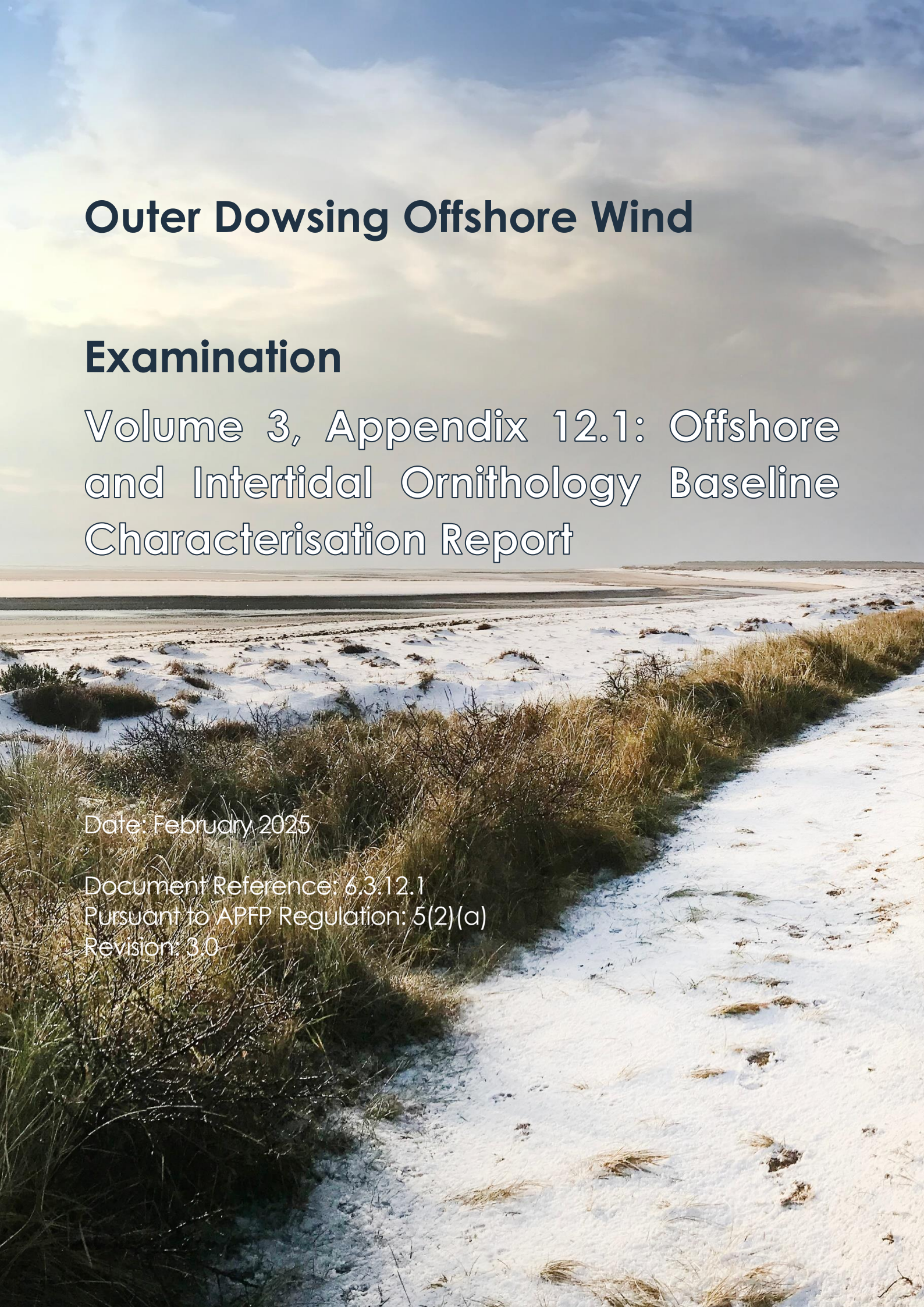
Outer Dowsing Offshore Wind

Examination

Volume 3, Appendix 12.1: Offshore and Intertidal Ornithology Baseline Characterisation Report



Date: February 2025

Document Reference: 6.3.12.1
Pursuant to APFP Regulation: 5(2)(a)
Revision: 3.0

Company:	**Outer Dowsing Offshore Wind**			Asset:		**Whole Asset**
Project:	**Whole Wind Farm**			Sub Project/Package:		Whole Asset
Document Title or Description:	Appendix 12.1 Offshore and Intertidal Ornithology Baseline Characterisation Report					
Internal Document Number:	PP1-ODOW-DEV-CS-REP-0171_02			3rd Party Doc No (If applicable):		N/A
Rev No.	**Date**	**Status / Reason for Issue**	**Author**	**Checked by**	**Reviewed by**	**Approved by**
V1.0	March 2024	DCO application	GoBe	GoBe	Shepherd & Wedderburn	Outer Dowsing
V2.0	September 2024	Procedural Deadline 19 September	GoBe	GoBe	Shepherd & Wedderburn	Outer Dowsing
V3.0	February 2025	Examination Update	GoBe	GoBe	Shepherd & Wedderburn	Outer Dowsing

Change Log

- Examination Update: updates to reflect, where relevant: clarifications to date in Examination; correcting errata; additional commitments made through Examination; and changes to status of or addition of cumulative projects.

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Acronyms & Definitions

Abbreviations / Acronyms

Abbreviation / Acronym	Description
ANS	Artificial Nesting Structure
AoS	Area of Search
ASL	Above Sea level
BDMPS	Biologically Defined Minimum Population Scales
BTO	British Trust for Ornithology
CI	Confidence Interval
CL	Confidence Limits
CV	Coefficient of Variance
DAS	Digital Aerial Survey
DCO	Development Consent Order
EIA	Environment Impact Assessment
ECC	Export Cable Corridor
EPP	Evidence Plan Process
ES	Environmental Statement
ETG	Expert Topic Group
FFC SPA	Flamborough and Filey Coast Special Protection Area
GSD	Ground Sample Distance
GT R4 ltd	The Applicant. The special project vehicle created in partnership between Corio Generation (a wholly owned Green Investment Group portfolio company), Gulf Energy Development and TotalEnergies.
HPAI	Highly Pathogenic Avian Influenza
JNCC	Joint Nature Conservation Committee
LCL	Lowe Confidence Level
MCA	Maritime and Coastguard Agency
MMO	Marine Management Organisation
MRSea	Marine Renewables Strategic environment assessment
NA	Not Applicable
NEWS	Non-Estuarine Waterbird Surveys
ODOW	Outer Dowsing Offshore Wind (The Project)
ORBA	Offshore Restricted Build Area
ORCP	Offshore Reactive Compensation Platform
OP	Offshore Platform
QA	Quality Assurance
SPA	Special Protection Area
TCE	The Crown Estate
UCL	Upper Confidence Level
UKHO	United Kingdom Hydrographic Office
WeBS	Wetland Bird Survey
WTG	Wind Turbine Generator

Terminology

Term	Definition
AfL array area	The area of the seabed awarded to GT R4 Ltd. through an Agreement for Lease (AfL) for the development of an offshore wind farm, as part of The Crown Estate's Offshore Wind Leasing Round 4.
Array Area	The area offshore within which the generating station (including wind turbine generators (WTG) and inter array cables), offshore accommodation platforms, offshore transformer substations and associated cabling will be positioned, including the ORBA.
Baseline	The status of the environment at the time of assessment without the development in place.
Effect	Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of an impact with the sensitivity of a receptor, in accordance with defined significance criteria.
GT R4 Ltd	The Applicant making the application for a DCO. Refer to as GT R4 Ltd on first introduction, then "the Applicant" thereafter. The Applicant is GTR4 Limited (a joint venture between Corio Generation and Total Energies), trading as Outer Dowsing Offshore Wind. The project is being developed by Corio Generation (a wholly owned Green Investment Group portfolio company) and Total Energies.
Impact	An impact to the receiving environment is defined as any change to its baseline condition, either adverse or beneficial.
Intertidal	Area where the ocean meets the land between high and low tides.
Landfall	The location at the land-sea interface where the offshore export cable will come ashore.
Outer Dowsing Offshore Wind (ODOW)	The Project
Offshore Export Cable Corridor (ECC)	The Offshore Export Cable Corridor (Offshore ECC) is the area within the ES Boundary within which the export cable running from the array to landfall will be situated.
Onshore infrastructure	The combined name for all onshore infrastructure associated with the Project from landfall to grid connection.
Offshore Restricted Build Area (ORBA)	The area within the array area, where no wind turbine generator, offshore transformer substation or offshore accommodation platform shall be erected.
Offshore Reactive Compensation Platform (ORCP)	A structure attached to the seabed by means of a foundation, with one or more decks (including bird deterrents) housing electrical reactors and switchgear for the purpose of the efficient transfer of power in the course of HVAC transmission by providing reactive compensation.
Receptor	A distinct part of the environment on which effects could occur and can be the subject of specific assessments. Examples of receptors

Term	Definition
	include species (or groups) of animals or plants, people (often categorised further such as 'residential' or those using areas for amenity or recreation), watercourses etc.
Study Area	Area(s) within which environmental impact may occur –to be defined on a receptor-by-receptor basis by the relevant technical specialist.
The Applicant	GTR4 Limited (a joint venture between Corio Generation (and its affiliates), TotalEnergies and Gulf Energy Development), trading as Outer Dowsing Offshore Wind.
The Project	Outer Dowsing Offshore Wind including proposed onshore and offshore infrastructure
Wind turbine generator (WTG)	A structure comprising a tower, rotor with three blades connected at the hub, nacelle and ancillary electrical and other equipment which may include J-tube(s), transition piece, access and rest platforms, access ladders, boat access systems, corrosion protection systems, fenders and maintenance equipment, helicopter landing facilities and other associated equipment, fixed to a foundation
WTG area	Following the introduction of the offshore restricted build area, the WTG area is a reduced area within the array area within which WTG and offshore platforms may be constructed.

1 Introduction

1.1 Project Background

1. GT R4 Limited (trading as Outer Dowsing Offshore Wind) hereafter referred to as the 'Applicant', is proposing to develop The Project. The Project will be located approximately 54km from the Lincolnshire coastline in the southern North Sea. The Project will include both offshore and onshore infrastructure including an offshore generating station (windfarm), export cables to landfall, Offshore Reactive Compensation Platforms (ORCPs), onshore cables, connection to the electricity transmission network, ancillary and associated development and areas for the delivery of up to two Artificial Nesting Structures (ANS) and the creation of a biogenic reef (if these compensation measures are deemed to be required by the Secretary of State) (see Chapter 3: Project Description (APP-058) for full details.
2. This technical annex provides and interprets offshore and intertidal ornithology data to determine the receptors that characterise the baseline and are of relevance to the assessment of potential impacts from the Project. It has also been produced to support Volume 1, Chapter 12: Offshore and Intertidal Ornithology (document reference 6.1.12). In addition, the data within this report are used to inform potential Project impacts as presented within Volume 3, Appendix 12.2: Collision Risk Modelling Assessment Appendix (document reference 6.3.12.2) and Volume 3, Appendix 12.3: Displacement Assessment Appendix (document reference 6.3.12.3).

1.2 Overview

3. This document has been updated to introduce two changes which have been made by the Applicant to the proposed Outer Dowsing Offshore Wind (the Project):
   - the introduction of an Offshore Restricted Build Area (ORBA) over the northern section of the Project array area; and
   - the removal of the northern section of the offshore Export Cable Corridor (ECC).
4. This document was first updated to introduce these changes made by the Applicant during the Examination at the Procedural Deadline 1 (PD1) and was submitted as 15.9D Offshore Restricted Build Area and Revision to the Offshore Export Cable Corridor Appendix D Ornithology Baseline Summary (PD1-086). The version submitted at PD1 included updated baseline information trimmed to the reduced array area (hereafter referred to as WTG area), updated figures, and improved the presentation of tabular information.
5. Following the Examining Authority acceptance of the Change Request, the EIA and HRA assessments have been updated and the version submitted at PD1 (now this version) has been amended further to incorporate terminology changes, include updated document references, and to include the intertidal survey results which were omitted from the PD1 version.

6. As a result of continuing engagement with stakeholders, and enabled by progress on engineering design, the area within which the Wind Turbine Generators (WTGs) and Offshore Platforms (OPs) will be positioned has been refined. The ORBA has been introduced to reduce the impact from the presence of the WTGs on auk species (specifically common guillemot), informed by a consideration of geophysical and geotechnical data. The ORBA also supports progress towards the required energy density for the final Project design, as set out within the Agreement for Lease (AfL).
7. The ORBA was introduced during examination and covers the northern section of the array area, restricting the installation of WTGs and OPs. For the avoidance of doubt, the ORBA may still be used for cable installation and ancillary operations during construction (and decommissioning) and operations and maintenance. Additionally, Project parameters including number of structures, foundation types, and cable parameters remain unchanged. As such, no change has been made to the extent of the array area, as defined within the draft Development Consent Order (DCO).
8. Further engineering design and procurement work, informed by additional geophysical, geotechnical and environmental survey work, undertaken post-consent (if granted), will confirm the final layout of infrastructure. Final details will be set out in a design plan to be submitted to and approved by the MMO, following consultation with Trinity House, the Maritime and Coastguard Agency (MCA) and United Kingdom Hydrographic Office (UKHO) prior to commencement of the licensed works, in line deemed Marine Licence condition 13 (see condition 13(1)(a), Part 2, Schedule 10 of the dDCO [document 3.1].
9. The location and size of the ORBA was decided using various factors. MRSea based analysis was used to generate estimates of distribution and abundance, underpinned by observations of guillemot recorded in the Digital Aerial Survey (DAS) imagery (Scott -Hayward et al., 2014). This produced month by month density distribution mapping for the period March 2021 to August 2023 that identified hotspots within the array area plus 2 km buffer.
10. There were some commonality in the hotspots between the 2021 and 2022 surveys with denser concentrations of guillemots recorded in the north and east of the area of interest (Figures 3.1 - 3.4 Appendix 12.6) particularly within the months of April and August both in 2021 and 2022.
11. The MRSea data (Appendix 12.6) strongly agreed with the design based density estimates, which also show a general pattern of higher densities of guillemot and razorbill to the north of the array area (see Figures 3.31 – 3.33 and 3.37 – 3.39)
12. The introduction and size of the ORBA has been made possible through continued engagement with the relevant oil and gas operators who have interests which overlap with the Project, i.e. due to the presence of oil and gas platforms within or adjacent to the array area. Since the Application, the Applicant has been able to agree the principles for co-existence between the Project and access arrangements to the Malory platform with Perenco, specifically for helicopter transfers to and from this platform. Confidence in the likely final protective provisions for this operator within the DCO for the Project has therefore allowed further engineering work to be undertaken to support additional mitigation of the impact to auk species through a reduction in the area within which WTGs and OPs may be placed.

13. The introduction of the ORBA has resulted in a reduction in the summed mean seasonal peak abundance of guillemot from 27,653.3 birds in the array area plus 2 km buffer (Appendix 12.1 Offshore and Intertidal Ornithology Technical Baseline AS1-064 Version 1) to a summed mean seasonal peak abundance of 23,586 guillemot in the WTG area, plus 2km buffer (Appendix 12.1 Offshore and Intertidal Ornithology Technical Baseline, Version 2, this document).
14. The offshore ECC presented within the Environmental Statement (ES) that supported the DCO Application included two routeing options within the inshore area of the cable route, a northern and a southern route. The northern route was included as it is situated north of the Inner Dowsing sandbank and thus avoided impacts to this designated feature. The southern route was also included as the northern route passes through aggregates Area 1805 which has an Exploration and Option agreement with The Crown Estate, although this was due to expire on 31st August 2024.
15. It has now been confirmed that the option on this area has been extended by TCE until 2025 (pers. comms. Hansons via email 1st May 2024), with a Marine Licence Application (MLA/2024/00227) having been made by the agreement holder on 25th April 2024 to permit aggregate extraction within the site. As such, it is clear that the agreement holder intends to take up the option over this area of the seabed for aggregate extraction, and therefore it is no longer a viable option for the Project to pursue. Consequently, the Project has excluded the northern route from the offshore ECC.

1.3 Purpose of the Document

16. The aim of this report is to present the results from offshore and intertidal bird surveys, to determine the species that characterise the baseline environment, and to determine which are of relevance to the assessment of potential impacts from the Project, specifically for the area of the array area which does not overlap with the ORBA. The data sources used to define the baseline characteristics include site-specific DAS, vantage point and landfall surveys for offshore ornithology, alongside existing data sources extracted from a desk-based review.
17. This report is primarily based on information on ornithological receptors in the Project WTG area and associated buffer from the 30 consecutive months of DAS undertaken between March 2021 and August 2023. Data were used to determine:
    - Abundance and density estimates of birds (monthly and for bio-seasons);
    - Bird behaviours (flying and sitting on the water);
    - Spatial distribution within the site and across bio-seasons.

1.4 Study Area

18. The study area for the offshore ornithological receptors covers 757.8km^2, covering the Project WTG area and a 4km surrounding buffer, the Export Cable Corridor (ECC) and the cable landfall area. Within the assessment, the high levels of mobility of birds were also taken into account, recognising that some recorded birds may nest outside of the Project survey area but fly into or across the area at different times of the year for feeding and/or migration.

19. The study area for offshore ornithology and its relation to the Project is presented in Figure 1.1.

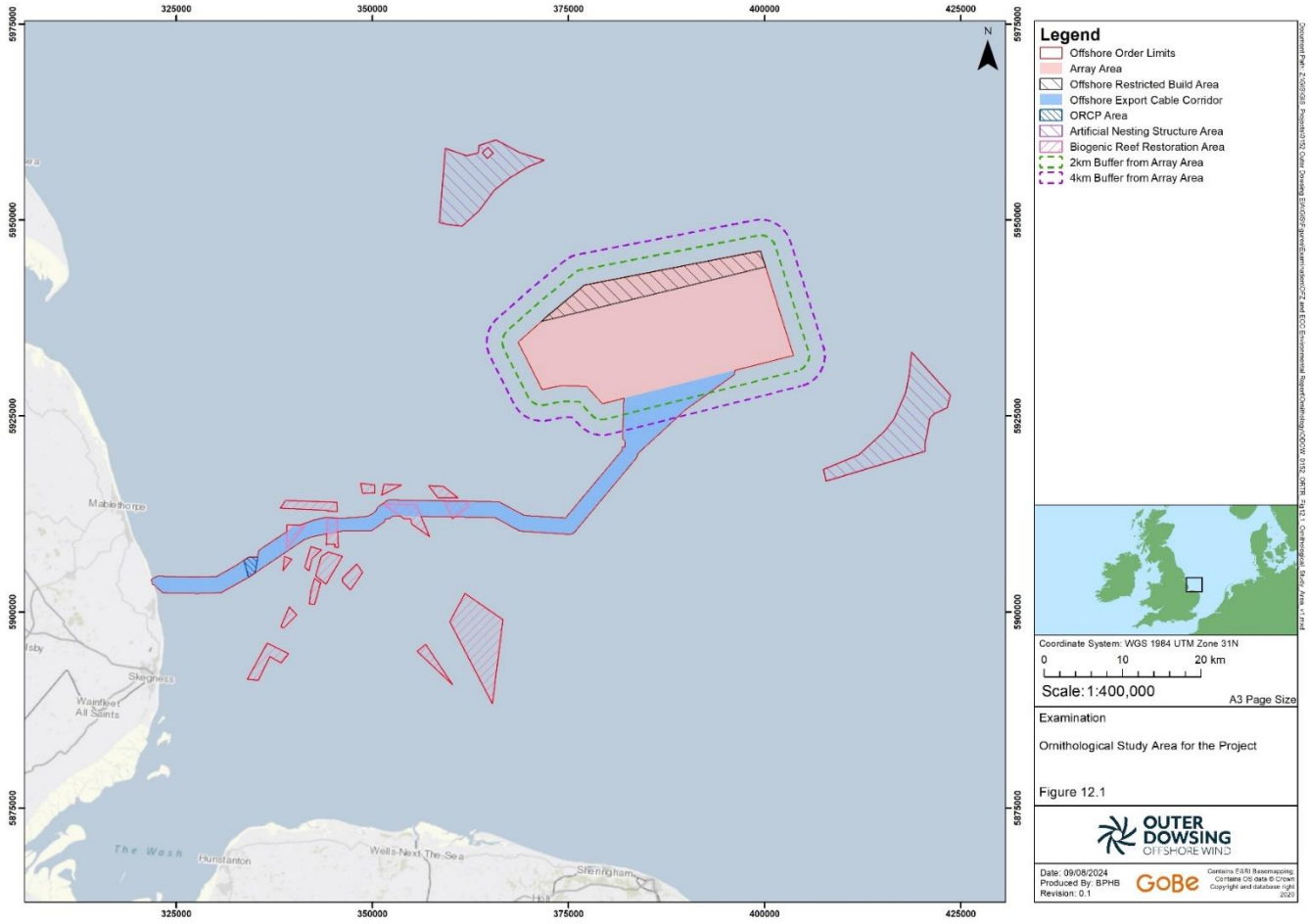

Figure 1.1. Offshore Order Limits relevant to offshore Ornithology.

1.5 Nomenclature

20. Throughout this 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 2022" column of the list of English and scientific names prepared by the British Ornithologists' Union (BOU, 2023).

2 Ornithological Data to Inform Baseline

2.1 Key Data Sources

21. The data sources in Table 2-1 provide species-specific information on the distribution and abundance of birds in the Project study area.

Table 2-1. Key sources of ornithological data used to characterise the baseline environment for the Project.

Source	Date	Summary	Coverage of study area
Outer Dowsing DAS data.	2021 – 2023	DASs conducted monthly by HiDef between March 2021 and August 2023.	Surveys covered the AfL array area +4km buffer, which incorporates the Project array area, +4km buffer (840.1km^2). The WTG area +4km buffer (757.8km^2) is a subset of the overall DAS survey area.
JNCC – red-throated diver, little gull and common scoter winter numbers in the Greater Wash survey report (Lawson *et al.,* 2016).	2002 - 2008	DASs undertaken to assess the importance of the Greater Wash to red-throated diver, little gull and common scoter.	Coverage of inshore areas and Offshore ECC relevant to the Project.
Wildfowl and Wetlands Trust – Aerial surveys of waterbirds in the UK.	2004-2009	Aerial surveys of waterbirds around the UK.	Coverage of inshore waters relevant to the Project from survey grids GW4, GW8, GW9 and GW10.
British Trust for Ornithology (BTO) Non-Estuarine Waterbird Surveys (NEWS).	1984 - 2016	NEWS provides recordings focused on intertidal habitats along the UK coastline. These were conducted in 1984/1985, 1997/98, 2006/07 and 2015/16.	Covers the Offshore ECC and cable landfall.
BTO Wetland Bird Survey (WeBS).	Annual Reports	Annual survey reports of wetland waterbirds. Most recent being Woodward *et al.*, (2024).	Coverage of UK intertidal and wetland zones. Source contains information which can be drawn upon at a Project specific scale,

Source	Date	Summary	Coverage of study area
			or a wider regional scale.
Census of kittiwake breeding on offshore oil and gas platforms.	July 2022 & June 2023	Two Project led surveys of kittiwake breeding on oil and gas platforms in proximity to the Project array area. Undertaken during July 2022 and June 2023.	All oil and gas platforms within 20km of the Project array area.
Potential impacts of offshore wind farms on birds	Various dates	Data on seabird populations and demographic rates for use in assessments e.g. Mitchell *et al.,* (2004); BirdLife International (2004); Eaton *et al.,* (2015); Musgrove *et al.*, (2013); Furness, (2015); Horswill *et al.*, (2017), JNCC (2020); Brenchley *et al.*, (2013)	These sources contain information which can be drawn upon at a Project specific scale, or a wider regional scale.
Bird breeding ecology	Various dates	Information on the breeding ecology of various bird species e.g. Cramp and Simmons (1977-94); Del Hoyo *et al.*, (1992-2011); Robinson (2005).	Generic information applicable to the Project ornithological receptors.
Bird distribution	Various dates	Publicly available reports of bird distribution in UK waters e.g. Stone *et al.*, (1995); Brown and Grice (2005); Kober *et al.*, (2010); Balmer *et al.* (2013); WWT (2013); Brenchley *et al.*, (2013). Waggitt et al., (2020).	UK wide coverage with information that can be drawn upon at a Project specific scale, or a wider regional scale. Also covers ANS areas of search, and ORCPs.
Bird migration and foraging movements	Various dates	Bird movements during breeding season foraging trips and migratory movements e.g. Wernham *et al.*, (2002); Thaxter *et al.,* (2012); Woodward *et al.,* (2019).	These sources contain information which can be drawn upon at a Project specific scale, or a wider regional scale. Also covers ANS areas of search, and ORCPs.

2.2 Digital Aerial Surveys

2.2.1 Digital Aerial Survey Methodology

22. A programme of high-resolution DAS took place between March 2021 and August 2023, conducted by HiDef Ltd. Surveys consisted of 2.5km-spaced transects across the Project AfL array area (435.7km^2) +4km buffer, creating an overall survey area of 840.1km^2. An additional monthly survey was carried out between March and August 2022 providing two monthly surveys (doubling survey effort) for these months. Although the full AfL array area +4km buffer was surveyed, for the purposes of the updated assessment, the ornithology study area encompasses the WTG area +4km buffer. Therefore, the data presented in this report is primarily based on this reduced area, not the full AfL area +4km buffer, unless otherwise stated. Notably all abundance and density estimates used to inform the assessments and presented throughout the baseline report are based on the reduced area (i.e., the Project WTG area).
23. Surveys were undertaken using an aircraft equipped system with four HiDef Gen II cameras with sensors set to a resolution of 2cm Ground Sample Distance (GSD) aligning with the best practice guidance from Natural England (Parker *et al.*, 2022a). Each camera sampled a strip of 125m width, separated from the next camera by ~25m, thus providing a combined sampled width of 500m within a 575m overall strip. The survey aimed to achieve a minimum of 15% coverage of the survey area, and data from two out of the four cameras were processed to achieve this. This ensured the survey had sufficient coverage and number of transects for precise abundance and density estimation, with the remaining unprocessed data archived. The survey dates and area coverage for the surveys are provided in Table 2-2 below. A figure outlining the project survey design is shown below in Figure 2.1.
24. Surveys were flown at a height of approximately 550m above sea level (ASL; ~1800'). Flying at this height ensures that there is reduced risk of flushing species that are easily disturbed by aircraft noise. Thaxter *et al.*, (2016) recommends a minimum flight altitude of 460 – 500m ASL.

Table 2-2. Dates and coverage of digital aerial surveys of the Project study area included in the ES.

Survey date	Area covered (km^2)	Area covered (%)	Total number of transects analysed	Total length of transects analysed (km)
22 March 2021	151.84	16.4	22	607.36
04 April 2021	151.97	16.4	22	607.88
12 May 2021	152.19	16.4	22	608.74
09 June 2021	151.38	16.4	22	605.53
24 July 2021	151.68	16.4	22	606.71
14 August 2021	152.13	16.4	22	608.53
07 September 2021	151.71	16.4	22	606.83
09 October 2021	152.23	16.5	22	608.92
02 November 2021	152.07	16.4	22	608.29
15 December 2021	151.63	16.4	22	606.51
06 January 2022	151.63	16.4	22	606.50

Survey date	Area covered (km^2)	Area covered (%)	Total number of transects analysed	Total length of transects analysed (km)
23 February 2022	151.65	16.4	22	606.59
11 March 2022	152.19	16.4	22	608.74
22 March 2022	152.29	16.5	22	609.15
02 April 2022	151.55	16.4	22	606.22
15 April 2022	151.94	16.4	22	607.75
02 May 2022	151.53	16.4	22	606.13
17 May 2022	152.28	16.5	22	609.14
09 June 2022	151.75	16.4	22	607.01
21 June 2022	151.18	16.3	22	604.74
04 July 2022	151.89	16.4	22	607.55
16 July 2022	152.29	16.5	22	609.17
08 August 2022	152.16	16.4	22	608.66
23 August 2022	151.91	16.4	22	607.65
13 September 2022	152.27	16.5	22	609.01
25 September 2022	152.22	16.4	22	608.87
10 October 2022	151.98	16.4	22	607.94
07 November 2022	147.99	16.0	22	591.95
13 December 2022	150.94	16.3	22	603.76
26 January 2023	151.49	16.3	22	605.98
10 February 2023	152.01	16.4	22	608.31
24 March 2023	152.52	16.5	22	610.07
05 April 2023	152.25	16.5	22	609.01
03 May 2023	151.36	16.4	22	605.42
17 June 2023	150.97	16.3	22	603.88
05 July 2023	151.75	16.4	22	606.99
10 August 2023	151.84	16.4	22	607.35

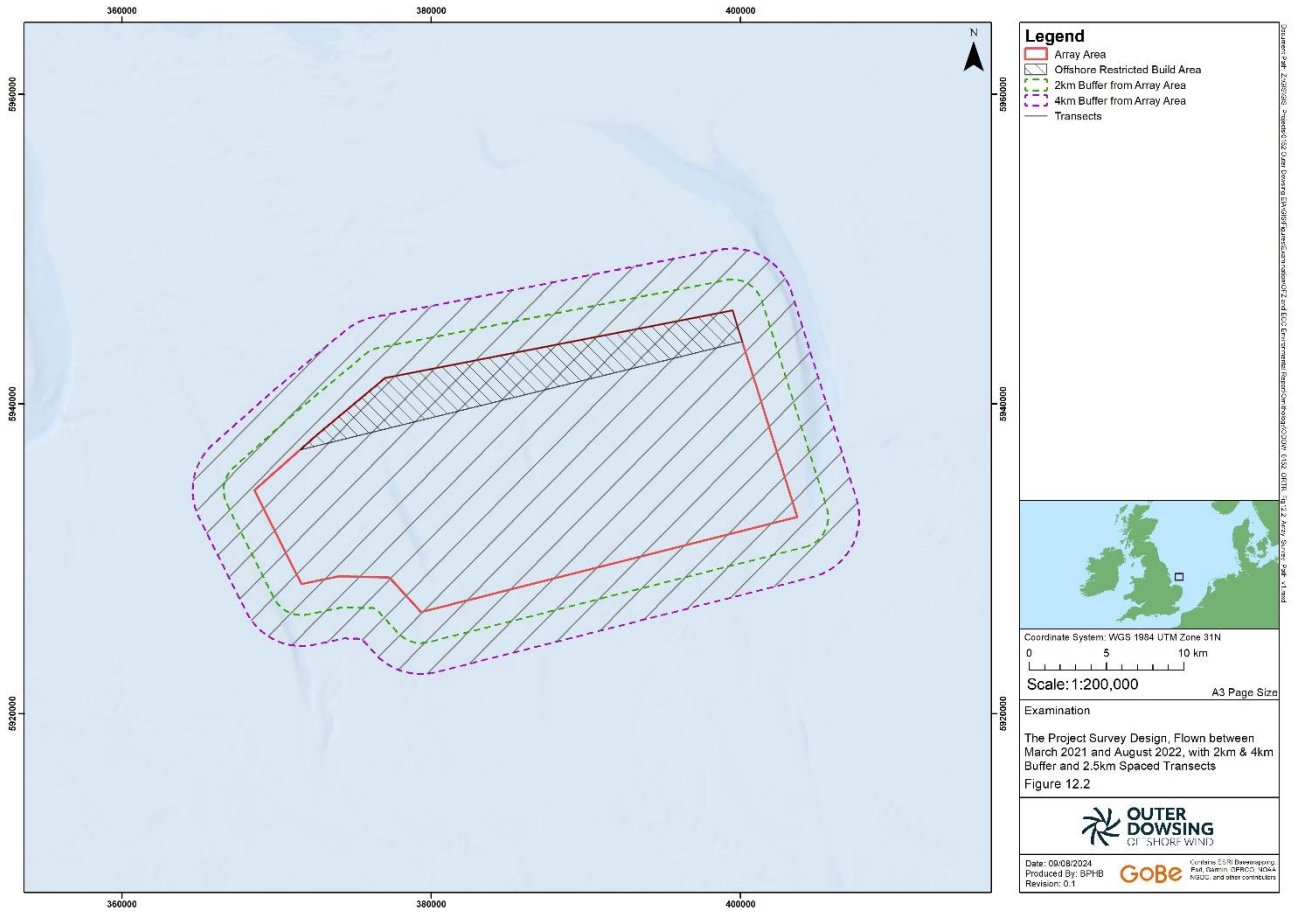

Figure 2.1. The Project survey design, flown between March 2021 and August 2023, with 2km & 4km buffer and 2.5km spaced transects.

2.2.2 Image analysis

25. Images were analysed by trained reviewers who located, identified and recorded all birds in each image. Where identification to species was not possible, a group level was assigned (e.g., 'Shearwater species'). The grouping for birds not identifiable to species level is provided in Table 2-3. Additional behavioural information was also recorded, including whether the bird was sitting, loafing on land or other objects, flying, diving, or taking off. Detail on approximate age, sex and any other details of interest was also recorded where possible.

26. To ensure high data quality, an internal quality assurance (QA) process was carried out on the data from each survey. A 'blind' review of 20% of the raw data was carried out and results compared to those of the original analysis. If 90% agreement was not achieved during the QA process, then corrective action was initiated: the remaining data set was reviewed and where appropriate, the failed reviewer's data discarded and all the data re-reviewed.

Table 2-3. Groupings for birds not identifiable to species level.

Species	Species Grouping Level 1	Species Grouping Level 2	Species Grouping Level 3		Species Grouping Level 4
Fulmar	NA	NA	NA	NA	Fulmar/gull species
Lesser black-backed gull	Large gull species	Unknown gull species	NA		
Great black-backed gull					
Herring gull					
Kittiwake	Small gull species		Tern/small gull species	Auk/small gull species	
Little gull					
Black-headed gull					
Common gull					
Sandwich tern	NA	Tern species		NA	NA
Common tern	Arctic/common tern ('Commic tern')				
Arctic tern					
Arctic skua	Skua species	NA	NA	NA	
Great skua					
Red-throated diver	Diver species	NA	Large auk/diver species	NA	
Guillemot	Large auk	Auk species			

Species	Species Grouping Level 1	Species Grouping Level 2	Species Grouping Level 3		Species Grouping Level 4
Razorbill				Auk/small gull species	Auk/shearwater species
Little Auk	Small auk		NA		
Puffin					
Manx shearwater	Shearwater species	NA	NA	NA	
Curlew	Wader species	NA	NA	NA	NA

2.3 Intertidal bird surveys to inform the baseline of the landfall area

27. A total of 14 hour long vantage point surveys were carried out at the proposed Wolla Bank landfall site through the autumn of 2022 and the winter of 2022/2023. These surveys focussed on waterbird species, along with any species noted that were listed on Annex 1 of the Birds Directive, or any large groups of other species of conservation concern.

2.4 Existing Datasets to Inform Baseline of the Array Area and ORCP locations

28. The DAS carried out over the array area from March 2021 to August 2023 found 25 species of seabird utilising the area and two species of terrestrial bird (curlew and oystercatcher) passing through it. The most abundant species found were guillemot (maximum abundance 12,999 birds), razorbill (maximum abundance 5,244 birds) and kittiwake (maximum abundance 5,479 birds). Further information on the Project array area habitat is provided in the species accounts below.
29. Site specific data were augmented by datasets for offshore bird distribution, numbers and migration as outlined in Table 2-1.

2.5 Existing datasets to inform the Baseline of the ANS search area

30. Assuming a requirement to provide compensation for impacts on breeding kittiwakes from FFC SPA, areas suitable for the siting of artificial nesting structures were considered. The search was refined through consideration of distance to existing colonies (in order to avoid competition with existing breeders but be close enough to attract immigrant first time breeders), wind farms, and densities of forage fish (Kittiwake Compensation Plan 7.7.1).
31. Details of SPA locations were taken from the JNCC Website[1]. Locations of OWF's and relevant published documents from previous applications were collated from the National Infrastructure Portal[2], as well as other sources where appropriate. Data on densities of forage fish were taken from Jensen *et al*., (2011).

[1] Available at https://jncc.gov.uk/our-work/list-of-spas/ [accessed September 2024]
[2] Available at https://infrastructure.planninginspectorate.gov.uk/ [accessed September 2024]

2.6 Existing Datasets to Inform Baseline of the Offshore ECC

32. The baseline of the Offshore ECC is based on Lawson *et al.*, (2016), which provides information on the abundance of red-throated diver, little gull and common scoter in the Greater Wash SPA survey area. Data collection (DAS) was undertaken between 2002 and 2008. The resulting mean peak population estimate for these species were 1,787, 2,153, and 3,517 individuals, respectively. Of these species, little gull is not considered at risk of displacement in the Offshore ECC, and therefore further consideration below is given to red-throated diver and common scoter only.
33. The Project Offshore ECC covers 151.2km^2 of the Greater Wash SPA. Based on these data and the overlap of the Offshore ECC with the Greater Wash SPA, the average and maximum predicted densities of common scoter and red-throated diver in the Offshore ECC are presented in Table 2-4 below. The estimated number of birds present in this overlap is based on the average density of birds (per km²) within the Offshore ECC area multiplied by the overlap area (km²), which results in a mean estimate of 35.1 for red-throated diver and 0.6 for common scoter within the Greater Wash SPA section of the Project Offshore ECC at any one time.

Table 2-4. Predicted average and maximum density of common scoter and red-throated diver in the Project Offshore ECC based on data by Lawson *et al.*, (2016).

Species	Average density in the Offshore ECC (birds/km^2)	Maximum density in the Offshore ECC (birds/km^2)
Common scoter	0.004	0.029
Red-throated diver	0.232	0.692

2.7 Data analysis

2.7.1 Data treatment

34. For presentation in this report, raw count data were trimmed to the WTG area and data processed to estimate density, abundance and distribution of key species and species groups within this area.
35. Records which were identified to species level were separated out from those identified to group level. Birds identified to group level only were apportioned to species level as outlined in Table 2-3 above.

36. The most appropriate method to incorporate data from months during which two surveys were undertaken (between March and August 2022) was to calculate the mean abundance or density of birds within each month for which two surveys were undertaken. The mean monthly abundance or density was then used within the assessments as normal. For example, the mean seasonal peak abundance was then calculated across the same bio-season between years, using the mean abundance from May 2022, with the single survey abundance from May 2021 and May 2023. Assessing impacts of collisions or displacement is carried out on a monthly, or bio-seasonal basis. Assessing against a mean monthly population ensures that impacts are less likely to be under or overestimated. Likewise, for displacement, using an average acknowledges that displacement mortality is not instant. It cannot be assumed that displacement causes mortality at any given rate in response to individual episodes of displacement (especially in species like auks that feed in the water column and are therefore able to find adequate alternative foraging easily). It is more likely that displacement causes mortality in response to multiple episodes of displacement. As such, the impact of displacement should be considered using the average monthly population of the site over the two surveys, rather than the maximum.

2.7.2 Population Estimates

37. Population estimates for seabirds recorded in the Project WTG area, WTG area +2km buffer, and WTG area +4km buffer were calculated for each species.
38. Each strip transect was treated as a statistically independent random sample from the site. The length and breadth (i.e. the width of the field of view of the camera) of each transect were multiplied together to give the transect area; dividing the number of observations for each species on each transect by the transect area gives a point estimate of the density of that species for the transect. The density of animals at the site (and hence the population size by multiplying by the area of the site), the standard deviation, the 95% confidence intervals (CIs) and coefficient of variance (CV) were then estimated using a nonparametric block bootstrap method with replacement (Buckland *et al.*, 2001), to ensure equal transect effort was sampled across each bootstrap iteration. This was done by using transect ID as the sampling unit with replacement. A group of transects were randomly sampled until their total length equalled approximately the same length as the total survey length.
39. A total of 1,000 bootstrap iterations were performed from which the mean and standard deviation of the sampled means were calculated, as well as the relative standard error (or CV) as defined by the standard deviation divided by the mean. Data were processed in the R programming language (R Core Team, 2021; version 4.1.1). The upper and lower confidence limits (CLs) define the range that the population estimate falls within with 95% certainty. The CV is a measure of the precision of the population and density estimates.
40. For most species these abundance estimates relate to absolute abundance, but for diving species such as auks, the abundance relates to relative abundance due to a proportion of animals being submerged at the time of survey.

2.7.3 Apportioning of Unidentified Birds

41. As per Table 2-3, birds which were not possible to identify to species were categorised as belonging to a higher-level group. Where it was not possible to assign a bird to the species group level, the bird was categorised as potentially belonging to a number of different higher-level groups. To avoid underestimating abundances due to the omission of birds not identifiable to species, the proportions of positively identified birds within a species group were assigned to the pool of unidentified birds from that species group, on a survey by survey basis. All confidence levels of species identifications (i.e. those identified as possible, probable or definite of a given species) were used in the analysis. Apportioned data is presented throughout the results of this technical baseline. Unapportioned data is only presented in the model-based results (MRSea) and auk data that has been corrected for availability bias (Annex C - Availability bias counts for Auks). All unapportioned species grouping data can be provided on request.

2.7.4 Correction for Availability Bias

42. During DAS, a proportion of seabirds that spend any time underwater will not be detectable at the surface. For the project, this is predominantly applicable to auk species such as guillemot, razorbill and puffin which undertake regular foraging dives underwater. To account for this, the density and abundance estimates therefore need to be corrected to allow for this 'availability bias'.
43. A species-specific correction factor was applied for each auk species recorded on the sea surface. For guillemots and razorbills, correction factors were derived from Thaxter *et al.*, (2010), estimating that the proportion of time spent at the surface for guillemots and razorbills was 0.7595 and 0.8182 respectively. For puffins, results from data loggers reported in Spencer (2012) were used, showing that the proportion of time spent at the surface was 0.8584.
44. The species-specific correction factor has been applied throughout the technical baseline results for all auk species. The overview of all apportioned DAS survey data in Annex B – Counts of Offshore and Intertidal Ornithological Receptors does not include a correction for auk availability bias. The overview of all apportioned and unapportioned DAS survey that includes a correction for auk availability bias can be found in Annex C - Availability bias counts for Auks.

2.7.5 Flight Direction of seabirds

45. Windrose diagrams were created to present the flight direction of seabirds, where each cardinal point (north, east, south, west, and intercardinal point (north-east, south-east, south-west, north-west) indicates the total number of birds recorded flying in that direction from a given survey. Flight direction rose diagrams have been presented for each survey. These windrose diagrams were created from the array area; however, these data are still applicable to the WTG area, which is a subset of the larger array area.

2.7.6 Flight heights

46. Flight heights were calculated from images of flying birds where sample sizes and image suitability allowed. Flight height was derived from the body length of known species, when compared to body lengths of birds flying at a known height (in this case, birds flying low enough for their reflection on the water to be visible). The flight height data were calculated from the array area; however, these data are still applicable to the WTG area, which is a subset of the larger array area.

2.7.7 Bio-seasons

47. Bird behaviour and abundance will vary depending upon the bio-season (species specific, ecologically defined periods related to breeding, migration, and non-breeding). The bio-seasons used here are the biologically defined minimum population scales (BDMPS) in Furness (2015). The use of the BDMPS bio-seasons has been agreed through the Offshore and Intertidal Ornithology Expert Topic Group (ETG) (Volume 1, Chapter 12: Offshore and Intertidal Ornithology, Section 12.3).
48. Six bio-seasons are defined in this report, though not all six are applicable for all seabird species, with different combinations used depending on the biology and life history of each species. The bio-seasons are as follows:
    - Return migration: when birds are migrating to breeding grounds;
    - Migration-free breeding: when birds are attending colonies, nesting and provisioning young, and no birds within the population are migrating;
    - 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 all migration has ceased;
    - Breeding: Bio-season from modal return to the colony until the modal departure from the colony at the end of the breeding season; and
    - Non-breeding: bio-season from modal departure from the colony at the end of the breeding season to modal return to the colony the following year.
49. The bio-seasons used for the species accounts in Section 2 are outlined in Table 2-5. Notably, bio-seasons for little gull were not included in Furness (2015), and so bio-seasons were based on Cramp & Simmons (1983) and expert judgement based on data presented in Table 2-5.

Table 2-5. Bio-seasons used for detailed species accounts, based on Furness (2015) unless specified otherwise.

Species	Return Migration	Breeding	Post-breeding Migration	Migration-free Winter	Non-breeding
Kittiwake	January-February	March-August	September-December	NA	NA

Species	Return Migration	Breeding	Post-breeding Migration	Migration-free Winter	Non-breeding
Little gull[1]	NA	May-August	NA	NA	September-April
Common gull[2]	NA	May-August	NA	NA	September-April
Great black-backed gull	NA	April-August	NA	NA	September-March
Herring gull	NA	March-August	NA	NA	September-February
Lesser black-backed gull	March	April-August	September-October	November-February	NA
Sandwich tern	March	April-August	September	NA	NA
Common tern	April	May-August	September	NA	October-March
Guillemot	NA	March-July	NA	NA	August-February
Razorbill	January-March	April-July	August-October	November-December	NA
Puffin	NA	April-August	NA	NA	September-March
Red-throated diver	NA	May-August	NA	NA	September-April
Gannet	December-February	March-September	October-November	NA	NA
Manx Shearwater	March	April-August	September-October	NA	NA
Fulmar	December	January-August	September-October	NA	November

[1] Little gull bio-seasons defined from Cramp & Simmons (1977); [2] Common gull bio-seasons defined from NatureScot (2020).

2.7.8 Highly Pathogenic Avian Influenza

50. Highly Pathogenic Avian Influenza (HPAI) virus was identified as a concern within seabird populations during 2022 (e.g. EFSA, 2023). Natural England have noted that the influence of HPAI may be apparent within the DAS data for offshore windfarm (windfarms) projects undertaking surveys from June 2022 onwards (Natural England, 2022).

51. The Project undertook DAS of the array area and a 4km buffer around the proposed array area from March 2021 to August 2023 (inclusive). A single survey per month was undertaken every month, with two surveys per month undertaken between March 2022 and September 2022.

52. To determine whether the DAS data recorded before the HPAI outbreak is representative of seabird abundance and densities during a standard year (pre-HPAI), an assessment of comparable datasets from other windfarms projects in the area, as well as regional datasets was carried out.

53. Table 2-6 presents the windfarm projects that have been included within this assessment due to their close proximity to the array area. As they are in the same region of the North Sea, it is considered reasonable to assume that they may share similar characteristics influencing seabird usage and distributions.

Table 2-6. Offshore windfarm projects considered within the DAS data comparison.

Windfarm project	Distance from array	Date of DAS
Hornsea Project Four	20km (north-east)	April 2016 to March 2018
Sheringham Shoal Extension Project (SEP)	26km (south)	May 2018 and April 2020.
Dudgeon Extension Project (DEP)	14km (south)	

54. The data have also been compared to the Waggitt *et al.* (2019) dataset, a modelled density map of seabirds in the North Sea region. The census data used in the report analysis was collated from varying sources, dating from 1980 to 2018 and therefore any comparison should be caveated due to the use of boat-based techniques.

55. Mean and peak densities for each species (i.e., kittiwake; guillemot; razorbill; puffin; gannet; sandwich tern and red-throated diver) for the relevant bio-seasons as per Furness (2015) were collated for comparison with the Project's DAS data. It was assumed that HPAI would have not spread before the 2022 breeding season began, and therefore the beginning of the species-specific breeding season could be used as a proxy for the start of HPAI.

56. A description of the DAS data is found in Section 2. In months that had two surveys, the mean value has been presented. The mean densities and mean peak densities per bio-seasons (Table 2-7; Table 2-8) have been calculated with the appropriate months incorporated. These densities have bene derived from the array area including the ORBA. All months prior to the 2022 breeding season are assumed to be unimpacted by HPAI and have been included in the "pre-HPAI" calculated bio-season mean densities.

57. The Hornsea Project Four density data were extracted for the key species from the Environmental Statement (ES) Ornithology Report Appendix B. The density data were previously apportioned and corrected for all species. The estimates were analysed using the Marine Renewables Strategic environmental assessment (MRSea) R package, for all species except Sandwich tern and Red-throated diver. The array +4km buffer was used for all species.

58. The Sheringham Shoal Extension Project & Dudgeon Extension Project density data were extracted for the key species from the Environmental Statement (ES) Ornithology Report Appendix 1. The density data were previously apportioned to account for unidentified individuals to species level and for the proportion of birds flying, sitting and the combination of other behaviours. Sandwich tern data were analysed using MRSea. The array +4km buffer was used for all species.
59. The data from Waggitt *et al.* (2019) has been extracted from the distribution maps produced from the report at 10km resolution, created from species distribution models. The data were clipped using GIS to a 50km buffer around the Project array where the mean, minimum and maximum density values were extracted. The densities within the Project array +4km buffer were also extracted. These data were included in the comparison to highlight any differences in the Project's DAS to historical regional data. Both the collection methods and age of this data must be considered when making comparisons to the abundances and densities of seabirds collected by the Project.
60. As per Table 2-7 and Table 2-8 the Projects densities were higher or comparable to the densities presented by other projects and Waggitt *et al.* (2019), importantly for key species: kittiwake, guillemot and gannet. Therefore, it was considered reasonable to assume that the Project's DAS data are representative of a standard year pre-HPAI and as such were used within the assessments as normal. In addition, there were no obvious impacts to the densities of birds due to HPAI in the post-HPAI DAS data.
61. It is important to note that there are large differences in the distribution of the seabirds annually. Some variation between different months within the same dataset are larger than the variation between projects/regional datasets. The data have been collated from surveys spanning from 1980s (Waggitt *et al.*, 2019) to Hornsea Project Four which was first collected in 2016 and more recent data collected from 2018/2019. The variation in densities could be due to the annual variation observed in seabirds due to other factors unrelated to HPAI, including prey availability and distribution.
62. Lastly, it is important to note that seabird counts at FFC SPA, the closest SPA to the Project array area, seem to be relatively unaffected by HPAI impacts to survival. For example, guillemot and razorbill counts have increased by 4.5% and 9.5% respectively, between 2017 and 2022. In addition, Butcher *et al.,* (2023) reported relatively minor impacts from HPAI at FFC SPA for kittiwake and auk species, and although gannets have been badly impacted by HPAI further North, the colony at FFC SPA reached its largest recorded size in the 2023 census.

Table 2-7. Summary of mean key species densities by bio-seasons (Furness, 2015). The densities used in this comparison have been taken from the full array area including the ORBA.

Bio-season	Outer Dowsing Windfarm		Waggitt		Hornsea Four	Dudgeon Extension Project	Sheringham Shoal Extension Project
	Pre-HPAI	Post-HPAI	Outer Dowsing Windfarm +4km	Outer Dowsing Windfarm +50km			
Kittiwake							
Return Migration	3.85	1.45	0.35	0.4	1.3	2.22	0.46
Migration-free breeding	2.51	3.24	0.18	0.22	2.02	1.56	0.09
Post-breeding migration	1.85	1.32	0.33	0.38	2.69	1.7	0.25
Guillemot							
Breeding season	12.84	13.98	0.62	0.63	8.53	7.96	2.55
Non-breeding	14.06	7.57	1.22	1.23	15.82	16.61	2.08
Razorbill							
Return Migration	5.79	6.53	0.20	0.19	0.33	0.56	0.3
Migration-free breeding	3.88	2.36	0.06	0.06	0.25	1.8	0.75
Post-breeding migration	2.89	1.22	0.18	0.16	2.51	6.52	1.37
Migration-free winter	3.39	1.88	0.11	0.21	0.63	2.21	2.24
Puffin							
Breeding season	0.14	0.17	0.02	0.03	0.10	0.05	0.02

Bio-season	Outer Dowsing Windfarm		Waggitt		Hornsea Four	Dudgeon Extension Project	Sheringham Shoal Extension Project
	Pre-HPAI	Post-HPAI	Outer Dowsing Windfarm +4km	Outer Dowsing Windfarm +50km			
Non-breeding	0.83	0.20	0.03	0.02	0.13	0.04	0.01
Gannet							
Return Migration	0.11	0.09	0.06	0.06	0.18	0.06	0.02
Migration-free breeding	0.34	0.72	0.12	0.13	0.63	0.48	0.09
Post-breeding migration	0.23	0.64	0.12	0.14	0.84	0.99	0.5
Sandwich tern							
Return Migration	0.24	-	-	-	0.00	1.16	0.32
Migration-free breeding	0.05	0.13	-	-	0.00	0.91	0.81
Post-breeding migration	0.01	0.00	-	-	0.01	0.76	0.6
Red-throated diver							
Return Migration	0.28	0.00	-	-	0.00	0.11	0.21
Migration-free breeding	0.01	0.00	-	-	0.00	0.01	0.00
Post-breeding migration	0.01	0.01	-	-	0.00	0.03	0.11
Migration-free winter	0.01	0.02	-	-	0.00	0.01	0.02

Table 2-8. Summary of mean peak key species densities by bio-seasons (Furness, 2015). The densities used in this comparison have been taken from the full array area including the ORBA.

Bio-season	Outer Dowsing Windfarm		Waggitt		Hornsea Four	Dudgeon Extension Project	Sheringham Shoal Extension Project
	Pre-HPAI	Post-HPAI	Outer Dowsing Windfarm +4km	Outer Dowsing Windfarm +50km			
Kittiwake							
Return Migration	10.19	2.9	0.45	0.51	4.35	8.02	1.74
Migration-free breeding	3.23	5.05	0.19	0.23	3.44	2.42	0.22
Post-breeding migration	6.13	4.14	0.42	0.48	6.24	4.01	0.46
Guillemot							
Breeding season	32.77	28.75	0.91	0.94	11.4	25.4	5.01
Non-breeding	34.39	25.5	1.35	1.39	39.45	57.81	5.21
Razorbill							
Return Migration	7.02	11.66	0.24	0.23	0.37	1.12	0.45
Migration-free breeding	10	4.28	0.07	0.06	0.39	6.36	2.86
Post-breeding migration	5.12	2.38	0.21	0.2	4.41	12.24	3.65
Migration-free winter	3.79	2.48	0.22	0.22	0.76	2.74	3.39
Puffin							

Bio-season	Outer Dowsing Windfarm		Waggitt		Hornsea Four	Dudgeon Extension Project	Sheringham Shoal Extension Project
	Pre-HPAI	Post-HPAI	Outer Dowsing Windfarm +4km	Outer Dowsing Windfarm +50km			
Breeding season	0.41	0.31	0.03	0.03	0.25	0.06	0.04
Non-breeding	2.46	0.37	0.04	0.03	0.48	0.12	0.05
Gannet							
Return Migration	0.31	0.24	0.06	0.07	0.35	0.11	0.04
Migration-free breeding	1.01	1.22	0.17	0.19	0.8	1.26	0.18
Post-breeding migration	0.33	1.41	0.17	0.18	1.00	1.19	1.42
Sandwich tern							
Return Migration	0.28	-	-	-	0.00	2.48	0.92
Migration-free breeding	0.05	0.13	-	-	0.00	0.91	0.81
Post-breeding migration	0.02	0.01	-	-	0.01	1.85	1.68
Red-throated diver							
Return Migration	0.30	0.00	-	-	0.00	0.15	0.55
Migration-free breeding	0.02	0.01	-	-	0.00	0.02	0.01
Post-breeding migration	0.03	0.01	-	-	0.00	0.05	0.22

Bio-season	Outer Dowsing Windfarm		Waggitt		Hornsea Four	Dudgeon Extension Project	Sheringham Shoal Extension Project
	Pre-HPAI	Post-HPAI	Outer Dowsing Windfarm +4km	Outer Dowsing Windfarm +50km			
Migration-free winter	0.02	0.03	-	-	0.00	0.01	0.03

3 Results

3.1 Intertidal Survey Results

63. Results from intertidal bird surveys carried out over the autumn of 2022 and the winter of 2022/2023 are presented in Table 3-1. A total of 14 counts were made over that period on the Wolla Bank landfall site, with data collected by observers using a standard vantage point survey methodology. On each date surveyed, data were recorded during hour long watches with a focus on waterbirds, any species listed on Annex 1 of the Birds Directive, and large groups of other species of conservation concern.

Table 3-1 Summarised observations from vantage point surveys at Wolla Bank.

Species	13/09/22	29/09/22	14/10/22	24/10/22	14/11/22	29/11/22	05/12/22	20/12/22	10/01/23	24/01/23	01/02/23	13/02/23	28/02/23	27/03/23	Total
Pink-footed goose	0	0	0	2	1	0	0	0	0	0	0	0	0	0	3
Greylag goose	0	32	0	0	0	0	0	0	0	0	0	0	0	0	32
Canada goose	0	0	0	0	0	0	0	11	0	0	0	0	0	0	11
Dark-bellied brent goose	0	0	0	7	0	0	4	0	0	0	0	0	0	0	11
Shelduck	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Mallard	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
Wigeon	0	0	33	0	0	0	0	0	0	0	0	500	0	0	533
Teal	0	0	0	12	0	0	0	0	0	0	0	0	0	0	12
Pintail	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2
Eider	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Common scoter	0	0	0	18	23	13	7	10	40	14	0	0	0	15	140
Oystercatcher	2	2	0	2	0	4	2	0	3	0	3	2	0	0	20
Golden plover	23	0	0	0	34	0	0	0	0	0	0	0	0	0	57
Grey plover	0	0	0	0	0	1	0	1	1	0	0	0	0	0	3
Curlew	0	0	2	1	2	0	0	2	0	8	16	18	5	6	60
Sanderling	0	3	11	0	0	12	19	7	11	3	7	4	4	3	84
Dunlin	0	0	0	0	17	7	12	6	0	0	0	0	0	0	42
Redshank	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Black-headed gull	4	8	12	12	13	9	10	17	10	9	16	15	9	30	174
Common gull	18	11	55	10	7	16	16	32	35	12	16	59	12	19	308

Species	13/09/22	29/09/22	14/10/22	24/10/22	14/11/22	29/11/22	05/12/22	20/12/22	10/01/23	24/01/23	01/02/23	13/02/23	28/02/23	27/03/23	Total
Great black-backed gull	0	0	0	0	0	0	3	2	4	0	0	0	2	1	12
Herring gull	3	3	9	4	5	2	2	5	4	3	16	5	3	4	68
Lesser black-backed gull	0	2	2	0	2	2	1	0	0	2	2	0	1	2	16
Red-throated diver	0	0	0	0	1	1	0	0	0	0	1	1	1	1	6
Great northern diver	0	0	0	0	0	1	1	1	1	1	0	0	0	0	5
Cormorant	0	0	0	2	2	2	0	2	2	0	3	1	2	3	19
Marsh harrier	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1

64. The landfall will be implemented using the Horizontal Directional Drill technique, meaning that cables will be pulled into place without any surface activity in the intertidal zone. As such, there will be no short term impacts of disturbance and displacement through human activity within the intertidal zone, and no longer term displacement impacts through infrastructure in the intertidal area. Therefore, combined with the low numbers of birds present in the search area, it is considered that impacts from landfall will be minimal, and are therefore not considered further.

3.2 Offshore Ornithology Survey Results

65. Over the 30-month survey period (March 2021 to August 2023) the following bird species (Table 3-2) were recorded within the Project WTG area and associated 4km buffer. Several species were recorded in the Project survey area minus the ORBA in numbers deemed too low to warrant detailed species accounts; the raw data for these species is presented within Appendix B.

66. Following the recent guidance from Natural England (Parker *et al.*, 2022a) the data used for all species were from the WTG area +2km buffer except for red-throated diver where data from the WTG area +4km buffer were used (the maximum extent of the surveys).

Table 3-2. Bird species recorded in site-specific DAS of the Project WTG area plus 4km buffer.

Oystercatcher	Lesser black-backed gull
Curlew	Great black-backed gull
Great skua	Common tern
Pomarine Skua	Arctic tern
Arctic skua	Sandwich tern
Guillemot	Red-throated diver
Razorbill	Great northern diver
Puffin	Fulmar
Little auk	Sooty shearwater
Kittiwake	Manx shearwater
Black-headed gull	Gannet
Little gull	Cormorant
Common gull	Shag
Herring gull	Golden plover
Whimbrel	Whooper swan

67. Details regarding the abundance, distribution and phenology of each of the species listed in Table 3-2 are presented in the following species accounts or are covered briefly in paragraphs 183 to 193.

68. Average flight heights were calculated for five species for each of the 30 months of DAS surveys. The results are shown in Table 0-1 in Annex A.

3.3 Kittiwake

3.3.1 Digital aerial survey data

69. Kittiwake were observed within the Project WTG area in all of the 30 months surveyed. Kittiwake presence was relatively high across the Project survey area through all three bio-seasons, with a summed mean seasonal peak abundance across all seasons of 5,019 birds (Table 3-6).
70. In the WTG area +2km buffer the summed mean seasonal peak abundance was 7,144 birds.

3.3.2 Kittiwake overview

71. The nearest kittiwake colony to the Project is the Flamborough and Filey Coast SPA (FFC). This is located approximately 95km from the Project and is within the mean maximum foraging range of kittiwake plus one standard deviation (156.1±144.5km; Woodward *et al.*, 2019). Outside the breeding season, impacts on kittiwake have been compared to the UK North Sea BDMPS, consisting of 829,937 individuals during autumn migration (September to December), and 627,814 individuals during spring migration (January to February) (Furness, 2015).

3.3.3 Foraging/Usage hotspots

72. A tracking study of 20 birds breeding at the FFC SPA in 2017 found an average foraging range of 88.7km. Trips ranged in length from 3.2km to 324km, with birds travelling into the North Sea northwest and southwest of the colony (Wischnewski *et al.*, 2017). The utilisation distributions produced from the 2017 tracking data indicate that the Project is just outside the core and home foraging ranges of kittiwake from this SPA but there are high densities during the migration bio-seasons.
73. The FFC SPA is the closest SPA to the Project WTG area and using species distribution models (Cleasby *et al*, 2020) hotspots were identified on the east end of the Project footprint (Figure 3.1) using Getis-Ord hotspot analysis (Cleasby *et al*, 2020).
74. Figure 3.1 presents the foraging hotspots from kittiwakes tracked from FFC SPA. The red areas in this figure portray the area within which 99% of the tracked birds foraging took place. As can be seen, there is overlap with the north eastern corner of the WTG area. This foraging distribution is similar, but not identical, to the distribution described by the DAS data during the breeding season.

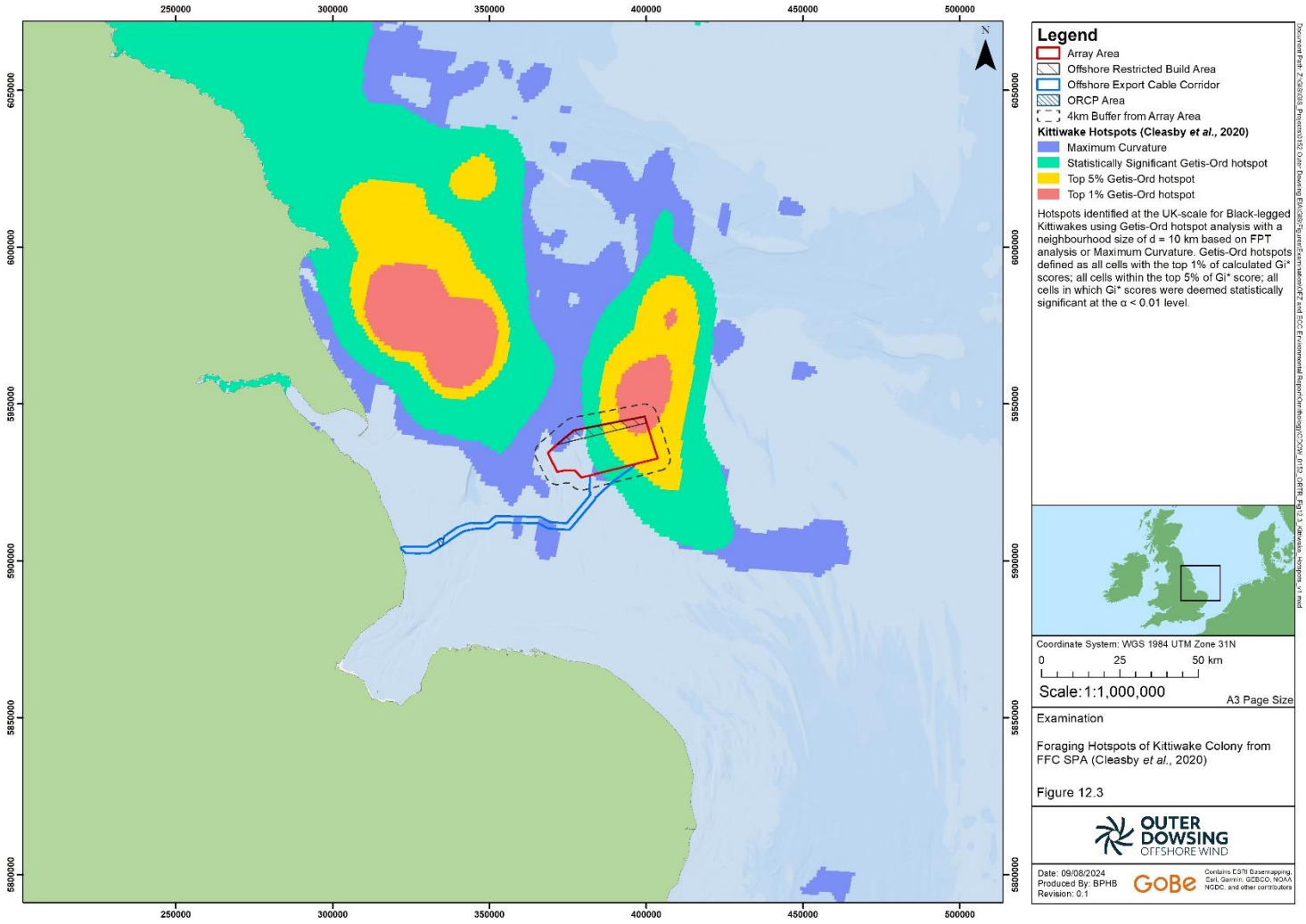

Figure 3.1. Foraging hotspots of kittiwake colony from FFC SPA (Cleasby *et al*, 2020).

3.3.4 Abundance and Phenology

75. Mean seasonal peak abundances and densities of kittiwake in the species bio-seasons (as defined in Furness 2015) are presented in Table 3-3. Estimates of monthly abundance and density within the WTG area, and monthly abundance and density within the WTG area +2km buffer are presented in Table 3-4, Table 3-5, and Table 3-6 for flying birds, birds sitting on the sea, and the total birds observed. The spatial density distribution of kittiwake within the Outer Dowsing Array Area +4km buffer is shown for three years of surveys in Figure 3.2, Figure 3.3, and Figure 3.4.

Table 3-3. Kittiwake bio-season mean seasonal peak apportioned abundance and density estimates in the Project WTG area.

