4.12

Rampion 2 WIND FARM

Volume 4, Chapter 12

Offshore Ornithology Appendices

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Contents

4.12.1

Rampion 2 WIND FARM

Volume 4, Appendix 12.1

Offshore and intertidal ornithology baseline technical report

GoBe wood.

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1. Introduction

This section outlines the background to the Rampion 2 Offshore Windfarm and the need to characterise the baseline environment, with specific reference to offshore and intertidal ornithology aspects.

1.1 Purpose of this report

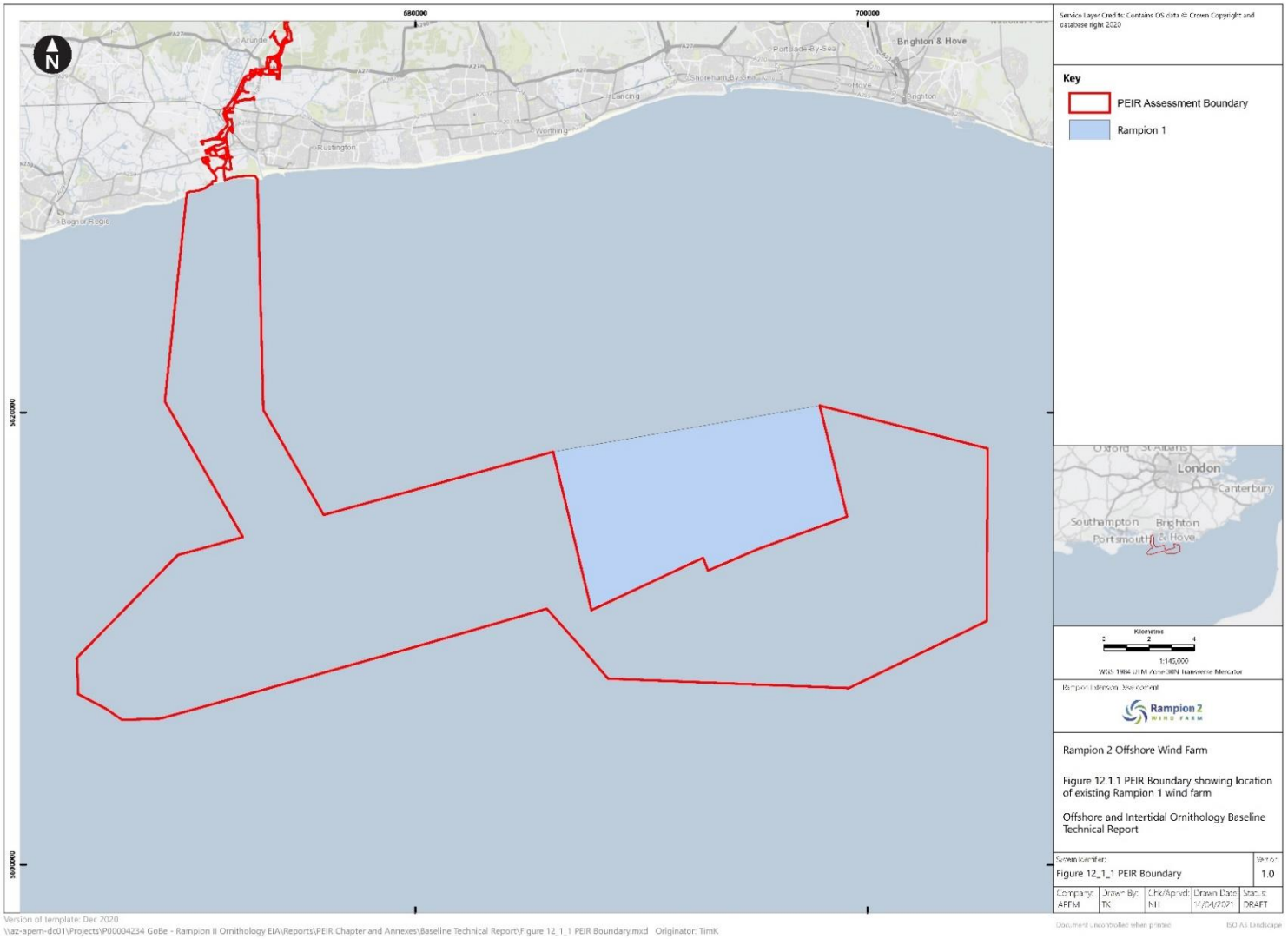
1.1.1 This technical report has been produced for the purpose of providing a detailed technical account of the methods and results used to establish the baseline characteristics of the offshore and intertidal ornithology aspects of the Rampion 2 Offshore Windfarm. This technical report provides supporting information to **Chapter 12: Offshore and intertidal ornithology, Volume 2**.

1.2 Project background

1.2.1 Rampion Extension Development Limited ('the Applicant' or 'RED') is proposing to develop the Rampion 2 Offshore Windfarm ('Rampion 2'). Rampion 2 will be sited adjacent to the existing Rampion Offshore Wind Farm (Rampion 1), located in the English Channel, 14 kilometres (km) off the coast of Brighton & Hove and approximately 30km east of the Isle of Wight. The existing Rampion 1 project was developed following award of Zone 6 in the United Kingdom Round 3 offshore wind development leasing round run by The Crown Estate (TCE) in 2009 and occupies 78 square kilometres (km^2). Rampion 2 will comprise both offshore and onshore infrastructure including offshore wind turbine generators (WTGs) and associated foundations and inter-array cabling, offshore substations, offshore export cables within a defined cable corridor, a landfall site, and an onshore substation for connection to the electricity transmission network. The offshore element of Rampion 2 will be located within an Area of Search adjacent to the west and south east of the existing Rampion 1 site, together with a small link or 'bridge' area between the two areas for cabling. The location of Rampion 2 is illustrated in **Graphic 1-1**. The Preliminary Environmental Information Report (PEIR) Assessment Boundary combines the assessment boundaries for the onshore and offshore infrastructure.

1.2.2 APEM Ltd (hereafter APEM) was commissioned to undertake a study of the offshore and intertidal ornithology that characterise the area in order to inform consideration of the potential likely significant effects on birds in the offshore and intertidal environment.

Graphic 1-1 PEIR Assessment Boundary showing location of existing Rampion 1 project



1.3 Aims and objectives

1.3.1 The aim of this technical report is to present the findings from offshore and intertidal ornithology data and to determine those receptors that characterise the baseline and are of relevance to the assessment of the potential impacts from Rampion 2 at the PEIR stage. Those receptors are primarily the bird species that are collectively called seabirds and shorebirds. A small number of other birds were detected, which are of relevance to **Chapter 23: Terrestrial ecology and nature conservation, Volume 2.** The data used to define the baseline characterisation are from site-specific aerial digital surveys for offshore ornithology and from desk study for the intertidal ornithology (for instance, birds that are seaward of the Mean High Water Springs (MHWS) tide level). Additional site-specific waterbird surveys are being undertaken along the coastal strip to provide further data during the non-breeding season and the preliminary results from the first 12 surveys are presented here, with the results from the full set of intertidal surveys being used to update this report for the final ES.

1.3.2 This technical report presents information on offshore birds derived from 15 consecutive months of aerial digital surveys undertaken between April 2019 and June 2020, inclusive. These are the results from the first 15 months of a 24-month programme of surveys, and the results from the full 24 months will be used to update this report for the final ES. The information that is presented within this report and its appendices for both the offshore and intertidal ornithology receptors includes the following:

- summary of desk study findings from intertidal bird data;
- details of site-specific offshore survey data, including:
  - bird abundance and density estimates (monthly and for bio-seasons);
  - behaviour of birds (numbers flying and sitting on the water);
  - age classification of key seabirds; and
  - spatial distribution maps of key seabirds (for bio-seasons).

1.4 Study area

1.4.1 The study area for the offshore and intertidal ornithology receptors includes all of the sea and coasts within the Rampion 2 array area of the PEIR Assessment Boundary, a 4km buffer surrounding the array area (but excluding Rampion 1 from this buffer), the export cable corridor and the cable landfall area. Account also has to be taken of the mobility of birds, noting that for instance, birds that nest outside the study area might fly in to or across the study area to feed during the breeding season, might fly into the study area outside of the breeding season to spend the winter or might fly across the study area on migration.

1.4.2 For the purposes of this section a split between offshore and intertidal is required in order to refine the focus of the ornithological assessments. The intertidal area and related assessments consider birds using the habitat mostly between MHWS and Mean Low Water Spring (MLWS), recognising that some of these birds might

nest or roost on the shore landward of MHWS. The offshore area and related assessments consider birds using the habitat seaward of MLWS within the export cable corridor out to the Rampion 2 array area of the PEIR Assessment Boundary and a 4km buffer surrounding it.

1.4.3 The data for the study area within the Rampion 2 array area have been refined for this assessment at PEIR from a wider survey data set, which was collected through a survey programme of the wider Rampion 2 Area of Search. The study area for offshore and intertidal ornithology is shown in **Graphic 1-1** and consists of the Rampion 2 array area, a 4km buffer surrounding it, the export cable corridor and the cable landfall area between MHWS and MLWS.

1.5 Bird names

1.5.1 Throughout this technical report the bird species names that are used are those that are in common use amongst English ornithologists and this corresponds to the "*British (English) vernacular name 2017*" column of the list of English and scientific names prepared by the British Ornithologists' Union (BOU, 2017). The corresponding scientific names from that publication are listed in the glossary on scientific bird names in **Annex A**.

2. Intertidal ornithology

This section describes the approach to baseline characterisation of intertidal ornithological aspects. The intertidal study area consists of the area between MHWS and MLWS within the export cable corridor.

2.1 Introduction

2.1.1 The intertidal study area is a stretch of vegetated shingle beach, on the south coast of England. The beach is backed by a sand dune system. The east of the study area is bounded by the mouth of the River Arun. The beach system extends west from the study area, eventually forming the pleasure beaches of resort towns including Bognor Regis. Shingle beaches are common on the south coast of England, although many are heavily influenced by human activities and developments. There are some notable areas of intertidal and estuarine habitats to the west, including the areas around Pagham Harbour and Chichester Harbour. The intertidal study area is fronted by the English Channel, which separates the island of Britain from France and the rest of continental Europe.

2.1.2 An initial desk-based review of appropriate literature and data sources was undertaken for the Scoping Report (RED, 2020). The data sources listed in **Table 2-1**, which were identified in the Scoping Report (RED, 2020), provide coverage of the study area and the wider region of interest for nearshore and intertidal bird species. These data sources and reports were confirmed through the Scoping Opinion (Planning Inspectorate (PINS), 2020) as the most appropriate sources to use to determine the baseline for intertidal and nearshore ornithology receptors to provide an account of all the information required for the impact assessments at PEIR. Further agreement is being sought through the Evidence Plan Process (EPP).

2.1.3 A programme of site-specific through-the-tide-cycle surveys is being undertaken along the coastal strip to provide further data during the non-breeding season for integration into the final baseline. Data collection is taking place from September 2020 to March 2021. Data collection is incomplete and detailed analysis has not been undertaken at this juncture. However, initial results have been included below for the first 12 visits, representing data from September 2020 to January 2021.

Table 2-1 Key sources of intertidal ornithology data for Rampion 2.

Source	Date	Summary	Coverage of study area
Site specific surveys	September 2020 to March 2021	A programme of through-the-tide-cycle surveys of the intertidal study.	Covers the export cable corridor Landfall area.

Source	Date	Summary	Coverage of study area
British Trust for Ornithology (BTO) Non-Estuarine Waterbird Surveys (NEWS)	1984 to 2016	NEWS were conducted in 1984/1985, 1997/98, 2006/07 and 2015/16 and provide records focused on intertidal habitats along the United Kingdom (UK) coastline.	Covers the export cable corridor Landfall area.
Wetland Bird Survey (WeBS)	Annual Reports	Annual survey reports of wetland waterbirds. Most recent being Frost *et al.* (2020).	Coverage of UK intertidal and wetland zones. Source contains information which can be drawn upon at a Rampion 2 specific scale, or a wider regional scale.
Local / County bird reports and atlases	Annual Reports	Annual publications produced by local birdwatching groups (for example, Sussex Ornithological Society) which summarise sightings and surveys results for Sussex and the wider south coast region. County atlases covering breeding and non-breeding birds within Sussex and the surrounding south coast counties.	Coverage across region at various intertidal and wetland and coastal areas.
Wildfowl and Wetlands Trust – Aerial surveys of waterbirds in the UK	2004 to 2009	Aerial surveys of waterbirds around the UK. Surveys undertaken by Wildfowl & Wetlands Trust (WWT) on behalf of DTI (now Department for Business, Energy and Industrial Strategy (BEIS) but also previously referred to as Department for Business, Enterprise and Regulatory Reform (BERR) and Department and Energy and Climate Change (DECC)).	Coverage of inshore waters relevant to Rampion 2 from survey grids SE3, SE4 and SE5.
Existing offshore	Various dates	Information obtained from various offshore wind farm Environmental	No coverage of Rampion 2

Source	Date	Summary	Coverage of study area
wind farm grey literature		Statements (for instance, Thanet Extension, Kentish Flats, Greater Gabbard).	study area but provides information on birds in the context of the English south east coast.
Designated sites	Various dates	Information of Special Protection Areas (SPAs) and other designations relevant to IOFs with potential connectivity to Rampion 2. Key source of information will be Natural England designated sites portal. Available at: https://designatedsites.naturalengland.org.uk/SiteSearch.aspx	Country wide information on designated sites.
National Bird Atlas (Balmer *et al.*, 2013)	2007 to 2011	Results of five years of breeding season and wintering surveys across the UK at a 10km resolution.	Cable route scoping boundary overlaps with 20km squares TQ_A and TQ_F.

2.2 Results

Site specific surveys

2.2.1 The raw counts from the first 12 visits of site specific intertidal surveys are presented in **Table 2-2** (survey dates are given in **Table 2-3**). The only count which exceeds the threshold for significance based on 1 percent of the Great Britian (GB) population (see **Table 2-4**) is Mediterranean gull, which had a peak count of 151.

Table 2-2 Peak count per visit from the first 12 visits of the site-specific surveys. LT/HT = Low Tide/High Tide.

Species	1-LT	2-HT	3-HT	4-LT	5-HT	6-LT	7-HT	8-LT	9-LT	10-HT	11-HT	12-LT
Dark-bellied Brent goose		1	1		4	620	295	650	187	11	160	7
Mute swan												3
Shelduck						2						
Gadwall			1							2		
Wigeon		13	2							18		19
Pintail	1	15								18		
Teal		1								2	1	
Common scoter	3	19		1		1		4	12	18	3	4
Red-breasted merganser						3	2	8	28	8		7
Great crested grebe				1	2	2		6	24	1	2	5
Slavonian grebe						1						
Oystercatcher	3	9	16		7		3	6	2	13		8
Lapwing											24	
Grey plover	2	3	6	2	15	71	37	47	9	47		
Ringed plover	12	14	11		19	12	27			4		7

Species	1-LT	2-HT	3-HT	4-LT	5-HT	6-LT	7-HT	8-LT	9-LT	10-HT	11-HT	12-LT
Turnstone	8	48	37	37	83	52	100	43	44	60	13	8
Knot					1	1						
Sanderling	3			15	80	35	19	21	60	19	32	
Dunlin	6	2	3		1	3	2	5	6			
Purple sandpiper			2									
Snipe												1
Black-headed gull			2	145	16	57			1		6	
Little gull		2										
Mediterranean gull	151	2	65	21	32	9	9	1	1	7	12	20
Common gull			1	178	18	4					70	
Great black-backed gull						1						
Herring gull						5					2	
Sandwich tern	2	3	2	1								
Guillemot								1		1		
Guillemot/ Razorbill										1		
Red-throated diver		1			1		1	12	3	18	1	2

Species	1-LT	2-HT	3-HT	4-LT	5-HT	6-LT	7-HT	8-LT	9-LT	10-HT	11-HT	12-LT
Great Northern diver				1								
Gannet	10	2					2			1	14	
Cormorant	4		2	3	1	2			6	2		2
Grey heron								1				
Little egret	2	2										
Kingfisher	1				1							
Kestrel			1									
Black redstart				1								

Table 2-3 Dates of site-specific intertidal surveys.

Survey Number	Date
1	24/09/2020
2	02/10/2020
3	05/10/2020
4	26/10/2020
5	03/11/2020
6	25/11/2020
7	03/12/2020
8	09/12/2020
9	08/01/2021
10	13/01/2021
11	12/02/2021
12	22/02/2021

Non-estuarine waterbird surveys

2.2.2 A programme of national counts of birds along the UK's non-estuarine shoreline was conducted in 1984/85, 1997/98, 2006/07 and 2015/16, originally under the title of the 'Winter Shorebird Count' and thereafter as the 'Non-Estuarine Waterbird Survey' (Frost *et al.*, 2017). The stretch of coast from Climping Beach to West Beach, Littlehampton was included in the most recent three surveys with consistent and complete coverage of the intertidal study area. The results for this sector are presented in **Table 2-1**, which represent peak winter count of birds (expressed as a range of values in the manner published by the BTO) from that programme of non-estuarine waterbird counts. Also included in **Table 2-1** are the 1 percent thresholds for identifying a site of national importance for each species. Only sanderling reach the 1 percent of the national populations for any species in the given season, the common threshold for consideration within impact assessments.

Table 2-4 NEWS results between Climping Beach and West Beach, Littlehampton.

Species	Survey			GB 1 percent threshold (Frost *et al.*, 2020)
	1997/98	2006/07	2015/16	
Dark-bellied brent goose	0	0	0	980
Mute swan	0	0	0	500
Wigeon	0	0	0	4,500
Teal	0	0	0	4,300
Red-breasted merganser	1 to 3	0	0	100
Little grebe	0	0	0	150
Great crested grebe	0	0	0	170
Oystercatcher	81 to 120	21 to 40	1 to 30	2,900
Grey plover	0	1 to 50	1 to 50	330
Ringed plover	21 to 30	31 to 60	0	420
Curlew	0	0	0	1,200
Turnstone	1 to 30	121 to 180	1 to 60	400
Sanderling	121 to 180	61 to 120	1 to 200	200
Dunlin	1 to 400	0	0	3,400
Redshank	1 to 4	1 to 10	0	940
Black-headed gull	nc	nc	1 to 200	22,000
Mediterranean gull	nc	nc	11 to 20	40
Common gull	nc	nc	1 to 30	7,000
Great black-backed gull	nc	nc	1 to 10	760
Herring gull	nc	nc	1 to 300	7,300
Lesser black-backed gull	nc	nc	0	1,200
Cormorant	0	1 to 10	0	620
Grey heron	0	0	0	450
Little egret	0	0	0	110

Nc = Not counted

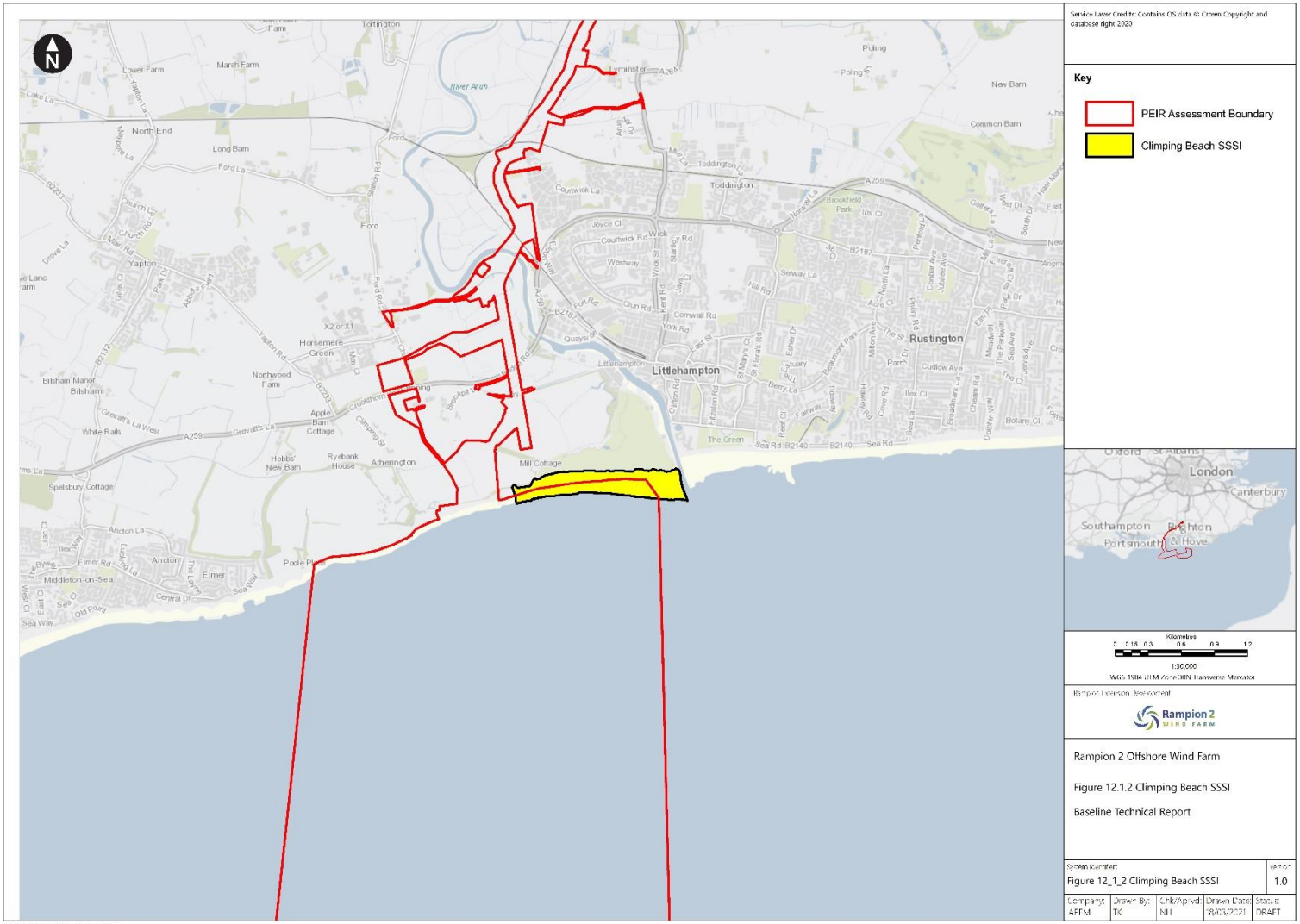
Designated sites

2.2.3 There is partial overlap between Climping Beach Site of Special Scientific Interest (SSSI) and the intertidal study area (**Graphic 2-1**Error! Reference source not found.). The citation for Climping Beach SSSI describes the intertidal zone as "*consisting of soft mud and sands and supporting important populations of*

wintering birds[1]. In particular, the citation notes that 'up to 300 sanderling have been recorded from this site in winter; a figure which represents 1 percent of the West European population of this bird. […]" Other wintering birds include grey plover and oystercatcher'.

[1] SSSI Citation available at https://designatedsites.naturalengland.org.uk/PDFsForWeb/Citation/1004174.pdf

Graphic 2-1 Map showing overlap of Climping Beach SSSI with the PEIR Assessment Boundary



Local/county bird reports and atlases

2.2.4 The 2016 and 2018 Sussex Bird Reports (Sussex Ornithological Society (SOS), 2017 and 2019) provide information on all species recorded in the county. The reports provide an overview of birds recorded with the intertidal and nearshore environment, with records of breeding and wintering numbers highlighted where considered of significance locally or regionally. However, records within county bird reports are, often, focused on particular locations that birdwatchers frequent on a regular basis and do not systematically cover entire stretches of coastline, so should not be the sole source of data used in order to evaluate bird populations for impact assessment purposes.

2.2.5 Generally, The Sussex Bird Report 2018 (SOS, 2019) suggests very few ducks, waders, gulls or terns breed within or in close proximity to the intertidal zone along the coast in the intertidal study area. The only exception is one pair of ringed plovers, which are reported to have fledged one chick at West Beach (Littlehampton). The nesting location itself would have been above MHWS, but it is likely that this pair would have been foraging in the intertidal zone during the breeding season.

2.2.6 Notable records of birds recorded on migration or during the non-breeding (wintering period) are referred to throughout the report. The notable counts recorded within The Sussex Bird Reports (SOS, 2017 and 2019) are presented in **Table 2-5**, with commentary with regards to the time of year and location of the records. Of those species recorded in peak numbers only sanderling and Mediterranean gull were recorded reaching the 1 percent of the national populations for the given season within the intertidal study area, the common threshold for consideration within impact assessments. Mediterranean gull peak counts occurred during the period of post-breeding dispersal in August and September.

Table 2-5 Notable counts of birds relevant to the intertidal study area given in the Sussex Bird Report 2018 (SOS, 2019).

Species	Month (2018)	Count	GB 1 percent Threshold (Frost *et al.*, 2020; Woodward *et al.*, 2020)	Comments
Slavonian grebe	February	3	9	Observed from Climping Gap / Middleton; not recorded using intertidal area. Counts are monthly minimum totals.
	March	5		
Oystercatcher	September	44	2,900	Peak count at Climping
Grey plover	March	75	330	Peak count at Climping
Ringed plover	N/A	N/A	N/A	One pair reported to have fledged at least one chick on West Beach (Littlehampton).
Turnstone	January	29	400	WeBS counts for Climping Gap (not exclusively intertidal)
	February	193		
	March	40		
	August	58		
	September	23		
	October	10		
	November	14		

Species	Month (2018)	Count	GB 1 percent Threshold (Frost *et al.*, 2020; Woodward *et al.*, 2020)	Comments
	December	39		
	October	100		Climping Gap notable count (non-WeBS)
Sanderling	January	10	200	WeBS counts for Climping Gap (not exclusively intertidal)
	February	153		
	March	30		
	August	2		
	September	4		
	November	110		
	December	20		
Sanderling	January	90	200	Minimum monthly counts for Littlehampton/Rustington/Climping
	February	153		
	March	155		
	November	110		
	December	250		

Species	Month (2018)	Count	GB 1 percent Threshold (Frost *et al.*, 2020; Woodward *et al.*, 2020)	Comments
Mediterranean gull	September	1,000	40	Observed from Climping Gap. Counts are monthly peak.
	October	500		
	November	100		
Black tern	May	2	N/A[2]	Observed from Climping; not recorded using intertidal area

[2] No population estimate given – regularly seen on passage, but no established breeding or wintering population

2.2.7 The Hampshire Bird Report 2018 (Chalmers, 2019) was also reviewed; however, it did not present any evidence relevant to the intertidal study area (as the intertidal study area lies approximately 24km from the Hampshire border at the nearest point). No additional data were identified in local atlases.

Rampion 1 Environmental Statement (ES)

2.2.8 For Rampion 1, the intertidal zone was included within the onshore (rather than offshore) ecology assessment. The Rampion 1 cable landfall location is at Lancing Beach, approximately 15km west from the Rampion 2 intertidal Area of Search. In the Rampion 1 ES (E.ON, 2012), it was mentioned that Adur Estuary SSSI lies close to the Rampion 1 cable landfall site and this SSSI is important for wading bird populations. Due to the distance between the cable landfall Area of Search for Rampion 2 and the area used for Rampion 1 no bird records were considered of relevance for this baseline report.

3. Offshore ornithology

This section describes the approach to baseline characterisation of offshore ornithological aspects. The offshore study area consists of the array area and export cable corridor (up to Mean Low Water Springs at the landfall site).

3.1 Key data sources

3.1.1 An initial desk-based review of appropriate literature and data sources was undertaken for the Scoping Report (RED, 2020). The data sources listed in **Table 3-1**, which were identified in the Scoping Report (Wood, 2020), provide coverage of the study area and the wider region of interest for nearshore and intertidal bird species. These data sources and reports were confirmed through the Scoping Opinion (PINS, 2020) as the most appropriate sources to use to determine the baseline for intertidal and nearshore ornithology receptors to provide an account of all the information required for the impact assessments at PEIR. Further confirmation is being sought through the EPP.

Table 3-1 Key sources of offshore ornithology data for Rampion 2

Source	Date	Summary	Coverage of study area
Rampion 2 – aerial digital survey data	2019 to 2021	Aerial digital surveys conducted by APEM Ltd. on a monthly basis between April 2019 and March 2021.	Rampion 2 array area plus 4km buffer. Data available for this PEIR assessment: April 2019 to June 2020.
Rampion Offshore Wind Farm – Baseline characterisation surveys	2010 to 2012	Boat-based surveys across the Rampion zone and 5km buffer plus an adjacent control zone to the east of the project. Data collection initiated in March 2010 for two years (end date February 2012).	Approximately 40 percent coverage of the Rampion 2 array area.
	2010 to 2011	Aerial visual surveys across Rampion zone and 5km buffer plus an adjacent control zone to the east of the project. Data collected for one year (August 2010 to August 2011).	Approximately 40 percent coverage of the Rampion 2 array area.

Source	Date	Summary	Coverage of study area
Local bird reports	Annual Reports	Annual publications produced by local birdwatching groups (for example, Sussex Ornithological Society) which summarise sightings and surveys results for Sussex and the wider south coast region.	Coverage across region at various intertidal and wetland and coastal areas.
Wildfowl and Wetlands Trust – Aerial surveys of waterbirds in the UK	2004 to 2009	Aerial visual surveys of waterbirds around the UK. Surveys undertaken by WWT on behalf of Department for Trade and Industry (DTI) (now BEIS but also previously referred to as BERR and DECC).	Coverage of inshore waters relevant to Rampion 2 from survey grids SE3, SE4 and SE5.
Existing offshore wind farm grey literature	Various dates	Information obtained from various offshore wind farm Environmental Statements (for instance, Thanet Extension, Kentish Flats, Greater Gabbard).	No coverage of Rampion 2 study area but provides information on birds in the context of the English south east coast.
Designated sites	Various dates	Information of Special Protection Areas (SPAs) and other designations relevant to IOFs with potential connectivity to Rampion 2. Key source of information will be Natural England designated sites portal. Available from: https://designatedsites.naturalengland.org.uk/SiteSearch.aspx	Country wide information on designated sites.
National Bird Atlas (Balmer *et al.*, 2013)	2007 to 2011	Results of five years of breeding season and wintering surveys across the UK at a 10km resolution.	Cable route scoping boundary overlaps with 20km squares TQ_A and TQ_F.

Source	Date	Summary	Coverage of study area
Potential impacts of offshore wind farms on birds	Various dates	Published, peer reviewed scientific literature on bird behaviour and potential impacts from offshore wind farm for example, Garthe and Hüppop (2004); Drewitt and Langston (2006); Stienen *et al.* (2007); Speakman *et al.* (2009); Langston (2010); Band (2012); Cook *et al.* (2012); Furness and Wade (2012); Wright *et al.* (2012); Furness *et al.* (2013); Johnston *et al.* (2014a,b); Cook *et al.* (2014); Dierschke *et al.* (2017); Statutory Nature Conservation Bodies (SNCB) (2017); Jarrett *et al.* (2018); Leopold and Verdaat (2018); Mendel *et al.* (2019).	Generic information applicable to Rampion 2 IOFs.
Large scale survey data sets	2014	Large scale seabird sensitivity mapping as part of the SeaMaST project (Bradbury *et al.*, 2014).	UK wide coverage with information that can be drawn upon at a Rampion 2 specific scale, or a wider regional scale.
Bird distribution	Various dates	Publicly available reports of seabird distribution in UK waters for example, Stone *et al.* (1995); Brown and Grice (2005); Kober *et al.* (2010); Waggitt *et al.* (2019); Cleasby *et al.* (2020).	UK wide coverage with information that can be drawn upon at a Rampion 2 specific scale, or a wider regional scale.
Bird breeding ecology	Various dates	Information on the breeding ecology of various bird species for example, Cramp and Simmons (1977 to 1994); Del Hoyo *et al.* (1992 to 2011); Robinson (2005).	Generic information applicable to Rampion 2 IOFs.

Source	Date	Summary	Coverage of study area
Bird population estimates and demographic rates	Various dates	Data on seabird populations and demographic rates for use in assessments for example, Mitchell *et al.*, 2004; BirdLife International, 2004; Holling *et al.*, 2011; Frost *et al.*, 2020; Musgrove *et al.*, 2013; Furness, 2015; Horswill *et al.*, 2017, Joint Nature Conservation Committee (JNCC), 2020.	These sources contain information which can be drawn upon at a Rampion 2 specific scale, or a wider regional scale.
Bird migration and foraging movements	Various dates	Bird movements during breeding season foraging trips and migratory movements for example, Wernham *et al.*, 2002; Thaxter *et al.*, 2012; Wright *et al.*, 2012; Furness *et al.*, 2018; Woodward *et al.*, 2019; Wakefield *et al.*, 2017; Wakefield *et al.*, 2013; Royal Society for the Protection of Birds (RSPB) FAME and STAR tracking data.	These sources contain information which can be drawn upon at a Rampion 2 specific scale, or a wider regional scale.

Review of bird data available for use in the Rampion 2 Environmental Impact Assessment (EIA)

Rampion 1 – baseline characterisation surveys

3.1.2 Site-specific boat-based and aerial visual surveys were undertaken in the pre-application phase for Rampion 1 to provide the ornithological baseline for ES assessment. Boat-based surveys were carried out at approximately monthly intervals from March 2010 to February 2012. Aerial visual surveys were carried out at approximately monthly intervals from August 2010 to August 2011. Both survey methods used observation teams and were based on transect distance sampling protocols. These surveys covered an area extending from the wind farm site that cover approximately 40 percent of the Rampion 2 array area. The evaluation of the conservation value of the bird populations recorded within 4km of the project site (excluding those which occurred in very low numbers) included:

- SPA species – gannet, lesser black-backed gull and common tern;

- European Union (EU) Birds Directive Annex 1 species) – little gull and Arctic tern; and
- apecies present in regionally important numbers and/or UK BAP priority species – fulmar, great skua, common gull, herring gull, great black-backed gull, kittiwake, guillemot and razorbill.

3.1.3 Review of the occurrence and distribution of these species from the ES baseline data suggested that only two of the above species (fulmar and herring gull) were recorded within the breeding season on a regular basis in numbers considered of importance. These data suggest that the area surveyed is of most ornithological interest during the migratory and non-breeding seasons for the majority of bird species and not during the breeding season. During the spring migratory season, notable species were common gull, little gull, auks and terns. During the winter season, the only species in notable numbers was great black-backed gull.

WWT waterbird surveys

3.1.4 WWT carried out a programme of comprehensive surveys of UK nearshore waters between 2004 and 2009. Surveys were carried out using an aerial observer approach and covered the area from the shore to approximately 40km offshore. Results were presented by irregularly shaped blocks, where each block consisted of the area that could be surveyed in a single day (approximately 600km of flight lines). The most relevant blocks for this study were SE3 (covering Selsey Bill to Worthing) and SE4 (Worthing to Peacehaven). Waterbird surveys were carried out at various points during the year, between 2004 and 2008. A map showing the location of the SE3 and SE4 blocks and exact survey dates are given in WWT (2009).

3.1.5 Although the surveys are not specific to the Rampion 2 study area, they give a useful overview of the species present in the region at different times of year. The results suggest that key species present all year round include fulmar, gannet, kittiwake, herring gull, great black-backed gull and auk species (it is assumed that most auks were guillemots or razorbills). Tern species and skua species were recorded in generally small numbers and only in some periods, which are likely to represent migratory movements through the area.

