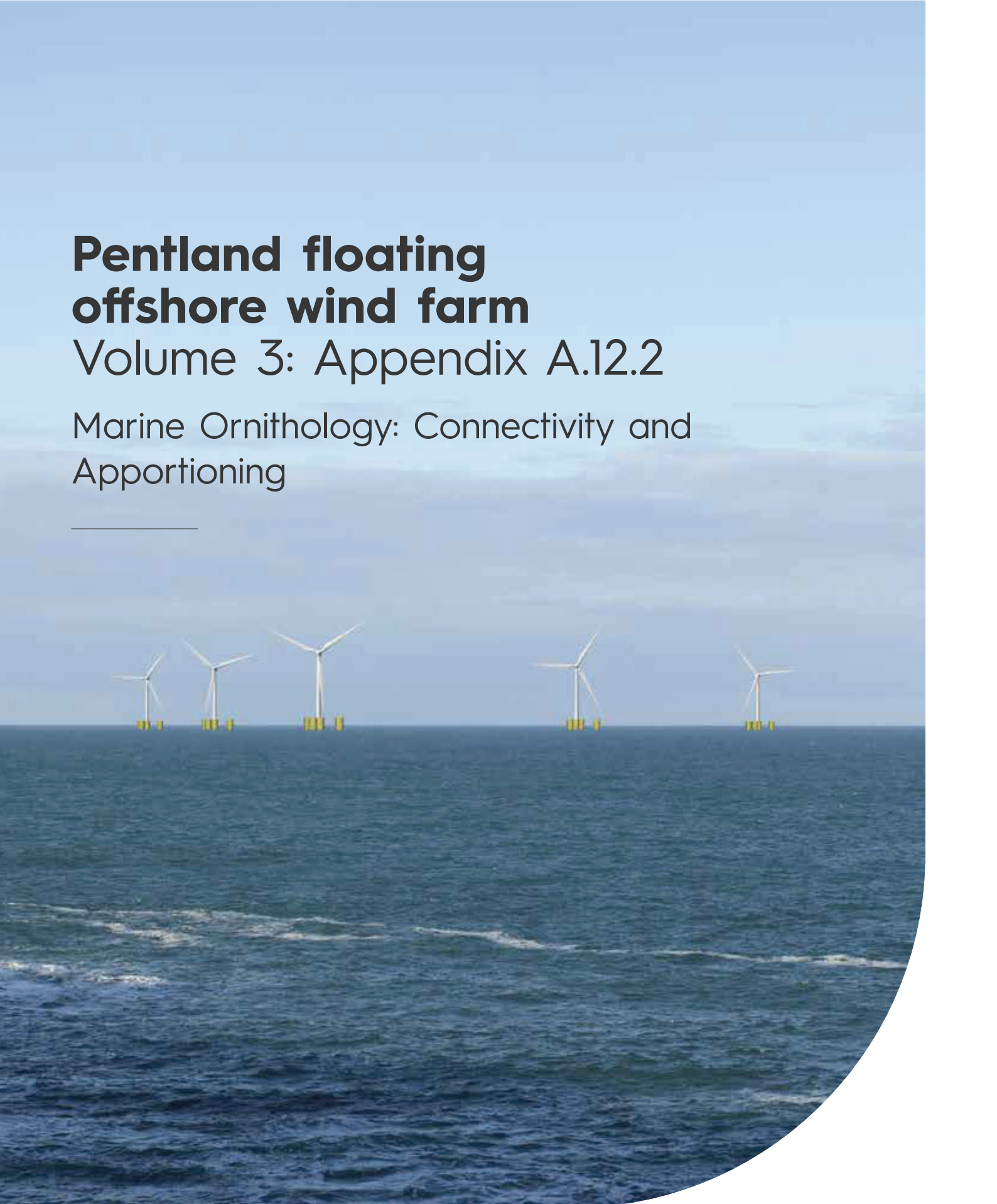


Pentland floating offshore wind farm

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Marine Ornithology: Connectivity and Apportioning



