shearwater is a designated feature are highlighted in light grey).

Manx shearwater colonies	Population Count	Count Unit	Count Year
Aberdaron Coast and Bardsey Island SPA	20,675	AOS	2015
Ailsa Craig SPA	20	AOS	2018
Beldog Harbour to Kid Island	30	AOS	2021
Blasket Islands SPA	14,1094	AOS	2016 / 2019 / 2023
Canna and Sanday SPA	6	AOS	2015
Channel Islands	5	AOS	2015
Copeland Islands SPA	4,850	AOS	2015-2021*
Cruagh Island SPA	3,285	AOS	2015-2021*
Deenish Island and Scariiff Island SPA	15,508	AOS	2021
Fetlar SPA	7	AOS	2002
Forth Islands SPA	1	AOS	2015
High Island, Inishshark and Davillaun SPA	868	AOS	2015-2021*
Inishbofin Island	30	AOS	2021
Inishtrahull Island SPA	50	AOS	2021
Inishturk Island	10	AOS	2019
Isle of Eigg (Summer Isles)	250	AOS	2015-2021*
Isles of Scilly SPA	1048	AOS	2015 / 2023
Lambay Island SPA	25	AOS	2015-2021*
Lundy	126,638	AOS	2023
Puffin Island SPA	3,381	AOS	2019
Ramsey and St David's Peninsula Coast SPA	6,225	AOS	2022
Rum SPA	288,894	AOS	2021
Saltee Islands SPA	1,060	AOS	2013 / 2021
Sanda Islands - Kintyre	300	AOS	2015-2021*
Skelligs SPA	573	AOS	2021

Manx shearwater colonies	Population Count	Count Unit	Count Year
Skomer, Skokholm and the Seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro SPA	455,156	AOS	2018
South Island	650	AOS	2019
South West Iona & Soa	1	AOS	2013
St Kilda SPA	3,731	AOS	2019
Stags of Broad Haven SPA	10	AOS	2021
Treshnish Isles SPA	1,992	AOS	2018

*Exact year of count not available in Burnell et al. (2023) or Seabird Counts database.

- 19 Various sites within the foraging range of Manx shearwater were found to have counts of 0, so have not been presented in Table 2 and were not included in breeding and non-breeding season apportioning calculations. These sites included Foula SPA, Hoy SPA, Rathlin Island SPA and Rinns of Islay.

2.1.2 Gannet

Table 3 Gannet colony connectivity long-list and associated breeding populations (SPA colonies for which gannet is a designated feature are highlighted in light grey).

Gannet colonies	Population Count	Count Unit	Count Year
Clare Island SPA	352	AOS	2017
Garvan Islands	30	AON	2016
Mingulay and Berneray SPA	15	AOS	2021
Saltee Islands SPA	4,722	AOS	2014
Skelligs SPA	35,294	AOS	2014
The Bull and The Cow Rocks SPA	6,388	AOS	2014

2.1.3 Shag

Table 4 Shag colony long-list and associated breeding populations.

Shag colonies	Population Count	Count Unit	Count Year
Inishmore SPA	19	AON	2015 / 2016

2.1.4 Kittiwake

Table 5 Kittiwake colony long-list and associated breeding populations (SPA colonies for which kittiwake is a designated feature are highlighted in light grey).

Kittiwake colonies	Population Count	Count Unit	Count Year
Aran Island	161	AON	2018
Aughris Head SPA	527	AON	2015
Beldog Harbour to Kid Island	249	AON	2015
Benaderreen	32	AON	2015
Bills Rocks SPA	43	AON	2018
Blasket Islands SPA	832	AON	2015 / 2016 / 2018 / 2022
Clare Island SPA	840	AON	2015-2018*
Cliffs of Moher SPA	3,981	AON	2016
Downpatrick to Creevagh Heads	1,163	AON	2015 / 2018
High Island, Inishshark and Davillaun SPA	43	AON	2015
Inishmore – not in SPA	5	AON	2015
Inishmore SPA	101	AON	2015
Inishturk Island	79	AON	2015
Iveragh Peninsula SPA	994	AON	2015
Loop Head SPA	1,221	AON	2015
Puffin Island SPA	127	AON	2023
Sheep's Head to Toe Head SPA	661/44	AON / IND	2015 / 2016 / 2018
Skelligs SPA	966	AON	2015 / 2021
Sligo Bay	28	AON	2018
South West Islands	151	AON	2015
Stags of Broad Haven SPA	174	AON	2018
The Bull and The Cow Rocks SPA	150	AON	2016
Tory Island SPA	310	AON	2000 / 2023
West Donegal Coast SPA	500	AON	2018

*Exact year of count not available in Cummins et al. (2019).

2.1.5 Common gull

Table 6 Common gull colony long-list and associated breeding populations (SPA colonies for which common gull is a designated feature are highlighted in light grey).

Common gull colonies	Population Count	Count Unit	Count Year
Connemara – Inland Lakes and Islands	32	AON	2016 / 2017 / 2018
Connemara Bog Complex SPA	139	AON	2001 / 2016 / 2017 / 2018
Inishmore SPA	17	AON	2016
Lough Corrib SPA	17	AON	2017
Slyne Head to Ardmore Point Islands SPA	61	AON	2016

2.1.6 Great black-backed gull

Table 7 Great black-backed gull colony long-list and associated breeding populations.

Great black-backed gull colonies	Population Count	Count Unit	Count Year
Cliffs of Moher SPA	7	AON	2015
Connemara	8	AON	2016
Connemara – Inland Lakes and Islands	13	AON	2016
Connemara Bog Complex SPA	2	AON	2016
Cruagh Island SPA	30	AON	2001
Doolin to Liscannor	2	AON	2016
Friar Island	13	AON	2018
High Island, Inishshark and Davillaun SPA	41	AON	2016 / 2018
Inishmore SPA	108	AON	2016
Inishturk Island	12	AON	2015
Mayo Islands	6	AON	2016
Mutton Island	187	AON	2016
Slyne Head to Ardmore Point Islands SPA	233	AON	2016
South West Islands	43	AON	2016

2.1.7 Herring gull

Table 8 Herring gull colony long-list and associated breeding populations.

Herring gull colonies	Population Count	Count Unit	Count Year
Achill Island	58	AON	2016
Clare Island SPA	7	AON	2015
Clew Bay	1	AON	2016
Cliffs of Moher SPA	56	AON	2015
Connemara	105	AON	2016
Connemara – Inland Lakes and Islands	153	AON	2016 / 2018
Friar Island	16	AON	2018
High Island, Inishshark and Davillaun SPA	11	AON	2016 / 2019
Inishbofin Island	112	AON	2016
Inishmaan	71	AON	2016
Inishmore – not in SPA	24	AON	2016
Inishmore SPA	85	AON	2015 / 2016
Inishturk Island	7	AON	2015
Inner Galway Bay SPA	50	AON	2016
Loop Head Peninsular	58	AON	2015
Loop Head SPA	140	AON	2015 / 2016
Mayo Islands	131	AON	2016 / 2018
Mutton Island	192	AON	2016
North East of Kilkee	20	AON	2002
Slyne Head to Ardmore Point Islands SPA	292	AON	2016
South West Islands	4	AON	2016

2.1.8 Lesser black-backed gull

Table 9 Lesser black-backed gull colony long-list and associated breeding populations (SPA colonies for which lesser black-backed gull is a designated feature are highlighted in light grey).

Lesser black-backed gull colonies	Population Count	Count Unit	Count Year
Achill Island	2	AON	2016
Ardboline Island and Horse Island SPA	80	AON	2016
Beara Peninsula SPA	43	AON	2016
Beldog Harbour to Kid Island	50	AON	2016
Bere Island (Bear Island)	30	AON	2016
Blacksod Bay/Broad Haven SPA	2	AON	2016
Blasket Islands SPA	83	AON	2015-2021*
Carrowmore Lake SPA	5	AON	2015
Clare Island SPA	63	AON	2000 / 2015
Clew Bay	42	AON	2016
Connemara	1	AON	2016
Connemara – Inland Lakes and Islands	33	AON	2016
Deenish Island and Scariff Island SPA	168	AON	2018
Derrynane	22	AON	2018
Dingle Peninsula SPA	17	AON	2016 / 2018
Duvillaun Islands SPA	64	AON	2016 / 2018
Friar Island	3	AON	2018
High Island, Inishshark and Davillaun SPA	38/14	AON / IND	2001 / 2016 / 2018
Illaunonearaun SPA	2	AON	2016
Inishbofin Island	19	AON	2016
Inishglora and Inishkeeragh SPA	83	AON	2015-2021* / 2016
Inishkea Islands SPA	93	AON	2016
Inishmaan	30	AON	2016
Inishmore – not in SPA	23	AON	2016

Lesser black-backed gull colonies	Population Count	Count Unit	Count Year
Inishmore SPA	85	AON	2016
Inishmurray SPA	353	AON	2016
Inishturk Island	49	AON	2019
Inner Galway Bay SPA	5	AON	2016
Iveragh Peninsula SPA	33	AON	2018
Kenmare River and Islands	103	AON	2016
Loop Head Peninsular	2	AON	2015
Loop Head SPA	7	AON	2015 / 2016
Magharee Islands SPA	240	AON	2016
Mattle Island	13	AON	2016
Mayo Islands	80	AON	2016
Mullet Peninsula	2	AON	2016
Mutton Island	82	AON	2016
North West Islands	20	AON	2016
Puffin Island SPA	291	AON	2018
Rathlin O'Birne Island SPA	11	AON	2016
Skelligs SPA	66	AON	2021
Slyne Head to Ardmore Point Islands SPA	86	AON	2016
South West Islands	3	AON	2016

*Exact year of count not available in Burnell et al. (2023) or Seabird Counts database.

2.1.9 Common tern

Table 10 Common tern colony long-list and associated breeding populations.

Common tern colonies	Population Count	Count Unit	Count Year
Connemara	1	AON	2016
Connemara – Inland Lakes and Islands	123	AON	2016 / 2017 / 2018
Inishmore SPA	2	AON	2016
Slyne Head to Ardmore Point Islands SPA	2	AON	2016

2.1.10 Arctic tern

Table 11 Arctic tern colony long-list and associated breeding populations (SPA colonies for which Arctic tern is a designated feature are highlighted in light grey).

Arctic tern colonies	Population Count	Count Unit	Count Year
Connemara – Inland Lakes and Islands	129	AON	2016
Slyne Head to Ardmore Point Islands SPA	123	AON	2016

- 20 Connemara Bog Complex SPA was found to be within the foraging range of Arctic tern but had recorded counts of 0. Due to this, Connemara Bog Complex SPA is not presented in Table 11 or included in breeding and non-breeding season apportioning calculations.

2.1.11 Guillemot

Table 12 Guillemot colony long-list and associated breeding populations (SPA colonies for which guillemot is a designated feature are highlighted in light grey).

Guillemot colonies	Population Count	Count Unit	Count Year
Beldog Harbour to Kid Island	207	IND	2015
Blasket Islands SPA	3,386	IND	2015
Clare Island SPA	2,078	IND	2015-2021*
Clare Island – not in SPA	90	IND	2015
Cliffs of Moher SPA	34,827	IND	2015
High Island, Inishshark and Davillaun SPA	68	IND	2015
Inishmore SPA	5,197	IND	2015
Inishturk Island	1,951	IND	2015
Kerry Head	45	IND	2015
Loop Head SPA	7,709	IND	2016
South West Islands	91	IND	2015
Stags of Broad Haven SPA	1	IND	2015

*Exact year of count not available in Burnell et al. (2023) or Seabird Counts database.

2.1.12 Razorbill

Table 13 Razorbill colony long-list and associated breeding populations (SPA colonies for which razorbill is a designated feature are highlighted in light grey).

Razorbill colonies	Population Count	Count Unit	Count Year
Beldog Harbour to Kid Island	129	IND	2015
Bills Rocks SPA	8	IND	2018
Blasket Islands SPA	752	IND	2015-2021*
Clare Island SPA	618	IND	2015
Cliffs of Moher SPA	4,046	IND	2015
High Island, Inishshark and Davillaun SPA	2	IND	2015
Inishbofin Island	2	IND	2016
Inishmore SPA	487	IND	2015
Inishturk Island	649	IND	2019
Kerry Head SPA	107	IND	2015
Loop Head SPA	137	IND	2016
South West Islands	58	IND	2015
Stags of Broad Haven SPA	29	IND	2015

*Exact year of count not available in Burnell et al. (2023) or Seabird Counts database.

- 21 Dingle Peninsula SPA was found to be within the foraging range of razorbill but had recorded counts of 0. Due to this, Dingle Peninsula SPA is not presented in Table 13 or included in breeding and non-breeding season apportioning calculations.

2.1.13 Puffin

Table 14 Puffin colony long-list and associated breeding populations (SPA colonies for which puffin is a designated feature are highlighted in light grey).

Puffin colonies	Population Count	Count Unit	Count Year
Bills Rocks SPA	150	AOB	2018
Blasket Islands SPA	2,413	AOB	2021
Clare Island SPA	38	AOB	1999
Cliffs of Moher SPA	195	AOB	2015
Illanmaster SPA	250	AOB	2021
Inishturk Island	259	AOB	2015 / 2017
Puffin Island SPA	2,250	AOB	2019
Skelligs SPA	6,808	AOB	2019
Stags of Broad Haven SPA	750	AOB	2021
West Donegal Coast SPA	20	AOB	1987

- 22 Beldog Harbour to Kid Island was found to be within the foraging range of puffin but had recorded counts of 0. Due to this, Beldog Harbour to Kid Island is not presented in Table 14 or included in breeding and non-breeding season apportioning calculations.