3.1.6 The raw count results are presented in **Annex B**. Note that these are raw counts and no analysis has been carried out.

Local bird reports

3.1.7 Local bird reports can be a valuable source of information regarding bird species in the near-shore environment, although as they rarely (if ever) incorporate boat-based or aerial observations, they provide less information on birds in the offshore environment. Local bird reports also tend to focus on rare or unusual sightings which are less likely to be relevant from an EIA perspective, although they also include a comprehensive systematic list.

3.1.8 The Sussex Bird Report 2016 and 2018 (SOS, 2017 and 2019) and the Hampshire Bird Report 2016 and 2018 (Hampshire Ornithological Society (HOS), 2017 and 2019) were reviewed for species of relevance to the export cable corridor and array area (species relevant to the intertidal area are discussed in **Section 2**).

Table 3-2 gives the peak seawatching counts from the Sussex Bird Report 2018, being the most recent available report and most relevant to the export cable corridor and array area. Non-seabirds are also listed if clearly linked to the offshore environment through for example,, migratory movements. Vagrants recorded offshore are not included as of no relevance for EIA purposes. Typically seawatching from the coast may identify birds out to approximately 10km and therefore provides information on birds flying over the offshore cable corridor; however, it would not identify birds in the array area.

Table 3-2 Peak seawatching counts of waterbirds and seabirds in Sussex Bird Report 2018 with relevance to the export cable corridor and array area

Species	Peak count	Month	Location/Notes
Dark-bellied Brent goose	5,248	March	Splash Point
Light-bellied Brent goose	1	April	Selsey Bill
Pink-footed goose	10	March	Telscombe Cliffs
White-fronted goose	1	April	Selsey Bill
Egyptian goose	2	April	Splash Point
Shelduck	23	April	Birling Gap
Garganey	6	April	Goring Gap
Shoveler	154	March	Splash Point
Gadwall	11	October	Selsey Bill
Wigeon	187	October	Selsey Bill
Mallard	12	March	Birling Gap
Pintail	31	March	Splash Point
Teal	66	October	Selsey Bill
Pochard	46	March	Barcombe Res
Tufted duck	7	April	Splash Point
Scaup	4	March	Selsey Bill
Eider duck	13	March	Worthing & Goring
Common scoter	3,020	April	Splash Point
Velvet scoter	8	April	Splash Point
Long-tailed duck	1	April	Splash Point
Red-breasted merganser	90	December	Worthing
Goosander	1	March	Goring Gap
Red-throated diver	155	April	Splash Point
Black-throated diver	12	May	Splash Point

Species	Peak count	Month	Location/Notes
Fulmar	34	April	Splash Point
Cory's shearwater	1	June	Selsey Bill
Manx shearwater	61	May	Selsey Bill
Balearic shearwater	1	August	Selsey Bill
Gannet	823	May	Selsey Bill
Cormorant	140	January	Selsey Bill
Shag	3	March	Splash Point
Avocet	6	March	Splash Point
Oystercatcher	26	April	Splash Point
Grey plover	345	April	Selsey Bill
Golden plover	23	March	Selsey Bill
Whimbrel	280	May	Splash Point
Curlew	31	March	Splash Point
Bar-tailed godwit	458	May	Splash Point
Turnstone	50	March	Selsey Bill
Knot	504	May	Splash Point
Sanderling	30	April	Selsey Bill
Kittiwake	700	April	Birling Gap
Black-headed gull	281	March	Splash Point
Little gull	183	April	Splash Point
Mediterranean gull	133	April	Splash Point
Common gull	353	March	Splash Point
Lesser black-backed gull	40	April	Selsey Bill
Herring gull	400	March	Splash Point
Caspian gull	1	March	Climping Gap
Great black-backed gull			No seawatching results reported; high count of 4,000 at Seaford/Cuckmere Haven in December.
Pomarine skua	34	May	Splash Point
Arctic skua	55	April	Splash Point
Great skua	53	April	Splash Point
Razorbill	134	April	Splash Point
Guillemot	8	April	(Unspecified)

Species	Peak count	Month	Location/Notes
Auk species	258	February	Fairlight
Little tern	110	April	Selsey Bill
Black tern	8	May	Selsey Bill
Sandwich tern	760	April	Selsey Bill
Common tern	194	April	Splash Point
Arctic tern	42	April	Splash Point
Common / Arctic tern	1,257	May	Birling Gap
Roseate tern	1	May	Selsey Bill

European Seabirds at Sea (ESAS)

3.1.9 The European Seabirds at Sea database (Camphuysen *et al.*, 2004) consists of observations collected through aerial and boat-based surveys between 1979 and 1996. **Table 3-3** shows the total number of birds recorded in the European Seabirds at Sea database within the array area plus 4km buffer. Note that this total number is compiled from numerous different surveys carried out across several years, and in various months. The most recent survey in the data included in the array area plus 4km buffer was in 1985, and therefore the data are 35 years old. The numbers of birds in **Table 3-3** should therefore be treated with caution, but may give some indication of the relative abundances of common species.

Table 3-3 Total number of birds of each species recorded by ESAS surveys in the array area plus 4km buffer.

Species	Total number of birds
Black-headed gull	1
Common gull	6
Fulmar	1
Gannet	4
Great black-backed gull	47
Guillemot	25
Guillemot / razorbill	14
Herring gull	43
Kittiwake	59
Lesser black-backed gull	17

3.2 Rampion 2 Aerial Digital Surveys

Overview

3.2.1 Offshore ornithology data has been collected for multiple purposes within the English Channel and wider UK waters that provide regional and national generic and species-specific information on the distribution, abundance, biological seasons, behaviour and characteristics of birds in the offshore environment. These data sources and additional sources identified through the EPP in consultation with Natural England and the RSPB were considered to characterise the wider region and for the purpose of impact assessments.

Methodology

3.2.2 A programme of 24 monthly aerial digital surveys has been undertaken between April 2019 and March 2021, with 15 months of data provided in this report. Surveys were carried out using APEM's high-resolution camera system to capture digital still imagery, to assess the abundance and distribution of birds and marine mammals of the Rampion 2 Survey Area. For this report, results are presented for the Rampion 2 array area and a 4km buffer around it. As any effects on birds within the Rampion 1 array area were accounted for with the impact assessments for that project bird data from with Rampion 1 have been excluded from the 4km buffer around Rampion 2 for abundance estimate calculations in order to reduce any instances of double counting (See **Graphic 3-1**).

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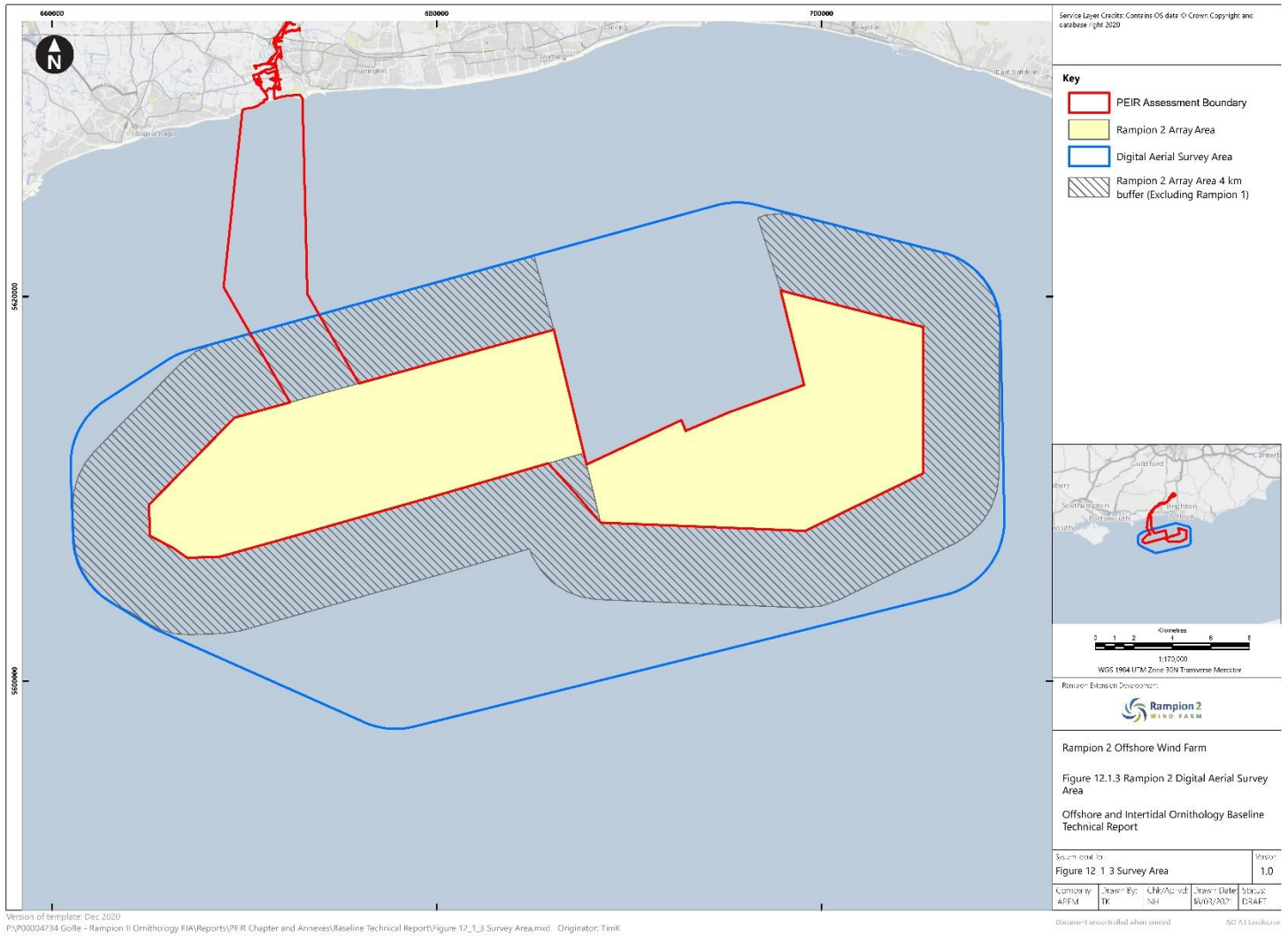
Graphic 3-1 Rampion 2 array area, 4km buffer used for abundance estimates, and whole survey area (used for flight direction analysis)



3.2.3 The survey method has been designed to optimise the data collection for all bird species using a grid-based survey design at 2cm ground sampling distance (GSD) to achieve a minimum of 10 percent coverage of Rampion 2 and a 4km buffer. The survey dates, start and finish times and percentage coverage are given in **Table 3-4**.

Table 3-4 Dates, times and coverage of the first 15 aerial digital surveys of the Rampion 2 study area

Survey	Survey Date	Survey Flight Times (UTC)	Coverage (percent)
April 2019	26/04/2019	09:32 – 12:47	11.58
May 2019	14/05/2019	08:08 – 10:10	11.59
June 2019	14/06/2019	12:55 – 15:05	11.59
July 2019	09/07/2019	13:44 – 16:00	12.10
August 2019	05/08/2019	15:48 – 17:58	12.17
September 2019	02/09/2019	07:41 – 09:50	12.24
October 2019	02/10/2019	14:05 – 16:02	12.24
November 2019	01/12/2019*	11:00 – 13:09	12.24
December 2019	22/12/2019	11:29 – 13:34	12.22
January 2020	15/01/2020	13:02 – 15:14	12.24
February 2020	07/02/2020	12:03 – 13:55	12.24
March 2020	09/03/2020	09:40 – 11:57	12.24

UTC = Coordinated Universal Time
* The November 2019 survey was delayed due to poor weather conditions, though for clarity, it is referred to as the November 2019 survey throughout this report.

3.2.4 Note that on 08 and 09 February 2020, ‘Storm Ciara’ disrupted travel networks, caused power cuts, and also caused flooding in particular regions of the UK. The February 2020 survey was conducted on 7 February 2020 (for instance, immediately before Storm Ciara made landfall in the UK) and results from this survey have shown a noteworthy increase in birds when compared with other survey months. It is considered that the meteorological conditions preceding the storm may have altered the behaviour of seabirds, for example by altering the timing of their migration and/or causing them to travel nearer to shore in order to avoid the worst impacts of the storm. This may have contributed to uncharacteristically high densities of seabirds in the survey area on the survey date.

Data analysis

Image Analysis

3.2.5 The aerial digital still images were analysed to locate, identify and record all birds in the image. Internal quality assurance (QA) was carried out on the data collected from each survey. Images were assessed in batches with a different staff member responsible for each batch. Each image containing birds was reviewed and checked by APEM's dedicated QA team, ensuring that 100 percent of birds found were subject to internal QA to ensure that species identification was correct. Images containing no birds were removed and kept separately for further internal QA. Of these 'blank' images, 10 percent were randomly selected for QA. If there was less than 90 percent agreement, the entire batch was re-analysed independently by a different staff member than who initially analysed the imagery.

Bird abundance and density estimates

3.2.6 For each monthly aerial digital survey, geo-referenced locations of all birds are recorded within each individual digital still image, which were used to generate raw counts. Bird locations contained within the study area were then extracted using ArcGIS or QGIS, providing raw count data.

3.2.7 The raw counts were then divided by the number of images collected to give the mean number of birds per image (i). Population estimates (N) for each survey month were then generated by multiplying the mean number of animals per image by the total number of images required to cover the entire study area (A):

$$N = iA$$

3.2.8 Non-parametric bootstrap methods were used for variance estimation. A variability statistic was generated by re-sampling 999 times with replacement from the raw count data. The statistic was evaluated from each of these 999 bootstrap samples and upper and lower 95 percent confidence intervals (CI) of these 999 values were taken as the variability of the statistic over the population (Efron and Tibshirani, 1993).

3.2.9 A measure of precision was calculated using a Poisson estimator, suitable for a pseudo-Poisson over-dispersed distribution. This produced a CV based on the relationship of the standard error to the mean.

3.2.10 All analyses and data manipulation carried out by APEM were conducted in the R programming language (R Development Core Team, 2012) and non-parametric 95 percent CI were generated using the 'boot' library of function (Canty and Ripley, 2010). This results in species-specific monthly abundance estimates being calculated from the raw count data, with upper and lower confidence limits. Where appropriate, a level of precision is also presented for each monthly abundance estimate. Dividing the monthly abundance estimates by the size of the area covered calculates the associated density (for example, birds per km^2) for any given species.

Species identification

3.2.11 All birds were first assigned to a species group and where possible, each of these then further identified to species level. Birds which could not be positively identified to species level remained assigned to the broader species group level. For example, a bird first assigned to the species group 'auk species' if not identified as a guillemot, would remain as an 'auk species' if no species level identification was determined. The grouping for unidentified birds and the species of which they comprise are listed in **Table 3-5**.

Attribution and apportionment of unidentified birds

3.2.12 There were occasions when it was not possible to identify a particular bird on the aerial digital survey image to the species level and the image is identified as belonging to a higher level group. To avoid underestimating species abundance due to the omission of birds which could not be identified to species level, the density of each unidentified species grouping (for example, large gulls, small gulls, etc.) was estimated (using the methods described above) and then added proportionately to each member species of that group. The proportions were calculated from the ratios of positively identified birds in that group. This was undertaken on a survey by survey basis. For example, the number of unidentified birds in a group (such as 'large gulls') is proportioned to the specific species that are contained within that group (great black-backed gull, herring gull and lesser black-backed gull) based on the relative abundance of the positively identified species in that month's survey. The grouping for unidentified birds and the species of which they comprise are listed in **Table 3-5**.

3.2.13 Instances can occur when there are no positively identified species in months where group level identified individuals have been recorded. The following rules were applied to such cases, in order of preference:

- use same month from a different year; or
- use the total average proportion across data from 15 surveys available for this baseline report.

3.2.14 Where no species were positively identified across all surveys, apportionment was not possible and so results have been presented for the group only. Examples where this occurred includes skua species and large grebe species.

Table 3-5 Grouping levels for birds with no species level identification.

Species	Species Grouping Level 1	Species Grouping Level 2	Species Grouping Level 3
Great crested grebe	Large grebe species	N/A	N/A
Slavonian grebe			
Black-necked grebe			
Kittiwake	Small gull species	N/A	

Species	Species Grouping Level 1	Species Grouping Level 2	Species Grouping Level 3
Little gull	Black-backed gull species	Large gull species	Unknown gull species
Common gull			
Mediterranean gull			
Great black-backed gull			
Lesser black-backed gull			
Herring gull			
Sandwich tern	N/A	Tern species	N/A
Common tern	Arctic / common ('commic') tern		
Artic tern			
Great skua	Skua species	N/A	N/A
Pomarine skua			
Arctic skua			
Long-tailed skua			
Guillemot	Guillemot / Razorbill	Auk species	N/A
Razorbill			
Puffin	N/A		
Red-throated diver	Diver species	N/A	N/A
Great northern diver			
European storm petrel	Storm petrel species	N/A	N/A
Leach's storm petrel			
Manx shearwater	Shearwater species	N/A	N/A
Cormorant	Cormorant / Shag	N/A	N/A
Shag			

3.2.15 Abundance estimates in **Section 3.3** are inclusive of apportionment. Additional tables in **Annex D** provide abundance estimates of each species and species group prior to apportionment, as well as behaviour information relating to flying and sitting birds.

3.2.16 As common terns and Arctic terns are very difficult to distinguish using aerial digital surveys, apportionment to species level was limited and therefore 'commic' tern has been treated as comparable to a species-level unit for analysis.

Correction for availability bias

3.2.17 For auk species such as guillemot, razorbill and puffin that make foraging dives underwater, a proportion will not be detectable at the surface during the analysis of the survey images. Density and abundance estimates need to be adjusted to allow for this 'availability bias'.

3.2.18 A fixed species-specific correction factor was applied to the number of each auk species recorded on the sea surface. The correction factors are derived from time spent under water (during the chick-rearing stage) from Thaxter *et al.* (2010) for guillemots and razorbills and from records from data loggers from Spencer (2012) for puffins.

3.2.19 The correction factors used to multiply the relative abundance estimate of guillemots, razorbills and puffins sitting on the sea surface are 1.2375, 1.174 and 1.1416, respectively.

3.2.20 Abundance estimates in **Section 3.3** are the corrected monthly abundance and density estimates, having been subjected to this process. Additional tables in **Annex D** provide abundance estimates of each species and species group prior to correction for availability bias.

Consideration of biological seasons

3.2.21 Bird behaviour and abundance is recognised to differ across a calendar year dependent upon the bio-season. Separate bio-seasons are recognised in this baseline technical report in order to establish the level of importance any seabird species has within the study area during any particular period of time. The biologically defined minimum population scales (BDMPS) bio-seasons are based on those in Furness (2015), hereafter referred to as BDMPS bio-seasons or bio-seasons (**Table 3-6**). The bio-seasons are defined within this baseline technical report as: return migration, migration-free breeding, post-breeding, migration-free winter and extended non-breeding bio-seasons. These four bio-seasons can be applied to different periods within the annual cycle for most species, though not all four are applicable for all seabird species, with different combinations used depending on the biology and life history of a species:

- return migration: when birds are migrating to breeding grounds;
- migration-free breeding: when birds are attending colonies, nesting and provisioning young;

- post-breeding migration: when birds are migrating to wintering areas or dispersing from colonies;
- migration-free winter: when non-breeding birds are over-wintering in an area; and
- extended non-breeding: extended bio-season from modal departure from the colony at the end of breeding to modal return to the colony the following year.

Table 3-6 BDMPS bio-seasons (Furness 2015) used as the basis for the species accounts presented in Section 3.3.

Species	Return Migration	Migration-free Breeding	Post-breeding Migration	Migration-free Winter	Extended non-breeding
Fulmar	December to March	April to August	September to October	November	N/A
Gannet	December to March	April to August	September to November	N/A	N/A
Kittiwake	January to April	May to July	August to December	N/A	N/A
Common gull[1]	January to April	May to July	August to December	N/A	N/A
Herring gull	January to April	May to July	August to November	December	September to February
Great black-backed gull	January to April	May to July	August to November	December	September to March
Guillemot	N/A	March to July	July to October	November	August to February
Razorbill	January to March	April to July	August to October	November to December	N/A

[1] Common gull is not included in Furness (2015); based on kittiwake as closely related and have a similar life history.

For herring gull and guillemot, due to the extensive overlap between breeding, migration and wintering periods, two bio-seasons have been used: migration-free breeding and extended non-breeding.

Results

Spatial distribution

3.2.22 For the purpose of this report the spatial distribution of seabirds within the Rampion 2 array area and a 4km buffer are presented in the form of heatmaps

within each species account. The heatmaps present data on a bio-season basis, pooling multiple months over separate bio-seasons (using the definitions in **Table 3-6**) in order to account for species-specific spatial and temporal distribution for the purpose of defining the Rampion 2 ornithological baseline.

3.2.23 To create the heatmaps, the point shapefiles were loaded into QGIS and the heatmap plugin for QGIS was installed. The shapefiles were then inputted to the heatmap plugin and a kernel radius of 3km was selected, which was determined to provide the most appropriate smoothing between the data points leaving no gaps in the model outputs. The output raster pixel size was set to 10m. All other default settings within the QGIS heatmap plugin were accepted. The heatmap plugin for each species was then run to generate GeoTIFF heatmaps, which were then loaded into ArcMap to produce the heatmaps presented in this report. Note that heatmaps were produced using data from the entire survey area, which includes some birds recorded outside of the array area plus 4km buffer.

Flight height/direction

3.2.24 Data were provided on flight direction from the aerial digital surveys, which are presented in **Annex A**. Note that flight direction data were recorded from birds across the entire survey area, which may include a small number of birds outside the Rampion 2 array area plus 4km buffer as a result of refinements to the array area boundary and excluding Rampion 1 from the buffer zone for abundance estimate purposes.

3.2.25 Bird flight height data were also collected, with estimates provided, where possible. It was determined using bespoke APEM software that applies a set of rules developed in-house as well as trigonometry to provide an estimate of flight height above mean sea level (MSL). However, due to the small sample sizes currently available for the majority of seabirds recorded, for the purpose of assessing collision risk impacts at this stage flight height data will be based on generic flight height data from Johnston *et al.* (2012).

Age classification

3.2.26 The knowledge of the different ages of each species of bird present within the proposed area for an offshore wind farm can contribute to the assessment of the significance of potential impacts. This can include consideration of whether that potential impact might occur to an adult bird that is part of the breeding population of a particular SPA or if it might occur to an immature bird that is not associated with the breeding population of a particular SPA. A detailed breakdown of seabird age classification for individuals recorded in the aerial digital surveys is presented in **Annex B**.

Species recorded

3.2.27 The following bird species (**Table 3-7**) were recorded within the study area between April 2019 and June 2020. A number of species were only recorded in the study area in trivial numbers or numbers determined by expert judgement to be too low to warrant detailed species accounts (these species are in italic font within the table). For the purpose of this baseline technical report these species are omitted from the main species accounts, but data are included for these

species in the form of raw counts, abundance and density estimates and behaviour within **Annex C**. Those species highlighted in bold in **Table 3-7** form the basis of detailed accounts for this baseline technical report.

Table 3-7 Bird species recorded in site-specific aerial digital surveys of Rampion 2 study area

Divers and pelagic species	Gulls	Terns	Auks	Other
Red-throated diver	**Kittiwake**	*Sandwich tern*	**Guillemot**	*Cormorant*
Great northern diver	*Little gull*	*Common tern*	**Razorbill**	*Brent goose*
Gannet	**Common gull**	**'Commic' tern*	*Puffin*	*Shelduck*
Fulmar	*Mediterranean gull*			
Manx shearwater	**Herring gull**			
	Great black-backed gull			
	Lesser black-backed gull			

* 'Commic' tern represents tern sightings of unidentified Arctic tern and common tern.

3.3 Species accounts

Fulmar

Rampion 1 survey data (boat-based and aerial visual surveys 2010 to 2012)

3.3.1 Fulmars were widely distributed across the Rampion 1 survey area, with the highest densities recorded in the south, partially overlapping with the Rampion 2 array area. The mean peak density within the baseline data for Rampion 1 within the array area and 4km buffer was 0.299 individuals per square kilometre (/km^2) in May 2011.The peak counts across the survey programmes were in May 2011 (number (n) = 1,774) in the boat-based surveys and August 2011 (n = 262) in the aerial surveys. Fulmars were recorded in 29 of the 30 2010/12 boat-based surveys and in 10 of the 11 2010/11 aerial surveys. During the breeding season fulmars were recorded in regionally important numbers.

Rampion 2 survey data (aerial digital surveys 2019 to 2020)

3.3.2 Fulmars were only recorded in two months within the Rampion 2 array area, in April 2019 and February 2020, with an estimated abundance of ten individuals and

nine individuals, respectively (**Table 3-8**). From the small number of fulmars recorded across the survey programme similar numbers were observed flying and sitting (**Table 3-8**).

Table 3-8 Fulmar monthly raw counts, estimated abundance and densities (individuals per km^2) within the Rampion 2 array area

a)Rampion 2 array area

Survey	All behaviours			Flying			Sitting		
	Raw Count	Abundance	Density	Raw Count	Abundance	Density	Raw Count	Abundance	Density
Apr-19	1	10	0.04	1	10	0.04	0	0	0.00
Feb-20	1	9	0.03	0	0	0.00	1	9	0.03

Fulmar spatial distribution and flight direction

3.3.3 Fulmars were recorded in only two of the four relevant bio-seasons, with very low densities during the return migration and migration-free breeding bio-seasons (**Graphic 3-2**). Fulmars were loosely distributed throughout the survey area with the greatest densities recorded to the southwest outside of the Rampion 2 array area.

3.3.4 Data presented in rose diagrams (**Annex C**) of monthly flight directions within the survey seasons show no predominant flight heading within the survey area for any bio-season.

Graphic 3-2 Heatmap of fulmar distribution in each bio-season

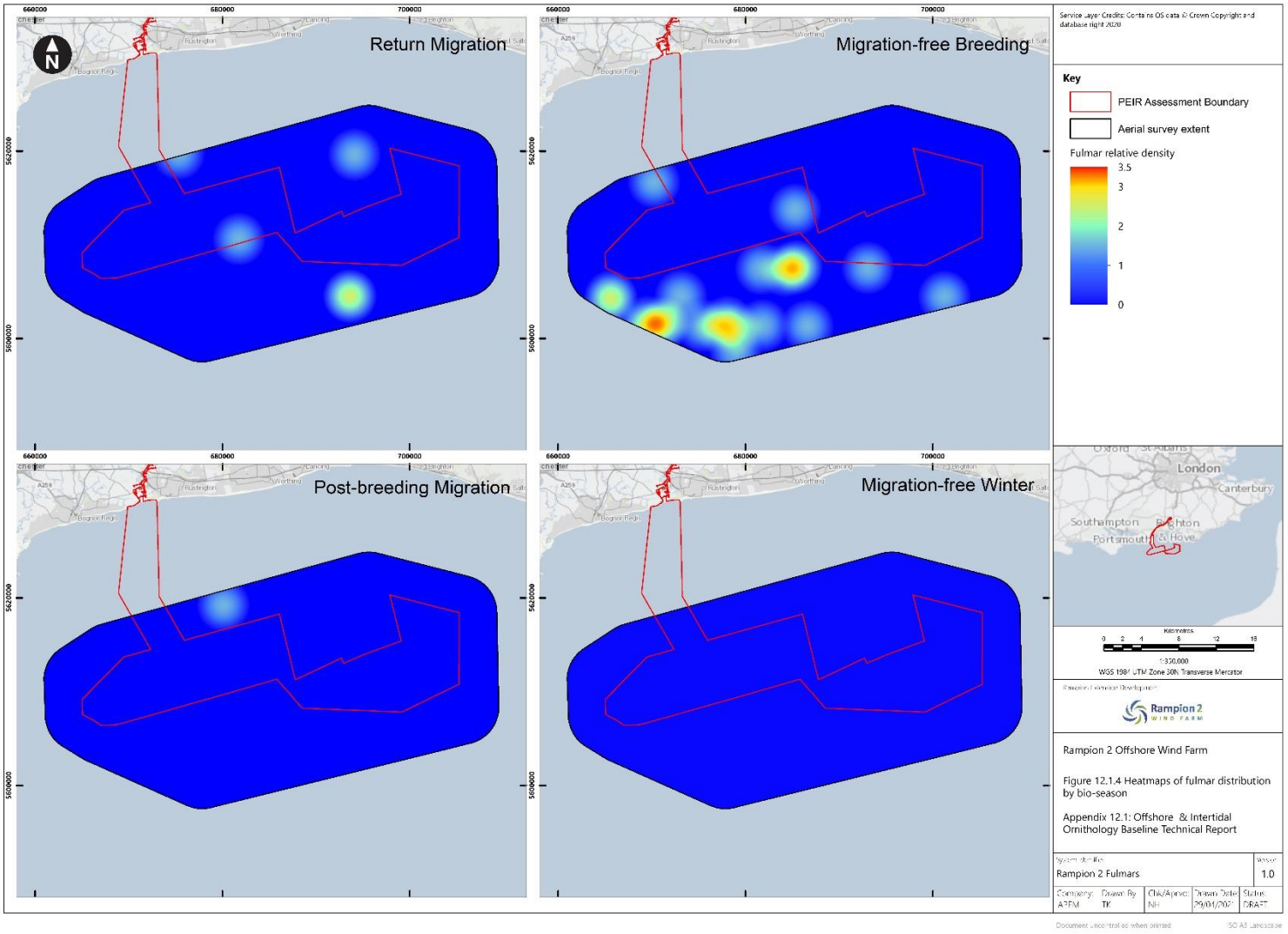


Table 3-9 Fulmar bio-season mean peak abundance and density (individuals per km^2) estimates in Rampion 2 array area

Rampion 2 array area						
	All behaviours		Flying		Sitting	
Bio-season	Mean peak abundance	Mean peak density	Mean peak abundance	Mean peak density	Mean peak abundance	Mean peak density
Return (spring) migration	9	0.03	0	0.00	9	0.03
Migration-free breeding	5	0.02	5	0.02	0	0.00
Post-breeding (autumn) migration	0	0.00	0	0.00	0	0.00
Migration-free winter	0	0.00	0	0.00	0	0.00

Gannet

Rampion 1 survey data (boat-based and aerial visual surveys 2010 to 2012)

3.3.5 Gannets were widely distributed across the survey area with large flocks recorded to the south of Rampion 1. The mean peak density for the whole survey area was 0.768 individuals/km^2 in May 2011.The peak counts across the survey programmes were in January 2011 (n = 2,861) and November 2011 (n = 6,524) in the boat-based surveys and October 2010 (n = 2,020) in the aerial surveys. Gannets occurred in all 30 surveys in the 2010/12 boat-based surveys and in all 11 surveys in the 2010/11 aerial surveys. Gannet peak densities were recorded during the migratory seasons.

Rampion 2 survey data (aerial digital surveys 2019 to 2020)

3.3.6 Gannets were recorded within the Rampion 2 array area in 13 of the 15 surveys, with a peak estimated abundance of 118 individuals in July 2019 (**Table 3-10**). In the Rampion 2 array area plus 4km buffer, gannets were recorded in 14 out of 15 surveys, with a peak estimated abundance of 456 individuals in August 2019 (**Table 3-10**). Gannets were slightly more likely to be observed flying than sitting.

Table 3-10 Gannet raw counts, total estimated abundance and total estimated density (individuals per km^2) in: a) Rampion 2 array area and b) Rampion 2 array area plus 4km buffer.

a) Rampion 2 array area

Survey	All behaviours			Flying			Sitting		
	Raw Count	Abundance	Density	Raw Count	Abundance	Density	Raw Count	Abundance	Density
May-19	2	20	0.08	2	20	0.08	0	0	0.00
Jun-19	2	20	0.08	1	10	0.04	1	10	0.04
Jul-19	13	118	0.44	4	36	0.14	9	82	0.31
Aug-19	10	90	0.34	7	63	0.24	3	27	0.10
Sep-19	5	46	0.17	3	28	0.11	2	19	0.07
Oct-19	9	78	0.29	4	35	0.13	5	44	0.17
Nov-19	5	44	0.17	4	35	0.13	1	9	0.03
Dec-19	1	9	0.03	0	0	0.00	1	9	0.03
Feb-20	5	45	0.17	2	18	0.07	3	27	0.10
Mar-20	2	17	0.06	2	17	0.06	0	0	0.00
Apr-20	9	78	0.29	8	69	0.26	1	9	0.03
May-20	2	17	0.06	1	9	0.03	1	9	0.03
Jun-20	7	61	0.23	3	26	0.10	4	35	0.13

b) Rampion 2 array area + 4km buffer

Survey	All behaviours			Flying			Sitting		
	Raw Count	Abundance	Density	Raw Count	Abundance	Density	Raw Count	Abundance	Density
Apr-19	1	10	0.02	0	0	0.00	1	10	0.02
May-19	3	29	0.04	3	29	0.04	0	0	0.00
Jun-19	6	58	0.09	3	29	0.04	3	29	0.04
Jul-19	38	335	0.51	8	71	0.11	30	264	0.40
Aug-19	53	456	0.70	23	198	0.30	30	258	0.40
Sep-19	6	54	0.08	4	36	0.06	2	18	0.03
Oct-19	41	346	0.53	26	219	0.34	15	127	0.19
Nov-19	12	102	0.16	9	76	0.12	3	25	0.04
Dec-19	2	17	0.03	1	8	0.01	1	8	0.01
Feb-20	26	234	0.36	7	63	0.10	19	171	0.26
Mar-20	2	17	0.03	2	17	0.03	0	0	0.00
Apr-20	9	75	0.12	8	67	0.10	1	8	0.01
May-20	19	161	0.25	6	51	0.08	13	110	0.17
Jun-20	11	92	0.14	6	50	0.08	5	42	0.06

Gannet spatial distribution and flight direction

3.3.7 Gannets were loosely distributed throughout the survey area in very low densities within all bio-seasons, with the majority of hotspots being to the south either within the 4km buffer or further afield in the wider survey area (**Graphic 3-3**).

3.3.8 Data presented in rose diagrams (**Graphic C-2**) of monthly flight directions within the survey area indicates that in the migration-free breeding bio-season, gannets were generally observed flying in a southernly direction, although direction of travel was found to be significant in only one month (Aug 2019). During the post breeding migratory bio-seasons the flight directions were more loosely parallel to the coast, suggesting migratory movements. During the return migration bio-season no dominant flight direction was noted.