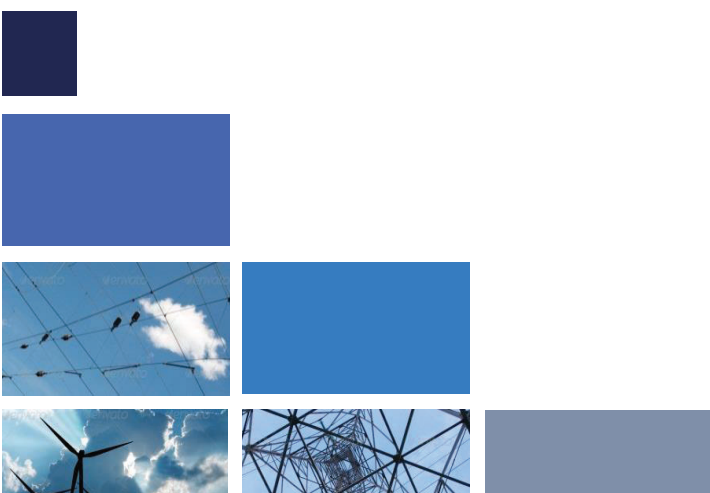
OFFSHORE EIAR (VOLUME 3): TECHNICAL APPENDICES

APPENDIX 12.2: MARINE ORNITHOLOGY – CONNECTIVITY AND APPORTIONING

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Pentland Floating Offshore Wind Farm: Marine Ornithology 12.2 Technical Appendix - Connectivity and Apportioning

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Acronyms and abbreviations

Acronyms / abbreviation	Full name
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
EIAR	Environmental Impact Assessment Report
HiDef	HiDef Aerial Surveying Limited
HRA	Habitats Regulations Appraisal
HWL	Highland Wind Limited
IND	Individuals
MS-LOT	Marine Scotland Licensing Operations Team
MSS	Marine Scotland Science
NCA	Nature Conservation Appraisal
NS	NatureScot
PFOWF	Pentland Floating Offshore Wind Farm
RIAA	Report to Inform the Appropriate Assessment
SD	Standard Deviation
SMP	Seabird Monitoring Programme
SPA	Special Protection Area
WTG	Wind Turbine Generator

I Introduction

- 1 Many seabird species are central-place foragers during the breeding season and most individuals recorded at sea during this period will be breeding adults associated with a breeding colony. Most of these breeding colonies are protected under the Habitats Regulations¹ as Special Protection Areas (SPAs). As advised by Marine Scotland Science (MSS) and NatureScot (NS) in the Scoping Opinion (MS-LOT, 2021), the marine ornithological assessment for the Pentland Floating Offshore Wind Farm (PFOWF) Array and Offshore Export Cable(s) (the Offshore Development) will focus on the qualifying interests of SPAs.
- 2 In this regard, the process of Habitats Regulations Appraisal (HRA) applies and is further discussed in the Report to Inform the Appropriate Assessment (RIAA). The purpose of this Technical Appendix is to identify which SPAs have ‘connectivity’ with the Offshore Development, addressed in Section 2, and then to determine the proportions of birds likely to be coming from each of these SPAs (‘apportioning’).
- 3 Connectivity is determined based on the seabird foraging ranges from identified breeding colonies (usually SPAs). The approach is described in Section 2 and results in a ‘long list’ of SPAs requiring further consideration (Tables 3-9). Once connectivity has been determined, apportioning can be undertaken. Apportioning during the breeding season is addressed in Section 3, applying the methodologies discussed in Sections 3.2.1 and 3.2.2; the Marine Scotland (MS) Apportioning Tool and NatureScot (2018) guidance.
- 4 Apportioning of non-breeding season impacts against these SPA breeding seabird colonies can also potentially be 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 a potential approach to non-breeding SPA apportioning for kittiwake, and Section 4.2 addresses guillemot, following the NS pre-application advice (Technical Appendix 12.6 Marine Ornithology: Consultation Advice).
- 5 As noted, the information provided by this Technical Appendix is primarily required to inform the RIAA, however, regional breeding populations have also been defined for the purposes of Environmental Impact Assessment (EIA). These regional breeding populations are the total of all the SPA breeding populations for each species, found within foraging range of the Offshore Development, and they are presented in Section 2.2.
- 6 This Technical Appendix addresses the following species as SPA qualifying interests, recorded during the breeding season at the Offshore Development (Technical Appendix 12.1 Marine Ornithology: Baseline Data). The other species scoped in for assessment in the Offshore EIAR (Volume 2) Chapter 12: Marine Ornithology (Section 12.4.4) are not relevant to this Technical Appendix and are therefore not addressed here. (The RIAA also considers petrels and shearwaters, and wildfowl and waders as SPA species under HRA, and peregrine as a qualifying interest of the North Caithness Cliffs SPA).
 - Black-legged kittiwake (*Rissa tridactyla*), hereafter ‘kittiwake’
 - Common guillemot (*Uria aalge*), hereafter ‘guillemot’

¹ Conservation (Natural Habitats, &c.) Regulations 1994, available at: <https://www.legislation.gov.uk/ukxi/1994/2716/contents/made>

- Razorbill (*Alca torda*)
- Atlantic puffin (*Fratercula arctica*), hereafter ‘puffin’
- Northern fulmar (*Fulmarus glacialis*), hereafter ‘fulmar’
- Northern gannet (*Morus bassanus*), hereafter ‘gannet’
- Arctic tern (*Sterna paradisaea*)
- Great skua (*Stercorarius skua*)