3 Apportioning in the breeding season

3.1 Method

- 23 Following the creation of colony long-lists for each species, apportioning is used to determine the proportional weightings between each colony, which will be used to share estimated impacts from the development to the relevant colonies.
- 24 For all species in Table 1, breeding season apportioning has been carried out based on the NatureScot (2018) apportioning approach and calculation, using the programme R (v4.1.3; R Core Team, 2023). The apportioning calculation used the colony counts for each species, as presented in Section 2.1.
- 25 The NatureScot (2018) apportioning calculation is a weighting based on population size (colony count), the distance between the Array Area and the colonies within mean max foraging range + 1 SD (as listed in Section 2.1), and area of sea included in the foraging range.
- 26 The exact points used to measure the distance of each colony from the closest edge of the Array Area differed based on the information available. The distances to SPAs were measured from the closest edge to the centre of the available SPA polygon. For the remaining colonies with counts taken from the SMP database, distances were measured from the closest edge of the Array Area to the sub-site point with the largest breeding population for each species. For counts taken from the Seabirds Count census database, the point presented within the database was used. Distances measured for each species are presented in Table 15 to Table 27. To be biologically meaningful, these are the 'at-sea' distances, i.e., the actual distance the bird flies across water, except for inland colonies, for which straight line distances were used as explained in Section 2.

3.2 Species-specific colony apportioning

- 27 Apportioning determines the weightings to be applied to the different breeding colonies. These weightings have been used to apportion the breeding season collision and displacement mortality estimates for each species (where relevant) to each colony listed. The impacts are modelled and reported in Technical Appendix 11-3: Collision Risk Modelling Technical Report and Technical Appendix 11-2: Seabird Displacement Matrices Technical Report.
- 28 Outputs from the apportioning calculations for each species are provided in Sections 3.2.1 – 3.2.13. The number of individuals (colony population) was always rounded up to the nearest whole number.

3.2.1 Manx shearwater

Table 15 Manx shearwater breeding season apportioning weightings (SPA colonies for which Manx shearwater is a designated feature are highlighted in light grey).

Colony	Distance from Array Area (km)	Colony population (IND)	Apportioning weighting
Blasket Islands SPA	139.0	282,188	0.541
Cruagh Island SPA	38.6	6,570	0.160
Skomer, Skokholm and the Seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro SPA	543.1	910,312	0.114
Rum SPA	511.0	577,788	0.082
Deenish Island and Scariff Island SPA	190.1	31,016	0.032
Lundy	597.7	253,276	0.026
High Island, Inishshark and Davillaun SPA	51.1	1,736	0.025
Puffin Island SPA	167.5	6,762	0.009
Aberdaron Coast and Bardsey Island SPA	648.8	41,350	0.004
Copeland Islands SPA	535.9	9,700	0.001
Inishbofin Island	51.1	60	0.001
Ramsey and St David's Peninsula Coast SPA	571.0	12,450	0.001
Skelligs SPA	176.4	1,146	0.001
St Kilda SPA	551.7	7,462	0.001
Treshnish Isles SPA	468.2	3,984	0.001
Ailsa Craig SPA	517.5	40	0.000
Beldog Harbour to Kid Island	143.1	60	0.000
Canna and Sanday SPA	519.8	12	0.000
Channel Islands	828.5	10	0.000
Fetlar SPA	1,048.1	14	0.000
Forth Islands SPA	1,197.7	2	0.000
Inishtrahull Island SPA	364.2	100	0.000
Inishturk Island	54.7	20	0.000
Isle of Eigg (Summer Isles)	508.6	500	0.000

Colony	Distance from Array Area (km)	Colony population (IND)	Apportioning weighting
Isles of Scilly SPA	557.9	2,096	0.000
Lambay Island SPA	669.5	50	0.000
Saltee Islands SPA	491.9	2,120	0.000
Sanda Islands - Kintyre	487.2	600	0.000
South Island	616.1	1,300	0.000
South West Iona & Soa	462.3	2	0.000
Stags of Broad Haven SPA	143.1	20	0.000

3.2.2 Gannet

Table 16 Gannet breeding season apportioning weightings (SPA colonies for which gannet is a designated feature are highlighted in light grey).

Colony	Distance from Array Area (km)	Colony population (IND)	Apportioning weighting
Skelligs SPA	176.4	70,588	0.806
The Bull and The Cow Rocks SPA	192.4	12,776	0.123
Clare Island SPA	70.7	704	0.053
Saltee Islands SPA	491.9	9,444	0.018
Garvan Islands	364.2	60	0.000
Mingulay and Berneray SPA	457.4	30	0.000

3.2.3 Shag

Table 17 Shag breeding season apportioning weightings.

Colony	Distance from Array Area	Colony population (IND)	Apportioning weighting
Inishmore SPA	16.0	38	1.000

3.2.4 Kittiwake

Table 18 Kittiwake breeding season apportioning weightings (SPA colonies for which kittiwake is a designated feature are highlighted in light grey).

Colony	Distance to Array Area (km)	Colony population (IND)	Apportioning weighting
Cliffs of Moher SPA	42.2	7,962	0.683
Inishmore SPA	16.0	202	0.119
Loop Head SPA	74.8	2,442	0.063
Clare Island SPA	70.7	1,680	0.051
Blasket Islands SPA	139.0	1,664	0.012
Downpatrick to Creevagh Heads	185.3	2,326	0.011
Iveragh Peninsula SPA	171.1	1,988	0.009
South West Islands	70.7	302	0.009
Skelligs SPA	176.4	1,932	0.008
High Island, Inishshark and Davillaun SPA	51.1	86	0.005
Inishturk Island	67.1	158	0.005
Beldog Harbour to Kid Island	143.1	498	0.004
Aughris Head SPA	225.7	1,054	0.003
Sheep's Head to Toe Head SPA	242.4	1,366	0.003
Stags of Broad Haven SPA	143.1	348	0.003
West Donegal Coast SPA	247.7	1,000	0.003
Bills Rocks SPA	76.0	86	0.002
Inishmore – not in SPA	26.1	10	0.002
Aran Island	259.6	322	0.001
Puffin Island SPA	167.5	254	0.001
The Bull and The Cow Rocks SPA	192.4	300	0.001
Tory Island SPA	291.7	620	0.001
Benaderreen	175.2	64	0.000
Sligo Bay	240.0	56	0.000

3.2.5 Common gull

Table 19 Common gull breeding season apportioning weightings (SPA colonies for which common gull is a designated feature are highlighted in light grey).

Colony	Distance from Array Area (km)	Colony population (IND)	Apportioning weighting
Slyne Head to Ardmore Point Islands SPA	6.7	122	0.677
Connemara - Inland Lakes and Islands	10.1	64	0.192
Connemara Bog Complex SPA	38.6	278	0.073
Inishmore SPA	16.0	34	0.039
Lough Corrib SPA	48.7	34	0.018

3.2.6 Great black-backed gull

Table 20 Great black-backed gull breeding season apportioning weightings

Colony	Distance from Array Area (km)	Colony population (IND)	Apportioning weighting
Slyne Head to Ardmore Point Islands SPA	6.7	466	0.869
Inishmore SPA	16.0	216	0.094
Mutton Island	60.6	374	0.014
Connemara - Inland Lakes and Islands	16.0	26	0.011
Cruagh Island SPA	38.6	60	0.003
High Island, Inishshark and Davillaun SPA	51.1	82	0.003
South West Islands	70.7	86	0.002
Cliffs of Moher SPA	42.2	14	0.001
Friar Island	38.6	26	0.001
Inishturk Island	54.7	24	0.001
Connemara	64.8	16	0.000
Connemara Bog Complex SPA	38.6	4	0.000
Doolin to Liscannor	52.3	4	0.000
Mayo Islands	64.8	12	0.000

3.2.7 Herring gull

Table 21 Herring gull breeding season apportioning weightings.

Colony	Distance from Array Area (km)	Colony population (IND)	Apportioning weighting
Slyne Head to Ardmore Point Islands SPA	6.7	584	0.795
Connemara - Inland Lakes and Islands	16.0	306	0.070
Inishmore SPA	16.0	170	0.052
Inishmaan	26.1	142	0.019
Inishmore – not in SPA	16.0	48	0.015
Mutton Island	60.6	384	0.010
Cliffs of Moher SPA	42.2	112	0.007
Connemara	54.7	210	0.005
Inishbofin Island	51.1	224	0.005
Inner Galway Bay SPA	56.5	100	0.005
Mayo Islands	64.8	262	0.005
Loop Head SPA	74.8	280	0.004
Loop Head Peninsular	69.5	116	0.002
Achill Island	83.2	116	0.001
Friar Island	38.6	32	0.001
High Island, Inishshark and Davillaun SPA	51.1	22	0.001
North East of Kilkee	57.0	40	0.001
Clare Island SPA	70.7	14	0.000
Clew Bay	80.8	2	0.000
Inishturk Island	67.1	14	0.000
South West Islands	54.7	8	0.000

3.2.8 Lesser black-backed gull

Table 22 Lesser black-backed gull breeding season apportioning weightings (SPA colonies for which lesser black-backed gull is a designated feature are highlighted in light grey).

Colony	Distance from Array Area (km)	Colony population (IND)	Apportioning weighting
Slyne Head to Ardmore Point Islands SPA	6.7	172	0.692
Inishmore SPA	16.0	170	0.135
Connemara - Inland Lakes and Islands	16.0	66	0.049
Inishmore – not in SPA	16.0	46	0.037
Inishmaan	26.1	60	0.018
Mutton Island	60.6	164	0.009
Magharee Islands SPA	103.3	480	0.008
Mayo Islands	64.8	160	0.008
High Island, Inishshark and Davillaun SPA	51.1	90	0.006
Clare Island SPA	70.7	126	0.005
Inishturk Island	67.1	98	0.004
Inishbofin Island	51.1	38	0.003
Inishkea Islands SPA	100.9	186	0.003
Inishmurray SPA	219.8	706	0.003
Puffin Island SPA	167.5	582	0.003
Clew Bay	102.8	84	0.002
Duvillaun Islands SPA	104.5	128	0.002
Inishglora and Inishkeeragh SPA	117.0	166	0.002
Ardboline Island and Horse Island SPA	225.7	160	0.001
Beldog Harbour to Kid Island	165.1	100	0.001
Blasket Islands SPA	139.0	166	0.001
Deenish Island and Scariff Island SPA	190.1	336	0.001
Friar Island	38.6	6	0.001
Inner Galway Bay SPA	56.5	10	0.001
Kenmare River and Islands	210.3	206	0.001
Mattle Island	60.6	26	0.001

Colony	Distance from Array Area (km)	Colony population (IND)	Apportioning weighting
Skelligs SPA	176.4	132	0.001
Achill Island	83.2	4	0.000
Beara Peninsula SPA	206.1	86	0.000
Bere Island (Bear Island)	226.3	60	0.000
Blacksod Bay/Broad Haven SPA	127.1	4	0.000
Carrowmore Lake SPA	149.1	10	0.000
Connemara	54.7	2	0.000
Derrynane	190.1	44	0.000
Dingle Peninsula SPA	119.3	34	0.000
Illaunonearaun SPA	65.9	4	0.000
Iveragh Peninsula SPA	171.1	66	0.000
Loop Head Peninsular	69.5	4	0.000
Loop Head SPA	74.8	14	0.000
Mullet Peninsula	129.5	4	0.000
North West Islands	129.5	40	0.000
Rathlin O'Birne Island SPA	221.6	22	0.000
South West Islands	67.1	6	0.000

3.2.9 Common tern

Table 23 Common tern breeding season apportioning weightings.

Colony	Distance from Array Area (km)	Colony population (IND)	Apportioning weighting
Connemara - Inland Lakes and Islands	12.5	246	0.949
Slyne Head to Ardmore Point Islands SPA	6.7	4	0.034
Connemara	8.6	2	0.012
Inishmore SPA	16.0	4	0.005

3.2.10 Arctic tern

Table 24 Arctic tern breeding season apportioning weightings (SPA colonies for which Arctic tern is a designated feature are highlighted in light grey).

Colony	Distance from Array Area (km)	Colony population (IND)	Apportioning weighting
Slyne Head to Ardmore Point Islands SPA	6.7	246	0.842
Connemara - Inland Lakes and Islands	16.0	258	0.158

3.2.11 Guillemot

Table 25 Guillemot breeding season apportioning weightings (SPA colonies for which guillemot is a designated feature are highlighted in light grey).

Colony	Distance from Array Area (km)	Colony population (IND)	Apportioning weighting
Cliffs of Moher SPA	42.2	46,669	0.522
Inishmore SPA	16.0	6,964	0.432
Loop Head SPA	74.8	10,331	0.025
Inishturk Island	54.7	2,615	0.010
Clare Island SPA	70.7	2,785	0.006
Blasket Islands SPA	139.0	4,538	0.002
Beldog Harbour to Kid Island	143.1	278	0.000
Clare Island - not in SPA	70.7	121	0.000
High Island, Inishshark and Davillaun SPA	51.1	92	0.000
Kerry Head SPA	87.3	61	0.000
South West Islands	70.7	122	0.000
Stags of Broad Haven SPA	143.1	2	0.000

3.2.12 Razorbill

Table 26 Razorbill breeding season apportioning weightings (SPA colonies for which razorbill is a designated feature are highlighted in light grey).