Graphic 3-3 Heatmap of gannet distribution in each bio-season

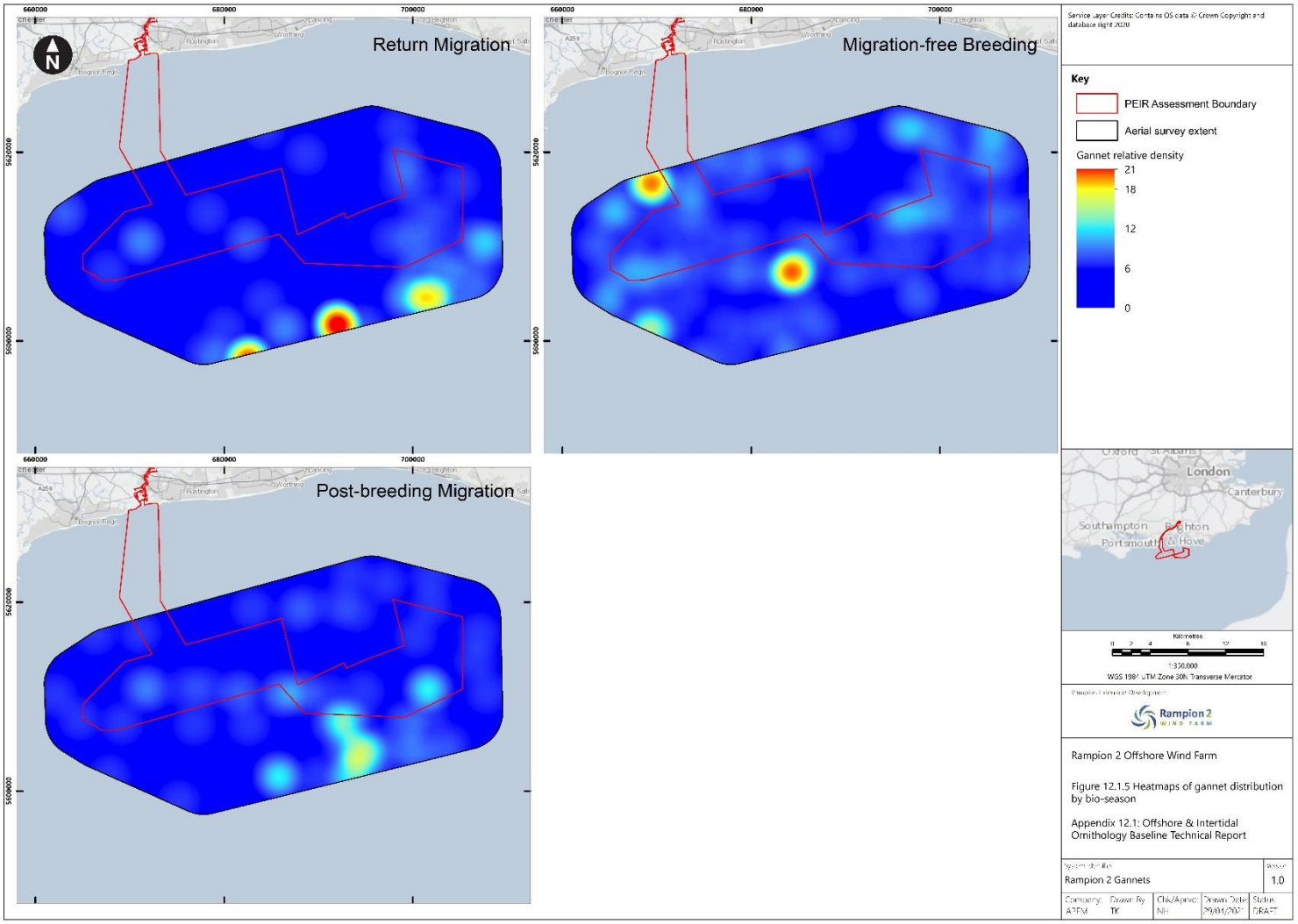


Table 3-11 Gannet bio-season mean peak abundance and density (individuals per km^2) in: a) Rampion 2 array area and b) Rampion 2 array area plus 4km buffer

a) Rampion 2 array area						
	All behaviours		Flying		Sitting	
Bio-season	Bio-season mean peak abundance	Bio-season mean peak density	Bio-season mean peak abundance	Bio-season mean peak density	Bio-season mean peak abundance	Bio-season mean peak density
Return (spring) migration	45	0.17	18	0.07	27	0.10
Migration-free breeding	98	0.37	66	0.25	59	0.22
Post-breeding (autumn) migration	78	0.29	35	0.13	44	0.17
b) Rampion 2 array area plus 4km buffer						
	All behaviours		Flying		Sitting	
Bio-season	Bio-season mean peak abundance	Bio-season mean peak density	Bio-season mean peak abundance	Bio-season mean peak density	Bio-season mean peak abundance	Bio-season mean peak density
Return (spring) migration	234	0.36	63	0.10	171	0.26
Migration-free breeding	309	0.47	133	0.20	187	0.29
Post-breeding (autumn) migration	346	0.53	219	0.34	127	0.19

Kittiwake

Rampion 1 survey data (boat-based and aerial visual surveys 2010 to 2012)

3.3.9 Kittiwakes were widely distributed across the survey area with the largest flock recorded to the south of Rampion 1. The mean peak density for the whole survey area was 0.773 individuals/km^2 in October 2010.The peak counts across the survey programmes were in January 2011 (n = 1,207) and June 2011 (n = 1,329) in the boat-based surveys and October 2010 (n = 2,183) in the aerial surveys. Kittiwakes were recorded in 28 of the 30 surveys in the 2010/12 boat-based surveys and in all 11 surveys in the 2010/11 aerial surveys. Kittiwake was recorded in national important numbers in all seasons.

Rampion 2 survey data (aerial digital surveys 2019 to 2020)

3.3.10 Kittiwakes were recorded in the Rampion 2 array area in seven of the 15 surveys, with a peak estimated abundance of 623.0 in February 2020 (**Table 3-12**). In the Rampion 2 array area plus 4km buffer, kittiwakes were recorded in nine of the 15 surveys with a peak estimated abundance of 1,519.3 in February 2020 (**Table 3-12**). Overall, more kittiwakes were observed sitting than flying, although this was not the case in every month (**Table 3-12**). Note that as described in **paragraph 3.2.4** above, the February 2020 survey was conducted immediately before Storm Ciara hit the UK and this may have led to unusually high concentrations of birds being present.

Table 3-12 Kittiwake raw counts, total estimated abundance (including apportionment, as appropriate) and total estimated density (individuals per km^2) in Rampion 2 array area

Rampion 2 array area									
	All behaviours			Flying			Sitting		
Survey	Raw Count	Abundance	Density	Raw Count	Abundance	Density	Raw Count	Abundance	Density
May-19	1	10	0.04	1	10	0.04	0	0	0.00
Jul-19	5	46	0.17	1	9	0.03	4	36	0.14
Oct-19	1	9	0.03	1	9	0.03	0	0	0.00
Nov-19	4	35	0.13	3	26	0.10	1	9	0.03
Dec-19	0	8	0.03	0	0	0.00	0	8	0.03
Feb-20	59	623	2.34	17	154	0.58	42	469	1.76
Mar-20	1	9	0.03	1	9	0.03	0	0	0.00
Apr-20	0	8	0.03	0	0	0.00	0	8	0.03
Jun-20	20	199	0.75	2	26	0.10	18	173	0.65

Kittiwake Spatial Distribution and Flight Direction

3.3.11 Kittiwakes were loosely distributed throughout the survey area within all three bio-seasons (**Graphic 3-4**). Highest densities of birds with greatest number of hotspots were recorded in the return migration bio-season with majority of birds recorded in the south and east of the survey area. Density of kittiwakes significantly dropped in the migration-free breeding bio-season with only a single hotspot observed intersecting the southern Rampion 1 and Rampion 2 array area boundary. Lowest densities were recorded in the post-breeding migration bio-season, with the largest congregation of kittiwakes observed in the Rampion 1 array area.

3.3.12 Data presented in rose diagrams (**Graphic C-3**) of monthly flight directions within the survey area indicates during the migration-free breeding bio-season kittiwakes were recorded flying in a north east flight direction, which could suggest flights from the array area towards the nearby colony at Seaford, although birds passing through on migration are likely to be travelling in a similar direction. During the post-breeding migration bio-season flight direction was generally in a Northerly direction and in the return migration bio-season no predominant flight heading was observed.

Graphic 3-4 Heatmaps of kittiwake distribution in each bio-season

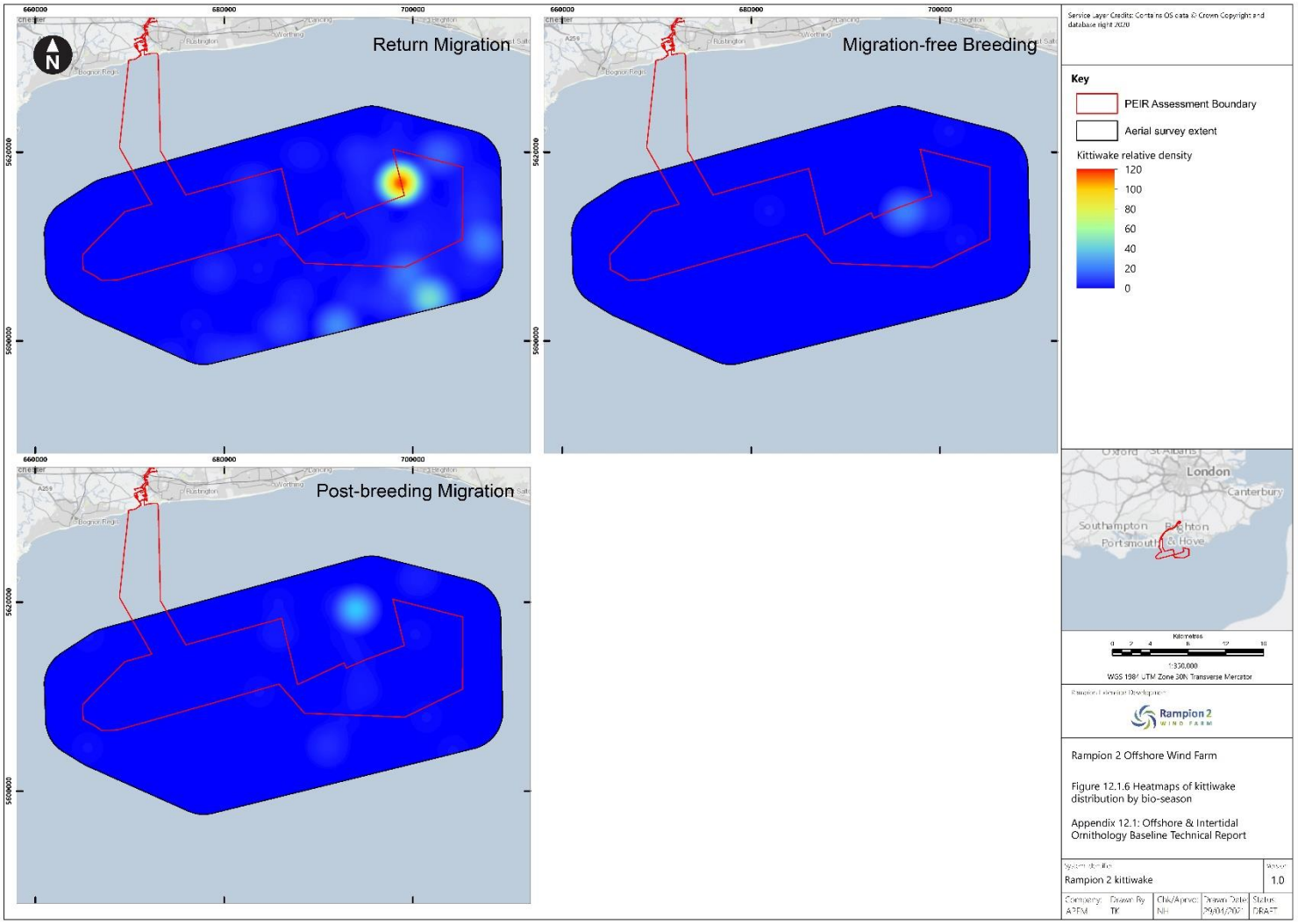


Table 3-13 Kittiwake bio-season mean peak abundance and density (individuals per km^2) in Rampion 2 array area

	Rampion 2 array area					
	All behaviours		Flying		Sitting	
Bio-season	Bio-season mean peak abundance	Bio-season mean peak density	Bio-season mean peak abundance	Bio-season mean peak density	Bio-season mean peak abundance	Bio-season mean peak density
Return (spring) migration	311	1.17	77	0.29	234	0.88
Migration-free breeding	122	0.46	18	0.07	104	0.39
Post-breeding (autumn) migration	35	0.13	26	0.10	9	0.03

Common gull

Rampion 1 survey data (boat-based and aerial visual surveys 2010 to 2012)

3.3.13 Common Gulls were distributed across the survey but with high densities strongly concentrated in shallower waters to the north of Rampion 1. The mean peak density for the whole survey area was 0.192 individuals/km^2 in November 2011.The peak counts across the survey programmes were in April 2010 (n = 1,534) and April 2011 (n = 2,510) in the boat-based surveys and November 2011 (n = 132) in the aerial surveys. Common gulls were recorded in 19 of the 30 surveys in the 2010/12 boat-based surveys and in seven of the 11 surveys in the 2010/11 aerial surveys. Common gulls were recorded in regionally important numbers in the breeding season.

Rampion 2 survey data (aerial digital surveys 2019 to 2020)

3.3.14 Common gulls were recorded within the Rampion 2 array area in three of the 15 surveys, with a peak estimated abundance of 160.2 individuals in February 2020 (**Table 3-14**). In the Rampion 2 array area plus 4km buffer, common gulls were recorded in three of the 15 surveys, with a peak estimated abundance of 247.3 individuals in February 2020 (**Table 3-14**). Common gulls were observed flying and sitting in similar numbers (**Table 3-14**).

Table 3-14 Common gull raw counts, total estimated abundance (including apportionment, as appropriate) and total estimated density (individuals per km^2) in Rampion 2 array area

Rampion 2 array area									
	All behaviours			Flying			Sitting		
Survey	Raw Count	Abundance	Density	Raw Count	Abundance	Density	Raw Count	Abundance	Density
Nov-19	5	44	0.17	3	26	0.10	2	18	0.07
Dec-19	0	1	0.00	0	0	0.00	0	1	0.00
Feb-20	17	160	0.60	14	127	0.48	3	33	0.12
Mar-20	3	95	0.36	0	0	0.00	3	95	0.36
Apr-20	0	1	0.00	0	0	0.00	0	1	0.00

Common gull spatial distribution and flight direction

3.3.15 Common gulls were recorded in migratory bio-seasons only, with all common gulls recorded within the Rampion 1 array area (**Graphic 3-5**). Highest densities were recorded in the return migration bio-season, with a single high density hotspot recorded intersecting the eastern Rampion 1 and Rampion 2 array area boundary. Densities were lower in the post-breeding migration bio-season with a low density hotspot recorded within the Rampion 1 array area.

3.3.16 Common gulls were observed flying within the survey area in the migratory bio-seasons only. Data presented in rose diagrams (**Graphic C-4**) of monthly flight directions within the survey area indicates in the post-breeding migration bio-season common gulls were observed flying in only two months only with no predominant flight direction. In the return migration bio-season common gulls were also only recorded flying in two months with a general southernly direction.

Graphic 3-5 Heatmaps showing distribution of common gulls in each bio-season

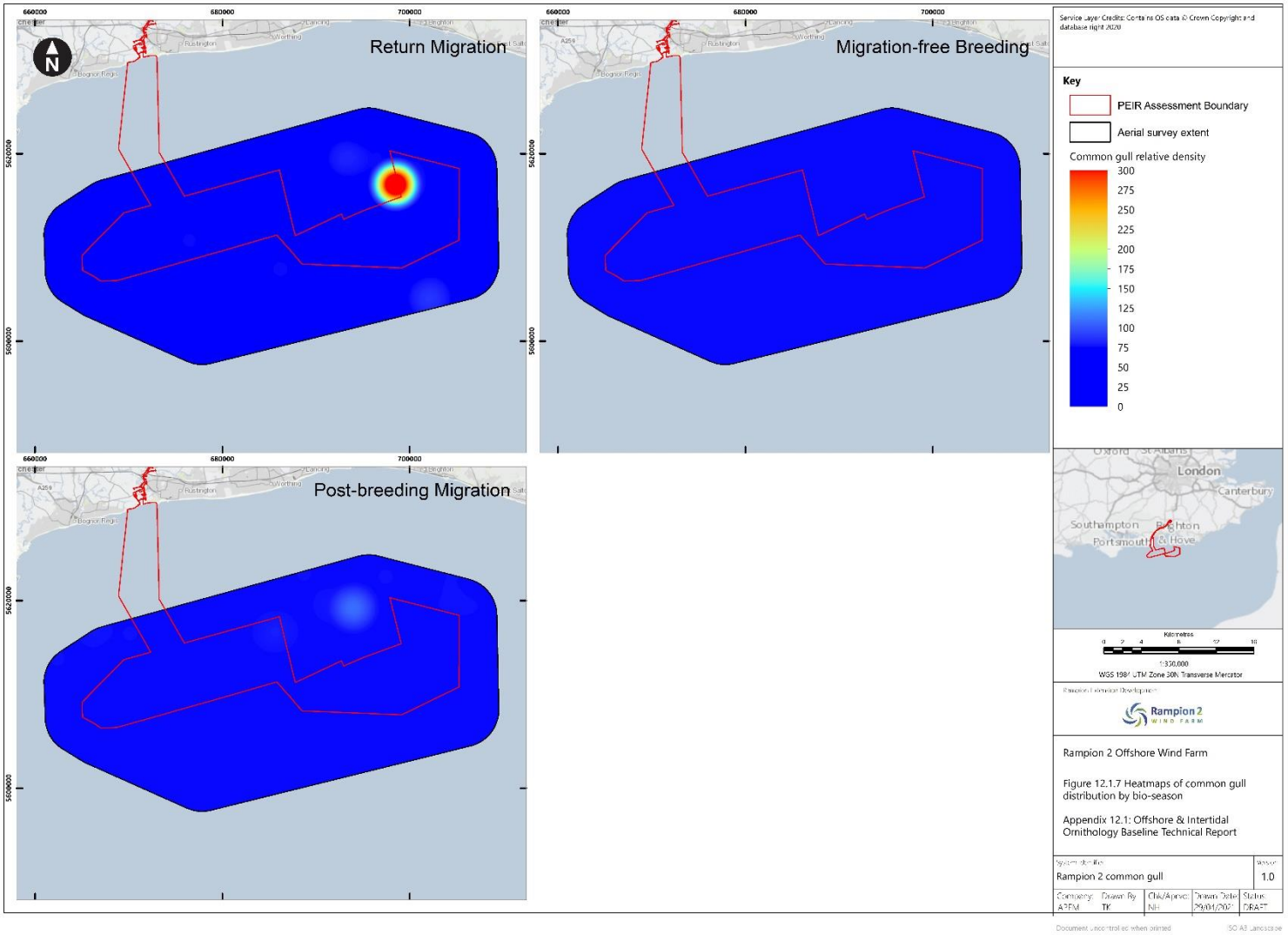


Table 3-15 Common gull bio-season mean peak abundance and density (individuals per km^2) in Rampion 2 array area

	Rampion 2 array area					
	All behaviours		Flying		Sitting	
Bio-season	Bio-season mean peak abundance	Bio-season mean peak density	Bio-season mean peak abundance	Bio-season mean peak density	Bio-season mean peak abundance	Bio-season mean peak density
Return (spring) migration	80	0.30	64	0.24	48	0.18
Migration-free breeding	0	0.00	0	0.00	0	0.00
Post-breeding (autumn) migration	44	0.17	26	0.10	18	0.07

Great black-backed gull

Rampion 1 survey data (boat-based and aerial visual surveys 2010 to 2012)

3.3.17 Great black-backed gulls were widely distributed across the survey area with one larger concentration recorded to the east of Rampion 1. The mean peak density for the whole survey area was 0.513 individuals/km^2 in May 2011.The peak counts across the survey programmes were in January 2011 (n = 3,365) and September 2011 (n = 2,724) in the boat-based surveys and November 2010 (n = 239) in the aerial surveys. Great black-backed gulls were recorded in 29 of the 30 surveys in the 2010/12 boat-based surveys and in nine of the 11 surveys in the 2010/11 aerial surveys. Outside the breeding season great black-backed gull was recorded in national important numbers.

Rampion 2 survey data (aerial digital surveys 2019 to 2020)

3.3.18 Great black-backed gulls were recorded within the Rampion 2 array area in 10 of the 15 surveys, with a peak estimated abundance of 110.5 individuals in March 2020 (**Table 3-16**). In the Rampion 2 array area plus 4km buffer, great black-backed gulls were recorded in 11 of the 15 surveys, with a peak estimated abundance of 189.1 individuals in March 2020 (**Table 3-16**). Overall, significantly more great black-backed gulls were observed sitting than flying, although this was not the case in every month (**Table 3-16**).

Table 3-16 Great black-backed gull raw counts, total estimated abundance (including apportionment, as appropriate) and total estimated density (individuals per km^2) in Rampion 2 array area

Rampion 2 array area									
	All behaviours			Flying			Sitting		
Survey	Raw Count	Abundance	Density	Raw Count	Abundance	Density	Raw Count	Abundance	Density
Apr-19	1	10	0.04	1	10	0.04	0	0	0.00
May-19	1	10	0.04	0	0	0.00	1	10	0.04
Jul-19	8	75	0.28	0	0	0.00	8	75	0.28
Aug-19	1	9	0.03	0	0	0.00	1	9	0.03
Sep-19	10	102	0.38	2	19	0.07	8	83	0.31
Nov-19	3	26	0.10	1	9	0.03	2	18	0.07
Jan-20	4	35	0.13	1	9	0.03	3	26	0.10
Feb-20	3	30	0.11	0	0	0.00	3	30	0.11
Mar-20	11	111	0.42	0	0	0.00	11	111	0.42
Apr-20	1	9	0.03	1	9	0.03	0	0	0.00

Great black-backed gull spatial distribution and flight direction

3.3.19 Great black-backed gulls were widely distributed throughout the survey areas, with highest densities recorded in and around the Rampion 1 array area in all bio-seasons (**Graphic 3-6**). The highest densities were recorded in the post-breeding migration bio-season with species widely distributed within the survey area. In the migration-free winter bio-season minimal numbers of great black-backed gulls were recorded with birds recorded in the outer areas of the survey only. In the return migration bio-season great-black gulls were distributed similarly to that of the post-breeding bio-season with denser hotspots recorded in the north east of the array area and North west edge of the survey area. In the migration-free breeding bio-season great black-backed gulls were recorded mainly in the east of the array area with a single hotspot within the Rampion 1 array area.

3.3.20 Data presented in rose diagrams (**Graphic C-5**) of monthly flight directions within the survey area indicates no predominant flight direction in either the breeding or non-breeding bio-seasons.

Graphic 3-6 Heatmaps showing distribution of great black-backed gulls in each bio-season

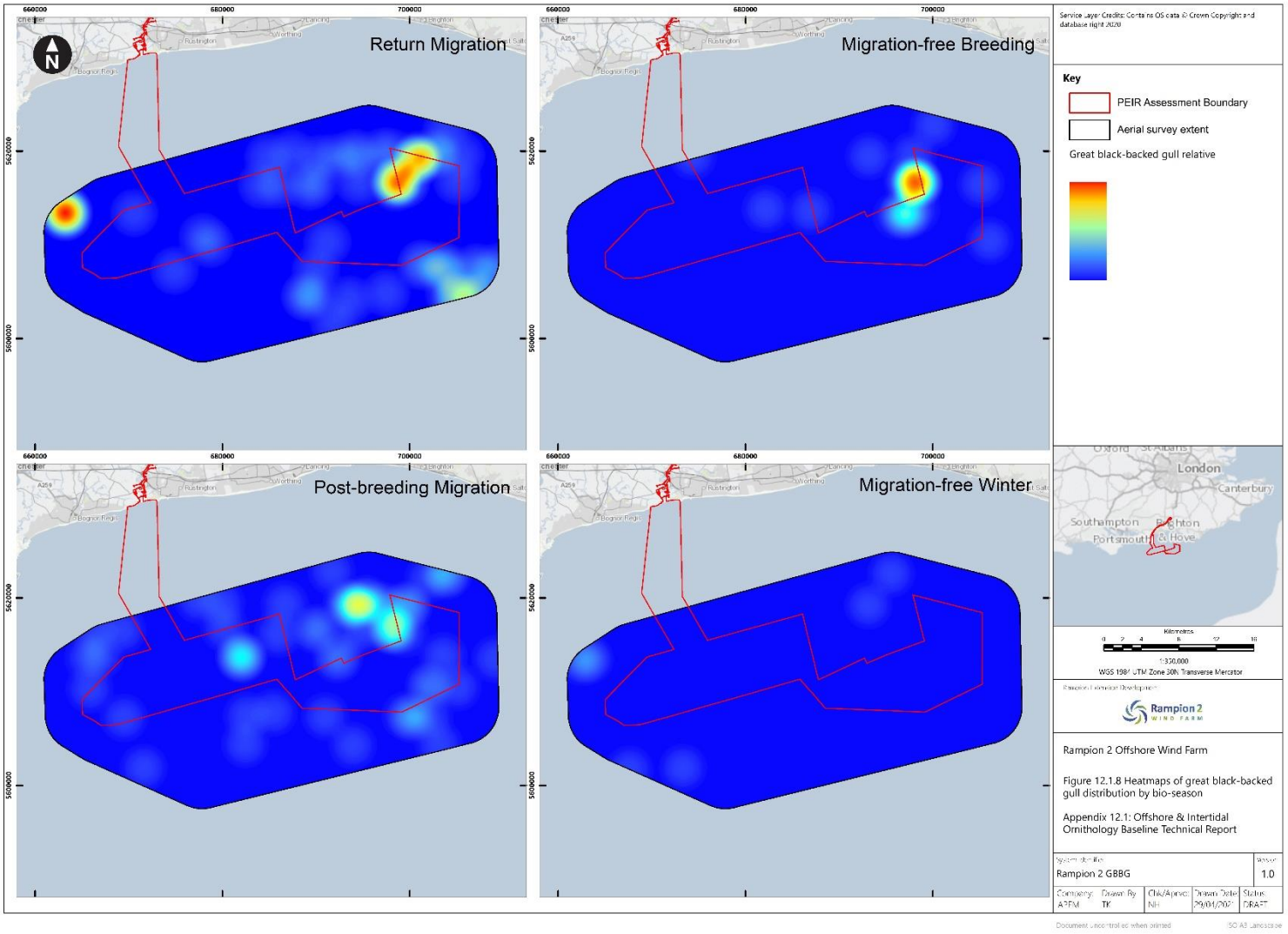


Table 3-17 Great black-backed gull bio-season mean peak abundance and density (individuals per km^2) in Rampion 2 array area

Rampion 2 array area						
	All behaviours		Flying		Sitting	
Bio-season	Bio-season mean peak abundance	Bio-season mean peak density	Bio-season mean peak abundance	Bio-season mean peak density	Bio-season mean peak abundance	Bio-season mean peak density
Return (spring) migration	60	0.23	10	0.04	55	0.21
Migration-free breeding	37	0.14	0	0.00	37	0.14
Post-breeding (autumn) migration	102	0.38	19	0.07	83	0.31
Migration-free winter	0	0.00	0	0.00	0	0.00

Herring gull

Rampion 1 survey data (boat-based and aerial visual surveys 2010 to 2012)

3.3.21 Herring gulls were widespread across the survey area, with the largest flock recorded to the south of Rampion 1. The mean peak density for the whole survey area was 1.586 individuals/km^2 in July 2011.The peak counts across the survey programmes were in June 2010 (n = 2,524) and July 2011 (n = 17820) in the boat-based surveys and July 2011 (n = 3,449) in the aerial surveys. Herring gulls were recorded in all 30 surveys in the 2010/12 boat-based surveys and in all 11 surveys in the 2010/11 aerial surveys. Peak numbers recorded during the 2011 breeding season are considered of national importance.

Rampion 2 survey data (aerial digital surveys 2019 to 2020)

3.3.22 Herring gulls were recorded in the Rampion 2 array area in nine of the 15 surveys, with a peak estimated abundance of 872.2 individuals in July 2019 (**Table 3-18**). In the Rampion 2 array area plus 4km buffer, herring gulls were recorded in 12 of the 15 surveys, with a peak abundance of 1,1443 individuals in July 2019 (**Table 3-18**). Overall, significantly more herring gulls were observed sitting than flying, although this was not the case in every month (**Table 3-18**).

Table 3-18 Herring gull raw counts, total estimated abundance (including apportionment, as appropriate) and total estimated density (individuals per km^2) in Rampion 2 array area

Rampion 2 array area									
	All behaviours			Flying			Sitting		
Survey	Raw Count	Abundance	Density	Raw Count	Abundance	Density	Raw Count	Abundance	Density
Jun-19	1	10	0.04	1	10	0.04	0	0	0.00
Jul-19	94	872	3.28	15	137	0.52	79	736	2.77
Nov-19	2	18	0.07	1	9	0.03	1	9	0.03
Dec-19	1	9	0.03	1	9	0.03	0	0	0.00
Jan-20	1	9	0.03	1	9	0.03	0	0	0.00
Feb-20	12	113	0.43	7	64	0.24	5	49	0.19
Mar-20	56	558	2.10	8	76	0.29	48	482	1.81
May-20	4	34	0.13	4	34	0.13	0	0	0.00
Jun-20	52	494	1.86	9	104	0.39	43	390	1.47

Herring gull spatial distribution and flight diagram

3.3.23 Herring gulls were recorded in both relevant bio-seasons, with distribution within the survey area mainly focused in and around the Rampion 1 array area. The highest density of herring gulls were recorded in the breeding bio-season with several hotspots recorded within or in close proximity to the Rampion 1 array area. Density was found to be significantly lower in the non-breeding bio-season, although distribution within the survey area was similar to that of the breeding bio-season with majority of herring gulls recorded within or in close proximity to the Rampion 1 array area.

3.3.24 Data presented in rose diagrams (**Graphic C-6**) of monthly flight directions within the survey area indicates during the breeding bio-season that no predominant flight direction occurred. During the non-breeding season flights were generally observed along the east-west axis of travel, suggesting migratory movements through the channel to wintering areas.

Graphic 3-7 Heatmaps showing distribution of herring gulls in each of the two bio-seasons relevant for this species

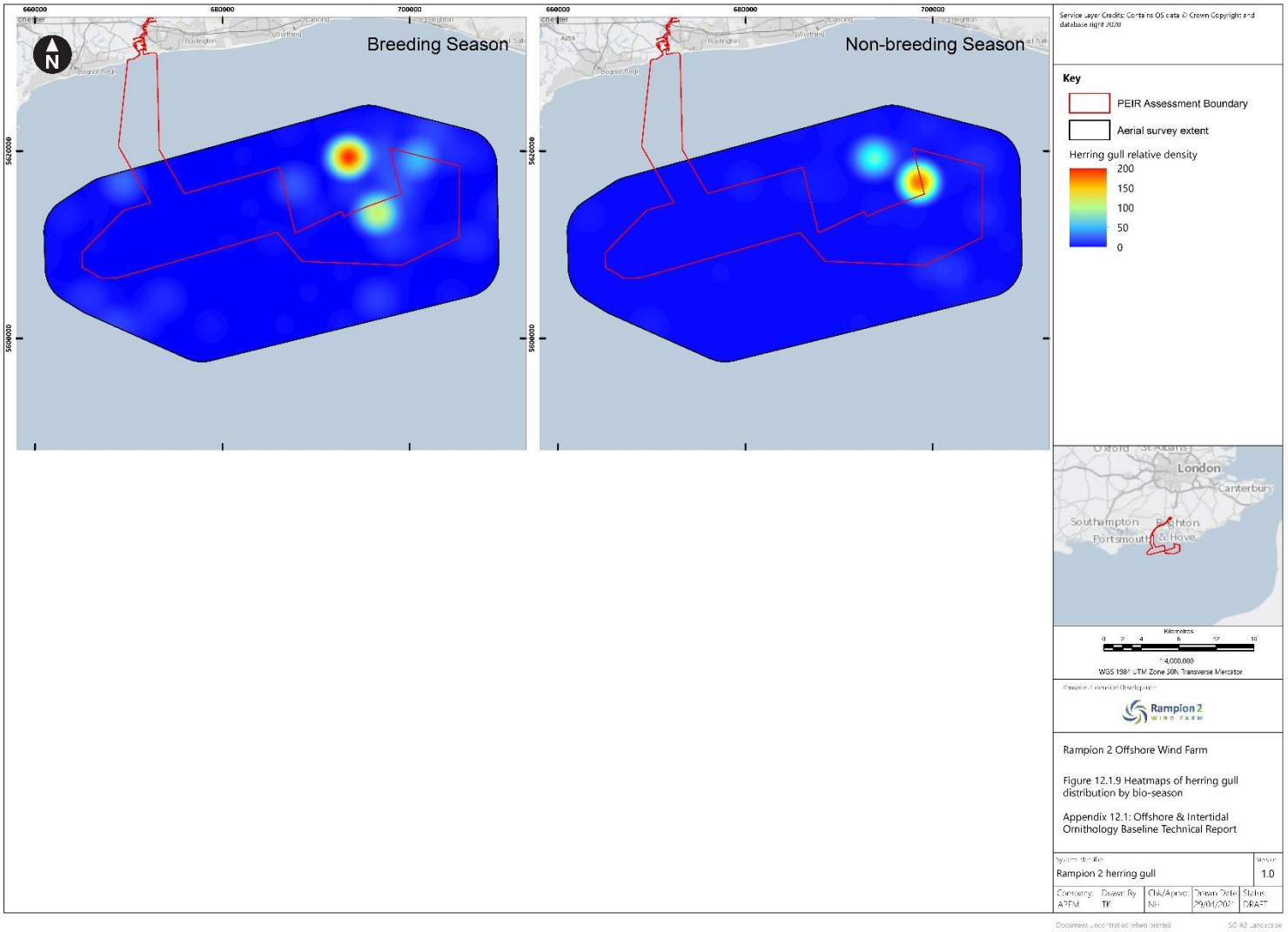


Table 3-19 Herring gull bio-season mean peak abundance and density (individuals per km^2) in Rampion 2 array area

	Rampion 2 array area					
	All behaviours		Flying		Sitting	
Bio-season	Bio-season mean peak abundance	Bio-season mean peak density	Bio-season mean peak abundance	Bio-season mean peak density	Bio-season mean peak abundance	Bio-season mean peak density
Breeding	715	2.69	121	0.45	609	2.29
Non-breeding	113	0.43	64	0.24	49	0.19

Guillemot

Rampion 1 survey data (boat-based and aerial visual surveys 2010 to 2012)

3.3.25 Guillemots were distributed across the survey area but with larger concentrations in shallower waters to the north of Rampion 1. The mean peak density for the whole survey area was 3.212 individuals/km^2 in February 2012.The peak counts across the survey programmes were in January 2011 (n = 10,143) and February 2012 (n = 18,496) in the boat-based surveys. In the aerial surveys guillemots were predominantly recorded to the level of auk species with a peak in March 2011 (n = 4,430). Guillemot occurred in 27 of the 30 surveys in the 2010/12 boat-based surveys and auk species in all 11 surveys in the 2010/11 aerial surveys. Guillemot were recorded in regionally important numbers in the return migratory and early breeding seasons.

Rampion 2 survey data (aerial digital surveys 2019 to 2020)

3.3.26 Guillemots were identified to species level in four of the 15 surveys in the Rampion 2 array area; however, individuals identified to higher level and apportioned to guillemot (guillemot/razorbill or auk species) were recorded in 12 of the 15 surveys. Peak estimated abundance was in February 2020, with 7,222 individuals (including apportioned individuals; **Table 3-20**). In the wider Rampion 2 array area plus 4km buffer, guillemots or individuals apportioned to guillemot were recorded in 12 of the 15 surveys, with a peak estimated abundance of 18,721 individuals (**Table 3-20**). The vast majority of guillemots observed were sitting, with only small numbers of flying birds (**Table 3-20**).