2 Connectivity in the breeding season

2.1 Introduction

- 7 As advised by MSS and NS in the Scoping Opinion, this Technical Appendix presents the long-list of SPAs for each species where connectivity is identified between the SPA in question and the Offshore Development, specifically the PFOWF Array Area which is the area where the Wind Turbine Generators (WTGs) will be located, within the Offshore Site (Figure 12.1 in the Offshore EIAR (Volume 2) Chapter 12: Marine Ornithology).
- 8 Determination of connectivity is based on mean max foraging distance 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 SPA long-lists presented in Section 2.2.
- 9 In respect of gannet, NS advised consideration of site-specific maximum foraging ranges for Forth Islands SPA (590 km), St Kilda SPA (709 km) and Grassholm SPA (517 km). This information is used to determine the SPA long-list for gannet presented in Table 8.
- 10 For guillemot and razorbill, NS advised use of mean max +1 SD, including data from Fair Isle for all Northern Isles designated sites. For all designated sites south of the Pentland Firth (i.e., excluding the Northern Isles), they advised use of mean max +1 SD discounting Fair Isle values and noted they consider North Caithness Cliffs SPA to lie south of the Pentland Firth. This information is presented in Table 2 and is used to determine the SPA long-list for guillemot (Table 4) and razorbill (Table 5).

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

Species	Mean Max (km)	SD (km)	Total (km)
Kittiwake	156.1	144.5	300.6
Puffin	137.1	128.3	265.4
Fulmar	542.3	657.9	1200.2
Gannet	315.2	194.2	509.4
Arctic tern	24.2	6.3	30.5
Great skua	443.3	487.9	931.2

Table 2 Guillemot and razorbill foraging ranges following NS scoping advice

Species	Mean max plus 1 SD (km) North of Pentland Firth	Mean max plus 1 SD (km) South of Pentland Firth
Guillemot	153.7	95.2
Razorbill	164.6	122.2

- 11 A connectivity analysis was carried out for Arctic tern which confirmed that there are no SPAs for this species within foraging range of the PFOWF Array Area. Therefore, impacts to Arctic tern are solely considered under EIA, in relation to non-designated colonies as recommended by RSPB: Melvich Bay, Caol Loch, Dounreay and Georgemas.

2.2 SPA long-lists and regional populations for each species

- 12 The SPA long-lists are presented in Tables 3-9 below. These tables list the SPAs in alphabetical order and include the distance between each SPA and the PFOWF Array Area, measured from the nearest boundaries. These are the SPA long-lists that were submitted for consultation with MSS and NS in Appendix A of the Nature Conservation Appraisal (NCA) screening report including the HRA screening (HWL, 2022).
- 13 Regional breeding populations have also been defined for each species for the purposes of EIA, simply summing the population counts for all the SPAs within mean max foraging range.

Table 3 Kittiwake SPA long-list and regional breeding population

Kittiwake SPAs	Distance to PFOWF Array Area (km)	Population Count	Count Unit	Count Year
Buchan Ness to Collieston Coast	204	11,295	AON*	2019
Calf of Eday	99	142	AON	2018
Canna and Sanday	289	1257	AON	2019
Cape Wrath	51	3,622	AON	2017
Copinsay	73	955	AON	2015
East Caithness Cliffs	73	24,460	AON	2015
Fair Isle	167	448	AON	2021
Flannan Isles	229	1,392	AON	1998
Foula	191	425	AON	2021
Fowlsheugh	275	14,039	AON	2018
Handa	98	3,749	AON	2018
Hermaness, Saxa Vord, Valla Field	300	177	AON	2016/2019
Hoy	30	304	AON	2016/2017
Marwick Head	58	906	AON	2018
North Caithness Cliffs	7.5	5,573	AON	2015/2016
North Rona and Sula Sgeir	157	1,253	AON	2012
Noss	243	76	AON	2019
Rousay	76	330	AON	2016
Sumburgh Head	206	1,407	AON	2017/2021
Troup, Pennan and Lion's Heads	169	10,504	AON	2017
West Westray	85	2,755	AON	2017
Regional breeding population	84,840 AON / 169,680 individual kittiwake			

*AON: *Apparently Occupied Nest*

- 14 As there are no recent counts for kittiwake at the Flannan Isles SPA, this SPA has not been included in the figure for the regional breeding population. Nor has it been included in the kittiwake SPA apportioning presented in Section 3. In this regard, exclusion of this SPA makes no material difference to the apportioning weightings that have been calculated for kittiwake.

