




# **Erebus: Offshore Ornithology 11.2 Technical Appendix - Apportioning**

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## I Introduction

- 1 This short report describes the apportioning process undertaken for the ornithological impact assessment at the proposed Erebus floating offshore wind farm demonstration site (hereafter 'the Project').
- 2 Apportioning follows guidance issued by NatureScot (2018) for marine renewables development and advice provided by Natural Resources Wales (NRW) and the Joint Nature Conservation Committee (JNCC) in September 2021. It determines the breeding populations of seabirds which may be impacted by a marine renewables development (such as an offshore wind farm) and apportions predicted impacts between these populations. The focus is on the breeding season, and the outputs of the apportioning calculations undertaken for the Project are presented.
- 3 Apportioning is undertaken for the following species recorded in the Project array area:
  - Northern gannet *Morus bassanus*
  - Manx shearwater *Puffinus puffinus*
  - Black legged Kittiwake *Rissa tridactyla*
  - Common guillemot *Uria aalge*
  - Razorbill *Alca torda*
  - Atlantic puffin *Fratercula arctica*
  - Lesser black-backed gull *Larus fuscus*
- 4 These species are all qualifying interests of Special Protection Areas (SPAs) found within foraging range of the Project. Foraging ranges are defined on a species-by-species basis based on the mean max foraging distance plus one standard deviation (SD) given in Woodward *et. al.* (2019) (Table 1).

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

Species	Mean Max (km)	1 SD (km)
Gannet	315.2	194.2
Manx shearwater	1346.8	1018.7
Kittiwake	156.1	144.5
Guillemot	73.2	80.5
Razorbill	88.7	75.9
Puffin	137.1	128.3
Lesser black-backed gull	127.0	109.0

## 2 Apportioning Method

- 5 Apportioning focuses on the key SPA breeding populations of concern and also includes the named Sites of Scientific Interest (SSSIs) recommended by Natural Resources Wales (NRW) in their pre-application advice of 7 September 2021 (Chapter 11: Offshore Ornithology, Table 11.4). It was not technically feasible to apportion against all colonies listed in Pritchard *et al.* (2021) and it is also questionable whether ‘at sea’ impacts can be considered against SSSIs in the way it is possible to do for SPAs. Impacts recorded under environmental impact assessment (EIA) are considered against regional populations as defined in Pritchard *et al.* (2021) for the breeding season and Furness (2015) for the non-breeding season.
- 6 The seabird populations used in the calculation are obtained from the Seabird Monitoring Programme database: <https://app.bto.org/seabirds/public/index.jsp>, as summarised in Table 2. In line with the guidance, apportioning is based on numbers of individuals at each colony for a defined baseline (NatureScot 2018). Counts must be comparable across sites so that if there is a significant gap between the counts at different sites then an earlier baseline should be used. This has been the case for gannet and for Manx shearwater which use Seabird 2000 as the baseline, as discussed further below.
- 7 The apportioning calculation is a weighting based on population size, distance between the Project and the breeding colonies within foraging range, and area of sea included in the foraging range (NatureScot 2018). The apportioning calculation has been coded by HiDef into the R programming language and a copy of the code can be provided upon request.
- 8 Distances were measured on a precautionary basis from nearest boundary of the breeding population to nearest boundary of the proposed development. To be biologically meaningful, these are the ‘at sea’ distances – the actual distance the bird flies across water between the breeding site and the proposed development.
- 9 Outputs from the apportioning calculations for each species are provided in Section 3. This information can be used to help identify ‘likely significant effect’ for those SPAs which will need to be addressed in Volume 3, Technical Appendix 8.3: Report to Inform Appropriate Assessment. Section 4 provides a summary of the suggested SPAs and current reference populations for the HRA short-list.