Table 3-20 Guillemot raw counts, total estimated abundance (including correction and apportionment, as appropriate) and total estimated density (individuals per km^2) in: a) Rampion 2 array area and b) Rampion 2 array area plus 4km buffer.

a) Rampion 2 array area

	All behaviours			Flying			Sitting		
Survey	**Raw Count**	**Abundance**	**Density**	**Raw Count**	**Abundance**	**Density**	**Raw Count**	**Abundance**	**Density**
Apr-19	4	150	0.56	0	0	0.00	4	150	0.56
May-19	5	74	0.28	0	0	0.00	5	74	0.28
Jul-19	1	15	0.06	0	0	0.00	1	15	0.06
Oct-19	0	70	0.26	0	0	0.00	0	70	0.26
Nov-19	0	43	0.16	0	7	0.03	0	35	0.13
Dec-19	0	98	0.37	0	0	0.00	0	98	0.37
Jan-20	0	557	2.10	0	21	0.08	0	536	2.02
Feb-20	0	7,222	27.16	0	141	0.53	0	7,082	26.64
Mar-20	0	52	0.20	0	0	0.00	0	52	0.20
Apr-20	0	21	0.08	0	0	0.00	0	21	0.08
May-20	0	42	0.16	0	0	0.00	0	42	0.16
Jun-20	3	43	0.16	0	0	0.00	3	43	0.16

b) Rampion 2 array area + 4km buffer									
	All behaviours			Flying			Sitting		
Survey	Raw Count	Abundance	Density	Raw Count	Abundance	Density	Raw Count	Abundance	Density
Apr-19	18	363	0.56	0	0	0.00	18	363	0.56
May-19	7	114	0.18	0	0	0.00	7	114	0.18
Jun-19	1	25	0.04	0	0	0.00	1	25	0.04
Jul-19	5	68	0.10	0	0	0.00	5	68	0.10
Oct-19	0	134	0.21	0	22	0.03	0	112	0.17
Nov-19	0	231	0.35	0	61	0.09	0	170	0.26
Dec-19	0	268	0.41	0	0	0.00	0	268	0.41
Jan-20	0	1,126	1.73	0	38	0.06	0	1,088	1.67
Feb-20	0	18,721	28.72	0	258	0.40	0	18,463	28.32
Mar-20	0	332	0.51	0	0	0.00	0	332	0.51
May-20	15	199	0.31	0	0	0.00	15	199	0.31
Jun-20	6	103	0.16	0	0	0.00	6	103	0.16

Guillemot spatial distribution

3.3.27 Guillemots were widely distributed throughout the survey area during the breeding bio-season with the greatest densities observed in the south west of the survey area (**Graphic 3-8**). Due to the difficulty in distinguishing between guillemots and razorbills in winter plumage, no guillemots were recorded to species level in the non-breeding bio-season. There were significant numbers of birds identified as guillemot/razorbill, and the distribution of those birds is considered in a subsequent section.

Graphic 3-8 Heatmaps showing distribution of guillemots in each of the two bio-seasons relevant for this species

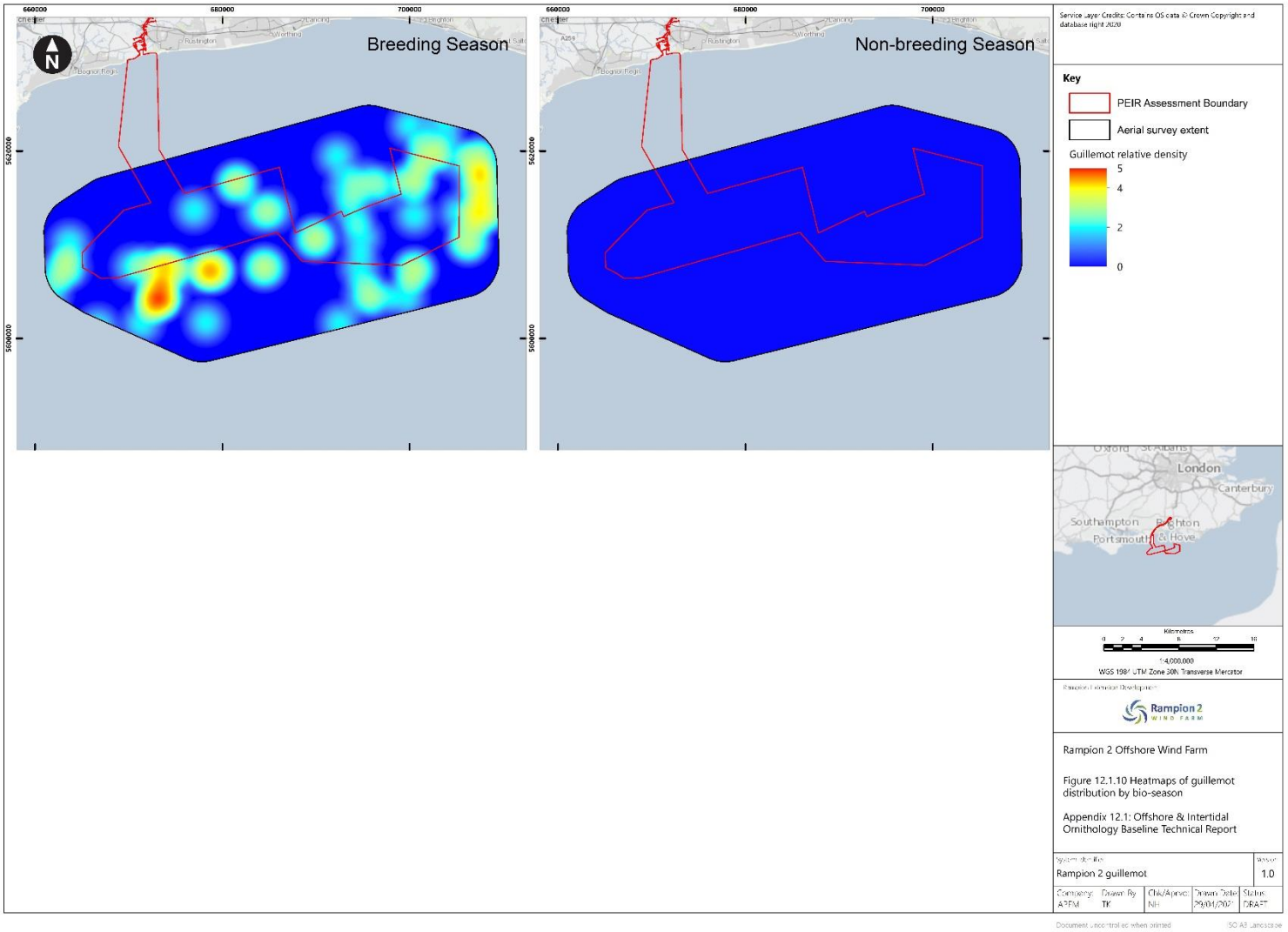


Table 3-21 Guillemot bio-season mean peak abundance and density (individuals per km^2) in: a) Rampion 2 array area and b) Rampion 2 array area plus 4km buffer

a) Rampion 2 array area						
	All behaviours		Flying		Sitting	
Bio-season	Bio-season mean peak abundance	Bio-season mean peak density	Bio-season mean peak abundance	Bio-season mean peak density	Bio-season mean peak abundance	Bio-season mean peak density
Breeding	101	0.38	0	0.00	101	0.38
Non-breeding	7,222	27.16	141	0.53	7,082	26.64
b) Rampion 2 array area plus 4km buffer						
	All behaviours		Flying		Sitting	
Bio-season	Bio-season mean peak abundance	Bio-season mean peak density	Bio-season mean peak abundance	Bio-season mean peak density	Bio-season mean peak abundance	Bio-season mean peak density
Breeding	347	0.53	0	0.00	347	0.53
Non-breeding	18,721	28.72	258	0.40	18,463	28.32

Razorbill

Rampion 1 survey data (boat-based and aerial visual surveys 2010 to 2012)

3.3.28 Razorbills were distributed across the survey area but with larger concentrations in shallower waters to the north of Rampion 1. The mean peak density for the whole survey area was 0.495 birds/km^2 in February 2012.The peak counts across the survey programmes were in January 2011 (n = 2,843) and February 2012 (n = 3,883) in the boat-based surveys. In the aerial surveys razorbills were predominantly recorded to the level of auk species with a peak in March 2011 (n = 4,430). Razorbills were recorded in 22 of the 30 surveys in the 2010/12 boat-based surveys and auk species in all 11 surveys in the 2010/11 aerial surveys. Razorbills were recorded in regionally important numbers in the return migratory and early breeding seasons.

Rampion 2 survey data (aerial digital surveys 2019 to 2020)

3.3.29 Razorbills were identified to species level in two of the 15 surveys in the Rampion 2 array area; however, individuals identified to higher level and apportioned to razorbill (guillemot/razorbill or auk species) were recorded in eight of the 15 surveys. Peak estimated abundance was in February 2020, with 1,583 individuals (including apportioned individuals; **Table 3-22**). In the wider Rampion 2 array area plus 4km buffer, razorbills or individuals apportioned to razorbills were recorded in 10 of the 15 surveys, with a peak estimated abundance of 2,051 individuals (**Table 3-22**). The majority of razorbills observed were sitting, with only a small number flying (**Table 3-22**).

Table 3-22 Razorbill raw counts, total estimated abundance (including correction and apportionment, as appropriate) and total estimated density (individuals per km^2) in: a) Rampion 2 array area and b) Rampion 2 array area plus 4km buffer

a) Rampion 2 array area

	All behaviours			Flying			Sitting		
Survey	**Raw Count**	**Abundance**	**Density**	**Raw Count**	**Abundance**	**Density**	**Raw Count**	**Abundance**	**Density**
Jul-19	2	28	0.11	0	0	0.00	2	28	0.11
Aug-19	1	11	0.04	0	0	0.00	1	11	0.04
Oct-19	0	15	0.06	0	0	0.00	0	15	0.06
Nov-19	0	9	0.04	0	2	0.01	0	8	0.03
Dec-19	0	21	0.08	0	0	0.00	0	21	0.08
Jan-20	0	122	0.46	0	5	0.02	0	117	0.44
Feb-20	0	1,583	5.95	0	32	0.12	0	1,550	5.83
Mar-20	0	11	0.04	0	0	0.00	0	11	0.04

b) Rampion 2 array area + 4km buffer

	All behaviours			Flying			Sitting		
Survey	**Raw Count**	**Abundance**	**Density**	**Raw Count**	**Abundance**	**Density**	**Raw Count**	**Abundance**	**Density**
May-19	1	16	0.02	0	0	0.00	1	16	0.02
Jul-19	3	38	0.06	0	0	0.00	3	38	0.06
Aug-19	1	11	0.02	0	0	0.00	1	11	0.02
Oct-19	0	15	0.02	0	3	0.00	0	12	0.02
Nov-19	0	26	0.04	0	7	0.01	0	19	0.03
Dec-19	0	29	0.05	0	0	0.00	0	29	0.05
Jan-20	0	123	0.19	0	4	0.01	0	119	0.18
Feb-20	0	2,051	3.15	0	30	0.05	0	2,021	3.10
Mar-20	0	36	0.06	0	0	0.00	0	36	0.06
Apr-20	1	68	0.10	0	0	0.00	1	68	0.10

Razorbill spatial distribution

3.3.30 Razorbills were scarcely distributed throughout the survey area, with low densities and no obvious hot spots occurring (**Graphic 3-9**). Due to the difficulty in distinguishing between guillemots and razorbills in winter plumage, limited numbers of razorbills were recorded in the migratory and winter bio-seasons to species level. The distribution of the guillemot / razorbill species group in the non-breeding season is detailed below.

Graphic 3-9 Heatmaps showing distribution of razorbills in each bio-season

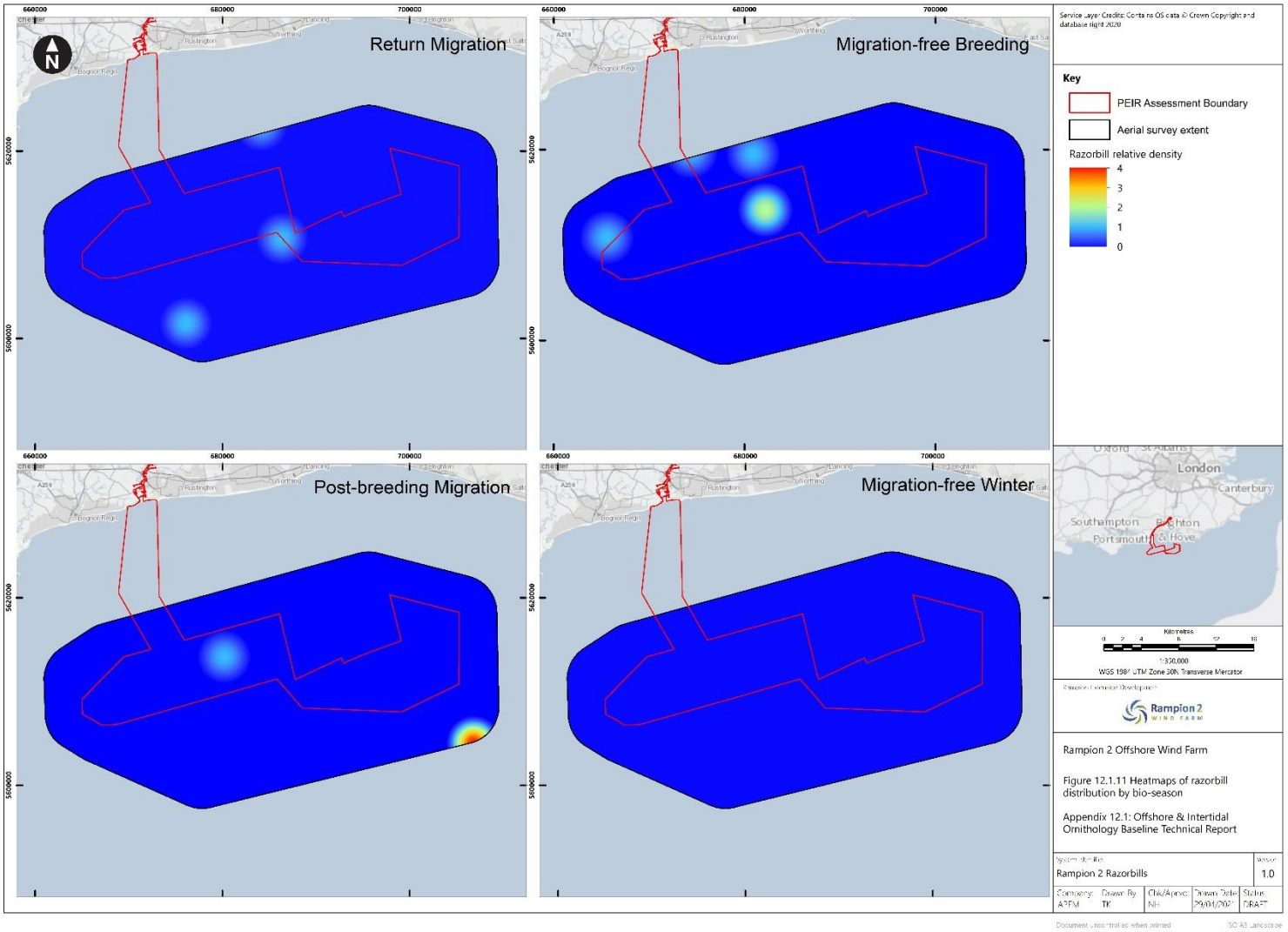


Table 3-23 Razorbill bio-season mean peak abundance and density (individuals per km^2) in: a) Rampion 2 array area and b) Rampion 2 array area plus 4km buffer

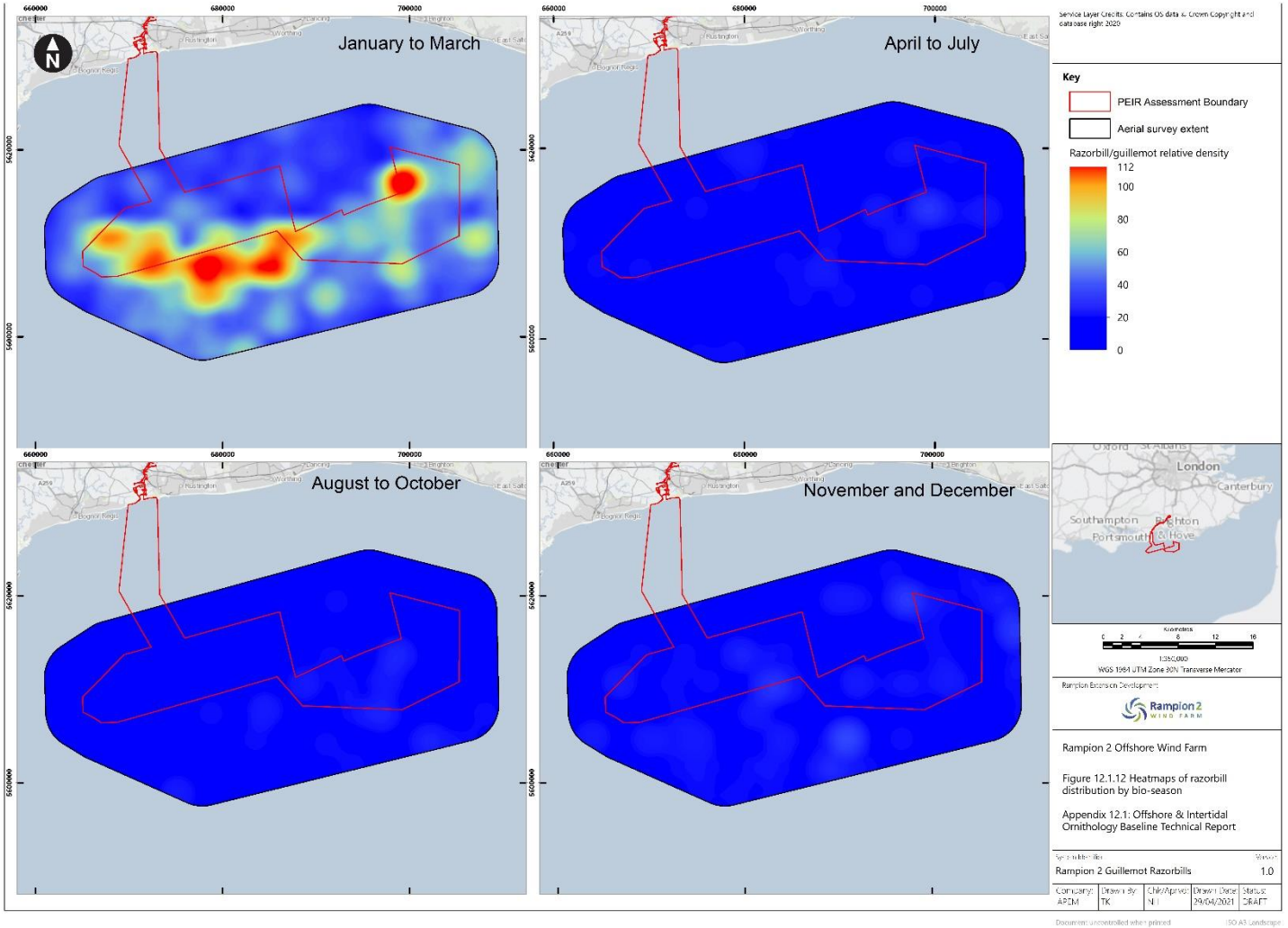
a) Rampion 2 array area						
	All behaviours		Flying		Sitting	
Bio-season	Bio-season mean peak abundance	Bio-season mean peak density	Bio-season mean peak abundance	Bio-season mean peak density	Bio-season mean peak abundance	Bio-season mean peak density
Return (spring) migration	1,583	5.95	32	0.12	1,550	5.83
Migration-free breeding	14	0.05	0	0.00	14	0.05
Post-breeding (autumn) migration	15	0.06	0	0.00	15	0.06
Migration-free winter	21	0.08	2	0.01	21	0.08
b) Rampion 2 array area plus 4km buffer						
	All behaviours		Flying		Sitting	
Bio-season	Bio-season mean peak abundance	Bio-season mean peak density	Bio-season mean peak abundance	Bio-season mean peak density	Bio-season mean peak abundance	Bio-season mean peak density
Return (spring) migration	2,051	3.15	30	0.05	2,021	3.10
Migration-free breeding	53	0.08	0	0.00	53	0.08
Post-breeding (autumn) migration	15	0.02	3	0.00	12	0.02
Migration-free winter	29	0.05	7	0.01	29	0.05

Guillemot/razorbill

3.3.31 It can be difficult to distinguish between guillemots and razorbills from aerial digital imagery, especially outside of the breeding season. The heatmaps within the individual guillemot and razorbill species accounts above are based on positively identified individuals only, and therefore do not include individuals identified to the group level guillemot/razorbill. As the number of birds identified only as guillemot/razorbill was significant in some months, the heatmaps presented above for the individual species should therefore be considered alongside **Graphic 3-10**, which presents the heatmap of birds identified as guillemot/razorbill between January and March inclusive.

3.3.32 There is no strong pattern of occurrence within this species pair aside from the highest densities occurring between January and March. This can be attributed to two factors, firstly, proportionately the fewest birds are identified to species during the non-breeding periods due to increased similarity of plumage, and lower light levels causing reduced image quality; and secondly the occurrence of Storm Ciara on the 8-9 February which was preceded by strong westerly-backed winds which encouraged an early movement of seabirds including large auks along the English channel and into the southern North Sea as recorded at Dungeness (Trektellen, 2020) and Portland Bird Observatories on 7 February (Portland Bird Observatory (PBO), 2020), concurrent with the survey. This led to unusually high numbers of guillemot/razorbills within the survey area. Birds were recorded in greatest densities in the south-west quadrant of the survey area with an additional cluster around the south-eastern corner of the existing Rampion 1 project.

Graphic 3-10 Heatmaps showing distribution of birds identified as guillemot/razorbill. Panels are based on razorbill bio-seasons, but as guillemots have different bio-seasons panels have been labelled by the months concerned rather than by bio-season



3.4 Glossary of terms and abbreviations

Table 3-24 Glossary of terms and abbreviations

Term (acronym)	Definition
APEM	APEM Limited
Baseline	Refers to existing conditions as represented by latest available survey and other data which is used as a benchmark for making comparisons to assess the impact of development.
BDMPS	Biologically Defined Minimum Population Scale
BEIS	Department for Business, Energy and Industrial Strategy
BERR	Department for Business, Enterprise and Regulatory Reform
Bio-season	Biological Season
BTO	British Trust for Ornithology
CI	Confidence Interval
CV	Coefficient of Variance
DECC	Department and Energy and Climate Change
DTI	Department for Trade and Industry
Environmental Impact Assessment (EIA)	The process of evaluating the likely significant environmental effects of a proposed project or development over and above the existing circumstances (or 'baseline').
Environmental Statement (ES)	The written output presenting the full findings of the Environmental Impact Assessment.
ESAS	European Seabirds at Sea
EU	European Union
Evidence Plan Process (EPP)	A voluntary consultation process with specialist stakeholders to agree the approach and the information required to support the EIA and HRA for certain aspects.
GB	Great Britian
GSD	Ground Sampling Distance
HRA	Habitats Regulations Assessment
HT	High Tide
Impact	The changes resulting from an action.
Joint Nature Conservation Committee (JNCC)	JNCC is the public body that advises the UK Government and devolved administrations on UK-wide and international nature conservation

Term (acronym)	Definition
km	Kilometre
km^2	Square Kilometre
/km^2	Per Square Kilometre
Likely Significant Effects	It is a requirement of Environmental Impact Assessment Regulations to determine the likely significant effects of the Proposed Development on the environment which should relate to the level of an effect and the type of effect.
LT	Low Tide
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MSL	Mean Sea Level
n	Number
NEWS	Non-Estuarine Waterbird Survey
PBO	Portland Bird Observatory
PEIR Assessment Boundary	The PEIR Assessment Boundary combines the search areas for the offshore and onshore infrastructure associated with the Proposed Development. It is defined as the area within which the Proposed Development and associated infrastructure will be located, including the temporary and permanent construction and operational work areas.
Planning Inspectorate (PINS)	The Planning Inspectorate deals with planning appeals, national infrastructure planning applications, examinations of local plans and other planning-related and specialist casework in England and Wales.
Preliminary Environmental Information Report (PEIR)	The written output of the Environmental Impact Assessment undertaken to date for the Proposed Development. It is developed to support formal consultation and presents the preliminary findings of the assessment to allow an informed view to be developed of the Proposed Development, the assessment approach that has been undertaken, and the preliminary conclusions on the likely significant effects of the Proposed Development and environmental measures proposed.
Proposed Development	The development that is subject to the application for development consent, as described in Chapter 4.
QA	Quality Assurance
Rampion 1	The existing Rampion Offshore Wind Farm located in the English Channel in off the south coast of England.

Term (acronym)	Definition
Receptor	These are as defined in Regulation 5(2) of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 and include population and human health, biodiversity, land, soil, water, air, climate, material assets, cultural heritage and landscape that may be at risk from exposure to pollutants which could potentially arise as a result of the Proposed Development.
RED	Rampion Extension Development Ltd. (The Applicant)
RSPB	Royal Society for the Protection of Birds
Scoping Opinion	A Scoping Opinion is adopted by the Secretary of State for a Proposed Development.
Scoping Report	A report that presents the findings of an initial stage in the Environmental Impact Assessment process.
Sensitivity	A term applied to specific receptors, combining judgements of the susceptibility of the receptor to the specific type of change or development proposed and the value associated to that receptor.
Significance	A measure of the importance of the environmental effect, defined by criteria specific to the environmental aspect.
Significant effects	It is a requirement of the EIA Regulations to determine the likely significant effects of the development on the environment which should relate to the level of an effect and the type of effect. Where possible significant effects should be mitigated.
SNCB	Statutory Nature Conservation Body
SOS	Sussex Ornithological Society
Special Protection Area (SPA)	Sites designated under EU Directive (79/409/EEC) to protect habitats of migratory birds and certain threatened birds under the Birds Directive
Site of Special Scientific Interest (SSSI)	Sites designated at the national level under the Wildlife & Countryside Act 1981 (as amended). They are a series of sites that are designated to protect the best examples of significant natural habitats and populations of species.
TCE	The Crown Estate
The Proposed Development / Rampion 2	The onshore and offshore infrastructure associated with the offshore wind farm comprising of installed capacity of up to 1200 MW, located in the English Channel in off the south coast of England.
UK	United Kingdom
UTC	Coordinated Universal Time
WeBS	Wetland Bird Survey

Term (acronym)	Definition
WTG	Wind Turbine Generator
WWT	Wildfowl & Wetlands Trust

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Annex A Scientific names and taxonomy

Table A-1 Common name and scientific name of species mentioned in this report, listed in taxonomic order as per Gill and Donsker (2012)

Common name	Scientific Name
Dark-bellied Brent goose	*Branta bernicla*
Light-bellied Brent goose	*Branta bernicla*
Pink-footed goose	*Anser brachyrhynchus*
White-fronted goose	*Anser albifrons*
Egyptian goose	*Alopochen aegyptiaca*
Shelduck	*Tadorna tadorna*
Pintail	*Anas acuta*
Garganey	*Anas querquedula*
Shoveler	*Anas clypeata*
Gadwall	*Anas strepera*
Wigeon	*Anas penelope*
Mallard	*Anas platyrhynchos*
Teal	*Anas crecca*
Pochard	*Aythya ferina*
Tufted duck	*Aythya fuligula*
Scaup	*Aythya marila*
Eider	*Somateria mollissima*
Common scoter	*Melanitta nigra*
Velvet scoter	*Melanitta fusca*
Long-tailed duck	*Clangula hyemalis*
Red-breasted merganser	*Mergus serrator*

Common name	Scientific Name
Goosander	*Mergus merganser*
Red-throated diver	*Gavia stellata*
Great northern diver	*Gavia immer*
Fulmar	*Fulmarus glacialis*
Cory's shearwater	*Calonectris diomedea*
Manx shearwater	*Puffinus puffinus*
Balearic shearwater	*Puffinus mauretanicus*
Storm petrel	*Hydrobates pelagicus*
Gannet	*Morus bassanus*
Cormorant	*Phalacrocorax carbo*
Shag	*Phalacrocorax aristotelis*
Little egret	*Egretta garzetta*
Grey heron	*Ardea cinerea*
Great crested grebe	*Podiceps cristatus*
Slavonian grebe	*Podiceps auritus*
Black-necked grebe	*Podiceps nigricollis*
Avocet	*Recurvirostra avosetta*
Oystercatcher	*Haematopus ostralegus*
Grey plover	*Pluvialis squatarola*
Golden plover	*Pluvialis apricaria*
Ringed plover	*Charadrius hiaticula*
Little ringed plover	*Charadrius dubius*
Lapwing	*Vanellus vanellus*
Whimbrel	*Numenius phaeopus*

Common name	Scientific Name
Curlew	*Numenius arquata*
Bar-tailed godwit	*Limosa lapponica*
Turnstone	*Arenaria interpres*
Knot	*Calidris canutus*
Ruff	*Philomachus pugnax*
Sanderling	*Calidris alba*
Dunlin	*Calidris alpina*
Redshank	*Tringa totanus*
Pomarine skua	*Stercorarius pomarinus*
Arctic skua	*Stercorarius parasiticus*
Great skua	*Stercorarius skua*
Black guillemot	*Cepphus grylle*
Razorbill	*Alca torda*
Little auk	*Alle alle*
Guillemot	*Uria aalge*
Little tern	*Sternula albifrons*
Black tern	*Chlidonias niger*
Sandwich tern	*Sterna sandvicensis*
Common tern	*Sterna hirundo*
Arctic tern	*Sterna paradisaea*
Roseate tern	*Sterna dougallii*
Kittiwake	*Rissa tridactyla*
Black-headed gull	*Chroicocephalus ridibundus*
Little gull	*Hydrocoloeus minutus*

Common name	Scientific Name
Mediterranean gull	*Larus melanocephalus*
Common gull	*Larus canus*
Lesser black-backed gull	*Larus fuscus*
Herring gull	*Larus argentatus*
Yellow-legged gull	*Larus michahellis*
Caspian gull	*Larus cachinnans*
Iceland gull	*Larus glaucoides*
Glaucous gull	*Larus hyperboreus*
Great black-backed gull	*Larus ichthyaetus*

Annex B WWT waterbird survey results

Table B-1 Raw counts from WWT Waterbird Surveys of block SE3. Full details of the surveys including dates, locations and methodology are given in WWT (2009)

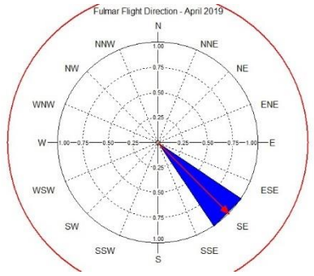
Species	Period		
	Mid-winter	Breeding (incubation)	Post fledging/ moult
Red-breasted merganser	7		
Diver species		1	
Fulmar	15	17	24
Manx shearwater			1
Gannet	1,137	104	168
Cormorant	6		1
Cormorant / shag	3		1
Arctic skua		1	
Great skua	2	2	
Skua species		2	
Kittiwake	119	62	45
Common gull	14		4
Herring gull	29	64	56
Great black-backed gull	31	2	3
Grey gull species (herring / common)	14	70	130
Black-backed gull species	11	3	8
Large gull species	141	22	12
Small gull species	14	2	31
Gull species	63	519	271
Sandwich tern		1	
Arctic / common tern		12	5
Tern species		14	
Guillemot	2		
Auk species	77	46	2

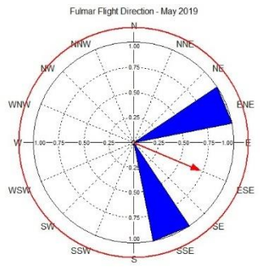
Table B-2 Raw counts from WWT Waterbird Surveys of block SE4. Full details of the surveys including dates, locations and methodology are given in WWT (2009)

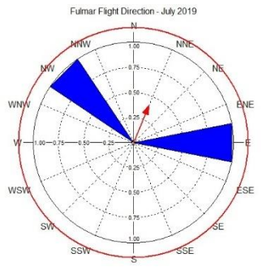
Species	Mid winter (1)	Mid winter (2)	Breeding (incubation)	Breeding (chick-rearing)	Post fledging/ moult
Red-throated diver	4	1			
Diver species	24	4	1		
Grebe species	1				
Fulmar	30	32	14	9	11
Gannet	268	1,048	60	73	138
Cormorant	1				
Arctic skua			3		
Great skua					1
Skua species			2		
Kittiwake	90	254	68	42	181
Black-headed gull		2	1	2	
Common gull	11	35		8	
Lesser black-backed gull	3	5		1	
Herring gull	16	53	30	55	82
Great black-backed gull	7	57	1	1	2
Grey gull species (herring / common)	45	62	173	44	18
Black-backed gull species	72	55		2	4
Large gull species	34	458	20	21	10
Small gull species	104	182	2		19
Gull species	659	819	113	775	129
Little tern			1		
Sandwich tern			2		
Arctic / common tern			41		1
Tern species			15		3
Razorbill		1	1		
Auk species	945	679	124	1	1

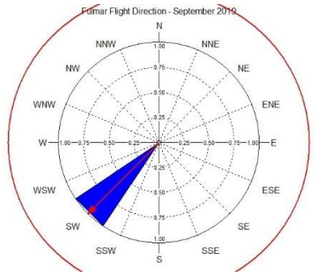
Annex C Flight Direction Rose Diagrams

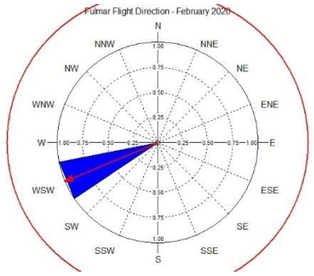
Graphic C-1 Summary of flight direction of fulmars during the survey period



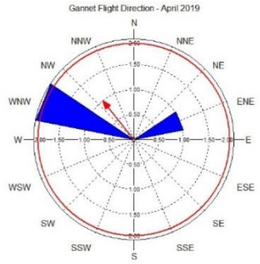


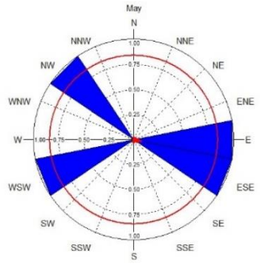


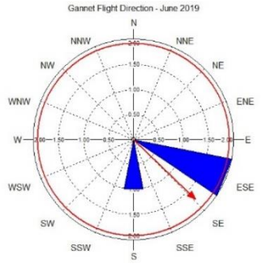


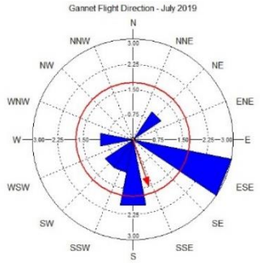


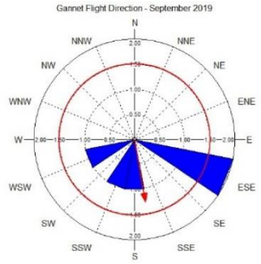
Graphic C-2 Summary of flight direction of gannets during the survey period