Table 4 Guillemot SPA long-list and regional breeding population

Guillemot SPAs	Distance to PFOWF Array Area (km)	Population Count	Count Unit	Count Year
Calf of Eday	99	5,524	IND*	2018
Cape Wrath	51	38,109	IND	2017
Copinsay	73	18,473	IND	2015
East Caithness Cliffs	73	148,805	IND	2015
Handa	98	54,664	IND	2018
Hoy	30	12,198	IND	2016/2017
Marwick Head	58	11,985	IND	2018
North Caithness Cliffs	7.5	38,898	IND	2015/2016
Rousay	76	5,911	IND	2016/2018
Sule Skerry and Sule Stack	52	10,068	IND	2018
West Westray	85	28,697	IND	2017
Regional breeding population	373,332 individual guillemot			

*IND: Individuals

Table 5 Razorbill SPA long-list and regional breeding population

Razorbill SPAs	Distance to PFOWF Array Area (km)	Population Count	Count Unit	Count Year
Cape Wrath	51	3,246	IND	2017
East Caithness Cliffs	73	30,003	IND	2015
Handa	98	8,207	IND	2019
North Caithness Cliffs	7.5	3,609	IND	2015/2016
North Rona and Sula Sgeir	157	513	IND	2012
West Westray	85	2,159	IND	2017
Regional breeding population	47,737 individual razorbill			

Table 6 Puffin SPA long-list and regional breeding population

Puffin SPAs	Distance to PFOWF Array Area (km)	Population Count	Count Unit	Count Year
Cape Wrath	51	2,244	IND	2018
Fair Isle	167	6,666	IND	2015
<i>Flannan Isles</i>	229	<i>15,761</i>	<i>IND</i>	<i>1999/2001</i>
Foula	191	6,351	IND	2016
Handa	98	1,210	IND	2021
Hoy	30	361	IND	2016/2017
North Caithness Cliffs	7.5	3,053	IND	2015/2016
<i>North Rona and Sula Sgeir</i>	<i>157</i>	<i>5,442</i>	<i>AOB*</i>	<i>1998/2001</i>
Noss	243	1,174	IND	2017
Sule Skerry and Sule Stack	52	95,484	IND	2018
Regional breeding population	116,543 individual puffin			

*AOB: *Apparently Occupied Burrow*

- 15 As there are no recent counts for puffin at either the Flannan Isles SPA or North Rona and Sula Sgeir SPA they have not been included in the figure for the regional breeding population. Nor have they been included in the apportioning for puffin, as presented in Section 3. In this regard, it should be noted that exclusion of these SPAs makes no material difference to the apportioning weightings calculated for puffin.

Table 7 Fulmar SPA long-list and regional breeding population

Fulmar SPAs	Distance to PFOWF Array Area (km)	Population Count	Count Unit	Count Year
Buchan Ness to Collieston Coast	204	826	AOS*	2019
Calf of Eday	99	1,836	AOS	2018
Cape Wrath	51	1,477	AOS	2017
Clare Island	714	667	AOS	2015
Cliffs of Moher	829	4,801	AOS	2015
Copinsay	73	1,585	AOS	2015
Deenish Island and Scariff Island	963	24	AOS	2018
Dingle Peninsula	880	625	AOS	2018
Duvillaun Islands	681	547	AOS	2015
East Caithness Cliffs	73	13,707	AOS	2015
Fair Isle	167	32,491	AOS	2021
Fetlar	297	8,518	AOS	2018
Flannan Isles	229	2,263	AOS	2013
Foula	191	10,253	AOS	2021
Fowlsheugh	275	525	AOS	2018
Handa	98	1,423	AOS	2017
Hermaness, Saxa Vord and Valla Field	300	13,208	AOS	2016
High Island, Inishshark, Davillaun	733	1,561	AOS	2015/2016
Horn Head to Fanad Head	499	545	AOS	2015/ 2018
Hoy	30	21,101	AOS	2016/2017 /2019
Iveragh Peninsula	954	306	AOS	2018
Kerry Head	870	128	AOS	2015
Lambay Island	721	375	AOS	2015
Mingulay and Berneray	326	7,048	AOS	2017/2021
North Caithness Cliffs	7.5	13,405	AOS	2015/2016
North Rona and Sula Sgeir	157	1,438	AOS	2012
Noss	243	5,092	AOS	2016

Fulmar SPAs	Distance to PFOWF Array Area (km)	Population Count	Count Unit	Count Year
Puffin Island	943	50	AOS	2021
Rathlin Island	491	1,049	AOS	2014/2021
Rousay	76	2,159	AOS	2016/2018
Saltee Islands	897	225	AOS	2015 - 2018
Skelligs	951	733	AOS	2020
St Kilda	307	29,186	AOS	2015/2016
Sumburgh Head	206	7437	AOS	2017/2021
Tory Island	511	507	AOS	2015
Troup, Pennan and Lion's Heads	169	1,894	AOS	2017
West Donegal Coast	531	585	IND	2018
West Westray	85	1,198	AOS	2017/2021
Regional breeding population	190,230 AOS or 380,460 individual fulmar			