		WTG area		WTG area+2km buffer	
BDMPS Bio-seasons	Months	Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)	Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)
Return migration	Jan-Feb	782 (545-1,022)	2.15 (1.50-2.80)	1,134 (841-1,451)	2.07 (1.53-2.64)
Breeding season	Mar-Aug	3,600 (2,524-4,849)	9.88 (6.92-13.231)	5,018 (3,799-6,322)	9.14 (6.92-11.52)
Post-breeding migration	Sep-Dec	637 (321-1,044)	1.75 (0.88-2.87)	993 (482-1,673)	1.81 (0.88-3.05)
Summed mean seasonal peak		5,019 (3,389-6,914)	-	7,144 (5,122-9,445)	-

Table 3-4. Kittiwake estimated apportioned abundance and estimated density of flying birds in the Project WTG area, WTG area +2km buffer.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	592	1.62	1003	1.83
Apr 21	1	1837	5.04	2579	4.7
May 21	1	237	0.65	755	1.37
Jun 21	1	152	0.41	401	0.73
Jul 21	1	647	1.77	1109	2.02
Aug 21	1	390	1.07	1890	3.44
Sep 21	1	290	0.8	476	0.87
Oct 21	1	30	0.08	55	0.1

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Nov 21	1	61	0.17	85	0.15
Dec 21	1	121	0.33	174	0.32
Jan 22	1	42	0.11	68	0.12
Feb 22	1	189	0.52	265	0.48
Mar 22	1	1237	3.39	1336	2.43
Mar 22	2	682	1.87	1227	2.24
Apr 22	1	746	2.05	1261	2.3
Apr 22	2	2026	5.56	2995	5.46
May 22	1	1211	3.32	1985	3.62
May 22	2	306	0.84	1069	1.95
Jun 22	1	114	0.31	568	1.03
Jun 22	2	683	1.87	1373	2.5
Jul 22	1	127	0.35	264	0.48
Jul 22	2	235	0.64	588	1.07
Aug 22	1	773	2.12	888	1.62
Aug 22	2	67	0.18	125	0.23
Sep 22	1	102	0.28	484	0.88
Sep 22	2	13	0.03	24	0.04
Oct 22	1	89	0.24	113	0.2
Nov 22	1	110	0.3	212	0.39
Dec 22	1	216	0.59	286	0.52
Jan 23	1	271	0.74	377	0.69
Feb 23	1	410	1.12	643	1.17
Mar 23	1	633	1.73	1050	1.91
Apr 23	1	851	2.33	1289	2.35
May 23	1	90	0.24	346	0.63
Jun 23	1	333	0.91	687	1.25
Jul 23	1	25	0.07	267	0.49
Aug 23	1	246	0.67	363	0.66

Table 3-5. Kittiwake estimated apportioned abundance and estimated density of birds sitting on the water in the Project WTG area, WTG area +2km buffer.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	1684	4.62	2621	4.78
Apr 21	1	2781	7.63	3689	6.72
May 21	1	395	1.08	656	1.2

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Jun 21	1	145	0.4	214	0.39
Jul 21	1	267	0.73	856	1.56
Aug 21	1	344	0.94	934	1.7
Sep 21	1	731	2.01	1110	2.02
Oct 21	1	19	0.05	31	0.06
Nov 21	1	46	0.13	49	0.09
Dec 21	1	19	0.05	18	0.03
Jan 22	1	13	0.03	18	0.03
Feb 22	1	193	0.53	323	0.59
Mar 22	1	1319	3.62	1691	3.08
Mar 22	2	530	1.45	920	1.68
Apr 22	1	1655	4.54	2352	4.29
Apr 22	2	1616	4.43	2597	4.73
May 22	1	1401	3.84	2102	3.83
May 22	2	518	1.42	1078	1.96
Jun 22	1	49	0.13	216	0.39
Jun 22	2	974	2.67	1320	2.41
Jul 22	1	80	0.22	92	0.17
Jul 22	2	88	0.24	217	0.39
Aug 22	1	885	2.43	928	1.69
Aug 22	2	91	0.25	350	0.64
Sep 22	1	13	0.03	328	0.6
Sep 22	2	0	0	0	0
Oct 22	1	0.08	31	42	0.08
Nov 22	1	0.12	43	139	0.25
Dec 22	1	0.1	37	54	0.1
Jan 23	1	0.76	276	332	0.6
Feb 23	1	2.12	774	1023	1.86
Mar 23	1	4.23	1542	2039	3.72
Apr 23	1	6	2188	2794	5.09
May 23	1	0.61	222	459	0.84
Jun 23	1	2.04	744	1146	2.09
Jul 23	1	0.25	92	736	1.34
Aug 23	1	1.13	411	589	1.07

Table 3-6. Kittiwake total estimated apportioned abundance and estimated density in the Project WTG area, WTG area +2km buffer (Total of flying and sitting birds).

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	2296	6.3	3597	6.56
Apr 21	1	4714	12.93	6331	11.54
May 21	1	630	1.73	1379	2.51
Jun 21	1	295	0.81	620	1.13
Jul 21	1	913	2.5	1950	3.55
Aug 21	1	741	2.03	2847	5.19
Sep 21	1	1021	2.8	1574	2.87
Oct 21	1	49	0.13	84	0.15
Nov 21	1	106	0.29	132	0.24
Dec 21	1	140	0.38	191	0.35
Jan 22	1	55	0.15	85	0.15
Feb 22	1	384	1.05	584	1.06
Mar 22	1	2556	7.01	3103	5.65
Mar 22	2	1213	3.33	2166	3.95
Apr 22	1	2419	6.64	3579	6.52
Apr 22	2	3639	9.98	5588	10.18
May 22	1	2613	7.17	4094	7.46
May 22	2	829	2.27	2136	3.89
Jun 22	1	162	0.44	794	1.45
Jun 22	2	1659	4.55	2701	4.92
Jul 22	1	204	0.56	356	0.65
Jul 22	2	326	0.89	791	1.44
Aug 22	1	1666	4.57	1808	3.29
Aug 22	2	161	0.44	485	0.88
Sep 22	1	114	0.31	798	1.45
Sep 22	2	12	0.03	24	0.04
Oct 22	1	119	0.33	156	0.28
Nov 22	1	151	0.41	353	0.64
Dec 22	1	252	0.69	341	0.62
Jan 23	1	543	1.49	714	1.3
Feb 23	1	1180	3.24	1683	3.07
Mar 23	1	2184	5.99	3060	5.58
Apr 23	1	3057	8.39	4138	7.54
May 23	1	313	0.86	814	1.48
Jun 23	1	1086	2.98	1825	3.32
Jul 23	1	113	0.31	1000	1.82
Aug 23	1	659	1.81	961	1.75

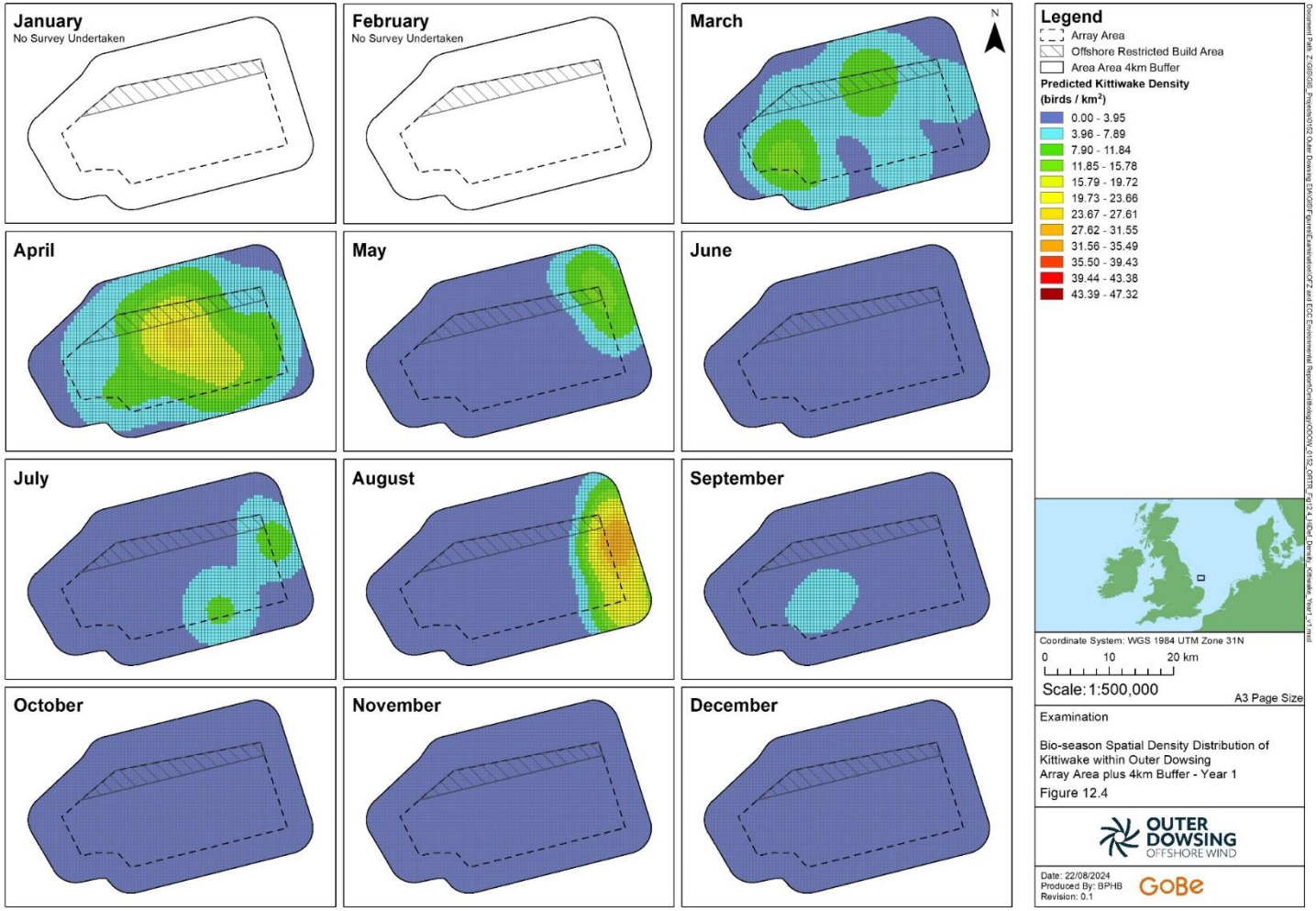

Figure 3.2. Bio-season spatial density distribution of kittiwake within the Array Area +4km buffer Year 1

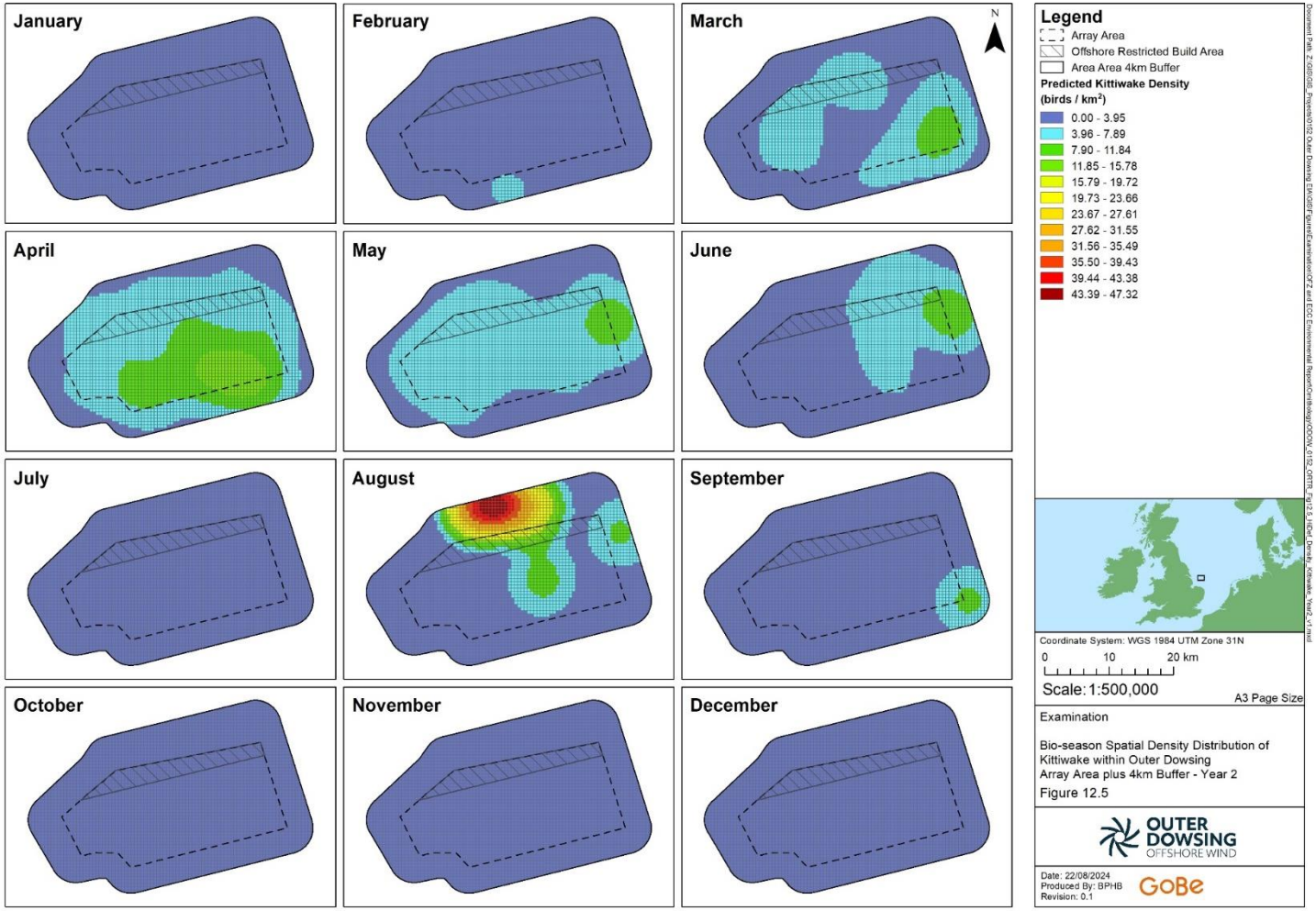

Figure 3.3. Bio-season spatial density distribution of kittiwake within the Array Area +4km buffer – Year 2

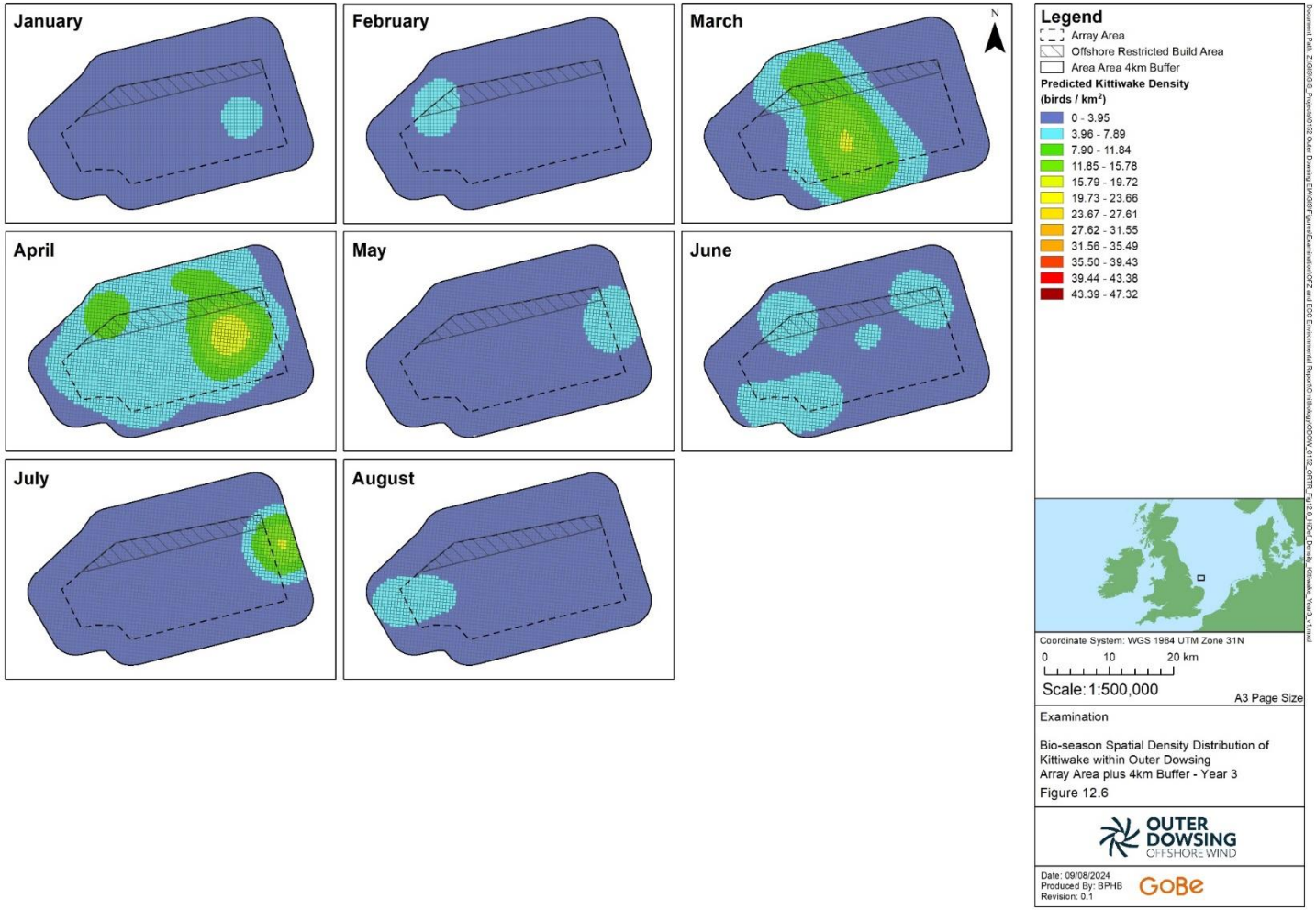

Figure 3.4. Bio-season spatial density distribution of kittiwake within the Array Area +4km buffer – Year 3

76. Kittiwake abundance followed a similar pattern over both years of DAS. In each year, populations peaked in early spring (April) with a much lower secondary peak in summer (June – September). The pattern of abundance within the WTG area was mirrored in the WTG area +2km buffer data. The changes in abundance over the two years of DAS data, for both the WTG area, and the WTG area +2km buffer, can be seen in Figure 3.5.

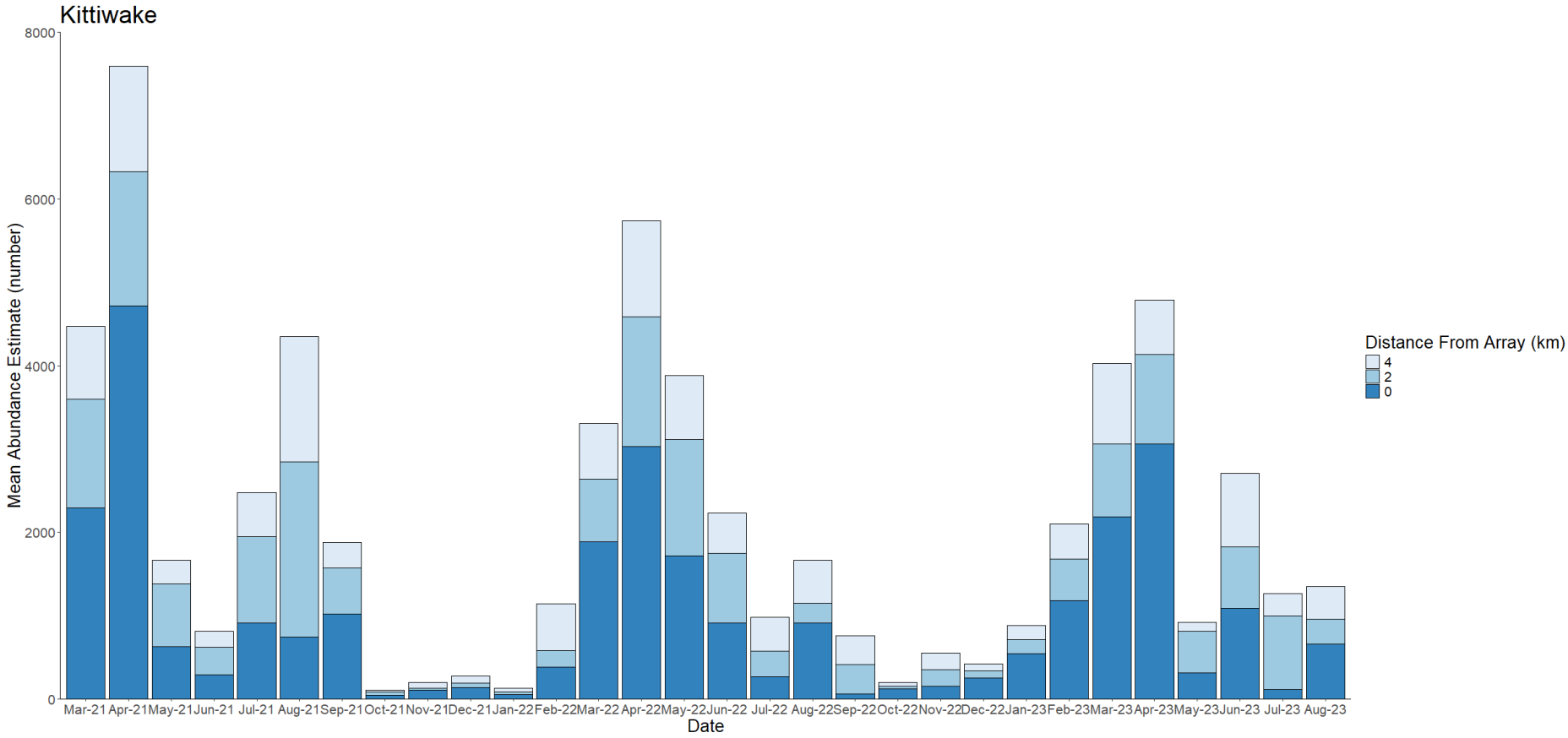

Figure 3.5. Monthly abundance of kittiwake in the WTG area and WTG area +2km buffer.

77. The peaks in April correspond with the end of the pre-breeding migration period. High numbers of birds during this month could be related to the passage of birds migrating towards more northerly colonies, or it could relate to increased feeding activity as birds prepare for the energetically demanding breeding season.

3.3.5 Flight direction

78. Figure 3.6 shows windrose diagrams presenting the flight directions recorded for kittiwake within the array area +4km buffer. These windrose diagrams were created from the array area +4km buffer; however, these data are still applicable to the WTG area +4km buffer, which is a subset of the larger array area +4km buffer. This data is still relevant to the project, as it indicates the relative flight directions for relevant bird species within the WTG area and immediate vicinity.

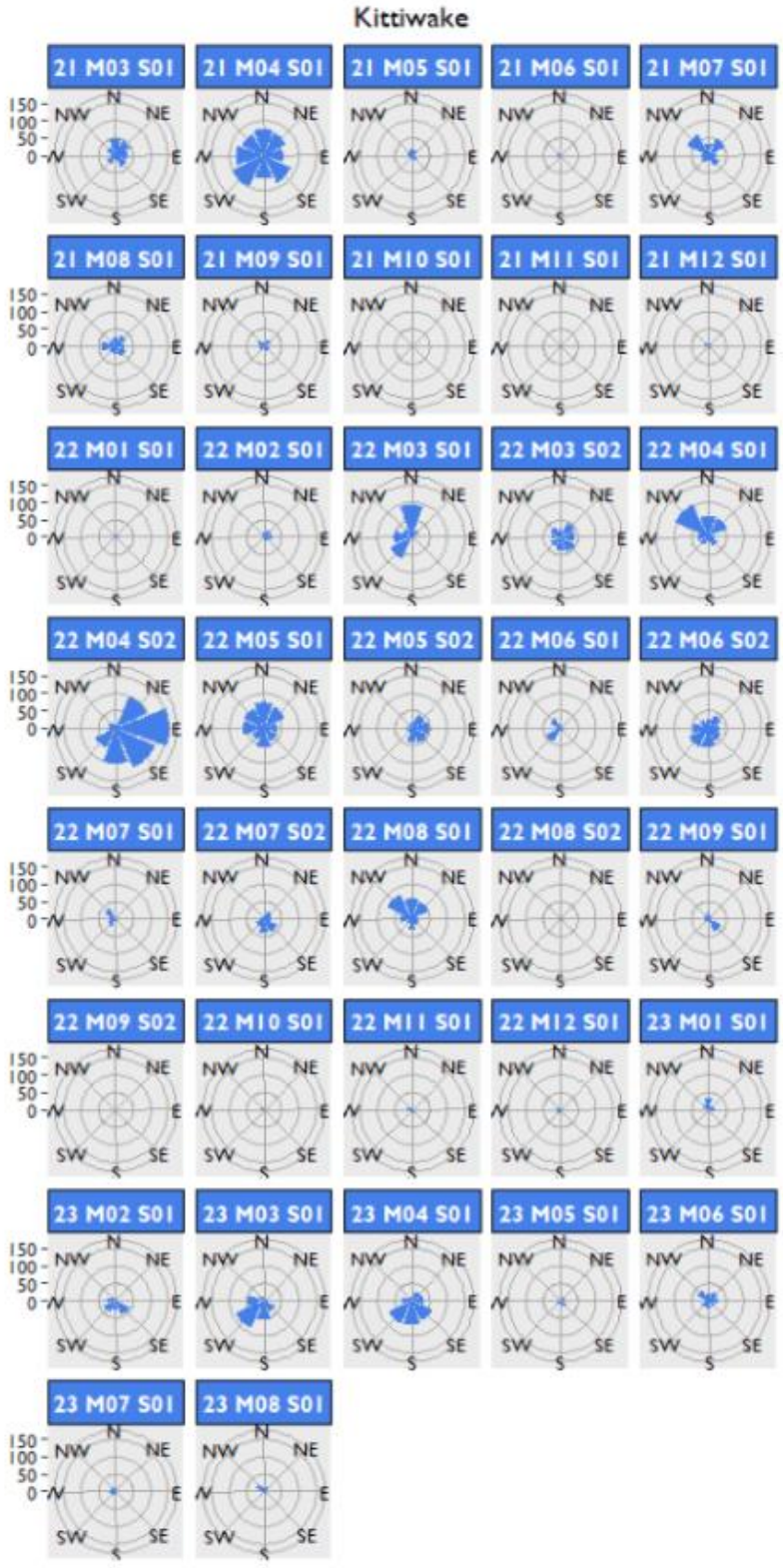

Figure 3.6. Windrose diagrams for months during which flying kittiwake were recorded within the array area +4km buffer.

3.3.6 Birds aged from DAS data

79. Proportions of kittiwake aged from DAS images are presented in Table 3-7. Adult proportions are derived from the proportion of birds identified as adults out of all of the aged birds for that species. Unaged birds do not contribute to the age proportions. Site-specific adult proportions based on the number of birds aged through the DAS images have been used for kittiwake throughout the assessment. The proportion of adults from each survey that fell within the kittiwake breeding season were averaged to produce the site-specific adult proportion (0.91).

Table 3-7. Proportions of kittiwake aged from DAS images within the WTG area +2km buffer.

Survey date	Adult	Immature	Juvenile	Unknown	Adult%	Total	Number of aged birds
22/03/2021	160	6	0	429	96	595	166
04/04/2021	417	12	0	628	97	1057	429
12/05/2021	109	16	0	99	87	224	125
09/06/2021	37	9	0	57	80	103	46
24/07/2021	177	2	8	143	95	330	187
14/08/2021	305	0	70	149	81	524	375
07/09/2021	113	4	19	115	83	251	136
09/10/2021	5	0	4	2	56	11	9
02/11/2021	12	0	2	6	86	20	14
15/12/2021	23	1	4	4	82	32	28
06/01/2022	8	3	0	3	73	14	11
23/02/2022	51	1	0	46	98	98	52
11/03/2022	227	11	0	274	95	512	238
22/03/2022	188	16	0	155	92	359	204
02/04/2022	191	19	0	392	91	602	210
15/04/2022	482	21	0	437	96	940	503
02/05/2022	298	25	0	354	92	677	323
17/05/2022	200	27	0	124	88	351	227
09/06/2022	97	9	0	28	92	134	106
21/06/2022	265	29	0	157	90	451	294
04/07/2022	47	2	0	12	96	61	49
16/07/2022	99	4	1	30	95	134	104
08/08/2022	108	7	4	183	91	302	119
23/08/2022	22	0	3	65	88	90	25
13/09/2022	60	1	19	57	75	137	80
25/09/2022	1	2	1	0	25	4	4

Survey date	Adult	Immature	Juvenile	Unknown	Adult%	Total	Number of aged birds
10/10/2022	6	0	13	6	32	25	19
07/11/2022	32	0	2	24	94	58	34
13/12/2022	44	2	2	7	92	55	48
26/01/2023	51	8	3	56	82	118	62
10/02/2023	121	14	0	137	90	272	135
24/03/2023	139	38	0	346	79	523	177
05/04/2023	190	25	0	465	88	680	215
03/05/2023	55	7	0	75	89	137	62
17/06/2023	86	22	6	198	75	312	114
05/07/2023	51	1	0	114	98	166	52
10/08/2023	50	1	11	99	81	161	62

3.4 Little gull

3.4.1 Digital aerial survey data

80. Little gull were recorded in the Project WTG area in 8 out of the 30 months surveyed, with a summed mean seasonal peak abundance across all seasons of 143 birds (Table 3-8).

81. In the WTG area +2km buffer, the summed mean seasonal peak abundance and density across all seasons was 262 birds (Table 3-8).

3.4.2 Little gull overview

82. The little gull breeding bio-season is from May to August, with non-breeding September to April (based on Cramp & Simmons 1983). Data from the DAS show that no birds were recorded during the breeding season apart from in July. Little gulls are considered passage migrants to Britain and Ireland, generally remaining close inshore while using the English Channel to leave the North Sea and move towards wintering areas predominantly in the western Mediterranean (Stone *et al.*, 1995; Skov *et al.*, 1995). With little gulls only recorded in July within the breeding season, it was considered that these birds were unlikely to be locally breeding birds but instead undertaking early post-breeding migration, or potentially adults taking sabbatical from breeding. To reflect this, the non-breeding bio-season was extended to include July.

3.4.3 Abundance and Phenology

83. Mean seasonal peak abundances of little gull in the species bio-seasons (as defined in Furness 2015) are presented in Table 3-8. Estimates of monthly abundance and density within the WTG area, and monthly abundance and density within the WTG area +2km buffer are presented in Table 3-9, Table 3-10, and Table 3-11 for flying birds, birds sitting on the sea, and the total birds observed. The spatial density distribution of little gull within the Outer Dowsing Array Area +4km buffer is shown for three years of surveys in Figure 3.7, Figure 3.8, and Figure 3.9.

Table 3-8. Little gull bio-season mean seasonal peak apportioned abundance and density estimates in the Project WTG area.

		Array area minus the ORBA		WTG area +2km buffer	
BDMPS Bio-seasons	Months	Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)	Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)
Breeding	May-Aug	11 (0-32)	0.03 (0.00-0.09)	17 (0-49)	0.03 (0.00-0.09)
Non-breeding	Sep-Apr	132 (69-204)	0.36 (0.19-0.56)	245 (153-352)	0.45 (0.28-0.64)
Summed mean seasonal peak		143 (69-236)	-	262 (153-401)	-

Table 3-9 Little gull estimated apportioned abundance and estimated density of flying birds in the Project WTG area and WTG area +2km buffer.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	0	0	0	0
Apr 21	1	0	0	0	0
May 21	1	0	0	0	0
Jun 21	1	0	0	6	0.01
Jul 21	1	13	0.03	13	0.02
Aug 21	1	7	0.02	7	0.01
Sep 21	1	62	0.17	72	0.13
Oct 21	1	146	0.4	294	0.54
Nov 21	1	0	0	0	0
Dec 21	1	0	0	0	0
Jan 22	1	0	0	0	0
Feb 22	1	0	0	0	0
Mar 22	1	7	0.02	7	0.01
Mar 22	2	12	0.03	12	0.02
Apr 22	1	0	0	0	0
Apr 22	2	0	0	0	0
May 22	1	0	0	0	0
May 22	2	0	0	0	0
Jun 22	1	0	0	0	0
Jun 22	2	0	0	0	0
Jul 22	1	0	0	0	0
Jul 22	2	0	0	0	0
Aug 22	1	0	0	0	0
Aug 22	2	7	0.02	7	0.01
Sep 22	1	133	0.36	232	0.42
Sep 22	2	35	0.1	49	0.09
Oct 22	1	1	0	7	0.01
Nov 22	1	12	0.03	12	0.02
Dec 22	1	0	0	0	0
Jan 23	1	0	0	0	0
Feb 23	1	0	0	0	0
Mar 23	1	0	0	0	0
Apr 23	1	0	0	0	0
May 23	1	0	0	0	0
Jun 23	1	0	0	0	0

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Jul 23	1	0	0	0	0
Aug 23	1	0	0	0	0

Table 3-10 Little gull estimated apportioned abundance and estimated density of birds sitting on the water in the Project WTG area and WTG area +2km buffer.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	0	0	0	0
Apr 21	1	0	0	0	0
May 21	1	0	0	0	0
Jun 21	1	0	0	0	0
Jul 21	1	0	0	0	0
Aug 21	1	0	0	0	0
Sep 21	1	7	0.02	19	0.03
Oct 21	1	32	0.09	43	0.08
Nov 21	1	0	0	0	0
Dec 21	1	0	0	0	0
Jan 22	1	0	0	0	0
Feb 22	1	0	0	0	0
Mar 22	1	0	0	0	0
Mar 22	2	0	0	0	0
Apr 22	1	0	0	0	0
Apr 22	2	0	0	0	0
May 22	1	0	0	0	0
May 22	2	0	0	0	0
Jun 22	1	0	0	0	0
Jun 22	2	0	0	0	0
Jul 22	1	0	0	0	0
Jul 22	2	0	0	0	0
Aug 22	1	0	0	0	0
Aug 22	2	0	0	0	0
Sep 22	1	6	0.02	18	0.03
Sep 22	2	0	0	0	0
Oct 22	1	0	0	0	0
Nov 22	1	0	0	6	0.01
Dec 22	1	0	0	0	0
Jan 23	1	0	0	1	0

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Feb 23	1	0	0	0	0
Mar 23	1	0	0	0	0
Apr 23	1	0	0	0	0
May 23	1	0	0	33	0.06
Jun 23	1	0	0	0	0
Jul 23	1	0	0	0	0
Aug 23	1	0	0	0	0

Table 3-11. Little gull total estimated apportioned abundance and estimated density in the Project WTG area and WTG area +2km buffer (Total of flying and sitting birds).

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km2)	Population estimate (n)	Density estimate (n/km2)
Mar 21	1	0	0	0	0
Apr 21	1	0	0	0	0
May 21	1	0	0	0	0
Jun 21	1	0	0	7	0.01
Jul 21	1	13	0.03	13	0.02
Aug 21	1	7	0.02	6	0.01
Sep 21	1	67	0.18	90	0.16
Oct 21	1	177	0.48	342	0.62
Nov 21	1	0	0	0	0
Dec 21	1	0	0	0	0
Jan 22	1	0	0	0	0
Feb 22	1	0	0	0	0
Mar 22	1	6	0.02	7	0.01
Mar 22	2	12	0.03	13	0.02
Apr 22	1	0	0	0	0
Apr 22	2	0	0	0	0
May 22	1	0	0	0	0
May 22	2	0	0	0	0
Jun 22	1	0	0	0	0
Jun 22	2	0	0	0	0
Jul 22	1	0	0	0	0
Jul 22	2	0	0	0	0
Aug 22	1	0	0	0	0
Aug 22	2	7	0.02	7	0.01

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km2)	Population estimate (n)	Density estimate (n/km2)
Sep 22	1	139	0.38	248	0.45
Sep 22	2	36	0.1	49	0.09
Oct 22	1	1	0	7	0.01
Nov 22	1	13	0.03	19	0.03
Dec 22	1	0	0	0	0
Jan 23	1	0	0	1	0
Feb 23	1	0	0	0	0
Mar 23	1	0	0	0	0
Apr 23	1	0	0	0	0
May 23	1	0	0	31	0.06
Jun 23	1	0	0	0	0
Jul 23	1	0	0	0	0
Aug 23	1	0	0	0	0

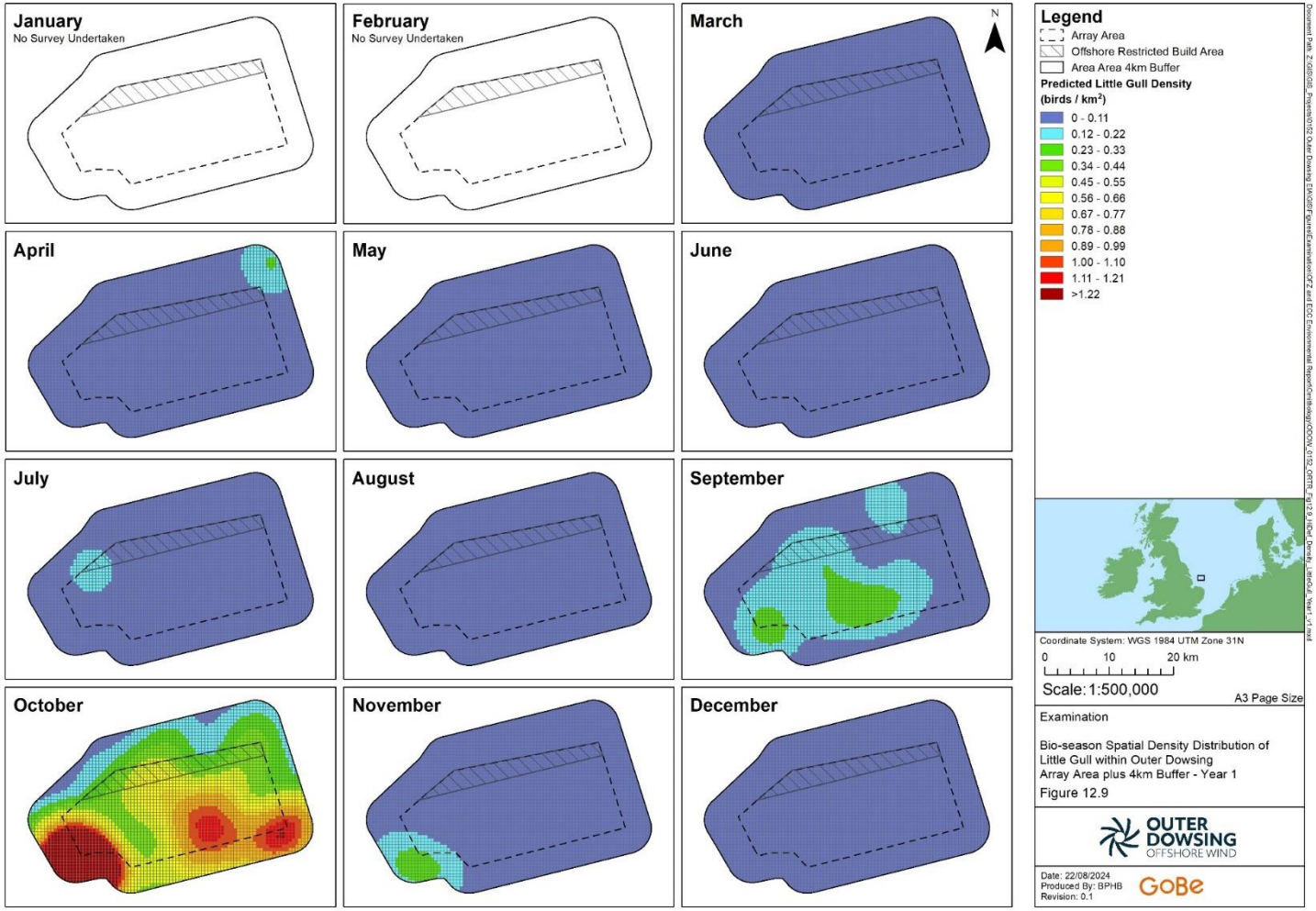

Figure 3.7. Bio-season spatial density distribution of little gull the Array Area +4km buffer – Year 1

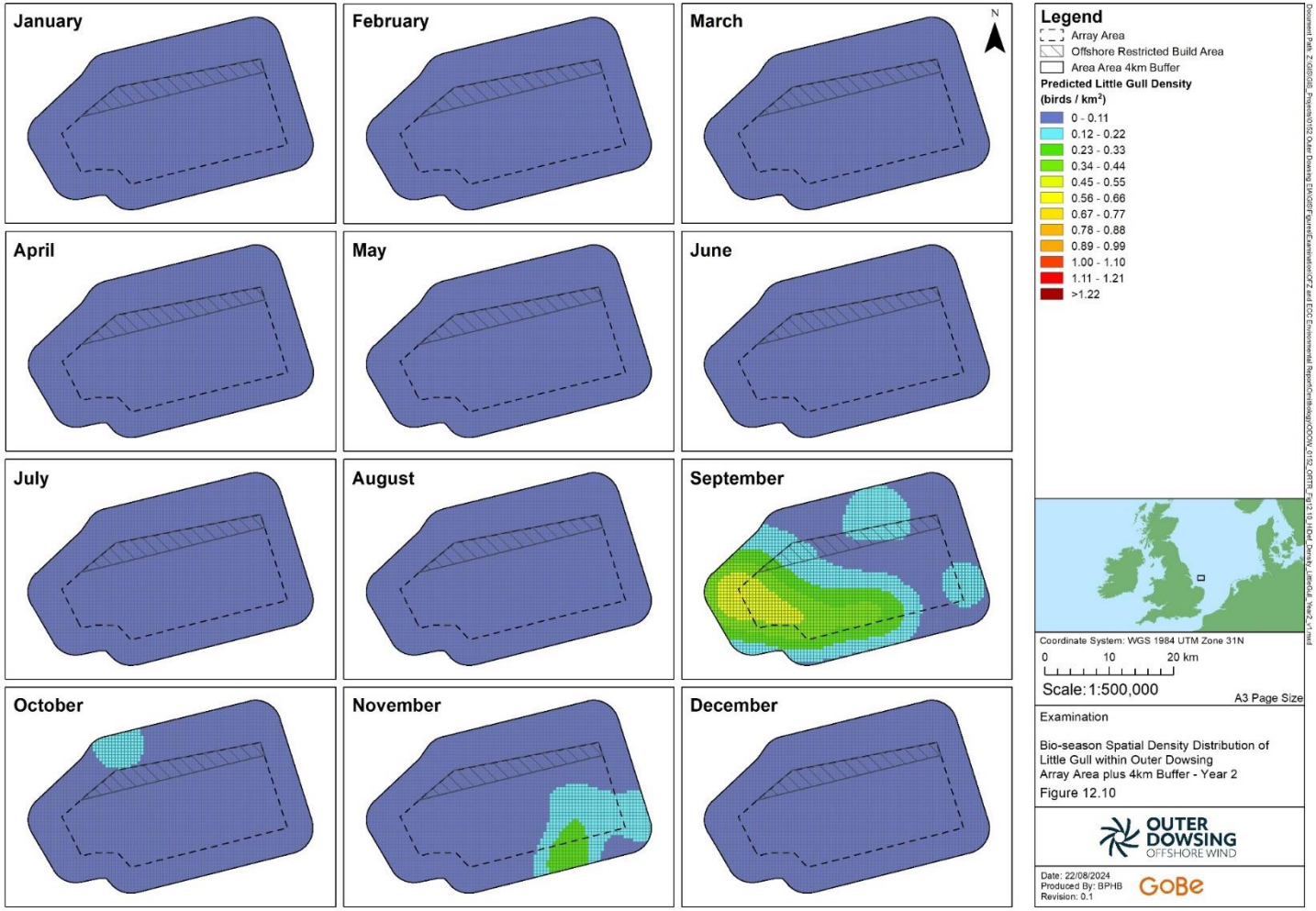

Figure 3.8. Bio-season spatial density distribution of little gull within the Array Area +4km buffer – Year 2

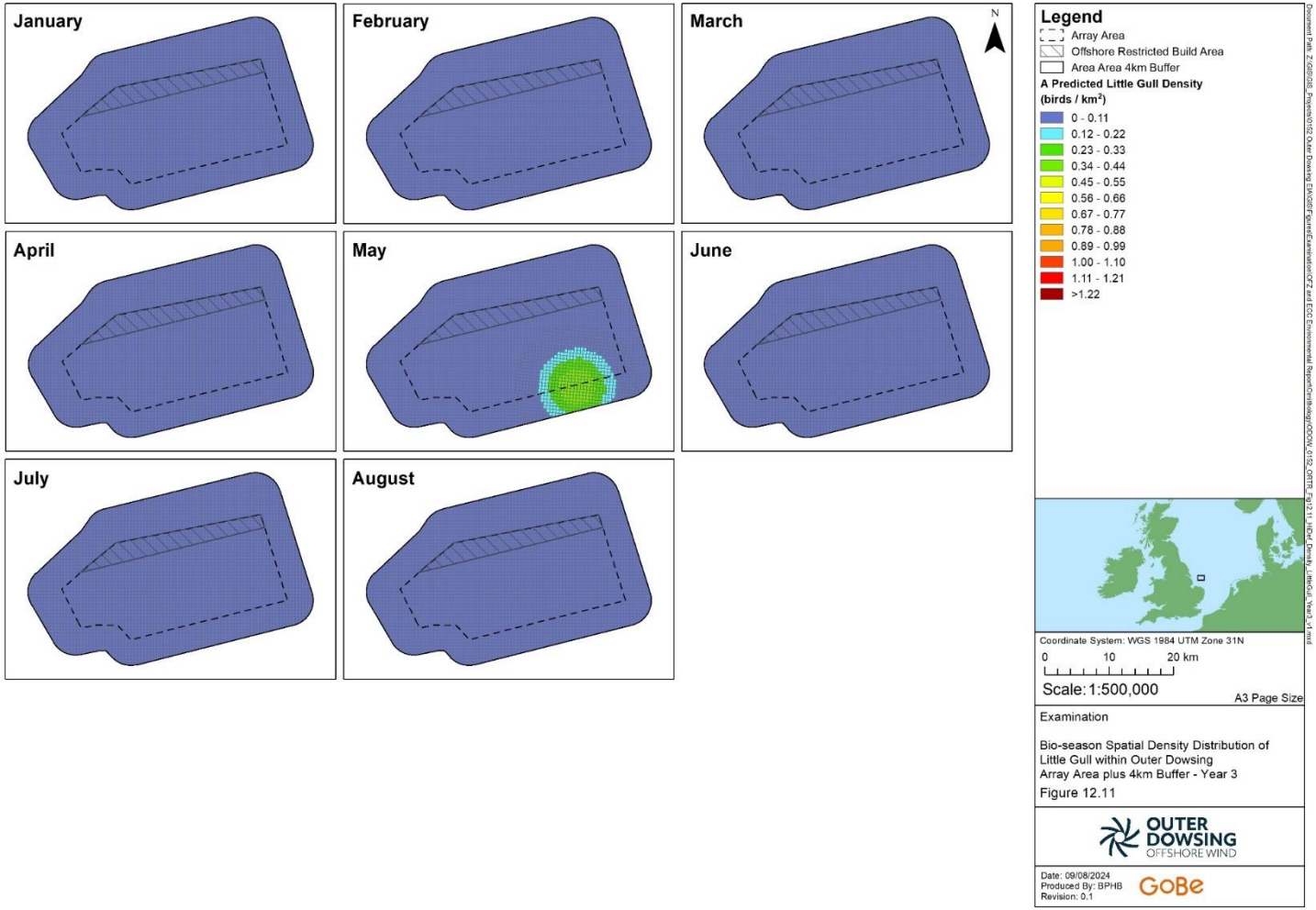

Figure 3.9. Bio-season spatial density distribution of little gull within the Array Area +4km buffer – Year 3

84. Little gull abundance showed the same pattern across both years for which DAS data were collected. In both years, abundance was very low throughout the year, apart from a peak in autumn (in October 2021 and September 2022). This pattern was observed across both the WTG area and the WTG area +4km buffer.

85. The autumn peaks observed here are likely to correspond to influx of birds that spend the non-breeding seasons in the UK or its UK waters, or to passage of birds moving to non-breeding areas elsewhere.

3.4.4 Flight direction

86. Figure 3.10 shows windrose diagrams presenting flight directions recorded for little gull within the array area +4km buffer. These windrose diagrams were created from the array area +4km buffer; however, these data are still applicable to the WTG area +4km buffer, which is a subset of the larger array area +4km buffer This data is still relevant to the project, as it indicates the relative flight directions for relevant bird species within the WTG area and immediate vicinity.

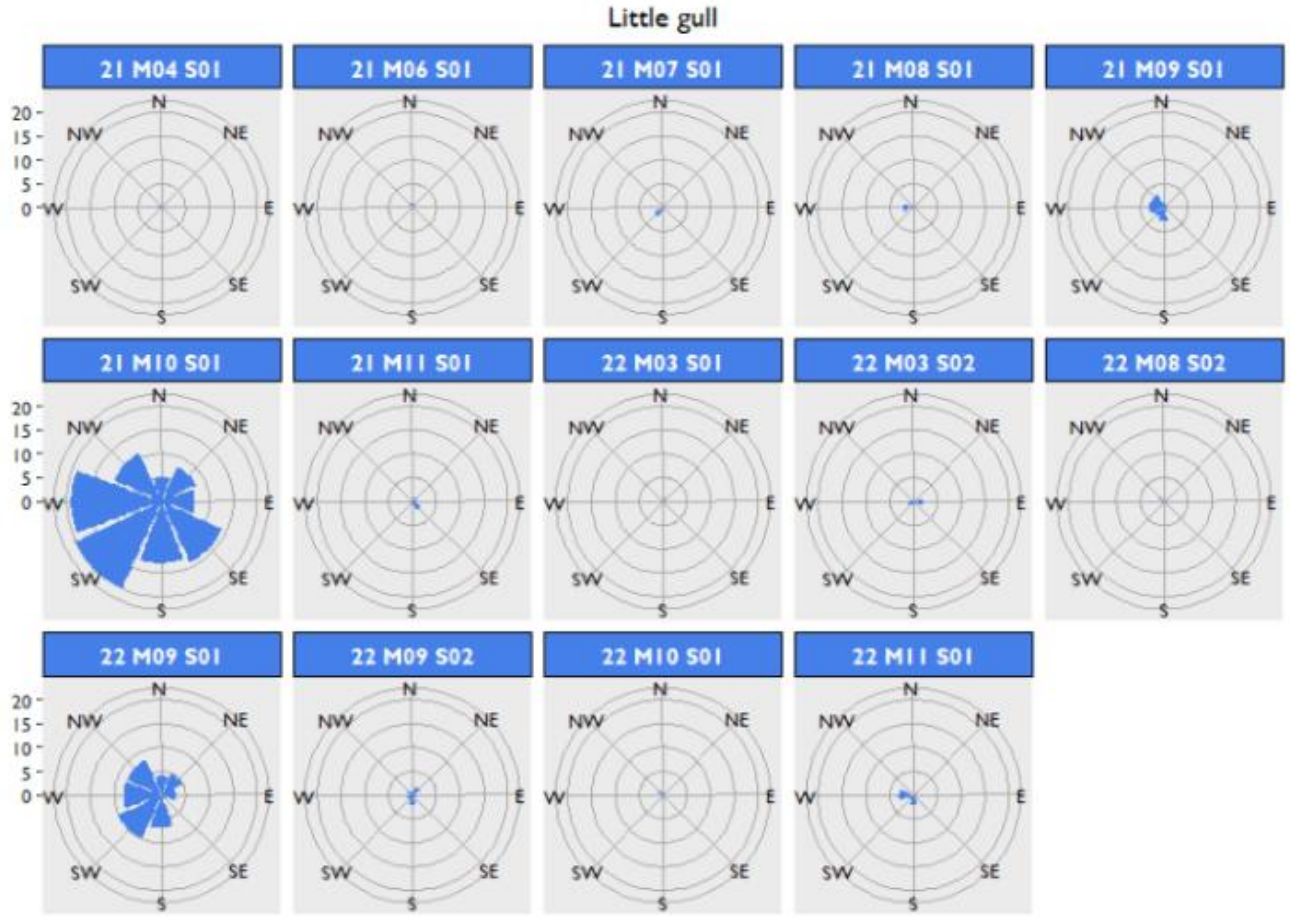

Figure 3.10. Windrose diagrams for months during which flying little gull were recorded within the array area +4km buffer.

3.4.5 Birds aged from DAS data

87. Proportions of little gull aged from DAS images are presented in Table 3-12. Adult proportions are derived from the proportion of birds identified as adults out of all the aged birds for that species. Unaged birds do not contribute to the age proportions.

Table 3-12. Proportions of little gull aged from DAS images within the WTG area +2km buffer.

Survey date	Adult	Immature	Juvenile	Unknown	Adult%	Total	Number of aged birds
3/22/2021	0	0	0	0	0	0	0
4/4/2021	0	0	0	0	0	0	0
5/12/2021	0	0	0	0	0	0	0
6/9/2021	0	0	0	1	0	1	0
7/24/2021	2	0	0	0	100	2	2
8/14/2021	0	0	1	0	0	1	1
9/7/2021	10	0	1	3	91	14	11
10/9/2021	40	1	7	9	83	57	48
11/2/2021	0	0	0	0	0	0	0
12/15/2021	0	0	0	0	0	0	0
1/6/2022	0	0	0	0	0	0	0
2/23/2022	0	0	0	0	0	0	0
3/11/2022	1	0	0	0	100	1	1
3/22/2022	2	0	0	0	100	2	2
4/2/2022	0	0	0	0	0	0	0
4/15/2022	0	0	0	0	0	0	0
5/2/2022	0	0	0	0	0	0	0
5/17/2022	0	0	0	0	0	0	0
6/9/2022	0	0	0	0	0	0	0
6/21/2022	0	0	0	0	0	0	0
7/4/2022	0	0	0	0	0	0	0
7/16/2022	0	0	0	0	0	0	0
8/8/2022	0	0	0	0	0	0	0
8/23/2022	0	0	1	0	0	1	1
9/13/2022	27	1	6	4	79	38	34
9/25/2022	5	1	0	0	83	6	6

Survey date	Adult	Immature	Juvenile	Unknown	Adult%	Total	Number of aged birds
10/10/2022	1	0	0	0	100	1	1
11/7/2022	3	0	0	0	100	3	3
12/13/2022	0	0	0	0	0	0	0
1/26/2023	0	0	0	0	0	0	0
2/10/2023	0	0	0	0	0	0	0
3/24/2023	0	0	0	0	0	0	0
4/5/2023	0	0	0	0	0	0	0
5/3/2023	0	0	0	5	0	5	0
6/17/2023	0	0	0	0	0	0	0
7/5/2023	0	0	0	0	0	0	0
8/10/2023	0	0	0	0	0	0	0

3.5 Great black-backed gull

3.5.1 Digital aerial survey data

88. Great black-backed gull were observed within the Project WTG area in 19 of the 30 months surveyed, with a summed mean seasonal peak abundance of 90 birds (Table 3-13).

89. In the WTG area +2km buffer, the summed mean seasonal peak abundance was 109 birds.

3.5.2 Great black-backed gull overview

90. The mean maximum foraging range of this species is 73km, though this was recorded from just a single study so is of low confidence (Woodward *et al.*, 2019). There are no known large colonies within this range of the Project.

3.5.3 Abundance and Phenology

91. Mean seasonal peak abundances of great black-backed gull in the species bio-seasons (as defined in Furness 2015) are presented in Table 3-13. Estimates of monthly abundance and density within the WTG area, and monthly abundance and density within the WTG area +2km buffer are presented in Table 3-14, Table 3-15, and Table 3-16 for flying birds, birds sitting on the sea, and the total birds observed.

92. Great black-backed gull was present in the Project WTG area across both bio-seasons. Presence was greatest during the non-breeding bio-season (September to March), with a mean seasonal peak estimate of 60 birds and mean seasonal peak density of 0.16 birds/km^2 (Table 3-16). The spatial density distribution of great black-backed gull within the Outer Dowsing WTG area +4km buffer is shown for three years of surveys in Figure 3.11, Figure 3.12, and Figure 3.13.

Table 3-13. Great black-backed gull bio-season mean seasonal peak apportioned abundance and density estimates in the Project WTG area +2km buffer.

		WTG area		WTG area +2km buffer	
BDMPS Bio-seasons	Months	Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)	Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)
Breeding	Apr - Aug	30 (2-72)	0.08 (0.00-0.19)	33 (4-78)	0.06 (0.01-0.14)
Non-breeding	Sep - Mar	60 (12-127)	0.16 (0.03-0.35)	76 (25-146)	0.13 (0.04-0.26)
Summed mean seasonal peak		90 (14-199)	-	109 (29-224)	-

Table 3-14. Great black-backed gull estimated apportioned abundance and estimated density of flying birds in the Project WTG area, and WTG area +2km buffer.

		WTG area		WTG area +2km buffer	
Month	Survey number	Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	7	0.02	13	0.02
Apr 21	1	0	0	0	0
May 21	1	0	0	6	0.01
Jun 21	1	0	0	0	0
Jul 21	1	0	0	0	0
Aug 21	1	0	0	0	0
Sep 21	1	24	0.07	31	0.05
Oct 21	1	7	0.02	6	0.01
Nov 21	1	25	0.07	25	0.04
Dec 21	1	7	0.02	19	0.03
Jan 22	1	7	0.02	7	0.01
Feb 22	1	0	0	0	0
Mar 22	1	0	0	0	0
Mar 22	2	0	0	0	0
Apr 22	1	0	0	0	0
Apr 22	2	0	0	6	0.01
May 22	1	0	0	0	0
May 22	2	0	0	6	0.01
Jun 22	1	0	0	7	0.01
Jun 22	2	6	0.02	7	0.01
Jul 22	1	0	0	0	0
Jul 22	2	0	0	0	0
Aug 22	1	12	0.03	13	0.02
Aug 22	2	0	0	7	0.01
Sep 22	1	0	0	12	0.02
Sep 22	2	6	0.02	13	0.02
Oct 22	1	0	0	0	0
Nov 22	1	6	0.02	12	0.02
Dec 22	1	18	0.05	25	0.04
Jan 23	1	63	0.17	70	0.13
Feb 23	1	0	0	0	0
Mar 23	1	6	0.02	7	0.01
Apr 23	1	0	0	6	0.01
May 23	1	0	0	13	0.02
Jun 23	1	0	0	0	0

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Jul 23	1	0	0	0	0
Aug 23	1	6	0.02	12	0.02

Table 3-15. Great black-backed gull estimated apportioned abundance and estimated density of birds sitting on the water in the Project WTG area, and WTG area +2km buffer.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	0	0	0	0
Apr 21	1	11	0.03	29	0.05
May 21	1	0	0	0	0
Jun 21	1	0	0	0	0
Jul 21	1	0	0	0	0
Aug 21	1	0	0	0	0
Sep 21	1	25	0.07	60	0.11
Oct 21	1	30	0.08	78	0.14
Nov 21	1	12	0.03	13	0.02
Dec 21	1	13	0.03	25	0.04
Jan 22	1	12	0.03	18	0.03
Feb 22	1	0	0	6	0.01
Mar 22	1	13	0.03	13	0.02
Mar 22	2	0	0	0	0
Apr 22	1	13	0.03	13	0.02
Apr 22	2	0	0	0	0
May 22	1	0	0	0	0
May 22	2	0	0	0	0
Jun 22	1	3	0.01	12	0.02
Jun 22	2	6	0.02	6	0.01
Jul 22	1	0	0	0	0
Jul 22	2	0	0	19	0.03
Aug 22	1	24	0.07	25	0.04
Aug 22	2	0	0	0	0
Sep 22	1	0	0	83	0.15
Sep 22	2	18	0.05	18	0.03
Oct 22	1	0	0	7	0.01
Nov 22	1	12	0.03	19	0.03
Dec 22	1	23	0.06	31	0.06
Jan 23	1	28	0.08	28	0.05

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Feb 23	1	0	0	0	0
Mar 23	1	29	0.08	31	0.06
Apr 23	1	43	0.12	44	0.08
May 23	1	0	0	0	0
Jun 23	1	6	0.02	12	0.02
Jul 23	1	0	0	7	0.01
Aug 23	1	7	0.02	7	0.01

Table 3-16. Great black-backed gull total estimated apportioned abundance and estimated density in the Project WTG area, and WTG area +2km buffer (Total of flying and sitting birds).