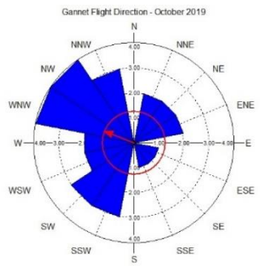


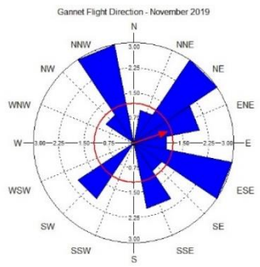


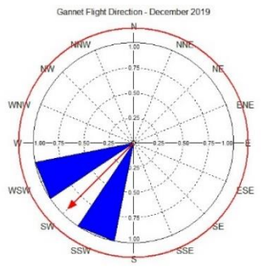


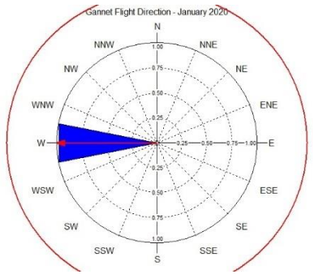


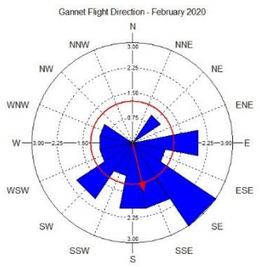


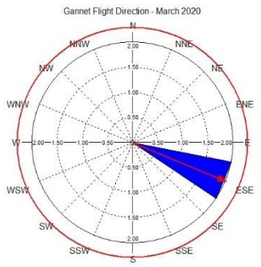




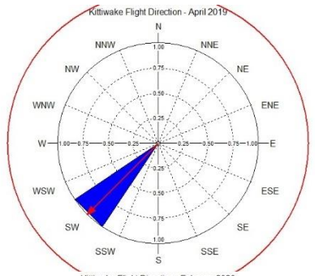


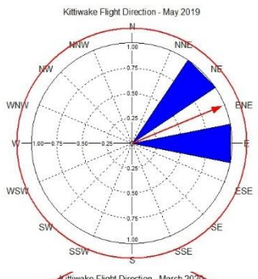


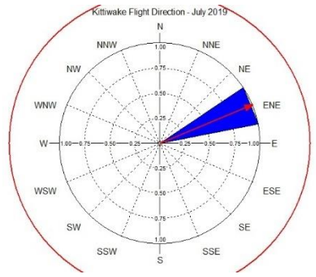


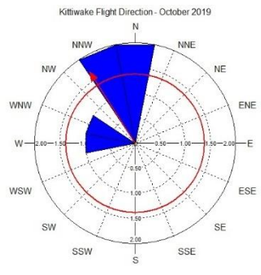


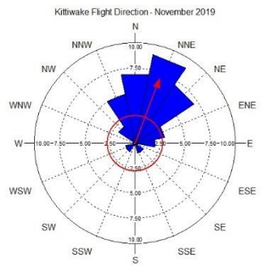
Graphic C-3 Summary of flight direction of kittiwakes during the survey period

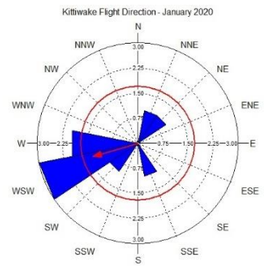


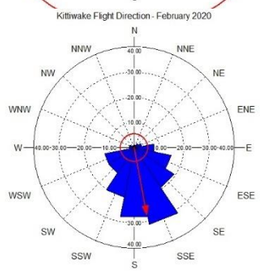


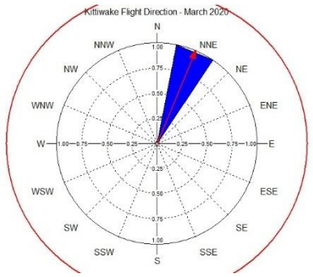




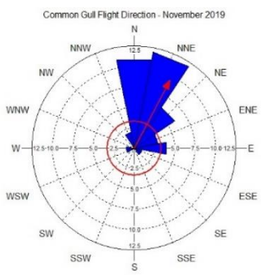


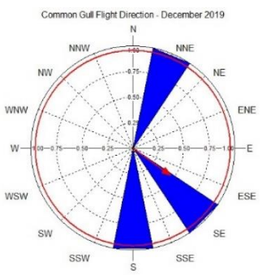


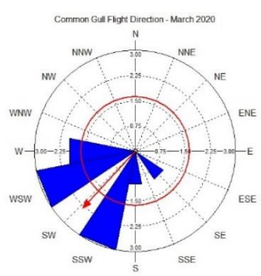




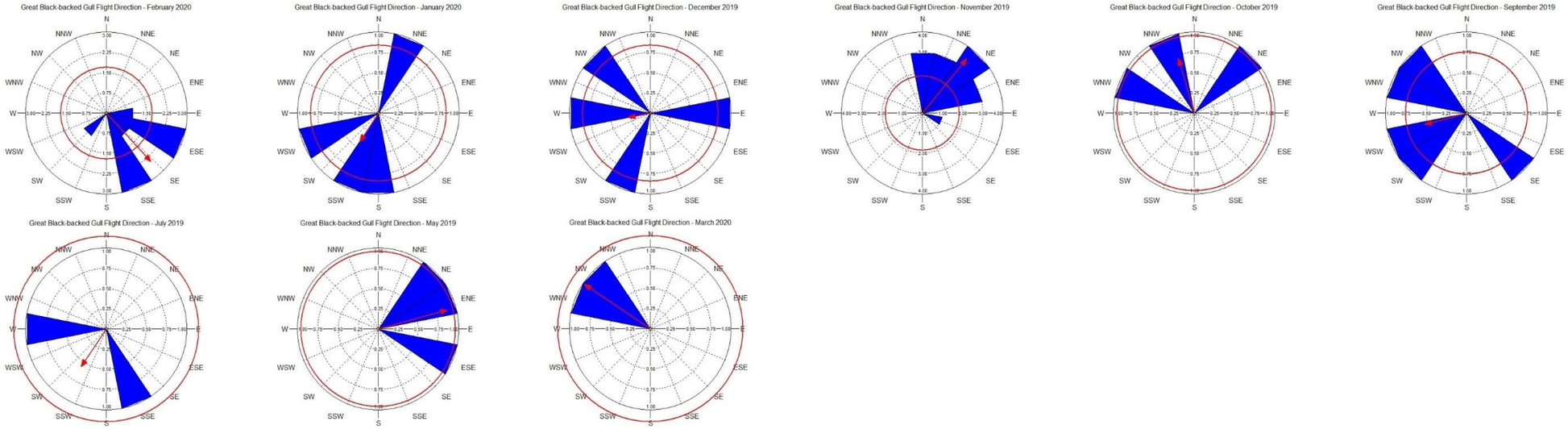
Graphic C-4 Summary of flight direction of common gulls during the survey period



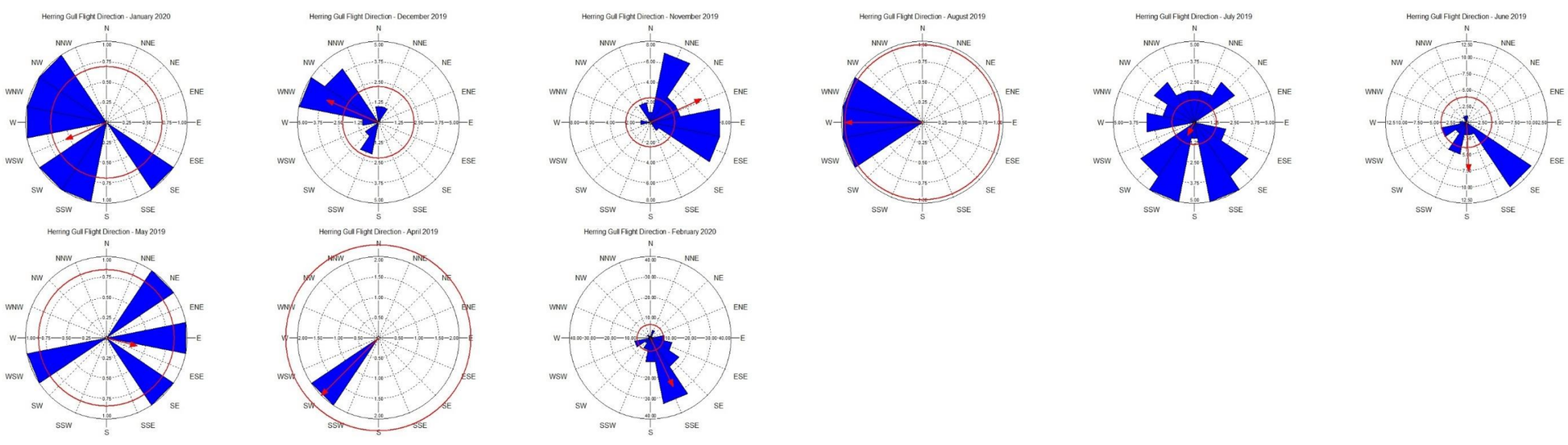




Graphic C-5 Summary of flight direction of great black-backed gulls during the survey period



Graphic C-6 Summary of flight direction of herring gulls during the survey period



Annex D Abundance and behaviour information for all birds (including unidentified birds)

Table D-1 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of shelduck (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	2	17	2	50	0.71	0.03	2	17	2	50	0.71	0.03	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

Table D-2 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of common scoter (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	7	60	7	181	0.38	0.23	7	60	7	181	0.38	0.23	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	7	58	7	175	0.38	0.09	7	58	7	175	0.38	0.09	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

Table D-3 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of red-throated diver (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	1	10	1	30	1.00	0.04	0	0	0	0	0.00	0.00	1	10	1	30	1.00	0.04
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	1	9	1	26	1.00	0.03	0	0	0	0	0.00	0.00	1	9	1	26	1.00	0.03
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density
Apr-19	2	20	2	78	0.71	0.03	0	0	0	0	0.00	0.00	2	20	2	59	0.71	0.03
May-19	1	10	1	29	1.00	0.02	0	0	0	0	0.00	0.00	1	10	1	29	1.00	0.02
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	5	42	8	92	0.45	0.06	0	0	0	0	0.00	0.00	5	42	8	101	0.45	0.06
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

Table D-4 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of great northern diver (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density
Apr-19	1	10	1	29	1.00	0.02	0	0	0	0	0.00	0.00	1	10	1	29	1.00	0.02
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	1	9	1	27	1.00	0.01	0	0	0	0	0.00	0.00	1	9	1	27	1.00	0.01
Mar-20	2	17	2	42	0.71	0.03	0	0	0	0	0.00	0.00	2	17	2	42	0.71	0.03
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

Table D-5 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of diver species (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	1	9	1	27	1.00	0.01	0	0	0	0	0.00	0.00	1	9	1	27	1.00	0.01
Mar-20	1	8	1	25	1.00	0.01	0	0	0	0	0.00	0.00	1	8	1	25	1.00	0.01
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

Table D-6 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of fulmar (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	1	10	1	30	1.00	0.04	1	10	1	30	1.00	0.04	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	1	9	1	27	1.00	0.03	0	0	0	0	0.00	0.00	1	9	1	27	1.00	0.03
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	1	10	1	29	1.00	0.02	1	10	1	29	1.00	0.02	0	0	0	0	0.00	0.00
May-19	1	10	1	29	1.00	0.02	0	0	0	0	0.00	0.00	1	10	1	29	1.00	0.02
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	2	18	2	53	0.71	0.03	2	18	2	44	0.71	0.03	0	0	0	0	0.00	0.00
Aug-19	6	52	9	112	0.41	0.08	2	17	2	43	0.71	0.03	4	34	4	86	0.50	0.05
Sep-19	1	9	1	27	1.00	0.01	1	9	1	27	1.00	0.01	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	3	27	3	72	0.58	0.04	0	0	0	0	0.00	0.00	3	27	3	72	0.58	0.04
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	1	8	1	34	1.00	0.01	0	0	0	0	0.00	0.00	1	8	1	25	1.00	0.01
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

Table D-7 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of Manx shearwater (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	1	9	1	26	1.00	0.01	1	9	1	26	1.00	0.01	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

Table D-8 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of storm-petrel species (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	1	9	1	26	1.00	0.03	1	9	1	26	1.00	0.03	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	4	34	4	93	0.50	0.05	3	25	3	68	0.58	0.04	1	8	1	25	1.00	0.01
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

Table D-9 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of gannet (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	2	20	2	50	0.71	0.08	2	20	2	50	0.71	0.08	0	0	0	0	0.00	0.00
Jun-19	2	20	2	50	0.71	0.08	1	10	1	40	1.00	0.04	1	10	1	30	1.00	0.04
Jul-19	13	118	64	182	0.28	0.44	4	36	9	73	0.50	0.14	9	82	36	137	0.33	0.31
Aug-19	10	90	36	143	0.32	0.34	7	63	18	125	0.38	0.24	3	27	3	63	0.58	0.10
Sep-19	5	46	9	102	0.45	0.17	3	28	3	74	0.58	0.11	2	19	2	46	0.71	0.07
Oct-19	9	78	9	200	0.33	0.29	4	35	9	78	0.50	0.13	5	44	5	131	0.45	0.17
Nov-19	5	44	9	97	0.45	0.17	4	35	4	88	0.50	0.13	1	9	1	26	1.00	0.03
Dec-19	1	9	1	26	1.00	0.03	0	0	0	0	0.00	0.00	1	9	1	26	1.00	0.03
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	5	45	9	100	0.45	0.17	2	18	2	45	0.71	0.07	3	27	3	64	0.58	0.10
Mar-20	2	17	2	43	0.71	0.06	2	17	2	43	0.71	0.06	0	0	0	0	0.00	0.00
Apr-20	9	78	17	155	0.33	0.29	8	69	17	138	0.35	0.26	1	9	1	34	1.00	0.03
May-20	2	17	2	43	0.71	0.06	1	9	1	34	1.00	0.03	1	9	1	26	1.00	0.03
Jun-20	7	61	17	112	0.38	0.23	3	26	3	61	0.58	0.10	4	35	4	86	0.50	0.13

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density
Apr-19	1	10	1	29	1.00	0.02	0	0	0	0	0.00	0.00	1	10	1	29	1.00	0.02
May-19	3	29	3	67	0.58	0.04	3	29	3	67	0.58	0.04	0	0	0	0	0.00	0.00
Jun-19	6	58	10	125	0.41	0.09	3	29	3	77	0.58	0.04	3	29	3	58	0.58	0.04
Jul-19	38	335	238	450	0.16	0.51	8	71	26	123	0.35	0.11	30	264	159	361	0.18	0.40
Aug-19	53	456	275	731	0.14	0.70	23	198	103	327	0.21	0.30	30	258	129	430	0.18	0.40
Sep-19	6	54	9	107	0.41	0.08	4	36	4	81	0.50	0.06	2	18	2	45	0.71	0.03
Oct-19	41	346	160	540	0.16	0.53	26	219	101	363	0.20	0.34	15	127	34	236	0.26	0.19
Nov-19	12	102	51	170	0.29	0.16	9	76	25	136	0.33	0.12	3	25	3	59	0.58	0.04
Dec-19	2	17	2	42	0.71	0.03	1	8	1	25	1.00	0.01	1	8	1	25	1.00	0.01
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	26	234	108	387	0.20	0.36	7	63	9	126	0.38	0.10	19	171	63	297	0.23	0.26
Mar-20	2	17	2	42	0.71	0.03	2	17	2	42	0.71	0.03	0	0	0	0	0.00	0.00
Apr-20	9	75	17	150	0.33	0.12	8	67	8	142	0.35	0.10	1	8	1	25	1.00	0.01
May-20	19	161	19	398	0.23	0.25	6	51	6	127	0.41	0.08	13	110	13	338	0.28	0.17
Jun-20	11	92	33	159	0.30	0.14	6	50	8	100	0.41	0.08	5	42	8	84	0.45	0.06

Table D-10 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of cormorant (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	1	9	1	26	1.00	0.01	0	0	0	0	0.00	0.00	1	9	1	26	1.00	0.01
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	1	9	1	27	1.00	0.01	0	0	0	0	0.00	0.00	1	9	1	27	1.00	0.01
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

Table D-11 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of cormorant (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	1	9	1	26	1.00	0.01	0	0	0	0	0.00	0.00	1	9	1	26	1.00	0.01
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	1	9	1	27	1.00	0.01	0	0	0	0	0.00	0.00	1	9	1	27	1.00	0.01
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

Table D-12 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of cormorant/shag (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	1	9	1	26	1.00	0.01	0	0	0	0	0.00	0.00	1	9	1	26	1.00	0.01
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	1	8	1	25	1.00	0.01	0	0	0	0	0.00	0.00	1	8	1	25	1.00	0.01
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

Table D-13 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of grebe species (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	1	8	1	25	1.00	0.01	0	0	0	0	0.00	0.00	1	8	1	25	1.00	0.01
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	1	8	1	25	1.00	0.01	0	0	0	0	0.00	0.00	1	8	1	25	1.00	0.01
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

Table D-14 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of kittiwake (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	1	10	1	30	1.00	0.04	1	10	1	30	1.00	0.04	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	5	46	5	128	0.45	0.17	1	9	1	27	1.00	0.03	4	36	4	109	0.50	0.14
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	1	9	1	26	1.00	0.03	1	9	1	26	1.00	0.03	0	0	0	0	0.00	0.00
Nov-19	4	35	4	88	0.50	0.13	3	26	3	70	0.58	0.10	1	9	1	26	1.00	0.03
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	59	536	136	1309	0.13	2.02	17	154	64	282	0.24	0.58	42	382	45	1018	0.15	1.44
Mar-20	1	9	1	26	1.00	0.03	1	9	1	26	1.00	0.03	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	20	173	20	519	0.22	0.65	2	17	2	52	0.71	0.06	18	156	18	623	0.24	0.59

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	1	10	1	29	1.00	0.02	1	10	1	29	1.00	0.02	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	6	53	6	141	0.41	0.08	1	9	1	26	1.00	0.01	5	44	5	141	0.45	0.07
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	5	42	8	84	0.45	0.06	4	34	8	68	0.50	0.05	1	8	1	25	1.00	0.01
Nov-19	7	59	8	119	0.38	0.09	6	51	8	102	0.41	0.08	1	8	1	25	1.00	0.01
Dec-19	4	33	4	100	0.50	0.05	0	0	0	0	0.00	0.00	4	33	4	100	0.50	0.05
Jan-20	8	67	17	143	0.35	0.10	5	42	5	92	0.45	0.06	3	25	3	67	0.58	0.04
Feb-20	158	1421	783	2249	0.08	2.18	67	603	369	846	0.12	0.93	91	819	342	1511	0.10	1.26
Mar-20	1	8	1	25	1.00	0.01	1	8	1	33	1.00	0.01	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	20	167	20	502	0.22	0.26	2	17	2	50	0.71	0.03	18	151	18	452	0.24	0.23

Table D-15 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of little gull (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	2	17	2	52	0.71	0.06	2	17	2	52	0.71	0.06	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	1	9	1	27	1.00	0.03	1	9	1	27	1.00	0.03	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	2	17	2	51	0.71	0.03	2	17	2	51	0.71	0.03	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	1	9	1	27	1.00	0.01	1	9	1	27	1.00	0.01	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

Table D-16 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of Mediterranean gull (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	1	8	1	25	1.00	0.01	1	8	1	25	1.00	0.01	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

Table D-17 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of small gull species (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	1	9	1	26	1.00	0.03	0	0	0	0	0.00	0.00	1	9	1	26	1.00	0.03
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	6	55	9	109	0.41	0.21	0	0	0	0	0.00	0.00	6	55	9	118	0.41	0.21
Mar-20	8	69	8	181	0.35	0.26	0	0	0	0	0.00	0.00	8	69	8	181	0.35	0.26
Apr-20	1	9	1	26	1.00	0.03	0	0	0	0	0.00	0.00	1	9	1	26	1.00	0.03
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	2	17	2	52	0.71	0.06	1	9	1	26	1.00	0.03	1	9	1	26	1.00	0.03

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	1	10	1	29	1.00	0.02	0	0	0	0	0.00	0.00	1	10	1	29	1.00	0.02
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	1	9	1	26	1.00	0.01	1	9	1	35	1.00	0.01	0	0	0	0	0.00	0.00
Aug-19	2	17	2	43	0.71	0.03	0	0	0	0	0.00	0.00	2	17	2	43	0.71	0.03
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	2	17	2	42	0.71	0.03	1	8	1	25	1.00	0.01	1	8	1	25	1.00	0.01
Dec-19	2	17	2	42	0.71	0.03	0	0	0	0	0.00	0.00	2	17	2	42	0.71	0.03
Jan-20	1	8	1	25	1.00	0.01	1	8	1	25	1.00	0.01	0	0	0	0	0.00	0.00
Feb-20	7	63	18	117	0.38	0.10	0	0	0	0	0.00	0.00	7	63	18	126	0.38	0.10
Mar-20	12	100	25	233	0.29	0.15	0	0	0	0	0.00	0.00	12	100	25	216	0.29	0.15
Apr-20	2	17	2	42	0.71	0.03	0	0	0	0	0.00	0.00	2	17	2	42	0.71	0.03
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	2	17	2	67	0.71	0.03	1	8	1	25	1.00	0.01	1	8	1	25	1.00	0.01

Table D-18 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of common gull (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	5	44	5	114	0.45	0.17	3	26	3	70	0.58	0.10	2	18	2	53	0.71	0.07
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	17	154	55	273	0.24	0.58	14	127	36	245	0.27	0.48	3	27	3	73	0.58	0.10
Mar-20	3	26	3	103	0.58	0.10	0	0	0	0	0.00	0.00	3	26	3	78	0.58	0.10
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	9	76	17	153	0.33	0.12	7	59	17	110	0.38	0.09	2	17	2	51	0.71	0.03
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	27	243	135	387	0.19	0.37	23	207	108	333	0.21	0.32	4	36	4	81	0.50	0.06
Mar-20	10	83	10	183	0.32	0.13	7	58	7	149	0.38	0.09	3	25	3	75	0.58	0.04
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

Table D-19 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of great black-backed gull (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	1	10	1	30	1.00	0.04	1	10	1	30	1.00	0.04	0	0	0	0	0.00	0.00
May-19	1	10	1	30	1.00	0.04	0	0	0	0	0.00	0.00	1	10	1	30	1.00	0.04
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	8	73	9	164	0.35	0.27	0	0	0	0	0.00	0.00	8	73	9	173	0.35	0.27
Aug-19	1	9	1	27	1.00	0.03	0	0	0	0	0.00	0.00	1	9	1	27	1.00	0.03
Sep-19	10	93	10	223	0.32	0.35	2	19	2	46	0.71	0.07	8	74	8	195	0.35	0.28
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	3	26	3	62	0.58	0.10	1	9	1	35	1.00	0.03	2	18	2	44	0.71	0.07
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	4	35	9	70	0.50	0.13	1	9	1	26	1.00	0.03	3	26	3	61	0.58	0.10
Feb-20	3	27	3	82	0.58	0.10	0	0	0	0	0.00	0.00	3	27	3	82	0.58	0.10
Mar-20	11	95	11	284	0.30	0.36	0	0	0	0	0.00	0.00	11	95	11	276	0.30	0.36
Apr-20	1	9	1	26	1.00	0.03	1	9	1	26	1.00	0.03	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density
Apr-19	1	10	1	39	1.00	0.02	1	10	1	29	1.00	0.02	0	0	0	0	0.00	0.00
May-19	1	10	1	29	1.00	0.02	0	0	0	0	0.00	0.00	1	10	1	38	1.00	0.02
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	10	88	26	185	0.32	0.13	1	9	1	26	1.00	0.01	9	79	18	168	0.33	0.12
Aug-19	2	17	2	43	0.71	0.03	0	0	0	0	0.00	0.00	2	17	2	43	0.71	0.03
Sep-19	18	161	63	295	0.24	0.25	5	45	9	89	0.45	0.07	13	116	18	242	0.28	0.18
Oct-19	3	25	3	59	0.58	0.04	3	25	3	59	0.58	0.04	0	0	0	0	0.00	0.00
Nov-19	12	102	42	161	0.29	0.16	7	59	17	119	0.38	0.09	5	42	8	85	0.45	0.06
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	7	59	17	109	0.38	0.09	3	25	3	59	0.58	0.04	4	34	8	67	0.50	0.05
Feb-20	7	63	9	135	0.38	0.10	0	0	0	0	0.00	0.00	7	63	9	126	0.38	0.10
Mar-20	20	166	33	382	0.22	0.25	0	0	0	0	0.00	0.00	20	166	42	382	0.22	0.25
Apr-20	6	50	8	100	0.41	0.08	1	8	1	25	1.00	0.01	5	42	5	92	0.45	0.06
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

Table D-20 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of herring gull (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	1	10	1	30	1.00	0.04	1	10	1	30	1.00	0.04	0	0	0	0	0.00	0.00
Jul-19	94	856	118	1940	0.10	3.22	15	137	55	246	0.26	0.52	79	720	79	1740	0.11	2.71
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	2	18	2	44	0.71	0.07	1	9	1	26	1.00	0.03	1	9	1	26	1.00	0.03
Dec-19	1	9	1	26	1.00	0.03	1	9	1	26	1.00	0.03	0	0	0	0	0.00	0.00
Jan-20	1	9	1	26	1.00	0.03	1	9	1	26	1.00	0.03	0	0	0	0	0.00	0.00
Feb-20	12	109	12	300	0.29	0.41	7	64	7	200	0.38	0.24	5	45	5	127	0.45	0.17
Mar-20	56	483	56	1723	0.13	1.82	8	69	8	190	0.35	0.26	48	414	48	1655	0.14	1.56
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	4	34	9	69	0.50	0.13	4	34	9	69	0.50	0.13	0	0	0	0	0.00	0.00
Jun-20	52	450	52	1228	0.14	1.69	9	78	9	199	0.33	0.29	43	372	43	1098	0.15	1.40

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	1	10	1	29	1.00	0.02	0	0	0	0	0.00	0.00	1	10	1	29	1.00	0.02
Jun-19	25	241	48	521	0.20	0.37	23	222	29	511	0.21	0.34	2	19	2	58	0.71	0.03
Jul-19	128	1128	335	2195	0.09	1.73	33	291	150	467	0.17	0.45	95	838	97	1895	0.10	1.29
Aug-19	1	9	1	26	1.00	0.01	0	0	0	0	0.00	0.00	1	9	1	26	1.00	0.01
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	16	136	16	331	0.25	0.21	15	127	15	331	0.26	0.19	1	8	1	25	1.00	0.01
Dec-19	10	84	10	226	0.32	0.13	10	84	10	217	0.32	0.13	0	0	0	0	0.00	0.00
Jan-20	2	17	2	42	0.71	0.03	2	17	2	42	0.71	0.03	0	0	0	0	0.00	0.00
Feb-20	34	306	90	576	0.17	0.47	28	252	81	468	0.19	0.39	6	54	6	135	0.41	0.08
Mar-20	58	482	58	1345	0.13	0.74	8	66	8	183	0.35	0.10	50	415	50	1262	0.14	0.64
Apr-20	7	58	8	133	0.38	0.09	6	50	8	108	0.41	0.08	1	8	1	25	1.00	0.01
May-20	39	330	51	778	0.16	0.51	34	288	34	685	0.17	0.44	5	42	5	118	0.45	0.06
Jun-20	55	461	55	1248	0.13	0.71	10	84	10	201	0.32	0.13	45	377	45	1080	0.15	0.58

Table D-21 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of lesser black-backed gull (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	1	9	1	36	1.00	0.03	0	0	0	0	0.00	0.00	1	9	1	27	1.00	0.03
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	4	34	4	103	0.50	0.13	2	17	2	52	0.71	0.06	2	17	2	52	0.71	0.06
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	2	17	2	43	0.71	0.06	2	17	2	43	0.71	0.06	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	1	9	1	26	1.00	0.01	0	0	0	0	0.00	0.00	1	9	1	26	1.00	0.01
Aug-19	1	9	1	26	1.00	0.01	1	9	1	26	1.00	0.01	0	0	0	0	0.00	0.00
Sep-19	1	9	1	36	1.00	0.01	0	0	0	0	0.00	0.00	1	9	1	27	1.00	0.01
Oct-19	1	8	1	25	1.00	0.01	0	0	0	0	0.00	0.00	1	8	1	25	1.00	0.01
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	4	33	4	100	0.50	0.05	2	17	2	50	0.71	0.03	2	17	2	50	0.71	0.03
Apr-20	3	25	3	58	0.58	0.04	3	25	3	58	0.58	0.04	0	0	0	0	0.00	0.00
May-20	13	110	13	313	0.28	0.17	8	68	8	169	0.35	0.10	5	42	5	118	0.45	0.06
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

Table D-22 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of black-backed gull species (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	7	59	7	237	0.38	0.09	0	0	0	0	0.00	0.00	7	59	7	178	0.38	0.09
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

Table D-23 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of large gull species (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	2	18	2	55	0.71	0.07	0	0	0	0	0.00	0.00	2	18	2	55	0.71	0.07
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	1	9	1	28	1.00	0.03	0	0	0	0	0.00	0.00	1	9	1	28	1.00	0.03
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	11	95	11	284	0.30	0.36	1	9	1	26	1.00	0.03	10	86	10	259	0.32	0.32
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	3	26	3	61	0.58	0.10	3	26	3	52	0.58	0.10	0	0	0	0	0.00	0.00

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	2	18	2	53	0.71	0.03	0	0	0	0	0.00	0.00	2	18	2	53	0.71	0.03
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	1	9	1	27	1.00	0.01	0	0	0	0	0.00	0.00	1	9	1	27	1.00	0.01
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	1	9	1	27	1.00	0.01	1	9	1	27	1.00	0.01	0	0	0	0	0.00	0.00
Mar-20	11	91	11	274	0.30	0.14	1	8	1	25	1.00	0.01	10	83	10	249	0.32	0.13
Apr-20	2	17	2	42	0.71	0.03	0	0	0	0	0.00	0.00	2	17	2	42	0.71	0.03
May-20	108	914	108	2707	0.10	1.40	1	8	1	25	1.00	0.01	107	905	107	2707	0.10	1.39
Jun-20	6	50	8	100	0.41	0.08	3	25	3	59	0.58	0.04	3	25	3	67	0.58	0.04

Table D-24 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of gull species (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	5	45	5	136	0.45	0.17	0	0	0	0	0.00	0.00	5	45	5	136	0.45	0.17
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	3	26	3	78	0.58	0.10	0	0	0	0	0.00	0.00	3	26	3	104	0.58	0.10

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	5	45	5	126	0.45	0.07	0	0	0	0	0.00	0.00	5	45	5	126	0.45	0.07
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	3	25	3	75	0.58	0.04	0	0	0	0	0.00	0.00	3	25	3	75	0.58	0.04

Table D-25 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of Sandwich tern (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	2	18	2	45	0.71	0.07	2	18	2	45	0.71	0.07	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	1	9	1	26	1.00	0.03	1	9	1	26	1.00	0.03	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	2	19	2	58	0.71	0.03	2	19	2	58	0.71	0.03	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	3	26	3	60	0.58	0.04	3	26	3	60	0.58	0.04	0	0	0	0	0.00	0.00
Sep-19	4	36	4	89	0.50	0.06	4	36	4	89	0.50	0.06	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	2	17	2	42	0.71	0.03	2	17	2	42	0.71	0.03	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

Table D-26 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of little tern (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	3	25	3	75	0.58	0.04	3	25	3	75	0.58	0.04	0	0	0	0	0.00	0.00

Table D-27 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of common tern (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	2	18	2	44	0.71	0.03	2	18	2	44	0.71	0.03	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	36	301	36	1005	0.17	0.46	36	301	36	854	0.17	0.46	0	0	0	0	0.00	0.00

Table D-28 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of common / Arctic ('commic') tern (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	2	19	2	56	0.71	0.07	2	19	2	56	0.71	0.07	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	1	9	1	26	1.00	0.03	1	9	1	26	1.00	0.03	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	1	10	1	39	1.00	0.02	1	10	1	29	1.00	0.02	0	0	0	0	0.00	0.00
May-19	6	58	6	163	0.41	0.09	6	58	6	173	0.41	0.09	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	5	45	5	107	0.45	0.07	5	45	5	107	0.45	0.07	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	8	68	8	135	0.35	0.10	8	68	17	144	0.35	0.10	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

Table D-29 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of guillemot (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	4	40	10	91	0.50	0.15	0	0	0	0	0.00	0.00	4	40	10	81	0.50	0.15
May-19	5	50	10	110	0.45	0.19	0	0	0	0	0.00	0.00	5	50	5	110	0.45	0.19
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	1	9	1	27	1.00	0.03	0	0	0	0	0.00	0.00	1	9	1	36	1.00	0.03
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	3	26	3	78	0.58	0.10	0	0	0	0	0.00	0.00	3	26	3	69	0.58	0.10

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density
Apr-19	18	176	88	273	0.24	0.27	0	0	0	0	0.00	0.00	18	176	98	273	0.24	0.27
May-19	7	67	19	134	0.38	0.10	0	0	0	0	0.00	0.00	7	67	19	125	0.38	0.10
Jun-19	1	10	1	29	1.00	0.02	0	0	0	0	0.00	0.00	1	10	1	29	1.00	0.02
Jul-19	5	44	9	97	0.45	0.07	0	0	0	0	0.00	0.00	5	44	9	88	0.45	0.07
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	15	127	42	228	0.26	0.19	0	0	0	0	0.00	0.00	15	127	51	228	0.26	0.19
Jun-20	6	50	8	109	0.41	0.08	0	0	0	0	0.00	0.00	6	50	8	109	0.41	0.08

Table D-30 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of razorbill (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	2	18	2	55	0.71	0.07	0	0	0	0	0.00	0.00	2	18	2	55	0.71	0.07
Aug-19	1	9	1	36	1.00	0.03	0	0	0	0	0.00	0.00	1	9	1	27	1.00	0.03
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	1	10	1	29	1.00	0.02	0	0	0	0	0.00	0.00	1	10	1	29	1.00	0.02
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	3	26	3	71	0.58	0.04	0	0	0	0	0.00	0.00	3	26	3	71	0.58	0.04
Aug-19	1	9	1	26	1.00	0.01	0	0	0	0	0.00	0.00	1	9	1	26	1.00	0.01
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	1	8	1	25	1.00	0.01	0	0	0	0	0.00	0.00	1	8	1	25	1.00	0.01
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

Table D-31 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of puffin (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	1	10	1	29	1.00	0.02	0	0	0	0	0.00	0.00	1	10	1	29	1.00	0.02
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