*AOS: *Apparently Occupied Site*

Table 8 Gannet SPA long-list and regional breeding population

Gannet SPAs	Distance to PFOWF Array Area (km)	Population Count	Count Unit	Count Year
Fair Isle	167	4,971	AON	2021
Forth Islands	365	75,259	AOS	2014
Hermaness, Saxa Vord and Valla Field	300	25,580	AOS	2014
North Rona and Sula Sgeir	157	11,230	AOS	2013
Noss	243	13,765	AON	2019
St Kilda	307	60,290	AOS	2013
Sule Skerry and Sule Stack	52	9,065	AON/AOS	2013/2018
Troup, Pennan and Lion's Heads (non-SPA gannet colony)	169	4,825	AON	2019
Regional breeding population	204,985 AON/AOS or 409,970 individual gannet			

- 16 Although gannet are not a qualifying interest of Troup, Pennan and Lion's Heads SPA, NS have previously advised on a number of different wind farm projects (such as Moray West, Moray East and Beatrice) that they would like the gannet colony here to be included in assessment. Although this has not been specifically requested for the Offshore Development it has been included based on previous advice.

Table 9 Great skua SPA long-list and regional breeding population

Great skua SPAs	Distance to PFOWF Array Area (km)	Population Count	Count Unit	Count Year
Fair Isle	167	430	AOT*	2020
Fetlar	297	852	AOT	2017
Foula	191	1,846	AOT	2015
Handa	98	283	AOT	2018
Hermaness, Saxa Vord and Valla Field	300	955	AOT	2018
Hoy	30	438	AON/AOT	2018
Noss	243	476	AOT	2018
Regional breeding population	5,710 AOT or 11,420 individual great skua			

*AOT: *Apparently Occupied Territory*

3 Apportioning in the breeding season

3.1 Introduction

17 Following the creation of SPA long-lists for each species, apportioning is used to determine the proportional weightings between each SPA within foraging range. Apportioning for kittiwake, guillemot and razorbill uses the MS tool (Wakefield option) as advised by MSS and NS in an email from Marine Scotland Licensing Operations Team (MS-LOT) received on 31 March 2022. Apportioning for all other species follows the guidance issued by NatureScot (2018), as described in Section 3.2.2 below.

3.2 Method

3.2.1 MS apportioning tool (Wakefield option)

18 The MS apportioning tool (Wakefield option) derives apportioning percentages using a statistical model that incorporates spatial distributions of seabirds using tracking data and model parameters related to accessibility, competition, and environmental effects (Butler *et al.*, 2020; Wakefield *et al.*, 2017; 2019).

19 It accounts for environmental heterogeneity and allows for segregation of foraging ranges between colonies. It also empirically estimates colony-specific bird density at a certain location from the tracking data, rather than using a pre-defined, uniform density-distance decay that's identical for all species/colonies, as assumed in NatureScot (2018).

20 As agreed with MSS and NS for in-combination HRA, the MS tool (Wakefield option) has been retrospectively applied to each of the Moray Firth offshore wind farm developments where these may impact the same seabird populations at North Caithness Cliffs SPA. Apportioning of Moray Firth impacts is set out in Technical Appendix 12.5 Marine Ornithology: Population Modelling in which the mortality scenarios for the in combination HRA are defined.

21 The MS apportioning tool (Wakefield option) uses Seabird 2000 count data and the outputs are presented as Excel spreadsheets.

3.2.2 NatureScot (2018) guidance

22 For all other species, apportioning has been carried out by HiDef Aerial Surveying Limited (HiDef) following the NS apportioning calculation, using program R. This NS apportioning is based on most recent SPA counts for each species, as presented in Sections 2.2 and 3.3.

23 The NS apportioning calculation is a weighting based on population size (using most recent available count data), distance between the PFOWF Array Area and the SPAs within foraging range (as listed in Section 2.2), and area of sea included in the foraging range. Distances have been measured on a precautionary basis from the nearest boundary of the PFOWF Array Area to the nearest boundary of the relevant SPA. To be biologically meaningful, these are the 'at sea' distances, i.e., the actual distance the bird flies across water.