Colony	Distance from Array Area (km)	Colony population (IND)	Apportioning weighting
Cliffs of Moher SPA	42.2	5,422	0.549
Inishmore SPA	16.0	653	0.384
Inishturk Island	54.7	870	0.032
Clare Island SPA	70.7	829	0.019
Blasket Islands SPA	139.0	1,008	0.005
Loop Head SPA	74.8	184	0.004
Kerry Head SPA	87.3	144	0.002
South West Islands	70.7	78	0.002
Beldog Harbour to Kid Island	143.1	173	0.001
Bills Rocks SPA	76.0	11	0.000
High Island, Inishshark and Davillaun SPA	51.1	3	0.000
Inishbofin Island	51.1	3	0.000
Stags of Broad Haven SPA	143.1	39	0.000

3.2.13 Puffin

Table 27 Puffin breeding season apportioning weightings (SPA colonies for which puffin is a designated feature are highlighted in light grey).

Colony	Distance from Array Area (km)	Colony population (IND)	Apportioning weighting
Skelligs SPA	176.4	13,616	0.299
Cliffs of Moher SPA	42.2	390	0.186
Blasket Islands SPA	139.0	4,826	0.176
Puffin Island SPA	167.5	4,500	0.111
Inishturk Island	67.1	518	0.097
Stags of Broad Haven SPA	143.1	1,500	0.059
Bills Rocks SPA	76.0	300	0.043
Illanmaster SPA	165.1	500	0.015
Clare Island SPA	70.7	75	0.012
West Donegal Coast SPA	247.7	39	0.001

4 Apportioning in the non-breeding season

- 29 Approaches to non-breeding season apportioning are an evolving process and there is currently no formal guidance or agreed methodology for undertaking such calculations. The work of Furness (2015) reports Biologically Defined Minimum Population Scales (BDMPS) in the non-breeding season which defines the geographic scale over which seabirds may range during this time when they are no longer tied to their breeding colonies. In this regard, most assessments carried out for offshore wind farms to date, consider non-breeding season seabird impacts against total BDMPS populations and do not attempt to apportion them.
- 30 There have been, however, ongoing discussions about whether to try and assign such non-breeding season impacts back to the summer breeding colonies (usually SPAs). While no formal guidance on the matter has yet been issued, a Method Statement was prepared by GoBe (2022) on behalf of the East Coast Irish Phase I Projects. Therefore, non-breeding apportioning has been undertaken following GoBe (2022), for all key species identified other than red-throated and great northern divers.

4.1 Method

- 31 In order to calculate the non-breeding season weightings for each colony the following formula was used:

$$\text{Weighting} = \frac{\text{Designated site population size}}{\text{Regional population size}} \times \text{Proportion of population that remain during season}$$

- 32 The designated population size for each colony was the sum of the number of adult individuals (Table 15 to Table 27) and the estimated number of immature individuals at each colony. The number of immature individuals was estimated by multiplying the number of adult individuals by the adult:immature ratio reported in Horswill and Robinson (2015). The number of individuals was always rounded up to the nearest whole number.
- 33 The regional population size for all species, excluding common gull, were calculated using the BDMPS regions defined by Furness (2015). To make these estimates relevant to Irish waters, the Republic of Ireland component for each region (as defined in Furness (2015)) was removed and replaced with the breeding population estimated in Burnell *et al.* (2023) for north and west coast counties between County Donegal and Mizen Head in County Cork. Counts from Burnell *et al.* (2023) were then corrected to include immature individuals using the adult:immature ratio from Horswill and Robinson (2015). The population sizes calculated for each step in this process are shown in Table 29.
- 34 In the non-breeding season, common gulls from Europe move into the UK and Ireland, resulting in a large wintering population, although the Irish winter population is not known. A review of SPA sites in Ireland concluded that based on the best available information, including breeding population data and peak winter counts, the all-Ireland wintering common gull population is likely to account for less than 1% of the biogeographic population, which was considered to be 1,300,000 – 2,100,000 birds (Dept of Arts, Heritage and the Gaeltacht, 2013).
- 35 The mid-point of this bio-geographic population is 1,700,000 birds, which would mean that 1% of this figure would equate to 17,000 birds, indicating that the all-Ireland wintering common gull population would likely be below this figure.

- 36 Alternatively, Crowe (2005) reported that the Irish common gull winter population has previously been estimated at 7,000 individuals plus “many thousands” of immigrants from elsewhere in Europe, resulting in a range of 18,050 individuals based on I-WeBS data⁴, up to 67,500 birds in the original 1981-83 Winter Atlas. The recent five-year mean number of wintering common gulls recorded on I-WeBS surveys between 2011/12 and 2015/16 was 21,438 birds, with a five-year peak over the same period of 30,216 birds (Lewis *et al.*, 2019).
- 37 To estimate a regional non-breeding population for the north and west coasts of Ireland, mean I-WeBS counts for sites that regularly supported 500 or more common gulls between 2011/12 and 2015/16 (Lewis *et al.*, 2019), were summed (Table 28). It should be noted that this is likely to be an under-estimate of the overall number of common gulls in the region in the non-breeding season, as sites that held less than 500 birds were not included. In addition, common gulls are an optional recording species for I-WeBS surveys, so are likely to be under-counted.

Table 28 Mean counts of common gulls from north and west coast I-WeBS sites between 2011/12 and 2015/16 (Lewis *et al.*, 2019).

Site	Year mean peak ((2011/12-2015/16, individuals)
Lough Foyle (Londonderry)	4,819
Lough Swilly (Donegal)	1,844
Inner Galway Bay (Galway)	1,215
Clew Bay (Mayo)	587
Total	8,465

- 38 The figure of 8,465 birds has therefore been considered as the minimum regional winter population for common gull for this assessment.
- 39 For all species, the proportion of a population that remains during the non-breeding season was assumed to be 1, as reliable estimates could not be made due to the lack of available information.

⁴ <https://birdwatchireland.ie/our-work/surveys-research/research-surveys/irish-wetland-bird-survey/>

Table 29 UK and Irish components used to calculate the regional population estimates used during non-breeding season apportioning. Republic of Ireland adult estimates were taken from Burnell et al. (2023) and the ratio of adults:immatures were taken from Horswill and Robinson (2015). Final regional population estimates are rounded up to the nearest whole number.

Species	Relevant UK BDMPS Region	BDMPS period	BDMPS estimate excluding Republic of Ireland component	Republic of Ireland adult estimates	Ratio of adults: immatures	Estimate of immature birds	Final regional population estimate
Manx shearwater	UK Western waters plus Channel	Autumn migration	1,572,158	266,270	1.132	301,418	2,139,846
		Spring migration	1,572,158	266,270	1.132	301,418	2,139,846
Gannet	UK Western waters	Autumn migration	514,058	84,068	0.761	63,976	662,102
		Spring migration	622,792	84,068	0.761	63,976	770,836
Shag	West of Scotland	Non-breeding season	37,311	7,156	0.792	5,668	50,135
Kittiwake	UK Western waters plus Channel	Autumn migration	892,546	28,028	0.898	25,169	945,743
		Spring migration	672,486	28,028	0.898	25,169	725,683
Common gull*	-	-	-	-	-	-	8,465
Great black-backed gull	West of Scotland	Non-breeding season	32,972	3,836	1.538	5,900	42,708
Herring gull	UK Western waters	Non-breeding season	165,869	10,478	1.370	14,355	190,702
		Autumn migration	159,230	8,010	0.876	7,017	174,257

Species	Relevant UK BDMPS Region	BDMPS period	BDMPS estimate excluding Republic of Ireland component	Republic of Ireland adult estimates	Ratio of adults: immatures	Estimate of immature birds	Final regional population estimate
Lesser black-backed gull	UK Western waters	Winter	39,381	8,010	0.876	7,017	54,408
		Spring migration	159,230	8,010	0.876	7,017	174,257
Common tern	UK Western waters	Autumn migration	61,052	1,844	0.701	1,293	64,189
		Spring migration	61,052	1,844	0.701	1,293	64,189
Arctic tern	UK Western waters	Autumn migration	69,028	3,296	0.511	1,684	74,008
		Spring migration	69,028	3,296	0.511	1,684	74,008
Guillemot	UK Western waters	Non-breeding season	1,139,220	77,149	0.916	70,668	1,287,037
Razorbill	UK Western waters	Autumn migration	600,964	16,119	0.876	14,120	631,203
		Winter	335,472	16,119	0.876	14,120	365,711
		Spring migration	600,964	16,119	0.876	14,120	631,203
Puffin	UK Western waters	Non-breeding season	296,397	26,276	0.842	22,124	344,797

**For common gull, the final regional population estimate was calculated using a different method described in Section 4.1 of this report.*

4.2 Species-specific non-breeding season apportioning

4.2.1 Manx shearwater

Table 30 Apportioning results for Manx shearwater during autumn migration and the population sizes used to calculate them.

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Skomer, Skokholm and the Seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro SPA	910,312	1,030,474	1,940,786	2,139,846	0.907
Rum SPA	577,788	654,057	1,231,845	2,139,846	0.576
Blasket Islands SPA	282,188	319,437	601,625	2,139,846	0.281
Lundy	253,276	286,709	539,985	2,139,846	0.252
Aberdaron Coast and Bardsey Island SPA	41,350	46,809	88,159	2,139,846	0.041
Deenish Island and Scariff Island SPA	31,016	35,111	66,127	2,139,846	0.031
Ramsey and St David's Peninsula Coast SPA	12,450	14,094	26,544	2,139,846	0.012
Copeland Islands SPA	9,700	10,981	20,681	2,139,846	0.010
Cruagh Island SPA	6,570	7,438	14,008	2,139,846	0.007
Puffin Island SPA	6,762	7,655	14,417	2,139,846	0.007
St Kilda SPA	7,462	8,447	15,909	2,139,846	0.007
Treshnish Isles SPA	3,984	4,510	8,494	2,139,846	0.004
High Island, Inishshark and Davillaun SPA	1,736	1,966	3,702	2,139,846	0.002

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Isles of Scilly SPA	2,096	2,373	4,469	2,139,846	0.002
Saltee Islands SPA	2,120	2,400	4,520	2,139,846	0.002
Sanda Islands - Kintyre	600	680	1,280	2,139,846	0.001
Skelligs SPA	1,146	1,298	2,444	2,139,846	0.001
South Island	1,300	1,472	2,772	2,139,846	0.001
Ailsa Craig SPA	40	46	86	2,139,846	0.000
Beldog Harbour to Kid Island	60	68	128	2,139,846	0.000
Canna and Sanday SPA	12	14	26	2,139,846	0.000
Channel Islands	10	12	22	2,139,846	0.000
Fetlar SPA	14	16	30	2,139,846	0.000
Forth Islands SPA	2	3	5	2,139,846	0.000
Inishbofin Island	60	68	128	2,139,846	0.000
Inishtrahull Island SPA	100	114	214	2,139,846	0.000
Inishturk Island	20	23	43	2,139,846	0.000
Isle of Eigg (Summer Isles)	500	566	1,066	2,139,846	0.000
Lambay Island SPA	50	57	107	2,139,846	0.000
South West Iona & Soa	2	3	5	2,139,846	0.000
Stags of Broad Haven SPA	20	23	43	2,139,846	0.000

Table 31 Appportioning results for Manx shearwater during spring migration and the populations used to calculate them.

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Skomer, Skokholm and the Seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro SPA	910,312	1,030,474	1,940,786	2,139,846	0.907
Rum SPA	577,788	654,057	1,231,845	2,139,846	0.576
Blasket Islands SPA	282,188	319,437	601,625	2,139,846	0.281
Lundy	253,276	286,709	539,985	2,139,846	0.252
Aberdaron Coast and Bardsey Island SPA	41,350	46,809	88,159	2,139,846	0.041
Deenish Island and Scariff Island SPA	31,016	35,111	66,127	2,139,846	0.031
Ramsey and St David's Peninsula Coast SPA	12,450	14,094	26,544	2,139,846	0.012
Copeland Islands SPA	9,700	10,981	20,681	2,139,846	0.010
Cruagh Island SPA	6,570	7,438	14,008	2,139,846	0.007
Puffin Island SPA	6,762	7,655	14,417	2,139,846	0.007
St Kilda SPA	7,462	8,447	15,909	2,139,846	0.007
Treshnish Isles SPA	3,984	4,510	8,494	2,139,846	0.004
High Island, Inishshark and Davillaun SPA	1,736	1,966	3,702	2,139,846	0.002
Isles of Scilly SPA	2,096	2,373	4,469	2,139,846	0.002
Saltee Islands SPA	2,120	2,400	4,520	2,139,846	0.002

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Sanda Islands - Kintyre	600	680	1,280	2,139,846	0.001
Skelligs SPA	1,146	1,298	2,444	2,139,846	0.001
South Island	1,300	1,472	2,772	2,139,846	0.001
Ailsa Craig SPA	40	46	86	2,139,846	0.000
Beldog Harbour to Kid Island	60	68	128	2,139,846	0.000
Canna and Sanday SPA	12	14	26	2,139,846	0.000
Channel Islands	10	12	22	2,139,846	0.000
Fetlar SPA	14	16	30	2,139,846	0.000
Forth Islands SPA	2	3	5	2,139,846	0.000
Inishbofin Island	60	68	128	2,139,846	0.000
Inishtrahull Island SPA	100	114	214	2,139,846	0.000
Inishturk Island	20	23	43	2,139,846	0.000
Isle of Eigg (Summer Isles)	500	566	1,066	2,139,846	0.000
Lambay Island SPA	50	57	107	2,139,846	0.000
South West Iona & Soa	2	3	5	2,139,846	0.000
Stags of Broad Haven SPA	20	23	43	2,139,846	0.000

4.2.2 Gannet

Table 32 Apportioning results for gannet during autumn migration and the population sizes used to calculate them.