**Table 2 Key breeding seabird populations used in apportioning**

Species	Breeding population	Count of adults	Baseline	Year of count
Gannet	Grassholm	61,376	Seabird 2000	1999
Gannet	Saltee Islands	3,790	Seabird 2000	1999
Gannet	Skelligs	57,598	Seabird 2000	1999
Manx shearwater	Skomer, Skokholm and the Seas off Pembrokeshire	302,000	Seabird 2000	1998

Species	Breeding population	Count of adults	Baseline	Year of count
Manx shearwater	Aberdaron Coast and Bardsey Island	32,366	Seabird 2000	2001
Manx shearwater	Rum	240,000	Seabird 2000	2001
Manx shearwater	Blasket Islands	39,068	Seabird 2000	2000/2001
Manx shearwater	St Kilda	2,598	Seabird 2000	1999
Manx shearwater	Saltee Islands	500	Seabird 2000	2001-2002
Manx shearwater	Skelligs	1,476	Seabird 2000	2001
Manx shearwater	Lambay Island	50	Seabird 2000	2002
Manx shearwater	Lundy	594	Seabird 2000	2001
Manx shearwater	Copeland Islands	10,442	Seabird 2000	mean 1998, 2000, 2002
Manx shearwater	Isles of Scilly	392	Seabird 2000	2000
Kittiwake	Skomer, Skokholm and the Seas off Pembrokeshire	2,472	Most recent counts	2018
Kittiwake	Saltee Islands	2,076	Most recent counts	2015-2018
Kittiwake	Howth Head Coast	6,162	Most recent counts	2015
Kittiwake	Lambay Island	6,640	Most recent counts	2015
Kittiwake	Aberarth Carreg Wylan	664	Most recent counts	2018
Kittiwake	Lundy	476	Most recent counts	2017
Kittiwake	Ireland's Eye	3,220	Most recent counts	2015
Kittiwake	Wicklow Head	1,546	Most recent counts	2019
Kittiwake	Old Head of Kinsale	1,422	Most recent counts	2015
Kittiwake	Rockabill	532	Most recent counts	2018
Kittiwake	Helvick Head to Ballyquin	130	Most recent counts	2018
Kittiwake	Isles of Scilly	150	Most recent counts	2015
Kittiwake	Castlemartin Range	0	Most recent counts	2021

Species	Breeding population	Count of adults	Baseline	Year of count
Guillemot	Skomer, Skokholm and the Seas off Pembrokeshire	29,744	Most recent counts	2017-2019
Guillemot	Castlemartin Range	18,611	Most recent counts	2021
Guillemot	Saltee Islands	25,851	Most recent counts	2015-2018
Guillemot	Lundy	6,198	Most recent counts	2017
Guillemot	Wicklow Head	955	Most recent counts	2019
Guillemot	Helvick Head to Ballyquin	1,170	Most recent counts	2018
Guillemot	Gower Coast: Rhossili to Porteynon	169	Most recent counts	2018
Razorbill	Skomer, Skokholm and the Seas off Pembrokeshire	10,694	Most recent counts	2018-2019
Razorbill	Castlemartin Range	1,682	Most recent counts	2021
Razorbill	Saltee Islands	6,519	Most recent counts	2015-2018
Razorbill	Lundy	1,735	Most recent counts	2017
Razorbill	Gower Coast: Rhossili to Porteynon	83	Most recent counts	2018
Razorbill	Helvick Head to Ballyquin	119	Most recent counts	2018
Puffin	Skomer, Skokholm and the Seas off Pembrokeshire	38,342	Most recent counts	2018
Puffin	Saltee Islands	390	Most recent counts	2015-2017
Puffin	Ynysoedd Y Gwylanod, Gwylan Islands	1,238	Most recent counts	2019
Puffin	Lundy	375	Most recent counts	2017
Puffin	Lambay Island	144	Most recent counts	2015

Species	Breeding population	Count of adults	Baseline	Year of count
Puffin	Ireland's Eye	127	Most recent counts	2015
Lesser black-backed gull	Skomer, Skokholm and the Seas off Pembrokeshire	12,836	Most recent counts	2018-2019
Lesser black-backed gull	Flat Holm	4,524	Most recent counts	2018
Lesser black-backed gull	Isles of Scilly	4,944	Most recent counts	2015-2019
Lesser black-backed gull	Aberarth Carreg Wylan	724	Most recent counts	mean 2018, 2019
Lesser black-backed gull	Saltee Islands	502	Most recent counts	2015-2018
Lesser black-backed gull	Lambay Island	690	Most recent counts	690