3.3 SPA apportioning for each species

- 24 Apportioning determines the weightings to be applied to the different SPA breeding colonies. These weightings have been used to apportion the breeding season collision and displacement mortality estimates for each species (where relevant) to each SPA listed (Table 10-16). The impacts are modelled and reported in Technical Appendices; 12.3 Marine Ornithology: Collision Risk Modelling and 12.4 Marine Ornithology: Displacement Analysis.
- 25 Each table includes the most recent SPA counts available from the Seabird Monitoring Programme (SMP) database². HiDef identified a discrepancy in the counts being shown on the SMP for North Caithness Cliffs SPA and those presented in Swann (2018); the NS colony monitoring report for 2015/16. Clarification was sought and the matter resolved with JNCC providing the confirmed SPA counts for kittiwake, guillemot, razorbill and puffin by email on 9 May 2022. These are presented in Annex A.
- 26 In this regard, the matter was not resolved for fulmar at North Caithness Cliffs SPA and therefore the most recent 2015/2016 count from Swann (2018) has been used in the apportioning for this species and is presented in Table 13.

² [Seabird Monitoring Programme | JNCC \(bto.org\)](https://www.jncc.gov.uk/information-and-services/our-work-programmes/seabird-monitoring-programme)

3.3.1 Apportioning weightings for each SPA using MS apportioning tool

Table 10 Kittiwake SPA breeding season apportioning weightings

SPA	Apportioning weighting	Most recent population count (AON)	Date of count
North Caithness Cliffs	0.717	5,573	2015/2016
East Caithness Cliffs	0.080	24,460	2015
West Westray	0.063	2,755	2017
Marwick Head	0.026	906	2018
Cape Wrath	0.025	3,622	2017
Hoy	0.010	304	2016/2017
Handa	0.006	3,749	2018
Rousay	0.005	330	2016
Copinsay	0.004	955	2015
Troup, Pennan and Lion's Heads	0.001	10,504	2017
Buchan Ness to Collieston Coast	0.000	11,295	2019
Calf of Eday	0.000	142	2018
Canna and Sanday	0.000	1,257	2019
Fair Isle	0.000	448	2021
Foula	0.000	425	2021
Fowlsheugh	0.000	14,039	2018
North Rona and Sula Sgeir	0.000	1,253	2012
Noss	0.000	76	2019
Hermaness, Saxa Vord, Valla Field	No output given by MS apportioning tool	177	2016/2019
Sumburgh Head	No output given by MS apportioning tool	1,407	2017/2021

- 27 As noted in paragraph 14, Flannan Isles SPA has not been included for this kittiwake apportioning due to its outdated population count. Exclusion of this SPA makes no material difference to the overall assessment for kittiwake or to the apportioning weightings presented in Table 10.

Table 11 Guillemot SPA breeding season apportioning weightings

SPA	Apportioning weighting	Most recent population count (IND)	Date of count
North Caithness Cliffs	0.695	38,898	2015/2016
Hoy	0.056	12,198	2017
Marwick Head	0.045	11,985	2018
East Caithness Cliffs	0.041	148,805	2015
Handa	0.034	54,664	2018
West Westray	0.021	28,697	2017
Cape Wrath	0.017	38,109	2017
Copinsay	0.004	18,473	2015
Sule Skerry and Sule Stack	0.004	10,068	2018
Rousay	0.002	5,911	2016/2018
Calf of Eday	0.000	5,524	2018

Table 12 Razorbill SPA breeding season apportioning weightings

SPA	Apportioning weighting	Most recent population count (IND)	Date of count
North Caithness Cliffs	0.357	3,609	2015/2016
East Caithness Cliffs	0.162	30,003	2015
Handa	0.159	8,207	2019
Cape Wrath	0.029	3,246	2017
West Westray	0.015	2,159	2017
North Rona and Sula Sgeir	0.001	513	2012

3.3.2 Apportioning weightings for each SPA following NatureScot (2018)

Table 13 Puffin SPA breeding season apportioning weightings

SPA	Apportioning weighting	Most recent population count (IND)	Date of count
North Caithness Cliffs	0.698	3,053	2015/2016
Sule Skerry and Sule Stack	0.282	95,484	2018
Cape Wrath	0.007	2,244	2018
Hoy	0.003	361	2016/2017
Fair Isle	0.002	6,666	2015
Foula	0.001	6,351	2016
Handa	0.001	1,210	2021
Noss	0.000	1,174	2017

- 28 As noted in paragraph 15, neither Flannan Isles SPA nor North Rona and Sula Sgeir SPA have been included for this puffin apportioning due to the outdated population counts at these SPAs. Exclusion of these two SPAs makes no material difference to the overall assessment for puffin or to the apportioning weightings presented in Table 13.