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	6	0.02	12	0.02
Apr 21	1	11	0.03	29	0.05
May 21	1	0	0	6	0.01
Jun 21	1	0	0	0	0
Jul 21	1	0	0	0	0
Aug 21	1	0	0	0	0
Sep 21	1	49	0.13	90	0.16
Oct 21	1	37	0.1	84	0.15
Nov 21	1	37	0.1	37	0.07
Dec 21	1	19	0.05	43	0.08
Jan 22	1	18	0.05	24	0.04
Feb 22	1	0	0	6	0.01
Mar 22	1	12	0.03	12	0.02
Mar 22	2	0	0	0	0
Apr 22	1	12	0.03	13	0.02
Apr 22	2	0	0	6	0.01
May 22	1	0	0	0	0
May 22	2	0	0	6	0.01
Jun 22	1	3	0.01	19	0.03
Jun 22	2	12	0.03	13	0.02
Jul 22	1	0	0	0	0
Jul 22	2	0	0	19	0.03
Aug 22	1	36	0.1	37	0.07
Aug 22	2	0	0	7	0.01
Sep 22	1	0	0	93	0.17

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Sep 22	2	24	0.07	32	0.06
Oct 22	1	0	0	7	0.01
Nov 22	1	18	0.05	31	0.05
Dec 22	1	43	0.12	53	0.09
Jan 23	1	95	0.26	102	0.18
Feb 23	1	0	0	0	0
Mar 23	1	37	0.1	35	0.06
Apr 23	1	42	0.11	49	0.09
May 23	1	0	0	13	0.02
Jun 23	1	6	0.02	12	0.02
Jul 23	1	0	0	7	0.01
Aug 23	1	13	0.03	19	0.03

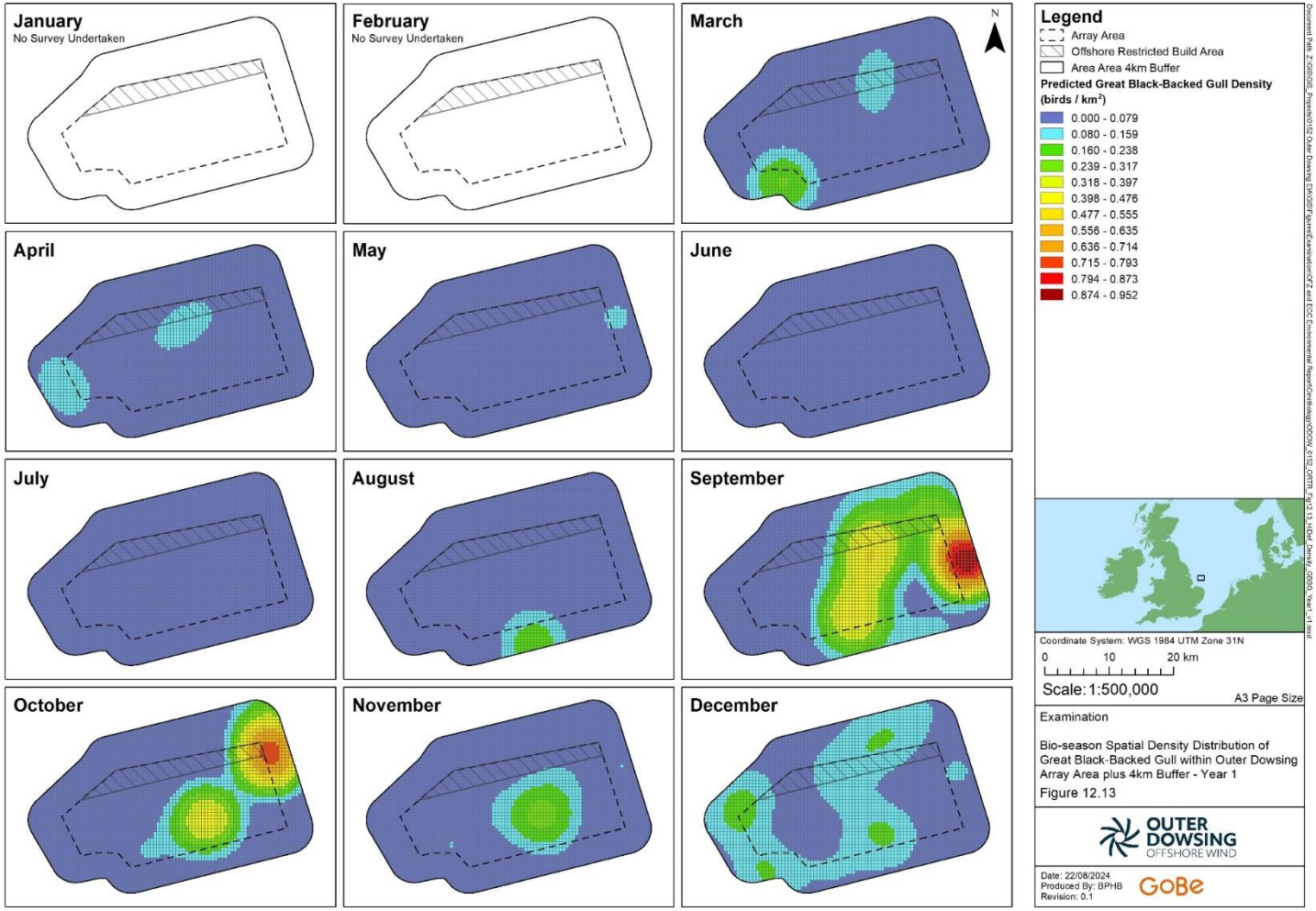

Figure 3.11. Bio-season spatial density distribution of great black-backed gull within the Array Area +4km buffer – Year 1

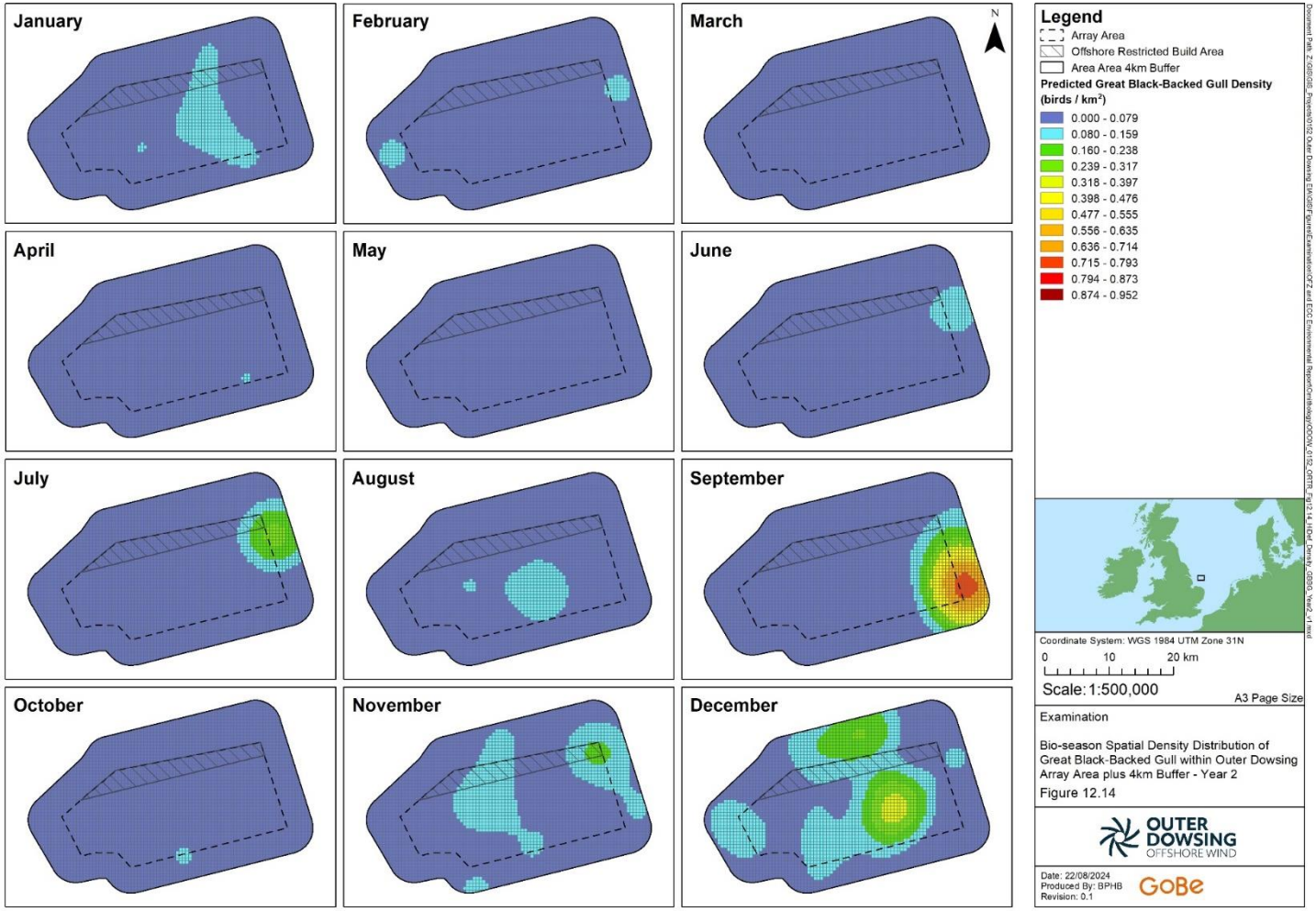

Figure 3.12. Bio-season spatial density distribution of great black-backed gull within the Array Area +4km buffer – Year 2

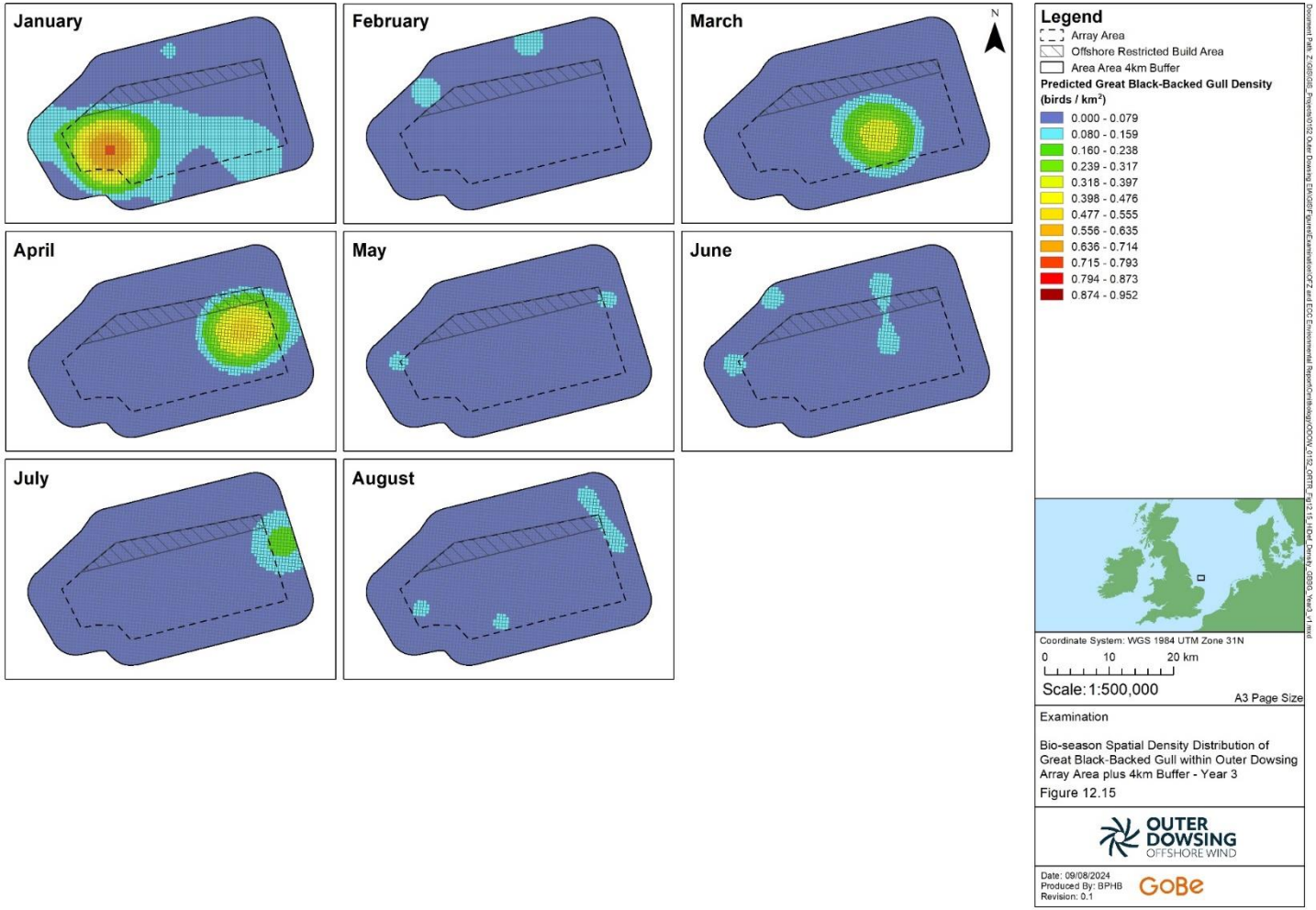

Figure 3.13. Bio-season spatial density distribution of great black-backed gull within the Array Area +4km buffer – Year 3

93. Great black-backed gull showed some variation in patterns of abundance across both years for which DAS data were collected. In both years, abundance was higher in autumn, however the highest abundance was estimated for January 2023. This peak did not occur the previous winter, and numbers in January 2023 were almost five times higher than those estimated for January 2022. This pattern was observed across both the WTG area and the WTG area +2km buffer.
94. High abundance in autumn is likely to correspond to post breeding dispersal from both the U.K. and colonies in Europe. The high numbers in winter 2022/23 are more difficult to account for but may be linked to improved breeding success in that year, or improved offshore foraging that winter.

3.5.4 Flight direction

95. Figure 3.14 shows windrose diagrams presenting flight directions recorded for great black-backed gull within the array area +4km buffer. These windrose diagrams were created from the array area +4km buffer; however, these data are still applicable to the WTG area +4km buffer, which is a subset of the larger array area +4km buffer This data is still relevant to the project, as it indicates the relative flight directions for relevant bird species within the WTG area and immediate vicinity.

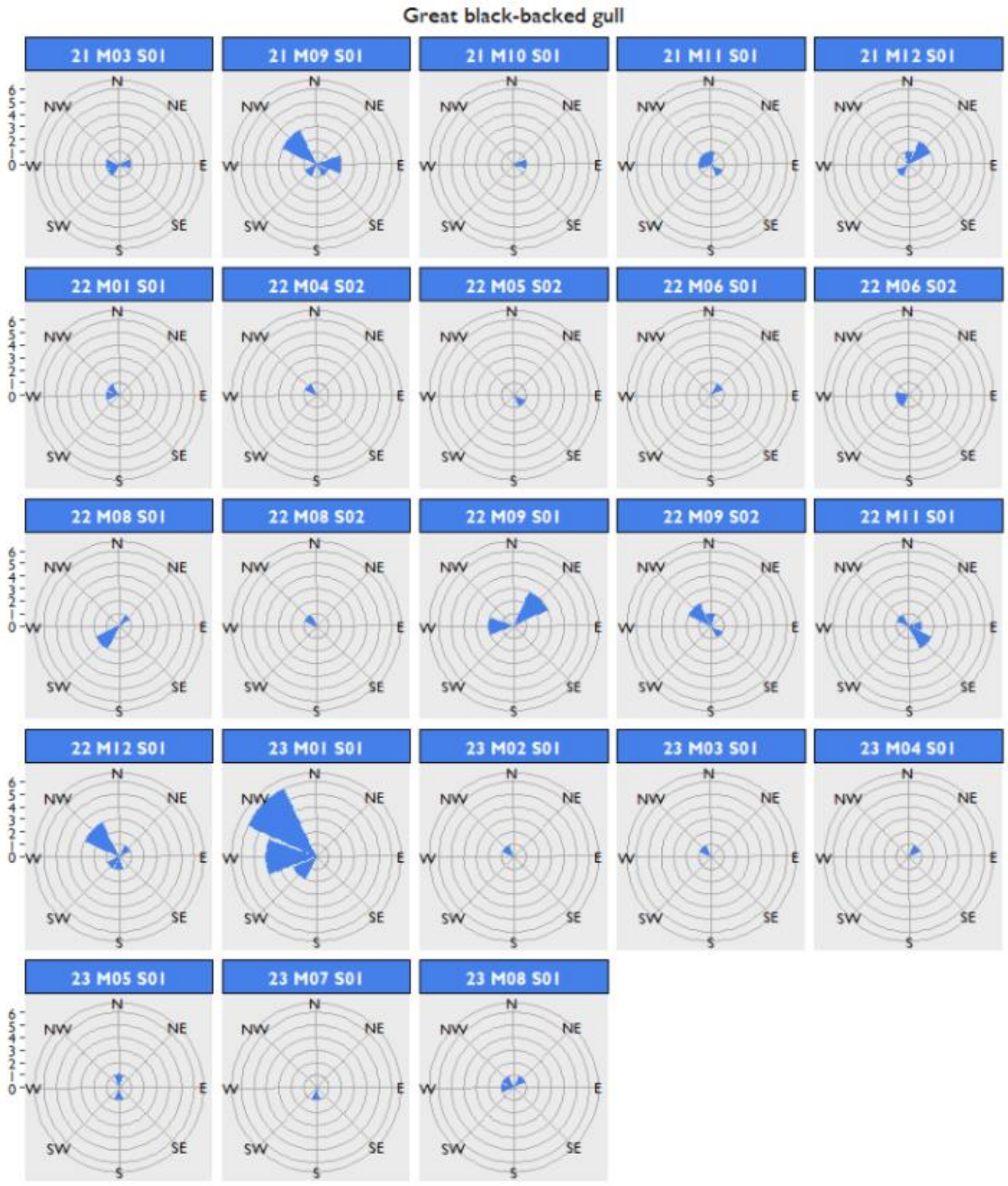

Figure 3.14. Windrose diagrams for months during which flying great black-backed gull were recorded within the array area +4km buffer.

3.5.5 Birds aged from DAS data

96. Proportions of great black-backed gull aged from DAS images are presented in Table 3-17. Adult proportions are derived from the proportion of birds identified as adults out of all the aged birds for that species. Unaged birds do not contribute to the age proportion.

Table 3-17. Proportions of great black-backed gull aged from DAS images within the WTG area+2km buffer.

Survey date	Adult	Immature	Juvenile	Unknown	Adult%	Total	Number of aged birds
3/22/2021	0	1	0	0	0	1	1
4/4/2021	1	0	0	3	100	4	1
5/12/2021	0	1	0	0	0	1	1
6/9/2021	0	0	0	0	0	0	0
7/24/2021	0	0	0	0	0	0	0
8/14/2021	0	0	0	0	0	0	0
9/7/2021	6	0	0	9	100	15	6
10/9/2021	0	0	1	13	0	14	1
11/2/2021	2	2	0	2	50	6	4
12/15/2021	3	0	0	4	100	7	3
1/6/2022	1	0	0	3	100	4	1
2/23/2022	0	0	0	1	0	1	0
3/11/2022	0	0	0	2	0	2	0
3/22/2022	0	0	0	0	0	0	0
4/2/2022	0	0	0	2	0	2	0
4/15/2022	1	0	0	0	100	1	1
5/2/2022	0	0	0	0	0	0	0
5/17/2022	0	1	0	0	0	1	1
6/9/2022	0	1	0	1	0	2	1
6/21/2022	0	1	0	1	0	2	1
7/4/2022	0	0	0	0	0	0	0
7/16/2022	0	0	0	3	0	3	0
8/8/2022	2	0	0	5	100	7	2
8/23/2022	0	1	0	0	0	1	1
9/13/2022	1	2	0	13	33	16	3
9/25/2022	0	0	1	3	0	4	1

Survey date	Adult	Immature	Juvenile	Unknown	Adult%	Total	Number of aged birds
10/10/2022	0	0	0	1	0	1	0
11/7/2022	0	3	1	1	0	5	4
12/13/2022	3	1	0	4	75	8	4
1/26/2023	8	3	0	3	73	14	11
2/10/2023	0	0	0	0	0	0	0
3/24/2023	1	0	0	5	100	6	1
4/5/2023	0	2	0	6	0	8	2
5/3/2023	0	2	0	0	0	2	2
6/17/2023	0	0	0	2	0	2	0
7/5/2023	1	0	0	0	100	1	1
8/10/2023	2	0	1	0	67	3	3

3.6 Herring gull

3.6.1 Digital aerial survey data

97. Herring gull were recorded within the Project the WTG area in 18 of the 30 months, with a summed mean seasonal peak abundance of 98 birds (Table 3-18)

98. In the WTG area +2km buffer, the summed mean seasonal peak abundance was 213 birds (Table 3-19, Table 3-20 and Table 3-21)

3.6.2 Herring gull overview

99. The nearest herring gull breeding sites to the Project lie at FFC SPA and on the north Norfolk coast. In recent years, birds have been recorded breeding at several locations, including Blakeney Point (latest count 39 nests in 2022), Holkham (latest count 119 nests in 2018) and Outer Trial Bank (latest count 776 nests in 2023) (JNCC, 2022). These sites are located approximately 60km from the Project. The mean maximum foraging range of herring gull is 58.8km (standard deviation = 14.9km) (Woodward *et al.*, 2019) and is thus within foraging range of the Project. In addition, none of these breeding locations are part of a designated population and it is not considered that there is any connectivity with other designated breeding populations of herring gull.

100. It is therefore considered that herring gulls recorded at the Project during the breeding season originate from the north Norfolk coast (approximately 196 pairs) and the Outer Trial Bank.

101. Outside the breeding season, impacts on herring gull have been compared to the UK North Sea and Channel BDMPS, consisting of 466,511 individuals during the non-breeding season (September to February) (Furness, 2015).

3.6.3 Abundance and Phenology

102. Mean seasonal peak abundances of herring gull in the species bio-seasons (as defined in Furness 2015) are presented in Table 3-18. Estimates of monthly abundance and density within the WTG area, and monthly abundance and density within the WTG area +2km buffer, are presented in Table 3-19, Table 3-20, and Table 3-21 for flying birds, birds sitting on the sea and the total birds observed. The spatial density distribution of herring gull within the Outer Dowsing Array Area +4km buffer is shown for three years of surveys in Figure 3.15, Figure 3.16, and Figure 3.17.

103. Herring gull were present in the Project WTG area across both bio-seasons. Presence was greatest during the breeding bio-season (March to August), with a mean seasonal peak abundance of 77 birds and mean seasonal peak density of 0.21 birds/km^2 (Table 3-18).

Table 3-18. Herring gull bio-season apportioned mean seasonal peak abundance and density estimates in the Project WTG area and WTG area +2km buffer.

BDMPS Bio-seasons	Months	Array minus the ORBA		Array minus the ORBA +2km buffer	
		Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)	Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)
Breeding	Mar - Aug	77 (25-146)	0.21 (0.07-0.40)	179 (15-482)	0.32 (0.03-0.88)
Non-breeding	Sep - Feb	21 (6-42)	0.06 (0.02-0.11)	34 (15-56)	0.06 (0.03-0.10)
Summed mean seasonal peak		98 (31-187)	-	213 (30-537)	-

Table 3-19. Herring gull estimated apportioned abundance and estimated density of flying birds in the Project WTG area and WTG area +2km buffer.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	6	0.02	13	0.02
Apr 21	1	0	0	0	0
May 21	1	0	0	6	0.01
Jun 21	1	31	0.08	0	0
Jul 21	1	7	0.02	0	0
Aug 21	1	0	0	0	0
Sep 21	1	0	0	31	0.05
Oct 21	1	0	0	6	0.01
Nov 21	1	0	0	25	0.04
Dec 21	1	0	0	19	0.03
Jan 22	1	7	0.02	7	0.01
Feb 22	1	0	0	0	0
Mar 22	1	0	0	0	0
Mar 22	2	0	0	0	0
Apr 22	1	12	0.03	0	0
Apr 22	2	6	0.02	6	0.01
May 22	1	13	0.03	0	0
May 22	2	6	0.02	6	0.01
Jun 22	1	0	0	7	0.01

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Jun 22	2	12	0.03	7	0.01
Jul 22	1	19	0.05	0	0
Jul 22	2	0	0	0	0
Aug 22	1	0	0	13	0.02
Aug 22	2	0	0	7	0.01
Sep 22	1	0	0	12	0.02
Sep 22	2	0	0	13	0.02
Oct 22	1	0	0	0	0
Nov 22	1	6	0.02	12	0.02
Dec 22	1	24	0.07	25	0.04
Jan 23	1	13	0.03	70	0.13
Feb 23	1	0	0	0	0
Mar 23	1	0	0	7	0.01
Apr 23	1	0	0	6	0.01
May 23	1	0	0	13	0.02
Jun 23	1	62	0.17	0	0
Jul 23	1	0	0	0	0
Aug 23	1	0	0	12	0.02

Table 3-20. Herring gull estimated apportioned abundance and estimated density of birds sitting on the water in the Project WTG area and WTG area +2km buffer.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	0	0	0	0
Apr 21	1	8	0.02	29	0.05
May 21	1	0	0	0	0
Jun 21	1	7	0.02	0	0
Jul 21	1	0	0	0	0
Aug 21	1	0	0	0	0
Sep 21	1	0	0	60	0.11
Oct 21	1	0	0	78	0.14
Nov 21	1	0	0	13	0.02
Dec 21	1	0	0	25	0.04
Jan 22	1	6	0.02	18	0.03
Feb 22	1	0	0	6	0.01
Mar 22	1	6	0.02	13	0.02
Mar 22	2	0	0	0	0

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Apr 22	1	7	0.02	13	0.02
Apr 22	2	0	0	0	0
May 22	1	0	0	0	0
May 22	2	0	0	0	0
Jun 22	1	7	0.02	12	0.02
Jun 22	2	97	0.27	6	0.01
Jul 22	1	0	0	0	0
Jul 22	2	0	0	19	0.03
Aug 22	1	1	0	25	0.04
Aug 22	2	0	0	0	0
Sep 22	1	0	0	83	0.15
Sep 22	2	0	0	18	0.03
Oct 22	1	7	0.02	7	0.01
Nov 22	1	7	0.02	19	0.03
Dec 22	1	6	0.02	31	0.06
Jan 23	1	14	0.04	28	0.05
Feb 23	1	0	0	0	0
Mar 23	1	19	0.05	31	0.06
Apr 23	1	19	0.05	44	0.08
May 23	1	0	0	0	0
Jun 23	1	75	0.21	12	0.02
Jul 23	1	6	0.02	7	0.01
Aug 23	1	0	0	7	0.01

Table 3-21. Herring gull total estimated apportioned abundance and estimated density, in the Project WTG area and WTG area +2km buffer (total of flying and sitting birds).

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	6	0.02	12	0.02
Apr 21	1	8	0.02	29	0.05
May 21	1	0	0	6	0.01
Jun 21	1	36	0.1	0	0
Jul 21	1	6	0.02	0	0
Aug 21	1	0	0	0	0
Sep 21	1	0	0	90	0.16
Oct 21	1	0	0	84	0.15

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Nov 21	1	0	0	37	0.07
Dec 21	1	0	0	43	0.08
Jan 22	1	12	0.03	24	0.04
Feb 22	1	0	0	6	0.01
Mar 22	1	6	0.02	12	0.02
Mar 22	2	0	0	0	0
Apr 22	1	19	0.05	13	0.02
Apr 22	2	6	0.02	6	0.01
May 22	1	12	0.03	0	0
May 22	2	7	0.02	6	0.01
Jun 22	1	6	0.02	19	0.03
Jun 22	2	114	0.31	13	0.02
Jul 22	1	18	0.05	0	0
Jul 22	2	0	0	19	0.03
Aug 22	1	1	0	37	0.07
Aug 22	2	0	0	7	0.01
Sep 22	1	0	0	93	0.17
Sep 22	2	0	0	32	0.06
Oct 22	1	6	0.02	7	0.01
Nov 22	1	13	0.03	31	0.05
Dec 22	1	30	0.08	53	0.09
Jan 23	1	27	0.07	102	0.18
Feb 23	1	0	0	0	0
Mar 23	1	18	0.05	35	0.06
Apr 23	1	19	0.05	49	0.09
May 23	1	0	0	13	0.02
Jun 23	1	135	0.37	12	0.02
Jul 23	1	7	0.02	7	0.01
Aug 23	1	0	0	19	0.03

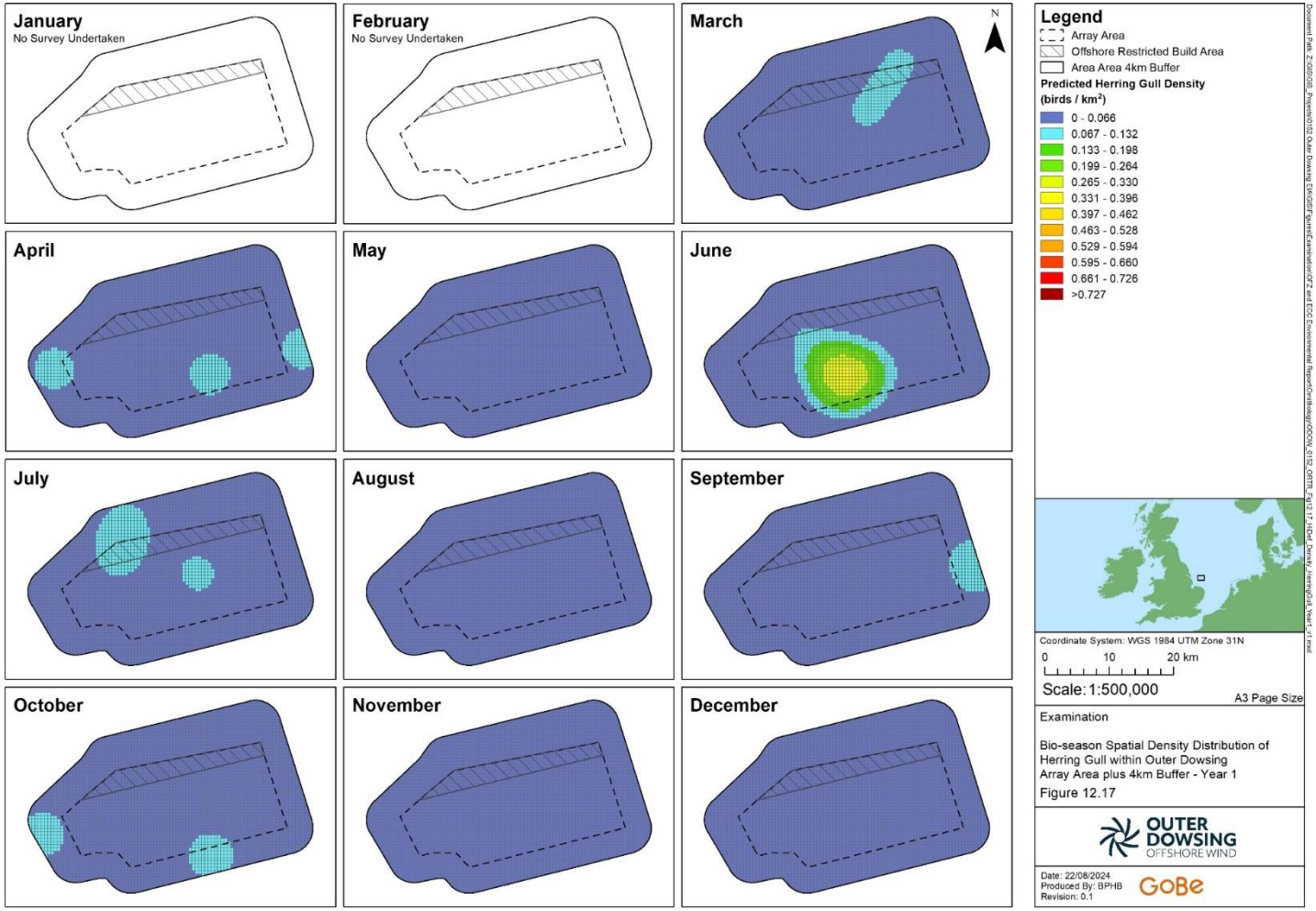

Figure 3.15. Bio-season spatial density distribution of herring gull within the Array Area +4km buffer – Year 1

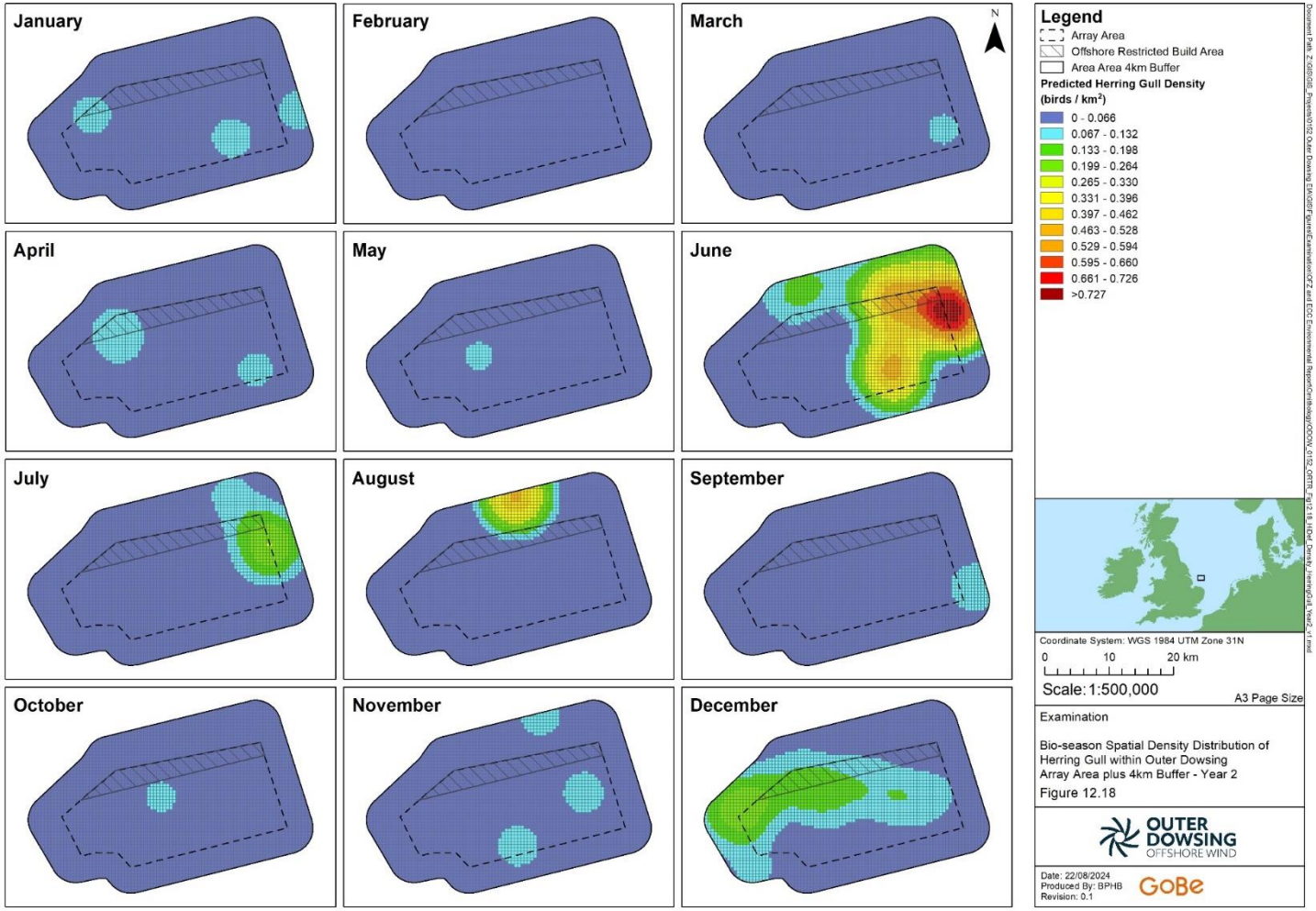

Figure 3.16. Bio-season spatial density distribution of herring gull within the Array Area +4km buffer - Year 2

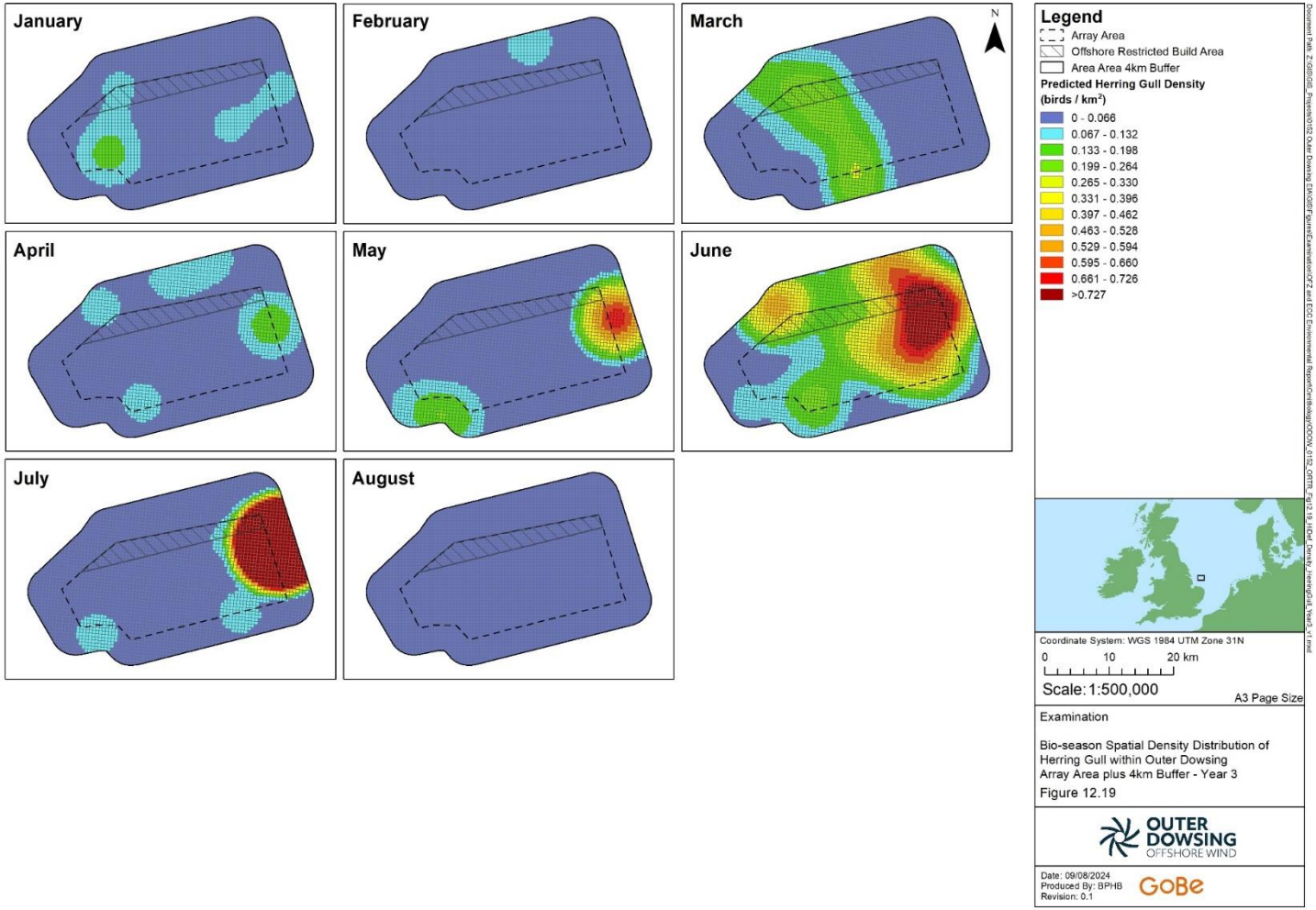

Figure 3.17. Bio-season spatial density distribution of herring gull within the Array Area +4km buffer - Year 3

104. Herring gull showed some variation in patterns of abundance across both years for which DAS data were collected. In both years, abundance offshore was high in the summer, corresponding with the chick rearing period for this species a time when adults are most likely to be foraging for soft food to provision young chicks. However, there was also high abundance estimated for December 2022 and January 2023. This peak did not occur the previous winter, and numbers in January 2023 were almost three times higher than those estimated for January 2022. This pattern was observed across both the WTG area and the WTG area +2km buffer and shows a similar pattern to that shown by great black-backed gull, suggesting that abundance of large gulls in that period was driven by food availability.

3.6.4 Flight direction

105. Figure 3.18 shows windrose diagrams presenting flight directions recorded for herring gull within the array area +4km. These windrose diagrams were created from the array area +4km buffer; however, these data are still applicable to the WTG area +4km buffer, which is a subset of the larger array area +4km buffer This data is still relevant to the project, as it indicates the relative flight directions for relevant bird species within the WTG area and immediate vicinity.

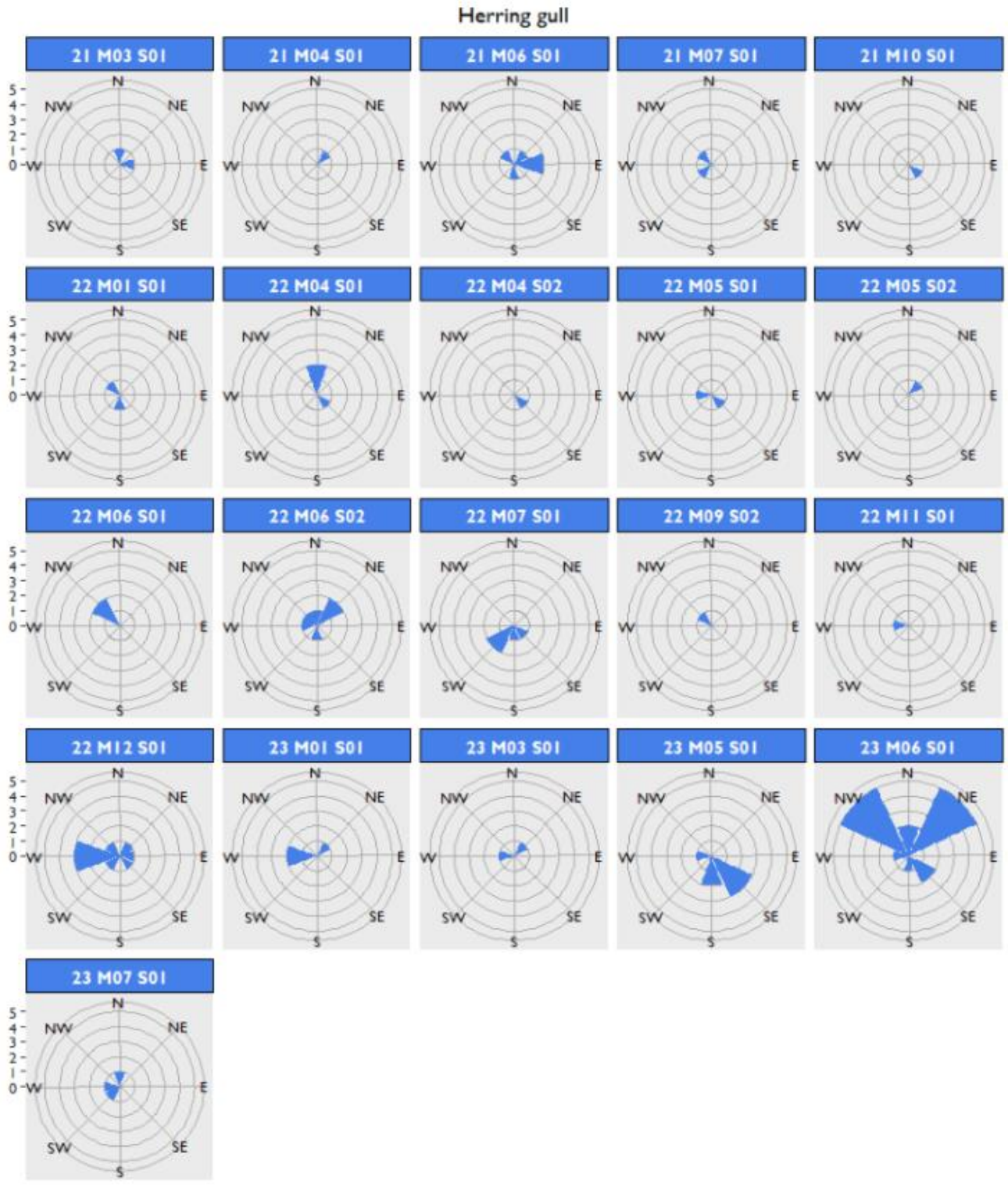

Figure 3.18. Windrose diagrams for months during which flying herring gull were recorded within the array area +4km buffer.

3.6.5 Birds aged from DAS data

106. Proportions of herring gull aged from DAS images are presented in Table 3-22. Adult proportions are derived from the proportion of birds identified as adults out of all the aged birds for that species. Unaged birds do not contribute to the age proportions.

Table 3-22. Proportions of herring gull aged from DAS images within the WTG area +2km buffer.

Survey Date	Adult	Immature	Juvenile	Unknown	Adult%	Total	Number of aged birds
3/22/2021	0	1	0	0	0	1	1
4/4/2021	0	0	0	2	0	2	0
5/12/2021	0	0	0	0	0	0	0
6/9/2021	1	4	0	1	20	6	5
7/24/2021	0	1	0	1	0	2	1
8/14/2021	0	0	0	0	0	0	0
9/7/2021	0	0	0	0	0	0	0
10/9/2021	1	0	0	0	100	1	1
11/2/2021	0	0	0	0	0	0	0
12/15/2021	0	0	0	0	0	0	0
1/6/2022	0	1	0	1	0	2	1
2/23/2022	0	0	0	0	0	0	0
3/11/2022	0	0	0	1	0	1	0
3/22/2022	0	0	0	0	0	0	0
4/2/2022	2	0	0	1	100	3	2
4/15/2022	0	1	0	0	0	1	1
5/2/2022	0	2	0	0	0	2	2
5/17/2022	0	1	0	0	0	1	1
6/9/2022	1	0	0	3	100	4	1
6/21/2022	3	7	0	22	30	32	10
7/4/2022	0	3	0	3	0	6	3
7/16/2022	0	0	0	1	0	1	0
8/8/2022	0	0	0	0	0	0	0
8/23/2022	0	0	0	0	0	0	0
9/13/2022	0	0	0	1	0	1	0
9/25/2022	0	0	0	0	0	0	0

Survey Date	Adult	Immature	Juvenile	Unknown	Adult%	Total	Number of aged birds
10/10/2022	0	0	0	1	0	1	0
11/7/2022	1	0	0	1	100	2	1
12/13/2022	5	0	1	3	83	9	6
1/26/2023	0	2	1	1	0	4	3
2/10/2023	0	0	0	0	0	0	0
3/24/2023	1	0	0	5	100	6	1
4/5/2023	1	1	0	1	50	3	2
5/3/2023	2	7	0	0	22	9	9
6/17/2023	2	9	0	17	18	28	11
7/5/2023	55	5	0	3	92	63	60
8/10/2023	0	0	0	0	0	0	0

3.7 Lesser black-backed gull

3.7.1 Digital aerial survey data

107. Lesser black-backed gull were recorded in the WTG area in 15 of the 30 months surveyed, with a summed mean seasonal peak abundance of 107 birds (Table 3-26).

108. In the WTG area +2km buffer, the summed mean seasonal peak abundance was 149 birds (Table 3-26).

3.7.2 Lesser black-backed gull overview

109. The nearest lesser black-backed gull breeding sites to the Project are found on the north Norfolk coast with the vast majority found on the Outer Trial Bank (582 nests in 2023) (BTO, 2022). This site is located approximately 90km from the Project WTG area, which means it is within the mean maximum foraging range of lesser black-backed gull (127km, standard deviation 109km) (Woodward *et al.*, 2019).

110. The nearest SPA that supports breeding lesser black-backed gull as a qualifying feature is the Alde-Ore Estuary SPA (population approximately 1,630 AON as of 2023. This SPA lies 147km from the Project array area and is beyond the mean maximum foraging range but within the mean maximum foraging range plus one standard deviation. Tracking data collected from breeding adults at this colony suggest that the Project does not fall within the home range of this population (Thaxter *et al.*, 2015).

111. Outside the breeding season, impacts on lesser black-backed gull have been compared to the UK North Sea and Channel BDMPS, consisting of 209,006 individuals during autumn migration (September to October), 39,313 individuals during the winter (November to February) and 197,482 individuals during spring migration (March) (Furness, 2015).

3.7.3 Abundance and Phenology

112. Mean seasonal peak abundances of lesser black-backed gull in the species bio-seasons (as defined in Furness 2015) are presented in Table 3-23. Estimates of monthly abundance and density within the WTG area, and monthly abundance and density within the WTG area +2km buffer are presented in Table 3-24, Table 3-25, and Table 3-26 for flying birds, birds sitting on the sea, and the total birds observed. The spatial density distribution of lesser black-backed gull within the Outer Dowsing Array Area +4km buffer is shown for three years of surveys in Figure 3.19, Figure 3.20, and Figure 3.21.

113. Lesser black-backed gull was present in the Project WTG area in consistent numbers across all four bio-seasons. Abundance was highest during the breeding bio-season (April to August), with a mean seasonal peak abundance of 75 birds and mean seasonal peak density of 0.21 birds/km^2 (Table 3-26).

Table 3-23. Lesser black-backed gull bio-season mean seasonal peak apportioned abundance and density estimates in the Project WTG area +2km buffer.

BDMPS Bio-seasons	Months	Array area minus the ORBA		Array area minus the ORBA +2km buffer	
		Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)	Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)
Return migration	Mar	13 (0-30)	0.03 (0.00-0.08)	22 (0-50)	0.04 (0.00-0.09)
Breeding	Apr-Aug	75 (36-117)	0.21 (0.10-0.32)	99 (50-150)	0.18 (0.09-0.27)
Post-breeding migration	Sep–Oct	12 (0-29)	0.03 (0.00-0.08)	23 (6-46)	0.04 (0.01-0.08)
Winter	Nov-Feb	7 (0-18)	0.02 (0.00-0.05)	6 (0-18)	0.01 (0.00-0.03)
Summed mean seasonal peak		107 (36-194)	-	149 (56-263)	-

Table 3-24. Lesser black-backed gull estimated apportioned abundance and estimated density of flying birds in the Project WTG area and WTG area +2km buffer.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	0	0	0	0
Apr 21	1	25	0.07	25	0.04
May 21	1	7	0.02	7	0.01
Jun 21	1	18	0.05	19	0.03
Jul 21	1	6	0.02	13	0.02
Aug 21	1	0	0	0	0
Sep 21	1	0	0	12	0.02
Oct 21	1	7	0.02	7	0.01
Nov 21	1	7	0.02	7	0.01
Dec 21	1	0	0	0	0
Jan 22	1	0	0	0	0
Feb 22	1	0	0	0	0
Mar 22	1	13	0.03	19	0.03
Mar 22	2	0	0	0	0
Apr 22	1	6	0.02	12	0.02
Apr 22	2	7	0.02	13	0.02
May 22	1	0	0	12	0.02

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
May 22	2	0	0	0	0
Jun 22	1	0	0	13	0.02
Jun 22	2	6	0.02	12	0.02
Jul 22	1	13	0.03	12	0.02
Jul 22	2	6	0.02	6	0.01
Aug 22	1	54	0.15	63	0.11
Aug 22	2	0	0	12	0.02
Sep 22	1	0	0	7	0.01
Sep 22	2	0	0	0	0
Oct 22	1	0	0	0	0
Nov 22	1	0	0	0	0
Dec 22	1	0	0	0	0
Jan 23	1	0	0	0	0
Feb 23	1	0	0	0	0
Mar 23	1	0	0	12	0.02
Apr 23	1	0	0	0	0
May 23	1	0	0	0	0
Jun 23	1	74	0.2	85	0.15
Jul 23	1	0	0	6	0.01
Aug 23	1	7	0.02	6	0.01

Table 3-25. Lesser black-backed gull estimated apportioned abundance and estimated density of birds sitting on the water in the Project WTG area and WTG area +2km buffer.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	0	0	0	0
Apr 21	1	0	0	0	0
May 21	1	0	0	0	0
Jun 21	1	0	0	0	0
Jul 21	1	7	0.02	6	0.01
Aug 21	1	0	0	0	0
Sep 21	1	12	0.03	18	0.03
Oct 21	1	0	0	0	0
Nov 21	1	0	0	0	0
Dec 21	1	0	0	0	0
Jan 22	1	0	0	0	0
Feb 22	1	0	0	0	0

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 22	1	0	0	13	0.02
Mar 22	2	0	0	0	0
Apr 22	1	0	0	0	0
Apr 22	2	0	0	0	0
May 22	1	0	0	12	0.02
May 22	2	0	0	0	0
Jun 22	1	7	0.02	6	0.01
Jun 22	2	6	0.02	6	0.01
Jul 22	1	0	0	0	0
Jul 22	2	0	0	0	0
Aug 22	1	7	0.02	7	0.01
Aug 22	2	6	0.02	6	0.01
Sep 22	1	0	0	9	0.01
Sep 22	2	0	0	0	0
Oct 22	1	0	0	0	0
Nov 22	1	0	0	0	0
Dec 22	1	0	0	0	0
Jan 23	1	0	0	0	0
Feb 23	1	0	0	0	0
Mar 23	1	0	0	0	0
Apr 23	1	13	0.03	12	0.02
May 23	1	0	0	0	0
Jun 23	1	93	0.25	145	0.26
Jul 23	1	0	0	88	0.16
Aug 23	1	0	0	0	0

Table 3-26. Lesser black-backed gull total estimated apportioned abundance and estimated density in the Project WTG area and WTG area +2km buffer (Total of flying and sitting birds).

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	0	0	0	0
Apr 21	1	25	0.07	24	0.04
May 21	1	6	0.02	6	0.01
Jun 21	1	19	0.05	19	0.03
Jul 21	1	13	0.03	19	0.03
Aug 21	1	0	0	0	0
Sep 21	1	12	0.03	30	0.05

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Oct 21	1	6	0.02	7	0.01
Nov 21	1	7	0.02	6	0.01
Dec 21	1	0	0	0	0
Jan 22	1	0	0	0	0
Feb 22	1	0	0	0	0
Mar 22	1	13	0.03	30	0.05
Mar 22	2	0	0	0	0
Apr 22	1	7	0.02	12	0.02
Apr 22	2	6	0.02	12	0.02
May 22	1	0	0	25	0.05
May 22	2	0	0	0	0
Jun 22	1	6	0.02	19	0.03
Jun 22	2	13	0.03	19	0.03
Jul 22	1	13	0.03	13	0.02
Jul 22	2	7	0.02	6	0.01
Aug 22	1	59	0.16	65	0.12
Aug 22	2	7	0.02	19	0.03
Sep 22	1	0	0	15	0.03
Sep 22	2	0	0	0	0
Oct 22	1	0	0	0	0
Nov 22	1	0	0	0	0
Dec 22	1	0	0	0	0
Jan 23	1	0	0	0	0
Feb 23	1	0	0	0	0
Mar 23	1	0	0	13	0.02
Apr 23	1	13	0.03	12	0.02
May 23	1	0	0	0	0
Jun 23	1	167	0.46	232	0.42
Jul 23	1	0	0	95	0.17
Aug 23	1	6	0.02	6	0.01

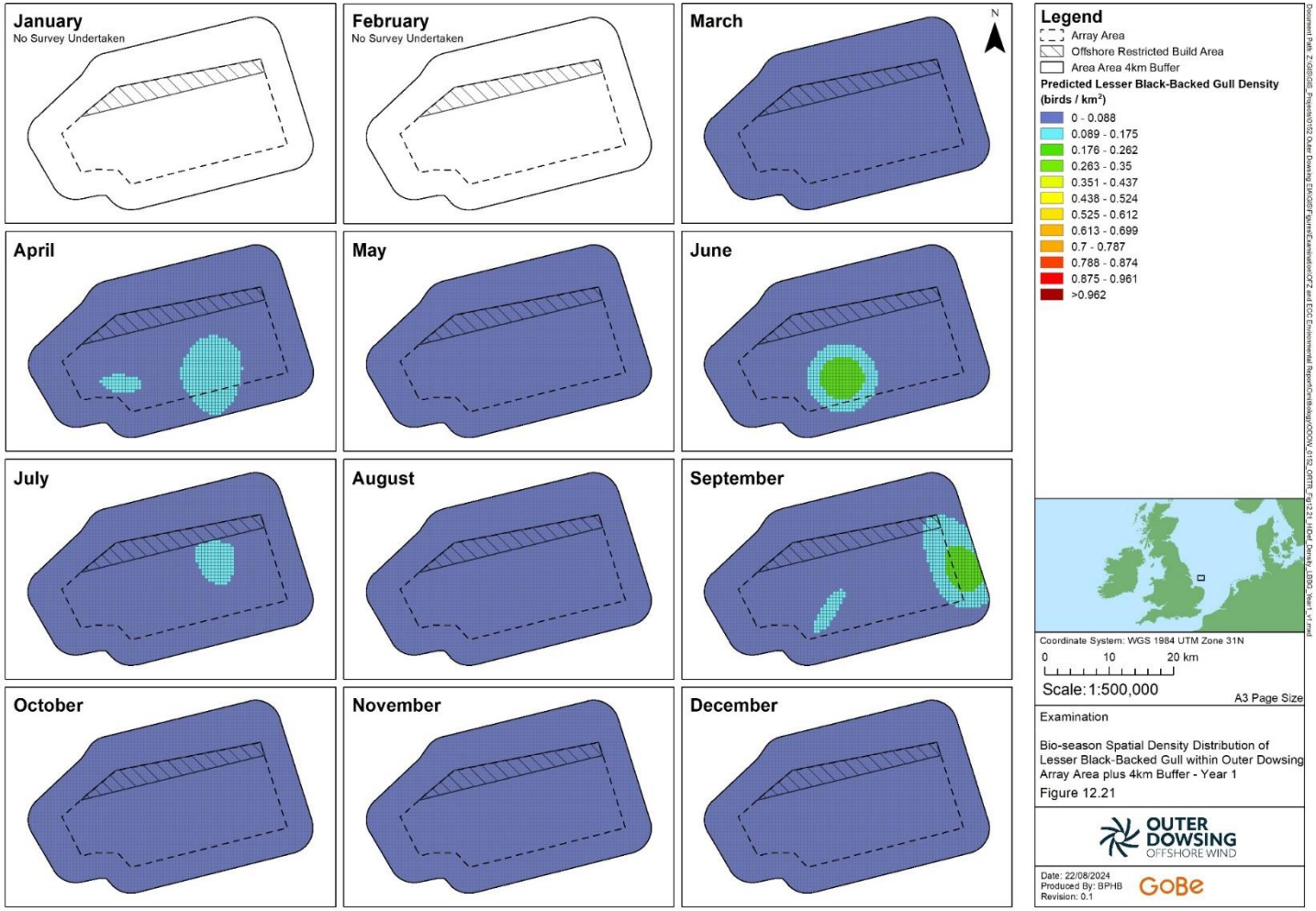

Figure 3.19. Bio-season spatial density distribution of lesser black-backed gull within the Array Area +4km buffer - Year 1

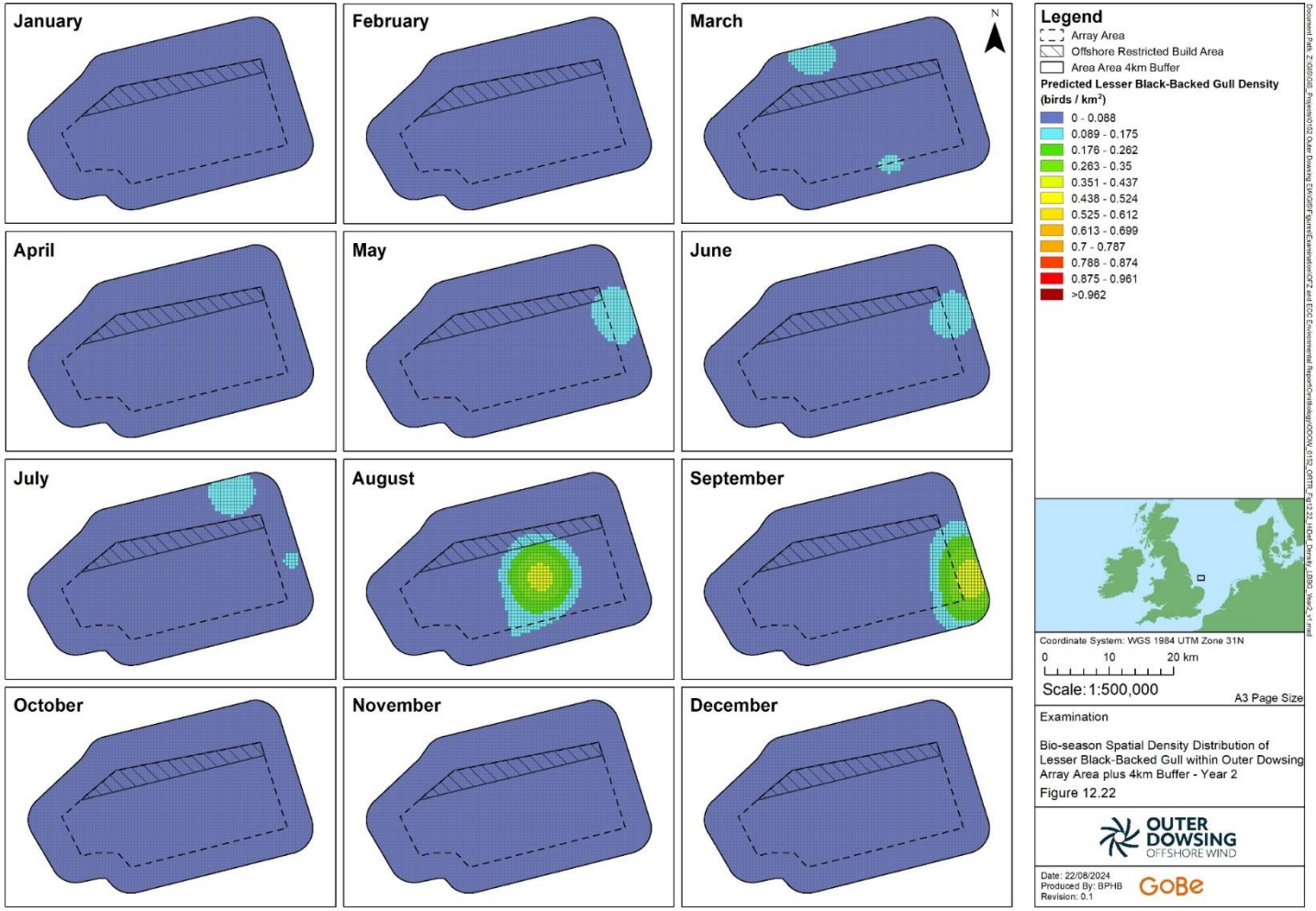

Figure 3.20. Bio-season spatial density distribution of lesser black-backed gull within the Array Area +4km buffer - Year 2

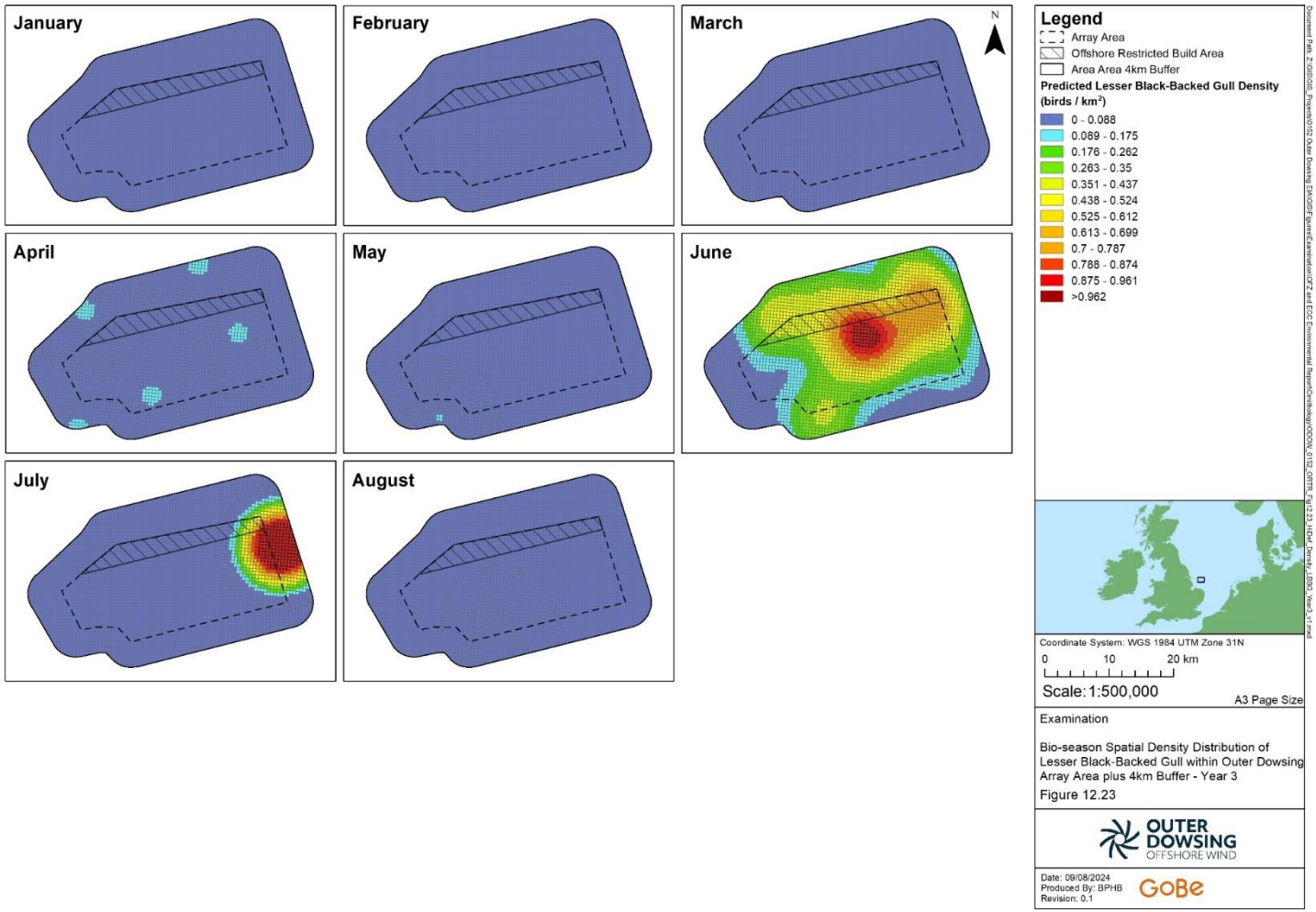

Figure 3.21. Bio-season spatial density distribution of lesser black-backed gull within the Array Area +4km buffer - Year 3.

Lesser black-backed gull showed some variation in patterns of abundance across both years for which DAS data were collected. In both years, abundance offshore was high in the autumn, corresponding with the period during which recently fledged birds start to become more independent and those undertaking their annual south westerly post breeding migration begin to do so. In the WTG area, this autumn peak was much higher in 2022 than in 2021. This pattern observed across the WTG area +2km buffer is much more difficult to interpret, with peaks in abundance in many months that do not correspond with high abundances in the WTG area.

3.7.4 Flight direction

114. Figure 3.22 shows windrose diagrams presenting flight directions recorded for lesser black-backed gull within the array area +4km buffer. These windrose diagrams were created from the array area +4km buffer; however, these data are still applicable to the WTG area +4km buffer, which is a subset of the larger array area +4km buffer This data is still relevant to the project, as it indicates the relative flight directions for relevant bird species within the WTG area and immediate vicinity.

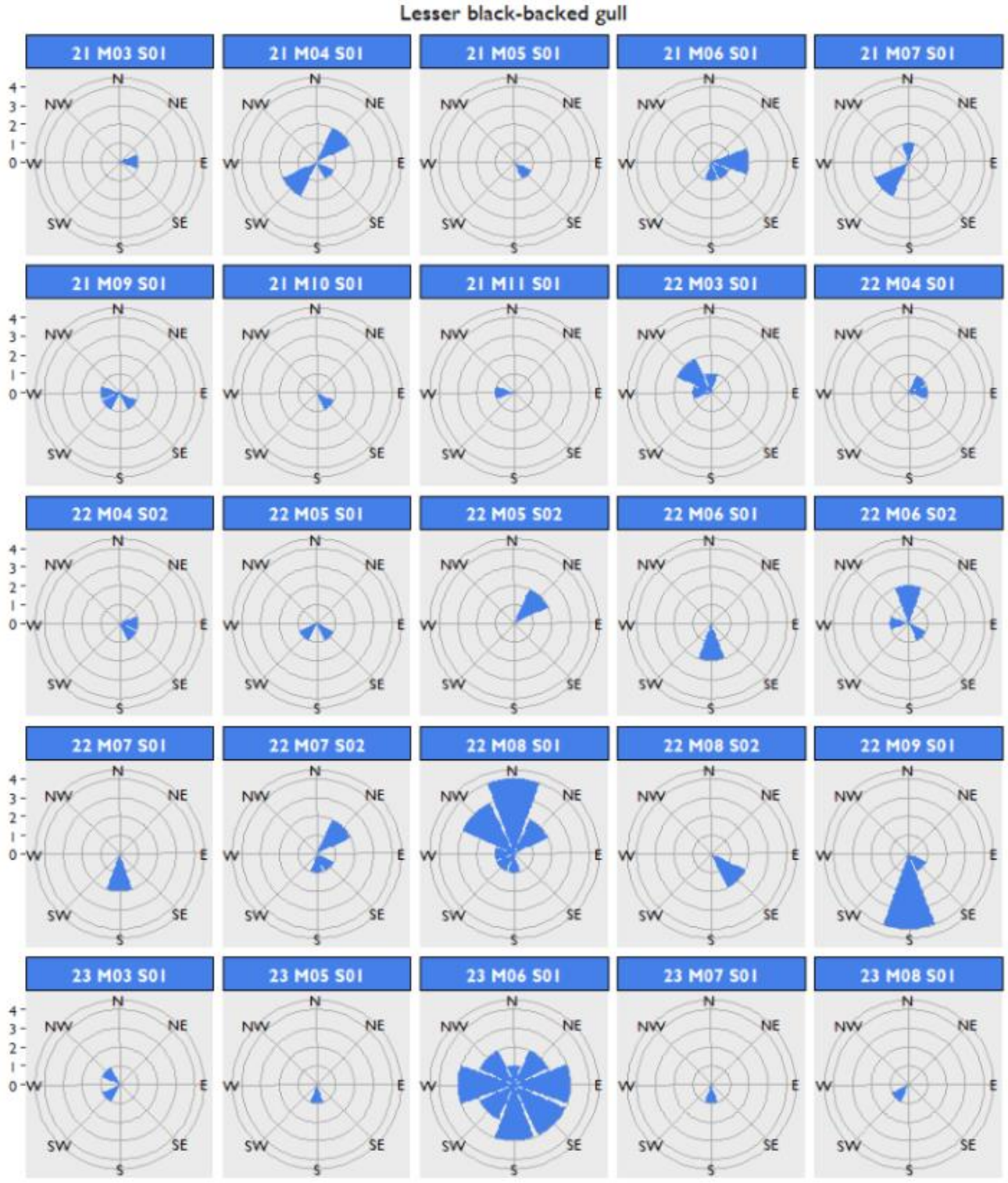

Figure 3.22. Windrose diagrams for months during which flying lesser black-backed gull were recorded within the array area +4km buffer.

3.7.5 Birds aged from DAS data

115. Proportions of lesser black-backed gull aged from DAS images are presented in Table 3-27. Adult proportions are derived from the proportion of birds identified as adults out of all the aged birds for that species. Unaged birds do not contribute to the age proportions. Site-specific adult proportions based on the number of birds aged through the DAS images have been used for lesser black-backed gull throughout the assessment. The proportion of adults from each survey that fell within the lesser black-backed gull breeding season were averaged to produce the site-specific adult proportion (0.66).

Table 3-27. Proportions of lesser black-backed gull aged from DAS images within the WTG area +2km buffer.

Survey Date	Adult	Immature	Juvenile	Unknown	Adult%	Total	Number of aged birds
22/03/2021	0	0	0	0	0	0	0
04/04/2021	4	0	0	0	100	4	4
12/05/2021	0	1	0	0	0	1	1
09/06/2021	1	2	0	0	33	3	3
24/07/2021	2	0	0	1	100	3	2
14/08/2021	0	0	0	0	0	0	0
07/09/2021	2	0	0	4	100	6	2
09/10/2021	1	0	0	0	100	1	1
02/11/2021	1	0	0	0	100	1	1
15/12/2021	0	0	0	0	0	0	0
06/01/2022	0	0	0	0	0	0	0
23/02/2022	0	0	0	0	0	0	0
11/03/2022	2	2	0	1	50	5	4
22/03/2022	0	0	0	0	0	0	0
02/04/2022	1	1	0	0	50	2	2
15/04/2022	2	0	0	0	100	2	2
02/05/2022	1	1	0	2	50	4	2
17/05/2022	0	0	0	0	0	0	0
09/06/2022	0	2	0	1	0	3	2
21/06/2022	1	1	0	1	50	3	2
04/07/2022	0	2	0	0	0	2	2
16/07/2022	1	0	0	0	100	1	1
08/08/2022	5	2	1	3	62	11	8
23/08/2022	2	0	0	1	100	3	2
13/09/2022	0	1	0	1	0	2	1
25/09/2022	0	0	0	0	0	0	0

Survey Date	Adult	Immature	Juvenile	Unknown	Adult%	Total	Number of aged birds
10/10/2022	0	0	0	0	0	0	0
07/11/2022	0	0	0	0	0	0	0
13/12/2022	0	0	0	0	0	0	0
26/01/2023	0	0	0	0	0	0	0
10/02/2023	0	0	0	0	0	0	0
24/03/2023	0	1	0	0	0	1	1
05/04/2023	1	0	0	1	100	2	1
03/05/2023	0	0	0	0	0	0	0
17/06/2023	8	5	1	24	57	38	14
05/07/2023	14	0	2	0	88	16	16
10/08/2023	0	1	0	0	0	1	1

3.8 Sandwich tern

3.8.1 Digital aerial survey data

116. Sandwich tern were recorded in the WTG areain 9 of the 30 months surveyed with a summed mean seasonal peak abundance of 125 birds (Table 3-31).