- 10 For gannet, the counts in Table 2 are based on a baseline of Seabird 2000 as the Skelligs have not been counted since 2004 and this is not comparable with the more recent counts for the other sites (all 2014). The Forth Islands SPA was checked on GIS and lies well beyond mean max foraging range plus one standard deviation of the Project (the distance the birds would fly by sea); and Ailsa Craig SPA was also scoped out on the basis of tracking data as agreed with the Joint Nature Conservation Committee (JNCC) during pre-application consultation. Nord Bretagne DO and Cote de Granit Rose – Sept Iles were also checked: these SPAs are designated for concentrations of seabirds at sea, they are not breeding colonies and are therefore not included in this apportioning.
- 11 For Manx shearwater, the counts in Table 2 are based on Seabird 2000 as the Skelligs, Blasket Islands and Lambay Island have not been counted since this time. A wider range of French and Spanish SPAs were considered but are not designated for breeding populations, rather they are for concentrations of birds recorded at sea. These sites are located at such distance from the Project that they make no material difference to the apportioning calculations.
- 12 For all other species it has been possible to use the most recent counts taken from the Seabird Monitoring Programme database.



## 3 Apportioning Results

### 3.1 Gannet

**Table 3. Apportionment of adult gannet on site to breeding colonies within foraging range which include this species as a feature**

Site	Count of adults	Distance to Erebus (km)	1/proportion foraging range as sea	Resulting weight	Proportional weight
Grassholm	61376	20	1.607	64.045	0.995
Saltee Islands	3790	92	1.507	0.175	0.003
Skelligs	57598	357	1.161	0.136	0.002

### 3.2 Manx shearwater

**Table 4. Apportionment of adult Manx shearwater on site to breeding colonies within foraging range which include this species as a feature**

Site	Count of adults	Distance to Erebus (km)	1/proportion foraging range as sea	Resulting weight	Proportional weight
Skomer, Skokholm and the Seas off Pembrokeshire	302000	24	1.073	108.812	0.995
Aberdaron Coast and Bardsey Island	32366	148	1.072	0.306	0.003
Rum	240000	602	1.072	0.137	0.001
Blasket Islands	39068	362	1.068	0.062	0.001
St Kilda	2598	757	1.072	0.001	0.000
Saltee Islands	500	92	1.071	0.012	0.000
Skelligs	1476	357	1.068	0.002	0.000
Lambay Island	50	226	1.072	0.000	0.000
Lundy	594	70	1.071	0.025	0.000
Copeland Islands	10442	353	1.072	0.017	0.000
Isles of Scilly	392	170	1.070	0.003	0.000

### 3.3 Kittiwake

**Table 5. Apportionment of adult kittiwake on site to breeding colonies within foraging range which include this species as a feature**

Site	Count of adults	Distance to Erebus (km)	1/proportion foraging range as sea	Resulting weight	Proportional weight
Skomer, Skokholm and the Seas off Pembrokeshire	2472	24	1.774	4.275	0.817
Saltee Islands	2076	92	1.733	0.239	0.046
Howth Head Coast	6162	209	2.172	0.172	0.033
Lambay Island	6640	226	2.206	0.161	0.031
Aberarth Carreg Wylan	664	84	2.007	0.106	0.020
Lundy	476	70	1.594	0.087	0.017
Ireland's Eye	3220	218	2.165	0.082	0.016
Wicklow Head	1546	167	2.172	0.068	0.013
Old Head of Kinsale	1422	206	1.325	0.025	0.005
Rockabill	532	231	2.207	0.012	0.002
Helvick Head to Ballyquin	130	152	1.520	0.005	0.001
Isles of Scilly	150	170	1.193	0.003	0.001
Castlemartin Range	0	41	1.732	0.000	0.000

### 3.4 Guillemot

**Table 6. Apportionment of adult guillemot on site to breeding colonies within foraging range which include this species as a feature**

Site	Count of adults	Distance to Erebus (km)	1/proportion foraging range as sea	Resulting weight	Proportional weight
Skomer, Skokholm and the Seas off Pembrokeshire	29744	24	1.452	5.537	0.754

Site	Count of adults	Distance to Erebus (km)	1/proportion foraging range as sea	Resulting weight	Proportional weight
Castlemartin Range	18611	41	1.568	1.282	0.175
Saltee Islands	25851	92	1.600	0.361	0.049
Lundy	6198	70	1.558	0.146	0.020
Wicklow Head	955	167	1.904	0.005	0.001
Helvick Head to Ballyquin	1170	152	1.899	0.007	0.001
Gower Coast: Rhossili to Porteynon	169	80	1.974	0.004	0.001