Table 14 Fulmar SPA breeding season apportioning weightings

SPA	Apportioning weighting	Most recent population count (AOS)	Date of count
North Caithness Cliffs	0.925	13,405	2015/2016
Hoy	0.058	21,101	2016/2017/ 2019
East Caithness Cliffs	0.006	13,707	2015
Fair Isle	0.003	32,491	2021
Cape Wrath	0.001	1,477	2017
Copinsay	0.001	1,585	2015
Rousay	0.001	2,159	2016/2018
Foula	0.001	10,253	2021
Buchan Ness to Collieston Coast	0.000	826	2019
Calf of Eday	0.000	1,836	2018
Clare Island	0.000	667	2015
Cliffs of Moher	0.000	4,801	2015
Deenish Island and Scariff Island	0.000	24	2018
Dingle Peninsula	0.000	625	2018
Duvillaun Islands	0.000	547	2015
Fetlar	0.000	8,518	2018
Flannan Isles	0.000	2,263	2013
Fowlsheugh	0.000	525	2018
Handa	0.000	1,423	2017
Hermaness, Saxa Vord, Valla Field	0.000	13,208	2016
High Island, Inishshark, Davillaun	0.000	1,561	2015/2016
Horn Head to Fanad Head	0.000	545	2015/ 2018
Iveragh Peninsula	0.000	306	2018
Kerry Head	0.000	128	2015
Lambay Island	0.000	375	2015
Mingulay and Berneray	0.000	7,048	2017/2021
Noss	0.000	5,092	2016

SPA	Apportioning weighting	Most recent population count (AOS)	Date of count
Puffin Island	0.000	50	2021
Rathlin Island	0.000	1,049	2014/2021
Saltee Islands	0.000	225	2015 - 2018
Skelligs	0.000	733	2020
St Kilda	0.000	29,186	2015/2016
Sumburgh Head	0.000	7,437	2017/2021
Tory Island	0.000	507	2015
Troup, Pennan and Lion's Heads	0.000	1,894	2017
West Donegal Coast	0.000	585 (IND)	2018
West Westray	0.000	1,198	2017/2021
North Rona and Sula Sgeir	No output available	1,438	2012

- 29 Although no output is available for North Rona and Sula Sgeir SPA from the HiDef apportioning undertaken for fulmar, this issue makes no material difference to the overall assessment for fulmar or to the other apportioning weightings presented in Table I4.

Table I5 Gannet SPA breeding season apportioning weightings

SPA	Apportioning weighting	Most recent population count (AOS)	Date of count
Sule Skerry and Sule Stack	0.527	9,065 (AON/AOS)	2013/2018
Forth Islands	0.111	75,259	2014
St Kilda	0.105	60,290	2015
North Rona and Sula Sgeir	0.102	11,230	2013
Hermaness, Saxa Vord, Valla Field	0.041	25,580	2014
Noss	0.035	13,765 (AON)	2019
Troup, Pennan and Lion's Heads (non-SPA colony)	0.029	4,825 (AON)	2019
Fair Isle	0.027	4,971 (AON)	2021

Table 16 Great skua SPA breeding season apportioning weightings

SPA	Impact weighting	Most recent population count (AOT)	Date of count
Hoy	0.800	438 (AON/AOT)	2013/2018
Foula	0.081	1,846	2015
Handa	0.049	283	2018
Fair Isle	0.025	430	2020
Hermaness, Saxa Vord, Valla Field	0.017	955	2018
Fetlar	0.015	852	2017
Noss	0.013	4,825	2019

4 Apportioning in the non-breeding season

4.1 Introduction

- 30 Approaches to non-breeding season SPA apportioning are an evolving process and there is currently no formal guidance or agreed methodology for undertaking such calculations. There is a report on 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 (Furness, 2015)³. 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.
- 31 There have, however, been 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 by any of the Statutory Nature Conservation Bodies (SNCBs), there was a presentation made by NS on non-breeding season SPA apportioning at the Bird Impact Assessment Workshop held on 20 February 2020 which outlined a couple of potential approaches (specifically in relation to gannet and to kittiwake).
- 32 Please see Technical Appendix 12.6 Marine Ornithology: Consultation Advice for the record of pre-application consultation, including discussion around non-breeding season SPA apportioning. The matter was touched on by NS in the Scoping Opinion (MS-LOT, 2021) for the Offshore Development which implied that non-breeding season apportioning should be carried out. In this regard, HiDef provided a paper (7 October 2021) outlining their proposed approach and the detailed method for undertaking the calculations, referring to the available tables in the BDMPS report, Appendix A *Contributions of individual SPA populations and of UK non-SPA populations and overseas populations to each BDMPS* (Furness, 2015).
- 33 In this regard, NS and MSS agreed in response (7 December 2021) that ‘apportioning should use the BDMPS approach for all species excluding guillemots.’ They did not raise any concerns or specific objections to HiDef’s suggested method and so it has been applied in assessment for kittiwake (Section 4.2). For guillemot, NS did provide more detailed advice explaining their suggested approach (email to MSS dated 18 March 2022) and this methodology is presented in Section 4.3.
- 34 Non-breeding SPA apportioning has only been undertaken for these two species: kittiwake and guillemot. This is because non-breeding season mortalities for all other species are zero, except fulmar and great black-backed gull. For fulmar there is a single displacement mortality in the non-breeding season; this has wholly been apportioned to North Caithness Cliffs SPA for simplicity as set out in Section 4.7 of the Technical Appendix 12.4 Marine Ornithology: Displacement Analysis. For great black-backed gull, the species is only recorded on-site in the non-breeding season, therefore there are no breeding SPAs screened in for assessment and non-breeding season impacts for this species are considered against the total North Sea BDMPS population.