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Skelligs SPA	70,588	53,718	124,306	662,102	0.188
The Bull and The Cow Rocks SPA	12,776	9,723	22,499	662,102	0.034
Saltee Islands SPA	9,444	7,187	16,631	662,102	0.025
Clare Island SPA	704	536	1,240	662,102	0.002
Garvan Islands	60	46	106	662,102	0.000
Mingulay and Berneray SPA	30	23	53	662,102	0.000

Table 33 Apportioning results for gannet during spring migration and the population sizes used to calculate them.

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Skelligs SPA	70,588	53,718	124,306	770,836	0.161
The Bull and The Cow Rocks SPA	12,776	9,723	22,499	770,836	0.029
Saltee Islands SPA	9,444	7,187	16,631	770,836	0.022
Clare Island SPA	704	536	1,240	770,836	0.002
Garvan Islands	60	46	106	770,836	0.000
Mingulay and Berneray SPA	30	23	53	770,836	0.000

4.2.3 Shag

Table 34 Non-breeding season apportioning results for shag and the population sizes used to calculate them.

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Inishmore SPA	38	31	69	50,135	0.001

4.2.4 Kittiwake

Table 35 Apportioning results for kittiwake during autumn migration and the population sizes used to calculate them.

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Cliffs of Moher SPA	7,962	7,150	15,112	945,743	0.016
Downpatrick to Creevagh Heads	2,326	2,089	4,415	945,743	0.005
Loop Head SPA	2,442	2,193	4,635	945,743	0.005
Iveragh Peninsula SPA	1,988	1,786	3,774	945,743	0.004
Skelligs SPA	1,932	1,735	3,667	945,743	0.004
Blasket Islands SPA	1,664	1,495	3,159	945,743	0.003
Clare Island SPA	1,680	1,509	3,189	945,743	0.003
Sheep's Head to Toe Head SPA	1,366	1,227	2,593	945,743	0.003
Aughris Head SPA	1,054	947	2,001	945,743	0.002
West Donegal Coast SPA	1,000	898	1,898	945,743	0.002
Aran Island	322	290	612	945,743	0.001
Beldog Harbour to Kid Island	498	448	946	945,743	0.001
Puffin Island SPA	254	229	483	945,743	0.001
South West Islands	302	272	574	945,743	0.001
Stags of Broad Haven SPA	348	313	661	945,743	0.001
The Bull and The Cow Rocks SPA	300	270	570	945,743	0.001

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Tory Island SPA	620	557	1 177	945,743	0.001
Benaderreen	64	58	122	945,743	0.000
Bills Rocks SPA	86	78	164	945,743	0.000
High Island, Inishshark and Davillaun SPA	86	78	164	945,743	0.000
Inishmore – not in SPA	10	9	19	945,743	0.000
Inishmore SPA	202	182	384	945,743	0.000
Inishturk Island	158	142	300	945,743	0.000
Sligo Bay	56	51	107	945,743	0.000

Table 36 Apportioning results for kittiwake during spring migration and the population sizes used to calculate them.

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Cliffs of Moher SPA	7,962	7,150	15,112	725,683	0.021
Downpatrick to Creevagh Heads	2,326	2,089	4,415	725,683	0.006
Loop Head SPA	2,442	2,193	4,635	725,683	0.006
Iveragh Peninsula SPA	1,988	1,786	3,774	725,683	0.005
Skelligs SPA	1,932	1,735	3,667	725,683	0.005
Blasket Islands SPA	1,664	1,495	3,159	725,683	0.004
Clare Island SPA	1,680	1,509	3,189	725,683	0.004
Sheep's Head to Toe Head SPA	1,366	1,227	2,593	725,683	0.004
Aughris Head SPA	1,054	947	2,001	725,683	0.003
West Donegal Coast SPA	1,000	898	1,898	725,683	0.003
Tory Island SPA	620	557	1,177	725,683	0.002
Aran Island	322	290	612	725,683	0.001
Beldog Harbour to Kid Island	498	448	946	725,683	0.001
Inishmore SPA	202	182	384	725,683	0.001
Puffin Island SPA	254	229	483	725,683	0.001
South West Islands	302	272	574	725,683	0.001
Stags of Broad Haven SPA	348	313	661	725,683	0.001
The Bull and The Cow Rocks SPA	300	270	570	725,683	0.001

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Benaderreen	64	58	122	725,683	0.000
Bills Rocks SPA	86	78	164	725,683	0.000
High Island, Inishshark and Davillaun SPA	86	78	164	725,683	0.000
Inishmore – not in SPA	10	9	19	725,683	0.000
Inishturk Island	158	142	300	725,683	0.000
Sligo Bay	56	51	107	725,683	0.000

4.2.5 Common gull

Table 37 Non-breeding season apportioning results for common gull and the population sizes used to calculate them.

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Connemara Bog Complex SPA	278	126	404	8,465	0.048
Slyne Head to Ardmore Point Islands SPA	122	56	178	8,465	0.021
Connemara - Inland Lakes and Islands	64	29	93	8,465	0.011
Inishmore SPA	34	16	50	8,465	0.006
Lough Corrib SPA	34	16	50	8,465	0.006

4.2.6 Great black-backed gull

Table 38 Non-breeding season apportioning results for great black-backed gull and the populations used to calculate them.

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Slyne Head to Ardmore Point Islands SPA	466	717	1,183	42,708	0.028
Mutton Island	374	576	950	42,708	0.022
Inishmore SPA	216	333	549	42,708	0.013
High Island, Inishshark and Davillaun SPA	82	127	209	42,708	0.005
South West Islands	86	133	219	42,708	0.005
Cruagh Island SPA	60	93	153	42,708	0.004
Connemara - Inland Lakes and Islands	26	40	66	42,708	0.002
Friar Island	26	40	66	42,708	0.002
Cliffs of Moher SPA	14	22	36	42,708	0.001
Connemara	16	25	41	42,708	0.001
Inishturk Island	24	37	61	42,708	0.001
Mayo Islands	12	19	31	42,708	0.001
Connemara Bog Complex SPA	4	7	11	42,708	0.000
Doolin to Liscannor	4	7	11	42,708	0.000

4.2.7 Herring gull

Table 39 Non-breeding season apportioning results for herring gull and the population sizes used to calculate them.

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Slyne Head to Ardmore Point Islands SPA	584	801	1,385	190,702	0.007
Mutton Island	384	527	911	190,702	0.005
Connemara - Inland Lakes and Islands	306	420	726	190,702	0.004
Connemara	210	288	498	190,702	0.003
Inishbofin Island	224	307	531	190,702	0.003
Loop Head SPA	280	384	664	190,702	0.003
Mayo Islands	262	359	621	190,702	0.003
Inishmaan	142	195	337	190,702	0.002
Inishmore SPA	170	233	403	190,702	0.002
Achill Island	116	159	275	190,702	0.001
Cliffs of Moher SPA	112	154	266	190,702	0.001
Inishmore – not in SPA	48	66	114	190,702	0.001
Inner Galway Bay SPA	100	137	237	190,702	0.001
Loop Head Peninsular	116	159	275	190,702	0.001
Clare Island SPA	14	20	34	190,702	0.000
Clew Bay	2	3	5	190,702	0.000

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Friar Island	32	44	76	190,702	0.000
High Island, Inishshark and Davillaun SPA	22	31	53	190,702	0.000
Inishturk Island	14	20	34	190,702	0.000
North East of Kilkee	40	55	95	190,702	0.000
South West Islands	8	11	19	190,702	0.000

4.2.8 Lesser black-backed gull

Table 40 Apportioning results for lesser black-backed gull during autumn migration and the population sizes used to calculate them.

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Inishmurray SPA	706	619	1,325	174,257	0.008
Puffin Island SPA	582	510	1,092	174,257	0.006
Magharee Islands SPA	480	421	901	174,257	0.005
Deenish Island and Scariff Island SPA	336	295	631	174,257	0.004
Ardboline Island and Horse Island SPA	160	141	301	174,257	0.002
Blasket Islands SPA	166	146	312	174,257	0.002
Inishglora and Inishkeeragh SPA	166	146	312	174,257	0.002
Inishkea Islands SPA	186	163	349	174,257	0.002
Inishmore SPA	170	149	319	174,257	0.002
Kenmare River and Islands	206	181	387	174,257	0.002
Mayo Islands	160	141	301	174,257	0.002
Mutton Island	164	144	308	174,257	0.002
Slyne Head to Ardmore Point Islands SPA	172	151	323	174,257	0.002
Beara Peninsula SPA	86	76	162	174,257	0.001
Beldog Harbour to Kid Island	100	88	188	174,257	0.001
Bere Island (Bear Island)	60	53	113	174,257	0.001

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Clare Island SPA	126	111	237	174,257	0.001
Clew Bay	84	74	158	174,257	0.001
Connemara - Inland Lakes and Islands	66	58	124	174,257	0.001
Duvillaun Islands SPA	128	113	241	174,257	0.001
High Island, Inishshark and Davillaun SPA	90	79	169	174,257	0.001
Inishmaan	60	53	113	174,257	0.001
Inishturk Island	98	86	184	174,257	0.001
Iveragh Peninsula SPA	66	58	124	174,257	0.001
Skelligs SPA	132	116	248	174,257	0.001
Achill Island	4	4	8	174,257	0.000
Blacksod Bay/Broad Haven SPA	4	4	8	174,257	0.000
Carrowmore Lake SPA	10	9	19	174,257	0.000
Connemara	2	2	4	174,257	0.000
Derrynane	44	39	83	174,257	0.000
Dingle Peninsula SPA	34	30	64	174,257	0.000
Friar Island	6	6	12	174,257	0.000
Illaunonearaun SPA	4	4	8	174,257	0.000
Inishbofin Island	38	34	72	174,257	0.000
Inishmore – not in SPA	46	41	87	174,257	0.000

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Inner Galway Bay SPA	10	9	19	174,257	0.000
Loop Head Peninsular	4	4	8	174,257	0.000
Loop Head SPA	14	13	27	174,257	0.000
Mattle Island	26	23	49	174,257	0.000
Mullet Peninsula	4	4	8	174,257	0.000
North West Islands	40	36	76	174,257	0.000
Rathlin O'Birne Island SPA	22	20	42	174,257	0.000
South West Islands	6	6	12	174,257	0.000

Table 41 Apportioning results for lesser black-backed gull during spring migration and the population sizes used to calculate them.

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Inishmurray SPA	706	619	1325	174257	0.008
Puffin Island SPA	582	510	1092	174257	0.006
Magharee Islands SPA	480	421	901	174257	0.005
Deenish Island and Scariff Island SPA	336	295	631	174257	0.004
Ardboline Island and Horse Island SPA	160	141	301	174257	0.002
Blasket Islands SPA	166	146	312	174257	0.002
Inishglora and Inishkeeragh SPA	166	146	312	174257	0.002
Inishkea Islands SPA	186	163	349	174257	0.002
Inishmore SPA	170	149	319	174257	0.002
Kenmare River and Islands	206	181	387	174257	0.002
Mayo Islands	160	141	301	174257	0.002
Mutton Island	164	144	308	174257	0.002
Slyne Head to Ardmore Point Islands SPA	172	151	323	174257	0.002
Beara Peninsula SPA	86	76	162	174257	0.001
Beldog Harbour to Kid Island	100	88	188	174257	0.001
Bere Island (Bear Island)	60	53	113	174257	0.001

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Clare Island SPA	126	111	237	174257	0.001
Clew Bay	84	74	158	174257	0.001
Connemara - Inland Lakes and Islands	66	58	124	174257	0.001
Duvillaun Islands SPA	128	113	241	174257	0.001
High Island, Inishshark and Davillaun SPA	90	79	169	174257	0.001
Inishmaan	60	53	113	174257	0.001
Inishturk Island	98	86	184	174257	0.001
Iveragh Peninsula SPA	66	58	124	174257	0.001
Skelligs SPA	132	116	248	174257	0.001
Achill Island	4	4	8	174257	0
Blacksod Bay/Broad Haven SPA	4	4	8	174257	0
Carrowmore Lake SPA	10	9	19	174257	0
Connemara	2	2	4	174257	0
Derrynane	44	39	83	174257	0
Dingle Peninsula SPA	34	30	64	174257	0
Friar Island	6	6	12	174257	0
Illaunonearaun SPA	4	4	8	174257	0

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Inishbofin Island	38	34	72	174257	0
Inishmore – not in SPA	46	41	87	174257	0
Inner Galway Bay SPA	10	9	19	174257	0
Loop Head Peninsular	4	4	8	174257	0
Loop Head SPA	14	13	27	174257	0
Mattle Island	26	23	49	174257	0
Mullet Peninsula	4	4	8	174257	0
North West Islands	40	36	76	174257	0
Rathlin O'Birne Island SPA	22	20	42	174257	0
South West Islands	6	6	12	174257	0

Table 42 Apportioning results for lesser black-backed gull during winter and the population sizes used to calculate them.