Table D-32 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of guillemot/razorbill (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	8	81	20	171	0.35	0.30	0	0	0	0	0.00	0.00	8	81	20	171	0.35	0.30
May-19	1	10	1	30	1.00	0.04	0	0	0	0	0.00	0.00	1	10	1	30	1.00	0.04
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	1	9	1	27	1.00	0.03	0	0	0	0	0.00	0.00	1	9	1	27	1.00	0.03
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	8	70	17	131	0.35	0.26	0	0	0	0	0.00	0.00	8	70	17	131	0.35	0.26
Nov-19	5	44	9	79	0.45	0.17	1	9	1	26	1.00	0.03	4	35	9	70	0.50	0.13
Dec-19	11	97	44	159	0.30	0.36	0	0	0	0	0.00	0.00	11	97	44	167	0.30	0.36
Jan-20	64	560	341	813	0.13	2.11	3	26	3	79	0.58	0.10	61	533	332	761	0.13	2.00
Feb-20	794	7215	5434	9060	0.04	27.14	19	173	55	327	0.23	0.65	775	7043	5370	8805	0.04	26.49
Mar-20	6	52	9	112	0.41	0.20	0	0	0	0	0.00	0.00	6	52	9	112	0.41	0.20
Apr-20	2	17	2	43	0.71	0.06	0	0	0	0	0.00	0.00	2	17	2	43	0.71	0.06
May-20	4	34	4	86	0.50	0.13	0	0	0	0	0.00	0.00	4	34	4	78	0.50	0.13
Jun-20	1	9	1	26	1.00	0.03	0	0	0	0	0.00	0.00	1	9	1	26	1.00	0.03

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density
Apr-19	12	117	39	225	0.29	0.18	0	0	0	0	0.00	0.00	12	117	49	215	0.29	0.18
May-19	3	29	3	67	0.58	0.04	0	0	0	0	0.00	0.00	3	29	3	67	0.58	0.04
Jun-19	1	10	1	29	1.00	0.02	0	0	0	0	0.00	0.00	1	10	1	29	1.00	0.02
Jul-19	2	18	2	44	0.71	0.03	0	0	0	0	0.00	0.00	2	18	2	44	0.71	0.03
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	15	127	59	203	0.26	0.19	3	25	3	68	0.58	0.04	12	101	42	177	0.29	0.15
Nov-19	26	221	102	365	0.20	0.34	8	68	8	161	0.35	0.10	18	153	68	280	0.24	0.23
Dec-19	29	242	125	409	0.19	0.37	0	0	0	0	0.00	0.00	29	242	125	401	0.19	0.37
Jan-20	122	1023	705	1401	0.09	1.57	5	42	5	101	0.45	0.06	117	981	663	1342	0.09	1.50
Feb-20	1882	16928	14455	19501	0.02	25.97	32	288	117	468	0.18	0.44	1850	16641	14086	19456	0.02	25.53
Mar-20	36	299	191	415	0.17	0.46	0	0	0	0	0.00	0.00	36	299	191	407	0.17	0.46
Apr-20	5	42	8	83	0.45	0.06	0	0	0	0	0.00	0.00	5	42	8	83	0.45	0.06
May-20	4	34	4	76	0.50	0.05	0	0	0	0	0.00	0.00	4	34	4	85	0.50	0.05
Jun-20	4	33	4	75	0.50	0.05	0	0	0	0	0.00	0.00	4	33	4	75	0.50	0.05

Table D-33 Raw count, mean abundance estimates, lower and upper 95 percent confidence interval (CI) abundance estimates, precision (Coefficient of Variance, CV) and mean density estimate of auk species (prior to apportionment and correction)

a) Rampion 2 array area

	All behaviours						Flying						Sitting					
Survey	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**	**Raw Count**	**Abundance**	**Lower CI**	**Upper CI**	**CV**	**Density**
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

b) Rampion 2 array area + 4km buffer

	All behaviours						Flying						Sitting					
Survey	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density	Raw Count	Abundance	Lower CI	Upper CI	CV	Density
Apr-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
May-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jul-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Aug-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Sep-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Oct-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Nov-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Dec-19	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jan-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Feb-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Mar-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Apr-20	1	8	1	25	1.00	0.01	0	0	0	0	0.00	0.00	1	8	1	25	1.00	0.01
May-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00
Jun-20	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0.00

Annex E Age Categories

Table E-1 Raw counts of fulmars by age classification across entire survey area

Survey	Adult	Juvenile	First winter	Second winter	Third winter	Fourth winter	First summer	Second summer	Third Summer	Fourth summer	Unknown
Apr-19	0	0	0	0	0	0	0	0	0	0	1
May-19	0	0	0	0	0	0	0	0	0	0	5
Jun-19	0	0	0	0	0	0	0	0	0	0	0
Jul-19	0	0	0	0	0	0	0	0	0	0	2
Aug-19	0	0	0	0	0	0	0	0	0	0	12
Sep-19	0	0	0	0	0	0	0	0	0	0	1
Oct-19	0	0	0	0	0	0	0	0	0	0	0
Nov-19	0	0	0	0	0	0	0	0	0	0	0
Dec-19	0	0	0	0	0	0	0	0	0	0	0
Jan-20	0	0	0	0	0	0	0	0	0	0	1
Feb-20	0	0	0	0	0	0	0	0	0	0	4
Mar-20	0	0	0	0	0	0	0	0	0	0	0
Apr-20	0	0	0	0	0	0	0	0	0	0	0

Survey	Adult	Juvenile	First winter	Second winter	Third winter	Fourth winter	First summer	Second summer	Third Summer	Fourth summer	Unknown
May-20	0	0	0	0	0	0	0	0	0	0	2
Jun-20	0	0	0	0	0	0	0	0	0	0	0

Table E-2 Raw counts of gannets by age classification across entire survey area

Survey	Adult	Juvenile	First winter	Second winter	Third winter	Fourth winter	First summer	Second summer	Third Summer	Fourth summer	Unknown
Apr-19	3	0	0	0	0	0	0	0	0	1	0
May-19	8	0	0	0	0	0	0	0	0	0	0
Jun-19	9	0	0	0	0	0	0	0	0	0	0
Jul-19	39	0	0	0	0	0	0	2	3	0	1
Aug-19	49	0	0	0	0	0	3	3	1	0	3
Sep-19	6	0	0	0	0	0	1	1	1	0	1
Oct-19	41	0	0	1	6	3	0	0	0	0	0
Nov-19	24	0	0	0	0	0	0	0	0	0	0
Dec-19	4	0	0	0	0	0	0	0	0	0	1
Jan-20	1	0	0	0	0	0	0	0	0	0	0
Feb-20	85	0	0	0	0	0	0	0	0	0	0

Survey	Adult	Juvenile	First winter	Second winter	Third winter	Fourth winter	First summer	Second summer	Third Summer	Fourth summer	Unknown
Mar-20	2	0	0	0	0	0	0	0	0	0	0
Apr-20	10	0	0	0	0	0	0	0	0	0	0
May-20	9	0	0	0	0	0	0	0	0	0	13
Jun-20	16	0	0	0	0	0	0	0	2	1	1

Table E-3 Raw counts of kittiwakes by age classification across entire survey area

Survey	Adult	Juvenile	First winter	Second winter	Third winter	Fourth winter	First summer	Second summer	Third Summer	Fourth summer	Unknown
Apr-19	1	0	0	0	0	0	0	0	0	0	0
May-19	2	0	0	0	0	0	0	0	0	0	0
Jun-19	0	0	0	0	0	0	0	0	0	0	0
Jul-19	6	0	0	0	0	0	0	0	0	0	0
Aug-19	0	0	0	0	0	0	0	0	0	0	0
Sep-19	0	0	0	0	0	0	0	0	0	0	0
Oct-19	7	0	0	0	0	0	0	0	0	0	0
Nov-19	41	0	0	0	0	0	0	0	0	0	0
Dec-19	6	0	0	0	0	0	0	0	0	0	0

Survey	Adult	Juvenile	First winter	Second winter	Third winter	Fourth winter	First summer	Second summer	Third Summer	Fourth summer	Unknown
Jan-20	8	0	0	0	0	0	0	0	0	0	8
Feb-20	148	0	6	0	0	0	0	0	0	0	177
Mar-20	1	0	0	0	0	0	0	0	0	0	5
Apr-20	0	0	0	0	0	0	0	0	0	0	0
May-20	0	0	0	0	0	0	0	0	0	0	0
Jun-20	2	0	0	0	0	0	0	0	0	0	18

Table E-4 Raw counts of little gulls by age classification across entire survey area

Survey	Adult	Juvenile	First winter	Second winter	Third winter	Fourth winter	First summer	Second summer	Third Summer	Fourth summer	Unknown
Apr-19	0	0	0	0	0	0	0	0	0	0	0
May-19	0	0	0	0	0	0	0	0	0	0	0
Jun-19	0	0	0	0	0	0	0	0	0	0	0
Jul-19	0	0	0	0	0	0	0	0	0	0	0
Aug-19	0	0	0	0	0	0	0	0	0	0	0
Sep-19	0	0	0	0	0	0	0	0	0	0	0
Oct-19	2	0	0	0	0	0	0	0	0	0	0

Survey	Adult	Juvenile	First winter	Second winter	Third winter	Fourth winter	First summer	Second summer	Third Summer	Fourth summer	Unknown
Nov-19	0	0	0	0	0	0	0	0	0	0	0
Dec-19	0	0	0	0	0	0	0	0	0	0	0
Jan-20	0	0	0	0	0	0	0	0	0	0	0
Feb-20	1	0	0	0	0	0	0	0	0	0	0
Mar-20	0	0	0	0	0	0	0	0	0	0	0
Apr-20	0	0	0	0	0	0	0	0	0	0	0
May-20	0	0	0	0	0	0	0	0	0	0	0
Jun-20	0	0	0	0	0	0	0	0	0	0	0

Table E-5 Raw counts of common gulls by age classification across entire survey area

Survey	Adult	Juvenile	First winter	Second winter	Third winter	Fourth winter	First summer	Second summer	Third Summer	Fourth summer	Unknown
Apr-19	0	0	0	0	0	0	0	0	0	0	0
May-19	0	0	0	0	0	0	0	0	0	0	0
Jun-19	0	0	0	0	0	0	0	0	0	0	0
Jul-19	0	0	0	0	0	0	0	0	0	0	0
Aug-19	0	0	0	0	0	0	0	0	0	0	0

Survey	Adult	Juvenile	First winter	Second winter	Third winter	Fourth winter	First summer	Second summer	Third Summer	Fourth summer	Unknown
Sep-19	0	0	0	0	0	0	0	0	0	0	0
Oct-19	0	0	0	0	0	0	0	0	0	0	0
Nov-19	38	0	5	0	0	0	0	0	0	0	1
Dec-19	2	0	1	0	0	0	0	0	0	0	0
Jan-20	0	0	0	0	0	0	0	0	0	0	0
Feb-20	152	0	2	0	0	0	0	0	0	0	200
Mar-20	11	0	1	0	0	0	0	0	0	0	3
Apr-20	0	0	0	0	0	0	0	0	0	0	0
May-20	0	0	0	0	0	0	0	0	0	0	0
Jun-20	0	0	0	0	0	0	0	0	0	0	0

Table E-6 Raw counts of great black-backed gulls by age classification across entire survey area

Survey	Adult	Juvenile	First winter	Second winter	Third winter	Fourth winter	First summer	Second summer	Third Summer	Fourth summer	Unknown
Apr-19	0	0	0	0	0	0	0	0	1	0	0
May-19	0	0	0	0	0	0	2	0	0	0	5
Jun-19	2	0	0	0	0	0	0	0	0	0	0

Survey	Adult	Juvenile	First winter	Second winter	Third winter	Fourth winter	First summer	Second summer	Third Summer	Fourth summer	Unknown
Jul-19	17	0	0	0	0	0	0	2	0	0	0
Aug-19	5	0	0	0	0	0	1	0	0	0	1
Sep-19	17	2	0	0	0	0	0	0	0	0	2
Oct-19	7	0	1	0	0	0	0	0	0	0	0
Nov-19	24	0	2	0	1	0	0	0	0	0	1
Dec-19	7	0	0	0	0	0	0	0	0	0	0
Jan-20	12	0	1	0	1	0	0	0	0	0	0
Feb-20	41	0	2	0	0	0	0	0	0	0	1
Mar-20	23	0	0	0	0	0	0	0	0	0	1
Apr-20	6	0	1	0	1	0	0	0	0	0	0
May-20	0	0	0	0	0	0	0	0	0	0	0
Jun-20	0	0	0	0	0	0	0	0	0	0	0

Table E-7 Raw counts of herring gulls by age classification across entire survey area

Survey	Adult	Juvenile	First winter	Second winter	Third winter	Fourth winter	First summer	Second summer	Third Summer	Fourth summer	Unknown
Apr-19	6	0	0	0	0	0	0	0	0	0	3

Survey	Adult	Juvenile	First winter	Second winter	Third winter	Fourth winter	First summer	Second summer	Third Summer	Fourth summer	Unknown
May-19	6	0	0	0	0	0	0	1	0	0	4
Jun-19	42	0	0	0	0	0	0	1	4	0	0
Jul-19	148	0	0	0	0	0	1	0	0	0	2
Aug-19	5	0	0	0	0	0	0	0	0	0	3
Sep-19	0	0	0	0	0	0	0	0	0	0	0
Oct-19	0	0	1	0	0	0	0	0	0	0	0
Nov-19	41	0	1	6	3	0	0	0	0	0	6
Dec-19	4	0	0	3	0	1	0	0	0	0	7
Jan-20	4	0	0	3	0	0	0	0	0	0	0
Feb-20	107	0	14	11	0	0	0	0	0	0	135
Mar-20	26	0	1	0	1	0	0	0	0	0	34
Apr-20	2	0	2	2	0	0	0	0	0	0	3
May-20	38	0	0	0	0	0	0	5	3	0	218
Jun-20	12	0	0	0	0	0	0	0	0	0	66

Table E-8 Raw counts of lesser black-backed gulls by age classification across entire survey area

Survey	Adult	Juvenile	First winter	Second winter	Third winter	Fourth winter	First summer	Second summer	Third Summer	Fourth summer	Unknown
Apr-19	0	0	0	0	0	0	0	0	0	0	0
May-19	0	0	0	0	0	0	0	0	0	0	0
Jun-19	1	0	0	0	0	0	0	0	0	0	0
Jul-19	0	0	0	0	0	0	0	0	0	0	1
Aug-19	0	1	0	0	0	0	0	0	0	0	0
Sep-19	1	0	0	0	0	0	0	0	0	0	0
Oct-19	0	0	0	0	0	0	0	0	0	0	1
Nov-19	2	0	0	0	0	0	0	0	0	0	0
Dec-19	0	0	0	0	0	0	0	0	0	0	0
Jan-20	0	0	0	0	0	0	0	0	0	0	0
Feb-20	1	0	0	0	0	0	0	0	0	0	3
Mar-20	4	0	0	0	0	0	0	0	0	0	2
Apr-20	5	0	0	0	0	0	0	0	0	0	1
May-20	5	0	0	0	0	0	0	0	2	0	6
Jun-20	2	0	0	0	0	0	0	0	0	0	0

Table E-9 Raw counts of 'commic' terns by age classification across entire survey area

Survey	Adult	Juvenile	First winter	Second winter	Third winter	Fourth winter	First summer	Second summer	Third Summer	Fourth summer	Unknown
Apr-19	0	0	0	0	0	0	0	0	0	0	19
May-19	0	0	0	0	0	0	0	0	0	0	6
Jun-19	0	0	0	0	0	0	0	0	0	0	0
Jul-19	0	0	0	0	0	0	0	0	0	0	0
Aug-19	0	0	0	0	0	0	0	0	0	0	0
Sep-19	0	0	0	0	0	0	0	0	0	0	5
Oct-19	0	0	0	0	0	0	0	0	0	0	0
Nov-19	0	0	0	0	0	0	0	0	0	0	0
Dec-19	0	0	0	0	0	0	0	0	0	0	0
Jan-20	0	0	0	0	0	0	0	0	0	0	0
Feb-20	0	0	0	0	0	0	0	0	0	0	0
Mar-20	0	0	0	0	0	0	0	0	0	0	0
Apr-20	0	0	0	0	0	0	0	0	0	0	0
May-20	0	0	0	0	0	0	0	0	0	0	10
Jun-20	0	0	0	0	0	0	0	0	0	0	0

Table E-10 Raw counts of guillemot by age classification across entire survey area

Survey	Adult	Juvenile	First winter	Second winter	Third winter	Fourth winter	First summer	Second summer	Third Summer	Fourth summer	Unknown
Apr-19	0	0	0	0	0	0	0	0	0	0	25
May-19	0	0	0	0	0	0	0	0	0	0	8
Jun-19	0	0	0	0	0	0	0	0	0	0	1
Jul-19	0	0	0	0	0	0	0	0	0	0	5
Aug-19	0	0	0	0	0	0	0	0	0	0	0
Sep-19	0	0	0	0	0	0	0	0	0	0	0
Oct-19	0	0	0	0	0	0	0	0	0	0	0
Nov-19	0	0	0	0	0	0	0	0	0	0	0
Dec-19	0	0	0	0	0	0	0	0	0	0	0
Jan-20	0	0	0	0	0	0	0	0	0	0	0
Feb-20	0	0	0	0	0	0	0	0	0	0	0
Mar-20	0	0	0	0	0	0	0	0	0	0	0
Apr-20	0	0	0	0	0	0	0	0	0	0	0
May-20	0	0	0	0	0	0	0	0	0	0	15
Jun-20	0	0	0	0	0	0	0	0	0	0	8

Table E-11 Raw counts of razorbill by age classification across entire survey area

Survey	Adult	Juvenile	First winter	Second winter	Third winter	Fourth winter	First summer	Second summer	Third Summer	Fourth summer	Unknown
Apr-19	0	0	0	0	0	0	0	0	0	0	0
May-19	0	0	0	0	0	0	0	0	0	0	1
Jun-19	0	0	0	0	0	0	0	0	0	0	0
Jul-19	0	0	0	0	0	0	0	0	0	0	4
Aug-19	0	0	0	0	0	0	0	0	0	0	1
Sep-19	0	0	0	0	0	0	0	0	0	0	0
Oct-19	0	0	0	0	0	0	0	0	0	0	4
Nov-19	0	0	0	0	0	0	0	0	0	0	0
Dec-19	0	0	0	0	0	0	0	0	0	0	0
Jan-20	0	0	0	0	0	0	0	0	0	0	0
Feb-20	0	0	0	0	0	0	0	0	0	0	0
Mar-20	0	0	0	0	0	0	0	0	0	0	0
Apr-20	0	0	0	0	0	0	0	0	0	0	3
May-20	0	0	0	0	0	0	0	0	0	0	0
Jun-20	0	0	0	0	0	0	0	0	0	0	0

4.12.2

Rampion 2 WIND FARM

Volume 4, Appendix 12.2

Offshore ornithology displacement analysis

GoBe

wood.

Contents

1. Introduction

This section outlines the proposed development and the need for displacement analysis to inform the environmental impact assessment (EIA).

1.1 Purpose of this report

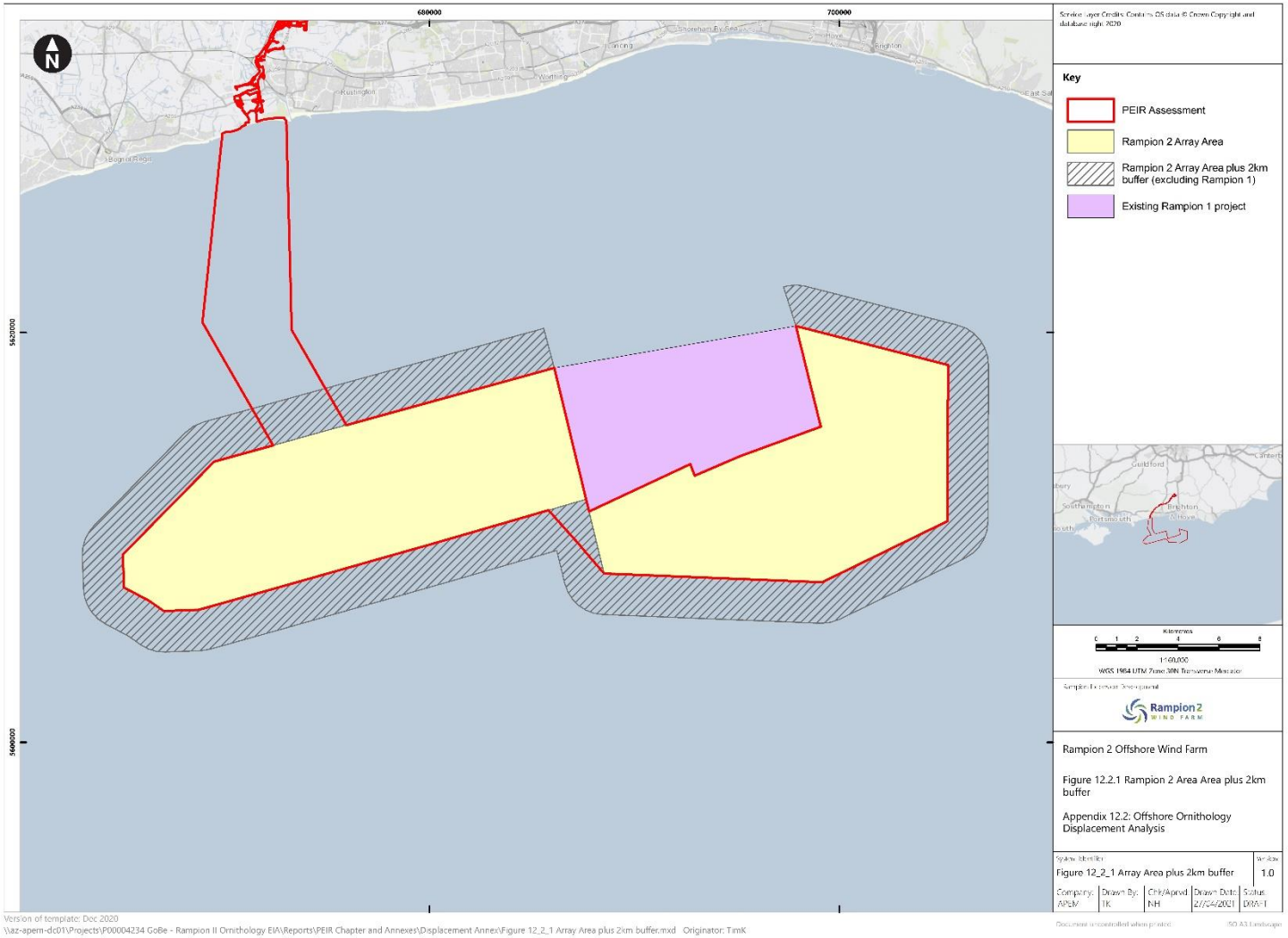
1.1.1 This report has been produced for the purpose of describing the displacement analysis methodology and results, which form part of the EIA for the proposed Rampion 2 Offshore Wind Farm. This report provides supporting information to **Chapter 12: Offshore and intertidal ornithology, Volume 2**.

1.2 Project background

1.2.1 Rampion Extension Development (RED; 'the Applicant') is proposing to develop the Rampion 2 Offshore Wind Farm ('Rampion 2'). Rampion 2 will be sited adjacent to the existing Rampion Offshore Wind Farm, located in the English Channel, 14 kilometres (km) off the coast of Brighton & Hove and approximately 30km east of the Isle of Wight. For the purposes of clarification, in this document, the existing Rampion Offshore Wind Farm is referred to as 'Rampion 1' hereon in to enable clear differentiation with Rampion 2. The existing Rampion 1 project was developed following award of Zone 6 in the United Kingdom Round 3 offshore wind development leasing round run by The Crown Estate (TCE) in 2009 and occupies 78 square kilometres (km^2) Rampion 2 will comprise both offshore and onshore infrastructure including offshore wind turbine generators (WTGs) and associated foundations and inter-array cabling, offshore substations, offshore export cables within a defined cable corridor, a landfall site, and an onshore substation for connection to the electricity transmission network. The offshore element of Rampion 2 will be located within an area adjacent to the west and south east of the existing Rampion 1 project, together with a small link or 'bridge' area between the two areas for cabling. The location of Rampion 2 is illustrated in **Graphic 2-1**. The Preliminary Environmental Information Report (PEIR) Assessment Boundary combines the assessment boundaries for the onshore and offshore infrastructure.

1.2.2 APEM Ltd (hereafter APEM) was commissioned to undertake a study of offshore and intertidal ornithology that characterise the area that may be influenced by Rampion 2. A separate report (**Appendix 12.1: Offshore and Intertidal Ornithology Baseline Technical Report**) provides the findings from offshore and intertidal ornithology data to determine the receptors that characterise the baseline and are of relevance to the assessment of potential impacts from Rampion 2. This technical appendix has been produced to support **Chapter 12, Volume 2**.

Graphic 2-1 Rampion 2 array area and 2km buffer used for displacement analysis



1.3 Displacement analysis

1.3.1 The presence of WTGs has the potential to directly disturb and displace seabirds that would normally reside within and around the area of sea where Rampion 2 is proposed. This in effect represents indirect habitat loss, potentially reducing the area available for those seabirds sensitive to disturbance to forage, loaf and/or moult in the way that they are currently able to within and around the Rampion 2 area. There is also the potential for the construction and decommissioning of WTGs, substations and cable laying to directly disturb and displace seabirds, though the nature of such potential impacts is more restricted spatially and temporally by virtue of the nature of those phases of the development.

1.4 Species of interest

1.4.1 Following consultation with Natural England and the Royal Society for the Protection of Birds (RSPB) through the Evidence Plan process (EPP), the following species were identified as the 'key' species for inclusion in this Rampion 2 disturbance and displacement assessment (Expert Topic Group (ETG) Meeting 18 September 2020):

- gannet (*Morus bassanus*);
- guillemot (*Uria aalge*); and
- razorbill (*Alca torda*).

1.4.2 This appendix presents the baseline data on the three key species screened in for the assessment of potential disturbance and displacement as a result of the construction, operation, and decommissioning phases of Rampion 2.

1.5 Displacement buffers

1.5.1 The main assessment on disturbance and displacement is found within **Chapter 12, Volume 2**. The scale of the potential displacement applied in this report is in response to guidance in the literature (Statutory Nature Conservation Bodies (SNCB), 2017) and comments received from Natural England and the RSPB through the EPP (ETG Meeting 18 September 2020).

1.5.2 Following the same generic guidance (SNCB, 2017), this report presents displacement matrices that consider gannet, guillemot and razorbill. These matrices present abundances for gannet within the Rampion 2 array area only and for guillemot and razorbill within the Rampion 2 array area plus a 2km buffer. Presenting displacement for the array area only for gannet and for the array area plus a 2km buffer for guillemot and razorbill follows the evidence-led approach as detailed in **Chapter 12, Volume 2**.

1.6 Data sources for displacement matrices

1.6.1 The data contributing to this appendix are from the first 15 months of aerial digital surveys (April 2019 to June 2020) conducted by APEM of the Rampion 2 site plus

a 4km buffer. Full details of the site-specific surveys can be found in **Appendix 12.1, Volume 4.** These data are inclusive of apportionment of unidentified birds and corrections for availability bias, where appropriate.

Displacement matrices are presented for each of the three species (gannet, guillemot and razorbill) representing the array area and the array area plus 2km buffer, where appropriate, separately for each bio-season. For the two auk species, only "sitting" birds (which includes birds observed diving, landing and taking off) were included in the displacement analysis. For gannets, all birds (flying and sitting) were included. Note that barrier effects are considered separately in **Chapter 12, Volume 2**.

Presentation of displacement by bio-seasons

1.6.2 Bio-seasons are based on Furness (2015) for all species in this analysis. The bio-seasons used for each species and the constituent months are presented in **Table 1-1**.

1.6.3 In order to provide a more visual approach to presenting data on the species considered for disturbance and displacement within the tables contained in this report, a colour coding has been used to represent different bio-seasons and combined / extended bio-seasons. For each species, the months defining each bio-season are different; the number of bio-seasons also varies between species. The colours used to define the bio-seasons are presented in **Table 1-1**.

Table 1-1 Bio-season colour coding

Bio-season	Gannet	Guillemot	Razorbill
Return Migration (Green)	December to March	N/A	January to March
Migration-free Breeding (Purple)	April to August	N/A	April to July
Post-breeding Migration (Red)	September to November	N/A	August to October
Migration-free Winter (Grey/Blue)	N/A	N/A	November to December
Extended Breeding (Pink)	N/A	March to July	N/A
Extended Non-breeding (Yellow)	N/A	August to February	N/A

Bio-season mean peak

1.6.4 As per SNCB (2017) guidance, displacement assessment is based on bio-season mean peak abundances. The peak abundance within a bio-season is the highest recorded abundance from surveys within a single bio-season. Mean peak abundance is the mean of peak abundances for each bio-season across years.

Note that, as described in **Section 1.6**, the data for this analysis are based on 15 monthly surveys and so most bio-seasons for each species are only represented by a single peak abundance. The bio-season mean peak abundances used for these analyses are presented in **Table 1-2**.

Table 1-2 Bio-season mean peak abundances used for displacement assessment (array area only for gannet; array area plus 2km buffer for guillemot and razorbill).

Bio-season	**Mean Peak Abundance**		
	Gannet	**Guillemot**	**Razorbill**
Return Migration	45	N/A	2,130
Migration-free Breeding	98	N/A	44
Post-breeding Migration	78	N/A	18
Migration-free Winter	N/A	N/A	22
Breeding	N/A	185	N/A
Non-breeding	N/A	13,020	N/A

2. Results

2.1 Gannet displacement matrices

Table 2-1 Gannet return migration displacement matrix (based on abundance of 45 for Rampion 2 array area only)

Displacement (percent)	Mortality Rates (percent)															
	0	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	1	1	2	2	3	3	4	4	5
20	0	0	0	0	0	0	1	2	3	4	5	5	6	7	8	9
30	0	0	0	0	1	1	1	3	4	5	7	8	9	11	12	14
40	0	0	0	1	1	1	2	4	5	7	9	11	13	14	16	18
50	0	0	0	1	1	1	2	5	7	9	11	14	16	18	20	23
60	0	0	1	1	1	1	3	5	8	11	14	16	19	22	24	27
70	0	0	1	1	1	2	3	6	9	13	16	19	22	25	28	32
80	0	0	1	1	1	2	4	7	11	14	18	22	25	29	32	36
90	0	0	1	1	2	2	4	8	12	16	20	24	28	32	36	41
100	0	0	1	1	2	2	5	9	14	18	23	27	32	36	41	45

Table 2.2 Gannet migration-free breeding displacement matrix (based on abundance of 98 for Rampion 2 array area only)

Displacement (percent)	Mortality Rates (percent)															
	0	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
10	0	0	0	0	0	0	1	2	3	4	5	6	7	8	9	10
20	0	0	0	1	1	1	2	4	6	8	10	12	14	16	18	20
30	0	0	1	1	1	1	3	6	9	12	15	18	21	24	26	29
40	0	0	1	1	2	2	4	8	12	16	20	24	27	31	35	39
50	0	0	1	1	2	2	5	10	15	20	25	29	34	39	44	49
60	0	1	1	2	2	3	6	12	18	24	29	35	41	47	53	59
70	0	1	1	2	3	3	7	14	21	27	34	41	48	55	62	69
80	0	1	2	2	3	4	8	16	24	31	39	47	55	63	71	78
90	0	1	2	3	4	4	9	18	26	35	44	53	62	71	79	88
100	0	1	2	3	4	5	10	20	29	39	49	59	69	78	88	98

Table 2.3 Gannet post-breeding migration displacement matrix (based on abundance of 78 for Rampion 2 array area only)

Displacement (percent)	Mortality Rates (percent)															
	0	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
10	0	0	0	0	0	0	1	2	2	3	4	5	5	6	7	8
20	0	0	0	0	1	1	2	3	5	6	8	9	11	12	14	16
30	0	0	0	1	1	1	2	5	7	9	12	14	16	19	21	23
40	0	0	1	1	1	2	3	6	9	12	16	19	22	25	28	31
50	0	0	1	1	2	2	4	8	12	16	20	23	27	31	35	39
60	0	0	1	1	2	2	5	9	14	19	23	28	33	37	42	47
70	0	1	1	2	2	3	5	11	16	22	27	33	38	44	49	55
80	0	1	1	2	2	3	6	12	19	25	31	37	44	50	56	62
90	0	1	1	2	3	4	7	14	21	28	35	42	49	56	63	70
100	0	1	2	2	3	4	8	16	23	31	39	47	55	62	70	78

2.2 Guillemot displacement matrices

Table 2.4 Guillemot breeding displacement matrix (based on abundance of 185 for Rampion 2 array area plus 2km buffer)

Displacement (percent)	Mortality Rates (percent)															
	0	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	2	2
10	0	0	0	1	1	1	2	4	6	7	9	11	13	15	17	18
20	0	0	1	1	1	2	4	7	11	15	18	22	26	30	33	37
30	0	1	1	2	2	3	6	11	17	22	28	33	39	44	50	55
40	0	1	1	2	3	4	7	15	22	30	37	44	52	59	66	74
50	0	1	2	3	4	5	9	18	28	37	46	55	65	74	83	92
60	0	1	2	3	4	6	11	22	33	44	55	66	78	89	100	111
70	0	1	3	4	5	6	13	26	39	52	65	78	90	103	116	129
80	0	1	3	4	6	7	15	30	44	59	74	89	103	118	133	148
90	0	2	3	5	7	8	17	33	50	66	83	100	116	133	150	166
100	0	2	4	6	7	9	18	37	55	74	92	111	129	148	166	185

Table 2.5 Guillemot non-breeding displacement matrix (based on abundance of 13,020 for Rampion 2 array area plus 2km buffer)

Displacement (percent)	Mortality Rates (percent)															
	0	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	3	4	5	7	13	26	39	52	65	78	91	104	117	130
10	0	13	26	39	52	65	130	260	391	521	651	781	911	1,042	1,172	1,302
20	0	26	52	78	104	130	260	521	781	1,042	1,302	1,562	1,823	2,083	2,344	2,604
30	0	39	78	117	156	195	391	781	1,172	1,562	1,953	2,344	2,734	3,125	3,515	3,906
40	0	52	104	156	208	260	521	1,042	1,562	2,083	2,604	3,125	3,646	4,166	4,687	5,208
50	0	65	130	195	260	325	651	1,302	1,953	2,604	3,255	3,906	4,557	5,208	5,859	6,510
60	0	78	156	234	312	391	781	1,562	2,344	3,125	3,906	4,687	5,468	6,249	7,031	7,812
70	0	91	182	273	365	456	911	1,823	2,734	3,646	4,557	5,468	6,380	7,291	8,202	9,114
80	0	104	208	312	417	521	1,042	2,083	3,125	4,166	5,208	6,249	7,291	8,333	9,374	10,416
90	0	117	234	352	469	586	1,172	2,344	3,515	4,687	5,859	7,031	8,202	9,374	10,546	11,718
100	0	130	260	391	521	651	1,302	2,604	3,906	5,208	6,510	7,812	9,114	10,416	11,718	13,020

2.3 Razorbill displacement matrices

Table 2.6 Razorbill return migration displacement matrix (based on abundance of 2,130 for Rampion 2 array area plus 2km buffer)

Displacement (percent)	Mortality Rates (percent)															
	0	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	1	1	1	2	4	6	9	11	13	15	17	19	21
10	0	2	4	6	9	11	21	43	64	85	106	128	149	170	192	213
20	0	4	9	13	17	21	43	85	128	170	213	256	298	341	383	426
30	0	6	13	19	26	32	64	128	192	256	319	383	447	511	575	639
40	0	9	17	26	34	43	85	170	256	341	426	511	596	681	767	852
50	0	11	21	32	43	53	106	213	319	426	532	639	745	852	958	1,065
60	0	13	26	38	51	64	128	256	383	511	639	767	894	1,022	1,150	1,278
70	0	15	30	45	60	75	149	298	447	596	745	894	1,044	1,193	1,342	1,491
80	0	17	34	51	68	85	170	341	511	681	852	1,022	1,193	1,363	1,533	1,704
90	0	19	38	57	77	96	192	383	575	767	958	1,150	1,342	1,533	1,725	1,917
100	0	21	43	64	85	106	213	426	639	852	1,065	1,278	1,491	1,704	1,917	2,130

Table 2.7 Razorbill migration-free breeding displacement matrix (based on abundance of 44 for Rampion 2 array area plus 2km buffer)

Displacement (percent)	Mortality Rates (percent)															
	0	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	1	1	2	2	3	3	4	4	4
20	0	0	0	0	0	0	1	2	3	4	4	5	6	7	8	9
30	0	0	0	0	1	1	1	3	4	5	7	8	9	11	12	13
40	0	0	0	1	1	1	2	4	5	7	9	11	12	14	16	18
50	0	0	0	1	1	1	2	4	7	9	11	13	16	18	20	22
60	0	0	1	1	1	1	3	5	8	11	13	16	19	21	24	27
70	0	0	1	1	1	2	3	6	9	12	16	19	22	25	28	31
80	0	0	1	1	1	2	4	7	11	14	18	21	25	28	32	36
90	0	0	1	1	2	2	4	8	12	16	20	24	28	32	36	40
100	0	0	1	1	2	2	4	9	13	18	22	27	31	36	40	44

Table 2.8 Razorbill post-breeding migration displacement matrix (based on abundance of 18 for Rampion 2 array area plus 2km buffer)

Displacement (percent)	Mortality Rates (percent)															
	0	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	1	1	1	1	1	1	2	2
20	0	0	0	0	0	0	0	1	1	1	2	2	3	3	3	4
30	0	0	0	0	0	0	1	1	2	2	3	3	4	4	5	5
40	0	0	0	0	0	0	1	1	2	3	4	4	5	6	6	7
50	0	0	0	0	0	0	1	2	3	4	4	5	6	7	8	9
60	0	0	0	0	0	1	1	2	3	4	5	6	8	9	10	11
70	0	0	0	0	1	1	1	3	4	5	6	8	9	10	11	13
80	0	0	0	0	1	1	1	3	4	6	7	9	10	11	13	14
90	0	0	0	0	1	1	2	3	5	6	8	10	11	13	15	16
100	0	0	0	1	1	1	2	4	5	7	9	11	13	14	16	18

Table 2.9 Razorbill migration-free winter displacement matrix (based on abundance of 22 for Rampion 2 array area plus 2km buffer)

Displacement (percent)	Mortality Rates (percent)															
	0	1	2	3	4	5	10	20	30	40	50	60	70	80	90	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	1	1	1	1	2	2	2	2
20	0	0	0	0	0	0	0	1	1	2	2	3	3	4	4	4
30	0	0	0	0	0	0	1	1	2	3	3	4	5	5	6	7
40	0	0	0	0	0	0	1	2	3	4	4	5	6	7	8	9
50	0	0	0	0	0	1	1	2	3	4	6	7	8	9	10	11
60	0	0	0	0	1	1	1	3	4	5	7	8	9	11	12	13
70	0	0	0	0	1	1	2	3	5	6	8	9	11	13	14	16
80	0	0	0	1	1	1	2	4	5	7	9	11	13	14	16	18
90	0	0	0	1	1	1	2	4	6	8	10	12	14	16	18	20
100	0	0	0	1	1	1	2	4	7	9	11	13	16	18	20	22

2.4 Glossary of terms and abbreviations

Table 2-10 Glossary of terms and abbreviations

Term (acronym)	Definition
APEM	APEM Limited
Baseline	Refers to existing conditions as represented by latest available survey and other data which is used as a benchmark for making comparisons to assess the impact of development.
Bio-season	Biological Season
Environmental Impact Assessment (EIA)	The process of evaluating the likely significant environmental effects of a proposed project or development over and above the existing circumstances (or 'baseline').
Evidence Plan Process (EPP)	A voluntary consultation process with specialist stakeholders to agree the approach and the information required to support the EIA and HRA for certain aspects.
Impact	The changes resulting from an action.
km	Kilometre
km^2	Square Kilometre
Likely Significant Effects	It is a requirement of Environmental Impact Assessment Regulations to determine the likely significant effects of the Proposed Development on the environment which should relate to the level of an effect and the type of effect.
PEIR Assessment Boundary	The PEIR Assessment Boundary combines the search areas for the offshore and onshore infrastructure associated with the Proposed Development. It is defined as the area within which the Proposed Development and associated infrastructure will be located, including the temporary and permanent construction and operational work areas.
Preliminary Environmental Information Report (PEIR)	The written output of the Environmental Impact Assessment undertaken to date for the Proposed Development. It is developed to support formal consultation and presents the preliminary findings of the assessment to allow an informed view to be developed of the Proposed Development, the assessment approach that has been undertaken, and the preliminary conclusions on the likely significant effects of the Proposed Development and environmental measures proposed.