³ <http://publications.naturalengland.org.uk/publication/6427568802627584>

4.2 Kittiwake, non-breeding season

- 35 Furness (2015) defines two non-breeding BDMPS periods for kittiwake: autumn migration (August to December) and spring migration (January to April). For each of these BDMPS periods the geographic region is the same, 'UK North Sea waters', but there is a different reference population defined for each as presented in Table 17.
- 36 Table 17 presents the total population of adults and immatures associated with North Caithness Cliffs SPA, compared against the total BDMPS population for each period, giving the proportion of birds within each BDMPS that may be associated with the SPA. The information presented is taken from Furness (2015) Appendix A *Contributions of individual SPA populations and of UK non-SPA populations and overseas populations to each BDMPS* (Table 47, p347 and Table 49, p351)⁴. This was undertaken only for North Caithness Cliffs SPA due to the low level of non-breeding season collision estimates (one bird).

Table 17 Kittiwake non-breeding season apportioning

Kittiwake	BDMPS period	
	Autumn	Spring
North Caithness Cliffs SPA; adults and immatures	19,326	17,539
UK North Sea BDMPS; adults and immatures	829,937	627,816
Proportion SPA	0.023	0.028

4.3 Guillemot, non-breeding season

- 37 NS advise that a 'regional' non-breeding population is defined based on the total populations (adults and immatures) estimated for each SPA found within the mean-max foraging range for guillemot +1 SD (as set out in Table 2 with the long-list of SPAs provided in Table 4). It is assumed that there are no other birds present in the region besides these SPA birds and that all the birds mix equally.
- 38 Furness (2015) provides the only available information on the total populations estimated for each SPA within the defined region; as set out in Table 62, p374 of Appendix A *Contributions of individual SPA populations and of UK non-SPA populations and overseas populations to each BDMPS* and summarised in Table 18.
- 39 The total populations for each SPA are added together to give an overall population for the entire region of 1,029,694 guillemots. This information can then be used to determine the proportion of birds within the region that are associated with each SPA, as presented in Table 18. This calculation has been based on the total population for each SPA rather than the breeding adults only.

⁴ <http://publications.naturalengland.org.uk/publication/6427568802627584>

Table 18 Guillemot non-breeding season apportioning

SPA	Count date	Breeding adults	Immatures	Total population	Proportion
North Caithness Cliffs	2000	94,000	69,560	163,560	0.159
Hoy	2007	12,600	9,324	21,924	0.021
Marwick Head	2012	22,194	16,424	38,618	0.038
East Caithness Cliffs	1999	213,000	157,620	370,620	0.360
Sule Skerry / Sule Stack	1998	15,266	11,297	26,563	0.026
Handa	2011	75,986	56,230	132,216	0.128
Cape Wrath	2000	54,718	40,491	95,209	0.092
Calf of Eday	2006	12,600	9,324	21,924	0.021
Copinsay	2012	11,214	8,298	19,512	0.019
Rousay	2009	12,400	9,176	21,576	0.021
West Westray	2007	67,800	50,172	117,972	0.115

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Annex A Confirmed North Caithness Cliff SPA Populations

Table A.1 North Caithness Cliffs SPA populations confirmed by JNCC (email dated 9 May 2022)

SPA sub-site	Kittiwake			Guillemot			Razorbill			Puffin		
	Count	Unit	Year	Count	Unit	Year	Count	Unit	Year	Count	Unit	Year
Duncansby Head	584	AON	2015	19,212	IND	2015	1,815	IND	2015	18	IND	2015
Dunnet Head	2,020	AON	2016	9,669	IND	2016	565	IND	2016	1,604	IND	2016
Holburn Head	55	AON	2015/2016	499	IND	2015/2016	68	IND	2015/2016	60	IND	2015
Melvich	2,777	AON	2015/2016	2,510	IND	2015/2016	612	IND	2015/2016	1,354	IND	2015/2016
Stroma	137	AON	2016	7,008	IND	2016	549	IND	2016	17	IND	2016
Whole SPA	5,573	AON	2015/2016	38,898	IND	2015/2016	3,609	IND	2015/2016	3,053	IND	2015/2016