117. In the WTG area +2km buffer, the summed mean seasonal peak abundance was 198 birds (Table 3-31).

3.8.2 Sandwich tern overview

118. The nearest breeding population of Sandwich terns to the Project is at the North Norfolk Coast SPA (NNC SPA), of which Sandwich tern is a qualifying feature. Within the boundary of the NNC SPA, Sandwich tern breed at two principal colonies; Blakeney Point and Scolt Head (JNCC, 2022; Perrow *et al.*, 2017), approximately 70km and 77km from the Project array, respectively. These sites both lie outside the species mean maximum foraging range plus one standard deviation, 34.3km (±23.2km) from the Project array area.

119. The most recent breeding numbers for Sandwich tern were 3,730 nests at Scolt Head (2023) and 3,134 nests at Blakeney Point (2021) with a total number of breeding adults within the North Norfolk Coast SPA found to be 6,864 based on the most recent 2020-2023 colony count (BTO, 2023).

120. Outside the breeding season, the predicted mortality impact from the Project has been compared to the appropriate BDMPS for the relevant bio-season. The relevant background population is considered to be the UK North Sea and Channel BDMPS, consisting of 38,050 individuals during autumn migration (September), and spring migration (March) (Furness, 2015).

3.8.3 Abundance and Phenology

121. Mean seasonal peak abundances of Sandwich tern in the species bio-seasons (as defined in Furness 2015) are presented in Table 3-28. Estimates of monthly abundance and density within the WTG area, and monthly abundance and density within the WTG area +2km buffer are presented in Table 3-29, Table 3-30, and Table 3-31 for flying birds, birds sitting on the sea, and the total birds observed. The spatial density distribution of sandwich tern within the Outer Dowsing Array Area +4km buffer is shown for three years of surveys in Figure 3.23, Figure 3.24, and Figure 3.25.

122. Sandwich tern were present in the Project WTG area across all three bio-seasons. Abundance was highest during the breeding bio-season (April to August), with a mean seasonal peak abundance of 112 birds and mean seasonal peak density of 0.31 birds/km^2 (Table 3-28).

Table 3-28. Sandwich tern bio-season apportioned mean seasonal peak abundance and density estimates in the Project WTG area and WTG area +2km buffer.

BDMPS Bio-seasons	Months	WTG area		Array area minus the ORBA +2km buffer	
		Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)	Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)
Return migration	Mar	0 (0-0)	0.00 (0.00-0.00)	0 (0-0)	0.00 (0.00-0.00)
Breeding season	Apr-Aug	112 (61-175)	0.31 (0.17-0.48)	185 (104-275)	0.34 (0.19-0.50)
Post-breeding migration	Sep	13 (0-30)	0.03 (0.00-0.08)	13 (1-30)	0.02 (0.00-0.05)
Summed mean seasonal peak		125 (61-205)	-	198 (105-305)	-

Table 3-29. Sandwich tern estimated apportioned abundance and estimated density of flying birds in the Project WTG area and WTG area+2km buffer.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	0	0	0	0
Apr 21	1	0	0	7	0.01
May 21	1	124	0.34	179	0.33
Jun 21	1	12	0.03	18	0.03
Jul 21	1	0	0	0	0
Aug 21	1	0	0	0	0
Sep 21	1	13	0.03	13	0.02
Oct 21	1	0	0	0	0
Nov 21	1	0	0	0	0
Dec 21	1	0	0	0	0
Jan 22	1	0	0	0	0
Feb 22	1	0	0	0	0
Mar 22	1	0	0	0	0
Mar 22	2	0	0	0	0
Apr 22	1	0	0	0	0
Apr 22	2	86	0.24	154	0.28
May 22	1	37	0.1	143	0.26
May 22	2	71	0.19	92	0.17

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Jun 22	1	74	0.2	129	0.23
Jun 22	2	18	0.05	43	0.08
Jul 22	1	0	0	0	0
Jul 22	2	0	0	6	0.01
Aug 22	1	0	0	0	0
Aug 22	2	0	0	0	0
Sep 22	1	0	0	0	0
Sep 22	2	0	0	0	0
Oct 22	1	0	0	0	0
Nov 22	1	0	0	0	0
Dec 22	1	0	0	0	0
Jan 23	1	0	0	0	0
Feb 23	1	0	0	0	0
Mar 23	1	0	0	0	0
Apr 23	1	0	0	0	0
May 23	1	150	0.41	212	0.38
Jun 23	1	0	0	0	0
Jul 23	1	7	0.02	7	0.01
Aug 23	1	13	0.03	13	0.02

Table 3-30. Sandwich tern estimated apportioned abundance and estimated density of birds sitting on the water in the Project WTG area and WTG area +2km buffer.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	0	0	0	0
Apr 21	1	0	0	0	0
May 21	1	6	0.02	6	0.01
Jun 21	1	0	0	0	0
Jul 21	1	0	0	0	0
Aug 21	1	0	0	0	0
Sep 21	1	0	0	0	0
Oct 21	1	0	0	0	0
Nov 21	1	0	0	0	0
Dec 21	1	0	0	0	0
Jan 22	1	0	0	0	0
Feb 22	1	0	0	0	0
Mar 22	1	0	0	0	0

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 22	2	0	0	0	0
Apr 22	1	0	0	0	0
Apr 22	2	0	0	0	0
May 22	1	0	0	13	0.02
May 22	2	0	0	0	0
Jun 22	1	0	0	0	0
Jun 22	2	0	0	0	0
Jul 22	1	0	0	0	0
Jul 22	2	0	0	0	0
Aug 22	1	0	0	0	0
Aug 22	2	0	0	0	0
Sep 22	1	0	0	0	0
Sep 22	2	0	0	0	0
Oct 22	1	0	0	0	0
Nov 22	1	0	0	0	0
Dec 22	1	0	0	0	0
Jan 23	1	0	0	0	0
Feb 23	1	0	0	0	0
Mar 23	1	0	0	0	0
Apr 23	1	0	0	0	0
May 23	1	0	0	0	0
Jun 23	1	0	0	0	0
Jul 23	1	0	0	0	0
Aug 23	1	0	0	0	0

Table 3-31. Sandwich tern total estimated apportioned abundance and estimated density, in the Project WTG area and WTG area +2km buffer (Total of flying and sitting birds).

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	0	0	0	0
Apr 21	1	0	0	6	0.01
May 21	1	131	0.36	185	0.34
Jun 21	1	13	0.03	18	0.03
Jul 21	1	0	0	0	0
Aug 21	1	0	0	0	0
Sep 21	1	13	0.03	13	0.02
Oct 21	1	0	0	0	0

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Nov 21	1	0	0	0	0
Dec 21	1	0	0	0	0
Jan 22	1	0	0	0	0
Feb 22	1	0	0	0	0
Mar 22	1	0	0	0	0
Mar 22	2	0	0	0	0
Apr 22	1	0	0	0	0
Apr 22	2	85	0.23	157	0.28
May 22	1	36	0.1	154	0.28
May 22	2	72	0.2	91	0.17
Jun 22	1	73	0.2	127	0.23
Jun 22	2	18	0.05	42	0.08
Jul 22	1	0	0	0	0
Jul 22	2	0	0	7	0.01
Aug 22	1	0	0	0	0
Aug 22	2	0	0	0	0
Sep 22	1	0	0	0	0
Sep 22	2	0	0	0	0
Oct 22	1	0	0	0	0
Nov 22	1	0	0	0	0
Dec 22	1	0	0	0	0
Jan 23	1	0	0	0	0
Feb 23	1	0	0	0	0
Mar 23	1	0	0	0	0
Apr 23	1	0	0	0	0
May 23	1	151	0.41	213	0.39
Jun 23	1	0	0	0	0
Jul 23	1	6	0.02	7	0.01
Aug 23	1	13	0.03	12	0.02

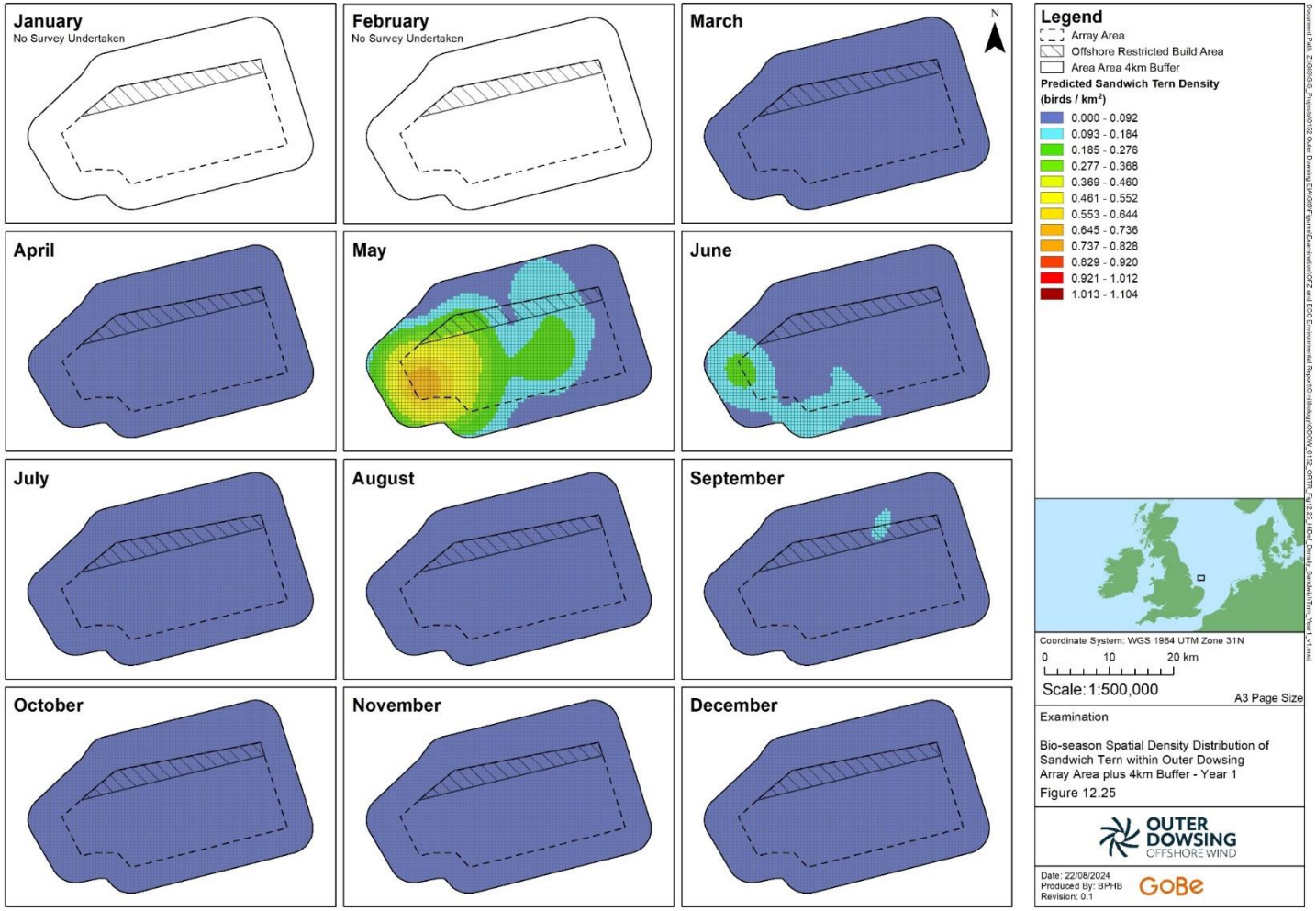

Figure 3.23. Bio-season spatial density distribution of sandwich tern within the Array Area +4km buffer - Year 1

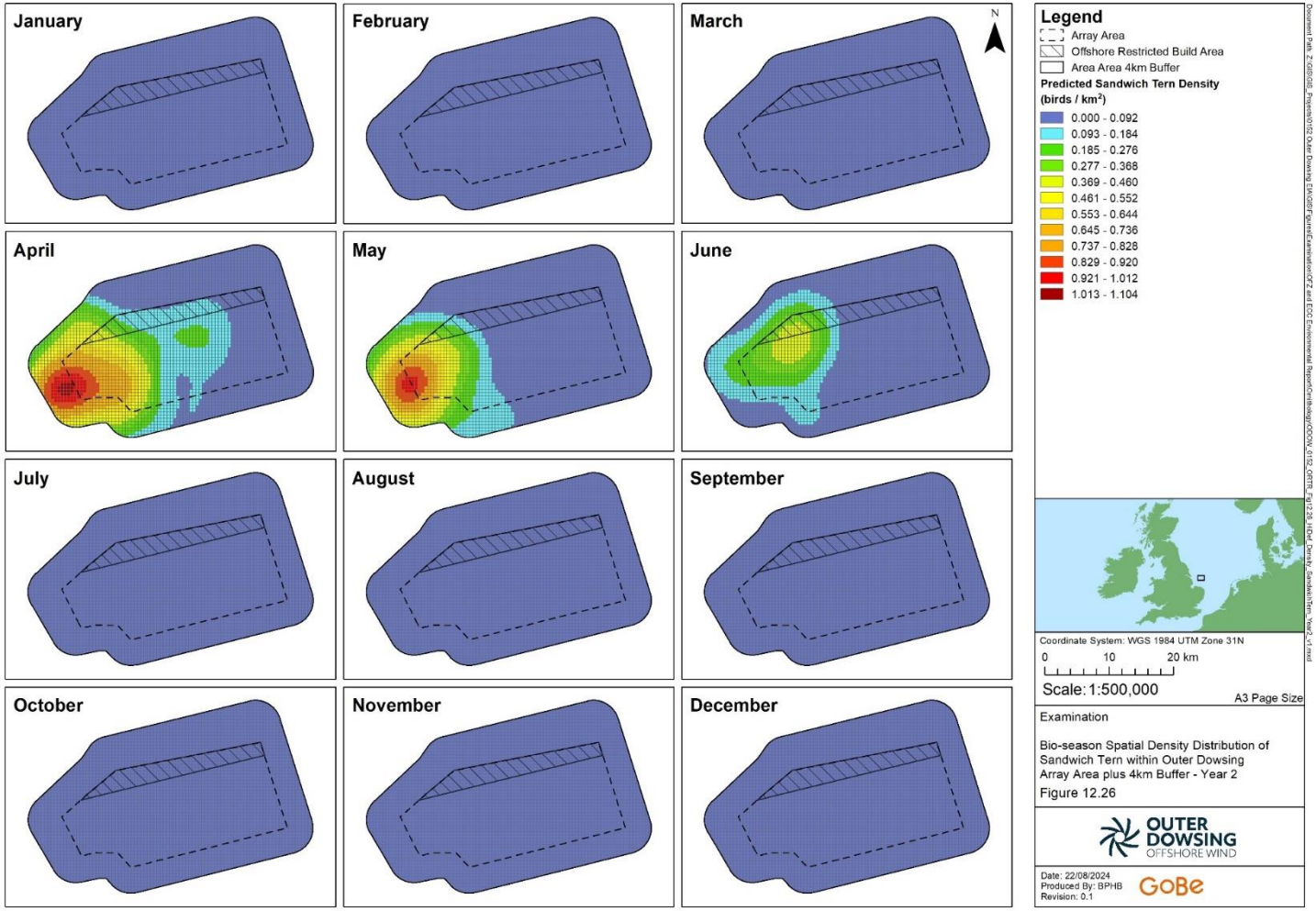

Figure 3.24. Bio-season spatial density distribution of sandwich tern within the Array Area +4km buffer - Year 2

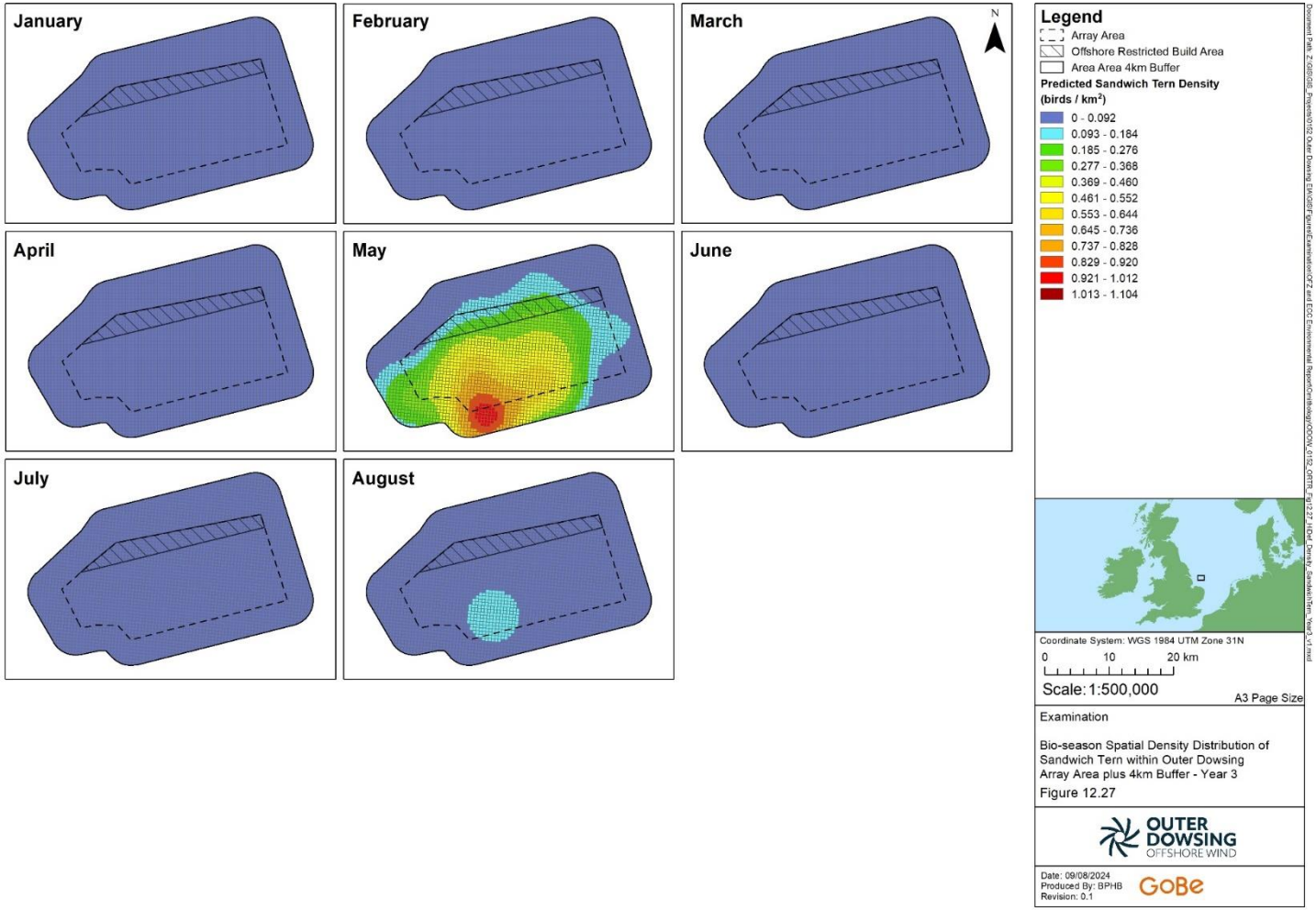

Figure 3.25. Bio-season spatial density distribution of sandwich tern within the Array Area +4km buffer - Year 3

123. Sandwich tern showed a very clear pattern of presence and abundance in both the WTG area and the WTG area +2km buffer. Birds were present during the early part of the breeding season, peaking in May all three years in the WTG area +2km buffer area and in the WTG area; there was also a peak in the WTG area in June 2022. In all three years, the species was largely absent from the site from August onwards, although a slight peak in September 2021 suggests the presence of a small number of birds on migration.

3.8.4 Flight direction

124. Figure 3.26 shows windrose diagrams presenting flight directions recorded for sandwich tern within the array area +4km buffer. These windrose diagrams were created from the array area +4km buffer; however, these data are still applicable to the WTG area +4km buffer, which is a subset of the larger array area +4km buffer This data is still relevant to the project, as it indicates the relative flight directions for relevant bird species within the WTG area and immediate vicinity.

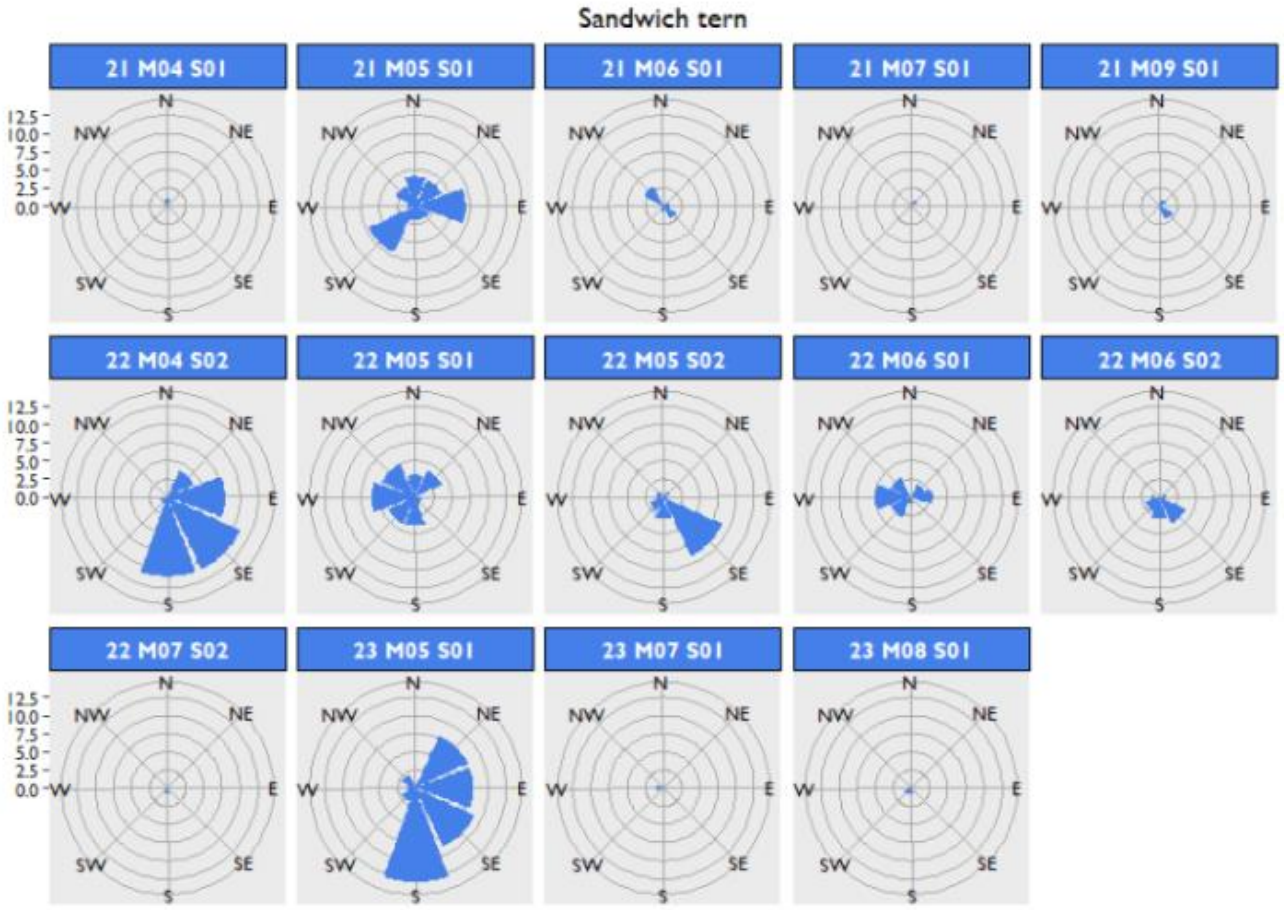

Figure 3.26. Windrose diagrams for months during which flying sandwich tern were recorded within the array area +4km buffer.

3.8.5 Birds aged from DAS data

125. Proportions of sandwich tern aged from DAS images are presented in Table 3-32. Adult proportions are derived from the proportion of birds identified as adults out of all the aged birds for that species. Unaged birds do not contribute to the age proportions.

Table 3-32. Proportions of sandwich tern aged from DAS images within the WTG area +2km buffer.

Survey Date	Adult	Immature	Juvenile	Unknown	Adult%	Total	Number of aged birds
22/03/2021	0	0	0	0	0	0	0
04/04/2021	0	0	0	1	0	1	0
12/05/2021	12	0	0	14	100	26	12
09/06/2021	2	0	0	1	100	3	2
24/07/2021	1	0	0	0	100	1	1
14/08/2021	0	0	0	0	0	0	0
07/09/2021	1	1	0	0	50	2	2
09/10/2021	0	0	0	0	0	0	0
02/11/2021	0	0	0	0	0	0	0
15/12/2021	0	0	0	0	0	0	0
06/01/2022	0	0	0	0	0	0	0
23/02/2022	0	0	0	0	0	0	0
11/03/2022	0	0	0	0	0	0	0
22/03/2022	0	0	0	0	0	0	0
02/04/2022	0	0	0	0	0	0	0
15/04/2022	26	0	0	0	100	26	26
02/05/2022	19	0	0	3	100	22	19
17/05/2022	14	0	0	0	100	14	14
09/06/2022	12	0	0	2	100	14	12
21/06/2022	7	0	0	0	100	7	7
04/07/2022	0	0	0	0	0	0	0
16/07/2022	0	0	0	1	0	1	0
08/08/2022	0	0	0	0	0	0	0
23/08/2022	0	0	0	0	0	0	0
13/09/2022	0	0	0	0	0	0	0
25/09/2022	0	0	0	0	0	0	0

Survey Date	Adult	Immature	Juvenile	Unknown	Adult%	Total	Number of aged birds
10/10/2022	0	0	0	0	0	0	0
07/11/2022	0	0	0	0	0	0	0
13/12/2022	0	0	0	0	0	0	0
26/01/2023	0	0	0	0	0	0	0
10/02/2023	0	0	0	0	0	0	0
24/03/2023	0	0	0	0	0	0	0
05/04/2023	0	0	0	0	0	0	0
03/05/2023	31	0	0	0	100	31	31
17/06/2023	0	0	0	0	0	0	0
05/07/2023	1	0	0	0	100	1	1
10/08/2023	2	0	0	0	100	2	2

3.9 Common tern

3.9.1 Digital aerial survey data

126. Common terns were recorded in the WTG area in 13 out of the 30 months surveyed with a summed mean seasonal peak abundance of 833 birds (Table 3-36).

127. In the WTG area +2km buffer, the summed mean seasonal peak abundance was 1,412 birds (Table 3-36).

3.9.2 Common tern overview

128. The mean maximum foraging range (±SD) of common tern is 18km (±8.9km), and the maximum recorded foraging range is 30km (Woodward *et al.*, 2019). The nearest colonies are in the NNC SPA, at least 65km from the Project and therefore out with the core foraging range of the colonies. The SPA breeding population is 110 pairs (BTO, 2023).

129. Outside the breeding season, impacts on common tern have been assessed against the UK North Sea and Channel BDMPS, consisting of 144,900 individuals during autumn migration (September), and spring migration (April) (Furness, 2015).

3.9.3 Abundance and Phenology

130. Mean seasonal peak abundances of common tern in the species bio-seasons (as defined in Furness 2015) are presented in Table 3-33. Estimates of monthly abundance and density within the WTG area, and monthly abundance and density within the WTG area +2km buffer, are presented in Table 3-33, Table 3-34, and Table 3-35 for flying birds, birds sitting on the sea, and the total birds observed.

131. Common tern was present in the Project WTG area in three bio-seasons; return migration, breeding, and post-breeding migration. Abundance in the WTG area was highest during the post-breeding migration bio-season (September), with a mean seasonal peak abundance of 733 birds (Table 3-33).

Table 3-33. Common tern bio-season mean seasonal peak apportioned abundance and density estimates in the Project WTG area.

		WTG area		WTG area +2km buffer	
BDMPS Bio-seasons	Months	Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)	Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)
Return Migration	Apr	25 (3-58)	0.07 (0.01-0.16)	48 (20-83)	0.09 (0.04-0.15)
Breeding	May-Aug	76 (26-143)	0.21 (0.07-0.39)	142 (51-291)	0.26 (0.09-0.53)
Post-breeding migration	Sep	733 (471-1,051)	2.01 (1.29-2.89)	1,222 (886-1,622)	2.23 (1.62-2.96)

BDMPS Bio-seasons	Months	WTG area		WTG area +2km buffer	
		Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)	Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)
Summed mean seasonal peak		833 (500-1,251)	-	1,412 (957-1,995)	-

Table 3-34. Common tern estimated apportioned abundance and estimated density of flying birds in the Project WTG area and WTG area +2km buffer.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	0	0	0	0
Apr 21	1	0	0	0	0
May 21	1	63	0.17	92	0.17
Jun 21	1	12	0.03	18	0.03
Jul 21	1	0	0	0	0
Aug 21	1	66	0.18	127	0.23
Sep 21	1	982	2.69	1379	2.51
Oct 21	1	0	0	0	0
Nov 21	1	0	0	0	0
Dec 21	1	0	0	0	0
Jan 22	1	0	0	0	0
Feb 22	1	0	0	0	0
Mar 22	1	0	0	0	0
Mar 22	2	0	0	0	0
Apr 22	1	0	0	0	0
Apr 22	2	44	0.12	91	0.17
May 22	1	0	0	0	0
May 22	2	67	0.18	133	0.24
Jun 22	1	0	0	25	0.05
Jun 22	2	6	0.02	7	0.01
Jul 22	1	0	0	0	0

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Jul 22	2	13	0.03	18	0.03
Aug 22	1	68	0.18	78	0.14
Aug 22	2	12	0.03	66	0.12
Sep 22	1	12	0.03	31	0.05
Sep 22	2	0	0	0	0
Oct 22	1	0	0	0	0
Nov 22	1	0	0	0	0
Dec 22	1	0	0	0	0
Jan 23	1	0	0	0	0
Feb 23	1	0	0	0	0
Mar 23	1	0	0	0	0
Apr 23	1	7	0.02	6	0.01
May 23	1	73	0.2	119	0.22
Jun 23	1	0	0	0	0
Jul 23	1	0	0	0	0
Aug 23	1	30	0.08	166	0.3

Table 3-35. Common tern estimated apportioned abundance and estimated density of birds sitting on the water in the Project WTG area and WTG area +2km buffer.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	0	0	0	0
Apr 21	1	0	0	0	0
May 21	1	24	0.07	36	0.06
Jun 21	1	0	0	0	0
Jul 21	1	0	0	0	0
Aug 21	1	0	0	0	0
Sep 21	1	475	1.3	1039	1.89
Oct 21	1	0	0	0	0
Nov 21	1	0	0	0	0
Dec 21	1	0	0	0	0
Jan 22	1	0	0	0	0
Feb 22	1	0	0	0	0
Mar 22	1	0	0	0	0

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 22	2	0	0	0	0
Apr 22	1	0	0	0	0
Apr 22	2	0	0	0	0
May 22	1	0	0	0	0
May 22	2	0	0	0	0
Jun 22	1	0	0	0	0
Jun 22	2	0	0	0	0
Jul 22	1	0	0	0	0
Jul 22	2	0	0	0	0
Aug 22	1	0	0	0	0
Aug 22	2	0	0	0	0
Sep 22	1	0	0	0	0
Sep 22	2	0	0	0	0
Oct 22	1	0	0	0	0
Nov 22	1	0	0	0	0
Dec 22	1	0	0	0	0
Jan 23	1	0	0	0	0
Feb 23	1	0	0	0	0
Mar 23	1	0	0	0	0
Apr 23	1	0	0	0	0
May 23	1	0	0	0	0
Jun 23	1	0	0	0	0
Jul 23	1	0	0	0	0
Aug 23	1	0	0	0	0

Table 3-36. Common tern total estimated apportioned abundance and estimated density in the Project WTG area and WTG area +2km buffer (Total of flying and sitting birds).

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	0	0	0	0
Apr 21	1	0	0	0	0
May 21	1	87	0.24	128	0.23
Jun 21	1	13	0.03	18	0.03
Jul 21	1	0	0	0	0
Aug 21	1	64	0.17	125	0.23
Sep 21	1	1452	3.98	2414	4.4
Oct 21	1	0	0	0	0

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Nov 21	1	0	0	0	0
Dec 21	1	0	0	0	0
Jan 22	1	0	0	0	0
Feb 22	1	0	0	0	0
Mar 22	1	0	0	0	0
Mar 22	2	0	0	0	0
Apr 22	1	0	0	0	0
Apr 22	2	44	0.12	90	0.16
May 22	1	0	0	0	0
May 22	2	66	0.18	134	0.24
Jun 22	1	0	0	24	0.04
Jun 22	2	7	0.02	6	0.01
Jul 22	1	0	0	0	0
Jul 22	2	13	0.03	18	0.03
Aug 22	1	68	0.19	77	0.14
Aug 22	2	12	0.03	67	0.12
Sep 22	1	13	0.03	30	0.05
Sep 22	2	0	0	0	0
Oct 22	1	0	0	0	0
Nov 22	1	0	0	0	0
Dec 22	1	0	0	0	0
Jan 23	1	0	0	0	0
Feb 23	1	0	0	0	0
Mar 23	1	0	0	0	0
Apr 23	1	6	0.02	6	0.01
May 23	1	74	0.2	121	0.22
Jun 23	1	0	0	0	0
Jul 23	1	0	0	0	0
Aug 23	1	30	0.08	164	0.3

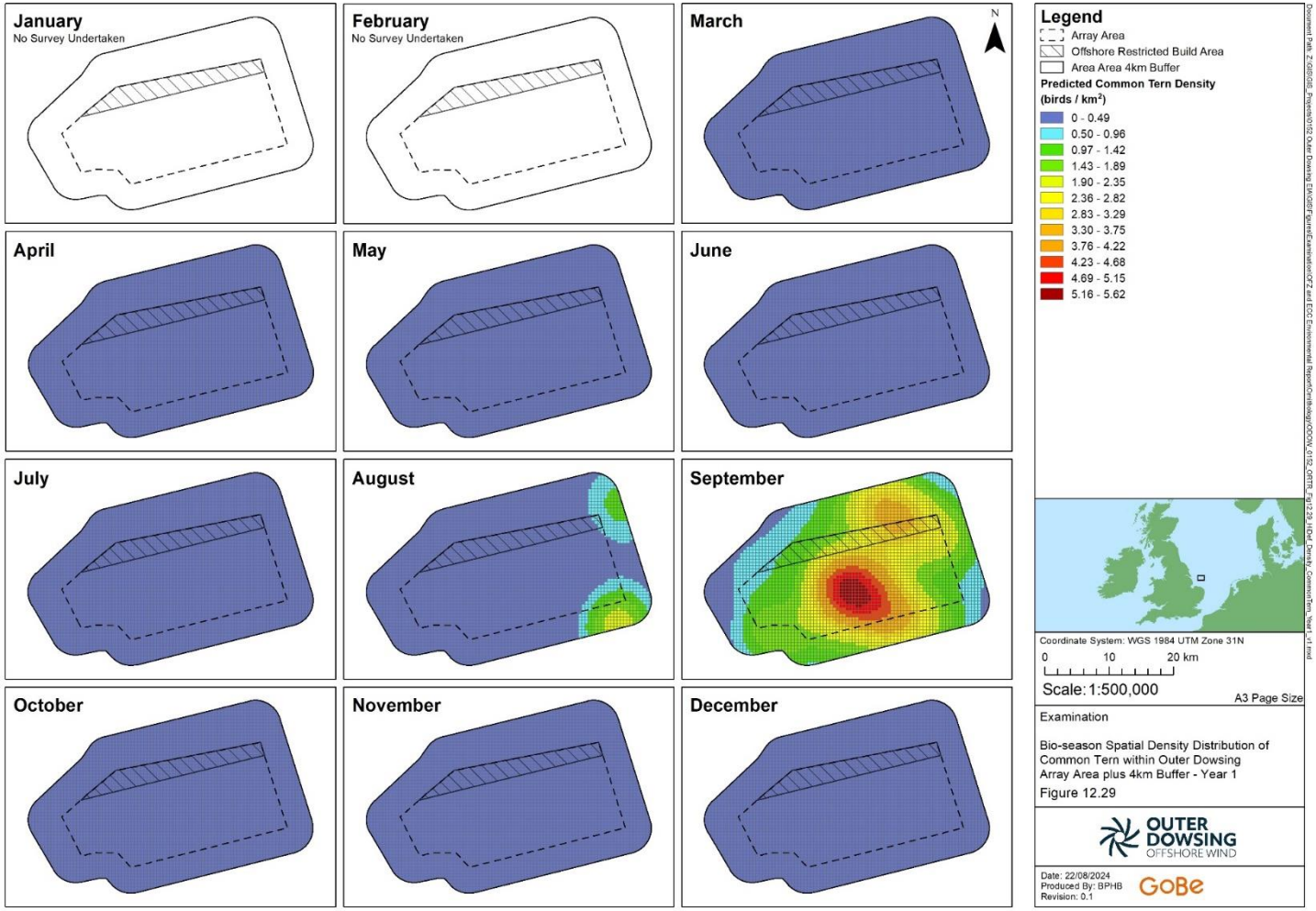

Figure 3.27. Bio-season spatial density distribution of common tern within the Array Area +4km buffer - Year 1

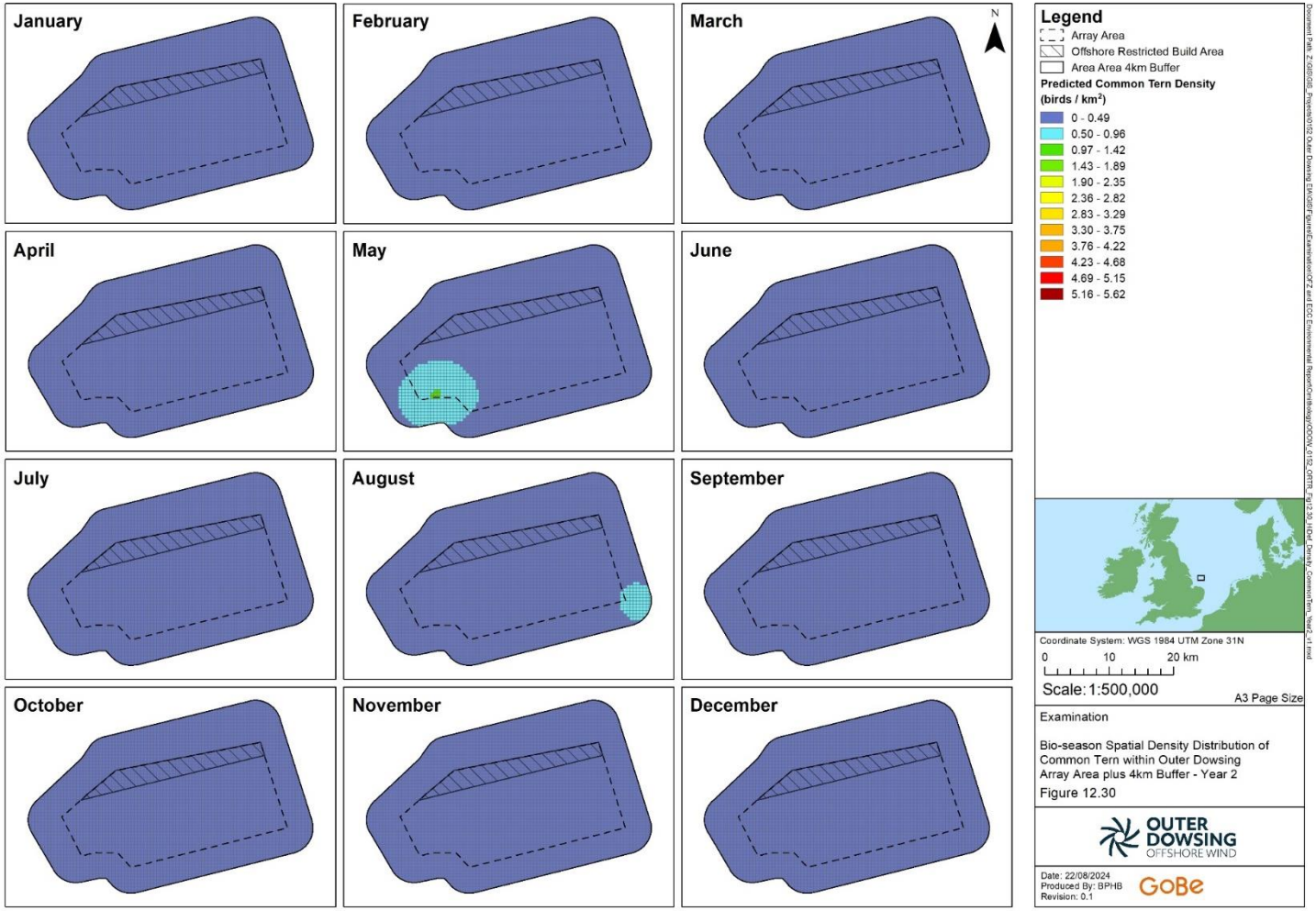

Figure 3.28. Bio-season spatial density distribution of common tern within the Array Area +4km buffer – Year 2

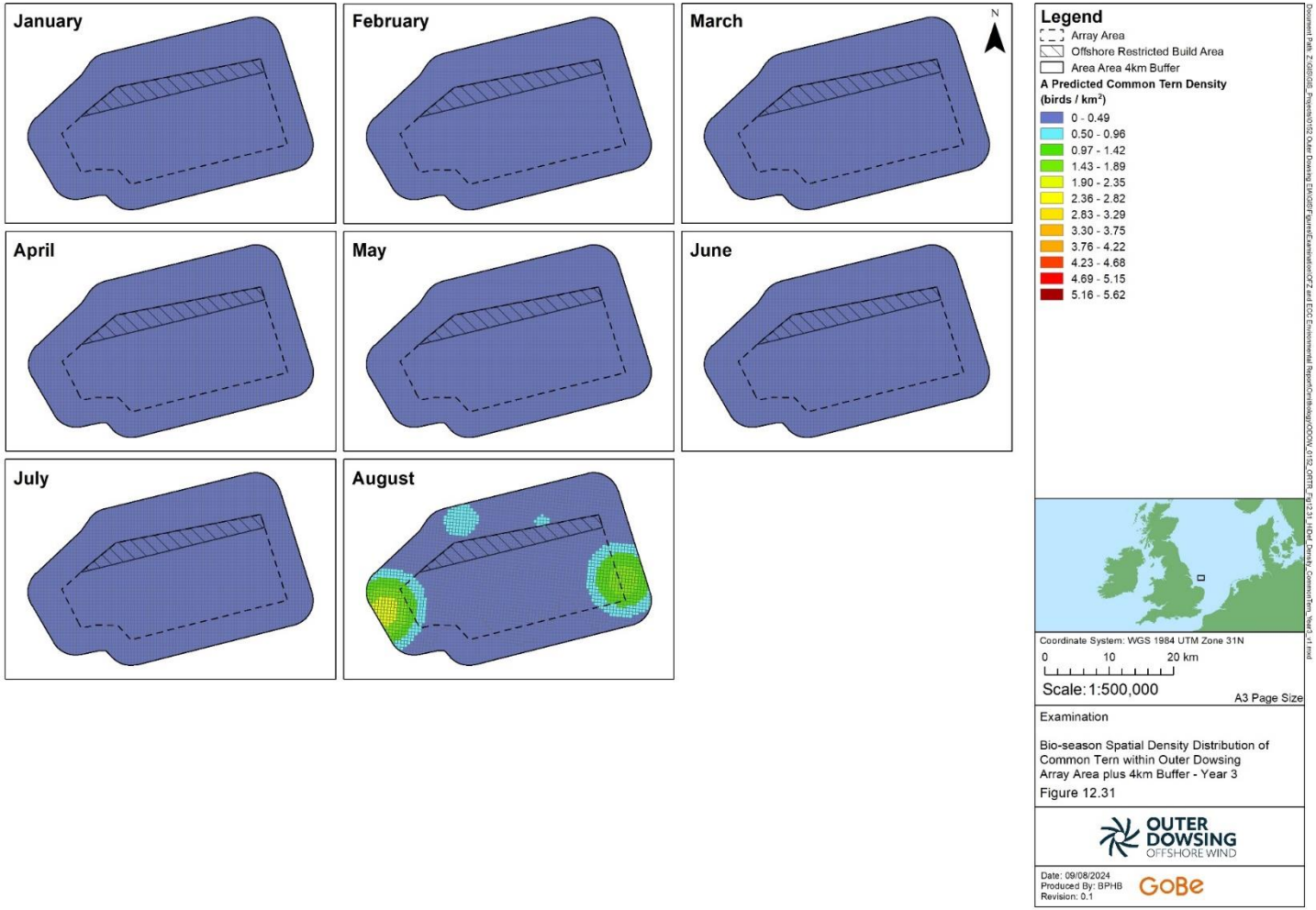

Figure 3.29. Bio-season spatial density distribution of common tern within the Array Area +4km buffer – Year 3

Common tern abundance varied between years. In 2021, the species was present in high numbers in both the WTG area and WTG area +2km buffer in September, suggesting a movement of migrating birds through the site in that month. In 2022, only very small numbers appeared during that period. The birds were also observed in both the WTG area and WTG area +2km buffer in spring, but in very low numbers. This again suggests the presence of birds on migration, as if breeding common tern were using the area their presence would be expected throughout the breeding season.

3.9.4 Flight direction

132. Figure 3.30 shows windrose diagrams presenting flight directions recorded for common tern within the array area +4km buffer. These windrose diagrams were created from the array area +4km buffer; however, these data are still applicable to the WTG area +4km buffer, which is a subset of the larger array area +4km buffer This data is still relevant to the project, as it indicates the relative flight directions for relevant bird species within the WTG area and immediate vicinity.

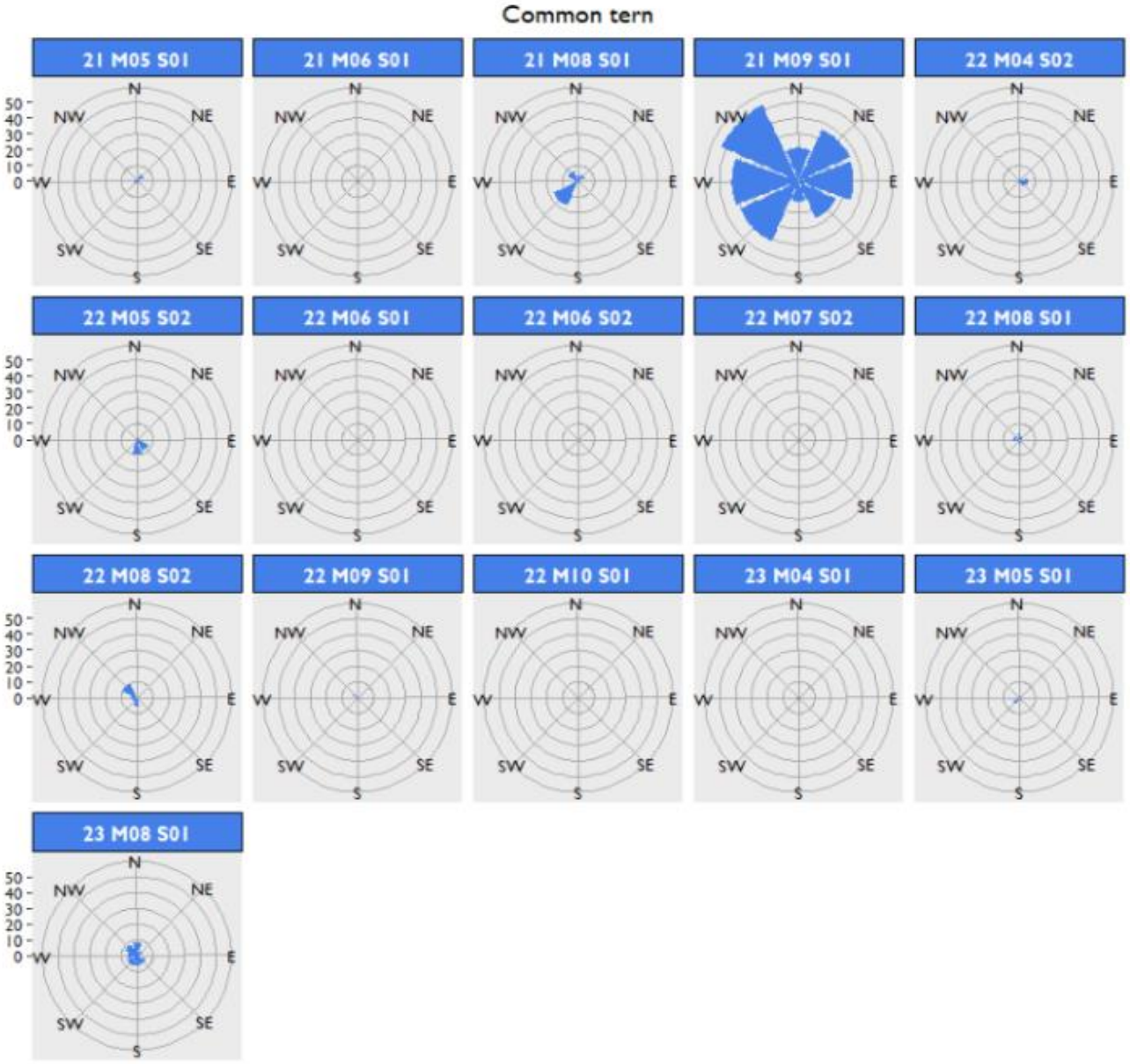

Figure 3.30. Windrose diagrams for months during which flying common tern were recorded within the array area +4km buffer.

3.9.5 Birds aged from DAS data

112. Proportions of common tern aged from DAS images are presented in Table 3-37. Adult proportions are derived from the proportion of birds identified as adults out of all the aged birds for that species. Unaged birds do not contribute to the age proportions.

Table 3-37. Proportions of common tern aged from DAS images within the WTG area +2km buffer.

Survey Date	Adult	Immature	Juvenile	Unknown	Adult%	Total	Number of aged birds
3/22/2021	0	0	0	0	0	0	0
4/4/2021	0	0	0	0	0	0	0
5/12/2021	8	0	0	8	100	16	8
6/9/2021	2	0	0	0	100	2	2
7/24/2021	0	0	0	0	0	0	0
8/14/2021	0	0	2	1	0	3	2
9/7/2021	131	0	19	71	87	221	150
10/9/2021	0	0	0	0	0	0	0
11/2/2021	0	0	0	0	0	0	0
12/15/2021	0	0	0	0	0	0	0
1/6/2022	0	0	0	0	0	0	0
2/23/2022	0	0	0	0	0	0	0
3/11/2022	0	0	0	0	0	0	0
3/22/2022	0	0	0	0	0	0	0
4/2/2022	0	0	0	0	0	0	0
4/15/2022	2	0	0	6	100	8	2
5/2/2022	0	0	0	0	0	0	0
5/17/2022	8	0	0	10	100	18	8
6/9/2022	1	0	0	0	100	1	1
6/21/2022	0	0	0	1	0	1	0
7/4/2022	0	0	0	0	0	0	0
7/16/2022	2	0	0	0	100	2	2
8/8/2022	0	0	0	5	0	5	0
8/23/2022	5	0	3	1	62	9	8
9/13/2022	2	0	1	0	67	3	3
9/25/2022	0	0	0	0	0	0	0

Survey Date	Adult	Immature	Juvenile	Unknown	Adult%	Total	Number of aged birds
10/10/2022	0	0	0	0	0	0	0
11/7/2022	0	0	0	0	0	0	0
12/13/2022	0	0	0	0	0	0	0
1/26/2023	0	0	0	0	0	0	0
2/10/2023	0	0	0	0	0	0	0
3/24/2023	0	0	0	0	0	0	0
4/5/2023	1	0	0	0	100	1	1
5/3/2023	11	0	0	0	100	11	11
6/17/2023	0	0	0	0	0	0	0
7/5/2023	0	0	0	0	0	0	0
8/10/2023	10	0	10	4	50	24	20

3.10 Guillemot

3.10.1 Digital aerial survey data

133. Guillemot were recorded in the WTG area in all 30 months surveyed with a summed mean seasonal peak abundance of 15,503 birds (Table 3-41).

134. In the WTG area +2km buffer, the summed mean seasonal peak abundance was 23,586 birds (Table 3-41).

3.10.2 Guillemot overview

135. The mean maximum foraging range of breeding adult guillemots is 73.2km plus one standard deviation of 80.5km (Woodward *et al.*, 2019). Based on the existing information regarding this species, its foraging range, and at sea distribution, it is concluded that there is connectivity between the Project during the breeding season with the nearest breeding population of the FFC SPA (Figure 12.18). The UK North Sea and Channel BDMPS is considered to be the relevant background population for guillemot during the non-breeding season (Furness, 2015), which consists of 1,617,305 birds.

3.10.3 Abundance and Phenology

136. Mean seasonal peak abundances of guillemot in the species bio-seasons (as defined in Furness 2015) are presented in Table 3-38. The alternative Natural England Approach to guillemot bio-seasons is addressed below in Consultation. This section also outlines how these different bio-seasons affect guillemot impacts. Estimates of monthly abundance and density within the WTG area, and monthly abundance and density within the WTG area +2km buffer, are presented in Table 3-39, Table 3-40, and Table 3-41 for flying birds, birds sitting on the sea, and the total birds observed. The spatial density distribution of guillemot within the Outer Dowsing Array Area +4km buffer is shown for three years of surveys in Figure 3.31, Figure 3.32, and Figure 3.33.

137. Guillemot was present in the Project WTG area consistently across both bio-seasons. Abundance in the WTG area was highest during the breeding bio-season (March to July), with a mean seasonal peak abundance of 9,618 birds and mean seasonal peak density of 26.39 birds/km^2 (Table 3-38).

138. In the WTG area +2km buffer, guillemot numbers were similarly greatest during the breeding bio-season, with a mean seasonal peak abundance of 14,371 birds and mean seasonal peak density of 26.19 birds/km^2 (Table 3-38).

Table 3-38. Guillemot bio-season mean seasonal peak apportioned abundance and density estimates in the Project WTG area +2km buffer.

BDMPS Bio-seasons	Months	Array area minus the ORBA		Array minus the ORBA +2km buffer	
		Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)	Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)
Breeding	Mar-Jul	9,618 (6,519-13,462)	26.39 (17.88-36.94)	14,371 (10,765-18,669)	26.19 (19.62-34.03)
Non-breeding	Aug-Feb	5,885 (4,332-7,708)	16.15 (11.88-21.15)	9,215 (6,979-12,043)	16.80 (12.72-21.95)
Summed mean seasonal peak		15,503 (10,850-21,170)	-	23,586 (17,743-30,712)	-

Table 3-39. Guillemot estimated apportioned abundance and estimated density of flying birds in the Project WTG area and WTG area +2km buffer.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	125	0.34	193	0.35
Apr 21	1	411	1.13	555	1.01
May 21	1	13	0.03	126	0.23
Jun 21	1	12	0.03	24	0.04
Jul 21	1	79	0.21	96	0.17
Aug 21	1	0	0	0	0
Sep 21	1	0	0	0	0
Oct 21	1	149	0.41	206	0.37
Nov 21	1	58	0.16	84	0.15
Dec 21	1	48	0.13	85	0.15
Jan 22	1	12	0.03	12	0.02
Feb 22	1	132	0.36	236	0.43
Mar 22	1	119	0.33	200	0.36
Mar 22	2	208	0.57	276	0.5
Apr 22	1	1267	3.48	1845	3.36
Apr 22	2	370	1.01	457	0.83
May 22	1	24	0.06	66	0.12
May 22	2	30	0.08	107	0.19
Jun 22	1	24	0.07	83	0.15

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Jun 22	2	6	0.02	56	0.1
Jul 22	1	19	0.05	31	0.06
Jul 22	2	30	0.08	81	0.15
Aug 22	1	6	0.02	7	0.01
Aug 22	2	0	0	0	0
Sep 22	1	31	0.08	42	0.08
Sep 22	2	0	0	13	0.02
Oct 22	1	107	0.29	199	0.36
Nov 22	1	13	0.03	12	0.02
Dec 22	1	219	0.6	373	0.68
Jan 23	1	82	0.22	89	0.16
Feb 23	1	46	0.12	103	0.19
Mar 23	1	481	1.32	573	1.04
Apr 23	1	31	0.08	42	0.08
May 23	1	19	0.05	61	0.11
Jun 23	1	6	0.02	37	0.07
Jul 23	1	18	0.05	42	0.08
Aug 23	1	12	0.03	18	0.03

Table 3-40. Guillemot estimated apportioned abundance and estimated density of birds sitting on the water in the Project WTG area and WTG area +2km buffer. Counts have been adjusted for availability bias.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	3303	9.06	5666	10.32
Apr 21	1	12837	35.22	18431	33.59
May 21	1	2225	6.11	4014	7.32
Jun 21	1	589	1.61	953	1.74
Jul 21	1	4695	12.88	6749	12.3
Aug 21	1	9671	26.53	13839	25.23
Sep 21	1	9689	26.58	15371	28.02
Oct 21	1	3527	9.68	5275	9.61
Nov 21	1	2774	7.61	4506	8.22
Dec 21	1	1535	4.21	2411	4.4
Jan 22	1	257	0.7	409	0.75
Feb 22	1	2536	6.95	3566	6.49

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 22	1	4513	12.39	5770	10.52
Mar 22	2	4466	12.26	7003	12.76
Apr 22	1	10934	30.01	18960	34.56
Apr 22	2	6665	18.29	10090	18.39
May 22	1	6620	18.17	12061	21.97
May 22	2	1473	4.04	3504	6.39
Jun 22	1	741	2.03	1855	3.38
Jun 22	2	1976	5.42	3076	5.61
Jul 22	1	806	2.21	1418	2.58
Jul 22	2	3024	8.29	5513	10.05
Aug 22	1	5610	15.39	6798	12.39
Aug 22	2	1390	3.82	2394	4.36
Sep 22	1	2154	5.91	5473	9.98
Sep 22	2	722	1.97	1193	2.17
Oct 22	1	948	2.59	1734	3.16
Nov 22	1	912	2.5	1502	2.74
Dec 22	1	1813	4.98	2843	5.17
Jan 23	1	1305	3.58	1434	2.61
Feb 23	1	1477	4.06	2146	3.91
Mar 23	1	4142	11.36	5371	9.78
Apr 23	1	5957	16.34	8409	15.33
May 23	1	737	2.03	3513	6.4
Jun 23	1	865	2.37	1612	2.94
Jul 23	1	894	2.45	1659	3.03
Aug 23	1	4452	12.22	7655	13.96

Table 3-41. Guillemot total estimated apportioned abundance and estimated density, in the Project WTG area and WTG area +2km buffer (Total of flying and sitting birds). Counts have been adjusted for availability bias.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	3428	9.4	5859	10.67
Apr 21	1	13248	36.35	18986	34.6
May 21	1	2238	6.14	4140	7.55
Jun 21	1	601	1.64	977	1.78
Jul 21	1	4774	13.09	6845	12.47

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Aug 21	1	9671	26.53	13839	25.23
Sep 21	1	9689	26.58	15371	28.02
Oct 21	1	3676	10.09	5481	9.98
Nov 21	1	2832	7.77	4590	8.37
Dec 21	1	1583	4.34	2496	4.55
Jan 22	1	269	0.73	421	0.77
Feb 22	1	2668	7.31	3802	6.92
Mar 22	1	4632	12.72	5970	10.88
Mar 22	2	4674	12.83	7279	13.26
Apr 22	1	12201	33.49	20805	37.92
Apr 22	2	7035	19.3	10547	19.22
May 22	1	6644	18.23	12127	22.09
May 22	2	1503	4.12	3611	6.58
Jun 22	1	765	2.1	1938	3.53
Jun 22	2	1982	5.44	3132	5.71
Jul 22	1	825	2.26	1449	2.64
Jul 22	2	3054	8.37	5594	10.2
Aug 22	1	5616	15.41	6805	12.4
Aug 22	2	1390	3.82	2394	4.36
Sep 22	1	2185	5.99	5515	10.06
Sep 22	2	722	1.97	1206	2.19
Oct 22	1	1055	2.88	1933	3.52
Nov 22	1	925	2.53	1514	2.76
Dec 22	1	2032	5.58	3216	5.85
Jan 23	1	1387	3.8	1523	2.77
Feb 23	1	1523	4.18	2249	4.1
Mar 23	1	4623	12.68	5944	10.82
Apr 23	1	5988	16.42	8451	15.41
May 23	1	756	2.08	3574	6.51
Jun 23	1	871	2.39	1649	3.01
Jul 23	1	912	2.5	1701	3.11
Aug 23	1	4464	12.25	7673	13.99

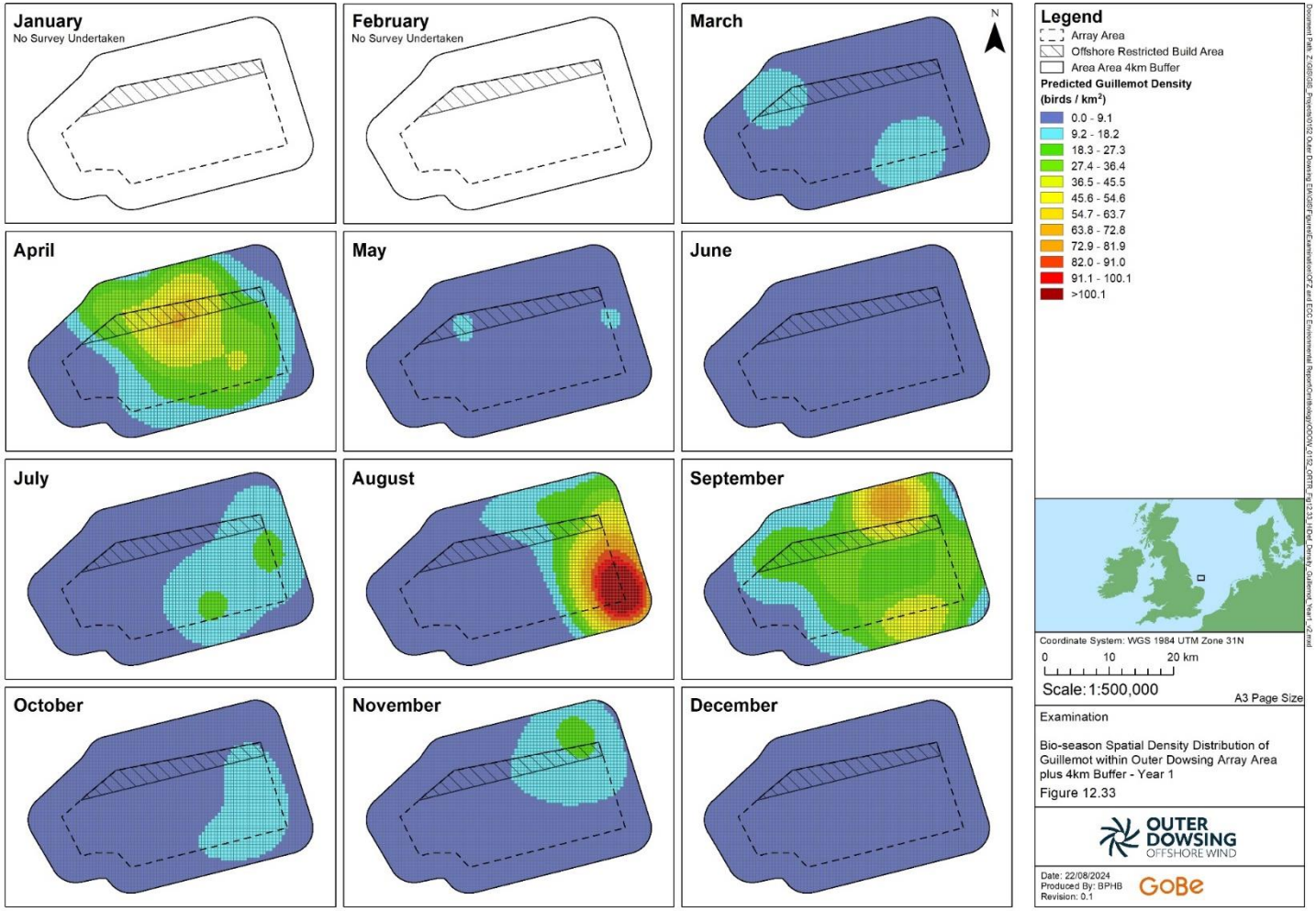

Figure 3.31. Bio-season spatial density distribution of guillemot within the Array Area +4km buffer – Year 1

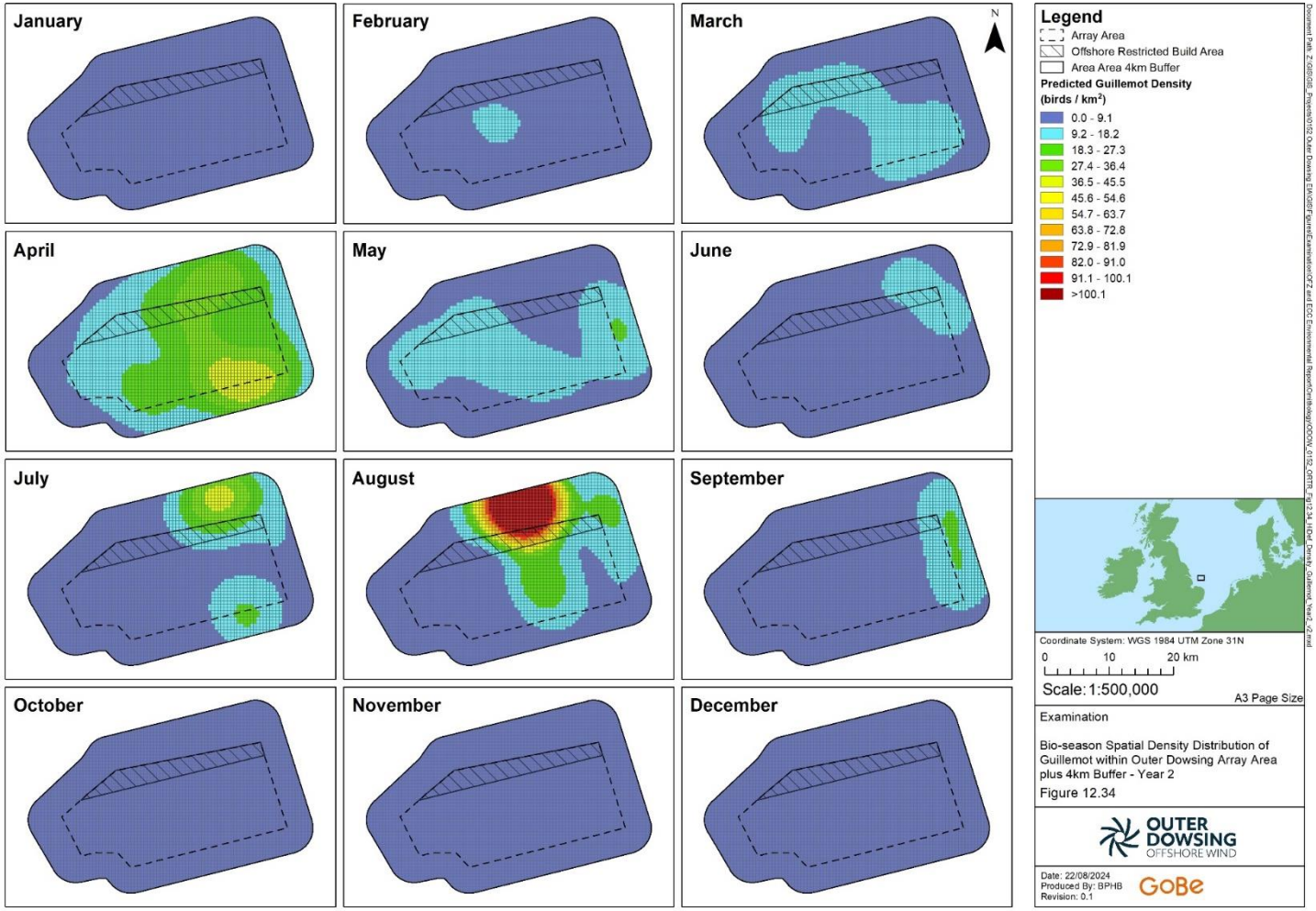

Figure 3.32. Bio-season spatial density distribution of guillemot within the Array Area +4km buffer – Year 2

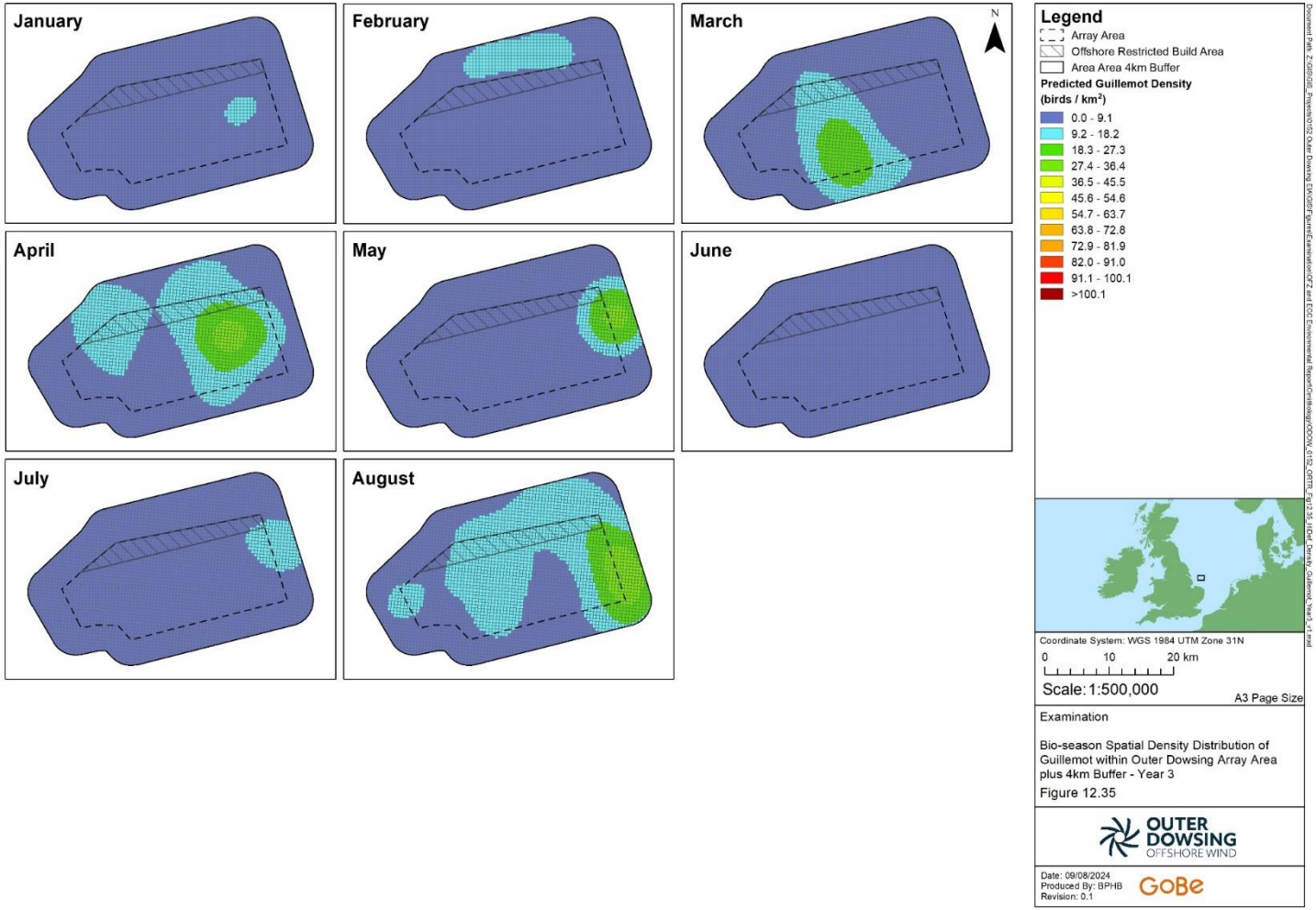

Figure 3.33. Bio-season spatial density distribution of guillemot within the Array Area +4km buffer – Year 3

139. Guillemot presence and abundance followed a clear pattern over the 30 months of survey in both the WTG area and WTG area +2km buffer. Abundance was highest in April all three years, reducing through the breeding season and then peaking again in August and September, corresponding with the period during which fledged young are accompanied offshore by male parents, before becoming independent. The late summer peak in 2021 is substantially higher than in 2022, perhaps reflecting breeding success. Birds were generally present but in low numbers during the winter months, as can be seen in Figure 3.34.