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Inishmurray SPA	706	619	1,325	54,408	0.024
Puffin Island SPA	582	510	1,092	54,408	0.020
Magharee Islands SPA	480	421	901	54,408	0.017
Deenish Island and Scariff Island SPA	336	295	631	54,408	0.012
Kenmare River and Islands	206	181	387	54,408	0.007
Ardboline Island and Horse Island SPA	160	141	301	54,408	0.006
Blasket Islands SPA	166	146	312	54,408	0.006
Inishglora and Inishkeeragh SPA	166	146	312	54,408	0.006
Inishkea Islands SPA	186	163	349	54,408	0.006
Inishmore SPA	170	149	319	54,408	0.006
Mayo Islands	160	141	301	54,408	0.006
Mutton Island	164	144	308	54,408	0.006
Slyne Head to Ardmore Point Islands SPA	172	151	323	54,408	0.006
Skelligs SPA	132	116	248	54,408	0.005
Clare Island SPA	126	111	237	54,408	0.004
Duvillaun Islands SPA	128	113	241	54,408	0.004

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Beara Peninsula SPA	86	76	162	54,408	0.003
Beldog Harbour to Kid Island	100	88	188	54,408	0.003
Clew Bay	84	74	158	54,408	0.003
High Island, Inishshark and Davillaun SPA	90	79	169	54,408	0.003
Inishturk Island	98	86	184	54,408	0.003
Bere Island (Bear Island)	60	53	113	54,408	0.002
Connemara - Inland Lakes and Islands	66	58	124	54,408	0.002
Derrynane	44	39	83	54,408	0.002
Inishmaan	60	53	113	54,408	0.002
Inishmore – not in SPA	46	41	87	54,408	0.002
Iveragh Peninsula SPA	66	58	124	54,408	0.002
Dingle Peninsula SPA	34	30	64	54,408	0.001
Inishbofin Island	38	34	72	54,408	0.001
Mattle Island	26	23	49	54,408	0.001
North West Islands	40	36	76	54,408	0.001
Rathlin O'Birne Island SPA	22	20	42	54,408	0.001
Achill Island	4	4	8	54,408	0.000

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Blacksod Bay/Broad Haven SPA	4	4	8	54,408	0.000
Carrowmore Lake SPA	10	9	19	54,408	0.000
Connemara	2	2	4	54,408	0.000
Friar Island	6	6	12	54,408	0.000
Illaunonearaun SPA	4	4	8	54,408	0.000
Inner Galway Bay SPA	10	9	19	54,408	0.000
Loop Head Peninsular	4	4	8	54,408	0.000
Loop Head SPA	14	13	27	54,408	0.000
Mullet Peninsula	4	4	8	54,408	0.000
South West Islands	6	6	12	54,408	0.000

4.2.9 Common tern

Table 43 Apportioning results for common tern during autumn migration and the population sizes used to calculate them.

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Connemara - Inland Lakes and Islands	246	173	419	64,189	0.007
Connemara	2	2	4	64,189	0.000
Inishmore SPA	4	3	7	64,189	0.000
Slyne Head to Ardmore Point Islands SPA	4	3	7	64,189	0.000

Table 44 Apportioning results for common tern during spring migration and the population sizes used to calculate them.

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Connemara - Inland Lakes and Islands	246	173	419	64,189	0.007
Connemara	2	2	4	64,189	0.000
Inishmore SPA	4	3	7	64,189	0.000
Slyne Head to Ardmore Point Islands SPA	4	3	7	64,189	0.000

4.2.10 Arctic tern

Table 45 Apportioning results for gannet during autumn migration and the population sizes used to calculate them.

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Connemara – Inland Lakes and Islands	258	132	390	74,008	0.005
Slyne Head to Ardmore Point Islands SPA	246	126	372	74,008	0.005

Table 46 Apportioning results for Arctic tern during spring migration and the population sizes used to calculate them.

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Connemara – Inland Lakes and Islands	258	132	390	74008	0.005
Slyne Head to Ardmore Point Islands SPA	246	126	372	74008	0.005

4.2.11 Guillemot

Table 47 Non-breeding season apportioning results for guillemot during and the population sizes used to calculate them.

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Cliffs of Moher SPA	46,669	42,749	89,418	1,287,037	0.069
Loop Head SPA	10,331	9,464	19,795	1,287,037	0.015
Inishmore SPA	6,964	6,380	13,344	1,287,037	0.010
Blasket Islands SPA	4,538	4,157	8,695	1,287,037	0.007
Clare Island SPA	2,785	2,552	5,337	1,287,037	0.004
Inishturk Island	2,615	2,396	5,011	1,287,037	0.004
Beldog Harbour to Kid Island	278	255	533	1,287,037	0.000
Clare Island - not in SPA	121	111	232	1,287,037	0.000
High Island, Inishshark and Davillaun SPA	92	85	177	1,287,037	0.000
Kerry Head SPA	61	56	117	1,287,037	0.000
South West Islands	122	112	234	1,287,037	0.000
Stags of Broad Haven SPA	2	2	4	1,287,037	0.000

4.2.12 Razorbill

Table 48 Apportioning results for razorbill during autumn migration and the population sizes used to calculate them.

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Cliffs of Moher SPA	5,422	4,750	10,172	631,203	0.016
Blasket Islands SPA	1,008	884	1,892	631,203	0.003
Inishturk Island	870	763	1,633	631,203	0.003
Clare Island SPA	829	727	1,556	631,203	0.002
Inishmore SPA	653	573	1,226	631,203	0.002
Beldog Harbour to Kid Island	173	152	325	631,203	0.001
Loop Head SPA	184	162	346	631,203	0.001
Bills Rocks SPA	11	10	21	631,203	0.000
High Island, Inishshark and Davillaun SPA	3	3	6	631,203	0.000
Inishbofin Island	3	3	6	631,203	0.000
Kerry Head SPA	144	127	271	631,203	0.000
South West Islands	78	69	147	631,203	0.000
Stags of Broad Haven SPA	39	35	74	631,203	0.000

Table 49 Apportioning results for razorbill during spring migration and the population sizes used to calculate them.

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Cliffs of Moher SPA	5,422	4,750	10,172	631,203	0.016
Blasket Islands SPA	1,008	884	1,892	631,203	0.003
Inishturk Island	870	763	1,633	631,203	0.003
Clare Island SPA	829	727	1,556	631,203	0.002
Inishmore SPA	653	573	1,226	631,203	0.002
Beldog Harbour to Kid Island	173	152	325	631,203	0.001
Loop Head SPA	184	162	346	631,203	0.001
Bills Rocks SPA	11	10	21	631,203	0.000
High Island, Inishshark and Davillaun SPA	3	3	6	631,203	0.000
Inishbofin Island	3	3	6	631,203	0.000
Kerry Head SPA	144	127	271	631,203	0.000
South West Islands	78	69	147	631,203	0.000
Stags of Broad Haven SPA	39	35	74	631,203	0.000

Table 50 Apportioning results for razorbill during winter and the population sizes used to calculate them.

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Cliffs of Moher SPA	5,422	4,750	10,172	365,711	0.028
Blasket Islands SPA	1,008	884	1,892	365,711	0.005
Clare Island SPA	829	727	1,556	365,711	0.004
Inishturk Island	870	763	1,633	365,711	0.004
Inishmore SPA	653	573	1,226	365,711	0.003
Beldog Harbour to Kid Island	173	152	325	365,711	0.001
Kerry Head SPA	144	127	271	365,711	0.001
Loop Head SPA	184	162	346	365,711	0.001
Bills Rocks SPA	11	10	21	365,711	0.000
High Island, Inishshark and Davillaun SPA	3	3	6	365,711	0.000
Inishbofin Island	3	3	6	365,711	0.000
South West Islands	78	69	147	365,711	0.000
Stags of Broad Haven SPA	39	35	74	365,711	0.000

4.2.13 Puffin

Table 51 Non-breeding season apportioning results for puffin and the population sizes used to calculate them.

Colony	Designated population			Regional population	Weighting
	Adults	Immatures	Total		
Skelligs SPA	13,616	11,465	25,081	344,797	0.073
Blasket Islands SPA	4,826	4,064	8,890	344,797	0.026
Puffin Island SPA	4,500	3,789	8,289	344,797	0.024
Stags of Broad Haven SPA	1,500	1,263	2,763	344,797	0.008
Illanmaster SPA	500	421	921	344,797	0.003
Inishturk Island	518	437	955	344,797	0.003
Bills Rocks SPA	300	253	553	344,797	0.002
Cliffs of Moher SPA	390	329	719	344,797	0.002
Clare Island SPA	75	64	139	344,797	0.000
West Donegal Coast SPA	39	33	72	344,797	0.000

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6 Annex A – Connectivity maps

Figure 1 Colonies (red) within Manx shearwater's mean max foraging range (Woodward et al., 2019; blue) from the Array Area (black).

Manx shearwater (1346.8 + 1018.7km)

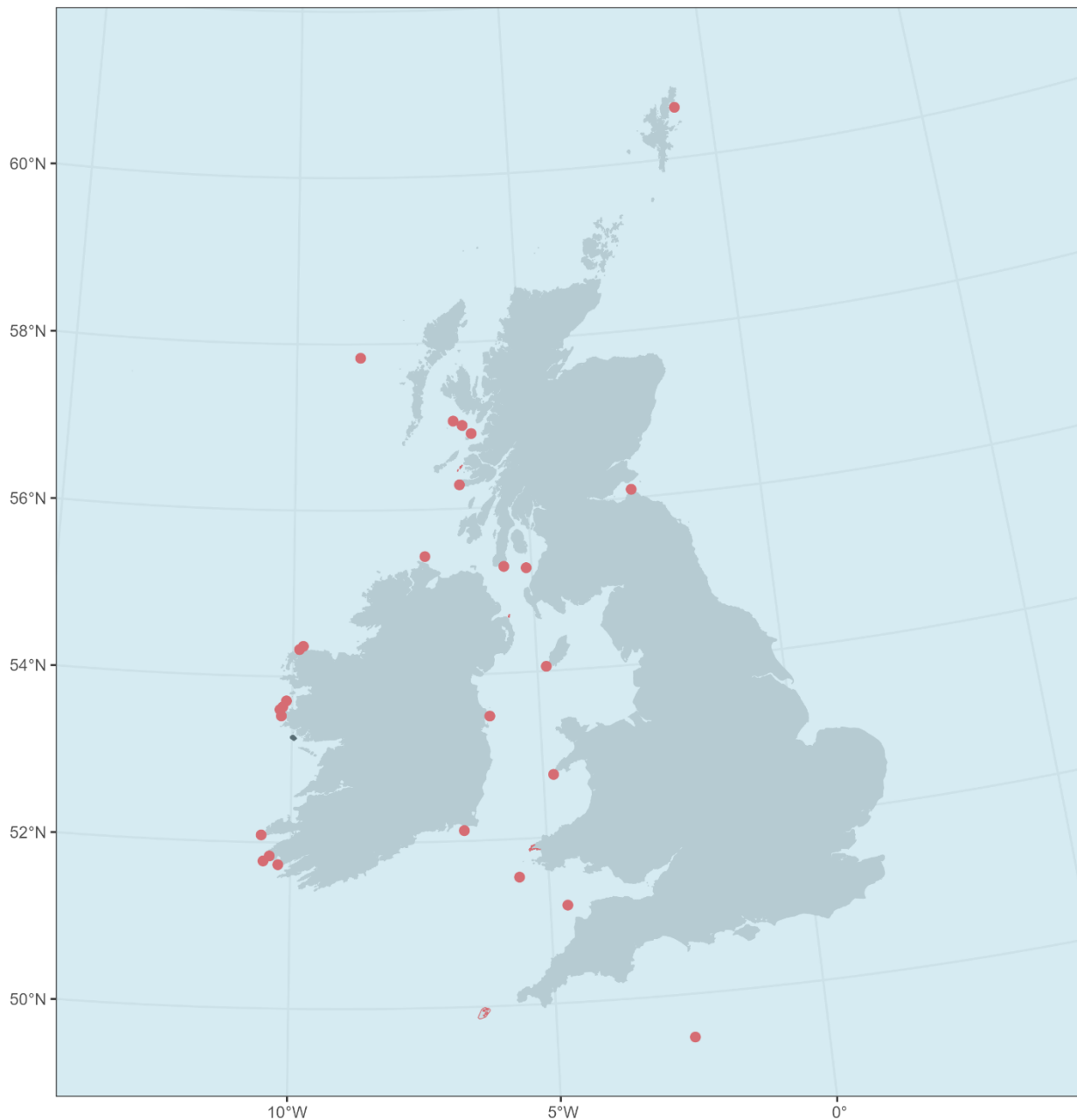


Figure 2 Colonies (red) within gannet's mean max foraging range (Woodward et al., 2019; blue) from the Array Area (black).