Term (acronym)	Definition
Proposed Development	The development that is subject to the application for development consent, as described in Chapter 4.
Rampion 1	The existing Rampion Offshore Wind Farm located in the English Channel in off the south coast of England.
Receptor	These are as defined in Regulation 5(2) of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 and include population and human health, biodiversity, land, soil, water, air, climate, material assets, cultural heritage and landscape that may be at risk from exposure to pollutants which could potentially arise as a result of the Proposed Development.
RED	Rampion Extension Development Ltd. (The Applicant)
RSPB	Royal Society for the Protection of Birds
Scoping Opinion	A Scoping Opinion is adopted by the Secretary of State for a Proposed Development.
Scoping Report	A report that presents the findings of an initial stage in the Environmental Impact Assessment process.
Significance	A measure of the importance of the environmental effect, defined by criteria specific to the environmental aspect.
Significant effects	It is a requirement of the EIA Regulations to determine the likely significant effects of the development on the environment which should relate to the level of an effect and the type of effect. Where possible significant effects should be mitigated.
SNCB	Statutory Nature Conservation Body
TCE	The Crown Estate
The Proposed Development / Rampion 2	The onshore and offshore infrastructure associated with the offshore wind farm comprising of installed capacity of up to 1,200MW, located in the English Channel in off the south coast of England.
WTG	Wind Turbine Generator

3. References

Furness, R.W. (2015). Non-breeding season populations of seabirds in UK waters; Population sizes for Biologically Defined Minimum Population Scales (BDMPS). Natural England Commissioned Reports, Number 164.

Statutory Nature Conservation Bodies (SCNB). (2017). Advice on how to present assessment information on the extent and potential consequences of seabird displacement from Offshore Wind Farm developments.

4.12.3

Rampion 2 WIND FARM

Volume 4, Appendix 12.3

Offshore ornithology collision risk modelling

GoBe wood.

Contents

1. Introduction

This section outlines the proposed development and the need for collision risk modelling to inform the environmental impact assessment (EIA).

1.1 Purpose of this report

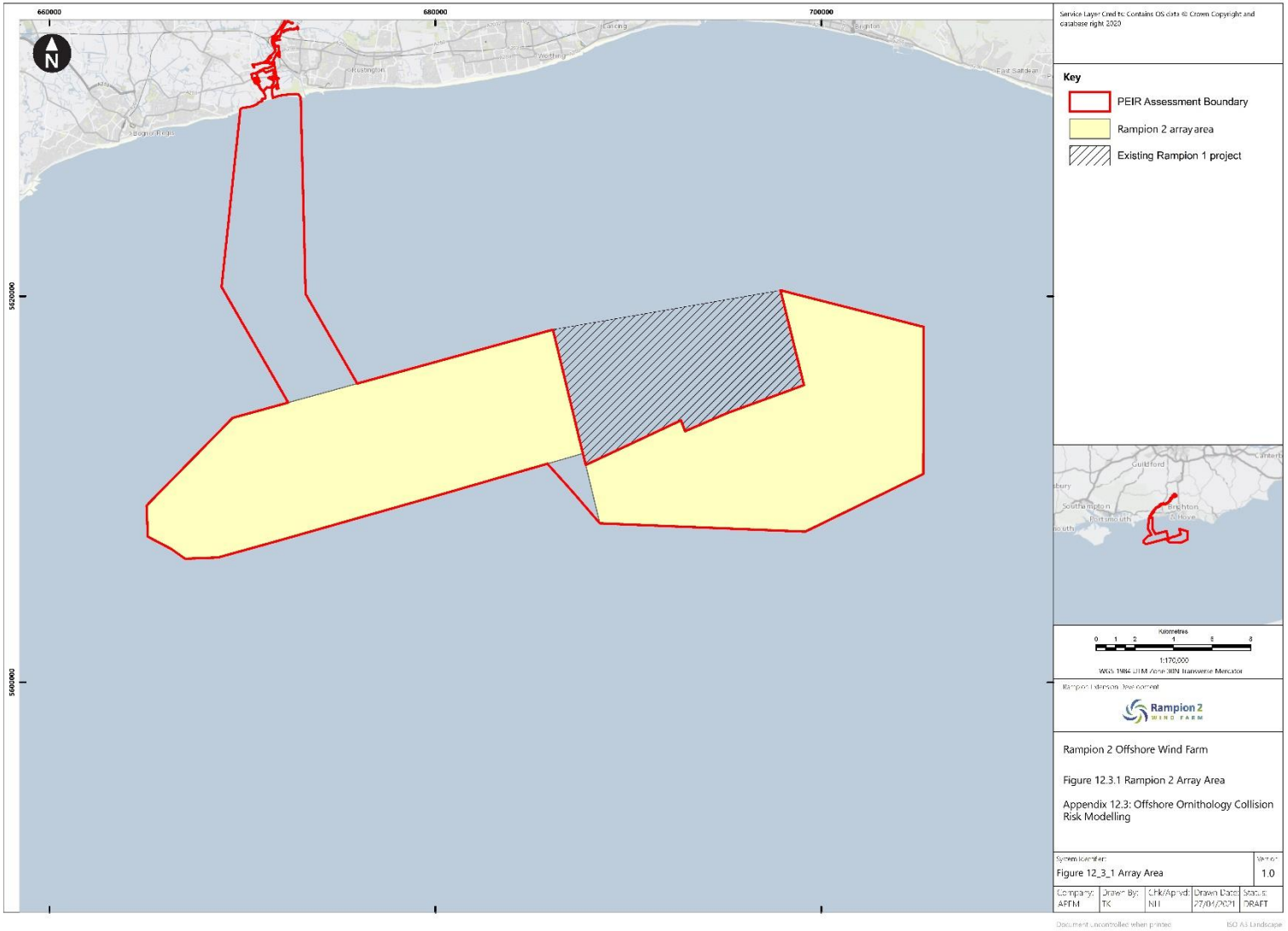
1.1.1 This report has been produced for the purpose of describing the collision risk modelling methodology and presenting the results, which form part of the EIA for the proposed Rampion 2 offshore wind farm. This report provides supporting information to **Chapter 12: Offshore and intertidal ornithology, Volume 2**.

1.2 Project background

1.2.1 Rampion Extension Development (RED; 'the Applicant') is proposing to develop the Rampion 2 Offshore Wind Farm ('Rampion 2'). Rampion 2 will be sited adjacent to the existing Rampion Offshore Wind Farm, located in the English Channel, 14 kilometre (km) off the coast of Brighton & Hove and approximately 30km east of the Isle of Wight. For the purposes of clarification, in this document, the existing Rampion Offshore Wind Farm is referred to as 'Rampion 1' hereon in to enable clear differentiation with Rampion 2. The existing Rampion 1 project was developed following award of Zone 6 in the United Kingdom Round 3 offshore wind development leasing round run by The Crown Estate (TCE) in 2009 and occupies 78 square kilometres (km^2).Rampion 2 will comprise both offshore and onshore infrastructure including offshore wind turbine generators (WTGs) and associated foundations and inter-array cabling, offshore substations, offshore export cables within a defined cable corridor, a landfall site, and an onshore substation for connection to the electricity transmission network. The offshore element of Rampion 2 will be located within an area adjacent to the west and south east of the existing Rampion 1 project, together with a small link or 'bridge' area between the two areas for cabling. The location of Rampion 2 is illustrated in **Graphic 1-1**. The Preliminary Environmental Information Report (PEIR) Assessment Boundary combines the assessment boundaries for the onshore and offshore infrastructure.

1.2.2 APEM Ltd (hereafter APEM) was commissioned to undertake a study of offshore and intertidal ornithology that characterise the area that may be influenced by Rampion 2. A separate report (**Appendix 12.1: Offshore and intertidal ornithology baseline technical report**) provides the findings from offshore and intertidal ornithology data to determine the receptors that characterise the baseline and are of relevance to the assessment of potential impacts from Rampion 2. This technical appendix has been produced to support **Chapter 12, Volume 2**.

Graphic 1-1 Rampion 2 PEIR Assessment Boundary and array area



1.3 Collision risk modelling (CRM)

1.3.1 There is potential risk to birds from offshore wind farms through collision with WTGs and associated infrastructure. There is an increase in potential risk of collision with WTGs if they are located in areas of high bird densities in which there is a high level of flight activity. That high level of flight activity can be associated with locations where food supplies are concentrated or with areas where there is a high turnover of individuals (possibly commuting daily between nesting and feeding areas or passing through the area on seasonal migrations). The potential collision risk can be estimated using collision risk modelling (CRM).

1.3.2 A screening exercise to determine species requiring CRM was carried as, as presented in **Section 12.13** of **Chapter 12, Volume 2**. The list of species and the approach to CRM have been presented to Natural England and other stakeholders through the Evidence Plan Process (EPP) (Expert Topic Group (ETG) Meeting 18 September 2020).

1.3.3 CRM has been carried out for Rampion 2 to provide information for nine seabird species or species groups of interest identified as potentially at risk and of interest for impact assessment:

- gannet (*Morus bassanus*);
- kittiwake (*Rissa tridactyla*);
- common gull (*Larus canus*);
- little gull (*Hydrocoloeus minutus*);
- lesser black-backed gull (*Larus fuscus*);
- herring gull (*Larus argentatus*);
- great black-backed gull (*Larus marinus*);
- common / Arctic ('commic') tern (*Sterna hirundo* / *S. paradisaea*); and
- Sandwich tern (*Thalasseus sandvicensis*).

1.3.4 Due to the difficulty in distinguishing common and Arctic terns from aerial surveys, the majority of individuals observed were recorded as 'commic' terns. Furthermore, common and Arctic terns are biologically similar, with similar biometrics and flight behaviours, so are likely to be exposed to similar collision risk. Therefore, CRM has been carried for 'commic' terns as a species group.

1.3.5 CRM was undertaken using the Stochastic Collision Risk Model (sCRM), developed by Marine Scotland (Donovan, 2018), run deterministically for each seabird species, to determine the risk of collision for these nine seabird species/species groups when in flight. The sCRM was accessed via the 'Shiny App' interface, which is a user-friendly graphical user interface accessible via a standard web-browser that uses an R code to estimate collision risk. The advantages of using the Shiny App are that users are not required to use any R code, are not required to install or maintain R, updates to the model are made directly to the server so are immediately programmed to users, and it is publicly available and free to access (Donovan, 2018). Unlike the Band 2012 CRM model

the sCRM also provides a clear and transparent audit trail for all modelling runs, which enables regulators to easily assess and reproduce the results of any modelling scenario. A full report on the sCRM was published by Marine Scotland in 2018 to accompany the user guide (McGregor *et al*., 2018).

2. Methodology

This section describes the method used in CRM.

2.1 Guidance and models

Overview

2.1.1 The user guide for the sCRM Shiny App provided by Marine Scotland (Donovan, 2018) has been followed for the modelling and assessment of impacts predicted for Rampion 2.

2.1.2 The parameters used in the CRM are presented in **Section 2.2**. A screening process was carried out based on the available data and following the precautionary principle (see **Section 12.13** of **Chapter 12, Volume 2**) which resulted in nine species been screened in for CRM assessment**.** The species selected were gannet, kittiwake, common gull, little gull, lesser black-backed gull, herring gull, great black-backed gull, 'commic' tern and Sandwich tern.

2.1.3 Within this report, the Shiny App audit trail for a single Band Option is presented, as described in the following sections.

2.1.4 Currently, no site-specific flight height data are available for any species and therefore it was not possible to undertake CRM using Band Option 1. Therefore, only CRM using Band Option 2, which relies on generic flight height data, are presented in this report. On receipt of the full 24 months of aerial digital survey data, a further review of site-specific flight height data will be undertaken to consider if any species could be run through Band Option 1 also. Band Option 1 follows the same approach as Band Option 2 (described in detail below) except using site-specific flight height data rather than published literature to determine the proportion of birds at potential collision height (PCH).

Basic band CRM option 2 with generic flight heights

2.1.5 The Basic Band model applies a uniform distribution of bird flights between the lowest and the highest levels of the rotors. Using Band Option 2, the proportion at PCH was determined from the results of the Strategic Ornithological Support Services (SOSS) SOSS-02 project (Cook *et al*., 2012) that analysed the flight height measurements taken from boat surveys conducted around the United Kingdom (UK). The project was updated following Johnston *et al*. (2014), and the revised published spreadsheet is used to determine the 'generic' percentage of flights at PCH for each species based on the Rampion 2 WTG parameters. This Band Option has been considered for all nine CRM seabird species/species groups.

2.2 CRM input parameters

Introduction

2.2.1 This report presents the CRM results used to inform the impact assessments at the PEIR stage. As the sCRM has been run deterministically only, an evidence-led approach determined the parameters used to determine collision risk for each species. The mean values describe the Applicant's advocated position, which forms the basis of the impact assessments described in **Chapter 12, Volume 2**. However, in order to provide a range of values to capture variability in both abiotic and biotic factors, the key input parameters were reviewed in order to provide 'minimum' and 'maximum' estimates of collision mortality rates. An overview of all input parameters used for the Applicant's mean, minimum and maximum scenarios are provided in **Table 2-1** to **Table A-9**.

Rampion 2 maximum design parameters

2.2.2 The input parameters for the Rampion 2 wind farm and WTGs are presented in **Table 2-1**. These are based on the maximum design scenario as described in **Chapter 4: The Proposed Development, Volume 2** and also presented in **Chapter 12, Volume 2** in relation to collision risk.

2.2.3 WTG rotation speed and blade pitch are related to windspeed and therefore some degree of uncertainty exists. Therefore, different values are used for the mean, minimum and maximum scenarios. The following process was used to estimate the mean, minimum and maximum:

- the distribution of windspeed was estimated using a Weibull distribution (supplied by the Applicant);
- the relationship between windspeed and turbine rotation speed and blade pitch was supplied by the Applicant;
- the minimum and maximum scenario turbine rotation speed have been estimated as the turbine rotation speed at the lower- and upper-15.8 percent percentile wind speed, respectively, which approximates one standard deviation (SD) from the mean; and
- the minimum and maximum scenario blade pitch have been estimated as the turbine rotation speed at the upper- and lower-15.8 percent percentile wind speed, which approximates one SD from the mean.

2.2.4 Note that as a precautionary approach, the minimum scenario uses the turbine rotation speed estimate and blade pitch estimate which leads to the lowest collision rate, while the maximum scenario uses the estimates which lead to the highest collision rate, even though the WTG rotation speed and blade pitch estimates used occur at different wind speeds.

Table 2-1 Rampion 2 maximum design scenario input parameters

Input Parameter (units in brackets)	Value (maximum design scenario)		
Maximum number of WTGs	116		
Rotor radius (metres (m))	86		
Air Gap above LAT/HAT (m)	30/22		
Number of blades	3		
Maximum blade width (m)	5.4		
Tidal offset (m)	4		
Large array correction	Yes		
Wind farm width (km)	6.8		
Latitude (degrees (º))	50.6 N		
Maintenance/repair downtime (annual average percent)	1.5		
Wind availability (annual average percent)	95.47		
	Min	**Mean**	**Max**
Rotation speed (rpm)	5.2	7.36	10.5
Pitch (º)	9	2.98	0

LAT = Lowest Astronomical Tide; HAT = Highest Astronomical Tide; rpm = revolutions per minute.

Species biometrics

2.2.5 The species-specific biometric input parameters used in the CRM are provided in **Table 2-2**. The biometrics for all species were derived from Robinson (2005). No SD values were used in the CRM, as Robinson (2005) does not provide SD values for the biometric data, whilst the SD values built-in to the sCRM Shiny App were not used due to uncertainties surrounding the source of these data.

Table 2-2 Species biometrics used for CRM

Species	Body Length (m)	Wingspan (m)
Gannet	0.94	1.72
Kittiwake	0.39	1.08
Common gull	0.41	1.20

Species	Body Length (m)	Wingspan (m)
Little gull	0.26	0.78
Lesser black-backed gull	0.58	1.42
Herring gull	0.60	1.44
Great black-backed gull	0.71	1.58
Common tern	0.33	0.88
Arctic tern	0.34	0.80
'Commic' tern	0.34	0.88
Sandwich tern	0.38	1.00

Avoidance rates

2.2.6 The species-specific avoidance rates that were applied in the CRM are presented in **Table 2-3**. The avoidance rates for all species follows the guidance from Cook *et al*. (2014) and the Statutory Nature Conservation Bodies (SNCB) review of avoidance rates to be applied in the Band models Joint Nature Conservation Committee (JNCC) *et al*., 2014 in response to Cook *et al*., 2014). The upper and lower values were derived from ± 2SD from the central estimate.

Table 2-3 Avoidance rates used for CRM

Species	Min	Mean	Max
Gannet	0.991	0.989	0.987
Kittiwake	0.991	0.989	0.987
Common gull	0.995	0.992	0.989
Little gull	0.995	0.992	0.989
Lesser black-backed gull	0.996	0.995	0.994
Herring gull	0.996	0.995	0.994
Great black-backed gull	0.996	0.995	0.994
Common tern	0.99	0.98	0.95
Arctic tern	0.99	0.98	0.95
'Commic' tern	0.99	0.98	0.95
Sandwich tern	0.99	0.98	0.95

Flight speeds

2.2.7 Central estimates of flight speeds for kittiwake, common gull, little gull, lesser black-backed gull, herring gull, great black-backed gull, common tern, Arctic tern and Sandwich tern were derived from Cook *et al*. (2014), which presents flight speed values taken from Pennycuick (1997) and Alerstam *et al*. (2007). Flight speed for gannet was derived from Skov *et al*. (2018). Flight speed for all species are presented in **Table 2-4**.

Table 2-4 Flight speeds used for CRM

Species	Flight speed (metres per second (ms^{-1}))
Gannet	13.33
Kittiwake	13.1
Common gull	9.5
Little gull	11.5
Lesser black-backed gull	13.1
Herring gull	12.8
Great black-backed gull	13.7
Common tern	10.05
Arctic tern	10.9
'Commic' tern	10.9
Sandwich tern	10.05

Flight heights

2.2.8 At this stage, no site-specific flight height data are available. The Johnston *et al*. (2014) Maximum Likelihood values are built-in to the sCRM and so should not need to be specified by the user. For clarity, the proportion of birds at PCH derived from Johnston *et al*. (2014) data are provided in **Table 2-5**.

Table 2-5 Proportion at PCH used for CRM

Species	Proportion at PCH (percent)
Gannet	10.21
Kittiwake	12.36
Common gull	18.76

Species	Proportion at PCH (percent)
Little gull	12.49
Lesser black-backed gull	24.71
Herring gull	28.26
Great black-backed gull	28.73
Common tern	5.69
Arctic tern	2.91
'Commic' tern	5.69
Sandwich tern	5.37

Nocturnal activity

2.2.9 The nocturnal activity rates for all species are represented as an upper and lower values in **Table 2-6**. A range of values were selected to account for the uncertainty in the currently available data sources on seabird nocturnal activity levels since no SDs are presented in the literature.

2.2.10 The upper values for nocturnal activity are based on the 1 to 5 scoring index for each species in Garthe and Hüppop (2004) and King *et al*. (2009), with the spreadsheet converting these factors into nocturnal activity as follows: 1 = 0 percent, 2 = 25 percent, 3 = 50 percent, 4 = 75 percent, 5 = 100 percent. It is considered that these literature sources for nocturnal activity rates are overly precautionary (gannet: 2, kittiwake: 3, and large gulls: 3) and have been superseded by more recent studies (MacArthur Green, APEM and Royal HaskoningDHV 2015; Skov *et al*., 2018; Masden, 2015), from which the values for the lower nocturnal activity rates are derived.

Table 2-6 Nocturnal activity factors used for CRM

Species	Nocturnal Activity (percent)		
	Min	Mean	Max
Gannet	0	0	25
Kittiwake	25	25	50
Common gull	25	25	50
Little gull	25	25	50
Lesser black-backed gull	25	25	50

Species	Nocturnal Activity (percent)		
	Min	Mean	Max
Herring gull	25	25	50
Great black-backed gull	25	25	50
Common tern	0	0	25
Arctic tern	0	0	25
'Commic' tern	0	0	25
Sandwich tern	0	0	25

Density of birds in flight

2.2.11 Density estimates ± SD were determined for Rampion 2 using data collected from the first 15 months of the programme of aerial digital surveys (carried out between April 2019 and June 2020, inclusive), which are presented in **Appendix 12.1**. The density data presented in this appendix are inclusive of apportionment of unidentified birds and corrections for availability bias, where appropriate. The minimum CRM scenario applied a mean - SD density estimates while the maximum CRM scenario applied a mean + SD density estimates for all species.

2.2.12 For species which were subject to apportionment, the upper and lower confidence intervals (CI) of flying birds were estimated assuming the ratio between the mean and the upper/lower confidence limit remained the same between unapportioned and apportioned estimates for flying birds.

2.2.13 For calendar months with more than one survey (for example, April was surveyed in both 2019 and 2020), the mean density across both surveys was used. At this stage only three months (April, May and June) have been surveyed twice, but all months will have been surveyed twice once the full 24-month survey programme has been completed.

2.2.14 One SD was estimated using the following equation:

$$1\,SD \approx \frac{Upper\ CL - Lower\ CL}{4}$$

2.2.15 For calendar months with more than one survey, one SD was estimated in the same manner but using the higher of the two upper confidence limits and the lower of the two lower confidence limits.

2.2.16 No common or Arctic terns were positively identified to species level within the Rampion 2 array area. CRM has therefore been run for the birds identified as 'commic' terns, noting that this will consist of a mixture of both common and Arctic terns in an unknown proportion. Whilst CRM parameters for both common and Arctic terns are very similar, as a precautionary assumption the most precautionary parameter value from either common or Arctic tern for each parameter were used in this assessment.

The mean, minimum and maximum monthly densities of each species used for CRM are presented in **Appendix A**.

3. Results

This section provides the CRM outputs for each of the species considered.

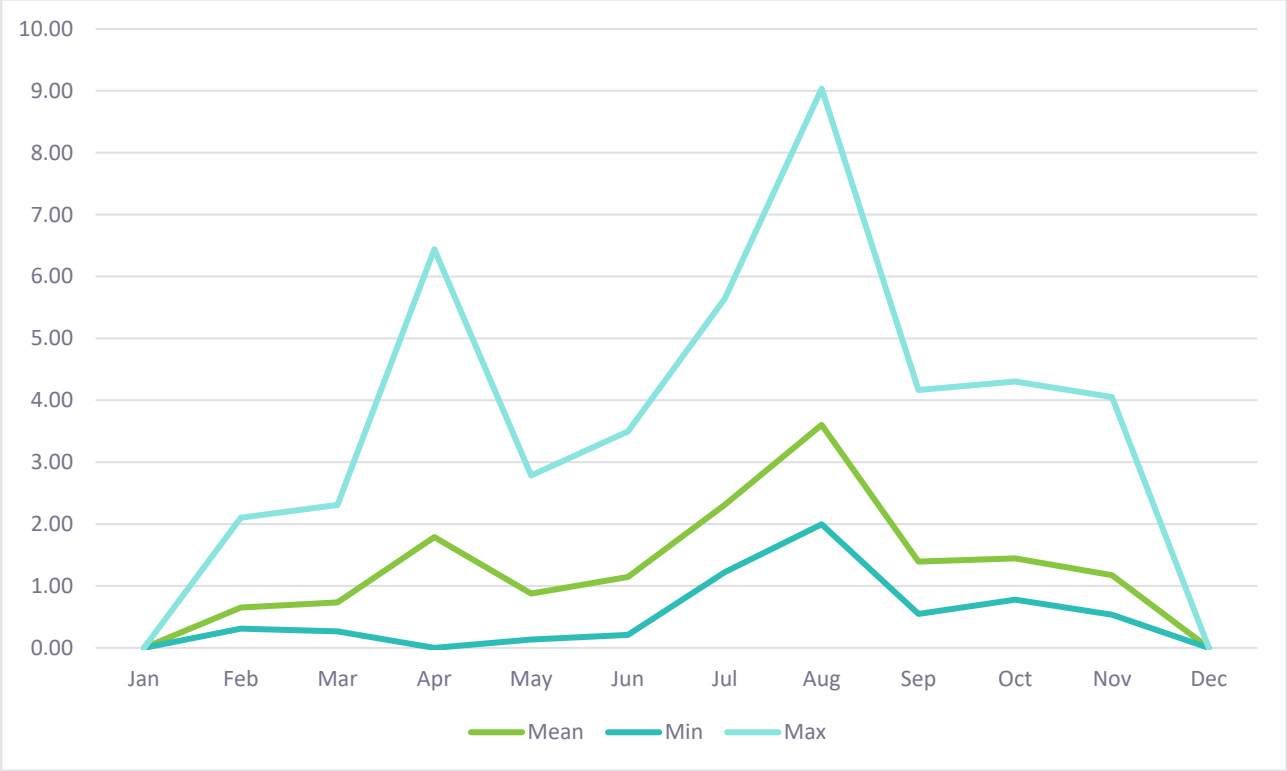
3.1 Gannet

3.1.1 **Table 3-1** and **Graphic 3-1** present the collision risk model results for gannet.

Table 3-1 Gannet mean, minimum and maximum monthly and annual predicted collisions (Band Option 2)

Month	Mean	Min	Max
January	0.00	0.00	0.00
February	0.65	0.31	2.10
March	0.73	0.27	2.31
April	1.79	0.00	6.44
May	0.88	0.14	2.79
June	1.15	0.21	3.50
July	2.31	1.22	5.64
August	3.60	2.00	9.03
September	1.40	0.55	4.17
October	1.45	0.78	4.30
November	1.18	0.54	4.05
December	0.00	0.00	0.00
Annual Total	**15.13**	**6.01**	**44.33**

Graphic 3-1 Gannet mean, minimum and maximum monthly predicted collisions (Band Option 2)



3.2 Kittiwake

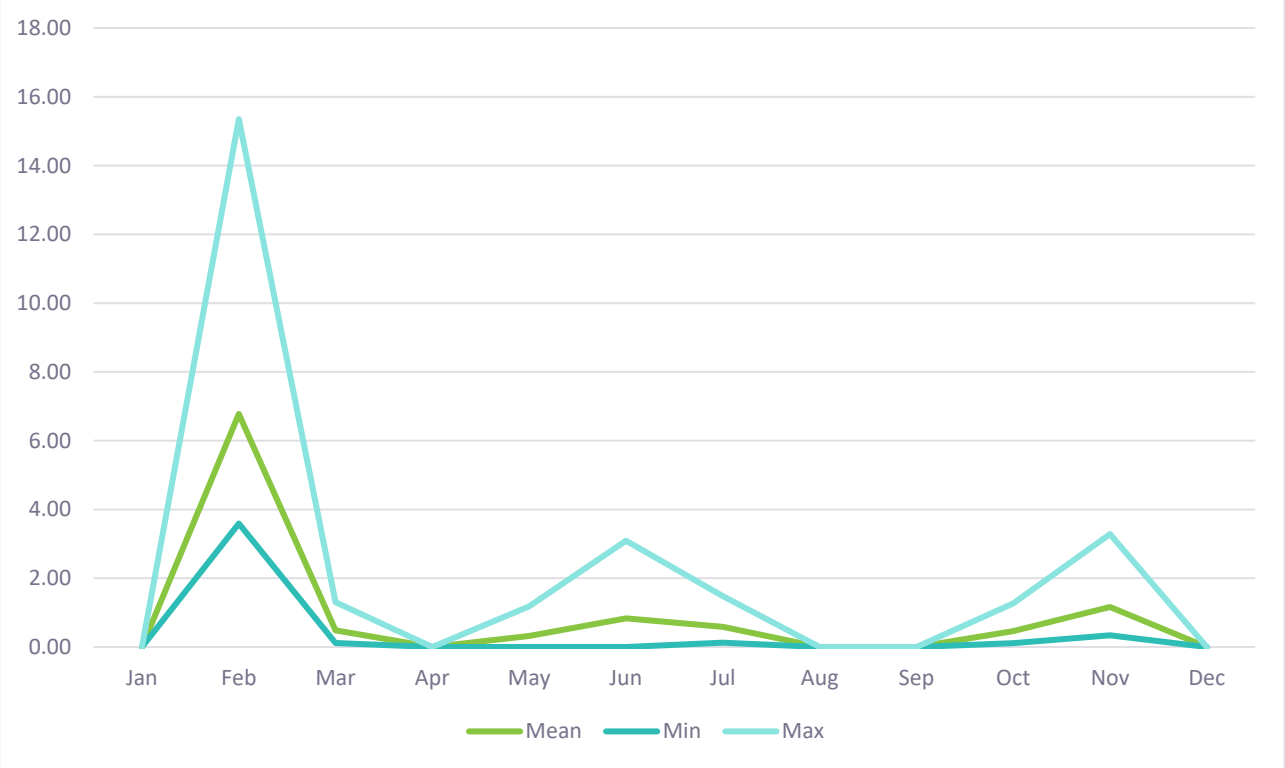
3.2.1 **Table 3-2** and **Graphic 3-2** present the collision risk model results for kittiwake.