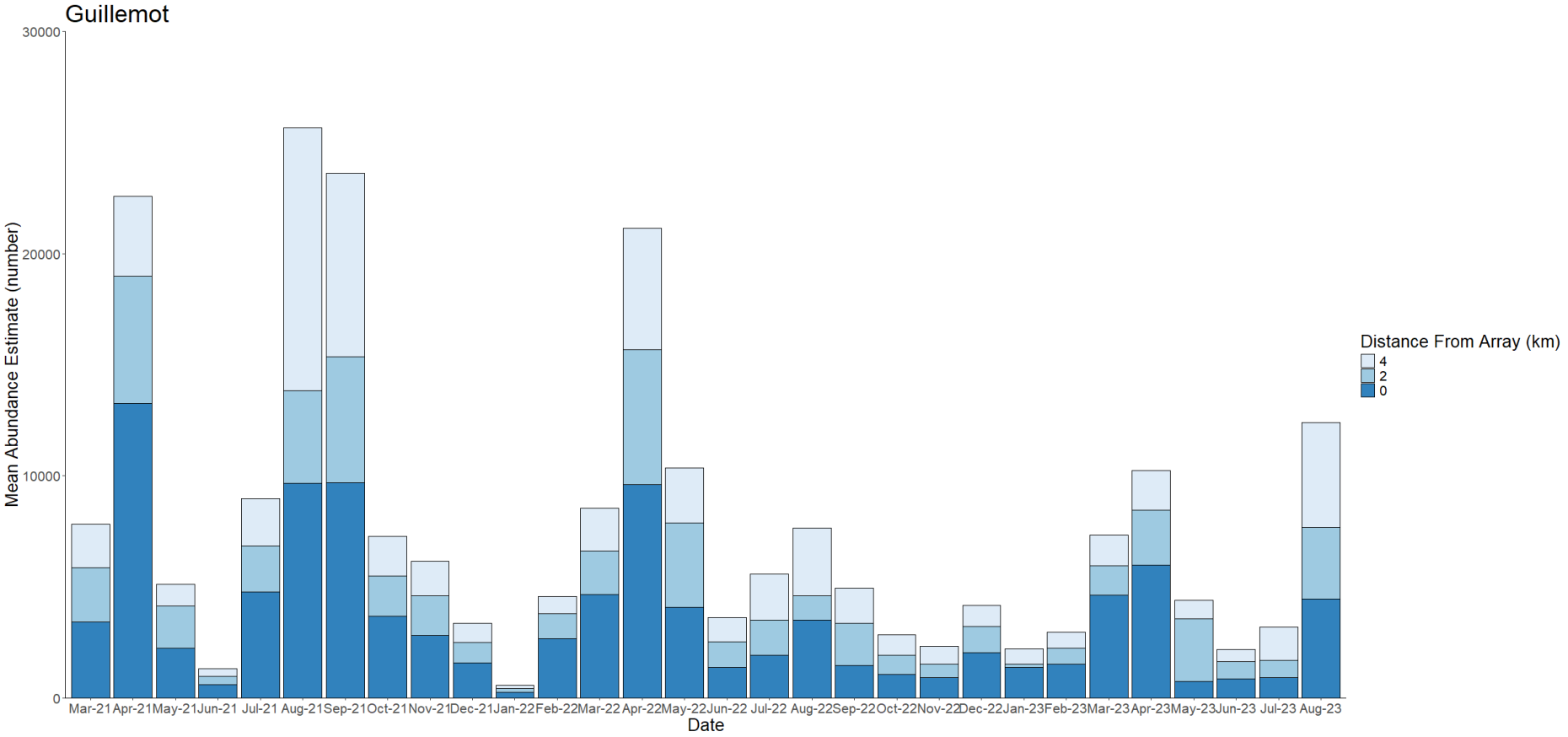

Figure 3.34. Monthly abundance of guillemot in the WTG area , WTG area +2km buffer and WTG area +4km buffer.

3.10.4 Flight direction

140. Figure 3.35 shows windrose diagrams presenting flight directions recorded for guillemot within the array area +4km buffer. As can be seen generally there are very few guillemots in flight but a large number of birds are shown to be flying north and north-west during April 2022. Proportions of guillemot in flight are presented in Figure 3.35. These windrose diagrams were created from the array area +4km buffer; however, these data are still applicable to the WTG area +4km buffer, which is a subset of the larger array area +4km buffer This data is still relevant to the project, as it indicates the relative flight directions for relevant bird species within the WTG area and immediate vicinity.

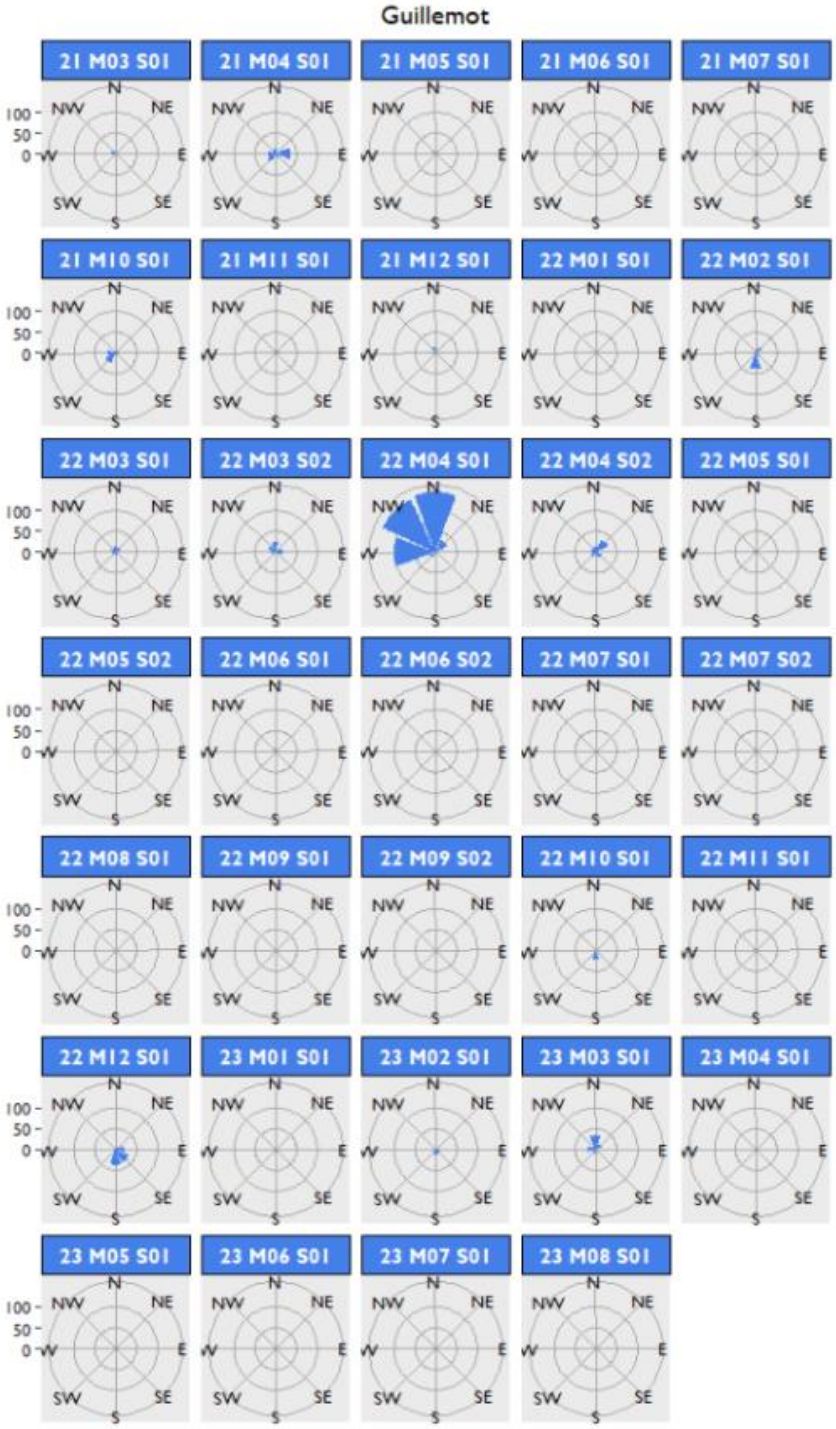

Figure 3.35. Windrose diagrams for months during which flying guillemot were recorded within the array area and a 4km buffer.

3.10.5 Foraging/Usage hotspots

141. The FFC SPA is the closest SPA to the Project array area that has guillemot listed as a feature. Using the species distribution model, hotspots were identified to the north of the Project footprint (Figure 3.36) using Getis-Ord hotspot analysis (Cleasby *et al,.* 2020). However, the Project array is clearly considerably further south and beyond the core foraging range of guillemot from FFC SPA.

142.

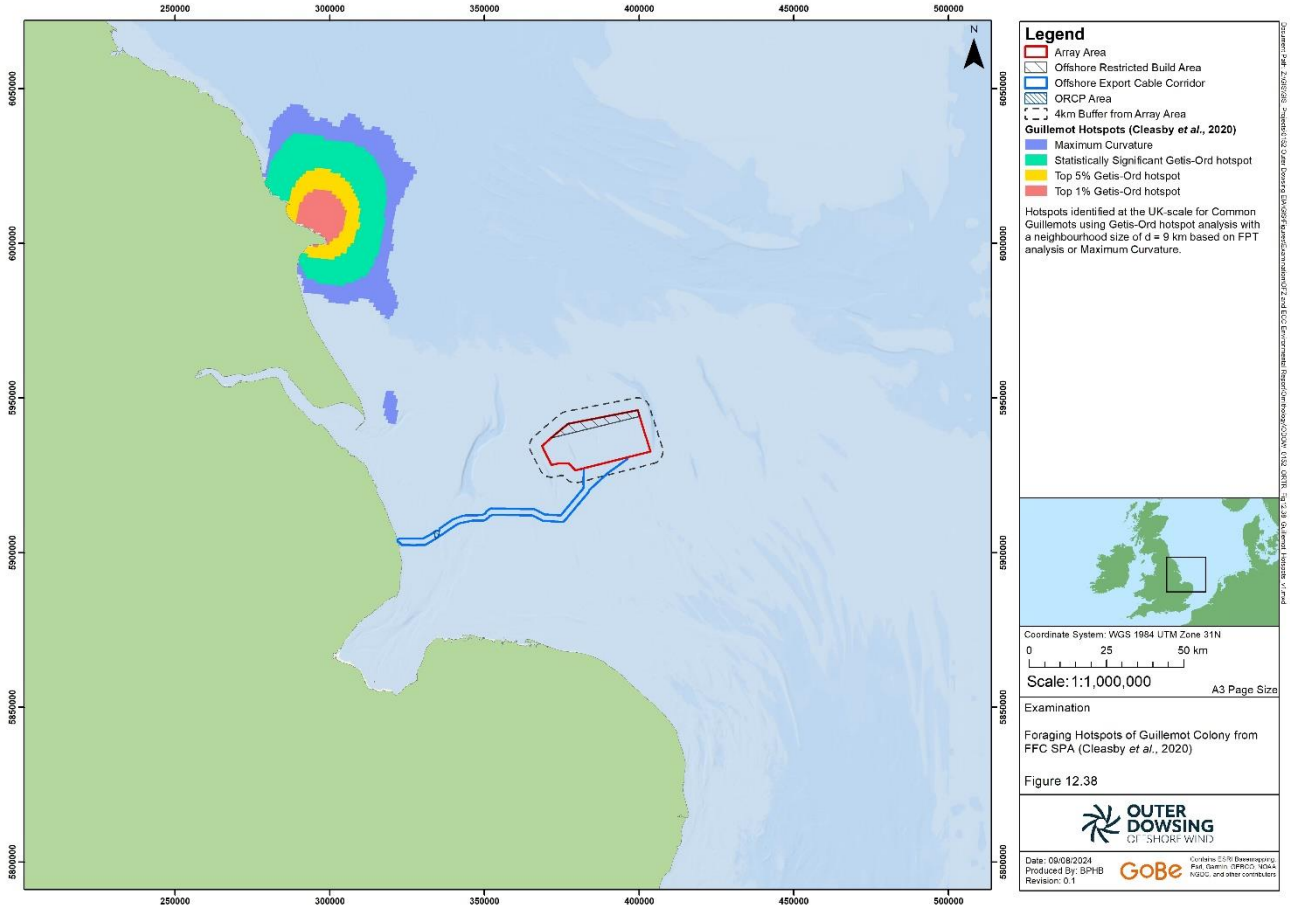

Figure 3.36. Foraging hotspots of guillemot colony from FFC SPA (Cleasby *et al*, 2020).

3.10.6 Birds aged from DAS data

143. Proportions of guillemot aged from DAS images are presented in Table 3-42.

Table 3-42. Proportions of guillemot aged from DAS images within the WTG area +2km buffer.

Survey date	Adult	Immature	Juvenile	Unknown	Adult%	Total	Number of aged birds
22/03/2021	0	0	0	678	0	678	0
04/04/2021	1	0	0	2365	100	2366	1
12/05/2021	0	0	0	497	0	497	0
09/06/2021	0	0	0	113	0	113	0
24/07/2021	56	0	65	730	46	851	121
14/08/2021	8	0	8	1731	50	1747	16
07/09/2021	0	0	0	1873	0	1873	0
09/10/2021	0	0	0	667	0	667	0
02/11/2021	0	0	0	547	0	547	0
15/12/2021	0	0	0	298	0	298	0
06/01/2022	0	0	0	45	0	45	0
23/02/2022	0	0	0	470	0	470	0
11/03/2022	1	0	0	722	100	723	1
22/03/2022	0	0	0	843	0	843	0
02/04/2022	0	0	0	2685	0	2685	0
15/04/2022	0	0	0	1354	0	1354	0
02/05/2022	0	0	0	1486	0	1486	0
17/05/2022	20	0	0	417	100	437	20
09/06/2022	0	0	0	248	0	248	0
21/06/2022	11	0	11	376	50	398	22
04/07/2022	56	0	58	71	49	185	114
16/07/2022	37	0	37	612	50	686	74
08/08/2022	5	0	6	835	45	846	11
23/08/2022	0	0	0	338	0	338	0
13/09/2022	0	0	0	707	0	707	0
25/09/2022	0	0	0	152	0	152	0

Survey date	Adult	Immature	Juvenile	Unknown	Adult%	Total	Number of aged birds
10/10/2022	0	0	0	232	0	232	0
07/11/2022	0	0	0	172	0	172	0
13/12/2022	0	0	0	389	0	389	0
26/01/2023	0	0	0	185	0	185	0
10/02/2023	0	0	0	276	0	276	0
24/03/2023	0	0	0	749	0	749	0
05/04/2023	0	0	0	1049	0	1049	0
03/05/2023	0	0	0	458	0	458	0
17/06/2023	1	0	1	209	50	211	2
05/07/2023	42	0	43	118	49	203	85
10/08/2023	13	0	13	917	50	943	26

3.10.7 Consultation

144. Consultation with key stakeholders has been undertaken as part of this DCO application process. The species assessed for used the UK joint SNCB parameters for displacement (MIG-Birds, 2022) and the latest guidance for offshore wind marine environmental assessments published by Natural England (Parker *et al.*, 2022c). These guidance documents outline how to present technical baseline information for the assessment of the extent and potential consequences of seabird effects from OWF developments. This approach has been agreed through EPP consultation and also through the Scoping Opinion as the most appropriate method to assess effects on seabirds.

145. Through further stakeholder consultation, however, Natural England, has stated a preference that alternative bioseasons for guillemot be used in assessments. In the baseline above, bio-seasons for all species, including guillemot, have been taken from Furness (2015), as per UK joint SNCB guidance. However, the alternative suggested bio-seasons from Natural England are presented here in Table 3-43. The alternative seasonal mean peak abundance and density estimates that use Natural England parameters are also presented below in Table 3-44.

Table 3-43. Bio-seasons used in the assessment for guillemot, including the UK joint SNCB bio-seasons taken from Furness (2015) and the Natural England suggested bio-seasons.

Species	Pre-breeding migration	Breeding	Post-breeding migration	Non-breeding	Migration-free winter
Guillemot (Furness, 2015)	-	March-July	-	August-February	-
Guillemot (Natural England)	-	March-July	August-September	October-February	-

Table 3-44. Guillemot bio-season mean seasonal peak apportioned abundance and density estimates (using Natural England parameters) in the Project WTG area +2km buffer.

		WTG area		WTG area +2km buffer	
BDMPS Bio-seasons	Months	Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)	Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)
Breeding	Mar-Jul	9,618 (6,519-13,462)	26.39 (17.88-36.94)	14,371 (10,765-18,669)	26.19 (19.62-34.03)
Post-breeding	Aug-Sep	5,885 (4,332-7,708)	16.15 (11.88-21.15)	9,215 (6,979-12,043)	16.80 (12.72-21.95)
Non-breeding	Oct-Feb	2,854 (2,253-3,549)	7.84 (6.18-9.74)	4,349 (3,511-5,311)	7.92 (6.40-9.68)

BDMPS Bio-seasons	Months	WTG area		WTG area +2km buffer	
		Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)	Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)
Summed mean seasonal peak		18,357 (13,103-24,719)	-	27,934 (21,254-36,022)	-

3.10.8 MRSea

146. For this assessment, the report used a model-based abundance and density estimates using the MRSea (Marine Renewables Strategic Environmental Assessment) modelling framework, developed specifically for offshore wind development (Scott-Hayward *et al*., 2014). These model-based abundance and density estimates have been used for guillemot specifically, as guillemot is a key species of interest for the Project due to its relatively high abundance in the array area relative to other species.

147. To provide more detail for common guillemot within the Project site, model-based approaches were used to determine statistically robust, spatially distributed population estimates. Using model-based techniques means that environmental variables can be included within the analysis to help predict abundance and density distributions within the AoI. MRSea based analysis was used to generate estimates of distribution and abundance, underpinned by observations of guillemot recorded in the DAS imagery (Scott-Hayward *et al*., 2014).

148. MRSea is a statistical analysis R software (R, 2022) package specifically designed by the Centre for Research into Ecological and Environmental Modelling (CREEM) for both baseline analysis (site characterisation) and, where data are available, pre- and post-construction analysis. The latter can be used for investigating potential changes in distributions of birds following an OWFs development. The model uses a "Complex Region Spatial Smoother" (CReSS) spatial modelling technique with a "Spatially Adaptive Local Smoothing Algorithm" (SALSA) to estimate bird distributions in a Generalised Additive Model (GAM) framework. This modelling method was developed to analyse spatial abundance data following an environmental change, such as the construction of a wind farm, and allows spatially auto-correlated and zero-inflated data to be modelled in a robust way (Scott-Hayward *et al*., 2021).

149. Model-based population estimates (unapportioned, apportioned and apportioned with availability bias) within the WTG area+2km buffer are presented in Table 3-45. Peak abundance (apportioned & availability bias) was estimated in April 2022, with 29,720 guillemots - equating to a density of 54.17 birds/km2. Results from the model-based abundance estimates show that in August 2021, the highest density of guillemots were estimated in the east of the AoI. Full modelled abundance and density estimates are provided in: Appendix 12.6 MRSea Modelling for Offshore Ornithology (document reference 6.3.12.6).

150. These modelled abundance estimates were used to provide mean peak abundance estimates for each guillemot bio-season. These mean seasonal peak abundance estimates are provided below using both the Furness (2015) and Natural England bio-seasons. The MRSea model produced a lower estimated abundance of guillemot across all months.

Table 3-45. Model-based population estimates and densities of guillemots, with lower and upper confidence limits for the WTG area +2km buffer.

Survey No.	Survey Month	Unapportioned				Apportioned				Apportioned & Availability Bias			
		Population Estimate	Lower CI	Upper CI	Density (birds/km2)	Population estimate	Lower CI	Upper CI	Density	Population Estimate	Lower CI	Upper CI	Density
01	March	4,047	3,043	5,460	7.38	4,428	3,330	5,974	8.07	5,830	4,384	7,866	10.63
02	April	11,360	7,946	16,326	20.71	11,924	8,341	17,137	21.74	15,700	10,982	22,563	28.62
03	May	2,813	1,933	4,407	5.13	2,956	2,032	4,631	5.39	3,892	2,675	6,098	7.09
04	June	662	454	986	1.21	732	502	1,090	1.33	964	660	1,435	1.76
05	July	4,440	3,390	5,850	8.09	4,558	3,481	6,005	8.31	6,001	4,583	7,907	10.94
06	August	12,922	8,020	21,429	23.55	13,641	8,466	22,622	24.87	17,961	11,147	29,785	32.74
07	September	12,211	8,706	17,342	22.26	12,745	9,087	18,100	23.23	16,781	11,964	23,832	30.59
08	October	3,637	3,037	4,359	6.63	4,007	3,347	4,803	7.30	5,275	4,406	6,324	9.62
09	November	2,859	2,384	3,452	5.21	3,058	2,550	3,692	5.57	4,026	3,358	4,861	7.34
10	December	1,681	1,338	2,110	3.06	1,854	1,476	2,327	3.38	2,441	1,943	3,064	4.45
11	January	247	153	448	0.45	296	184	537	0.54	389	242	707	0.71
12	February	2,532	1,823	3,605	4.62	2,677	1,927	3,811	4.88	3,525	2,538	5,018	6.43
13	March (I)	4,295	2,861	6,765	7.83	4,527	3,015	7,131	8.25	5,960	3,970	9,389	10.86
14	March (II)	4,407	3,531	5,563	8.03	4,968	3,981	6,271	9.06	6,541	5,241	8,256	11.92
15	April (I)	14,758	11,699	18,761	26.90	15,048	11,929	19,129	27.43	19,813	15,707	25,187	36.12
16	April (II)	7,344	5,356	10,132	13.39	7,524	5,487	10,380	13.71	9,906	7,225	13,667	18.06

Survey No.	Survey Month	Unapportioned				Apportioned				Apportioned & Availability Bias			
		Population Estimate	Lower CI	Upper CI	Density (birds/km2)	Population estimate	Lower CI	Upper CI	Density	Population Estimate	Lower CI	Upper CI	Density
17	May (I)	8,667	6,817	11,186	15.80	8,929	7,023	11,524	16.28	11,756	9,247	15,173	21.43
18	May (II)	2,575	1,697	4,194	4.69	2,696	1,777	4,391	4.91	3,549	2,339	5,781	6.47
19	June (I)	1,401	744	2,764	2.55	1,455	773	2,871	2.65	1,916	1,018	3,780	3.49
20	June (II)	2,175	1,614	2,938	3.97	2,201	1,634	2,973	4.01	2,898	2,151	3,914	5.28
21	July (I)	1,301	952	1,762	2.37	1,322	967	1,791	2.41	1,741	1,274	2,358	3.17
22	July (II)	4,339	2,646	7,466	7.91	4,560	2,781	7,846	8.31	6,004	3,661	10,331	10.95
23	August (I)	5,078	2,540	13,743	9.26	5,285	2,643	14,303	9.63	6,958	3,481	18,832	12.68
24	August (II)	2,059	1,334	3,280	3.75	2,077	1,346	3,309	3.79	2,735	1,772	4,356	4.98
25	September (I)	4,486	2,908	7,407	8.18	4,730	3,066	7,810	8.62	6,227	4,036	10,283	11.35
26	September (II)	845	662	1,105	1.54	882	690	1,153	1.61	1,161	909	1,519	2.12
27	October	1,475	1,198	1,846	2.69	1,648	1,339	2,063	3.00	2,169	1,763	2,716	3.95
28	November	1,017	727	1,450	1.85	1,144	818	1,631	2.09	1,506	1,077	2,147	2.75
29	December	2,274	1,828	2,860	4.14	2,493	2,004	3,135	4.54	3,282	2,639	4,128	5.98
30	January	983	518	1,810	1.79	1,119	590	2,061	2.04	1,473	777	2,713	2.69
31	February	1,720	1,061	2,844	3.14	1,781	1,098	2,945	3.25	2,345	1,446	3,877	4.27
32	March	1,757	1,239	2,528	3.20	1,879	1,325	2,703	3.42	2,474	1,744	3,559	4.51
33	April	2,565	1,893	3,503	4.67	2,684	1,981	3,666	4.89	3,533	2,608	4,827	6.44

Survey No.	Survey Month	Unapportioned				Apportioned				Apportioned & Availability Bias			
		Population Estimate	Lower CI	Upper CI	Density (birds/km2)	Population estimate	Lower CI	Upper CI	Density	Population Estimate	Lower CI	Upper CI	Density
34	May	1,019	422	3,155	1.86	1,076	445	3,331	1.96	1,417	586	4,386	2.58
35	June	530	338	838	0.97	557	355	881	1.02	734	468	1,159	1.34
36	July	620	474	814	1.13	679	519	891	1.24	894	684	1,174	1.63
37	August	3,204	2,217	4,854	5.84	3,335	2,308	5,053	6.08	4,391	3,039	6,653	8.00

Table 3-46. Guillemot modelled bio-season apportioned and adjusted mean seasonal peak abundance estimates (using both Furness, 2015 and Natural England parameters) in the Project WTG area +2km buffer.

Approach	Bio-season	Months	Mean seasonal peak abundance (n)
Applicant (Furness, 2015)	Breeding	Mar-Jul	11,364 (8,352-15,606)
	Non-breeding	Aug-Feb	9,066 (5,604-16,011)
	Summed mean seasonal peak		20,430 (13,956-31,616)
Natural England	Breeding	Mar-Jul	11,364 (8,352-15,606)
	Post-breeding	Aug-Sep	9,066 (5,604-16,011)
	Non-breeding	Oct-Feb	4,279 (3,523-5,226)
	Summed mean seasonal peak		24,709 (17,479-36,842)

3.11 Razorbill

3.11.1 Digital aerial survey data

151. Razorbill were recorded in the WTG area in all 30 months surveyed with a summed mean seasonal peak abundance of 8,616 birds (Table 3-47).

152. In the WTG area +2km buffer, the summed mean seasonal peak abundance was 12,257 birds (Table 3-47).

3.11.2 Razorbill overview

153. The nearest razorbill colony to the Project is the FFC SPA. Located approximately 95km from the Project, it is beyond the mean maximum foraging range of (88.7km ±75.9km), though within the mean maximum foraging range plus standard deviation (Woodward *et al.*, 2019).

154. Based on the existing information regarding this species foraging range and at sea distribution, it is concluded that there is some connectivity between the Project and the breeding population of the FFC SPA during the breeding season. The UK North Sea and Channel BDMPS consists of 591,875 individuals during migration periods (August to October and January to March), and 218,621 individuals during winter (November and December) (Furness, 2015). Since immature seabirds are known often to remain in wintering areas, the number of immature birds in the relevant population during the breeding season may be estimated as 43% of the total wintering BDMPS population (Furness, 2015).

3.11.3 Abundance and Phenology

155. Mean seasonal peak abundances of razorbill in the species bio-seasons (as defined in Furness 2015) are presented in Table 3-47. Estimates of monthly abundance and density within the WTG area, and monthly abundance and density within the WTG area +2km buffer are presented in Table 3-48, Table 3-49, and Table 3-50 for flying birds, birds sitting on the sea, and the total birds observed. The spatial density distribution of razorbill within the Outer Dowsing Array Area +4km buffer is shown for three years of surveys in Figure 3.37, Figure 3.38, and Figure 3.39.

156. Razorbill were present in the Project WTG area across all four bio-seasons. Abundance in the Project WTG area was highest during the return migration bio-season (January to March), with a mean seasonal peak abundance of 4,067 birds and a mean seasonal peak density of 11.16 birds/km (Table 3-47).

157. In the WTG area +2km buffer, razorbill numbers were similarly greatest during the return migration bio-season, with a mean seasonal peak abundance of 5,134 birds and mean seasonal peak density of 9.36 birds/km^2 (Table 3-47).

Table 3-47. Razorbill bio-season mean seasonal peak apportioned abundance and density estimates in the Project WTG area +2km buffer.

BDMPS Bio-seasons	Months	Array area minus the ORBA		Array minus the ORBA +2km buffer	
		Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)	Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)
Return Migration	Jan - Mar	4,067 (2,627-5,666)	11.16 (7.20-15.54)	5,134 (3,575-6,800)	9.36 (6.51-12.39)
Breeding	Apr - Jul	2,310 (1,212-3,626)	6.34 (3.33-9.95)	3,159 (1,935-4,712)	5.76 (3.53-8.59)
Post-breeding migration	Aug – Oct	1,044 (399-1,975)	2.86 (1.09-5.42)	2,185 (932-3,847)	3.99 (1.69-7.01)
Winter	Nov - Dec	1,196 (864-1,599)	3.28 (2.38-4.39)	1,779 (1,338-2,253)	3.24 (2.44-4.11)
Summed mean seasonal peak		8,616 (5,102-12,866)	-	12,257 (7,779-17,611)	-

Table 3-48. Razorbill estimated apportioned abundance and estimated density of flying birds in the Project WTG area and WTG area +2km buffer.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	94	0.26	118	0.21
Apr 21	1	138	0.38	253	0.46
May 21	1	19	0.05	47	0.09
Jun 21	1	12	0.03	12	0.02
Jul 21	1	31	0.08	54	0.1
Aug 21	1	0	0	0	0
Sep 21	1	0	0	0	0
Oct 21	1	76	0.21	93	0.17
Nov 21	1	27	0.07	44	0.08
Dec 21	1	0	0	0	0
Jan 22	1	0	0	0	0
Feb 22	1	0	0	6	0.01
Mar 22	1	79	0.21	90	0.16
Mar 22	2	7	0.02	6	0.01
Apr 22	1	183	0.5	236	0.43
Apr 22	2	105	0.29	105	0.19

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
May 22	1	61	0.16	90	0.16
May 22	2	0	0	7	0.01
Jun 22	1	0	0	7	0.01
Jun 22	2	0	0	13	0.02
Jul 22	1	13	0.03	13	0.02
Jul 22	2	19	0.05	20	0.03
Aug 22	1	0	0	0	0
Aug 22	2	0	0	0	0
Sep 22	1	13	0.03	18	0.03
Sep 22	2	7	0.02	7	0.01
Oct 22	1	14	0.04	24	0.04
Nov 22	1	7	0.02	7	0.01
Dec 22	1	42	0.11	43	0.08
Jan 23	1	7	0.02	20	0.03
Feb 23	1	147	0.4	225	0.41
Mar 23	1	331	0.91	428	0.78
Apr 23	1	24	0.07	42	0.08
May 23	1	13	0.03	13	0.02
Jun 23	1	0	0	7	0.01
Jul 23	1	18	0.05	18	0.03
Aug 23	1	13	0.03	12	0.02

Table 3-49. Razorbill estimated apportioned abundance and estimated density of birds sitting on the water in the Project WTG area and WTG area +2km buffer. Counts have been adjusted for availability bias.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	2309	6.33	3502	6.38
Apr 21	1	4646	12.75	6008	10.95
May 21	1	255	0.7	359	0.66
Jun 21	1	104	0.28	164	0.29
Jul 21	1	1303	3.57	1886	3.43
Aug 21	1	1248	3.42	2191	4
Sep 21	1	783	2.15	1140	2.08
Oct 21	1	413	1.14	678	1.23
Nov 21	1	1330	3.64	1967	3.58

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Dec 21	1	1299	3.57	1868	3.4
Jan 22	1	400	1.09	469	0.86
Feb 22	1	2915	7.99	4340	7.91
Mar 22	1	1764	4.84	2455	4.47
Mar 22	2	738	2.03	1134	2.07
Apr 22	1	710	1.94	1287	2.35
Apr 22	2	611	1.67	915	1.67
May 22	1	1333	3.65	2179	3.97
May 22	2	145	0.4	285	0.51
Jun 22	1	109	0.29	290	0.53
Jun 22	2	138	0.38	176	0.32
Jul 22	1	29	0.07	51	0.1
Jul 22	2	1215	3.34	1833	3.34
Aug 22	1	82	0.22	86	0.16
Aug 22	2	121	0.33	262	0.48
Sep 22	1	649	1.78	2025	3.69
Sep 22	2	64	0.17	90	0.16
Oct 22	1	182	0.5	292	0.53
Nov 22	1	351	0.97	489	0.89
Dec 22	1	992	2.73	1503	2.74
Jan 23	1	768	2.1	906	1.65
Feb 23	1	5529	15.17	6494	11.83
Mar 23	1	3278	9	3909	7.13
Apr 23	1	1316	3.61	1894	3.45
May 23	1	86	0.23	153	0.28
Jun 23	1	402	1.1	444	0.81
Jul 23	1	485	1.33	724	1.32
Aug 23	1	1505	4.13	3283	5.99

Table 3-50. Razorbill total estimated apportioned abundance and estimated density, in the Project WTG areaand WTG area +2km buffer (Total of flying and sitting birds). Counts have been adjusted for availability bias.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	2403	6.59	3620	6.59
Apr 21	1	4784	13.13	6261	11.41

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
May 21	1	274	0.75	406	0.75
Jun 21	1	116	0.31	176	0.31
Jul 21	1	1334	3.65	1940	3.53
Aug 21	1	1248	3.42	2191	4
Sep 21	1	783	2.15	1140	2.08
Oct 21	1	489	1.35	771	1.4
Nov 21	1	1357	3.71	2011	3.66
Dec 21	1	1299	3.57	1868	3.4
Jan 22	1	400	1.09	469	0.86
Feb 22	1	2915	7.99	4346	7.92
Mar 22	1	1843	5.05	2545	4.63
Mar 22	2	745	2.05	1140	2.08
Apr 22	1	893	2.44	1523	2.78
Apr 22	2	716	1.96	1020	1.86
May 22	1	1394	3.81	2269	4.13
May 22	2	145	0.4	292	0.52
Jun 22	1	109	0.29	297	0.54
Jun 22	2	138	0.38	189	0.34
Jul 22	1	42	0.1	64	0.12
Jul 22	2	1234	3.39	1853	3.37
Aug 22	1	82	0.22	86	0.16
Aug 22	2	121	0.33	262	0.48
Sep 22	1	662	1.81	2043	3.72
Sep 22	2	71	0.19	97	0.17
Oct 22	1	196	0.54	316	0.57
Nov 22	1	358	0.99	496	0.9
Dec 22	1	1034	2.84	1546	2.82
Jan 23	1	775	2.12	926	1.68
Feb 23	1	5676	15.57	6719	12.24
Mar 23	1	3609	9.91	4337	7.91
Apr 23	1	1340	3.68	1936	3.53
May 23	1	99	0.26	166	0.3
Jun 23	1	402	1.1	451	0.82
Jul 23	1	503	1.38	742	1.35
Aug 23	1	1518	4.16	3295	6.01

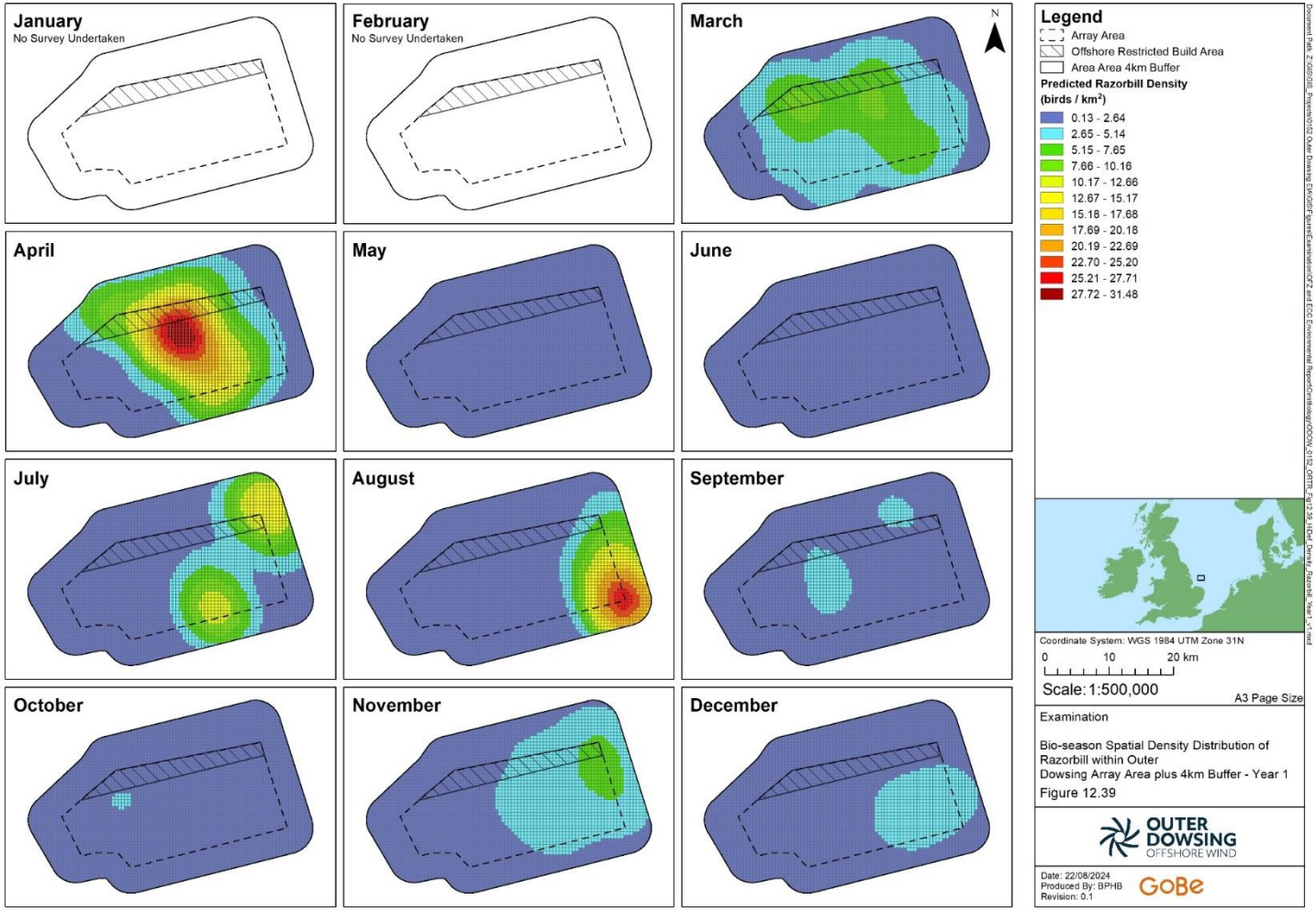

Figure 3.37. Bio-season spatial density distribution of razorbill within the Array Area +4km buffer – Year 1

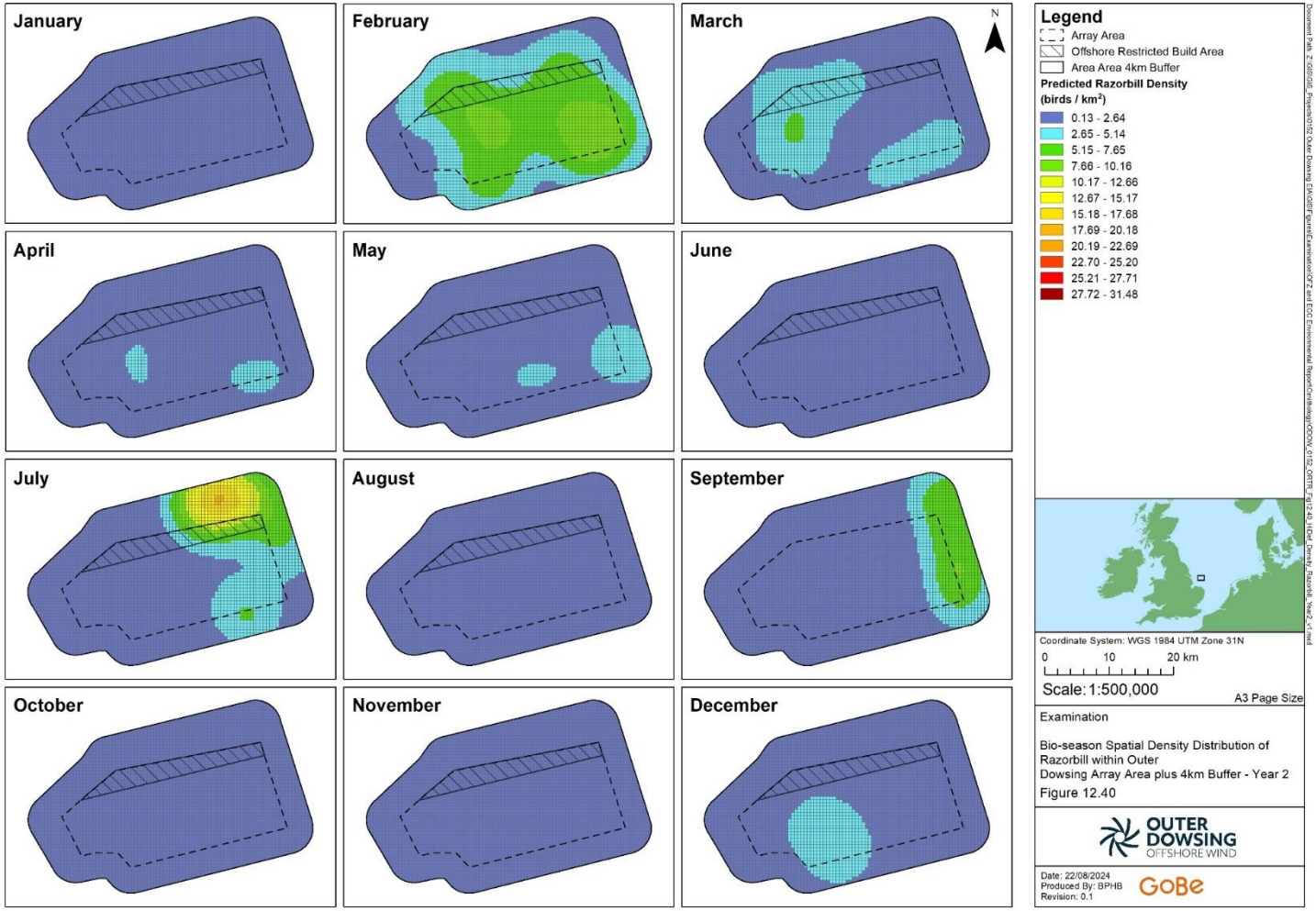

Figure 3.38. Bio-season spatial density distribution of razorbill within the Array Area +4km buffer – Year 2

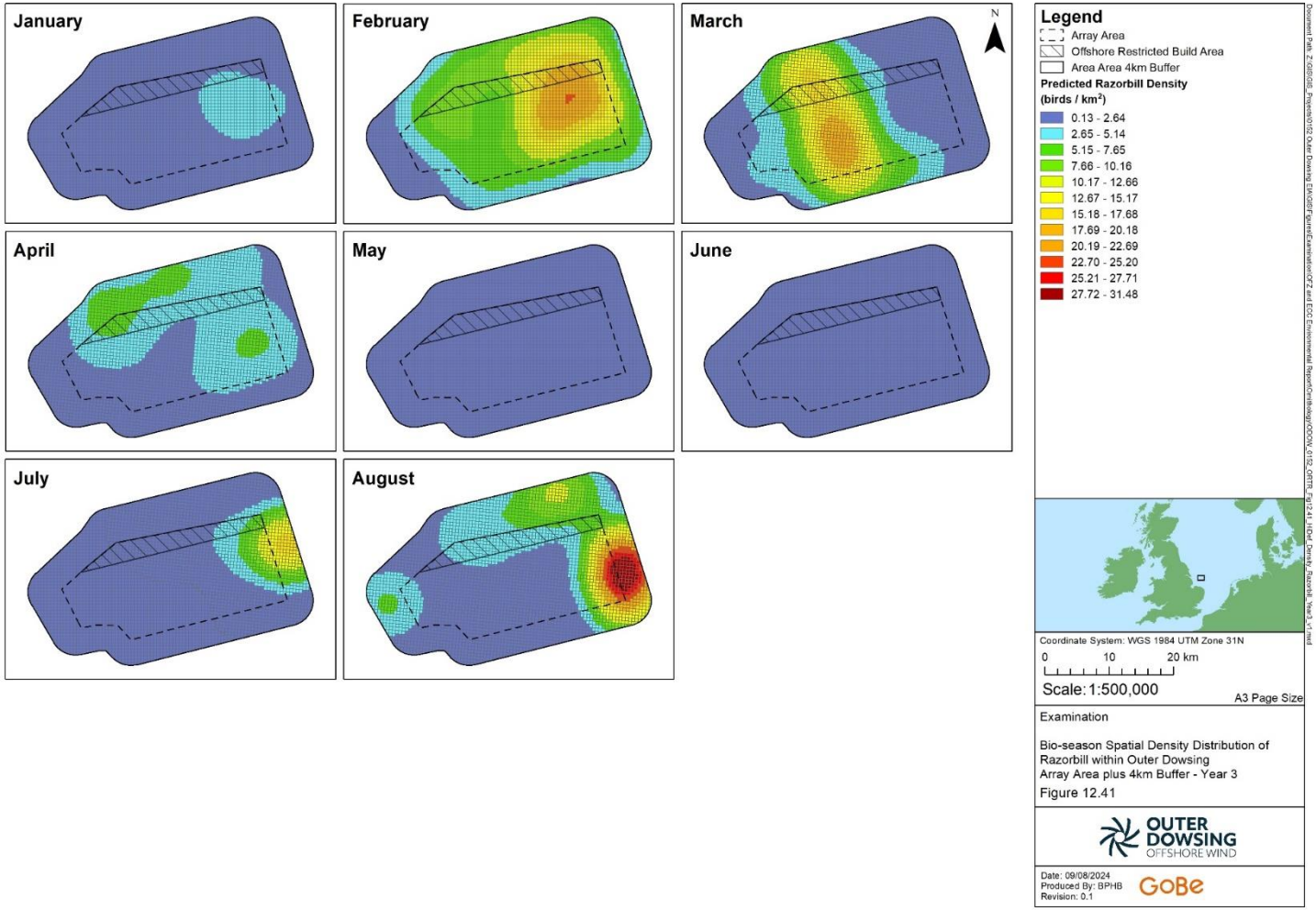

Figure 3.39. Bio-season spatial density distribution of razorbill within the Array Area +4km buffer – Year 3

158. Razorbill presence and distribution showed some similarities to that displayed by guillemot, particularly the high abundances seen in the build up to the breeding season, in March and April. However, post-breeding and non-breeding abundance was generally low, over both the WTG area and the WTG area +2km buffer. Of note is the very high abundance recorded in February 2023, appearing earlier, and in higher numbers than the spring peaks recorded in the two previous years surveyed. Patterns of abundance of razorbill were similar across the WTG area and the WTG area +2km buffer, as can be seen in Figure 3.40.

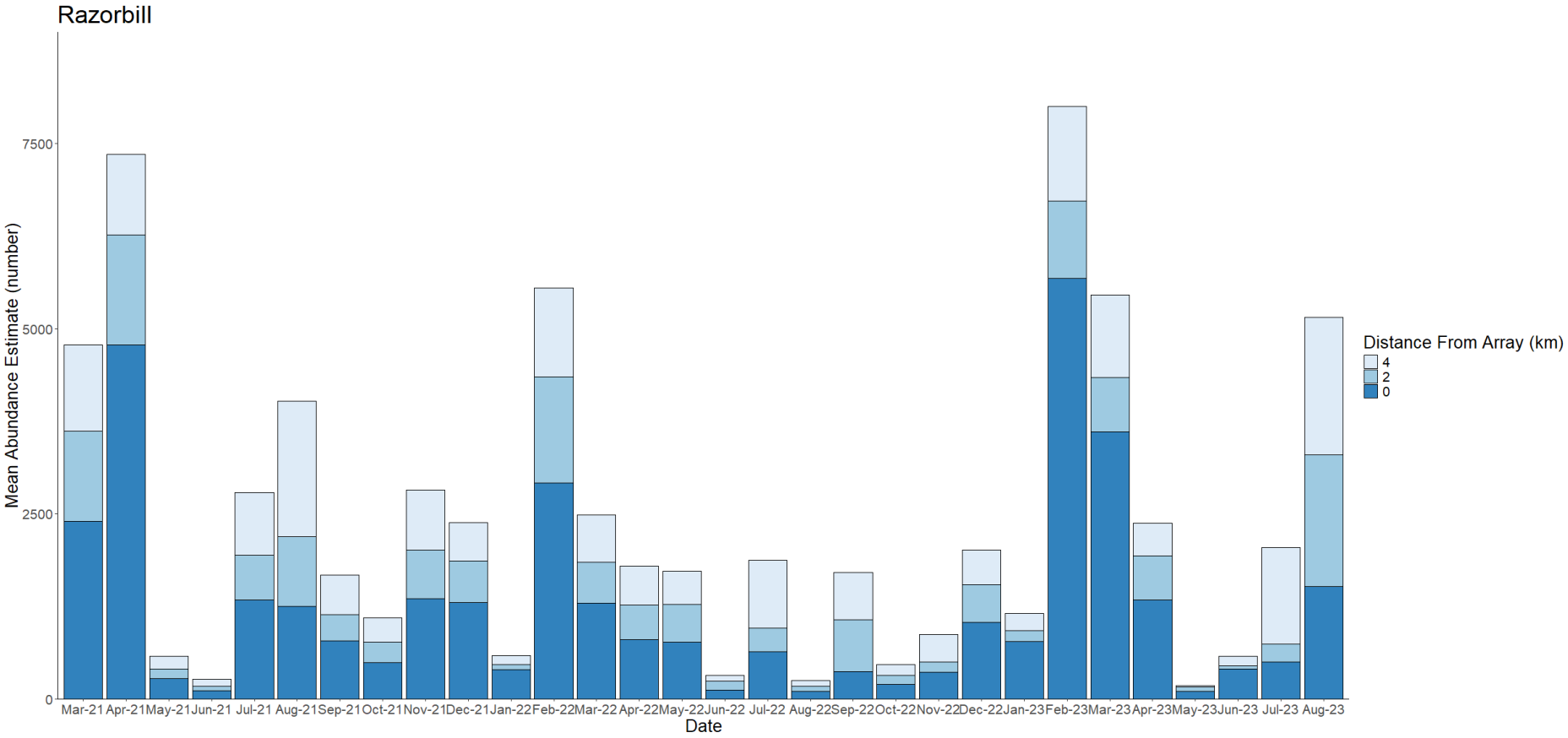

Figure 3.40. Monthly abundance of razorbill in the WTG area, WTG area +2km buffer and WTG area +4km buffer.

3.11.4 Flight direction

159. Figure 3.41 shows windrose diagrams presenting flight directions recorded for razorbill within the array area +4km buffer. These windrose diagrams were created from the array area +4km buffer; however, these data are still applicable to the WTG area +4km buffer, which is a subset of the larger array area +4km buffer This data is still relevant to the project, as it indicates the relative flight directions for relevant bird species within the WTG area and immediate vicinity.

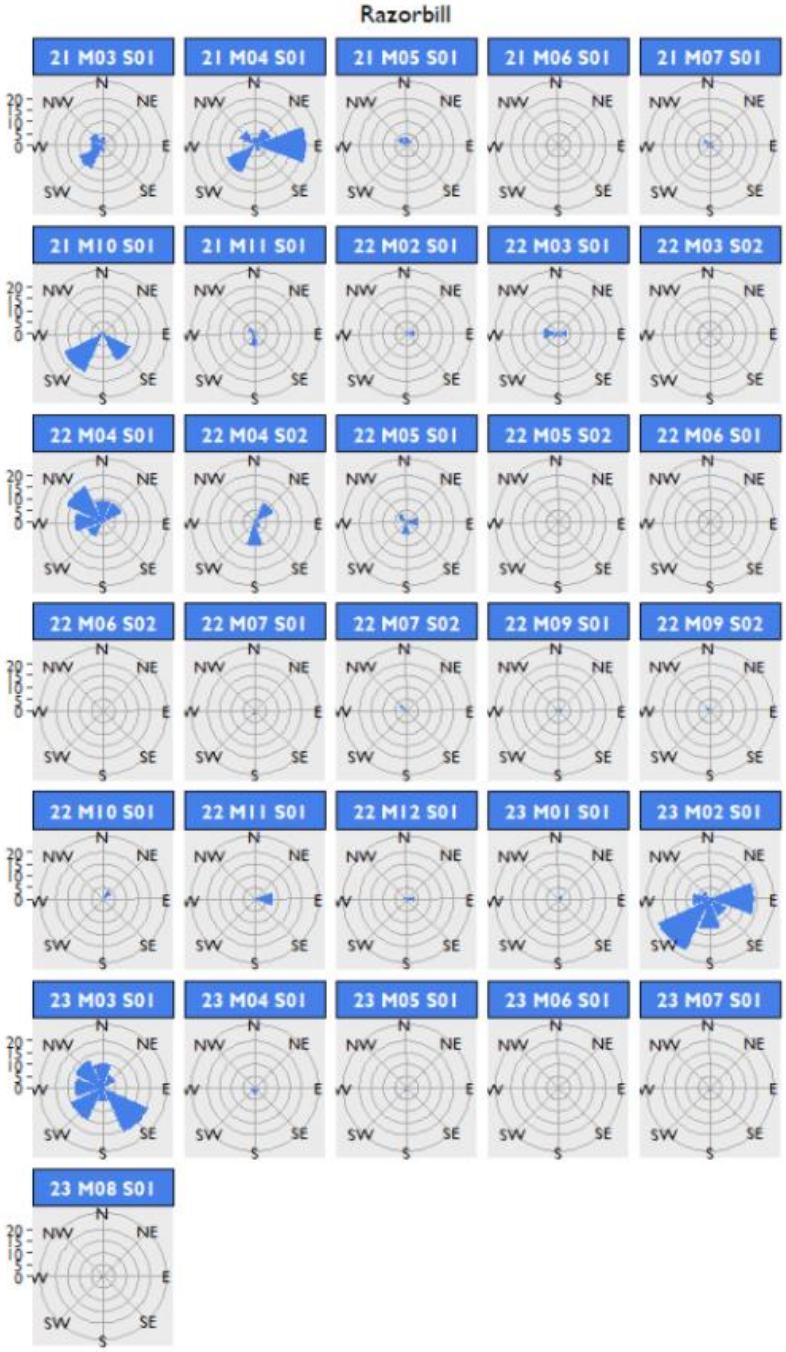

Figure 3.41. Windrose diagrams for months during which flying razorbill were recorded within the array area +4km buffer.

3.11.5 Foraging/Usage hotspots

160. The FFC SPA is the closest SPA to the Project array area. Using species distribution models, hotspots were identified to the north of the Project footprint (Figure 3.42) using Getis-Ord hotspot analysis (Cleasby *et al*, 2020). As with guillemot, the Project is clearly considerably further south-east, and beyond the core breeding season foraging hotspots from FFC SPA.

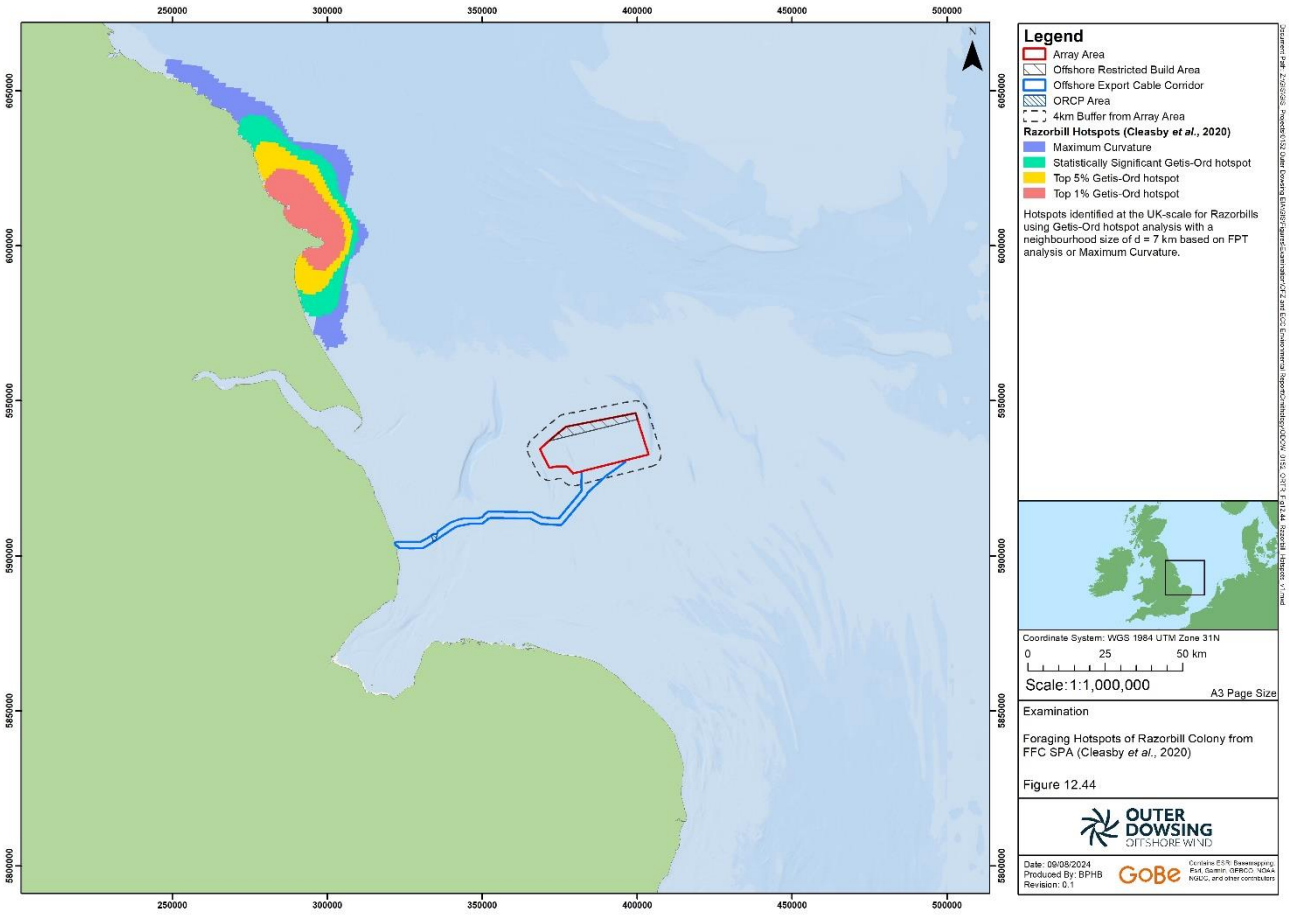

Figure 3.42. Foraging hotspots of razorbill colony from FFC SPA (Cleasby *et al*, 2020).G

3.11.6 Birds aged from DAS data

161. Proportions of razorbill aged from DAS images are presented in Table 3-51. Adult proportions are derived from the proportion of birds identified as adults out of all the aged birds for that species. Unaged birds do not contribute to the age proportions.

Table 3-51. Proportions of razorbill aged from DAS images within the WTG area +2km buffer.

Survey date	Adult	Immature	Juvenile	Unknown	Adult%	Total	Number of aged birds
22/03/2021	0	0	0	423	0	423	0
04/04/2021	0	0	0	827	0	827	0
12/05/2021	0	0	0	48	0	48	0
09/06/2021	0	0	0	16	0	16	0
24/07/2021	5	0	5	238	50	248	10
14/08/2021	3	0	0	308	100	311	3
07/09/2021	0	0	0	145	0	145	0
09/10/2021	0	0	0	90	0	90	0
02/11/2021	0	0	0	248	0	248	0
15/12/2021	0	0	0	213	0	213	0
06/01/2022	0	0	0	57	0	57	0
23/02/2022	0	0	0	576	0	576	0
11/03/2022	0	0	0	320	0	320	0
22/03/2022	0	0	0	138	0	138	0
02/04/2022	0	0	0	203	0	203	0
15/04/2022	0	0	0	144	0	144	0
02/05/2022	0	0	0	300	0	300	0
17/05/2022	0	0	0	36	0	36	0
09/06/2022	0	0	0	37	0	37	0
21/06/2022	0	0	0	25	0	25	0
04/07/2022	0	0	0	9	0	9	0
16/07/2022	10	0	10	213	50	233	20
08/08/2022	0	0	0	11	0	11	0
23/08/2022	0	0	0	37	0	37	0
13/09/2022	0	0	0	283	0	283	0
25/09/2022	0	0	0	12	0	12	0

Survey date	Adult	Immature	Juvenile	Unknown	Adult%	Total	Number of aged birds
10/10/2022	0	0	0	38	0	38	0
07/11/2022	0	0	0	53	0	53	0
13/12/2022	0	0	0	187	0	187	0
26/01/2023	0	0	0	118	0	118	0
10/02/2023	0	0	0	921	0	921	0
24/03/2023	0	0	0	596	0	596	0
05/04/2023	0	0	0	249	0	249	0
03/05/2023	0	0	0	22	0	22	0
17/06/2023	0	0	0	60	0	60	0
05/07/2023	19	0	20	58	49	97	39
10/08/2023	3	0	3	400	50	406	6

3.12 Puffin

3.12.1 Digital aerial survey data

Puffin were recorded in the WTG area in 27 of the 30 months surveyed, with a summed mean seasonal peak abundance of 680 birds (Table 3-55).