Northern gannet ($315.2 \pm 194.2\text{km}$)

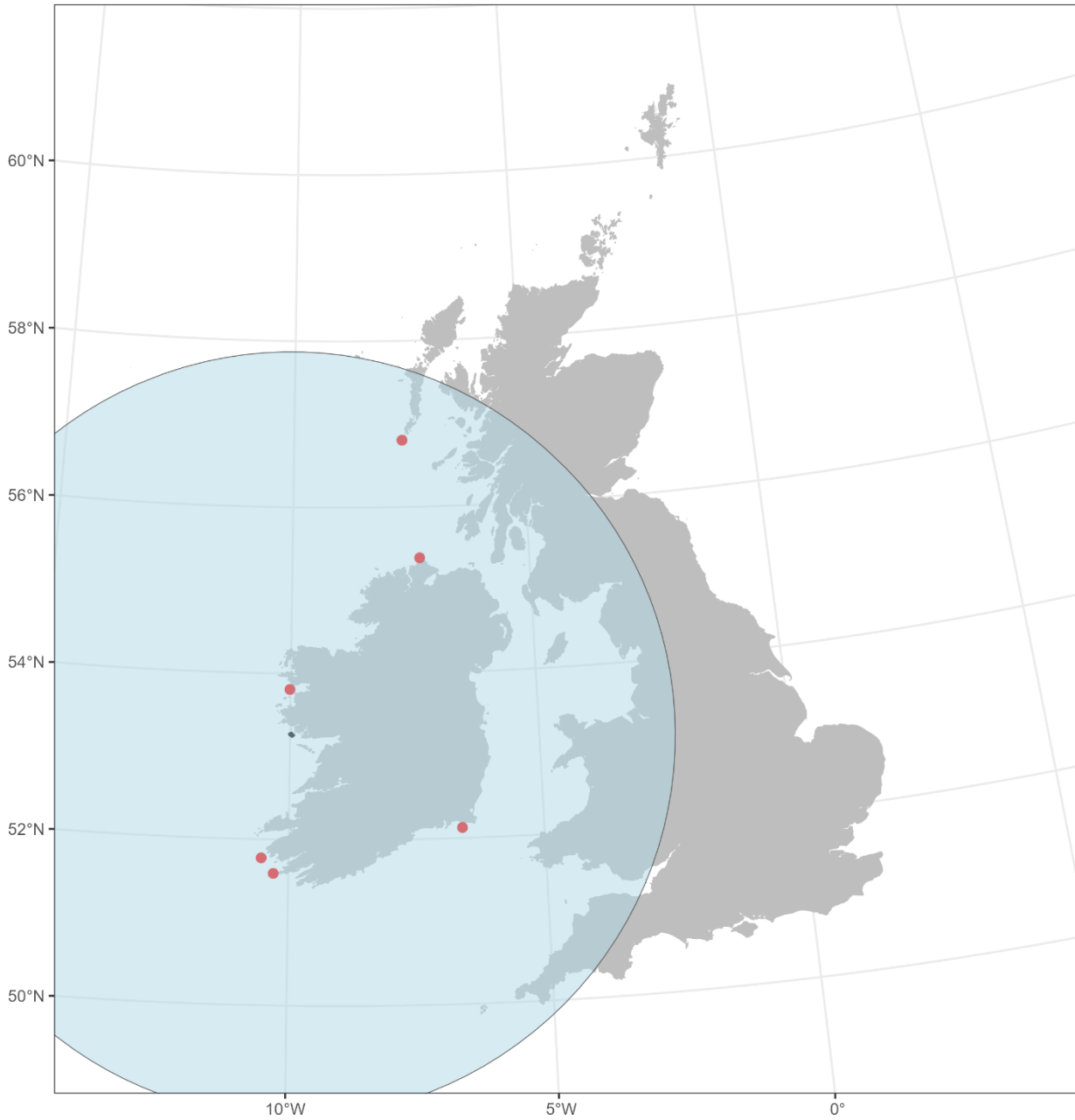


Figure 3 Colonies (red) within shag's mean max foraging range (Woodward et al., 2019; blue) from the Array Area (black).

European shag ($13.2 \pm 10.5\text{km}$)



Figure 4 Colonies (red) within kittiwake's mean max foraging range (Woodward *et al.*, 2019; blue) from the Array Area (black).

Black-legged kittiwake (156.1 + 144.5km)

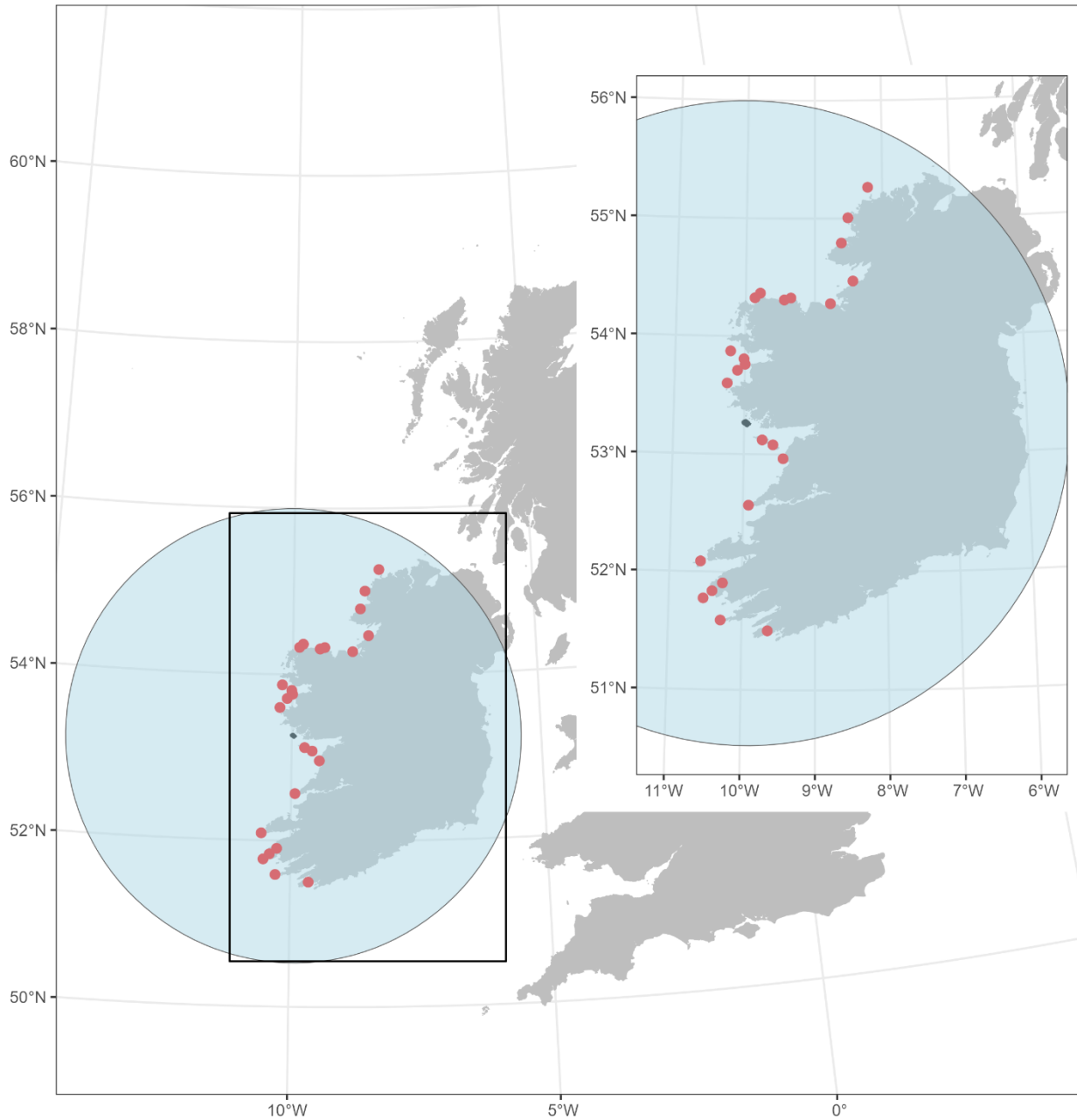


Figure 5 Colonies (red) within common gull's mean max foraging range (Woodward et al., 2019; blue) from the Array Area (black).

Common gull (50 + 0km)

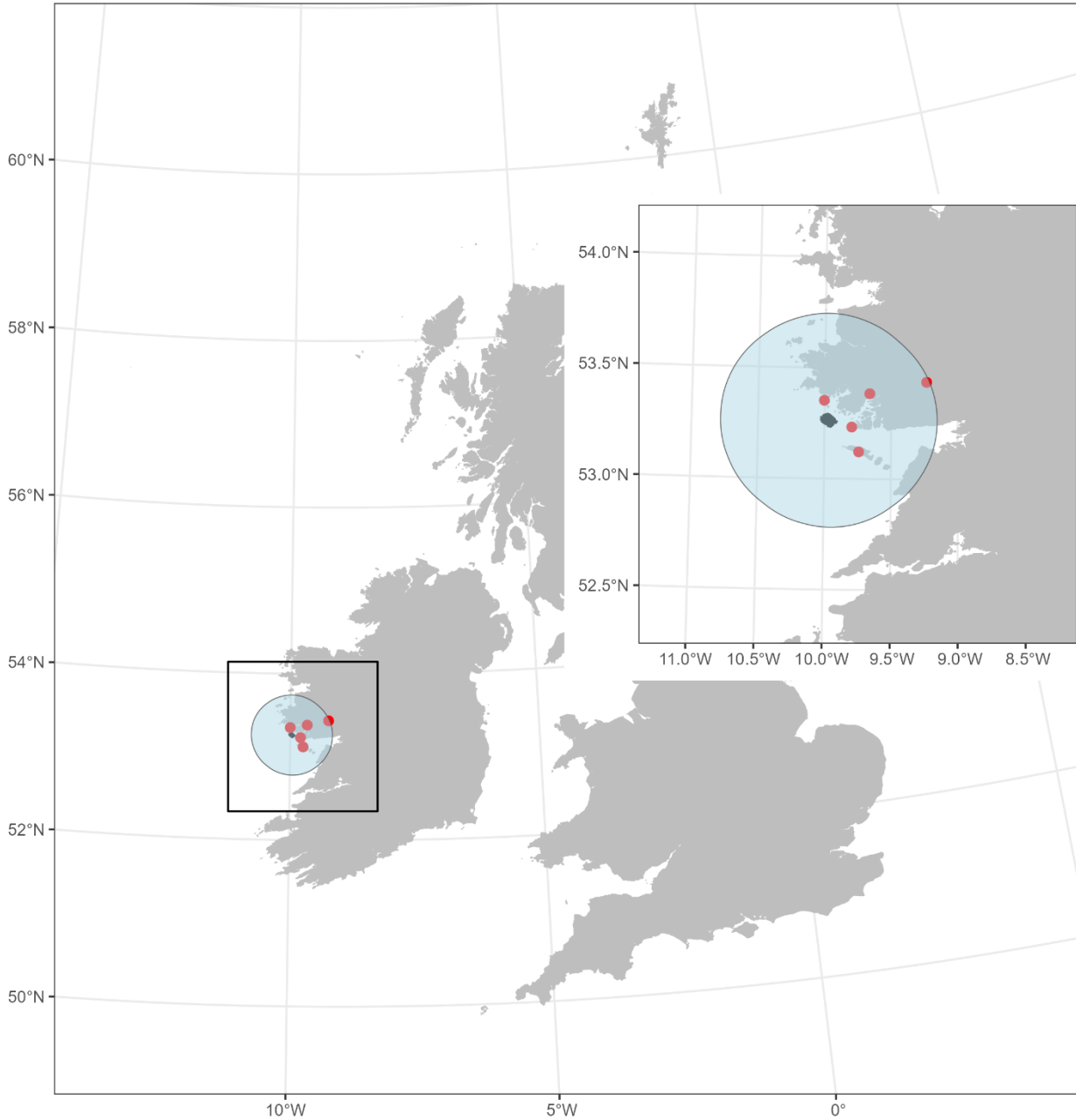


Figure 6 Colonies (red) within great black-backed gull's mean max foraging range (Woodward et al., 2019; blue) from the Array Area (black).