Table 3-2 Kittiwake mean, minimum and maximum monthly and annual predicted collisions (Band Option 2)

Month	Mean	Min	Max
January	0.00	0.00	0.00
February	6.78	3.59	15.35
March	0.49	0.18	1.30
April	0.00	0.00	0.00
May	0.32	0.00	1.18
June	0.83	0.00	3.09
July	0.59	0.13	1.48
August	0.00	0.00	0.00
September	0.00	0.00	0.00

Month	Mean	Min	Max
October	0.46	0.11	1.26
November	1.16	0.34	3.28
December	0.00	0.00	0.00
Annual Total	**10.63**	**4.29**	**26.95**

Graphic 3-2 Kittiwake mean, minimum and maximum monthly predicted collisions (Band Option 2)



3.3 Common gull

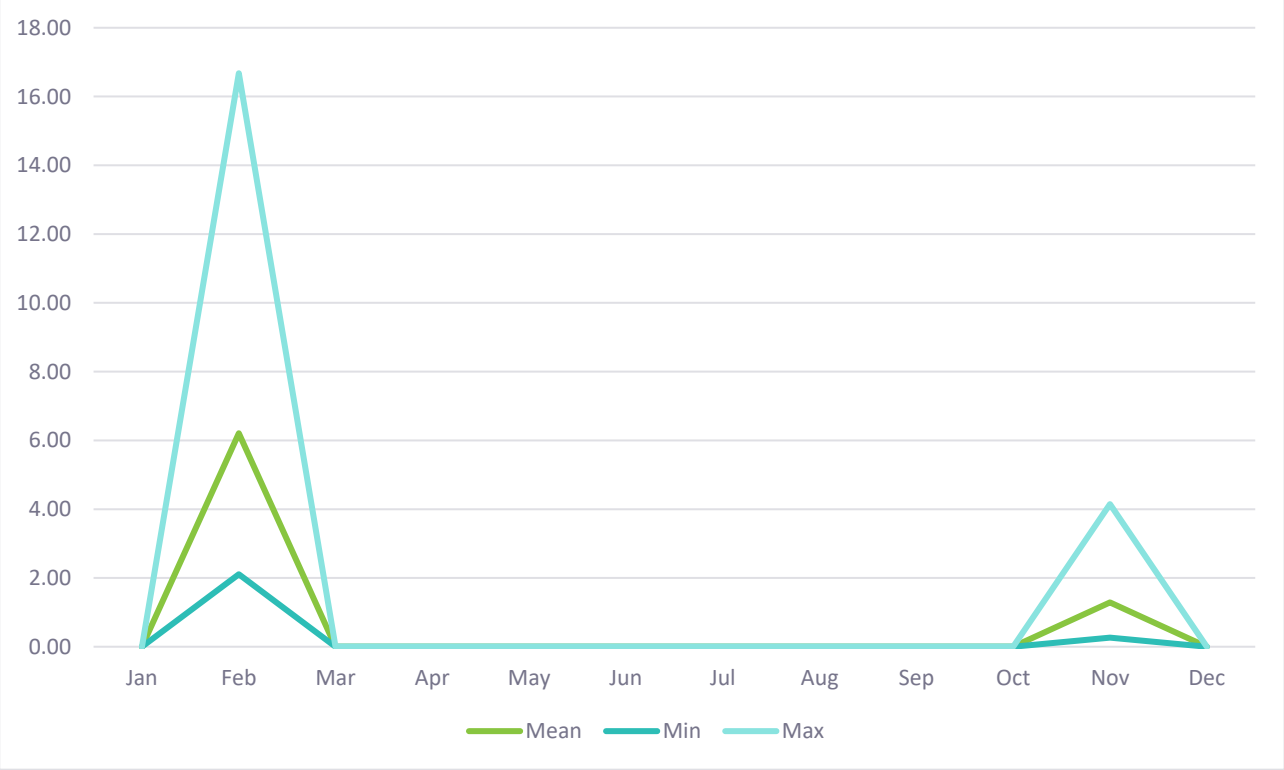
3.3.1 **Table 3-3** and **Graphic 3-3** present the collision risk model results for common gull.

Table 3-3 Common gull mean, minimum and maximum monthly and annual predicted collisions (Band Option 2)

Month	Mean	Min	Max
January	0.00	0.00	0.00
February	6.21	2.11	16.68
March	0.00	0.00	0.00

Month	Mean	Min	Max
April	0.00	0.00	0.00
May	0.00	0.00	0.00
June	0.00	0.00	0.00
July	0.00	0.00	0.00
August	0.00	0.00	0.00
September	0.00	0.00	0.00
October	0.00	0.00	0.00
November	1.29	0.27	4.15
December	0.00	0.00	0.00
Annual Total	**7.50**	**2.37**	**20.83**

Graphic 3-3 Common gull mean, minimum and maximum monthly predicted collisions (Band Option 2)



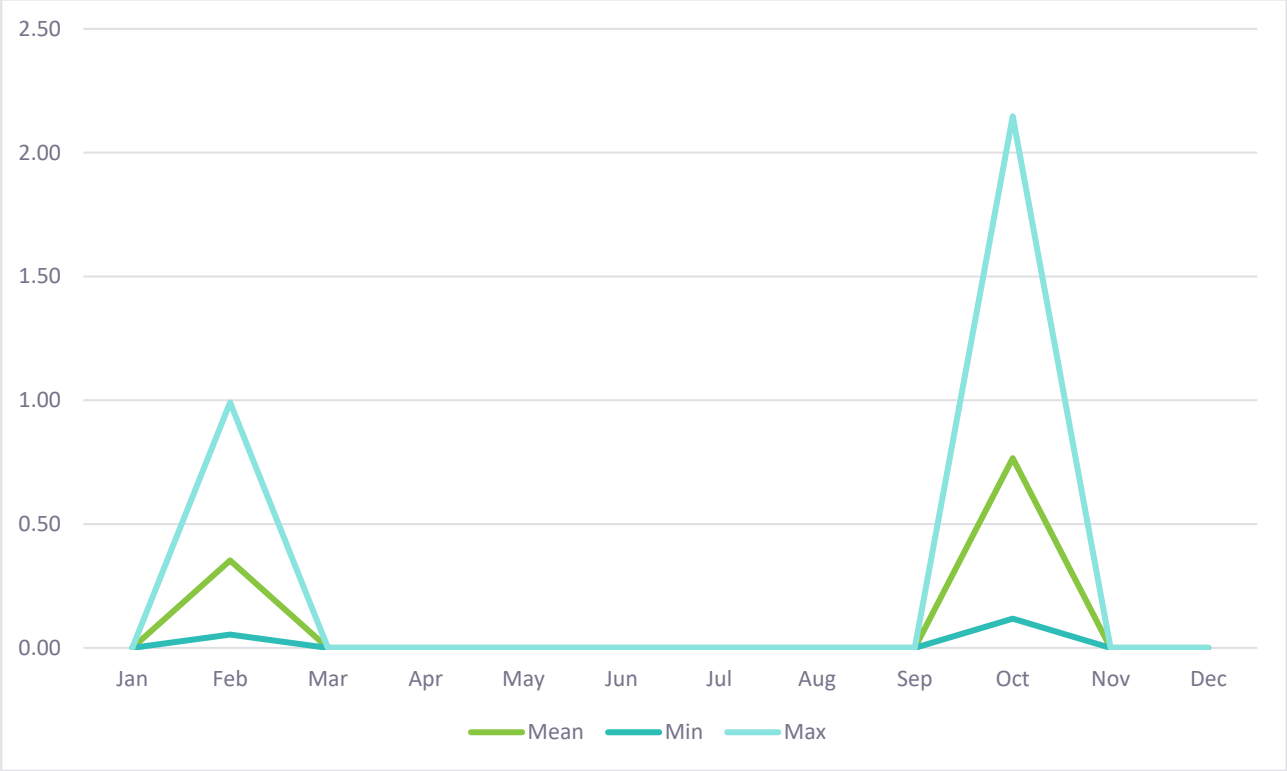
3.4 Little gull

3.4.1 **Table 3-4** and **Graphic 3-4** present the collision risk model results for little gull.

Table 3-4 Little gull mean, minimum and maximum monthly and annual predicted collisions (Band Option 2)

Month	Mean	Min	Max
January	0.00	0.00	0.00
February	0.35	0.05	0.99
March	0.00	0.00	0.00
April	0.00	0.00	0.00
May	0.00	0.00	0.00
June	0.00	0.00	0.00
July	0.00	0.00	0.00
August	0.00	0.00	0.00
September	0.00	0.00	0.00
October	0.77	0.12	2.15
November	0.00	0.00	0.00
December	0.00	0.00	0.00
Annual Total	**1.12**	**0.17**	**3.14**

Graphic 3-4 Little gull mean, minimum and maximum monthly predicted collisions (Band Option 2)



3.5 Herring gull

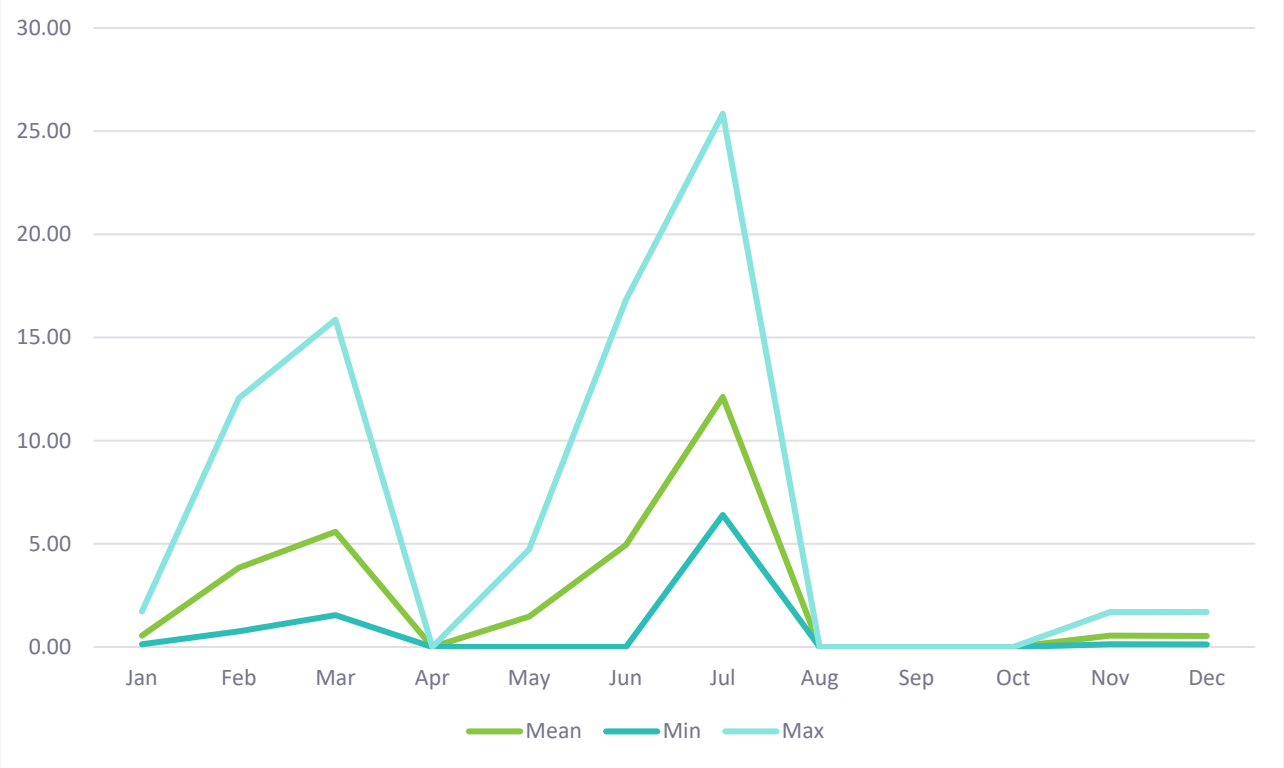
3.5.1 **Table 3-5** and **Graphic 3-5** present the collision risk model results for herring gull.

Table 3-5 Herring gull mean, minimum and maximum monthly and annual predicted collisions (Band Option 2).

Month	Mean	Min	Max
January	0.55	0.13	1.72
February	3.84	0.76	12.05
March	5.59	1.54	15.87
April	0.00	0.00	0.00
May	1.47	0.00	4.73
June	4.95	0.00	16.83
July	12.12	6.40	25.85
August	0.00	0.00	0.00
September	0.00	0.00	0.00

Month	Mean	Min	Max
October	0.00	0.00	0.00
November	0.55	0.13	1.70
December	0.54	0.13	1.70
Annual Total	**29.61**	**9.10**	**80.45**

Graphic 3-5 Herring gull mean, minimum and maximum monthly predicted collisions (Band Option 2)



3.6 Lesser black-backed gull

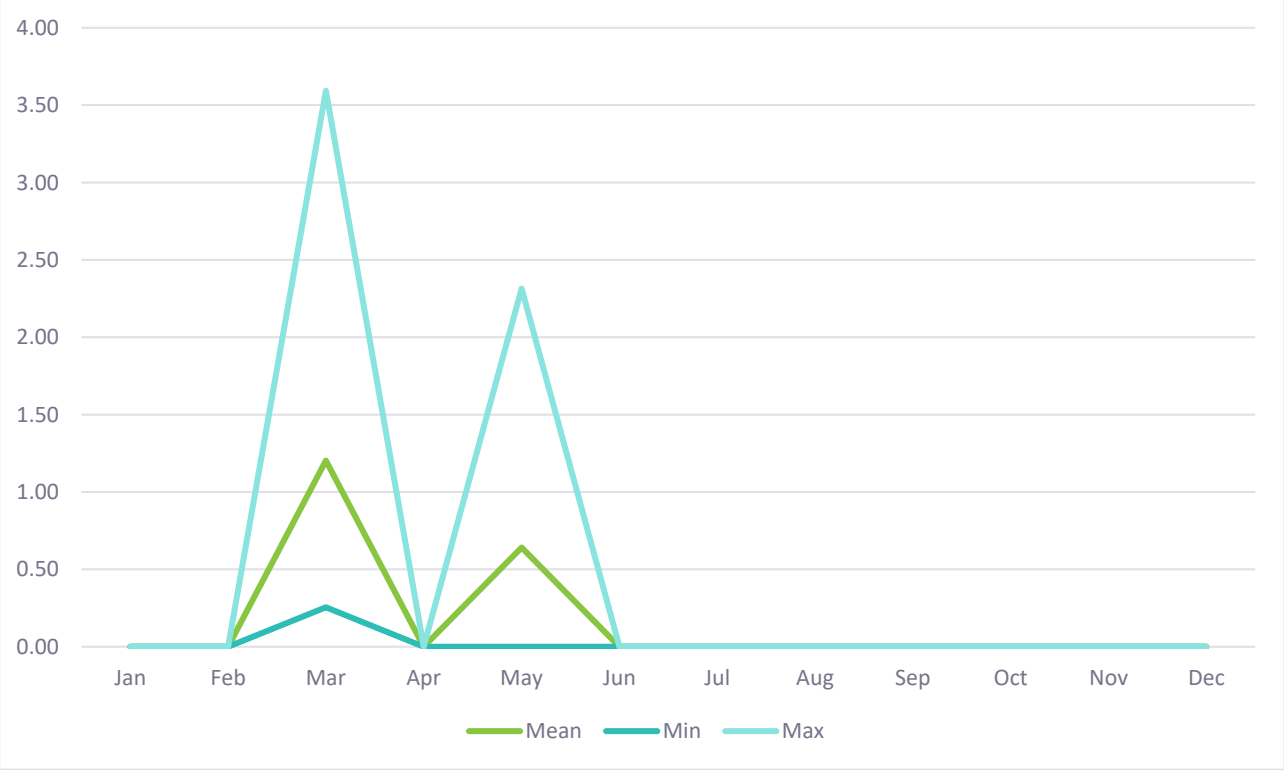
3.6.1 **Table 3-6** and **Graphic 3-6** present the collision risk model results for lesser black-backed gull.

Table 3-6 Lesser black-backed gull mean, minimum and maximum monthly and annual predicted collisions (Band Option 2)

Month	Mean	Min	Max
January	0.00	0.00	0.00
February	0.00	0.00	0.00
March	1.20	0.26	3.59

Month	Mean	Min	Max
April	0.00	0.00	0.00
May	0.64	0.00	2.32
June	0.00	0.00	0.00
July	0.00	0.00	0.00
August	0.00	0.00	0.00
September	0.00	0.00	0.00
October	0.00	0.00	0.00
November	0.00	0.00	0.00
December	0.00	0.00	0.00
Annual Total	**1.84**	**0.26**	**5.91**

Graphic 3-6 Lesser black-backed gull mean, minimum and maximum monthly predicted collisions (Band Option 2)



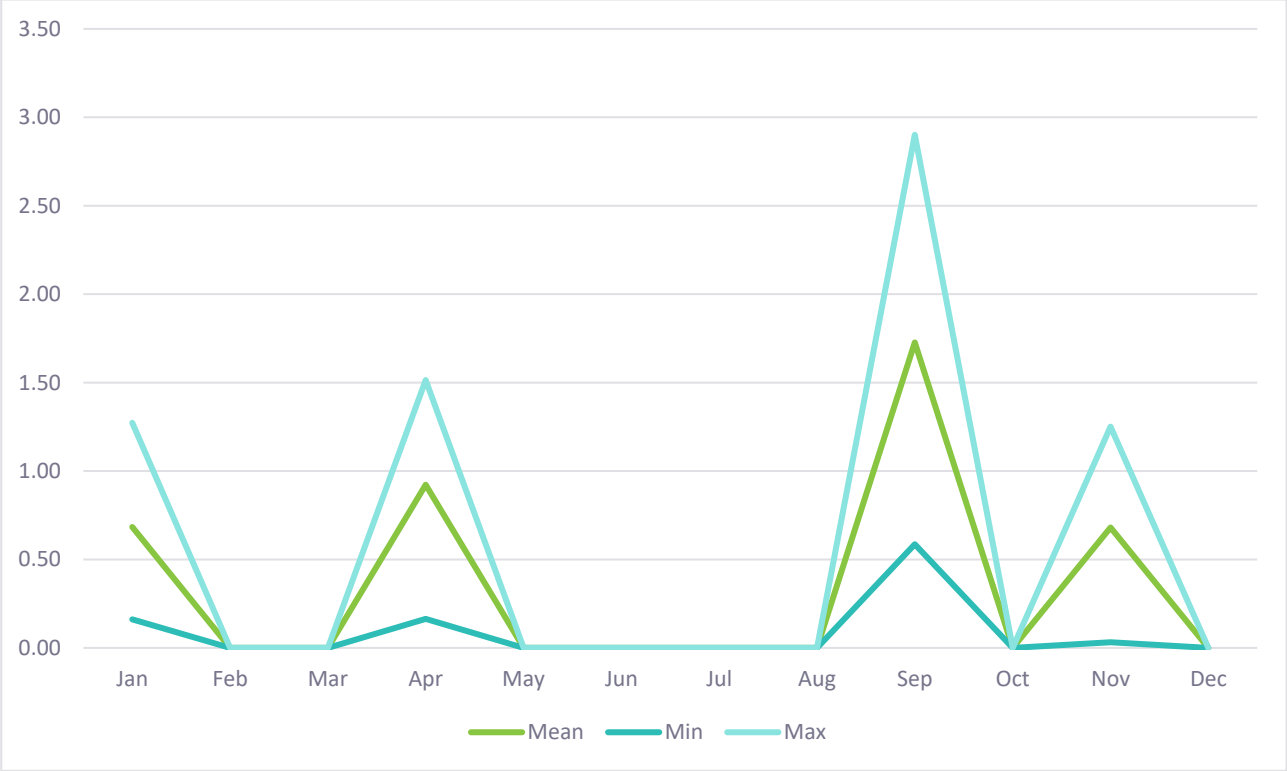
3.7 Great black-backed gull

3.7.1 **Table 3-7** and **Graphic 3-7** present the collision risk model results for great black-backed gull.

Table 3-7 Great black-backed gull mean, minimum and maximum monthly and annual predicted collisions (Band Option 2)

Month	Mean	Min	Max
January	0.68	0.16	1.27
February	0.00	0.00	0.00
March	0.00	0.00	0.00
April	0.92	0.16	1.51
May	0.00	0.00	0.00
June	0.00	0.00	0.00
July	0.00	0.00	0.00
August	0.00	0.00	0.00
September	1.73	0.59	2.90
October	0.00	0.00	0.00
November	0.68	0.03	1.25
December	0.00	0.00	0.00
Annual Total	**4.01**	**0.94**	**6.94**

Graphic 3-7 Great black-backed gull mean, minimum and maximum monthly predicted collisions (Band Option 2)



3.8 'Commic' tern

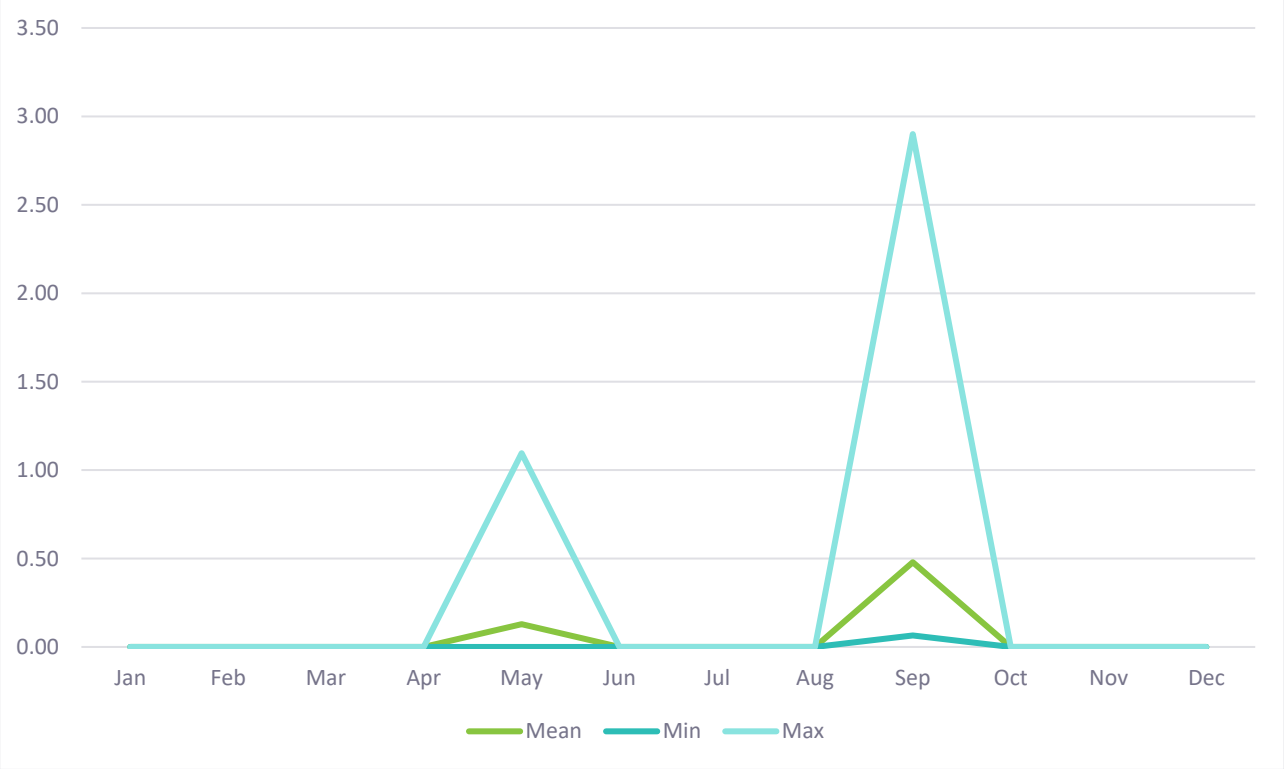
3.8.1 **Table 3-8** and **Graphic 3-8** present the collision risk model results for 'commic' terns. Note that these figures represent a mixture of common and Arctic terns in unknown proportions.

Table 3-8 'Commic' tern mean, minimum and maximum monthly and annual predicted collisions (Band Option 2)

Month	Mean	Min	Max
January	0.00	0.00	0.00
February	0.00	0.00	0.00
March	0.00	0.00	0.00
April	0.00	0.00	0.00
May	0.13	0.00	1.10
June	0.00	0.00	0.00
July	0.00	0.00	0.00
August	0.00	0.00	0.00

Month	Mean	Min	Max
September	0.48	0.07	2.90
October	0.00	0.00	0.00
November	0.00	0.00	0.00
December	0.00	0.00	0.00
Annual Total	**0.61**	**0.07**	**4.00**

Graphic 3-8 'Commic' tern mean, minimum and maximum monthly predicted collisions (Band Option 2).



3.9 Sandwich tern

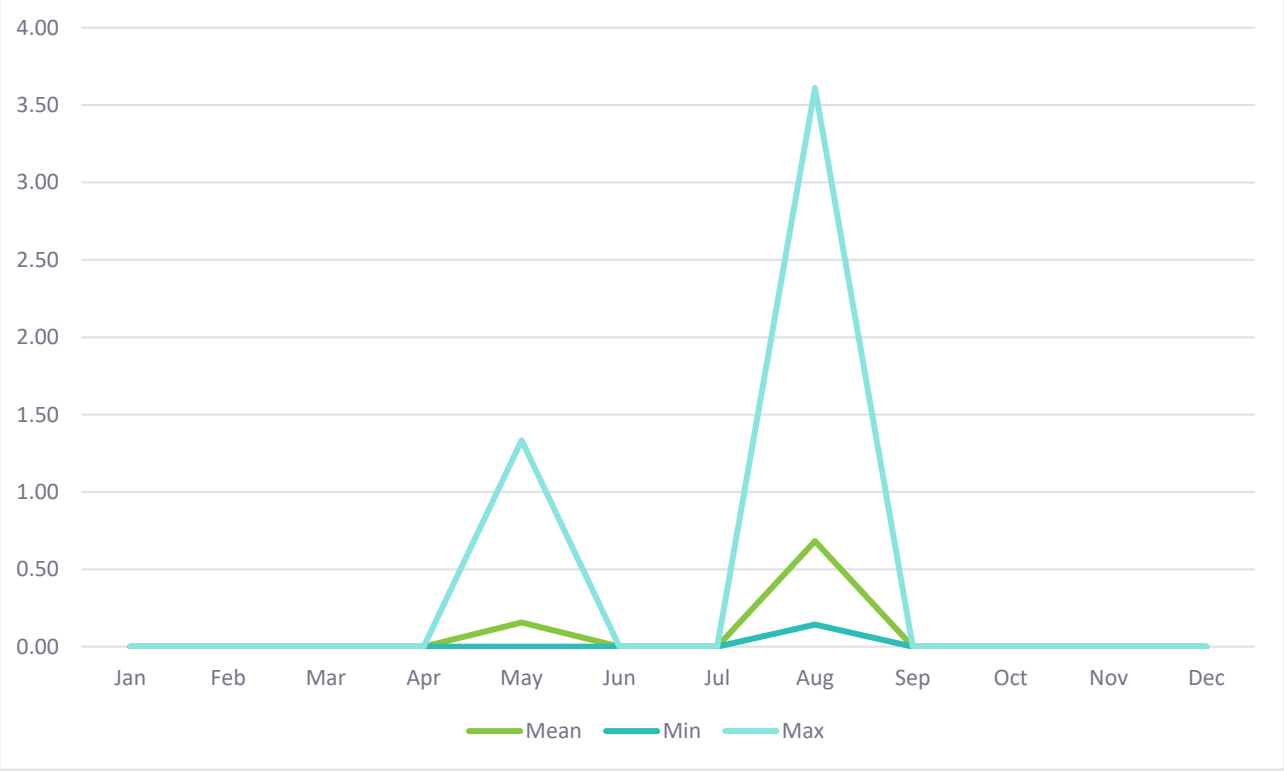
3.9.1 **Table 3-9** and **Graphic 3-9** present the collision risk model results for Sandwich terns.

Table 3-9 Sandwich tern mean, minimum and maximum monthly and annual predicted collisions (Band Option 2)

Month	Mean	Min	Max
January	0.00	0.00	0.00
February	0.00	0.00	0.00

Month	Mean	Min	Max
March	0.00	0.00	0.00
April	0.00	0.00	0.00
May	0.16	0.00	1.33
June	0.00	0.00	0.00
July	0.00	0.00	0.00
August	0.68	0.14	3.61
September	0.00	0.00	0.00
October	0.00	0.00	0.00
November	0.00	0.00	0.00
December	0.00	0.00	0.00
Annual Total	**0.84**	**0.14**	**4.94**

Graphic 3-9 Sandwich tern mean, minimum and maximum monthly predicted collisions (Band Option 2)



3.10 Glossary of terms and abbreviations

Table 3-10 Glossary of terms and abbreviations

Term (acronym)	Definition
APEM	APEM Limited
Baseline	Refers to existing conditions as represented by latest available survey and other data which is used as a benchmark for making comparisons to assess the impact of development.
CI	Confidence Interval
CRM	Collision Risk Modelling
°	Degrees
Environmental Impact Assessment (EIA)	The process of evaluating the likely significant environmental effects of a proposed project or development over and above the existing circumstances (or 'baseline').
ETG	Expert Topic Group
Evidence Plan Process (EPP)	A voluntary consultation process with specialist stakeholders to agree the approach and the information required to support the EIA and HRA for certain aspects.
HAT	Highest Astronomical Tide
Impact	The changes resulting from an action.
Joint Nature Conservation Committee (JNCC)	JNCC is the public body that advises the UK Government and devolved administrations on UK-wide and international nature conservation
km	Kilometre
km^2	Square Kilometre
LAT	Lowest Astronomical Tide
m	Metre
ms^{-1}	Metres Per Second
PCH	Potential Collision Height
PEIR Assessment Boundary	The PEIR Assessment Boundary combines the search areas for the offshore and onshore infrastructure associated with the Proposed Development. It is defined as the area within which the Proposed Development and associated infrastructure will be located, including the temporary and permanent construction and operational work areas.
±	Plus / Minus

Term (acronym)	Definition
Preliminary Environmental Information Report (PEIR)	The written output of the Environmental Impact Assessment undertaken to date for the Proposed Development. It is developed to support formal consultation and presents the preliminary findings of the assessment to allow an informed view to be developed of the Proposed Development, the assessment approach that has been undertaken, and the preliminary conclusions on the likely significant effects of the Proposed Development and environmental measures proposed.
Proposed Development	The development that is subject to the application for development consent, as described in Chapter 4.
Rampion 1	The existing Rampion Offshore Wind Farm located in the English Channel in off the south coast of England.
Receptor	These are as defined in Regulation 5(2) of The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 and include population and human health, biodiversity, land, soil, water, air, climate, material assets, cultural heritage and landscape that may be at risk from exposure to pollutants which could potentially arise as a result of the Proposed Development.
RED	Rampion Extension Development Ltd. (The Applicant)
rpm	Revolutions Per Minute
sCRM	Stochastic Collision Risk Model
SD	Standard Deviation
SNCB	Statutory Nature Conservation Body
SOSS	Strategic Ornithological Support Services
TCE	The Crown Estate
The Proposed Development / Rampion 2	The onshore and offshore infrastructure associated with the offshore wind farm comprising of installed capacity of up to 1200 MW, located in the English Channel in off the south coast of England.
UK	United Kingdom
WTG	Wind Turbine Generator

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Appendix A Monthly Densities of Birds in Flight in Rampion 2 Array Area

Table A-1 Gannet monthly densities used for CRM

Month	Density (mean)	Density (mean – SD)	Density (mean + SD)
January	0.000	0.000	0.000
February	0.070	0.030	0.110
March	0.060	0.021	0.099
April	0.130	0.000	0.260
May	0.055	0.009	0.101
June	0.070	0.014	0.126
July	0.140	0.080	0.200
August	0.240	0.139	0.341
September	0.110	0.043	0.177
October	0.130	0.065	0.195
November	0.130	0.051	0.209
December	0.000	0.000	0.000

Table A-2 Kittiwake monthly densities used for CRM

Month	Density (mean)	Density (mean – SD)	Density (mean + SD)
January	0.000	0.000	0.000
February	0.579	0.374	0.784
March	0.034	0.010	0.057
April	0.000	0.000	0.000
May	0.019	0.000	0.047
June	0.049	0.000	0.124
July	0.034	0.009	0.058
August	0.000	0.000	0.000
September	0.000	0.000	0.000
October	0.034	0.010	0.057
November	0.098	0.035	0.161
December	0.000	0.000	0.000

Table A-3 Common gull monthly densities used for CRM

Month	Density (mean)	Density (mean – SD)	Density (mean + SD)
January	0.000	0.000	0.000
February	0.478	0.281	0.674
March	0.000	0.000	0.000
April	0.000	0.000	0.000
May	0.000	0.000	0.000
June	0.000	0.000	0.000
July	0.000	0.000	0.000
August	0.000	0.000	0.000
September	0.000	0.000	0.000
October	0.000	0.000	0.000
November	0.098	0.035	0.161
December	0.000	0.000	0.000

Table A-4 Little gull monthly densities used for CRM

Month	Density (mean)	Density (mean – SD)	Density (mean + SD)
January	0.000	0.000	0.000
February	0.034	0.009	0.058
March	0.000	0.000	0.000
April	0.000	0.000	0.000
May	0.000	0.000	0.000
June	0.000	0.000	0.000
July	0.000	0.000	0.000
August	0.000	0.000	0.000
September	0.000	0.000	0.000
October	0.064	0.017	0.111
November	0.000	0.000	0.000
December	0.000	0.000	0.000

Table A-5 Herring gull monthly densities used for CRM

Month	Density (mean)	Density (mean – SD)	Density (mean + SD)
January	0.034	0.010	0.057
February	0.241	0.059	0.422
March	0.287	0.098	0.476

Month	Density (mean)	Density (mean – SD)	Density (mean + SD)
April	0.000	0.000	0.000
May	0.064	0.000	0.129
June	0.214	0.000	0.463
July	0.515	0.336	0.695
August	0.000	0.000	0.000
September	0.000	0.000	0.000
October	0.000	0.000	0.000
November	0.034	0.010	0.057
December	0.034	0.010	0.057

Table A-6 Lesser black-backed gull monthly densities used for CRM

Month	Density (mean)	Density (mean – SD)	Density (mean + SD)
January	0.000	0.000	0.000
February	0.000	0.000	0.000
March	0.071	0.019	0.123
April	0.000	0.000	0.000
May	0.032	0.000	0.072
June	0.000	0.000	0.000
July	0.000	0.000	0.000
August	0.000	0.000	0.000
September	0.000	0.000	0.000
October	0.000	0.000	0.000
November	0.000	0.000	0.000
December	0.000	0.000	0.000

Table A-7 Great back-blacked gull monthly densities used for CRM

Month	Density (mean)	Density (mean – SD)	Density (mean + SD)
January	0.034	0.010	0.057
February	0.000	0.000	0.000
March	0.000	0.000	0.000
April	0.036	0.008	0.063
May	0.000	0.000	0.000
June	0.000	0.000	0.000
July	0.000	0.000	0.000

Month	Density (mean)	Density (mean – SD)	Density (mean + SD)
August	0.000	0.000	0.000
September	0.071	0.030	0.113
October	0.000	0.000	0.000
November	0.034	0.002	0.066
December	0.000	0.000	0.000

Table A-8 'Commic' tern monthly densities used for CRM

Month	Density (mean)	Density (mean – SD)	Density (mean + SD)
January	0.000	0.000	0.000
February	0.000	0.000	0.000
March	0.000	0.000	0.000
April	0.000	0.000	0.000
May	0.015	0.000	0.039
June	0.000	0.000	0.000
July	0.000	0.000	0.000
August	0.000	0.000	0.000
September	0.070	0.019	0.121
October	0.000	0.000	0.000
November	0.000	0.000	0.000
December	0.000	0.000	0.000

Table A-9 Sandwich tern monthly densities used for CRM

Month	Density (mean)	Density (mean – SD)	Density (mean + SD)
January	0.000	0.000	0.000
February	0.000	0.000	0.000
March	0.000	0.000	0.000
April	0.000	0.000	0.000
May	0.015	0.000	0.039
June	0.000	0.000	0.000
July	0.000	0.000	0.000
August	0.070	0.030	0.110
September	0.000	0.000	0.000
October	0.000	0.000	0.000
November	0.000	0.000	0.000
December	0.000	0.000	0.000