Table 3-53. Puffin estimated apportioned abundance and estimated density of flying birds in the Project WTG area and WTG area +2km buffer.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	15	0.04	21	0.04
Apr 21	1	0	0	6	0.01
May 21	1	0	0	0	0
Jun 21	1	0	0	0	0
Jul 21	1	0	0	0	0
Aug 21	1	0	0	0	0
Sep 21	1	0	0	0	0
Oct 21	1	7	0.02	13	0.02
Nov 21	1	0	0	0	0
Dec 21	1	0	0	0	0
Jan 22	1	0	0	0	0
Feb 22	1	0	0	0	0
Mar 22	1	0	0	0	0
Mar 22	2	2	0	2	0
Apr 22	1	0	0	0	0
Apr 22	2	0	0	15	0.03
May 22	1	0	0	0	0
May 22	2	0	0	0	0
Jun 22	1	7	0.02	13	0.02
Jun 22	2	0	0	0	0
Jul 22	1	0	0	0	0
Jul 22	2	6	0.02	19	0.03
Aug 22	1	0	0	0	0
Aug 22	2	0	0	0	0
Sep 22	1	0	0	0	0
Sep 22	2	0	0	0	0
Oct 22	1	0	0	0	0
Nov 22	1	0	0	0	0
Dec 22	1	0	0	0	0
Jan 23	1	0	0	0	0
Feb 23	1	0	0	0	0

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 23	1	7	0.02	30	0.05
Apr 23	1	0	0	0	0
May 23	1	12	0.03	19	0.03
Jun 23	1	7	0.02	12	0.02
Jul 23	1	0	0	0	0
Aug 23	1	0	0	0	0

Table 3-54. Puffin estimated apportioned abundance and estimated density of birds sitting on the water in the Project WTG area and WTG area +2km buffer. Counts have been adjusted for availability bias.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	106	0.29	181	0.33
Apr 21	1	16	0.05	23	0.05
May 21	1	21	0.06	22	0.03
Jun 21	1	15	0.03	23	0.05
Jul 21	1	132	0.36	211	0.38
Aug 21	1	721	1.98	1203	2.19
Sep 21	1	620	1.7	898	1.63
Oct 21	1	630	1.72	927	1.69
Nov 21	1	289	0.79	407	0.75
Dec 21	1	22	0.06	42	0.07
Jan 22	1	0	0	0	0
Feb 22	1	5	0.01	5	0.01
Mar 22	1	205	0.56	304	0.56
Mar 22	2	61	0.16	125	0.22
Apr 22	1	17	0.05	29	0.05
Apr 22	2	55	0.15	73	0.13
May 22	1	217	0.59	277	0.5
May 22	2	0	0	10	0.01
Jun 22	1	13	0.03	22	0.03
Jun 22	2	0	0	0	0
Jul 22	1	8	0.02	13	0.02
Jul 22	2	73	0.2	137	0.24
Aug 22	1	27	0.07	62	0.12
Aug 22	2	17	0.05	16	0.03

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Sep 22	1	105	0.29	165	0.3
Sep 22	2	58	0.16	89	0.16
Oct 22	1	116	0.31	188	0.34
Nov 22	1	65	0.17	108	0.2
Dec 22	1	121	0.33	153	0.28
Jan 23	1	0	0	0	0
Feb 23	1	52	0.14	119	0.21
Mar 23	1	36	0.09	56	0.1
Apr 23	1	61	0.16	121	0.22
May 23	1	59	0.16	97	0.17
Jun 23	1	14	0.03	40	0.07
Jul 23	1	122	0.34	198	0.36
Aug 23	1	395	1.08	651	1.19

Table 3-55. Puffin total estimated apportioned abundance and estimated density, in the Project WTG area and WTG area +2km buffer (Total of flying and sitting birds). Counts have been adjusted for availability bias.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	121	0.33	202	0.37
Apr 21	1	16	0.05	29	0.06
May 21	1	21	0.06	22	0.03
Jun 21	1	15	0.03	23	0.05
Jul 21	1	132	0.36	211	0.38
Aug 21	1	721	1.98	1203	2.19
Sep 21	1	620	1.7	898	1.63
Oct 21	1	637	1.74	940	1.71
Nov 21	1	289	0.79	407	0.75
Dec 21	1	22	0.06	42	0.07
Jan 22	1	0	0	0	0
Feb 22	1	5	0.01	5	0.01
Mar 22	1	205	0.56	304	0.56
Mar 22	2	63	0.16	127	0.22
Apr 22	1	17	0.05	29	0.05
Apr 22	2	55	0.15	88	0.16
May 22	1	217	0.59	277	0.5

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
May 22	2	0	0	10	0.01
Jun 22	1	20	0.05	35	0.05
Jun 22	2	0	0	0	0
Jul 22	1	8	0.02	13	0.02
Jul 22	2	79	0.22	156	0.27
Aug 22	1	27	0.07	62	0.12
Aug 22	2	17	0.05	16	0.03
Sep 22	1	105	0.29	165	0.3
Sep 22	2	58	0.16	89	0.16
Oct 22	1	116	0.31	188	0.34
Nov 22	1	65	0.17	108	0.2
Dec 22	1	121	0.33	153	0.28
Jan 23	1	0	0	0	0
Feb 23	1	52	0.14	119	0.21
Mar 23	1	43	0.11	86	0.15
Apr 23	1	61	0.16	121	0.22
May 23	1	71	0.19	116	0.2
Jun 23	1	21	0.05	52	0.09
Jul 23	1	122	0.34	198	0.36
Aug 23	1	395	1.08	651	1.19

In the WTG area +2km buffer, the summed mean seasonal peak abundance was 1,080 birds (Table 3-55).

Table 3-53. Puffin estimated apportioned abundance and estimated density of flying birds in the Project WTG area and WTG area +2km buffer.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	15	0.04	21	0.04
Apr 21	1	0	0	6	0.01
May 21	1	0	0	0	0
Jun 21	1	0	0	0	0
Jul 21	1	0	0	0	0
Aug 21	1	0	0	0	0
Sep 21	1	0	0	0	0
Oct 21	1	7	0.02	13	0.02
Nov 21	1	0	0	0	0

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Dec 21	1	0	0	0	0
Jan 22	1	0	0	0	0
Feb 22	1	0	0	0	0
Mar 22	1	0	0	0	0
Mar 22	2	2	0	2	0
Apr 22	1	0	0	0	0
Apr 22	2	0	0	15	0.03
May 22	1	0	0	0	0
May 22	2	0	0	0	0
Jun 22	1	7	0.02	13	0.02
Jun 22	2	0	0	0	0
Jul 22	1	0	0	0	0
Jul 22	2	6	0.02	19	0.03
Aug 22	1	0	0	0	0
Aug 22	2	0	0	0	0
Sep 22	1	0	0	0	0
Sep 22	2	0	0	0	0
Oct 22	1	0	0	0	0
Nov 22	1	0	0	0	0
Dec 22	1	0	0	0	0
Jan 23	1	0	0	0	0
Feb 23	1	0	0	0	0
Mar 23	1	7	0.02	30	0.05
Apr 23	1	0	0	0	0
May 23	1	12	0.03	19	0.03
Jun 23	1	7	0.02	12	0.02
Jul 23	1	0	0	0	0
Aug 23	1	0	0	0	0

Table 3-54. Puffin estimated apportioned abundance and estimated density of birds sitting on the water in the Project WTG area and WTG area +2km buffer. Counts have been adjusted for availability bias.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	106	0.29	181	0.33
Apr 21	1	16	0.05	23	0.05

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
May 21	1	21	0.06	22	0.03
Jun 21	1	15	0.03	23	0.05
Jul 21	1	132	0.36	211	0.38
Aug 21	1	721	1.98	1203	2.19
Sep 21	1	620	1.7	898	1.63
Oct 21	1	630	1.72	927	1.69
Nov 21	1	289	0.79	407	0.75
Dec 21	1	22	0.06	42	0.07
Jan 22	1	0	0	0	0
Feb 22	1	5	0.01	5	0.01
Mar 22	1	205	0.56	304	0.56
Mar 22	2	61	0.16	125	0.22
Apr 22	1	17	0.05	29	0.05
Apr 22	2	55	0.15	73	0.13
May 22	1	217	0.59	277	0.5
May 22	2	0	0	10	0.01
Jun 22	1	13	0.03	22	0.03
Jun 22	2	0	0	0	0
Jul 22	1	8	0.02	13	0.02
Jul 22	2	73	0.2	137	0.24
Aug 22	1	27	0.07	62	0.12
Aug 22	2	17	0.05	16	0.03
Sep 22	1	105	0.29	165	0.3
Sep 22	2	58	0.16	89	0.16
Oct 22	1	116	0.31	188	0.34
Nov 22	1	65	0.17	108	0.2
Dec 22	1	121	0.33	153	0.28
Jan 23	1	0	0	0	0
Feb 23	1	52	0.14	119	0.21
Mar 23	1	36	0.09	56	0.1
Apr 23	1	61	0.16	121	0.22
May 23	1	59	0.16	97	0.17
Jun 23	1	14	0.03	40	0.07
Jul 23	1	122	0.34	198	0.36
Aug 23	1	395	1.08	651	1.19

Table 3-55. Puffin total estimated apportioned abundance and estimated density, in the Project WTG area and WTG area +2km buffer (Total of flying and sitting birds). Counts have been adjusted for availability bias.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	121	0.33	202	0.37
Apr 21	1	16	0.05	29	0.06
May 21	1	21	0.06	22	0.03
Jun 21	1	15	0.03	23	0.05
Jul 21	1	132	0.36	211	0.38
Aug 21	1	721	1.98	1203	2.19
Sep 21	1	620	1.7	898	1.63
Oct 21	1	637	1.74	940	1.71
Nov 21	1	289	0.79	407	0.75
Dec 21	1	22	0.06	42	0.07
Jan 22	1	0	0	0	0
Feb 22	1	5	0.01	5	0.01
Mar 22	1	205	0.56	304	0.56
Mar 22	2	63	0.16	127	0.22
Apr 22	1	17	0.05	29	0.05
Apr 22	2	55	0.15	88	0.16
May 22	1	217	0.59	277	0.5
May 22	2	0	0	10	0.01
Jun 22	1	20	0.05	35	0.05
Jun 22	2	0	0	0	0
Jul 22	1	8	0.02	13	0.02
Jul 22	2	79	0.22	156	0.27
Aug 22	1	27	0.07	62	0.12
Aug 22	2	17	0.05	16	0.03
Sep 22	1	105	0.29	165	0.3
Sep 22	2	58	0.16	89	0.16
Oct 22	1	116	0.31	188	0.34
Nov 22	1	65	0.17	108	0.2
Dec 22	1	121	0.33	153	0.28
Jan 23	1	0	0	0	0
Feb 23	1	52	0.14	119	0.21
Mar 23	1	43	0.11	86	0.15
Apr 23	1	61	0.16	121	0.22
May 23	1	71	0.19	116	0.2
Jun 23	1	21	0.05	52	0.09
Jul 23	1	122	0.34	198	0.36

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Aug 23	1	395	1.08	651	1.19

3.12.2 Puffin overview

162. The nearest puffin colony to the Project is the FFC SPA, where it is listed as a component of the breeding seabird assemblage. The colony is 95km from the Project and within the mean maximum foraging range of breeding adult puffin (137.1km, standard deviation 128.3km) (Woodward *et al.*, 2019). The latest colony count from FFC SPA was 2,986 individuals in 2022 (BTO, 2023).

163. Outside the breeding season, impacts on puffin have been compared to the UK North Sea and Channel BDMPS, consisting of 231,958 individuals during the non-breeding season (September to March) (Furness, 2015).

3.12.3 Abundance and Phenology

164. Mean seasonal peak abundances of puffin in the species bio-seasons (as defined in Furness 2015) are presented in Table 3-52. Estimates of monthly abundance and density in the WTG area, and monthly abundance and density within the WTG area +2km buffer are presented in Table 3-53, Table 3-54, and Table 3-55 for flying birds, birds sitting on the sea, and the total birds observed. The spatial density distribution of puffin within the Outer Dowsing Array Area +4km buffer is shown for three years of surveys in Figure 3.43, Figure 3.44, and Figure 3.45.

165. Puffin were present in the Project WTG area across both bio-seasons. Abundance in the WTG area was greatest during the breeding bio-season (April to August), with a mean seasonal peak abundance of 408 birds and mean seasonal peak density of 1.12 birds/km^2 (Table 3-52).

166. In the WTG area +2km buffer, puffin numbers were similarly greatest during the breeding bio-season, with a mean seasonal peak abundance of 666 birds and mean seasonal peak density of 1.21 birds/km^2 (Table 3-52).

Table 3-52. Puffin bio-season mean seasonal peak apportioned abundance and density estimates in the Project WTG area +2km buffer.

BDMPS Bio-seasons	Months	Array area minus the ORBA		Array area minus the ORBA +2km buffer	
		Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)	Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)
Breeding	Apr – Aug	408 (238-612)	1.12 (0.65-1.68)	666 (419-960)	1.21 (0.76-1.75)
Non-breeding	Sep – Mar	271 (187-376)	0.74 (0.51-1.03)	414 (293-570)	0.75 (0.53-1.04)

BDMPS Bio-seasons	Months	Array area minus the ORBA		Array area minus the ORBA +2km buffer	
		Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)	Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)
Summed mean seasonal peak		680 (425-988)	-	1,080 (712-1,529(	-

Table 3-53. Puffin estimated apportioned abundance and estimated density of flying birds in the Project WTG area and WTG area +2km buffer.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	15	0.04	21	0.04
Apr 21	1	0	0	6	0.01
May 21	1	0	0	0	0
Jun 21	1	0	0	0	0
Jul 21	1	0	0	0	0
Aug 21	1	0	0	0	0
Sep 21	1	0	0	0	0
Oct 21	1	7	0.02	13	0.02
Nov 21	1	0	0	0	0
Dec 21	1	0	0	0	0
Jan 22	1	0	0	0	0
Feb 22	1	0	0	0	0
Mar 22	1	0	0	0	0
Mar 22	2	2	0	2	0
Apr 22	1	0	0	0	0
Apr 22	2	0	0	15	0.03
May 22	1	0	0	0	0
May 22	2	0	0	0	0
Jun 22	1	7	0.02	13	0.02
Jun 22	2	0	0	0	0
Jul 22	1	0	0	0	0
Jul 22	2	6	0.02	19	0.03
Aug 22	1	0	0	0	0
Aug 22	2	0	0	0	0
Sep 22	1	0	0	0	0
Sep 22	2	0	0	0	0

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Oct 22	1	0	0	0	0
Nov 22	1	0	0	0	0
Dec 22	1	0	0	0	0
Jan 23	1	0	0	0	0
Feb 23	1	0	0	0	0
Mar 23	1	7	0.02	30	0.05
Apr 23	1	0	0	0	0
May 23	1	12	0.03	19	0.03
Jun 23	1	7	0.02	12	0.02
Jul 23	1	0	0	0	0
Aug 23	1	0	0	0	0

Table 3-54. Puffin estimated apportioned abundance and estimated density of birds sitting on the water in the Project WTG area and WTG area +2km buffer. Counts have been adjusted for availability bias.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	106	0.29	181	0.33
Apr 21	1	16	0.05	23	0.05
May 21	1	21	0.06	22	0.03
Jun 21	1	15	0.03	23	0.05
Jul 21	1	132	0.36	211	0.38
Aug 21	1	721	1.98	1203	2.19
Sep 21	1	620	1.7	898	1.63
Oct 21	1	630	1.72	927	1.69
Nov 21	1	289	0.79	407	0.75
Dec 21	1	22	0.06	42	0.07
Jan 22	1	0	0	0	0
Feb 22	1	5	0.01	5	0.01
Mar 22	1	205	0.56	304	0.56
Mar 22	2	61	0.16	125	0.22
Apr 22	1	17	0.05	29	0.05
Apr 22	2	55	0.15	73	0.13
May 22	1	217	0.59	277	0.5
May 22	2	0	0	10	0.01
Jun 22	1	13	0.03	22	0.03

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Jun 22	2	0	0	0	0
Jul 22	1	8	0.02	13	0.02
Jul 22	2	73	0.2	137	0.24
Aug 22	1	27	0.07	62	0.12
Aug 22	2	17	0.05	16	0.03
Sep 22	1	105	0.29	165	0.3
Sep 22	2	58	0.16	89	0.16
Oct 22	1	116	0.31	188	0.34
Nov 22	1	65	0.17	108	0.2
Dec 22	1	121	0.33	153	0.28
Jan 23	1	0	0	0	0
Feb 23	1	52	0.14	119	0.21
Mar 23	1	36	0.09	56	0.1
Apr 23	1	61	0.16	121	0.22
May 23	1	59	0.16	97	0.17
Jun 23	1	14	0.03	40	0.07
Jul 23	1	122	0.34	198	0.36
Aug 23	1	395	1.08	651	1.19

Table 3-55. Puffin total estimated apportioned abundance and estimated density, in the Project WTG area and WTG area +2km buffer (Total of flying and sitting birds). Counts have been adjusted for availability bias.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	121	0.33	202	0.37
Apr 21	1	16	0.05	29	0.06
May 21	1	21	0.06	22	0.03
Jun 21	1	15	0.03	23	0.05
Jul 21	1	132	0.36	211	0.38
Aug 21	1	721	1.98	1203	2.19
Sep 21	1	620	1.7	898	1.63
Oct 21	1	637	1.74	940	1.71
Nov 21	1	289	0.79	407	0.75
Dec 21	1	22	0.06	42	0.07
Jan 22	1	0	0	0	0
Feb 22	1	5	0.01	5	0.01

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 22	1	205	0.56	304	0.56
Mar 22	2	63	0.16	127	0.22
Apr 22	1	17	0.05	29	0.05
Apr 22	2	55	0.15	88	0.16
May 22	1	217	0.59	277	0.5
May 22	2	0	0	10	0.01
Jun 22	1	20	0.05	35	0.05
Jun 22	2	0	0	0	0
Jul 22	1	8	0.02	13	0.02
Jul 22	2	79	0.22	156	0.27
Aug 22	1	27	0.07	62	0.12
Aug 22	2	17	0.05	16	0.03
Sep 22	1	105	0.29	165	0.3
Sep 22	2	58	0.16	89	0.16
Oct 22	1	116	0.31	188	0.34
Nov 22	1	65	0.17	108	0.2
Dec 22	1	121	0.33	153	0.28
Jan 23	1	0	0	0	0
Feb 23	1	52	0.14	119	0.21
Mar 23	1	43	0.11	86	0.15
Apr 23	1	61	0.16	121	0.22
May 23	1	71	0.19	116	0.2
Jun 23	1	21	0.05	52	0.09
Jul 23	1	122	0.34	198	0.36
Aug 23	1	395	1.08	651	1.19

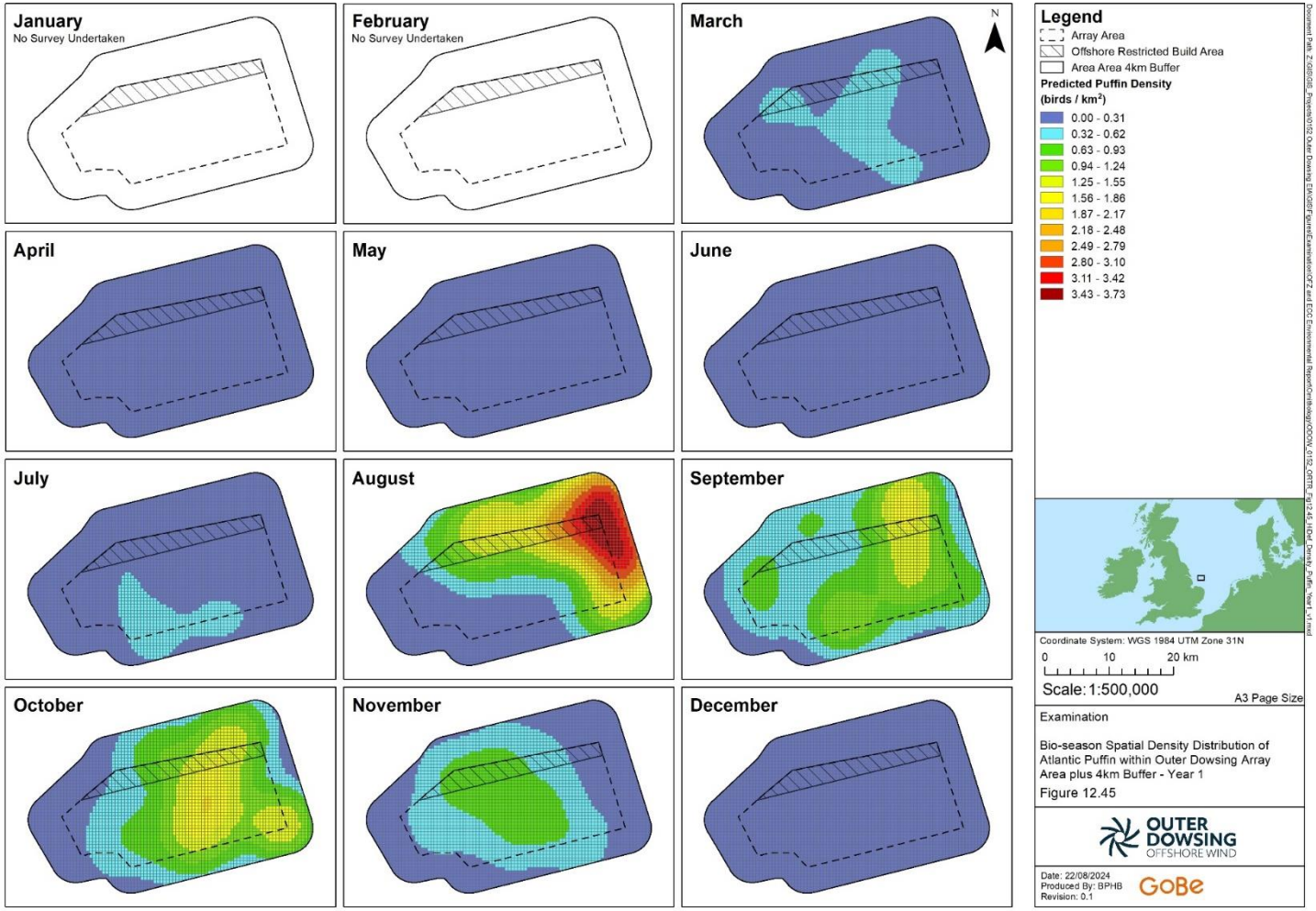

Figure 3.43. Bio-season spatial density distribution of puffin within the Array Area +4km buffer – Year 1

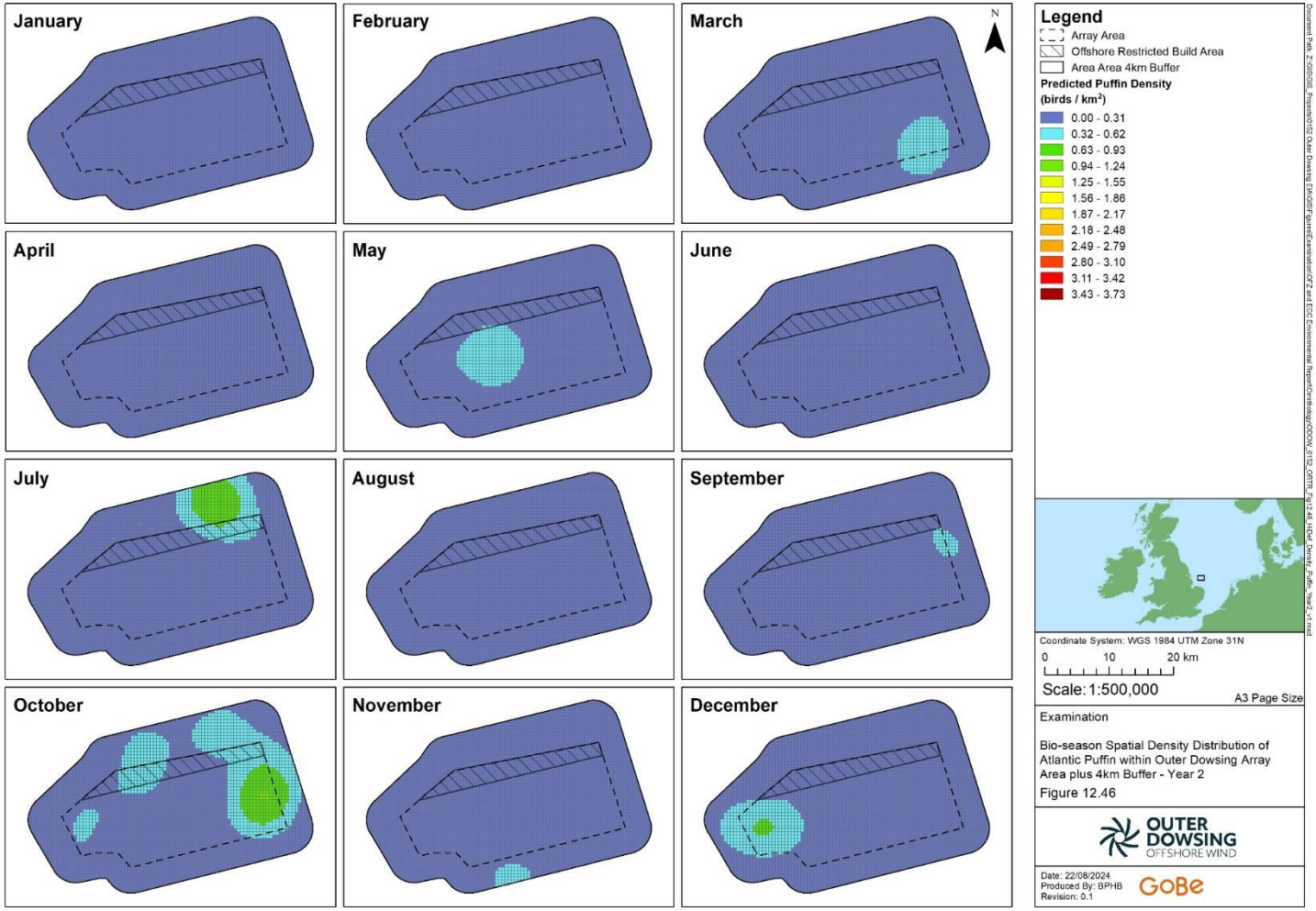

Figure 3.44. Bio-season spatial density distribution of puffin within the Array Area +4km buffer – Year 2

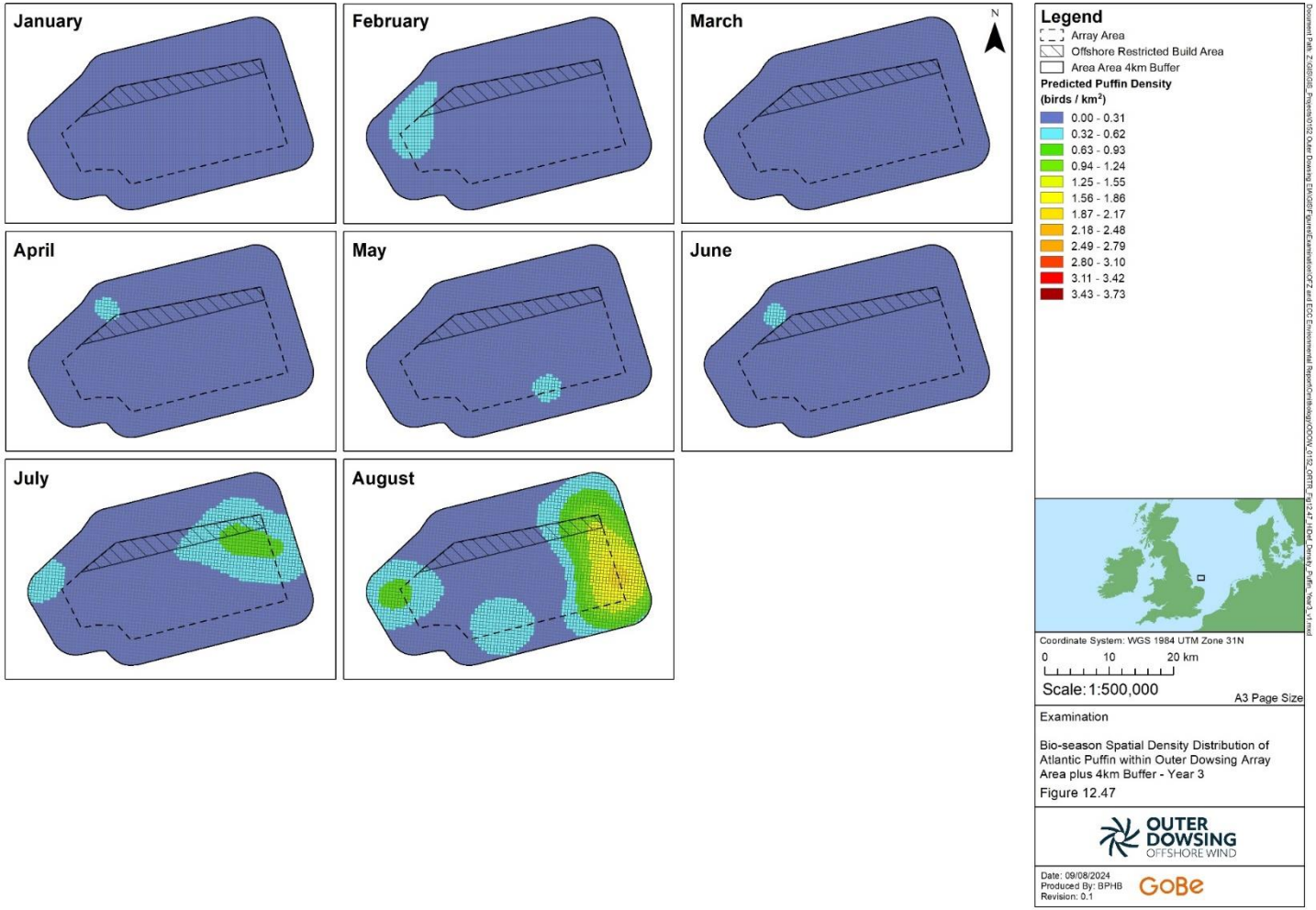

Figure 3.45. Bio-season spatial density distribution of puffin within the Array Area +4km buffer – Year 3

167. Puffin showed an interesting pattern of presence and abundance across the two years that were surveyed. Abundance was generally low (rarely occurring in numbers of over 200 birds in the WTG area +2km buffer), apart from a very high peak in abundance in late Summer and Autumn 2021. Patterns in abundance were similar across both the WTG area and WTG area +2km buffer, as can be seen in Figure 3.46.

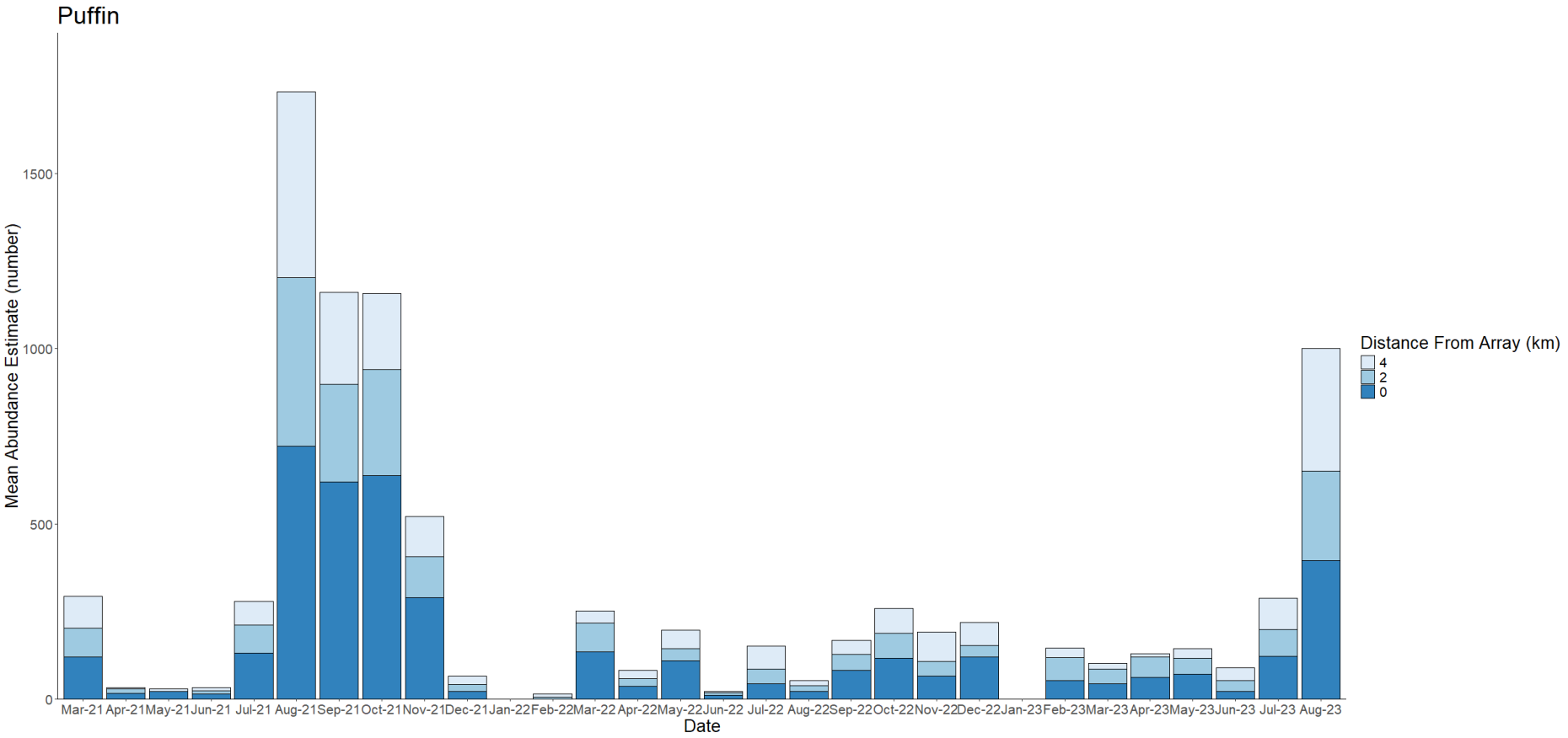

Figure 3.46. Monthly abundance of puffin in the WTG area, WTG area +2km buffer and WTG area +4km buffer.

3.12.4 Flight direction

168. Figure 3.47 shows windrose diagrams presenting flight directions recorded for puffin within the array area +4km buffer. These windrose diagrams were created from the array area +4km buffer; however, these data are still applicable to the WTG area +4km buffer, which is a subset of the larger array area +4km buffer This data is still relevant to the project, as it indicates the relative flight directions for relevant bird species within the WTG area and immediate vicinity.

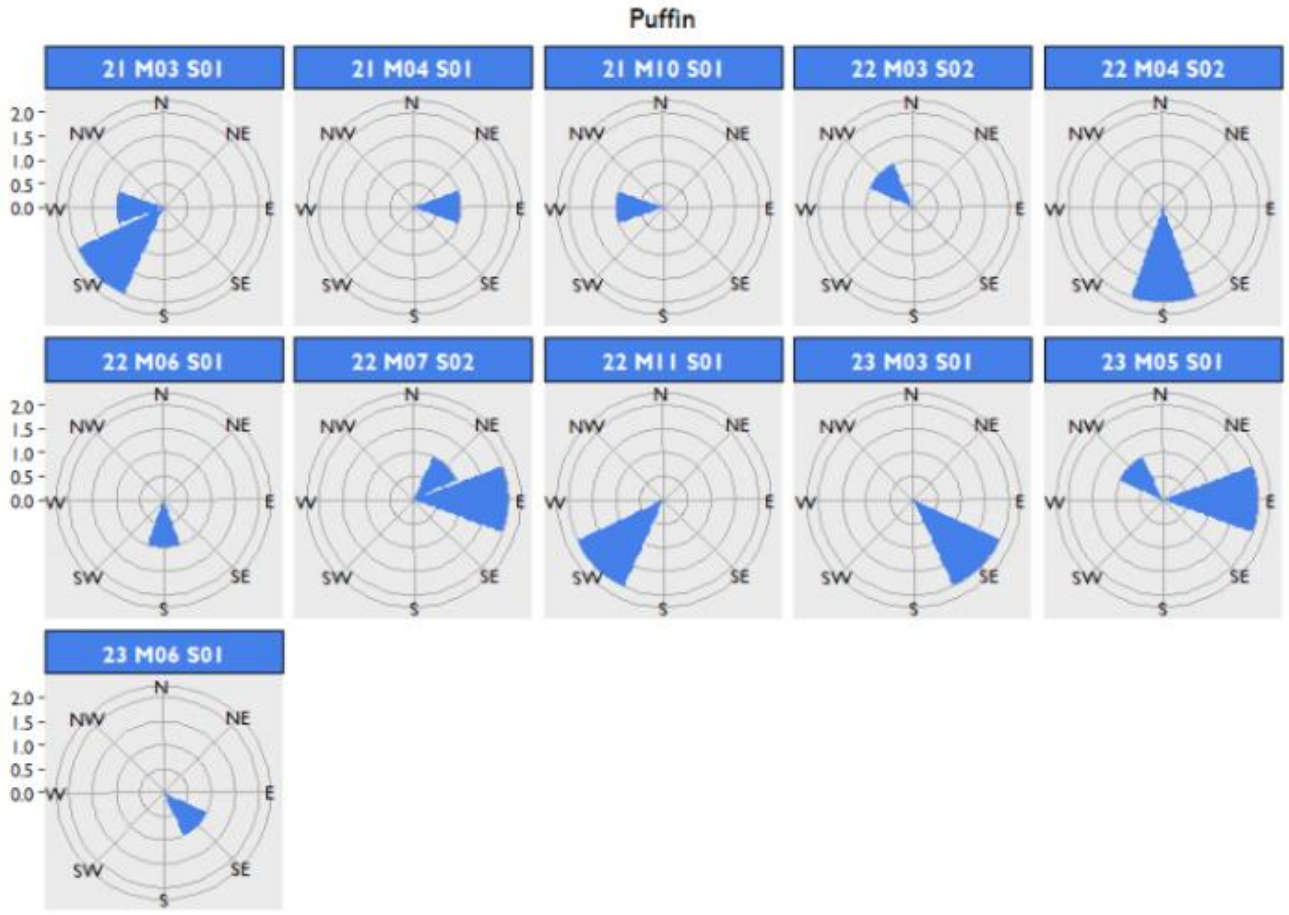

Figure 3.47. Windrose diagrams for months during which flying puffin were recorded within the array area +4km buffer.

3.12.5 Birds aged from DAS data

169. Proportions of puffin aged from DAS images are presented in Table 3-56. Adult proportions are derived from the proportion of birds identified as adults out of all the aged birds for that species. Unaged birds do not contribute to the age proportions.

Table 3-56. Proportions of puffin aged from DAS images within the WTG area +2km buffer.

Survey date	Adult	Immature	Juvenile	Unknown	Adult%	Total	Number of aged birds
22/03/2021	0	0	0	21	0	21	0
04/04/2021	0	0	0	4	0	4	0
12/05/2021	0	0	0	2	0	2	0
09/06/2021	0	0	0	1	0	1	0
24/07/2021	0	0	0	17	0	17	0
14/08/2021	0	0	0	79	0	79	0
07/09/2021	0	0	0	73	0	73	0
09/10/2021	0	0	0	86	0	86	0
02/11/2021	0	0	0	43	0	43	0
15/12/2021	0	0	0	3	0	3	0
06/01/2022	0	0	0	0	0	0	0
23/02/2022	0	0	0	0	0	0	0
11/03/2022	0	0	0	25	0	25	0
22/03/2022	0	0	0	7	0	7	0
02/04/2022	0	0	0	3	0	3	0
15/04/2022	0	0	0	6	0	6	0
02/05/2022	0	0	0	27	0	27	0
17/05/2022	0	0	0	1	0	1	0
09/06/2022	0	0	0	3	0	3	0
21/06/2022	0	0	0	0	0	0	0
04/07/2022	0	0	0	1	0	1	0
16/07/2022	0	0	0	15	0	15	0
08/08/2022	0	0	0	6	0	6	0
23/08/2022	0	0	0	1	0	1	0
13/09/2022	0	0	0	14	0	14	0
25/09/2022	0	0	0	5	0	5	0

Survey date	Adult	Immature	Juvenile	Unknown	Adult%	Total	Number of aged birds
10/10/2022	0	0	0	25	0	25	0
07/11/2022	0	0	0	6	0	6	0
13/12/2022	0	0	0	14	0	14	0
26/01/2023	0	0	0	0	0	0	0
10/02/2023	0	0	0	6	0	6	0
24/03/2023	0	0	0	5	0	5	0
05/04/2023	0	0	0	3	0	3	0
03/05/2023	0	0	0	11	0	11	0
17/06/2023	0	0	0	6	0	6	0
05/07/2023	0	0	0	16	0	16	0
10/08/2023	0	0	0	47	0	47	0

3.13 Red-throated diver

3.13.1 Digital aerial survey data

Red-throated diver were recorded in the WTG area in 14 of the 30 months surveyed, with a summed mean seasonal peak abundance of 122 birds (Table 3-58).

In the WTG area +4km buffer, the summed mean seasonal peak abundance was 192 birds (Table 3-57).

3.13.2 Red-throated diver overview

170. The nearest SPA with red-throated diver as a qualifying feature to the Project is the Greater Wash SPA, which is 23.4km from the Project array area and overlaps with the offshore ECC. The SPA has a wintering aggregation of 1,787 red-throated divers which is approximately 8% of the wintering UK population (JNCC, 2022).

171. The southwest North Sea BDMPS population of 13,276 individuals is relevant to the winter period (September to April) (Furness, 2015).

3.13.3 Abundance and Phenology

172. Mean seasonal peak abundances of red-throated diver in the species bio-seasons (as defined in Furness 2015) are presented in Table 3-57. Estimates of monthly abundance and density within the WTG area, and monthly abundance and density within the WTG area +2km buffer are presented in Table 3-58, Table 3-59, and Table 3-60 for flying birds, birds sitting on the sea, and the total birds observed. The spatial density distribution of red-throated diver within the Outer Dowsing Array Area +4km buffer is shown for three years of surveys in Figure 3.48, Figure 3.49, and Figure 3.50.

173. Red-throated diver were present in the Project WTG area across all bio-seasons. Abundance in the WTG area was greatest during the winter bio-season (September to April), with a mean seasonal peak abundance of 113 birds and mean seasonal peak density of 0.31 birds/km^2 (Table 3-57) .

174. In the WTG area +4km buffer, red-throated diver numbers were again highest during the non-breeding bio-season, with a mean seasonal peak abundance of 192 birds and a mean seasonal peak density of 0.25 birds/km^2 (Table 3-57).

Table 3-57. Red-throated diver bio-season mean seasonal peak apportioned abundance and density estimates in the Project WTG area +4km buffer

BDMPS Bio-seasons	Months	Array area minus the ORBA		Array area minus the ORBA +4km buffer	
		Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)	Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)
Breeding	May-Aug	10 (0-24)	0.03 (0.00-0.07)	13 (0-29)	0.02 (0.00-0.04)
Winter period	Sep-Apr	113 (49-186)	0.31 (0.14-0.51)	180 (104-266)	0.24 (0.14-0.39)
Summed mean seasonal peak		122 (49-210)	-	192 (104-295)	-

Table 3-58. Red-throated diver estimated apportioned abundance and estimated density of flying birds in the Project WTG area and WTG area +4km buffer.

Month	Survey number	WTG area		WTG area +4km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	7	0.02	6	0.01
Apr 21	1	0	0	0	0
May 21	1	0	0	0	0
Jun 21	1	0	0	0	0
Jul 21	1	0	0	0	0
Aug 21	1	0	0	0	0
Sep 21	1	0	0	0	0
Oct 21	1	0	0	0	0
Nov 21	1	0	0	0	0
Dec 21	1	7	0.02	6	0.01
Jan 22	1	0	0	0	0
Feb 22	1	0	0	0	0
Mar 22	1	0	0	0	0
Mar 22	2	0	0	0	0
Apr 22	1	7	0.02	24	0.03
Apr 22	2	0	0	0	0
May 22	1	0	0	7	0.01
May 22	2	0	0	0	0
Jun 22	1	0	0	0	0
Jun 22	2	0	0	0	0
Jul 22	1	0	0	0	0

Month	Survey number	WTG area		WTG area +4km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Jul 22	2	0	0	0	0
Aug 22	1	0	0	0	0
Aug 22	2	0	0	0	0
Sep 22	1	0	0	0	0
Sep 22	2	0	0	0	0
Oct 22	1	0	0	0	0
Nov 22	1	0	0	0	0
Dec 22	1	0	0	0	0
Jan 23	1	0	0	0	0
Feb 23	1	0	0	0	0
Mar 23	1	0	0	0	0
Apr 23	1	7	0.02	6	0.01
May 23	1	0	0	0	0
Jun 23	1	0	0	0	0
Jul 23	1	0	0	0	0
Aug 23	1	0	0	0	0

Table 3-59. Red-throated diver estimated apportioned abundance and estimated density of birds sitting on the water in the Project WTG area and WTG area +4km buffer.

Month	Survey number	WTG area		WTG area +4km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	162	0.44	248	0.33
Apr 21	1	154	0.42	200	0.26
May 21	1	6	0.02	12	0.02
Jun 21	1	0	0	0	0
Jul 21	1	0	0	0	0
Aug 21	1	0	0	0	0
Sep 21	1	0	0	0	0
Oct 21	1	13	0.03	18	0.02
Nov 21	1	0	0	7	0.01
Dec 21	1	7	0.02	19	0.02
Jan 22	1	0	0	0	0
Feb 22	1	19	0.05	19	0.02
Mar 22	1	37	0.1	36	0.05
Mar 22	2	92	0.25	134	0.18
Apr 22	1	175	0.48	234	0.31
Apr 22	2	19	0.05	37	0.05

Month	Survey number	WTG area		WTG area +4km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
May 22	1	0	0	12	0.02
May 22	2	0	0	7	0.01
Jun 22	1	0	0	0	0
Jun 22	2	0	0	0	0
Jul 22	1	0	0	0	0
Jul 22	2	0	0	0	0
Aug 22	1	0	0	0	0
Aug 22	2	0	0	0	0
Sep 22	1	0	0	7	0.01
Sep 22	2	0	0	0	0
Oct 22	1	0	0	6	0.01
Nov 22	1	0	0	0	0
Dec 22	1	13	0.03	30	0.04
Jan 23	1	42	0.11	67	0.09
Feb 23	1	31	0.08	43	0.06
Mar 23	1	65	0.18	133	0.17
Apr 23	1	59	0.16	133	0.18
May 23	1	13	0.03	13	0.02
Jun 23	1	0	0	0	0
Jul 23	1	0	0	0	0
Aug 23	1	0	0	0	0

Table 3-60. Red-throated diver total estimated apportioned abundance and estimated density, in the Project WTG area and WTG area +4km buffer (Total of flying and sitting birds).

Month	Survey number	WTG area		WTG area +4km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	171	0.47	253	0.33
Apr 21	1	154	0.42	197	0.26
May 21	1	6	0.02	13	0.02
Jun 21	1	0	0	0	0
Jul 21	1	0	0	0	0
Aug 21	1	0	0	0	0
Sep 21	1	0	0	0	0
Oct 21	1	12	0.03	18	0.02
Nov 21	1	0	0	7	0.01
Dec 21	1	13	0.03	25	0.03
Jan 22	1	0	0	0	0

Month	Survey number	WTG area		WTG area +4km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Feb 22	1	19	0.05	19	0.02
Mar 22	1	37	0.1	36	0.05
Mar 22	2	91	0.25	133	0.18
Apr 22	1	180	0.49	256	0.34
Apr 22	2	19	0.05	37	0.05
May 22	1	0	0	18	0.02
May 22	2	0	0	6	0.01
Jun 22	1	0	0	0	0
Jun 22	2	0	0	0	0
Jul 22	1	0	0	0	0
Jul 22	2	0	0	0	0
Aug 22	1	0	0	0	0
Aug 22	2	0	0	0	0
Sep 22	1	0	0	6	0.01
Sep 22	2	0	0	0	0
Oct 22	1	0	0	7	0.01
Nov 22	1	0	0	0	0
Dec 22	1	12	0.03	30	0.04
Jan 23	1	43	0.12	73	0.1
Feb 23	1	31	0.08	43	0.06
Mar 23	1	66	0.18	134	0.18
Apr 23	1	67	0.18	139	0.18
May 23	1	13	0.03	13	0.02
Jun 23	1	0	0	0	0
Jul 23	1	0	0	0	0
Aug 23	1	0	0	0	0

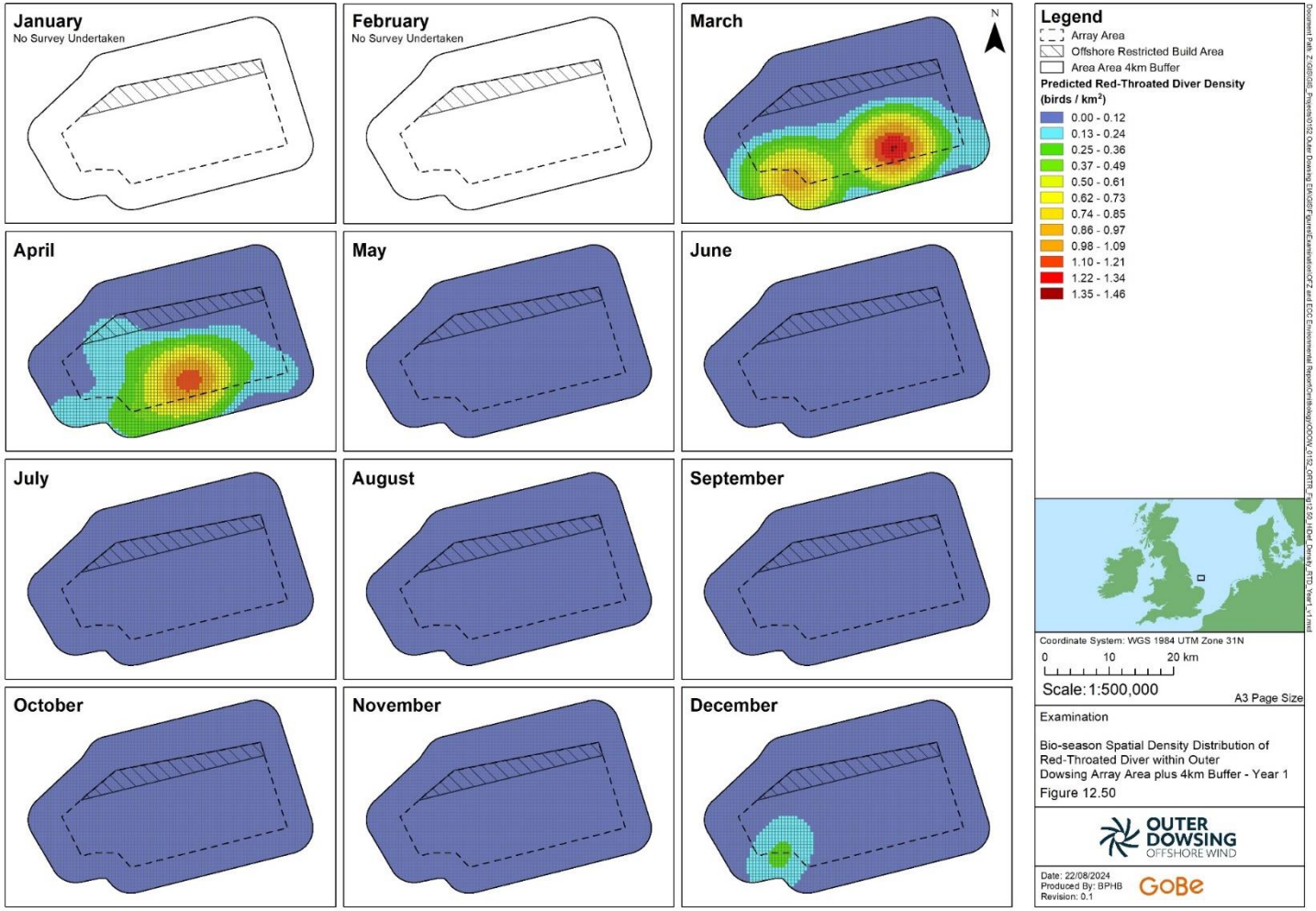

Figure 3.48. Bio-season spatial density distribution of red-throated diver within the Array Area +4km buffer – Year 1

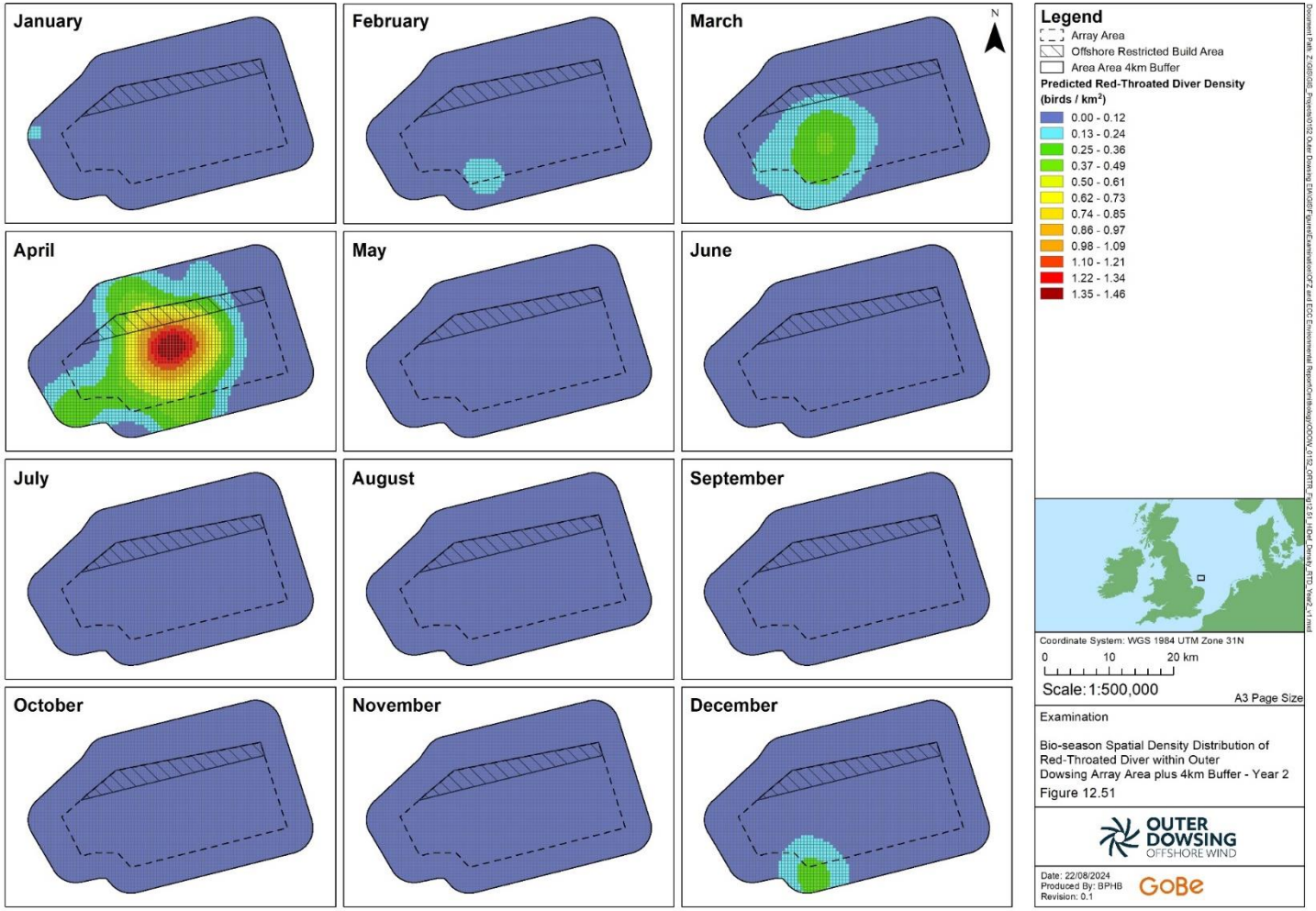

Figure 3.49. Bio-season spatial density distribution of red-throated diver within the Array Area +4km buffer – Year 2

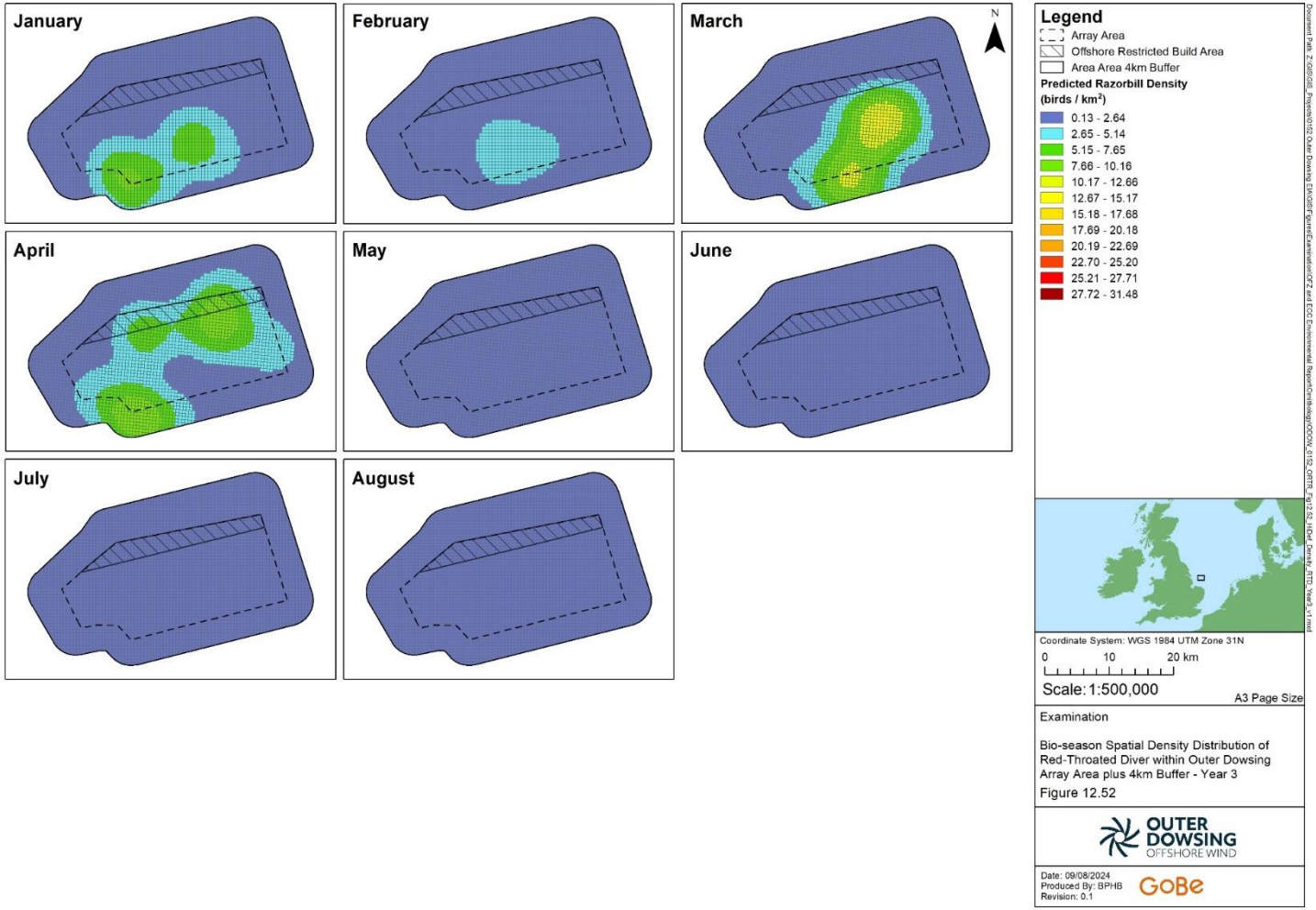

Figure 3.50. Bio-season spatial density distribution of red-throated diver within the Array Area +4km buffer – Year 3

175. Red-throated diver showed clear patterns of presence and abundance across both the WTG area and the WTG area +4km buffer. Abundance was highest in the spring (March and April) across both years, and it was largely absent during the breeding season (reflecting the distance to the species breeding range and it's relatively small foraging range). Much smaller peaks were estimated for the Autumn and Winter, possibly reflecting the presence of a small number of birds on post-breeding migration, and potentially very small numbers wintering in the area.

3.13.4 Flight direction

176. Figure 3.51 shows windrose diagrams presenting flight directions recorded for red-throated diver within the array area +4km buffer. These windrose diagrams were created from the array area +4km buffer; however, these data are still applicable to the WTG area +4km buffer, which is a subset of the larger array area +4km buffer This data is still relevant to the project, as it indicates the relative flight directions for relevant bird species within the WTG area and immediate vicinity.

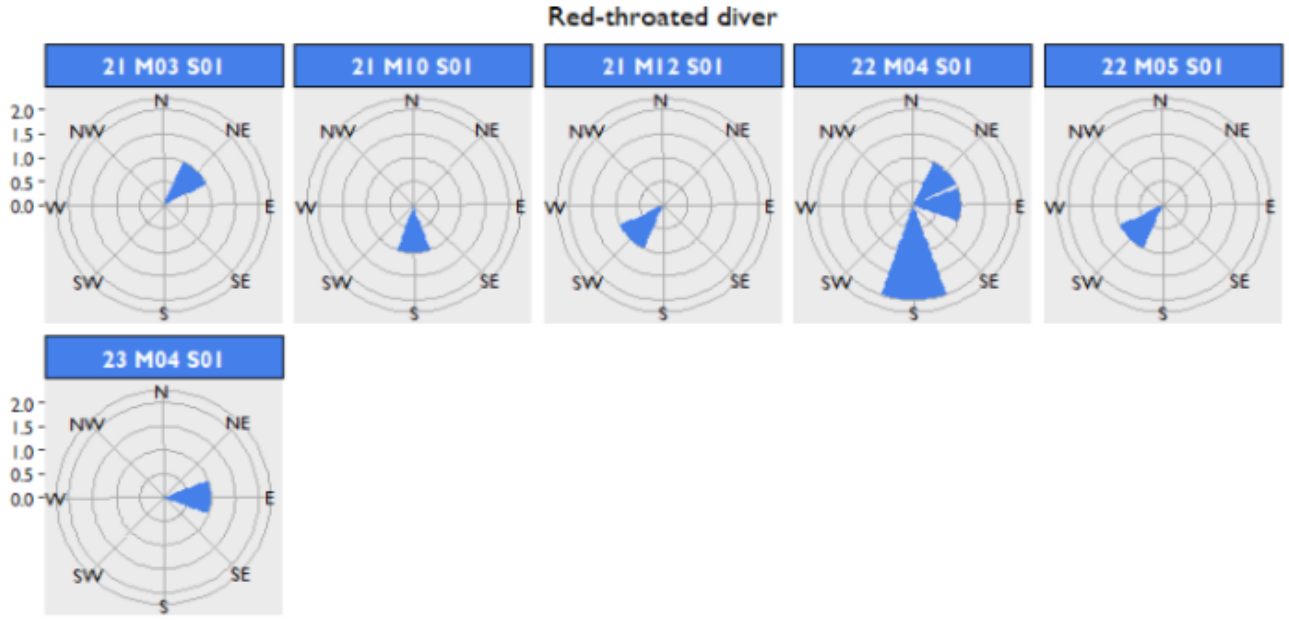

Figure 3.51. Windrose diagrams for months during which red-throated diver were recorded within the array area +4km buffer.

3.13.5 Birds aged from DAS data

177. Proportions of red-throated diver aged from DAS images are presented in Table 3-61. Adult proportions are derived from the proportion of birds identified as adults out of all the aged birds for that species. Unaged birds do not contribute to the age proportions.

Table 3-61. Proportions of red-throated diver aged from DAS images within the WTG area +2km buffer.

Survey date	Adult	Immature	Juvenile	Unknown	Adult%	Total	Number of aged birds
22/03/2021	0	0	0	37	0	37	0
04/04/2021	0	0	0	30	0	30	0
12/05/2021	0	0	0	1	0	1	0
09/06/2021	0	0	0	0	0	0	0
24/07/2021	0	0	0	0	0	0	0
14/08/2021	0	0	0	0	0	0	0
07/09/2021	0	0	0	0	0	0	0
09/10/2021	0	0	0	3	0	3	0
02/11/2021	0	0	0	1	0	1	0
15/12/2021	0	0	0	2	0	2	0
06/01/2022	0	0	0	0	0	0	0
23/02/2022	0	0	0	3	0	3	0
11/03/2022	0	0	0	6	0	6	0
22/03/2022	0	0	0	18	0	18	0
02/04/2022	0	0	0	35	0	35	0
15/04/2022	0	0	0	6	0	6	0
02/05/2022	0	0	0	1	0	1	0
17/05/2022	0	0	0	0	0	0	0
09/06/2022	0	0	0	0	0	0	0
21/06/2022	0	0	0	0	0	0	0
04/07/2022	0	0	0	0	0	0	0
16/07/2022	0	0	0	0	0	0	0
08/08/2022	0	0	0	0	0	0	0
23/08/2022	0	0	0	0	0	0	0
13/09/2022	0	0	0	0	0	0	0
25/09/2022	0	0	0	0	0	0	0

Survey date	Adult	Immature	Juvenile	Unknown	Adult%	Total	Number of aged birds
10/10/2022	0	0	0	1	0	1	0
07/11/2022	0	0	0	0	0	0	0
13/12/2022	0	0	0	3	0	3	0
26/01/2023	0	0	0	10	0	10	0
10/02/2023	0	0	0	6	0	6	0
24/03/2023	0	0	0	17	0	17	0
05/04/2023	0	0	0	20	0	20	0
03/05/2023	0	0	0	2	0	2	0
17/06/2023	0	0	0	0	0	0	0
05/07/2023	0	0	0	0	0	0	0
10/08/2023	0	0	0	0	0	0	0

3.14 Fulmar

3.14.1 Digital aerial survey data

178. Fulmar were recorded in the WTG area in 19 of the 30 months surveyed with a summed mean seasonal peak abundance of 96 birds (Table 3-62).

179. In the WTG area +2km buffer, the summed mean seasonal peak abundance was 107 birds (Table 3-62).

3.14.2 Fulmar overview

180. Fulmar has a large mean maximum foraging range plus one standard deviation (542.3km ±657.9km) (Woodward *et al.*, 2019). This means that many of the fulmar breeding colonies in Scotland are within the foraging range of the Project (Stroud *et al.*, 2016) although birds recorded during the breeding season are more likely to come from smaller, closer colonies, including FFC and North Norfolk Coast SPAs. Likewise, during the chick rearing period, birds are much more constrained by the need to return to the nest to feed young. As such, this large mean max foraging range should be considered as most applicable to the incubation period (April to June), with a much smaller foraging range being used when rearing chicks (July to August).