Great black-backed gull (73 + 0km)

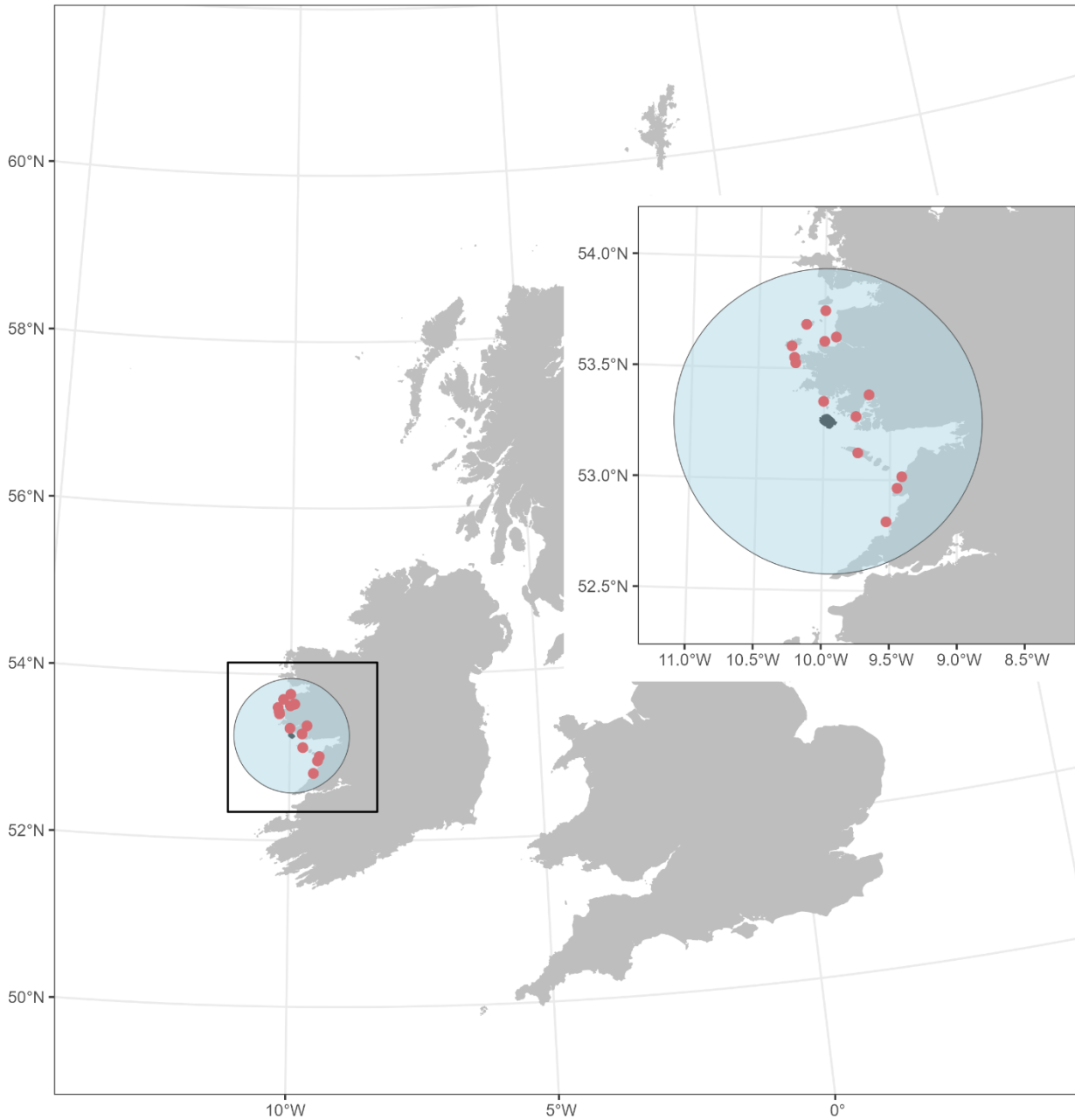


Figure 7 Colonies (red) within herring gull's mean max foraging range (Woodward et al., 2019; blue) from the Array Area (black).

Herring gull (58.8 + 26.8km)

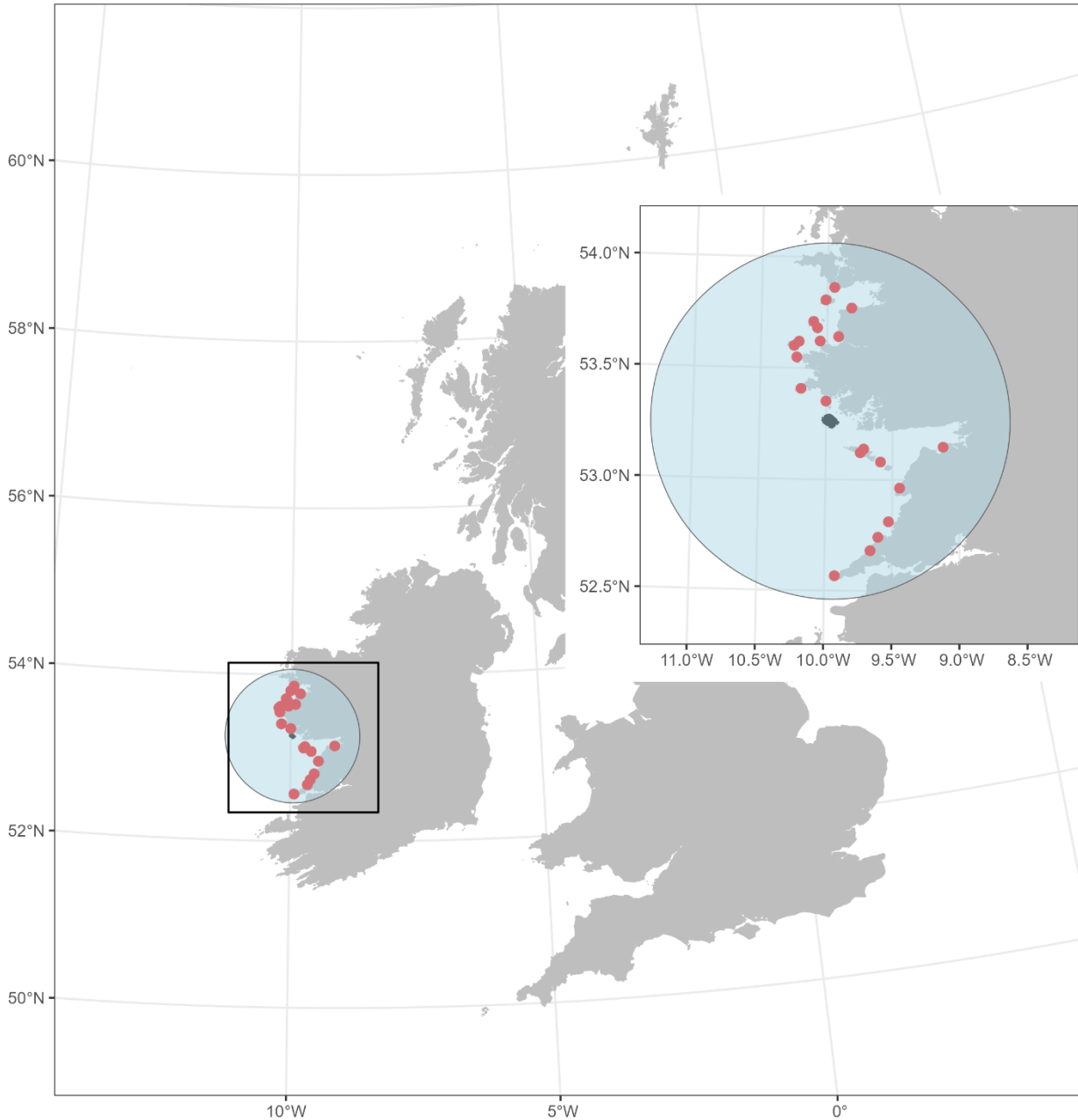


Figure 8 Colonies (red) within lesser black-backed gull's mean max foraging range (Woodward et al., 2019; blue) from the Array Area (black).

Lesser black-backed gull (127 + 109km)

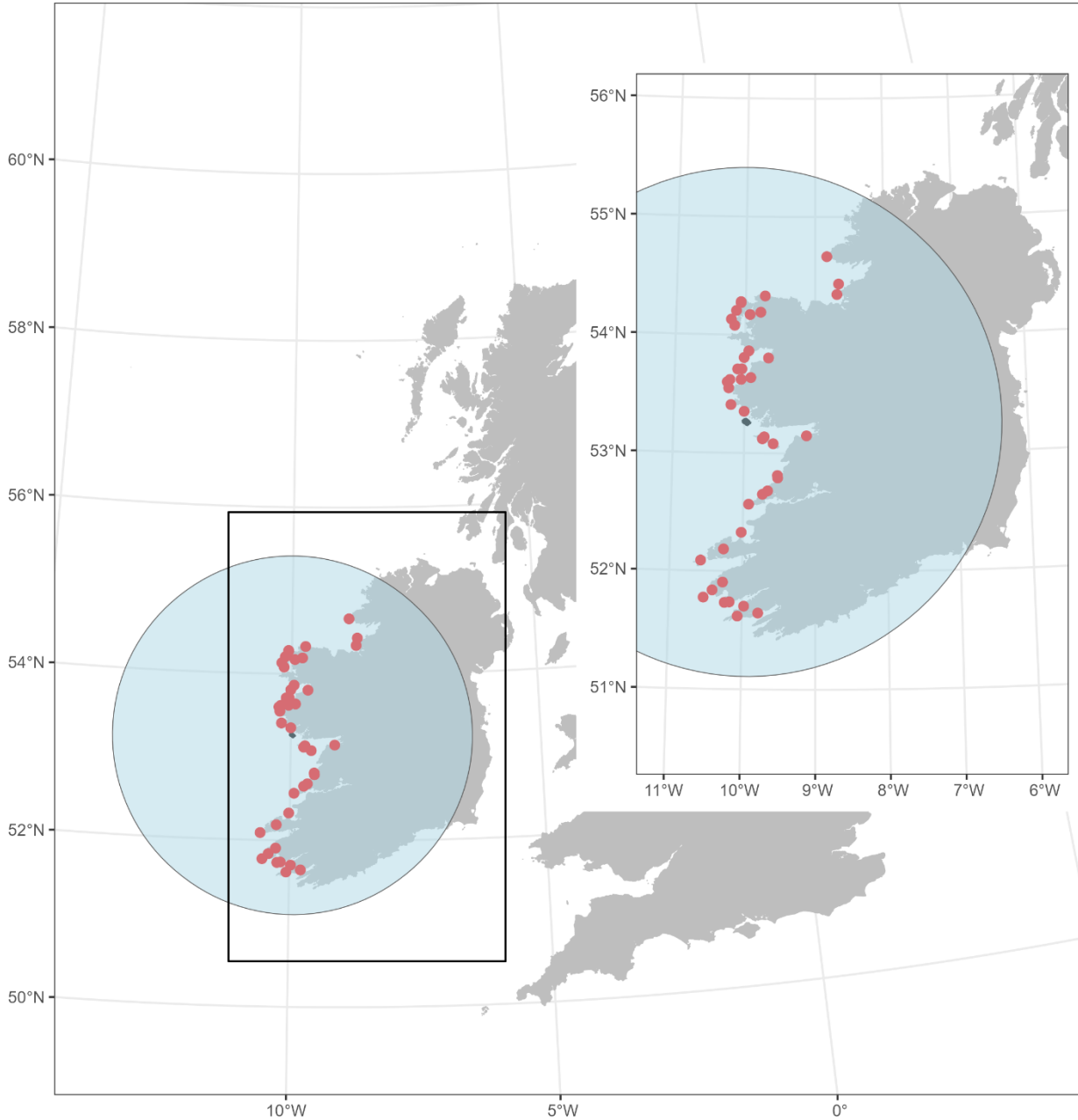


Figure 9 Colonies (red) within common tern's mean max foraging range (Woodward et al., 2019; blue) from the Array Area (black).

Common tern ($18 \pm 8.9\text{km}$)

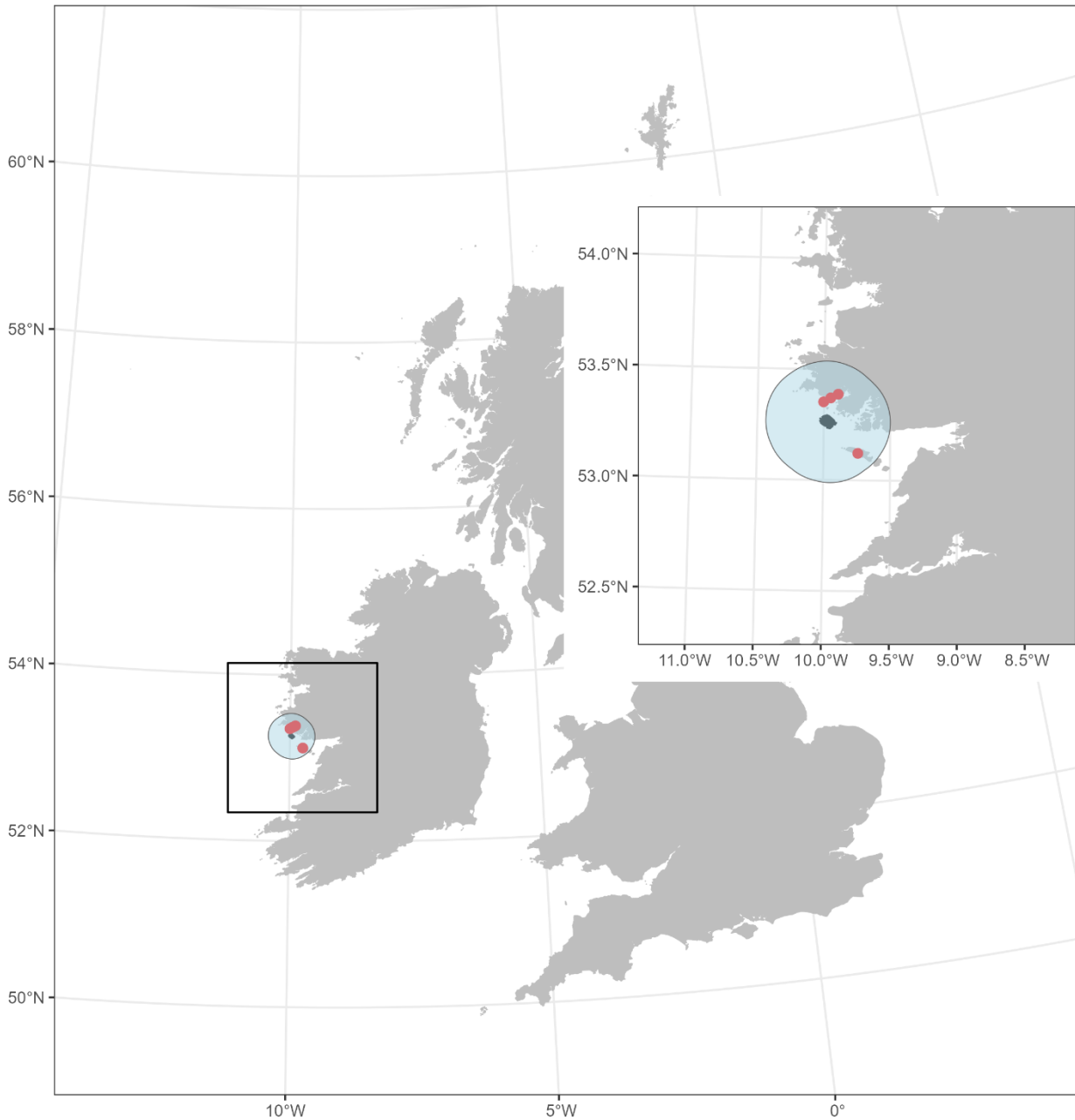


Figure 10 Colonies (red) within Arctic tern's mean max foraging range (Woodward et al., 2019; blue) from the Array Area (black).