### 3.5 Razorbill

**Table 7. Apportionment of adult razorbill on site to breeding colonies within foraging range which include this species as a feature**

Site	Count of adults	Distance to Erebus (km)	1/proportion foraging range as sea	Resulting weight	Proportional weight
Skomer, Skokholm and the Seas off Pembrokeshire	10694	24	1.519	6.085	0.892
Castlemartin Range	1682	41	1.614	0.348	0.051
Saltee Islands	6519	92	1.612	0.268	0.039
Lundy	1735	70	1.532	0.117	0.017
Gower Coast: Rhossili to Porteynon	83	80	1.930	0.005	0.001
Helvick Head to Ballyquin	119	152	1.832	0.002	0.000

### 3.6 Puffin

**Table 8. Apportionment of adult puffin on site to breeding colonies within foraging range which include this species as a feature**

SPA name	Count of adults	Distance to Erebus (km)	1/proportion foraging range as sea	Resulting weight	Proportional weight
Skomer, Skokholm and the Seas off Pembrokeshire	38342	24	1.744	32.404	0.997
Saltee Islands	390	92	1.784	0.023	0.001
Ynysoedd Y Gwylanod, Gwylan Islands	1238	160	2.520	0.034	0.001
Lundy	375	70	1.550	0.033	0.001
Lambay Island	144	226	2.317	0.002	0.000
Ireland's Eye	127	218	2.270	0.002	0.000

### 3.7 Lesser black-backed gull

**Table 9. Apportionment of adult Lesser black-backed gull on site to breeding colonies within foraging range which include this species as a feature**

SPA name	Count of adults	Distance to Erebus (km)	1/proportion foraging range as sea	Resulting weight	Proportional weight
Skomer, Skokholm and the Seas off Pembrokeshire	12836	24	1.728	17.891	0.978
Flat Holm	4524	165	2.070	0.160	0.009
Isles of Scilly	4944	170	1.084	0.086	0.005
Aberarth Carreg Wylan	724	84	1.943	0.093	0.005
Saltee Islands	502	92	1.773	0.049	0.003
Lambay Island	690	226	2.359	0.015	0.001

## 4 Conclusion

- 13 These apportioning outputs identify a ‘short-list’ of SPA seabird breeding colonies for inclusion in Volume 3, Technical Appendix 8.3: Report to Inform Appropriate Assessment, see Table 10. These are the SPAs where apportioning would suggest ‘likely significant effect’ although that judgement will ultimately depend on the impacts that are modelled for the Project.
- 14 Impacts are modelled for the Project in Volume 3, Technical Appendix 11.3: Collision Risk and Volume 3, Technical Appendix 11.4: Displacement Analysis. Impacts will be apportioned between the different SPAs, as identified, based on the weightings for each species reported in Section 3. These apportioned impacts will be considered in Volume 3, Technical Appendix 8.3: Report to Inform Appropriate Assessment.
- 15 Table 10 includes the most recent count for each species and SPA taken from the Seabird Monitoring Programme database. These are the populations against which apportioned impacts should be considered.
- 16 There is also one SSSI where impacts may need to be separately considered under EIA: this is the Castlemartin Range SSSI for guillemot – please refer to Table 6. For all other species, EIA will consider impacts against the regional populations defined in Pritchard *et. al.* (2021).

**Table 10. Short-list of SPA breeding populations suggested for HRA**

Species	Site	Most recent count	Count unit*	Year
Gannet	Grassholm	36,011	AOS	2015
Manx shearwater	Skomer, Skokholm and Seas off Pembrokeshire	455,156	AOS	2018
Kittiwake	Skomer, Skokholm and Seas off Pembrokeshire	1236	AON	2018
Guillemot	Skomer, Skokholm and Seas off Pembrokeshire	29,744	IND	2017-2019
Razorbill	Skomer, Skokholm and Seas off Pembrokeshire	10,694	IND	2018-2019
Puffin	Skomer, Skokholm and Seas off Pembrokeshire	38,342	IND	2018
Lesser black-backed gull	Skomer, Skokholm and Seas off Pembrokeshire	6,418	AON	2018-2019

\* Count Units: AOS – apparently occupied sites, AON – apparently occupied nests, IND - individuals

## 5 References

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