181. Outside the breeding season, impacts on fulmar have been assessed against the UK North Sea BDMPS. This numbers 957,499 individuals during autumn migration (September to October) and spring migration (December), and 568,733 individuals during winter (November) (Furness, 2015).

3.14.3 Abundance and Phenology

182. Mean seasonal peak abundances of fulmar in the species bio-seasons (as defined in Furness 2015) are presented in Table 3-62. Estimates of monthly abundance and density within the WTG area, and monthly abundance and density within the WTG area +4km buffer, are presented in Table 3-63, Table 3-64, and Table 3-65 for flying birds, birds sitting on the sea, and the total birds observed.

183. Fulmar were present in the Project WTG area across both bio-seasons. Abundance was highest during the breeding bio-season (January to August), with a mean seasonal peak abundance of 71 birds and a mean seasonal peak density of 0.19 birds/km^2 (Table 3-62).

Table 3-62. Fulmar bio-season mean seasonal peak apportioned abundance and density estimates in the Project WTG area +2km buffer.

BDMPS Bio-seasons	Months	Array area minus the ORBA		Array area minus the ORBA +2km buffer	
		Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)	Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)
Pre-breeding season	Dec	12 (0-33)	0.03 (0.00-0.09)	21 (0-48)	0.04 (0.00-0.09)
Breeding season	Jan – Aug	71 (14-153)	0.19 (0.04-0.42)	77 (20-156)	0.14 (0.03-0.28)
Post-breeding season	Sep-Oct	13 (0-30)	0.03 (0.00-0.08)	10 (0-27)	0.02 (0.00-0.05)
Non-breeding season	Nov	0 (0-0)	0.00 (0.00-0.00)	0 (0-0)	0.00 (0.00-0.00)
Summed mean seasonal peak		96 (14-216)	-	107 (20-230)	-

Table 3-63. Fulmar estimated apportioned abundance and estimated density of flying birds in the Project WTG area plus 2km buffer.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	0	0	0	0
Apr 21	1	25	0.07	24	0.04
May 21	1	0	0	0	0
Jun 21	1	0	0	6	0.01
Jul 21	1	31	0.08	30	0.05
Aug 21	1	0	0	0	0
Sep 21	1	0	0	0	0
Oct 21	1	0	0	0	0
Nov 21	1	0	0	0	0
Dec 21	1	7	0.02	7	0.01
Jan 22	1	13	0.03	12	0.02
Feb 22	1	6	0.02	6	0.01
Mar 22	1	0	0	0	0
Mar 22	2	0	0	0	0
Apr 22	1	49	0.13	54	0.1
Apr 22	2	13	0.03	18	0.03

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
May 22	1	13	0.03	18	0.03
May 22	2	0	0	0	0
Jun 22	1	6	0.02	6	0.01
Jun 22	2	24	0.07	25	0.04
Jul 22	1	0	0	0	0
Jul 22	2	0	0	0	0
Aug 22	1	0	0	6	0.01
Aug 22	2	0	0	0	0
Sep 22	1	0	0	0	0
Sep 22	2	0	0	0	0
Oct 22	1	0	0	7	0.01
Nov 22	1	0	0	0	0
Dec 22	1	0	0	0	0
Jan 23	1	55	0.15	61	0.11
Feb 23	1	0	0	13	0.02
Mar 23	1	0	0	0	0
Apr 23	1	0	0	0	0
May 23	1	7	0.02	18	0.03
Jun 23	1	13	0.03	19	0.03
Jul 23	1	0	0	0	0
Aug 23	1	24	0.07	37	0.07

Table 3-64. Fulmar estimated apportioned abundance and estimated density of birds sitting on the water, in the Project WTG area plus 2km buffer.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	0	0	17	0.03
Apr 21	1	12	0.03	13	0.02
May 21	1	0	0	0	0
Jun 21	1	13	0.03	18	0.03
Jul 21	1	37	0.1	37	0.07
Aug 21	1	7	0.02	19	0.03
Sep 21	1	12	0.03	12	0.02
Oct 21	1	0	0	0	0
Nov 21	1	0	0	0	0
Dec 21	1	6	0.02	18	0.03
Jan 22	1	7	0.02	7	0.01

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Feb 22	1	5	0.01	4	0.01
Mar 22	1	0	0	0	0
Mar 22	2	18	0.05	30	0.05
Apr 22	1	25	0.07	42	0.08
Apr 22	2	12	0.03	24	0.04
May 22	1	7	0.02	43	0.08
May 22	2	0	0	0	0
Jun 22	1	3	0.01	7	0.01
Jun 22	2	19	0.05	18	0.03
Jul 22	1	6	0.02	7	0.01
Jul 22	2	43	0.12	43	0.08
Aug 22	1	77	0.21	79	0.14
Aug 22	2	7	0.02	6	0.01
Sep 22	1	0	0	7	0.01
Sep 22	2	0	0	0	0
Oct 22	1	0	0	0	0
Nov 22	1	0	0	0	0
Dec 22	1	13	0.03	18	0.03
Jan 23	1	37	0.1	36	0.06
Feb 23	1	0	0	0	0
Mar 23	1	0	0	0	0
Apr 23	1	13	0.03	12	0.02
May 23	1	7	0.02	13	0.02
Jun 23	1	35	0.09	40	0.07
Jul 23	1	0	0	0	0
Aug 23	1	32	0.09	31	0.06

Table 3-65. Fulmar total estimated apportioned abundance and estimated density, in the Project WTG area plus 2km buffer (Total of flying and sitting birds).

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	0	0	16	0.03
Apr 21	1	37	0.1	36	0.06
May 21	1	0	0	0	0
Jun 21	1	12	0.03	24	0.04
Jul 21	1	67	0.18	67	0.12
Aug 21	1	7	0.02	19	0.03

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Sep 21	1	13	0.03	12	0.02
Oct 21	1	0	0	0	0
Nov 21	1	0	0	0	0
Dec 21	1	12	0.03	24	0.04
Jan 22	1	19	0.05	18	0.03
Feb 22	1	11	0.03	10	0.02
Mar 22	1	0	0	0	0
Mar 22	2	18	0.05	30	0.05
Apr 22	1	72	0.2	97	0.18
Apr 22	2	24	0.07	42	0.08
May 22	1	18	0.05	60	0.11
May 22	2	0	0	0	0
Jun 22	1	9	0.02	12	0.02
Jun 22	2	43	0.12	42	0.08
Jul 22	1	6	0.02	6	0.01
Jul 22	2	43	0.12	42	0.08
Aug 22	1	79	0.21	84	0.15
Aug 22	2	6	0.02	6	0.01
Sep 22	1	0	0	6	0.01
Sep 22	2	0	0	0	0
Oct 22	1	0	0	7	0.01
Nov 22	1	0	0	0	0
Dec 22	1	12	0.03	18	0.03
Jan 23	1	91	0.25	96	0.17
Feb 23	1	0	0	13	0.02
Mar 23	1	0	0	0	0
Apr 23	1	12	0.03	13	0.02
May 23	1	13	0.03	31	0.05
Jun 23	1	47	0.13	58	0.1
Jul 23	1	0	0	0	0
Aug 23	1	56	0.15	67	0.12

184. Fulmar showed similar patterns in presence and abundance across both the WTG area and the WTG area +2km buffer, but the patterns were not the same across both years of survey. In 2021, abundance peaked in June, but in 2022, abundance was highest in April, with a secondary peak in August. There is also a notable peak in abundance in January 2032. Numbers across the WTG area +2km buffer were generally low, with only all abundance estimates under 100 birds.

3.14.4 Flight direction

185. Figure 3.52 shows windrose diagrams presenting flight directions recorded for fulmar within the array area +4km buffer. These windrose diagrams were created from the array area +4km buffer; however, these data are still applicable to the WTG area +4km buffer, which is a subset of the larger array area +4km buffer This data is still relevant to the project, as it indicates the relative flight directions for relevant bird species within the WTG area and immediate vicinity.

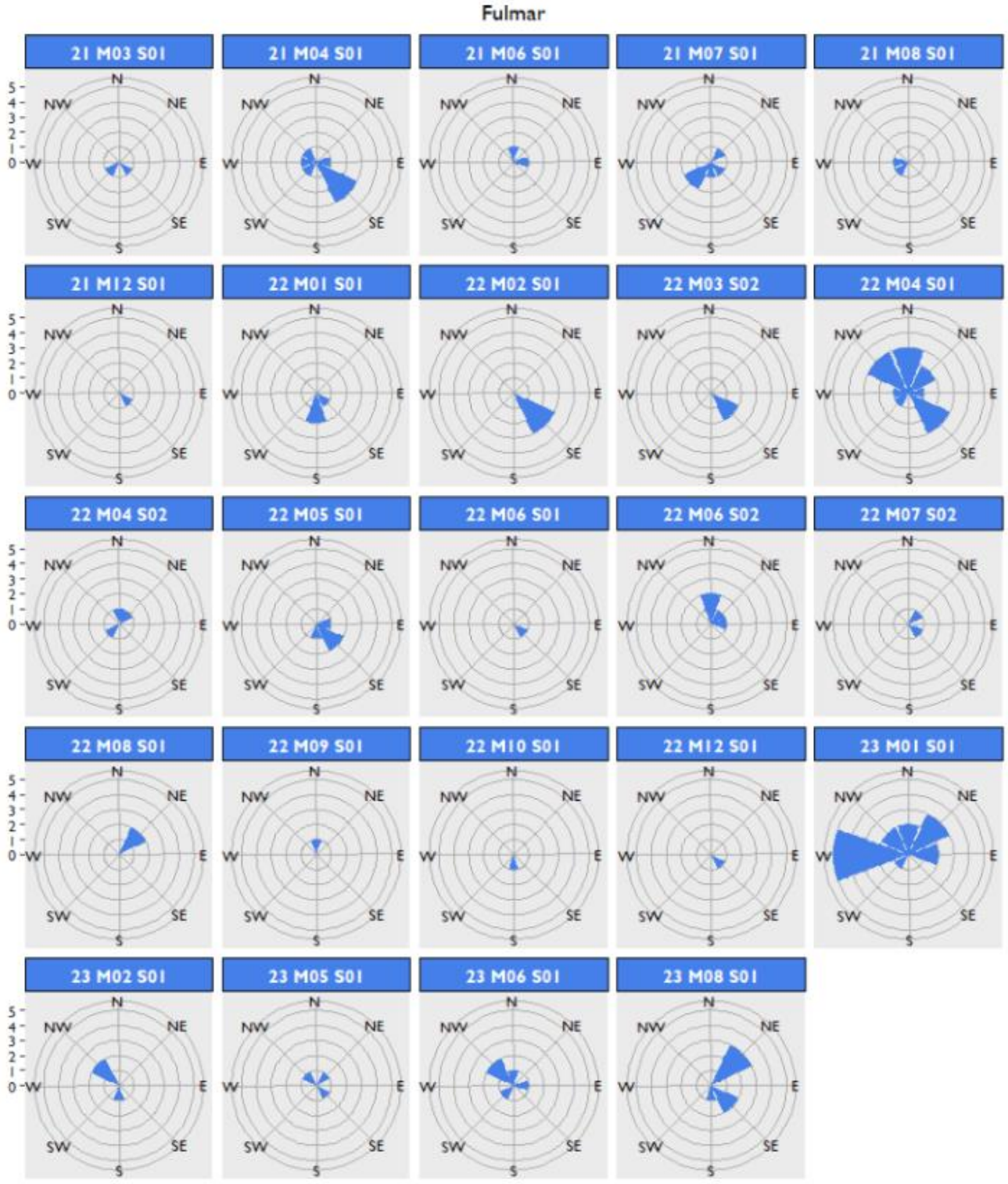

Figure 3.52. Windrose diagrams for months during which flying fulmar were recorded within the array area +4km buffer.

3.14.5 Birds aged from DAS data

186. Proportions of fulmar aged from DAS images are presented in Table 3-66. Adult proportions are derived from the proportion of birds identified as adults out of all the aged birds for that species. Unaged birds do not contribute to the age proportions.

Table 3-66. Proportions of fulmar aged from DAS images within the WTG area +2km buffer.

Survey date	Adult	Immature	Juvenile	Unknown	Adult%	Total	Number of aged birds
22/03/2021	0	0	0	0	0	0	0
04/04/2021	0	0	0	6	0	6	0
12/05/2021	0	0	0	0	0	0	0
09/06/2021	0	0	0	3	0	3	0
24/07/2021	0	0	0	11	0	11	0
14/08/2021	0	0	0	2	0	2	0
07/09/2021	0	0	0	2	0	2	0
09/10/2021	0	0	0	0	0	0	0
02/11/2021	0	0	0	0	0	0	0
15/12/2021	0	0	0	2	0	2	0
06/01/2022	0	0	0	3	0	3	0
23/02/2022	0	0	0	1	0	1	0
11/03/2022	0	0	0	0	0	0	0
22/03/2022	0	0	0	5	0	5	0
02/04/2022	0	0	0	15	0	15	0
15/04/2022	0	0	0	7	0	7	0
02/05/2022	0	0	0	9	0	9	0
17/05/2022	0	0	0	0	0	0	0
09/06/2022	0	0	0	1	0	1	0
21/06/2022	0	0	0	6	0	6	0
04/07/2022	0	0	0	1	0	1	0
16/07/2022	0	0	0	6	0	6	0
08/08/2022	0	0	0	13	0	13	0
23/08/2022	0	0	0	1	0	1	0
13/09/2022	0	0	0	1	0	1	0
25/09/2022	0	0	0	0	0	0	0

Survey date	Adult	Immature	Juvenile	Unknown	Adult%	Total	Number of aged birds
10/10/2022	0	0	0	0	0	0	0
07/11/2022	0	0	0	0	0	0	0
13/12/2022	0	0	0	2	0	2	0
26/01/2023	0	0	0	16	0	16	0
10/02/2023	0	0	0	2	0	2	0
24/03/2023	0	0	0	0	0	0	0
05/04/2023	0	0	0	1	0	1	0
03/05/2023	0	0	0	5	0	5	0
17/06/2023	0	0	0	9	0	9	0
05/07/2023	0	0	0	0	0	0	0
10/08/2023	0	0	0	11	0	11	0

3.15 Manx shearwater

3.15.1 Digital aerial survey data

187. Manx shearwater were recorded in the WTG area in 7 of the 30 months surveyed, with a summed mean seasonal peak abundance of 214 birds (Table 3-67).

188. In the WTG area +2km buffer, the summed mean seasonal peak abundance was 524 birds (Table 3-67).

3.15.2 Manx shearwater overview

189. Manx shearwater have a large mean maximum foraging range plus one standard deviation (1346.8km ±1018.7km) (Woodward *et al.*, 2019). This means that many of the Manx shearwater breeding colonies in Scotland are within the foraging range of the Project (Stroud *et al.*, 2016).

190. Outside the breeding season, impacts on Manx shearwater have been assessed against the UK North Sea BDMPS. This numbers 8,507 individuals during autumn migration (September to October) and spring migration (March) (Furness, 2015).

3.15.3 Abundance and Phenology

191. Mean seasonal peak abundances of Manx shearwater in the species bio-seasons (as defined in Furness 2015) are presented in Table 3-67. Estimates of monthly abundance and density within the WTG area, and monthly abundance and density within the WTG area +2km buffer are presented in Table 3-68, Table 3-69, and Table 3-70 for flying birds, birds sitting on the sea, and the total birds observed.

192. Manx shearwater were present in the Project WTG area across all three bio-seasons. Abundance was highest during the post-breeding bio-season (September to October), with a mean seasonal peak abundance of 178 birds and mean seasonal peak density of 0.49 birds/km^2 within the WTG area (Table 3-67).

Table 3-67. Manx shearwater bio-season mean seasonal peak apportioned abundance and density estimates in the Project WTG area and WTG area +2km buffer.

		Array area minus the ORBA		Array area minus the ORBA +2km buffer	
BDMPS Bio-seasons	Months	Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)	Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)
Breeding season	Apr-Aug	36 (1-95)	0.10 (0.00-0.26)	46 (4-111)	0.08 (0.01-0.20)
Post breeding migration	Sep-Oct	178 (0-536)	0.49 (0.00-1.47)	478 (30-1,109)	0.87 (0.05-2.02)
Return migration	Mar	0 (0-0)	0.00 (0.00-0.00)	0 (0-0)	0.00 (0.00-0.00)

BDMPS Bio-seasons	Months	Array area minus the ORBA		Array area minus the ORBA +2km buffer	
		Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)	Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)
Summed mean seasonal peak		214 (1-631)	-	524 (34-1,220)	-

Table 3-68. Manx shearwater estimated apportioned abundance and estimated density of flying birds in the Project WTG area and WTG area +2km buffer.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	0	0	0	0
Apr 21	1	0	0	0	0
May 21	1	0	0	0	0
Jun 21	1	0	0	0	0
Jul 21	1	0	0	0	0
Aug 21	1	0	0	0	0
Sep 21	1	0	0	0	0
Oct 21	1	0	0	0	0
Nov 21	1	0	0	0	0
Dec 21	1	0	0	0	0
Jan 22	1	0	0	0	0
Feb 22	1	0	0	0	0
Mar 22	1	0	0	0	0
Mar 22	2	0	0	0	0
Apr 22	1	0	0	7	0.01
Apr 22	2	0	0	0	0
May 22	1	0	0	0	0
May 22	2	0	0	0	0
Jun 22	1	0	0	0	0
Jun 22	2	7	0.02	6	0.01
Jul 22	1	0	0	0	0
Jul 22	2	0	0	0	0
Aug 22	1	18	0.05	18	0.03
Aug 22	2	0	0	0	0
Sep 22	1	19	0.05	32	0.06
Sep 22	2	0	0	0	0
Oct 22	1	0	0	0	0

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Nov 22	1	0	0	0	0
Dec 22	1	0	0	0	0
Jan 23	1	0	0	0	0
Feb 23	1	0	0	0	0
Mar 23	1	0	0	0	0
Apr 23	1	0	0	0	0
May 23	1	0	0	0	0
Jun 23	1	0	0	0	0
Jul 23	1	0	0	0	0
Aug 23	1	7	0.02	6	0.01

Table 3-69. Manx shearwater estimated apportioned abundance and estimated density of birds sitting on the water in the Project WTG area and WTG area +2km buffer.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	0	0	0	0
Apr 21	1	0	0	0	0
May 21	1	0	0	0	0
Jun 21	1	0	0	0	0
Jul 21	1	10	0.03	20	0.04
Aug 21	1	0	0	0	0
Sep 21	1	0	0	0	0
Oct 21	1	0	0	0	0
Nov 21	1	0	0	0	0
Dec 21	1	0	0	0	0
Jan 22	1	0	0	0	0
Feb 22	1	0	0	0	0
Mar 22	1	0	0	0	0
Mar 22	2	0	0	0	0
Apr 22	1	7	0.02	7	0.01
Apr 22	2	0	0	0	0
May 22	1	0	0	0	0
May 22	2	0	0	0	0
Jun 22	1	0	0	0	0
Jun 22	2	0	0	0	0
Jul 22	1	0	0	0	0
Jul 22	2	51	0.14	60	0.11

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Aug 22	1	37	0.1	73	0.13
Aug 22	2	41	0.11	50	0.09
Sep 22	1	167	0.46	467	0.85
Sep 22	2	0	0	0	0
Oct 22	1	0	0	0	0
Nov 22	1	0	0	0	0
Dec 22	1	0	0	0	0
Jan 23	1	0	0	0	0
Feb 23	1	0	0	0	0
Mar 23	1	0	0	0	0
Apr 23	1	0	0	0	0
May 23	1	0	0	0	0
Jun 23	1	25	0.07	25	0.05
Jul 23	1	0	0	0	0
Aug 23	1	0	0	0	0

Table 3-70. Manx shearwater total estimated apportioned abundance and estimated density, in the Project WTG area and WTG area +2km buffer (Total of flying and sitting birds).

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	0	0	0	0
Apr 21	1	0	0	0	0
May 21	1	0	0	0	0
Jun 21	1	0	0	0	0
Jul 21	1	10	0.03	20	0.04
Aug 21	1	0	0	0	0
Sep 21	1	0	0	0	0
Oct 21	1	0	0	0	0
Nov 21	1	0	0	0	0
Dec 21	1	0	0	0	0
Jan 22	1	0	0	0	0
Feb 22	1	0	0	0	0
Mar 22	1	0	0	0	0
Mar 22	2	0	0	0	0
Apr 22	1	7	0.02	12	0.02
Apr 22	2	0	0	0	0
May 22	1	0	0	0	0

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
May 22	2	0	0	0	0
Jun 22	1	0	0	0	0
Jun 22	2	6	0.02	6	0.01
Jul 22	1	0	0	0	0
Jul 22	2	56	0.15	66	0.12
Aug 22	1	103	0.28	140	0.25
Aug 22	2	43	0.12	49	0.09
Sep 22	1	178	0.49	478	0.87
Sep 22	2	0	0	0	0
Oct 22	1	0	0	0	0
Nov 22	1	0	0	0	0
Dec 22	1	0	0	0	0
Jan 23	1	0	0	0	0
Feb 23	1	0	0	0	0
Mar 23	1	0	0	0	0
Apr 23	1	0	0	0	0
May 23	1	0	0	0	0
Jun 23	1	24	0.06	24	0.04
Jul 23	1	0	0	0	0
Aug 23	1	6	0.02	6	0.01

193. Manx shearwater were generally absent from the WTG area and WTG area +2km buffer apart from in three periods. There is a small peak in July 2021, another very small peak in April 2022, and a much higher peak in the late Summer and Autumn of 2022 (spanning July to September of that year).

3.15.4 Flight direction

194. Figure 3.53 shows windrose diagrams presenting flight directions recorded for Manx shearwater within the array area +4km buffer. These windrose diagrams were created from the array area +4km buffer; however, these data are still applicable to the WTG area +4km buffer, which is a subset of the larger array area +4km buffer This data is still relevant to the project, as it indicates the relative flight directions for relevant bird species within the WTG area and immediate vicinity.

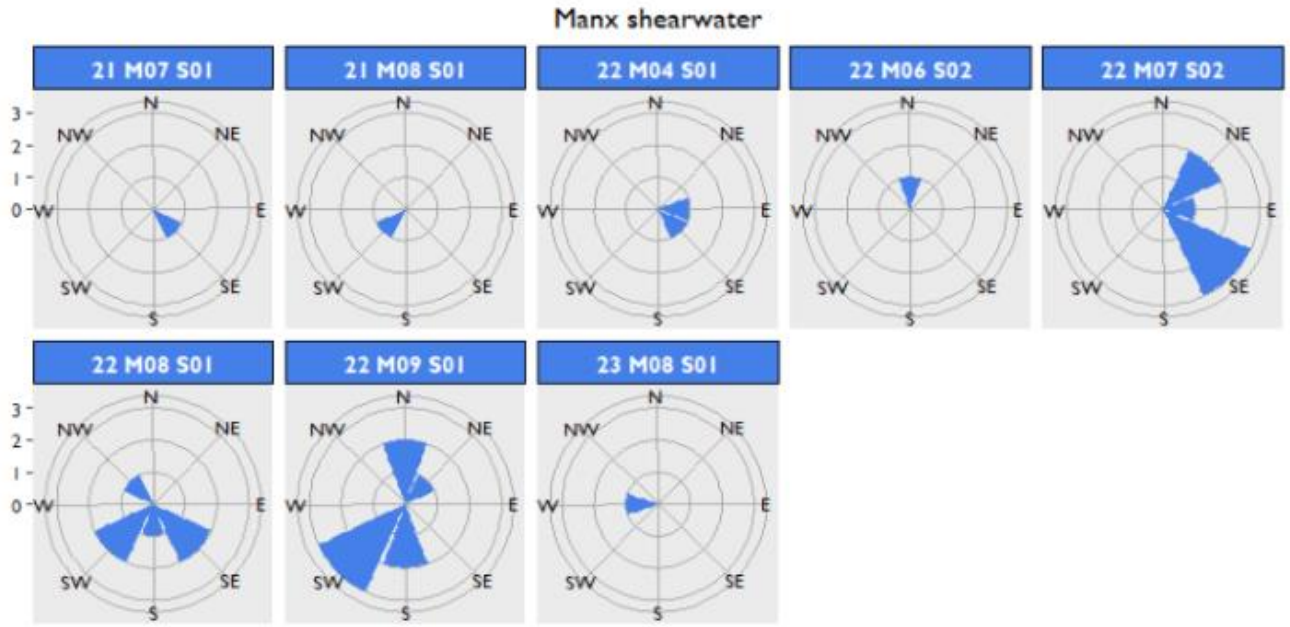

Figure 3.53. Windrose diagrams for months during which flying Manx shearwater were recorded within the array area +4km.

3.15.5 Birds aged from DAS data

195. Proportions of Manx shearwater aged from DAS images are presented in Table 3-71. Adult proportions are derived from the proportion of birds identified as adults out of all the aged birds for that species. Unaged birds do not contribute to the age proportions.

Table 3-71. Proportions of Manx shearwater aged from DAS images within the WTG area +2km buffer.

Survey date	Adult	Immature	Juvenile	Unknown	Adult%	Total	Number of aged birds
22/03/2021	0	0	0	0	0	0	0
04/04/2021	0	0	0	0	0	0	0
12/05/2021	0	0	0	0	0	0	0
09/06/2021	0	0	0	0	0	0	0
24/07/2021	0	0	0	0	0	0	0
14/08/2021	0	0	0	0	0	0	0
07/09/2021	0	0	0	0	0	0	0
09/10/2021	0	0	0	0	0	0	0
02/11/2021	0	0	0	0	0	0	0
15/12/2021	0	0	0	0	0	0	0
06/01/2022	0	0	0	0	0	0	0
23/02/2022	0	0	0	0	0	0	0
11/03/2022	0	0	0	0	0	0	0
22/03/2022	0	0	0	0	0	0	0
02/04/2022	0	0	0	2	0	2	0
15/04/2022	0	0	0	0	0	0	0
02/05/2022	0	0	0	0	0	0	0
17/05/2022	0	0	0	0	0	0	0
09/06/2022	0	0	0	0	0	0	0
21/06/2022	0	0	0	1	0	1	0
04/07/2022	0	0	0	0	0	0	0
16/07/2022	0	0	0	7	0	7	0
08/08/2022	0	0	0	22	0	22	0
23/08/2022	0	0	0	8	0	8	0
13/09/2022	0	0	0	69	0	69	0
25/09/2022	0	0	0	0	0	0	0

Survey date	Adult	Immature	Juvenile	Unknown	Adult%	Total	Number of aged birds
10/10/2022	0	0	0	0	0	0	0
07/11/2022	0	0	0	0	0	0	0
13/12/2022	0	0	0	0	0	0	0
26/01/2023	0	0	0	0	0	0	0
10/02/2023	0	0	0	0	0	0	0
24/03/2023	0	0	0	0	0	0	0
05/04/2023	0	0	0	0	0	0	0
03/05/2023	0	0	0	0	0	0	0
17/06/2023	0	0	0	4	0	4	0
05/07/2023	0	0	0	0	0	0	0
10/08/2023	0	0	0	1	0	1	0

3.16 Gannet

3.16.1 Digital aerial survey data

196. Gannet were recorded in the WTG area in 27 of the 30 months surveyed, with a summed mean seasonal peak abundance of 840 birds (Table 3-72).

197. In the WTG area +2km buffer, the summed mean seasonal peak abundance was 1,119 birds (Table 3-72).

3.16.2 Gannet overview

198. The nearest breeding gannet to the Project are at the FFC SPA. This is approximately 95km northwest of the Project array area and within the mean maximum foraging range of gannets (315.2km, standard deviation 194.2km) (Woodward *et al.*, 2019). The most recent population found at FFC SPA is 13,125 pairs in 2022 (BTO., 2023).

199. Migration season impacts on gannet have been assessed relative to the UK North Sea and Channel BDMPS. This consists of 456,299 individuals during autumn migration (October to November), and 248,385 individuals during spring migration (December to February) (Furness, 2015).

3.16.3 Abundance and Phenology

200. Mean seasonal peak abundances of gannet in the species bio-seasons (as defined in Furness 2015) are presented in Table 3-72. Estimates of monthly abundance and density within the WTG area, and monthly abundance and density within the WTG area +2km buffer are presented in Table 3-73, Table 3-74, and Table 3-75 for flying birds, birds sitting on the sea, and the total birds observed. The spatial density distribution of gannet within the Outer Dowsing Array Area +4km buffer is shown for three years of surveys in Figure 3.55, Figure 3.56, and Figure 3.57.

201. Gannet were present in the Project WTG area across all three bio-seasons. Abundance was greatest during the breeding bio-season (March to August), with a mean seasonal peak abundance of 447 birds and a mean seasonal peak density of 1.23 birds/km^2 (Table 3-72).

202. In the WTG area +2km buffer, gannet numbers were highest during the breeding bio-season, with a mean seasonal peak abundance of 554 birds and a mean seasonal peak density of 1.01 birds/km^2 (Table 3-72).

Table 3-72. Gannet bio-season mean seasonal peak apportioned abundance and density estimates in the Outer Dowsing WTG area +2km buffer

BDMPS Bio-seasons	Months	Array area minus the ORBA		Array area minus the ORBA +2km buffer	
		Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)	Mean seasonal peak abundance (n)	Mean seasonal peak density (n/km^2)
Return migration	Dec-Feb	46 (24-73)	0.13 (0.07-0.20)	69 (41-103)	0.13 (0.07-0.19)
Breeding	Mar-Sep	447 (246-686)	1.23 (0.68-1.88)	554 (316-829)	1.01 (0.58-1.51)
Post-breeding migration	Oct-Nov	348 (182-536)	0.96 (0.50-1.47)	496 (280-767)	0.90 (0.51-1.40)
Summed mean seasonal peak		840 (451-1,294)	-	1,119 (637-1,699)	-

Table 3-73. Gannet estimated apportioned abundance and estimated density of flying birds in the Project WTG area and WTG area +2km buffer.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	68	0.19	78	0.14
Apr 21	1	212	0.58	263	0.48
May 21	1	36	0.1	36	0.07
Jun 21	1	30	0.08	43	0.08
Jul 21	1	37	0.1	92	0.17
Aug 21	1	49	0.13	72	0.13
Sep 21	1	12	0.03	37	0.07
Oct 21	1	37	0.1	49	0.09
Nov 21	1	31	0.08	54	0.1
Dec 21	1	0	0	0	0
Jan 22	1	7	0.02	7	0.01
Feb 22	1	6	0.02	18	0.03
Mar 22	1	56	0.15	72	0.13
Mar 22	2	25	0.07	37	0.07
Apr 22	1	86	0.23	107	0.19
Apr 22	2	209	0.57	294	0.54
May 22	1	242	0.66	362	0.66
May 22	2	30	0.08	37	0.07

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Jun 22	1	37	0.1	36	0.07
Jun 22	2	43	0.12	48	0.09
Jul 22	1	48	0.13	152	0.28
Jul 22	2	102	0.28	169	0.31
Aug 22	1	61	0.17	79	0.14
Aug 22	2	18	0.05	18	0.03
Sep 22	1	18	0.05	31	0.06
Sep 22	2	53	0.14	73	0.13
Oct 22	1	90	0.25	138	0.25
Nov 22	1	268	0.73	373	0.68
Dec 22	1	0	0	0	0
Jan 23	1	18	0.05	24	0.04
Feb 23	1	61	0.17	96	0.17
Mar 23	1	48	0.13	127	0.23
Apr 23	1	49	0.13	79	0.14
May 23	1	0	0	6	0.01
Jun 23	1	74	0.2	85	0.15
Jul 23	1	0	0	19	0.03
Aug 23	1	62	0.17	121	0.22

Table 3-74. Gannet estimated apportioned abundance and estimated density of birds sitting on the water in the Project WTG area and WTG area +2km buffer.

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	80	0.22	90	0.16
Apr 21	1	152	0.42	207	0.38
May 21	1	6	0.02	12	0.02
Jun 21	1	13	0.03	12	0.02
Jul 21	1	37	0.1	37	0.07
Aug 21	1	30	0.08	37	0.07
Sep 21	1	31	0.08	55	0.1
Oct 21	1	61	0.17	73	0.13
Nov 21	1	24	0.07	102	0.19
Dec 21	1	0	0	0	0
Jan 22	1	0	0	0	0
Feb 22	1	7	0.02	7	0.01
Mar 22	1	61	0.16	84	0.15

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 22	2	25	0.07	36	0.06
Apr 22	1	103	0.28	119	0.22
Apr 22	2	794	2.18	936	1.71
May 22	1	338	0.93	502	0.91
May 22	2	25	0.07	60	0.11
Jun 22	1	66	0.18	89	0.16
Jun 22	2	333	0.91	351	0.64
Jul 22	1	49	0.13	84	0.15
Jul 22	2	116	0.32	175	0.32
Aug 22	1	72	0.2	93	0.17
Aug 22	2	18	0.05	31	0.06
Sep 22	1	50	0.13	108	0.2
Sep 22	2	6	0.02	13	0.02
Oct 22	1	19	0.05	18	0.03
Nov 22	1	336	0.92	445	0.81
Dec 22	1	0	0	0	0
Jan 23	1	0	0	0	0
Feb 23	1	19	0.05	18	0.03
Mar 23	1	231	0.63	278	0.51
Apr 23	1	304	0.83	367	0.67
May 23	1	0	0	7	0.01
Jun 23	1	200	0.55	266	0.48
Jul 23	1	7	0.02	7	0.01
Aug 23	1	103	0.28	128	0.23

Table 3-75. Gannet total estimated apportioned abundance and estimated density in the Project WTG area and WTG area +2km buffer (Total of flying and sitting birds).

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Mar 21	1	160	0.44	180	0.33
Apr 21	1	375	1.03	479	0.87
May 21	1	43	0.12	48	0.09
Jun 21	1	43	0.12	54	0.1
Jul 21	1	72	0.2	133	0.24
Aug 21	1	79	0.21	109	0.2
Sep 21	1	42	0.11	90	0.16
Oct 21	1	98	0.27	120	0.22

Month	Survey number	WTG area		WTG area +2km buffer	
		Population estimate (n)	Density estimate (n/km^2)	Population estimate (n)	Density estimate (n/km^2)
Nov 21	1	54	0.15	166	0.3
Dec 21	1	0	0	0	0
Jan 22	1	6	0.02	6	0.01
Feb 22	1	12	0.03	25	0.04
Mar 22	1	116	0.32	157	0.28
Mar 22	2	49	0.13	74	0.13
Apr 22	1	185	0.51	229	0.42
Apr 22	2	1026	2.81	1240	2.26
May 22	1	580	1.59	867	1.58
May 22	2	56	0.15	98	0.18
Jun 22	1	103	0.28	125	0.23
Jun 22	2	363	1	407	0.74
Jul 22	1	95	0.26	241	0.44
Jul 22	2	217	0.6	342	0.62
Aug 22	1	137	0.37	179	0.33
Aug 22	2	36	0.1	48	0.09
Sep 22	1	67	0.18	140	0.26
Sep 22	2	65	0.18	90	0.16
Oct 22	1	109	0.3	157	0.28
Nov 22	1	598	1.64	825	1.5
Dec 22	1	0	0	0	0
Jan 23	1	19	0.05	25	0.04
Feb 23	1	79	0.22	113	0.21
Mar 23	1	286	0.78	408	0.74
Apr 23	1	360	0.99	449	0.82
May 23	1	0	0	13	0.02
Jun 23	1	275	0.75	355	0.65
Jul 23	1	6	0.02	25	0.04
Aug 23	1	164	0.45	247	0.45

203. Gannet showed similar patterns in abundance between the WTG area and the WTG area +2km buffer over the 24 month survey period. Both years showed a peak in the early spring (April in both years), but after this the patterns of abundance were not the same across the years surveyed. In 2021, gannet was only present in very low numbers after the initial April peak, but in 2022, post April numbers declined more gradually, meaning the species was much more abundant in the breeding season of 2022. 2022 also showed a very high peak in numbers in November (this was the month with the highest estimated abundance for the WTG area +2km buffer. In 2021, estimated abundance in November was very low, as can be seen in Figure 3.54.

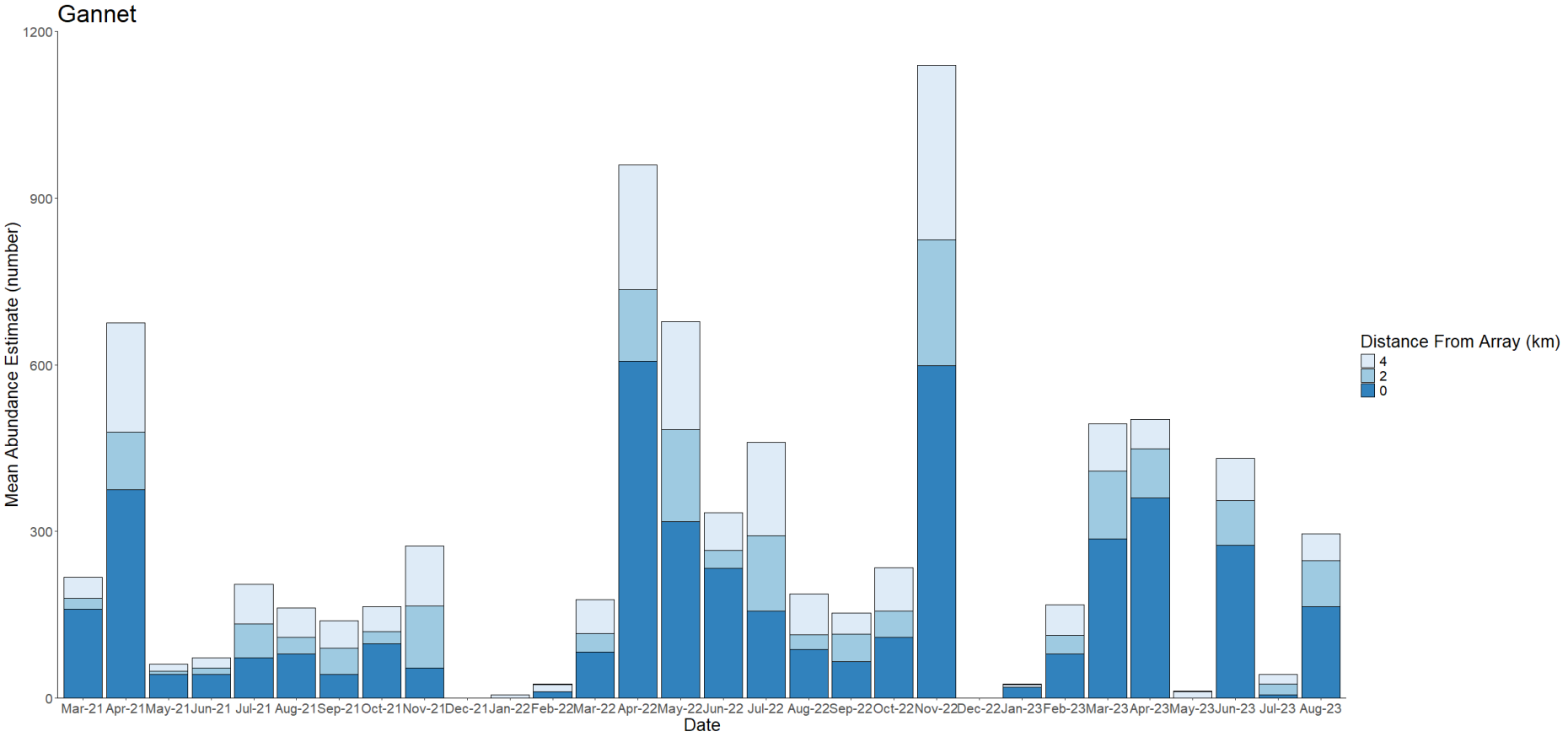

Figure 3.54. Monthly abundance of gannet in the WTG area, WTG area +2km buffer and WTG area +4km buffer.

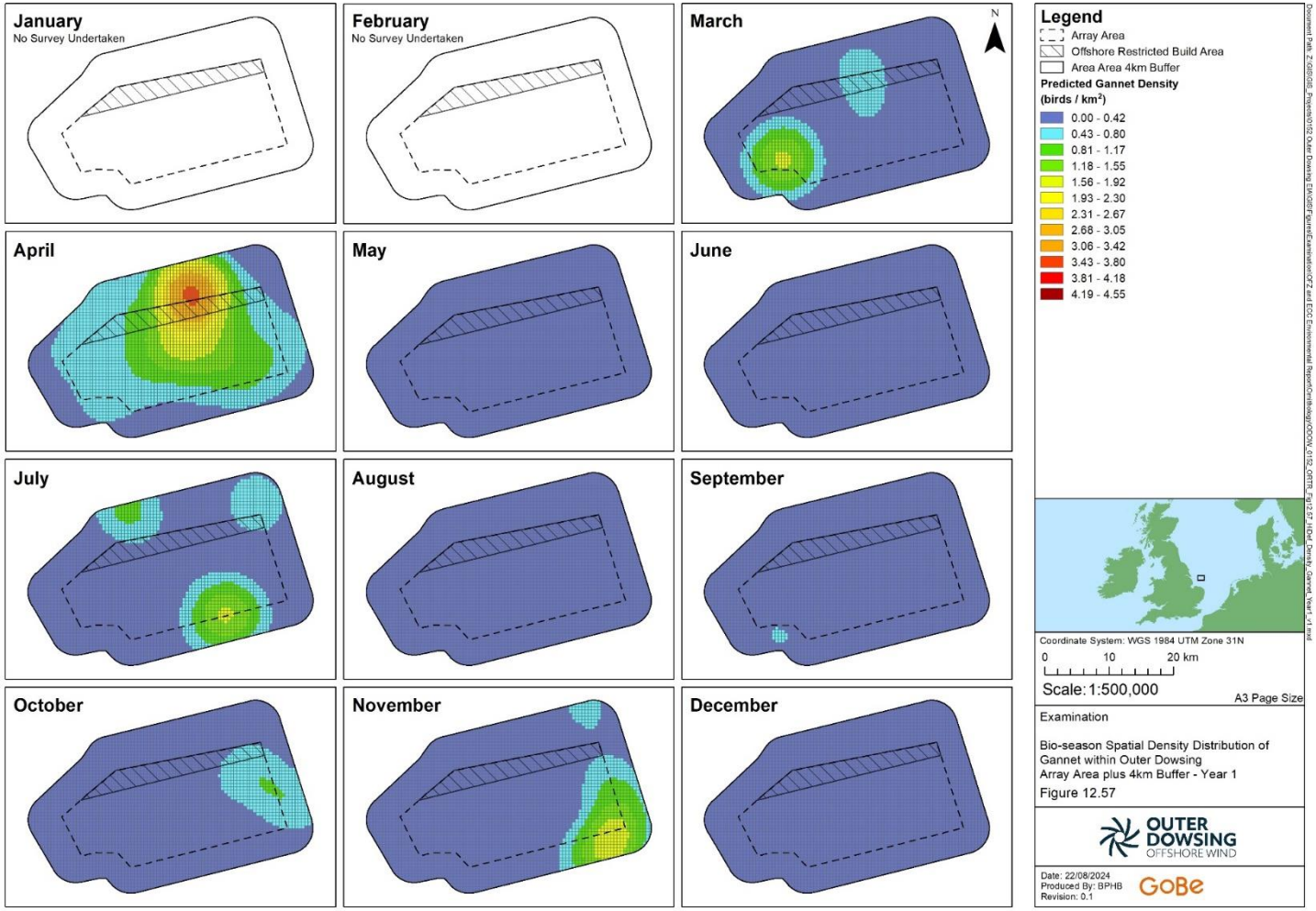

Figure 3.55. Bio-season spatial density distribution of gannet within the Array Area +4km buffer – Year 1

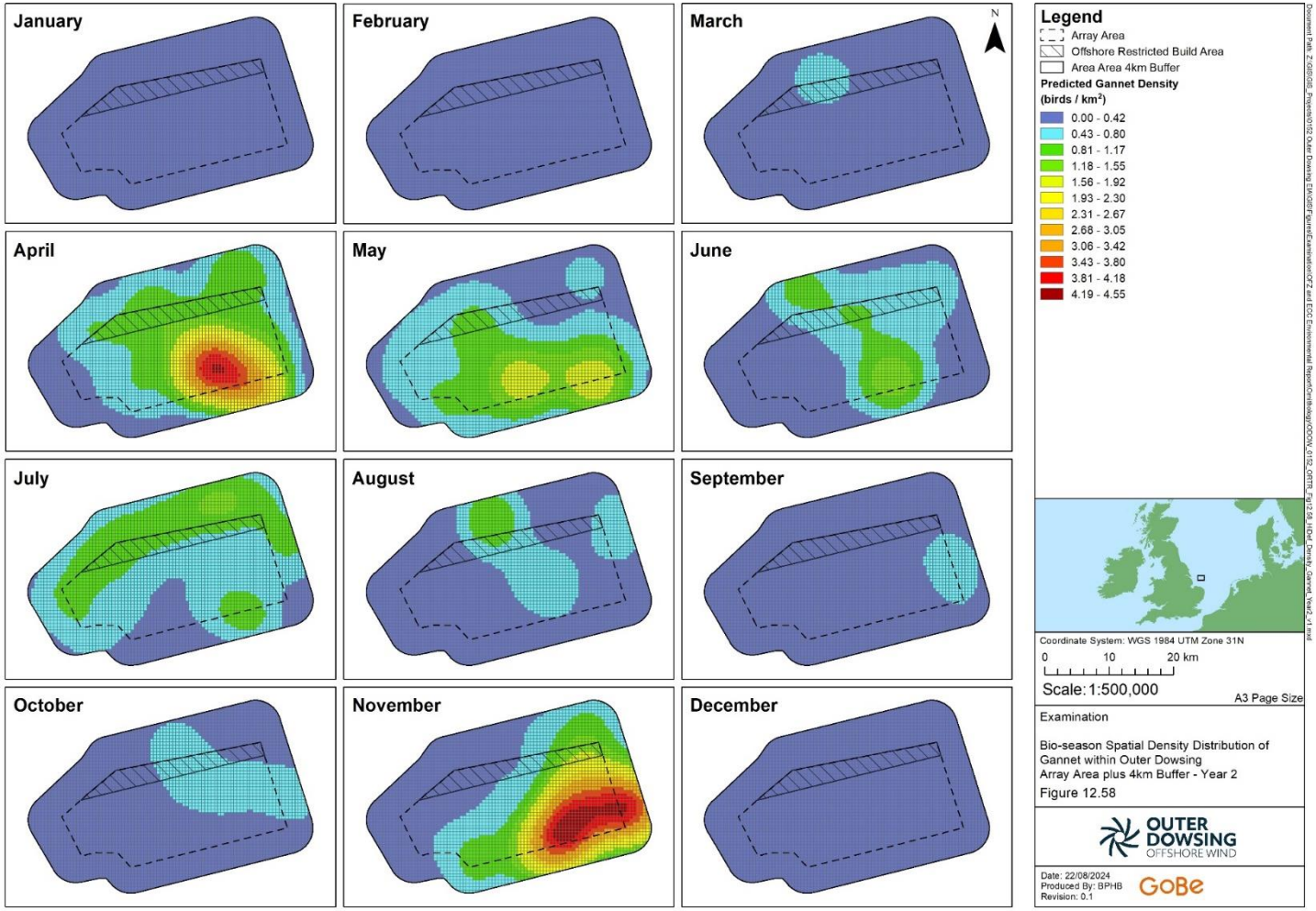

Figure 3.56. Bio-season spatial density distribution of gannet within the Array Area +4km buffer – Year 2

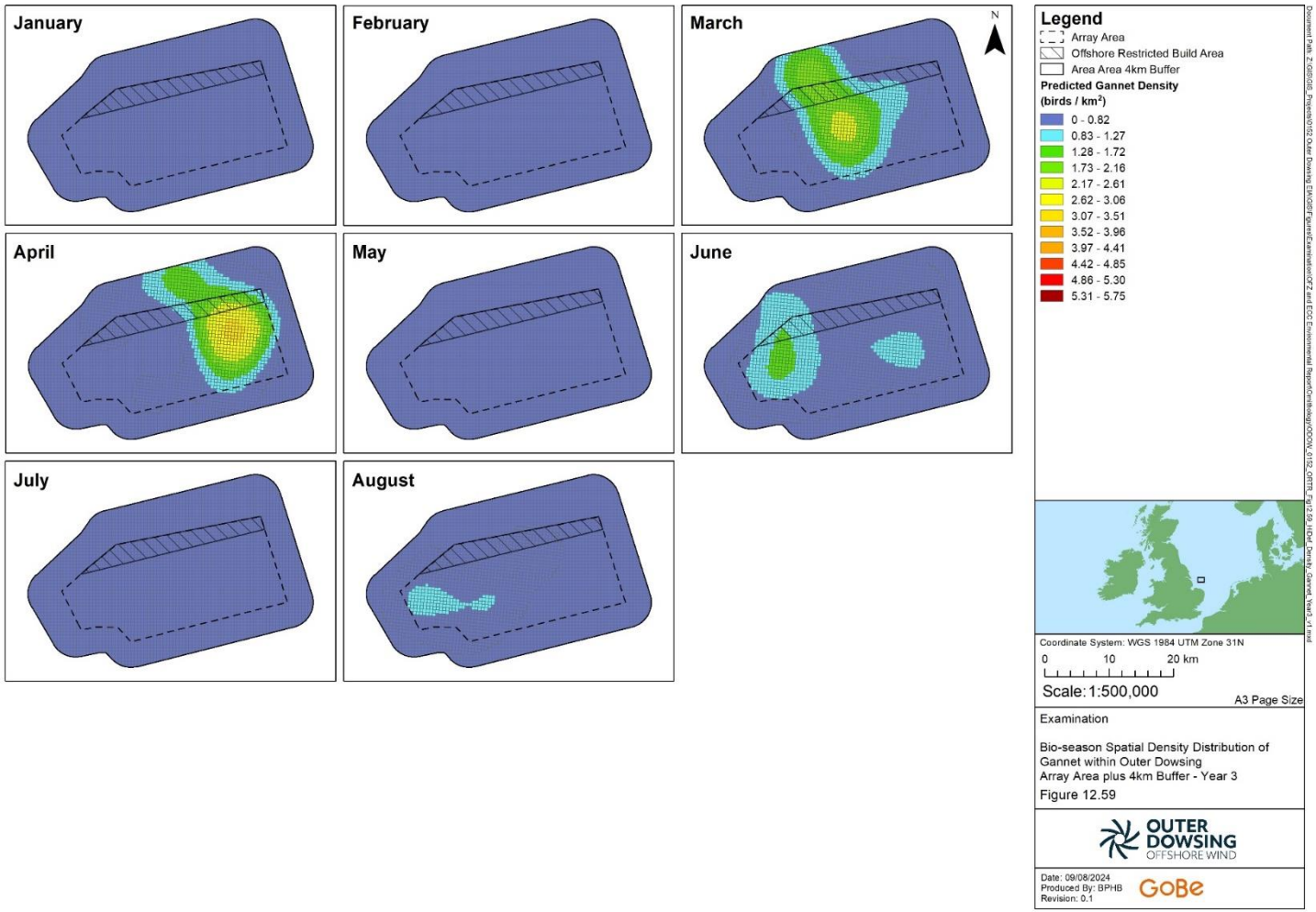

Figure 3.57. Bio-season spatial density distribution of gannet within the Array Area +4km buffer – Year 3

3.16.4 Flight direction

204. Figure 3.58 shows windrose diagrams presenting flight directions recorded for gannet within the array area +4km buffer. These windrose diagrams were created from the array area +4km buffer; however, these data are still applicable to the WTG area +4km buffer, which is a subset of the larger array area +4km buffer This data is still relevant to the project, as it indicates the relative flight directions for relevant bird species within the WTG area and immediate vicinity.

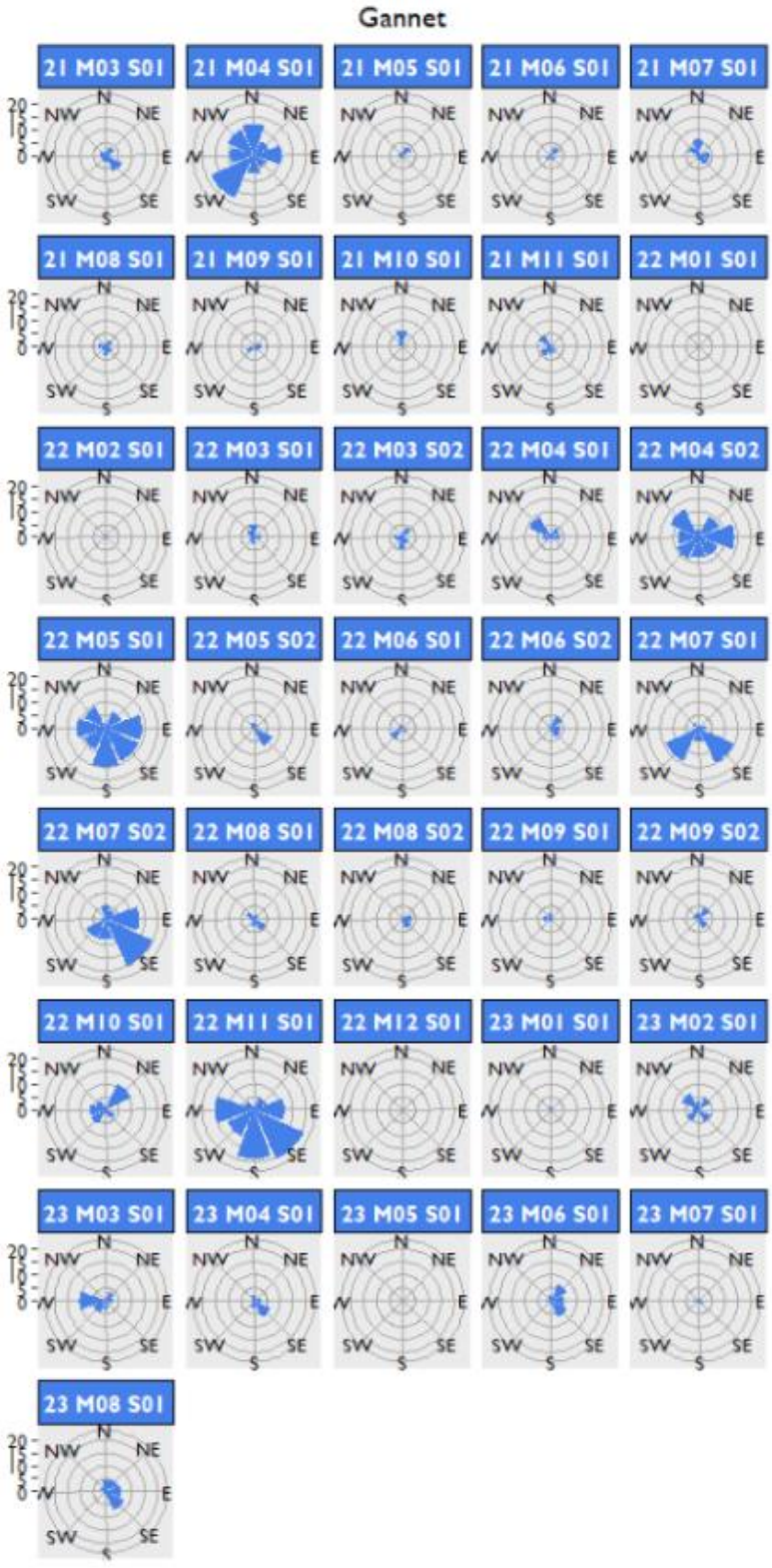

Figure 3.58. Windrose diagrams for months during which flying gannet were recorded within the array area +4km buffer.

3.16.5 Birds aged from DAS data

205. Proportions of gannet aged from DAS images are presented in Table 3-76. Adult proportions are derived from the proportion of birds identified as adults out of all the aged birds for that species. Unaged birds do not contribute to the age proportions. Site-specific adult proportions based on the number of birds aged through the DAS images have been used for gannet throughout the assessment. The proportion of adults from each survey that fell within the gannet breeding season were averaged to produce the site-specific adult proportion (0.90).

Table 3-76. Proportions of gannet aged from DAS images within the WTG area +2km buffer.

Survey date	Adult	Immature	Juvenile	Unknown	Adult%	Total	Number of aged birds
22/03/2021	15	0	0	15	100	30	15
04/04/2021	47	1	0	34	98	82	48
12/05/2021	6	0	0	2	100	8	6
09/06/2021	4	3	0	2	57	9	7
24/07/2021	6	10	0	7	38	23	16
14/08/2021	15	1	0	3	94	19	16
07/09/2021	6	2	1	6	67	15	9
09/10/2021	6	2	0	12	75	20	8
02/11/2021	10	0	0	18	100	28	10
15/12/2021	0	0	0	0	0	0	0
06/01/2022	1	0	0	0	100	1	1
23/02/2022	4	0	0	0	100	4	4
11/03/2022	18	0	0	8	100	26	18
22/03/2022	6	0	0	6	100	12	6
02/04/2022	18	0	0	21	100	39	18
15/04/2022	73	0	0	130	100	203	73
02/05/2022	61	1	0	83	98	145	62
17/05/2022	9	1	0	5	90	15	10
09/06/2022	11	1	0	11	92	23	12
21/06/2022	28	1	0	39	97	68	29
04/07/2022	26	1	0	10	96	37	27
16/07/2022	28	7	0	23	80	58	35
08/08/2022	11	0	0	18	100	29	11
23/08/2022	2	1	0	5	67	8	3
13/09/2022	4	0	0	18	100	22	4
25/09/2022	7	4	1	4	58	16	12

Survey date	Adult	Immature	Juvenile	Unknown	Adult%	Total	Number of aged birds
10/10/2022	20	0	1	3	95	24	21
07/11/2022	77	0	1	60	99	138	78
13/12/2022	0	0	0	0	0	0	0
26/01/2023	3	1	0	0	75	4	4
10/02/2023	18	0	0	2	100	20	18
24/03/2023	21	0	0	47	100	68	21
05/04/2023	38	1	0	36	97	75	39
03/05/2023	2	0	0	0	100	2	2
17/06/2023	7	7	0	46	50	60	14
05/07/2023	3	1	0	0	75	4	4
10/08/2023	30	7	1	1	79	39	38

3.17 Less abundant bird species

206. Less abundance species recorded across surveys are outlined below, with abundance and density estimates presented in Appendix A.

207. Oystercatcher were recorded in the WTG area in a single survey in August 2021 with an abundance estimate of 36 individuals and a density estimate of 0.1 individuals per km^2. Oystercatcher were recorded in the WTG area +2km buffer in August 2021 with an abundance estimate of 49 individuals and a density estimate of 0.09 individuals per km^2.

208. Curlew were recorded in the WTG area in four surveys, corresponding to a peak abundance estimate of 12 individuals and a density estimate of 0.01 individuals per km^2 in August 2022. Curlew were recorded in the WTG area +2km buffer in five surveys, corresponding to a peak abundance estimate of 13 individuals and a density estimate of 0.02 individuals per km^2 in August 2022.

209. Black-headed gull were recorded in the WTG area in six surveys, corresponding to a peak abundance estimate of 26 individuals and a density estimate of 0.07 individuals per km^2 in October 2022. Black-headed gull were recorded in the WTG area +2km buffer in seven surveys, corresponding to a peak abundance estimate of 39 individuals and a density estimate of 0.07 individuals per km^2 in October 2022.

210. Arctic tern were recorded in the WTG area in eight surveys, corresponding to a peak abundance estimate of 49 individuals and a density estimate of 0.13 individuals per km^2 in May 2022. Arctic tern were recorded in the WTG area +2km buffer in nine surveys, corresponding to a peak abundance estimate of 49 individuals and a density estimate of 0.01 individuals per km^2 in May 2022.

211. Great skua were recorded in the WTG area in one survey, corresponding to a peak abundance estimate of 7 individuals and a density estimate of 0.02 individuals per km^2 in August 2023. Great skua were recorded in the WTG area +2km buffer in three surveys, corresponding to a peak abundance estimate of 7 individuals and a density estimate of 0.01 individuals per km^2 in all three months (August 2021, September 2022, August 2023).

212. Arctic skua were recorded in the WTG area in two surveys, corresponding to a peak abundance estimate of 12 individuals and a density estimate of 0.03 individuals per km^2 in September 2021. Arctic skua were recorded in the WTG area +2km buffer in two surveys, corresponding to a peak abundance estimate of 13 individuals and a density estimate of 0.02 individuals per km^2 in September 2021.

213. Shag were recorded in the WTG area in two surveys, corresponding to a peak abundance estimate of 7 individuals and a density estimate of 0.02 individuals per km^2 in December 2021. Shag were recorded in the WTG area +2km buffer in two surveys, corresponding to a peak abundance estimate of 7 individuals and a density estimate of 0.01 individuals per km^2 in February 2022.

3.18 Common Scoter

214. Notably, while being highlighted as present in the area by other data sources (e.g. Lawson *et al*., 2016), no common scoter were recorded within the survey area.

215. The Project Offshore ECC covers 151.2km^2 of the Greater Wash SPA. Based on these data and the overlap of the Offshore ECC with the Greater Wash SPA, the average and maximum predicted densities of common scoter are 0.004 and 0.029 birds per km². The estimated number of birds present in this overlap is based on the average density of birds (per km²) within the Offshore ECC area multiplied by the overlap area (km²), which results in a mean estimate of 0.6 for common scoter within the Greater Wash SPA section of the Project Offshore ECC at any one time.

3.19 Unidentified birds

216. Unidentified birds were recorded throughout the survey period with the greatest numbers recorded in August and September 2021. The summer peaks of non-identification relate primarily to difficulties separating razorbill and guillemot and reflect the large number of birds present at that time. These are especially hard to distinguish when birds are in moult and accompanied by juveniles.

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Annex A – Flight heights from DAS

Table 0-1. Proportions of birds at potential collision height, calculated from DAS imagery. This data was taken from flight height DAS surveys that were calculated from the array area; however, these data are still applicable to the WTG area, which is a subset of the larger array area.

Species	Proportion at Potential Collision Height	Sample size	Proportion at Potential Collision Height	Sample size
	Year 1		Year 2	
Kittiwake	15.6	840	33.4	1,516
Great black-backed gull	49.7	8	53.3	13
Herring gull	60.7	10	37.7	13
Lesser black-backed gull	84.6	13	55.8	16
Gannet	50.7	77	57.7	222

Annex B – Counts of Offshore and Intertidal Ornithological Receptors

217. Apportioned data is presented throughout this annex. Unapportioned data is only presented in the model-based results (MRSea) and auk data that has been corrected for availability bias (Annex C - Availability bias counts for Auks). All unapportioned species grouping data can be provided on request.

Table 0-1. Overview of apportioned total survey data for the WTG area. These data do not account for auk availability bias. Further information can be found in Annex C - Availability bias counts for Auks.