Arctic tern (25.7 + 14.8km)

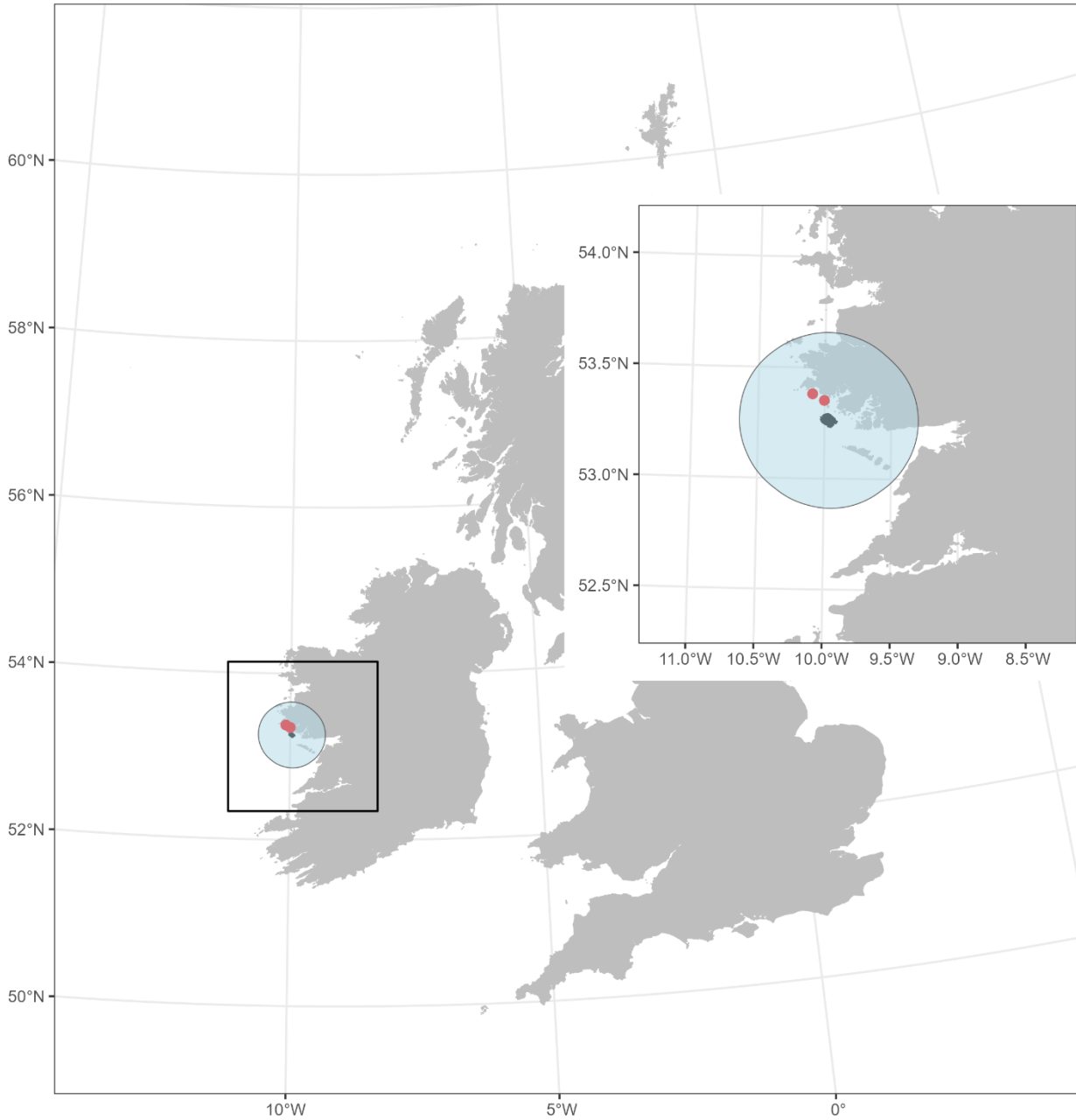


Figure 11 Colonies (red) within guillemot's mean max foraging range (Woodward *et al.*, 2019; blue) from the Array Area (black).

Common guillemot ($73.2 \pm 80.5\text{km}$)

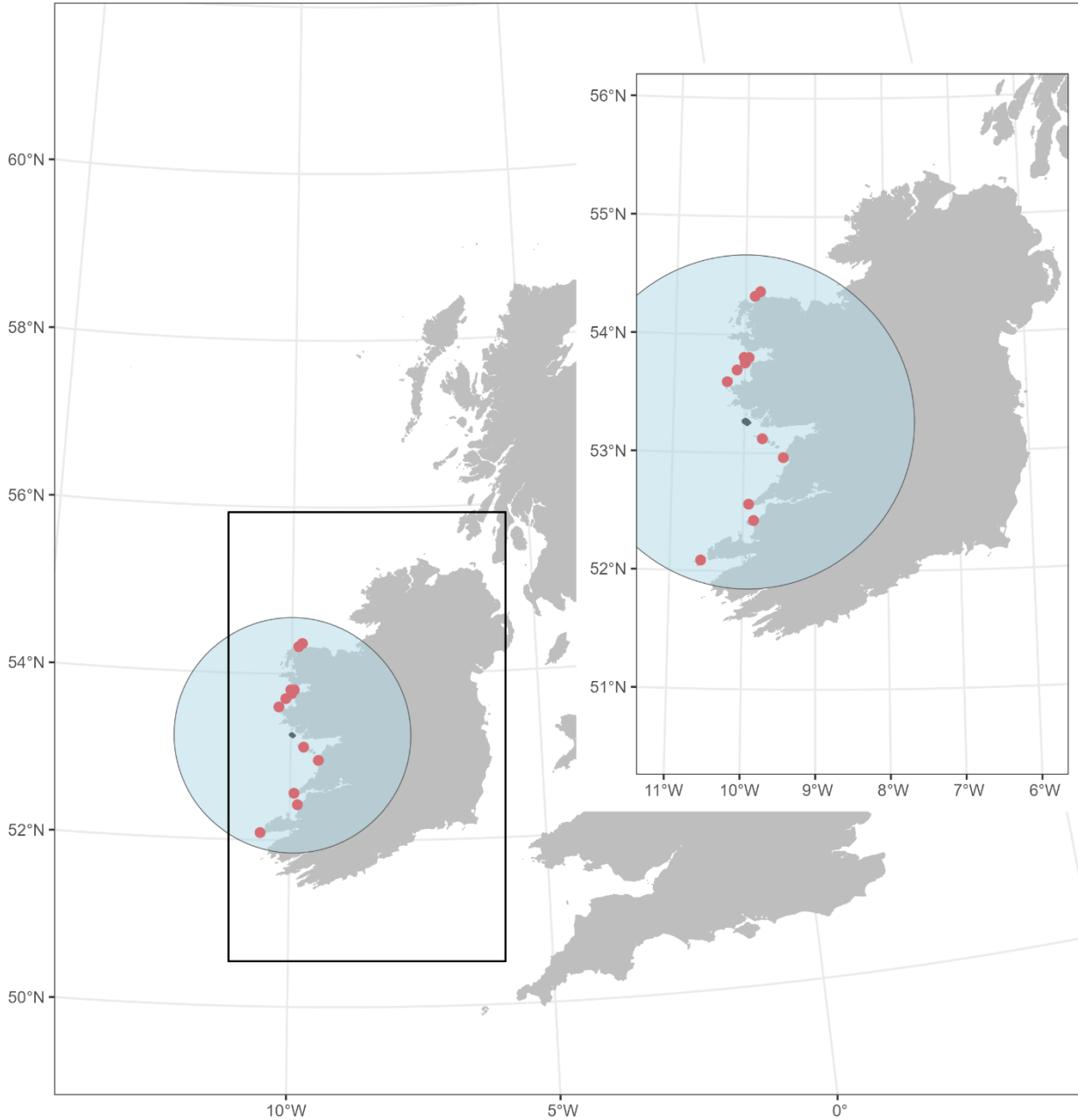


Figure 12 Colonies (red) within razorbill's mean max foraging range (Woodward et al., 2019; blue) from the Array Area (black).

Razorbill (88.7 + 75.9km)

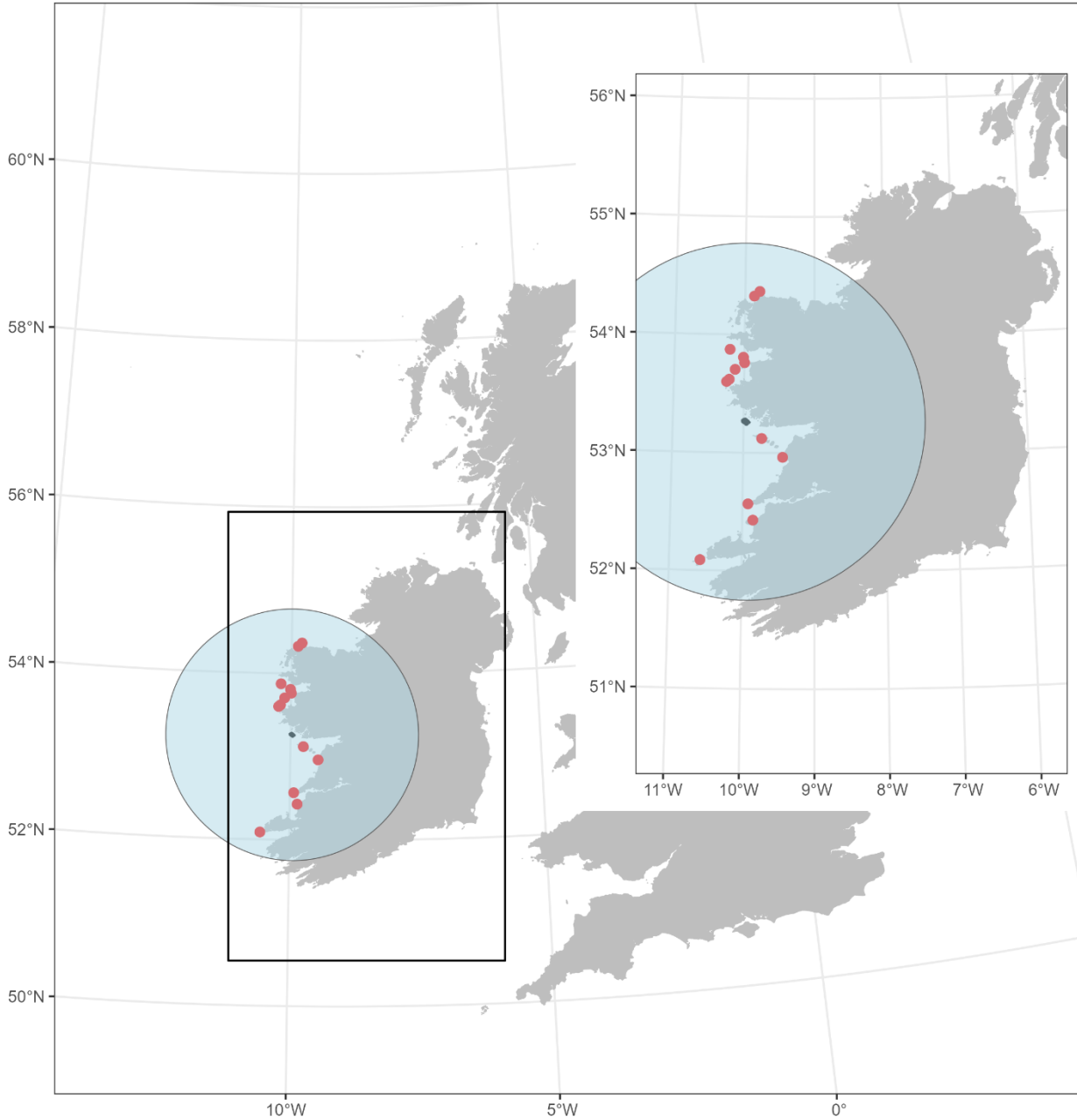


Figure 13 Colonies (red) within puffin's mean max foraging range (Woodward et al., 2019; blue) from the Array Area (black).

Atlantic puffin ($137.1 + 128.3\text{km}$)