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
Mar-21	1	Kittiwake	6.3	4.12	8.96	2296	1503	3266	466	20.29
		Black-headed gull	0.02	0	0.05	7	0	18	6	95.25
		Great black-backed gull	0.02	0	0.05	6	0	18	6	89.55
		Herring gull	0.02	0	0.05	6	0	18	6	95.97
		Little auk	0	0	0	1	1	2	1	24.24
		Guillemot	7.2	5.84	8.66	2623	2128	3157	263	10
		Razorbill	5.46	4.07	6.83	1990	1485	2490	264	13.24
		Puffin	0.29	0.19	0.4	106	69	146	21	18.88
		Red-throated diver	0.47	0.21	0.76	171	78	276	51	29.78

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Gannet	0.44	0.13	0.86	160	48	313	66	41.32
Apr-21	1	Kittiwake	12.93	9.11	17.11	4714	3321	6235	744	15.77
		Common gull	0.02	0	0.05	7	0	18	6	89.97
		Great black-backed gull	0.03	0	0.07	11	0	27	8	63.85
		Herring gull	0.02	0	0.05	8	0	20	6	75.4
		Lesser black-backed gull	0.07	0.02	0.12	25	6	43	10	39.45
		Guillemot	27.85	18.15	40.35	10149	6613	14706	2130	20.98
		Razorbill	10.86	4.94	17.67	3959	1802	6440	1174	29.64
		Puffin	0.04	0	0.08	14	2	31	8	54.36
		Red-throated diver	0.42	0.19	0.68	154	70	248	45	29.15
		Great northern diver	0.02	0	0.05	7	0	18	6	90.84
		Fulmar	0.1	0.03	0.18	37	12	66	14	36.63
		Gannet	1.03	0.73	1.35	375	266	493	58	15.47
May-21	1	Kittiwake	1.73	1.06	2.59	630	388	944	148	23.41
		Common gull	0.02	0	0.05	6	0	18	6	98.14
		Lesser black-backed gull	0.02	0	0.05	6	0	18	6	96.08

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Sandwich tern	0.36	0.23	0.53	131	84	195	28	20.93
		Common tern	0.24	0.1	0.44	87	35	162	33	38.17
		Guillemot	4.67	3.89	5.52	1703	1419	2013	151	8.83
		Razorbill	0.61	0.3	0.94	225	109	343	62	27.35
		Puffin	0.05	0.01	0.13	18	3	48	12	66.83
		Red-throated diver	0.02	0	0.05	6	0	18	6	98.45
		Gannet	0.12	0.03	0.24	43	12	88	21	47.58
Jun-21	1	Kittiwake	0.81	0.47	1.23	295	170	448	73	24.64
		Common gull	0.02	0	0.05	7	0	18	6	90.86
		Herring gull	0.1	0	0.23	36	0	84	23	62.95
		Lesser black-backed gull	0.05	0	0.15	19	0	54	17	89.42
		Sandwich tern	0.03	0	0.08	13	0	30	9	66.72
		Common tern	0.03	0	0.1	13	0	36	12	94.01
		Guillemot	1.25	0.9	1.58	457	329	575	66	14.25
		Razorbill	0.27	0.12	0.41	97	45	151	29	29.56
		Puffin	0.03	0	0.08	13	2	31	8	64.34
		Fulmar	0.03	0	0.08	12	0	30	8	66.44
		Gannet	0.12	0.02	0.24	43	6	89	22	50.93

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
July-21	1	Kittiwake	2.5	1.63	3.59	913	595	1310	180	19.65
		Black-headed gull	0.02	0	0.05	6	0	18	6	93.35
		Little gull	0.03	0	0.1	13	0	37	13	96.74
		Herring gull	0.02	0	0.05	6	0	18	6	94.23
		Lesser black-backed gull	0.03	0	0.08	13	0	30	8	61.71
		Guillemot	9.87	6.92	13.12	3597	2523	4781	568	15.79
		Razorbill	2.96	1.09	5.5	1078	399	2004	424	39.32
		Puffin	0.31	0.2	0.41	113	75	150	20	17.24
		Fulmar	0.18	0.07	0.31	67	24	113	23	33.37
		Manx shearwater	0.03	0	0.08	10	0	29	9	91.44
		Gannet	0.2	0.07	0.34	72	25	124	26	35.41
Aug-21	1	Oystercatcher	0.1	0	0.3	38	0	108	36	95.43
		Kittiwake	2.03	0.98	3.47	741	356	1265	246	33.12
		Little gull	0.02	0	0.05	7	0	18	6	94.95
		Common tern	0.17	0.02	0.45	64	6	165	42	65.72
		Arctic tern	0.01	0	0.02	3	1	7	2	62.94
		Great skua	0.02	0	0.05	6	0	18	6	95.88
		Guillemot	20.87	8.89	35.98	7608	3242	13111	2673	35.13

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Razorbill	2.8	0.8	5.59	1021	291	2037	444	43.45
		Puffin	1.71	1.02	2.47	623	372	901	138	22.04
		Fulmar	0.02	0	0.05	7	0	18	7	98.67
		Gannet	0.21	0.11	0.32	79	40	119	20	25.48
Sep-21	1	Kittiwake	2.8	1.24	4.85	1021	452	1768	337	33.01
		Little gull	0.18	0.08	0.28	67	30	102	19	27.94
		Common gull	0	0	0	1	0	1	1	55.42
		Great black-backed gull	0.13	0.03	0.25	49	12	90	20	39.94
		Lesser black-backed gull	0.03	0	0.08	12	0	29	8	60.98
		Sandwich tern	0.03	0	0.08	13	0	30	8	59.58
		Common tern	3.98	2.58	5.67	1452	942	2066	285	19.59
		Arctic tern	0.07	0.01	0.14	25	6	52	12	48.06
		Arctic skua	0.05	0	0.1	19	0	36	9	48.54
		Guillemot	20.26	15.46	25.46	7382	5634	9279	900	12.19
		Razorbill	1.77	1.13	2.44	644	413	890	125	19.36
		Puffin	1.46	1.12	1.8	531	408	657	64	12.06
		Fulmar	0.03	0	0.08	13	0	30	8	60.72
		Gannet	0.11	0.03	0.2	42	12	72	15	35.83

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
Oct-21	1	Kittiwake	0.13	0.06	0.22	49	23	82	16	32.69
		Black-headed gull	0.05	0	0.12	19	0	45	12	64.96
		Little gull	0.48	0.27	0.71	177	101	260	43	24.36
		Common gull	0.05	0	0.1	18	0	36	10	53.52
		Great black-backed gull	0.1	0	0.27	37	0	98	28	74.41
		Lesser black-backed gull	0.02	0	0.05	6	0	18	6	92.92
		Arctic skua	0.02	0	0.05	6	0	19	6	99.38
		Guillemot	7.76	6.29	9.44	2830	2294	3442	292	10.3
		Razorbill	1.12	0.57	1.91	407	208	698	127	31
		Puffin	1.51	1.18	1.92	550	429	700	69	12.5
		Red-throated diver	0.03	0	0.08	12	0	30	9	70
		Gannet	0.27	0.15	0.43	98	54	158	27	26.93
Nov-21	1	Kittiwake	0.29	0.17	0.42	106	61	152	24	22.14
		Great black-backed gull	0.1	0.02	0.2	37	6	72	18	47.83
		Lesser black-backed gull	0.02	0	0.05	7	0	18	6	93.05

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Guillemot	5.93	4.72	7.26	2163	1720	2648	241	11.14
		Razorbill	3.06	2.25	3.96	1115	821	1445	160	14.28
		Puffin	0.68	0.52	0.85	248	191	309	30	12.02
		Gannet	0.15	0.06	0.25	54	24	91	18	32.91
Dec-21	1	Kittiwake	0.38	0.21	0.56	140	77	205	33	23.08
		Great black-backed gull	0.05	0	0.1	19	0	37	10	49.58
		Guillemot	3.32	2.93	3.71	1210	1070	1352	74	6.12
		Razorbill	2.92	1.95	3.95	1063	712	1440	182	17.11
		Puffin	0.05	0.02	0.08	19	9	31	6	31.92
		Red-throated diver	0.03	0	0.08	13	0	30	8	63.55
		Fulmar	0.03	0	0.08	12	0	30	8	66.45
		Shag	0.02	0	0.05	6	0	18	6	92.95
Jan-22	1	Kittiwake	0.15	0.08	0.23	55	29	84	14	25.71
		Great black-backed gull	0.05	0	0.1	18	0	36	9	49.36
		Herring gull	0.03	0	0.08	12	0	30	9	68.52
		Guillemot	0.57	0.36	0.77	209	131	282	38	18.18
		Razorbill	0.93	0.51	1.42	339	185	518	87	25.51

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Fulmar	0.05	0	0.13	19	0	48	14	71.04
		Gannet	0.02	0	0.05	6	0	18	6	95.57
Feb-22	1	Kittiwake	1.05	0.67	1.46	384	245	533	75	19.38
		Common gull	0.02	0	0.05	6	0	18	7	100.9
		Guillemot	5.65	4.24	7.34	2059	1547	2676	290	14.06
		Razorbill	6.56	5.48	7.71	2392	1996	2811	211	8.79
		Puffin	0.01	0	0.02	4	2	6	2	36.24
		Red-throated diver	0.05	0.02	0.1	19	6	35	9	46.61
		Fulmar	0.03	0	0.08	11	0	30	10	94.34
		Gannet	0.03	0	0.08	12	0	29	8	63.38
		Shag	0.01	0	0.05	6	0	18	6	103.32
Mar-22	1	Kittiwake	7.01	3.79	11.19	2556	1382	4080	714	27.9
		Little gull	0.02	0	0.05	6	0	18	6	98.22
		Common gull	0.21	0.05	0.39	78	18	144	32	41.05
		Great black-backed gull	0.03	0	0.08	12	0	30	9	68.85
		Herring gull	0.02	0	0.06	6	0	23	7	102.61
		Lesser black-backed gull	0.03	0	0.08	13	0	30	8	62.54

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Guillemot	9.87	6.53	13.8	3597	2379	5028	694	19.29
		Razorbill	4.18	2.29	6.35	1524	836	2314	384	25.21
		Puffin	0.48	0.26	0.74	174	95	270	46	26.23
		Red-throated diver	0.1	0.03	0.17	37	12	63	13	34.77
		Gannet	0.32	0.11	0.58	116	40	212	45	38.64
		Shag	0.02	0	0.05	6	0	18	6	96.24
	2	Kittiwake	3.33	2.55	4.19	1213	928	1527	151	12.41
		Little gull	0.03	0	0.1	12	0	36	12	95.76
		Guillemot	9.91	7.82	12.02	3613	2851	4381	395	10.92
		Razorbill	1.69	1.07	2.35	615	391	856	116	18.82
		Puffin	0.15	0.05	0.26	53	19	97	21	37.87
		Red-throated diver	0.25	0.12	0.37	91	46	135	24	25.45
		Fulmar	0.05	0	0.13	18	0	47	13	67.47
		Gannet	0.13	0.03	0.24	49	12	90	20	40.52
Apr-22	1	Kittiwake	6.64	4.39	9.7	2419	1599	3535	487	20.11
		Great black-backed gull	0.03	0	0.12	12	0	45	13	100.75
		Herring gull	0.05	0	0.13	19	0	46	13	69.28

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Lesser black-backed gull	0.02	0	0.05	7	0	18	6	91.07
		Guillemot	26.37	20.42	32.19	9610	7442	11733	1145	11.91
		Razorbill	2.07	1.23	2.96	756	448	1080	165	21.76
		Puffin	0.04	0.01	0.08	16	3	31	8	47.69
		Red-throated diver	0.49	0.21	0.82	180	78	299	58	31.84
		Fulmar	0.2	0.06	0.37	72	23	136	29	39.74
		Manx shearwater	0.02	0	0.05	7	0	18	6	90.27
		Gannet	0.51	0.24	0.78	185	87	284	51	27.26
	2	Kittiwake	9.98	7.1	12.94	3639	2589	4716	559	15.35
		Herring gull	0.02	0	0.05	6	0	19	6	100.31
		Lesser black-backed gull	0.02	0	0.05	6	0	18	6	95.81
		Sandwich tern	0.23	0.06	0.44	85	24	162	36	42.3
		Common tern	0.12	0.02	0.25	44	6	92	22	49.47
		Arctic tern	0.05	0	0.11	19	0	40	10	53.52
		Guillemot	15.08	10.18	19.93	5496	3710	7264	890	16.19
		Razorbill	1.65	0.94	2.52	601	344	918	148	24.52
		Puffin	0.13	0.03	0.25	47	10	93	21	44.97

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Red-throated diver	0.05	0.02	0.11	19	6	39	10	49.39
		Fulmar	0.07	0	0.14	24	0	53	13	54.38
		Gannet	2.81	1.53	4.38	1026	557	1595	273	26.59
May-22	1	Kittiwake	7.17	5.84	8.8	2613	2129	3207	277	10.58
		Herring gull	0.03	0	0.08	12	0	30	8	65.48
		Sandwich tern	0.1	0	0.22	36	0	82	20	56.19
		Arctic tern	0.13	0.05	0.22	48	18	80	16	33.13
		Guillemot	13.81	10.91	16.56	5035	3977	6036	526	10.43
		Razorbill	3.12	2.24	4.11	1137	815	1498	173	15.15
		Puffin	0.53	0.3	0.79	194	108	290	49	24.88
		Fulmar	0.05	0	0.1	18	0	36	9	51.31
		Gannet	1.59	1.04	2.29	580	380	835	119	20.43
	2	Kittiwake	2.27	1.64	2.85	829	598	1038	109	13.04
		Herring gull	0.02	0	0.05	7	0	18	6	93
		Sandwich tern	0.2	0.07	0.36	72	24	131	26	35.56
		Common tern	0.18	0.05	0.36	66	18	131	30	44.74
		Arctic tern	0	0	0	1	0	1	1	95.9
		Guillemot	3.2	2.51	3.86	1165	917	1408	124	10.59
		Razorbill	0.32	0.13	0.55	118	48	202	42	35.08

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Gannet	0.15	0.05	0.27	56	18	98	21	37.92
Jun-22	1	Kittiwake	0.44	0.24	0.66	162	88	242	41	25.19
		Great black-backed gull	0.01	0	0.02	3	0	9	3	93.82
		Herring gull	0.02	0	0.05	6	0	18	6	99.51
		Lesser black-backed gull	0.02	0	0.05	6	0	18	6	94
		Sandwich tern	0.2	0.03	0.46	73	12	167	41	56.28
		Guillemot	1.62	1.21	2.08	591	441	758	83	13.91
		Razorbill	0.24	0.05	0.48	87	19	175	42	47.84
		Puffin	0.05	0	0.12	18	2	45	12	69.3
		Fulmar	0.02	0	0.06	9	0	22	6	67.54
		Gannet	0.28	0.13	0.45	103	48	165	31	29.49
	2	Curlew	0.02	0	0.05	6	0	18	6	97.32
		Kittiwake	4.55	2.92	6.08	1659	1066	2215	305	18.37
		Great black-backed gull	0.03	0	0.08	12	0	29	8	64.6
		Herring gull	0.31	0.07	0.68	114	24	250	61	52.93
		Lesser black-backed gull	0.03	0	0.08	13	0	30	8	63.87

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Sandwich tern	0.05	0	0.1	18	0	36	10	51.42
		Common tern	0.02	0	0.05	7	0	18	6	93.92
		Guillemot	4.15	2.94	5.43	1512	1072	1980	236	15.55
		Razorbill	0.32	0.09	0.6	115	34	219	49	42.37
		Fulmar	0.12	0.05	0.21	43	17	75	16	36.53
		Manx shearwater	0.02	0	0.05	6	0	18	6	94.73
		Gannet	1	0.42	1.68	363	154	614	118	32.34
Jul-22	1	Kittiwake	0.56	0.32	0.83	204	118	304	47	22.87
		Herring gull	0.05	0	0.11	18	0	42	12	65.46
		Lesser black-backed gull	0.03	0	0.1	13	0	36	12	94.04
		Guillemot	1.72	1.1	2.36	628	400	859	121	19.26
		Razorbill	0.09	0.01	0.2	34	4	73	18	52.93
		Puffin	0.02	0.01	0.04	8	3	14	4	47.13
		Fulmar	0.02	0	0.05	6	0	18	6	97.99
		Gannet	0.26	0.11	0.43	95	41	156	30	30.66
	2	Curlew	0.02	0	0.05	7	0	18	6	92.27
		Kittiwake	0.89	0.6	1.23	326	218	449	58	17.71
		Black-headed gull	0.02	0	0.05	7	0	18	6	92.74

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Common gull	0.03	0	0.08	13	0	30	8	60.08
		Lesser black-backed gull	0.02	0	0.05	7	0	18	6	91.17
		Common tern	0.03	0	0.08	13	0	30	8	62.92
		Guillemot	6.38	4.72	8.37	2325	1721	3050	349	15
		Razorbill	2.73	1.55	4.28	996	566	1559	258	25.83
		Puffin	0.19	0.07	0.32	69	28	118	24	33.49
		Fulmar	0.12	0.03	0.22	43	12	82	19	43.82
		Manx shearwater	0.15	0.04	0.29	56	15	106	24	41.57
		Gannet	0.6	0.39	0.82	217	143	299	43	19.51
Aug-22	1	Kittiwake	4.57	1.65	7.69	1666	601	2803	560	33.57
		Great black-backed gull	0.1	0.01	0.2	36	6	74	19	52.47
		Herring gull	0	0	0	1	0	2	1	90.76
		Lesser black-backed gull	0.16	0	0.34	59	0	125	33	55.06
		Common tern	0.19	0	0.49	68	0	178	51	75.6
		Arctic tern	0.03	0	0.08	11	0	30	10	88.42
		Guillemot	11.88	4.86	20.77	4331	1772	7570	1511	34.87
		Razorbill	0.18	0.05	0.36	67	19	133	31	45.96

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Puffin	0.06	0.02	0.11	23	8	39	9	37.06
		Fulmar	0.21	0.03	0.42	79	12	152	35	44.47
		Manx shearwater	0.28	0.02	0.74	103	6	270	77	74.4
		Gannet	0.37	0.14	0.63	137	53	231	46	33.13
	2	Curlew	0.03	0	0.1	13	0	36	12	88.91
		Kittiwake	0.44	0.19	0.76	161	71	279	55	33.77
		Little gull	0.02	0	0.06	7	0	23	6	94.01
		Lesser black-backed gull	0.02	0	0.05	7	0	18	6	88.1
		Common tern	0.03	0	0.08	12	0	30	8	67.1
		Guillemot	2.9	1.48	4.82	1058	540	1757	312	29.49
		Razorbill	0.27	0.05	0.54	100	17	198	46	46.08
		Puffin	0.04	0.01	0.08	14	2	28	7	47.93
		Fulmar	0.02	0	0.05	6	0	18	6	92.4
		Manx shearwater	0.12	0	0.34	43	0	125	41	96.17
		Gannet	0.1	0.03	0.18	36	12	66	15	39.99
Sep-22	1	Kittiwake	0.31	0.12	0.59	114	45	215	44	38.64
		Little gull	0.38	0.2	0.57	139	72	210	35	25.11
		Common tern	0.03	0	0.1	13	0	36	12	90.73
		Guillemot	4.57	2.97	6.79	1666	1083	2477	379	22.72

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Razorbill	1.5	0.75	2.37	546	275	865	156	28.57
		Puffin	0.25	0.12	0.41	90	44	148	28	30.42
		Sooty shearwater	0.11	0	0.34	42	0	124	39	93
		Manx shearwater	0.49	0	1.47	178	0	536	165	92.51
		Gannet	0.18	0.08	0.31	67	29	112	22	31.86
	2	Kittiwake	0.03	0	0.1	12	0	36	12	98.87
		Little gull	0.1	0	0.23	36	0	84	22	60.57
		Great black-backed gull	0.07	0	0.18	24	0	66	18	73.62
		Guillemot	1.52	1.01	2.15	554	369	784	105	18.95
		Razorbill	0.16	0.04	0.33	58	14	120	29	48.63
		Puffin	0.13	0.04	0.25	50	15	92	21	41.6
		Gannet	0.18	0.03	0.36	65	12	130	31	47.13
Oct-22	1	Kittiwake	0.33	0.2	0.46	119	72	169	26	21.64
		Black-headed gull	0.07	0	0.19	26	0	68	20	76.29
		Little gull	0	0	0	1	0	2	1	94.91
		Common gull	0.03	0	0.08	13	1	29	8	58.43
		Herring gull	0.02	0	0.05	6	0	18	6	94.66
		Guillemot	2.31	1.6	3.07	841	585	1120	138	16.38

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Razorbill	0.45	0.11	0.87	164	40	316	69	42.25
		Puffin	0.3	0.08	0.68	109	28	248	57	52.34
		Gannet	0.3	0.18	0.42	109	66	155	24	21.24
Nov-22	1	Kittiwake	0.41	0.26	0.58	151	97	210	30	19.4
		Little gull	0.03	0	0.1	13	0	36	12	94.15
		Great black-backed gull	0.05	0	0.12	18	0	45	12	67.17
		Herring gull	0.03	0	0.08	13	0	29	8	61.07
		Pomarine skua	0.02	0	0.05	6	0	18	6	92.84
		Guillemot	1.94	0.96	3.01	709	351	1096	191	26.95
		Razorbill	0.81	0.38	1.31	294	139	480	87	29.58
		Puffin	0.16	0.06	0.27	57	23	100	21	35.32
		Gannet	1.64	0.85	2.5	598	310	913	151	25.14
Dec-22	1	Kittiwake	0.69	0.52	0.88	252	189	319	34	13.23
		Common gull	0.05	0	0.11	18	0	41	10	53.66
		Great black-backed gull	0.12	0.02	0.26	43	6	96	24	53.89
		Herring gull	0.08	0.03	0.14	30	12	53	11	36.36
		Guillemot	4.36	3.65	5.05	1589	1329	1842	131	8.2
		Razorbill	2.35	1.63	3.35	857	595	1221	161	18.71

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Puffin	0.28	0.1	0.49	102	37	179	37	35.96
		Red-throated diver	0.03	0	0.08	12	0	29	8	66.37
		Fulmar	0.03	0	0.1	12	0	36	12	96.98
		Shag	0.02	0	0.05	7	0	18	6	94.14
Jan-23	1	Kittiwake	1.49	0.72	2.34	543	265	855	152	28.02
		Common gull	0.07	0	0.17	24	0	64	18	73.88
		Great black-backed gull	0.26	0.07	0.54	95	24	197	48	49.68
		Herring gull	0.07	0	0.17	27	2	61	16	57.58
		Guillemot	2.85	0.56	6.08	1039	204	2218	510	49.05
		Razorbill	1.71	0.64	2.88	625	235	1051	211	33.65
		Red-throated diver	0.12	0.03	0.2	43	12	72	16	36.05
		Fulmar	0.25	0.02	0.66	91	6	240	67	73.46
		Gannet	0.05	0	0.11	19	0	40	10	52.25
		Cormorant	0.03	0	0.1	12	0	36	12	97.87
Feb-23	1	Kittiwake	3.24	2.32	4.14	1180	845	1510	171	14.45
		Common gull	0.05	0.02	0.1	18	6	36	9	45.37
		Guillemot	3.17	1.99	4.58	1156	725	1668	239	20.6

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Razorbill	13.09	8.92	17.69	4772	3251	6448	850	17.8
		Puffin	0.12	0.03	0.25	46	11	90	21	46.08
		Red-throated diver	0.08	0	0.16	31	0	60	15	47.61
		Gannet	0.22	0.13	0.32	79	47	116	19	22.99
Mar-23	1	Kittiwake	5.99	3.59	8.8	2184	1309	3206	480	21.97
		Common gull	0.03	0	0.08	13	0	30	8	62.65
		Great black-backed gull	0.1	0	0.26	37	0	95	28	75.44
		Herring gull	0.05	0	0.1	18	0	36	9	49.16
		Guillemot	10.04	6.83	13.62	3659	2489	4963	646	17.63
		Razorbill	8.12	4.47	12.55	2959	1631	4575	746	25.22
		Puffin	0.1	0.02	0.2	36	6	72	18	49.74
		Red-throated diver	0.18	0.03	0.4	66	12	144	35	52.66
		Gannet	0.78	0.33	1.34	286	122	488	96	33.34
Apr-23	1	Kittiwake	8.39	5.91	11.49	3057	2156	4186	534	17.46
		Common gull	0.18	0.06	0.31	66	24	113	23	34.85
		Great black-backed gull	0.11	0	0.31	42	0	114	34	82.05

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Herring gull	0.05	0	0.13	19	0	47	13	67.16
		Lesser black-backed gull	0.03	0	0.08	13	0	29	8	61.5
		Common tern	0.02	0	0.06	6	0	23	6	101.22
		Arctic tern	0.02	0	0.05	7	0	18	6	91.52
		Guillemot	12.47	8.86	17.76	4544	3228	6472	848	18.66
		Razorbill	3.04	2.25	3.95	1108	821	1442	152	13.71
		Puffin	0.14	0.07	0.23	53	25	86	16	29.95
		Red-throated diver	0.18	0.08	0.31	67	28	112	22	31.76
		Fulmar	0.03	0	0.08	12	0	30	8	61.74
		Gannet	0.99	0.41	1.72	360	149	626	128	35.3
		Cormorant	0.02	0	0.05	7	0	18	7	99.4
May-23	1	Whooper swan	0.05	0	0.15	18	0	54	17	93.13
		Kittiwake	0.86	0.46	1.4	313	169	511	89	28.26
		Sandwich tern	0.41	0.24	0.61	151	87	222	35	22.65
		Common tern	0.2	0.07	0.37	74	24	135	28	37.67
		Guillemot	1.58	1.33	1.81	577	484	659	44	7.57
		Razorbill	0.22	0.1	0.35	82	39	126	23	27.65
		Puffin	0.18	0.08	0.28	65	29	103	19	29.6

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Red-throated diver	0.03	0	0.08	13	0	30	8	65.51
		Fulmar	0.03	0	0.08	13	0	29	8	62.87
Jun-23	1	Curlew	0.02	0	0.06	7	0	23	7	100.61
		Kittiwake	2.98	2.04	4.03	1086	745	1470	189	17.41
		Great black-backed gull	0.02	0	0.05	6	0	18	6	91.58
		Herring gull	0.37	0.17	0.6	135	64	219	40	29.4
		Lesser black-backed gull	0.46	0.28	0.65	167	102	237	35	20.86
		Guillemot	1.79	1.12	2.57	653	409	936	133	20.33
		Razorbill	0.88	0.46	1.31	322	167	479	84	26.01
		Puffin	0.05	0	0.1	18	0	36	9	51.09
		Fulmar	0.13	0.03	0.22	47	12	82	18	38.79
		Manx shearwater	0.06	0	0.16	24	0	58	15	62.6
		Gannet	0.75	0.45	1.19	275	163	433	68	24.7
Jul-23	1	Kittiwake	0.31	0.11	0.57	113	42	210	43	38.08
		Herring gull	0.02	0	0.05	7	0	18	6	89.58
		Sandwich tern	0.02	0	0.05	6	0	18	6	93.04
		Guillemot	1.92	1	2.82	701	366	1028	163	23.23

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Razorbill	1.09	0.45	1.84	399	164	672	129	32.19
		Puffin	0.29	0.13	0.48	107	49	175	33	30.8
		Gannet	0.02	0	0.05	6	0	18	7	101.11
Aug-23	1	Kittiwake	1.81	1.16	2.66	659	422	970	142	21.56
		Black-headed gull	0.05	0	0.11	18	0	42	12	64.27
		Great black-backed gull	0.03	0	0.08	13	0	29	8	61.64
		Lesser black-backed gull	0.02	0	0.05	6	0	18	6	95.01
		Sandwich tern	0.03	0	0.1	13	0	36	12	87.37
		Common tern	0.08	0.03	0.14	30	12	52	11	36.37
		Arctic tern	0	0	0	1	0	1	1	88.93
		Great skua	0.02	0	0.05	6	0	18	6	93.68
		Guillemot	9.34	8.22	10.64	3405	2997	3879	226	6.62
		Razorbill	3.39	1.55	6.51	1237	567	2374	491	39.65
		Puffin	0.92	0.53	1.4	336	195	511	84	25.04
		Fulmar	0.15	0.03	0.29	56	12	106	25	43.43
		Manx shearwater	0.02	0	0.05	6	0	18	6	91.77
		Gannet	0.45	0.21	0.78	164	77	285	54	32.72

Table 0-2 Overview of apportioned sitting survey data for the WTG area. These data do not account for auk availability bias. Further information can be found in Annex C - Availability bias counts for Auks.

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
Mar-21	1	Kittiwake	4.62	2.72	7.04	1684	992	2567	416	24.69
		Little auk	0	0	0	1	1	2	1	24.78
		Guillemot	6.88	5.46	8.49	2509	1989	3093	283	11.25
		Razorbill	5.18	3.96	6.59	1889	1443	2402	252	13.29
		Puffin	0.25	0.14	0.36	91	51	131	21	22.57
		Red-throated diver	0.44	0.18	0.76	162	67	277	53	32.72
		Gannet	0.22	0.02	0.54	80	6	199	54	68.17
Apr-21	1	Kittiwake	7.63	4.74	11.12	2781	1728	4054	617	22.18
		Great black-backed gull	0.03	0	0.07	11	0	26	7	62.24
		Herring gull	0.02	0	0.05	8	0	20	6	76.56
		Guillemot	26.75	17.46	39.2	9750	6362	14286	2037	20.89
		Razorbill	10.43	4.98	17.07	3801	1816	6221	1144	30.08
		Puffin	0.04	0	0.08	14	2	31	8	53.75

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Red-throated diver	0.42	0.2	0.67	154	75	246	45	28.97
		Great northern diver	0.02	0	0.05	6	0	18	6	91.37
		Fulmar	0.03	0	0.08	12	0	30	8	65.89
		Gannet	0.42	0.23	0.63	152	84	229	39	25.12
May-21	1	Kittiwake	1.08	0.67	1.53	395	244	558	83	21.04
		Sandwich tern	0.02	0	0.05	6	0	18	6	93.56
		Common tern	0.07	0	0.2	24	0	73	24	100.35
		Guillemot	4.64	3.82	5.51	1690	1391	2009	158	9.35
		Razorbill	0.57	0.26	0.91	209	96	333	63	30.09
		Puffin	0.05	0.01	0.11	18	3	42	11	63.88
		Red-throated diver	0.02	0	0.05	6	0	18	6	93.73
		Gannet	0.02	0	0.05	6	0	18	6	99.29
Jun-21	1	Kittiwake	0.4	0.16	0.69	145	59	251	47	32.05
		Herring gull	0.02	0	0.05	7	0	18	6	95.19
		Guillemot	1.22	0.87	1.55	447	317	565	65	14.5
		Razorbill	0.23	0.1	0.38	85	36	140	26	30.78
		Puffin	0.03	0	0.08	13	2	30	9	65.4

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		Fulmar	0.03	0	0.08	13	0	30	8	64.44
		Gannet	0.03	0	0.08	13	0	29	8	64.21
Jul-21	1	Kittiwake	0.73	0.18	1.45	267	66	530	125	46.7
		Lesser black-backed gull	0.02	0	0.05	7	0	18	6	94.12
		Guillemot	9.78	6.79	13.02	3566	2476	4745	576	16.14
		Razorbill	2.92	1.06	5.56	1066	385	2025	422	39.59
		Puffin	0.31	0.2	0.42	113	75	154	21	18.02
		Fulmar	0.1	0.03	0.17	37	12	63	13	34.84
		Manx shearwater	0.03	0	0.08	10	0	29	10	95.45
		Gannet	0.1	0.03	0.18	37	12	66	15	38.63
Aug-21	1	Kittiwake	0.94	0.14	2.21	344	52	805	203	58.9
		Great skua	0.02	0	0.05	6	0	18	6	90.38
		Guillemot	20.15	8.1	34.45	7345	2952	12555	2645	36.01
		Razorbill	2.8	0.83	5.53	1021	304	2016	430	42.05
		Puffin	1.7	0.99	2.51	619	360	915	145	23.43
		Fulmar	0.02	0	0.06	7	0	23	7	99.52
		Gannet	0.08	0.02	0.16	30	6	57	13	43.34
Sep-21	1	Kittiwake	2.01	0.61	3.7	731	222	1350	302	41.25
		Little gull	0.02	0	0.05	7	1	19	6	92.62

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		Common gull	0	0	0	1	0	1	1	54.16
		Great black-backed gull	0.07	0.02	0.11	25	6	41	9	35.79
		Lesser black-backed gull	0.03	0	0.08	12	0	29	7	60
		Common tern	1.3	0.62	2.22	475	226	808	152	31.94
		Arctic skua	0.02	0	0.05	7	0	18	6	94.24
		Guillemot	20.19	15.77	25.24	7359	5749	9197	879	11.93
		Razorbill	1.76	1.13	2.48	641	413	903	125	19.51
		Puffin	1.46	1.1	1.81	532	400	661	67	12.5
		Fulmar	0.03	0	0.08	12	0	30	8	63.69
		Gannet	0.08	0	0.17	31	0	64	16	50.12
Oct-21	1	Kittiwake	0.05	0	0.1	19	0	36	10	51.28
		Little gull	0.09	0	0.23	32	0	83	24	75.45
		Great black-backed gull	0.08	0	0.24	30	0	89	28	91.13
		Guillemot	7.35	5.83	9.03	2679	2124	3291	306	11.39
		Razorbill	0.93	0.58	1.3	338	213	473	70	20.73
		Puffin	1.48	1.16	1.85	541	423	675	67	12.26

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		Red-throated diver	0.03	0	0.08	13	0	30	9	70.01
		Gannet	0.17	0.06	0.27	61	24	101	20	32.85
Nov-21	1	Kittiwake	0.13	0.04	0.23	46	15	86	19	40.19
		Great black-backed gull	0.03	0	0.1	12	0	36	11	94.87
		Guillemot	5.78	4.6	7.06	2107	1678	2573	235	11.13
		Razorbill	2.98	2.24	3.83	1088	815	1396	154	14.12
		Puffin	0.68	0.51	0.83	248	188	302	30	11.93
		Gannet	0.07	0	0.15	24	0	54	14	56.95
Dec-21	1	Kittiwake	0.05	0	0.13	19	0	47	14	72.82
		Great black-backed gull	0.03	0	0.08	13	0	30	8	65.44
		Guillemot	3.2	2.82	3.6	1166	1027	1314	75	6.42
		Razorbill	2.92	1.94	4.09	1063	708	1490	192	18.02
		Puffin	0.05	0.02	0.08	19	9	31	6	31.76
		Red-throated diver	0.02	0	0.05	7	0	18	6	93.69
		Fulmar	0.02	0	0.05	6	0	18	6	94.99
Jan-22	1	Kittiwake	0.03	0	0.08	13	0	30	8	62.22

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		Great black-backed gull	0.03	0	0.08	12	0	29	8	62
		Herring gull	0.02	0	0.05	6	0	18	6	93.34
		Guillemot	0.53	0.34	0.72	195	125	264	37	18.95
		Razorbill	0.89	0.48	1.35	327	177	494	81	24.76
		Fulmar	0.02	0	0.05	7	0	18	6	93.54
Feb-22	1	Kittiwake	0.53	0.33	0.72	193	122	264	37	18.69
		Guillemot	5.28	3.92	6.82	1926	1429	2487	276	14.31
		Razorbill	6.54	5.4	7.65	2385	1970	2789	212	8.86
		Puffin	0.01	0	0.02	4	2	6	2	36.33
		Red-throated diver	0.05	0	0.1	19	0	36	9	46.86
		Fulmar	0.01	0	0.03	5	0	12	4	90.57
		Gannet	0.02	0	0.05	7	0	18	6	92.79
Mar-22	1	Kittiwake	3.62	1.87	6.02	1319	684	2195	408	30.87
		Common gull	0.13	0.03	0.26	49	12	97	23	46.3
		Great black-backed gull	0.03	0	0.08	13	0	30	8	64.48
		Herring gull	0.02	0	0.06	6	0	23	7	103.86
		Guillemot	9.41	6.11	13.58	3428	2228	4948	716	20.86

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		Razorbill	3.96	2.08	5.99	1443	758	2183	362	25.04
		Puffin	0.48	0.26	0.78	176	95	286	48	27.17
		Red-throated diver	0.1	0.03	0.16	37	12	61	13	33.94
		Gannet	0.16	0.02	0.39	61	6	143	37	60.34
		Shag	0.02	0	0.05	6	0	18	6	94.78
	2	Kittiwake	1.45	1.04	1.95	530	378	710	84	15.84
		Guillemot	9.31	7.18	11.55	3392	2618	4210	410	12.06
		Razorbill	1.66	1.06	2.28	604	386	831	116	19.13
		Puffin	0.14	0.05	0.25	52	20	92	19	36.35
		Red-throated diver	0.25	0.13	0.38	92	49	137	23	24.4
		Fulmar	0.05	0	0.11	18	0	42	12	65.81
		Gannet	0.07	0	0.16	25	0	58	15	61.53
Apr-22	1	Kittiwake	4.54	2.44	7.11	1655	888	2592	438	26.41
		Great black-backed gull	0.03	0	0.1	13	0	37	12	97.91
		Herring gull	0.02	0	0.05	7	0	19	6	98.51
		Guillemot	22.79	17.05	29.06	8304	6214	10592	1107	13.32
		Razorbill	1.59	0.91	2.34	581	331	852	137	23.56

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		Puffin	0.04	0	0.08	15	2	30	8	49.09
		Red-throated diver	0.48	0.19	0.8	175	69	294	58	32.94
		Fulmar	0.07	0	0.15	25	0	54	14	57.67
		Manx shearwater	0.02	0	0.05	7	0	18	6	96.65
		Gannet	0.28	0.11	0.48	103	40	177	36	35.11
	2	Kittiwake	4.43	2.71	6.14	1616	988	2238	319	19.71
		Guillemot	13.89	8.92	18.64	5062	3252	6793	891	17.59
		Razorbill	1.37	0.79	2.13	500	288	776	126	25.11
		Puffin	0.13	0.03	0.25	47	12	91	22	45.25
		Red-throated diver	0.05	0.02	0.1	19	6	37	9	48.43
		Fulmar	0.03	0	0.08	12	0	29	8	64
		Gannet	2.18	0.94	3.8	794	344	1386	269	33.83
May-22	1	Kittiwake	3.84	3.23	4.41	1401	1176	1609	113	8.03
		Guillemot	13.8	11.12	16.55	5028	4052	6033	509	10.12
		Razorbill	2.99	2.13	3.94	1091	778	1438	171	15.61
		Puffin	0.51	0.3	0.76	186	109	279	45	24.15
		Fulmar	0.02	0	0.05	7	0	18	6	93.42
		Gannet	0.93	0.52	1.4	338	191	511	84	24.67

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	2	Kittiwake	1.42	0.92	1.93	518	337	705	94	18.1
		Guillemot	3.07	2.47	3.69	1119	902	1345	117	10.45
		Razorbill	0.33	0.13	0.55	119	47	200	40	33.58
		Gannet	0.07	0	0.14	25	0	53	13	54
Jun-22	1	Kittiwake	0.13	0.06	0.21	49	22	78	16	31.72
		Great black-backed gull	0.01	0	0.02	3	0	9	3	89.8
		Herring gull	0.02	0	0.05	7	0	18	6	93.01
		Lesser black-backed gull	0.02	0	0.05	7	0	18	6	92.55
		Guillemot	1.54	1.09	2.04	563	397	742	89	15.72
		Razorbill	0.24	0.05	0.47	89	20	173	41	45.75
		Puffin	0.03	0	0.07	11	2	25	7	59.84
		Fulmar	0.01	0	0.02	3	0	9	3	93.74
		Gannet	0.18	0.06	0.33	66	23	122	27	39.61
	2	Kittiwake	2.67	1.56	3.97	974	569	1447	220	22.53
		Great black-backed gull	0.02	0	0.05	6	0	18	6	93.64
		Herring gull	0.27	0.03	0.61	97	12	222	55	56.87

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		Lesser black-backed gull	0.02	0	0.05	6	0	18	6	93.94
		Guillemot	4.12	2.88	5.34	1501	1049	1946	236	15.69
		Razorbill	0.31	0.08	0.61	113	31	223	50	44.12
		Fulmar	0.05	0	0.13	19	0	47	13	67.92
		Gannet	0.91	0.43	1.56	333	157	570	107	32.05
Jul-22	1	Kittiwake	0.22	0.07	0.39	80	24	141	32	38.98
		Guillemot	1.68	1.12	2.28	612	407	831	110	17.9
		Razorbill	0.06	0.01	0.16	24	3	59	17	71.15
		Puffin	0.02	0	0.04	7	0	14	4	49.28
		Fulmar	0.02	0	0.05	6	0	18	6	102.2
		Gannet	0.13	0.05	0.22	49	18	82	18	36.18
	2	Kittiwake	0.24	0.05	0.49	88	18	181	44	49.39
		Guillemot	6.3	4.56	8.42	2297	1662	3068	359	15.59
		Razorbill	2.73	1.4	4.41	994	512	1608	279	27.99
		Puffin	0.17	0.06	0.29	63	24	106	21	33.45
		Fulmar	0.12	0.03	0.23	43	12	82	19	43.68
		Manx shearwater	0.14	0.02	0.28	51	7	104	24	46.93
		Gannet	0.32	0.13	0.54	116	47	197	38	32.59
Aug-22	1	Kittiwake	2.43	0.82	4.22	885	300	1539	319	36.04

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		Great black-backed gull	0.07	0	0.17	24	0	62	17	71.35
		Herring gull	0	0	0	1	0	2	1	95.12
		Lesser black-backed gull	0.02	0	0.05	7	0	18	6	90.24
		Guillemot	11.69	4.84	20.17	4261	1764	7350	1486	34.87
		Razorbill	0.18	0.05	0.36	67	19	133	31	45.48
		Puffin	0.06	0.02	0.11	23	8	41	9	37.86
		Fulmar	0.21	0.03	0.42	77	12	154	38	48.98
		Manx shearwater	0.1	0	0.26	37	0	95	28	74.43
		Gannet	0.2	0.06	0.35	72	24	128	28	38.99
	2	Kittiwake	0.25	0.08	0.43	91	29	157	34	36.9
		Lesser black-backed gull	0.02	0	0.05	6	0	18	6	95.89
		Guillemot	2.9	1.5	4.64	1056	548	1693	308	29.13
		Razorbill	0.27	0.06	0.55	99	24	201	48	47.71
		Puffin	0.04	0.01	0.08	15	2	28	7	46.19
		Fulmar	0.02	0	0.05	7	0	18	6	91.61
		Manx shearwater	0.11	0	0.34	41	0	124	38	94.27
		Gannet	0.05	0	0.13	18	0	48	13	72.43

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Sep-22	1	Kittiwake	0.03	0	0.1	13	0	36	12	95.58
		Little gull	0.02	0	0.05	6	0	18	6	94.63
		Guillemot	4.49	2.87	6.96	1636	1045	2537	399	24.35
		Razorbill	1.46	0.72	2.3	531	261	837	149	27.95
		Puffin	0.25	0.12	0.4	90	43	145	27	29.48
		Sooty shearwater	0.1	0	0.29	38	0	108	36	94.41
		Manx shearwater	0.46	0	1.38	167	0	504	171	102.31
		Gannet	0.13	0.05	0.24	50	18	88	19	37.52
	2	Great black-backed gull	0.05	0	0.13	18	0	46	13	71.85
		Guillemot	1.5	1.01	2.12	548	370	774	103	18.68
		Razorbill	0.14	0.03	0.31	52	11	112	27	52.45
		Puffin	0.14	0.04	0.25	50	15	93	22	42.7
		Gannet	0.02	0	0.05	6	0	18	6	95.03
Oct-22	1	Kittiwake	0.08	0.03	0.15	31	12	54	12	37.7
		Herring gull	0.02	0	0.05	7	0	18	6	91.97
		Guillemot	1.97	1.21	2.86	720	442	1043	150	20.79
		Razorbill	0.41	0.06	0.85	149	21	311	77	51.32
		Puffin	0.27	0.06	0.61	100	23	224	54	53.61
		Gannet	0.05	0.02	0.1	19	6	35	9	45.85

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Nov-22	1	Kittiwake	0.12	0.03	0.21	43	13	76	16	36.75
		Great black-backed gull	0.03	0	0.08	12	0	30	8	66.74
		Herring gull	0.02	0	0.05	7	0	18	6	91.49
		Guillemot	1.9	0.95	3	693	346	1093	191	27.56
		Razorbill	0.79	0.37	1.28	287	136	466	86	29.93
		Puffin	0.15	0.06	0.27	56	21	98	21	36.56
		Gannet	0.92	0.37	1.54	336	137	561	108	31.98
Dec-22	1	Kittiwake	0.1	0.03	0.17	37	12	64	13	35.04
		Great black-backed gull	0.06	0	0.16	23	0	60	17	72.43
		Herring gull	0.02	0	0.05	6	0	18	6	96.11
		Guillemot	3.78	3.29	4.28	1377	1200	1561	96	6.97
		Razorbill	2.23	1.6	3.06	812	583	1116	140	17.18
		Puffin	0.28	0.1	0.51	104	38	187	39	36.99
		Red-throated diver	0.03	0	0.08	13	0	29	8	62.02
		Fulmar	0.03	0	0.1	13	0	36	12	94.79
		Shag	0.02	0	0.05	6	0	18	6	95.66
Jan-23	1	Kittiwake	0.76	0.38	1.18	276	140	430	75	26.96

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		Great black-backed gull	0.08	0	0.19	28	0	68	18	61.98
		Herring gull	0.04	0	0.1	14	0	38	12	85.11
		Guillemot	2.72	0.58	5.82	991	212	2120	490	49.47
		Razorbill	1.72	0.75	2.84	628	273	1036	200	31.83
		Red-throated diver	0.11	0.05	0.2	42	17	72	15	35.62
		Fulmar	0.1	0.02	0.2	37	6	74	18	47.11
		Cormorant	0.03	0	0.1	12	0	36	12	98.52
Feb-23	1	Kittiwake	2.12	1.44	3.01	774	525	1097	142	18.32
		Guillemot	3.08	1.96	4.62	1122	716	1684	245	21.81
		Razorbill	12.41	8.15	17.1	4524	2972	6233	838	18.52
		Puffin	0.12	0.03	0.25	45	11	93	22	47.8
		Red-throated diver	0.08	0	0.17	31	0	64	16	51.82
		Gannet	0.05	0	0.13	19	0	47	14	70
Mar-23	1	Kittiwake	4.23	2.28	6.5	1542	833	2371	398	25.78
		Great black-backed gull	0.08	0	0.24	29	0	89	28	94.2
		Herring gull	0.05	0.01	0.1	19	6	35	9	47.01

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		Guillemot	8.63	5.43	12.18	3146	1981	4438	641	20.36
		Razorbill	7.36	3.5	11.8	2682	1275	4300	768	28.62
		Puffin	0.08	0	0.19	31	0	68	18	57.67
		Red-throated diver	0.18	0.03	0.39	65	12	143	35	53.24
		Gannet	0.63	0.2	1.08	231	75	396	84	36.02
Apr-23	1	Kittiwake	6	4.02	8.43	2188	1466	3073	420	19.17
		Common gull	0.08	0	0.17	31	0	64	16	50.03
		Great black-backed gull	0.12	0	0.31	43	0	113	33	76.41
		Herring gull	0.05	0	0.13	19	0	49	13	69.14
		Lesser black-backed gull	0.03	0	0.08	13	0	29	8	62.87
		Guillemot	12.41	8.75	17.31	4524	3191	6308	848	18.73
		Razorbill	2.95	2.11	3.84	1077	771	1399	166	15.39
		Puffin	0.14	0.07	0.23	52	25	85	16	30.3
		Red-throated diver	0.16	0.05	0.28	59	18	104	23	37.66
		Fulmar	0.03	0	0.08	13	0	29	8	59.51
		Gannet	0.83	0.34	1.47	304	124	536	107	35.28

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Cormorant	0.02	0	0.06	7	0	23	6	99.6
May-23	1	Whooper swan	0.05	0	0.15	18	0	54	17	94.37
		Kittiwake	0.61	0.21	1.14	222	78	416	86	38.68
		Guillemot	1.54	1.29	1.78	560	471	649	44	7.8
		Razorbill	0.19	0.07	0.32	70	26	116	24	33.63
		Puffin	0.14	0.05	0.25	51	18	90	19	36.21
		Red-throated diver	0.03	0	0.08	13	0	30	9	65.08
		Fulmar	0.02	0	0.05	7	0	18	6	90.77
Jun-23	1	Kittiwake	2.04	1.24	2.92	744	452	1064	162	21.74
		Great black-backed gull	0.02	0	0.05	6	0	18	6	94.25
		Herring gull	0.21	0.1	0.33	75	37	121	22	28.19
		Lesser black-backed gull	0.25	0.08	0.46	93	30	168	37	39.42
		Guillemot	1.8	1.13	2.54	657	414	925	136	20.57
		Razorbill	0.9	0.48	1.36	329	174	497	84	25.43
		Puffin	0.03	0	0.08	12	0	28	8	68.86
		Fulmar	0.09	0.02	0.18	35	10	66	15	43.07
		Manx shearwater	0.07	0	0.16	25	0	60	16	62.7

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Gannet	0.55	0.26	0.96	200	95	349	71	35.53
Jul-23	1	Kittiwake	0.25	0.06	0.52	92	23	190	45	48.63
		Herring gull	0.02	0	0.05	6	0	18	6	97.15
		Guillemot	1.86	1.05	2.73	679	382	995	156	22.86
		Razorbill	1.09	0.42	1.9	397	152	692	140	35.13
		Puffin	0.29	0.13	0.46	105	47	166	32	29.68
		Gannet	0.02	0	0.05	7	0	18	6	95.26
Aug-23	1	Kittiwake	1.13	0.61	1.8	411	223	655	108	26.15
		Great black-backed gull	0.02	0	0.05	7	0	18	6	93.55
		Guillemot	9.28	8.13	10.47	3381	2964	3816	220	6.5
		Razorbill	3.38	1.48	6.35	1231	539	2314	483	39.17
		Puffin	0.93	0.54	1.43	339	199	520	86	25.22
		Fulmar	0.09	0	0.22	32	0	80	23	72.54
		Gannet	0.28	0.09	0.52	103	34	190	42	39.96

Table 0-3 Overview of apportioned flying survey data for the WTG area. These data do not account for auk availability bias. Further information can be found in Annex C - Availability bias counts for Auks.

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
Mar-21	1	Kittiwake	1.62	0.93	2.43	592	340	886	138	23.26
		Black-headed gull	0.02	0	0.05	6	0	18	6	100.11
		Great black-backed gull	0.02	0	0.05	7	0	18	6	89.72
		Herring gull	0.02	0	0.05	6	0	18	6	92.46
		Guillemot	0.34	0.1	0.63	125	36	228	50	39.68
		Razorbill	0.26	0.11	0.42	94	40	155	32	33.57
		Puffin	0.04	0	0.12	15	0	44	12	80.64
		Red-throated diver	0.02	0	0.05	7	0	18	6	90.64
		Gannet	0.19	0.08	0.31	68	29	113	22	31.93
Apr-21	1	Kittiwake	5.04	3.67	6.59	1837	1339	2402	283	15.39
		Common gull	0.02	0	0.05	7	0	18	6	90.17
		Lesser black-backed gull	0.07	0.02	0.12	25	6	45	10	39.18
		Guillemot	1.13	0.46	1.87	411	170	682	131	31.85
		Razorbill	0.38	0.13	0.66	138	48	242	49	35.59

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Fulmar	0.07	0.02	0.13	25	6	49	12	47.28
		Gannet	0.58	0.4	0.77	212	148	282	34	15.72
May-21	1	Kittiwake	0.65	0.29	1.18	237	107	432	91	38.15
		Common gull	0.02	0	0.05	7	0	19	6	94.76
		Lesser black-backed gull	0.02	0	0.05	7	0	18	6	95.26
		Sandwich tern	0.34	0.21	0.5	124	77	182	26	20.97
		Common tern	0.17	0.08	0.27	63	30	99	18	28.49
		Guillemot	0.03	0	0.08	13	0	30	9	68.35
		Razorbill	0.05	0	0.13	19	0	47	13	70.99
		Gannet	0.1	0	0.21	36	0	78	20	55.95
Jun-21	1	Kittiwake	0.41	0.18	0.68	152	66	248	47	30.93
		Common gull	0.02	0	0.05	7	0	18	6	88.72
		Herring gull	0.08	0	0.22	31	0	80	23	73.74
		Lesser black-backed gull	0.05	0	0.15	18	0	54	17	92.07
		Sandwich tern	0.03	0	0.08	12	0	29	8	64.16
		Common tern	0.03	0	0.1	12	0	36	12	97.21
		Guillemot	0.03	0	0.08	12	0	29	8	63.93
		Razorbill	0.03	0	0.08	12	0	29	8	66.7

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Gannet	0.08	0	0.21	30	0	77	23	74.7
Jul-21	1	Kittiwake	1.77	1.22	2.43	647	445	887	112	17.32
		Black-headed gull	0.02	0	0.05	7	0	18	6	92.78
		Little gull	0.03	0	0.1	13	0	36	12	93.98
		Herring gull	0.02	0	0.05	7	0	18	6	95.19
		Lesser black-backed gull	0.02	0	0.05	6	0	18	6	93.06
		Guillemot	0.21	0.06	0.42	79	24	153	35	43.82
		Razorbill	0.08	0.03	0.15	31	12	54	11	36.23
		Fulmar	0.08	0.02	0.16	31	6	58	13	43
		Gannet	0.1	0.03	0.18	37	12	65	14	36.16
Aug-21	1	Oystercatcher	0.1	0	0.29	36	0	107	34	91.98
		Kittiwake	1.07	0.68	1.53	390	250	557	78	19.97
		Little gull	0.02	0	0.05	7	0	18	6	90.01
		Common tern	0.18	0.01	0.46	66	6	169	43	65.97
		Arctic tern	0.01	0	0.02	3	1	7	2	63.34
		Gannet	0.13	0.05	0.22	49	18	80	16	31.71
Sep-21	1	Kittiwake	0.8	0.52	1.1	290	189	402	54	18.32
		Little gull	0.17	0.06	0.28	62	24	101	20	31.02

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Great black-backed gull	0.07	0.01	0.14	24	6	51	13	52.49
		Sandwich tern	0.03	0	0.08	13	0	29	8	58.99
		Common tern	2.69	1.61	3.87	982	589	1412	220	22.36
		Arctic tern	0.07	0.02	0.14	25	7	51	12	47.45
		Arctic skua	0.03	0	0.08	12	0	29	8	61.64
		Gannet	0.03	0	0.08	12	0	29	8	61.51
Oct-21	1	Kittiwake	0.08	0.03	0.13	30	12	49	11	34.39
		Black-headed gull	0.05	0	0.13	18	0	47	13	70.37
		Little gull	0.4	0.21	0.59	146	77	215	36	24.22
		Common gull	0.05	0	0.11	18	0	40	10	54.14
		Great black-backed gull	0.02	0	0.05	7	0	18	6	89.27
		Lesser black-backed gull	0.02	0	0.05	7	0	18	6	89.29
		Arctic skua	0.02	0	0.05	6	0	19	6	97.22
		Guillemot	0.41	0.07	0.97	149	24	355	90	60.3
		Razorbill	0.21	0	0.64	76	0	232	72	94.71
		Puffin	0.02	0	0.05	7	0	18	6	96.72

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Gannet	0.1	0.03	0.17	37	13	63	13	34.68
Nov-21	1	Kittiwake	0.17	0.08	0.26	61	30	96	17	27.69
		Great black-backed gull	0.07	0.02	0.12	25	6	43	10	39.51
		Lesser black-backed gull	0.02	0	0.05	7	0	18	6	90.05
		Guillemot	0.16	0.07	0.27	58	26	99	20	34.01
		Razorbill	0.07	0.02	0.15	27	6	54	13	46.59
		Gannet	0.08	0.03	0.14	31	12	53	11	36.28
Dec-21	1	Kittiwake	0.33	0.2	0.47	121	72	171	25	20.54
		Great black-backed gull	0.02	0	0.05	7	0	18	6	89.89
		Guillemot	0.13	0.05	0.23	48	18	83	18	36.27
		Red-throated diver	0.02	0	0.05	7	0	18	6	92.19
		Fulmar	0.02	0	0.05	7	0	18	6	93.78
		Shag	0.02	0	0.05	7	0	18	6	90.05
Jan-22	1	Kittiwake	0.11	0.05	0.19	42	18	71	15	33.87
		Great black-backed gull	0.02	0	0.05	7	0	18	6	97.31
		Herring gull	0.02	0	0.05	7	0	19	6	97.71

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Guillemot	0.03	0	0.08	12	0	29	8	63.11
		Fulmar	0.03	0	0.08	13	0	30	8	65.06
		Gannet	0.02	0	0.05	7	0	18	6	91.42
Feb-22	1	Kittiwake	0.52	0.23	0.81	189	85	295	54	28.1
		Common gull	0.02	0	0.05	7	0	18	6	97.84
		Guillemot	0.36	0.15	0.62	132	54	227	45	33.71
		Fulmar	0.02	0	0.05	6	0	18	6	93.01
		Gannet	0.02	0	0.05	6	0	18	6	97.59
		Shag	0.02	0	0.05	6	0	18	6	98.73
Mar-22	1	Kittiwake	3.39	1.79	5.43	1237	651	1981	348	28.09
		Little gull	0.02	0	0.05	7	0	19	7	100.84
		Common gull	0.08	0.02	0.16	30	6	61	15	48.85
		Lesser black-backed gull	0.03	0	0.08	13	0	30	9	67.24
		Guillemot	0.33	0.17	0.51	119	61	187	33	27.35
		Razorbill	0.21	0.05	0.4	79	18	146	34	42.57
		Gannet	0.15	0.03	0.3	56	12	109	26	46.58
	2	Kittiwake	1.87	1.29	2.58	682	471	939	117	17.06
		Little gull	0.03	0	0.1	12	0	37	12	99.3
		Guillemot	0.57	0.26	0.94	208	97	344	63	30.18

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Razorbill	0.02	0	0.05	7	0	18	6	93.57
		Puffin	0	0	0.01	2	0	4	2	98.6
		Gannet	0.07	0.02	0.12	25	6	46	10	39.99
Apr-22	1	Kittiwake	2.05	1.6	2.46	746	585	896	82	10.89
		Herring gull	0.03	0	0.1	12	0	36	12	94.82
		Lesser black-backed gull	0.02	0	0.05	6	0	18	6	95.27
		Guillemot	3.48	2.61	4.34	1267	952	1581	158	12.4
		Razorbill	0.5	0.25	0.78	183	90	283	51	27.44
		Red-throated diver	0.02	0	0.05	7	0	18	6	93.65
		Fulmar	0.13	0.03	0.25	49	12	91	21	42.21
		Gannet	0.23	0.11	0.38	86	41	139	25	28.91
	2	Kittiwake	5.56	3.73	7.54	2026	1359	2749	352	17.36
		Herring gull	0.02	0	0.05	6	0	18	6	99.13
		Lesser black-backed gull	0.02	0	0.05	7	0	18	6	90.71
		Sandwich tern	0.24	0.06	0.45	86	24	166	37	42.6
		Common tern	0.12	0.03	0.24	44	12	88	21	46.31
		Arctic tern	0.05	0	0.11	18	0	39	10	53.49

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Guillemot	1.01	0.54	1.51	370	199	553	95	25.55
		Razorbill	0.29	0.02	0.71	105	6	258	67	63.57
		Fulmar	0.03	0	0.08	13	0	30	8	63.8
		Gannet	0.57	0.27	0.97	209	97	354	67	31.99
May-22	1	Kittiwake	3.32	2.48	4.51	1211	905	1644	190	15.62
		Herring gull	0.03	0	0.08	13	0	30	8	65.04
		Sandwich tern	0.1	0	0.23	37	0	84	22	58.33
		Arctic tern	0.13	0.05	0.22	49	18	81	16	32.23
		Guillemot	0.06	0	0.14	24	0	53	14	55.71
		Razorbill	0.16	0	0.49	61	0	179	56	92.94
		Fulmar	0.03	0	0.08	13	0	29	8	61.17
		Gannet	0.66	0.4	1	242	146	366	58	24
	2	Kittiwake	0.84	0.5	1.16	306	184	423	63	20.31
		Herring gull	0.02	0	0.05	6	0	18	6	95.34
		Sandwich tern	0.19	0.07	0.34	71	24	125	26	36.2
		Common tern	0.18	0.05	0.35	67	17	129	30	43.91
		Arctic tern	0	0	0	1	0	1	1	97
		Guillemot	0.08	0	0.17	30	0	64	17	54.79
		Gannet	0.08	0.02	0.16	30	6	60	14	46.52
Jun-22	1	Kittiwake	0.31	0.18	0.47	114	65	172	28	24.15

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Sandwich tern	0.2	0.03	0.48	74	12	174	43	57.65
		Guillemot	0.07	0.02	0.11	24	6	42	10	39.31
		Puffin	0.02	0	0.06	7	0	23	7	98.3
		Fulmar	0.02	0	0.05	6	0	18	6	90.84
		Gannet	0.1	0	0.24	37	0	87	24	65.7
	2	Curlew	0.02	0	0.05	6	0	18	6	96.13
		Kittiwake	1.87	1.23	2.68	683	448	977	140	20.39
		Great black-backed gull	0.02	0	0.05	6	0	18	6	97.21
		Herring gull	0.03	0	0.1	12	0	36	11	96.17
		Lesser black-backed gull	0.02	0	0.05	6	0	18	6	95.96
		Sandwich tern	0.05	0	0.1	18	0	36	9	49.24
		Common tern	0.02	0	0.05	6	0	19	7	102.11
		Guillemot	0.02	0	0.05	6	0	18	6	101.11
		Fulmar	0.07	0.02	0.13	24	6	48	13	52.67
		Manx shearwater	0.02	0	0.05	7	0	18	6	94.26
		Gannet	0.12	0.03	0.21	43	11	78	19	42.84
Jul-22	1	Kittiwake	0.35	0.21	0.55	127	78	200	33	25.8
		Herring gull	0.05	0	0.13	19	0	46	13	67.87

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Lesser black-backed gull	0.03	0	0.1	13	0	36	12	92.15
		Guillemot	0.05	0	0.13	19	0	47	13	68.47
		Razorbill	0.03	0	0.1	13	0	36	12	92.59
		Gannet	0.13	0.02	0.29	48	6	107	28	57.34
	2	Curlew	0.02	0	0.05	6	0	18	6	94.72
		Kittiwake	0.64	0.44	0.89	235	161	325	45	18.78
		Black-headed gull	0.02	0	0.05	6	0	18	6	96.08
		Common gull	0.03	0	0.08	13	0	30	8	62.32
		Lesser black-backed gull	0.02	0	0.05	6	0	18	6	90.98
		Common tern	0.03	0	0.08	13	0	30	9	67.35
		Guillemot	0.08	0	0.17	30	0	63	16	53.29
		Razorbill	0.05	0	0.13	19	0	49	14	72.54
		Puffin	0.02	0	0.05	6	0	18	6	90.84
		Gannet	0.28	0.14	0.43	102	53	158	27	26.49
Aug-22	1	Kittiwake	2.12	0.88	3.61	773	321	1317	260	33.56
		Great black-backed gull	0.03	0	0.1	12	0	36	12	99.67

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Lesser black-backed gull	0.15	0	0.34	54	0	126	34	63.39
		Common tern	0.18	0	0.49	68	0	179	50	74.5
		Arctic tern	0.03	0	0.08	12	0	31	10	87.33
		Guillemot	0.02	0	0.05	6	0	18	6	92.26
		Manx shearwater	0.05	0	0.12	18	0	43	12	67.1
		Gannet	0.17	0.05	0.33	61	18	120	28	44.43
	2	Curlew	0.03	0	0.1	13	0	36	12	92.85
		Kittiwake	0.18	0.06	0.32	67	24	119	24	36.03
		Little gull	0.02	0	0.05	7	0	18	6	97.03
		Common tern	0.03	0	0.08	12	0	30	8	65.87
		Gannet	0.05	0.02	0.1	18	6	35	9	45.34
Sep-22	1	Kittiwake	0.28	0.08	0.53	102	29	195	44	42.38
		Little gull	0.36	0.19	0.57	133	70	209	36	26.83
		Common tern	0.03	0	0.1	12	0	36	11	93.55
		Guillemot	0.08	0.03	0.15	31	12	54	12	39.69
		Razorbill	0.03	0	0.08	13	0	29	8	63.95
		Sooty shearwater	0.02	0	0.05	7	0	18	6	94.83
		Manx shearwater	0.05	0	0.14	19	0	52	14	74.01
		Gannet	0.05	0	0.13	18	0	46	13	71.52

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
	2	Kittiwake	0.03	0	0.1	13	0	36	12	91.05
		Little gull	0.1	0	0.23	35	0	85	23	63.82
		Great black-backed gull	0.02	0	0.05	6	0	18	6	97.81
		Razorbill	0.02	0	0.05	7	0	18	6	96.41
		Gannet	0.14	0.03	0.32	53	12	116	29	53.54
Oct-22	1	Kittiwake	0.24	0.15	0.35	89	53	127	20	21.53
		Black-headed gull	0.07	0	0.19	26	0	69	20	76.23
		Little gull	0	0	0	1	0	2	1	95.22
		Common gull	0.03	0	0.08	13	1	29	8	61.8
		Guillemot	0.29	0.11	0.5	107	40	184	38	34.8
		Razorbill	0.04	0.01	0.08	14	3	30	8	51.26
		Gannet	0.25	0.14	0.37	90	52	135	22	23.41
Nov-22	1	Kittiwake	0.3	0.19	0.42	110	70	153	23	20.29
		Little gull	0.03	0	0.1	12	0	37	12	101.21
		Great black-backed gull	0.02	0	0.05	6	0	18	6	93.8
		Herring gull	0.02	0	0.05	6	0	18	6	93.72
		Pomarine skua	0.02	0	0.05	6	0	18	6	96.52

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Guillemot	0.03	0	0.1	13	0	36	12	93.1
		Razorbill	0.02	0	0.05	7	0	19	6	90.03
		Gannet	0.73	0.46	1.03	268	167	374	55	20.56
Dec-22	1	Kittiwake	0.59	0.41	0.78	216	151	285	34	15.76
		Common gull	0.05	0	0.11	19	0	40	10	52.15
		Great black-backed gull	0.05	0	0.1	18	0	36	10	51.77
		Herring gull	0.07	0.02	0.13	24	6	47	11	45.1
		Guillemot	0.6	0.28	0.97	219	104	355	66	30.15
		Razorbill	0.11	0.03	0.2	42	12	74	16	38.17
Jan-23	1	Kittiwake	0.74	0.3	1.33	271	110	484	96	35.44
		Common gull	0.06	0	0.18	24	0	65	19	76.58
		Great black-backed gull	0.17	0.02	0.44	63	6	159	43	67.63
		Herring gull	0.03	0	0.1	13	0	37	11	84.88
		Guillemot	0.22	0	0.66	82	0	241	74	90.02
		Razorbill	0.02	0	0.05	7	0	20	7	91.55
		Fulmar	0.15	0	0.45	55	0	163	54	98.7
		Gannet	0.05	0	0.11	18	0	41	10	54.74
Feb-23	1	Kittiwake	1.12	0.73	1.57	410	267	572	79	19.13

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Common gull	0.05	0.02	0.1	19	6	36	9	46.53
		Guillemot	0.12	0.01	0.27	46	6	97	25	54.17
		Razorbill	0.4	0.12	0.76	147	45	277	60	40.6
		Gannet	0.17	0.11	0.23	61	40	83	12	19.75
Mar-23	1	Kittiwake	1.73	1.09	2.52	633	398	917	138	21.7
		Common gull	0.03	0	0.08	12	0	30	8	66.23
		Great black-backed gull	0.02	0	0.05	6	0	18	6	97.31
		Guillemot	1.32	0.94	1.7	481	343	621	71	14.72
		Razorbill	0.91	0.65	1.2	331	238	438	53	16
		Puffin	0.02	0	0.06	7	0	23	7	96.99
		Gannet	0.13	0.05	0.22	48	18	82	17	33.86
Apr-23	1	Kittiwake	2.33	1.65	3.06	851	603	1115	128	14.98
		Common gull	0.1	0.02	0.23	37	6	83	21	54.62
		Common tern	0.02	0	0.06	7	0	23	7	97.14
		Arctic tern	0.02	0	0.05	6	0	18	6	95.45
		Guillemot	0.08	0	0.21	31	0	78	20	62.08
		Razorbill	0.07	0	0.15	24	0	57	15	61.25
		Red-throated diver	0.02	0	0.05	7	0	18	6	93.27

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Gannet	0.13	0.05	0.24	49	17	88	19	38.54
May-23	1	Kittiwake	0.24	0.08	0.43	90	28	158	35	38.49
		Sandwich tern	0.41	0.23	0.61	150	85	221	35	22.86
		Common tern	0.2	0.06	0.35	73	24	128	26	35.5
		Guillemot	0.05	0	0.1	19	0	36	9	46.59
		Razorbill	0.03	0	0.1	13	0	36	12	89.88
		Puffin	0.03	0	0.1	12	0	36	12	97.03
		Fulmar	0.02	0	0.05	7	0	18	6	94.23
Jun-23	1	Curlew	0.02	0	0.05	7	0	19	7	96.61
		Kittiwake	0.91	0.63	1.22	333	230	445	57	17.06
		Herring gull	0.17	0.05	0.34	62	18	125	30	47.71
		Lesser black-backed gull	0.2	0.11	0.3	74	41	109	18	24.09
		Guillemot	0.02	0	0.05	6	0	18	6	99.55
		Puffin	0.02	0	0.05	7	0	18	6	88.38
		Fulmar	0.03	0	0.08	13	0	30	8	63.19
		Gannet	0.2	0.1	0.32	74	36	117	22	29.33
Jul-23	1	Kittiwake	0.07	0.02	0.15	25	6	53	14	52.62
		Sandwich tern	0.02	0	0.05	7	0	18	6	89.46
		Guillemot	0.05	0.01	0.1	18	6	35	9	46.58

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Razorbill	0.05	0	0.12	18	0	42	12	67.7
Aug-23	1	Kittiwake	0.67	0.46	0.91	246	167	334	44	17.54
		Black-headed gull	0.05	0	0.13	19	0	47	13	67.05
		Great black-backed gull	0.02	0	0.05	6	0	18	6	92.12
		Lesser black-backed gull	0.02	0	0.05	7	0	18	6	91.89
		Sandwich tern	0.03	0	0.1	13	0	36	12	88.02
		Common tern	0.08	0.03	0.14	30	12	52	11	34.35
		Arctic tern	0	0	0	1	0	1	1	91.93
		Great skua	0.02	0	0.05	7	0	18	6	90.32
		Guillemot	0.03	0	0.08	12	0	29	8	65.63
		Razorbill	0.03	0	0.08	13	0	30	8	66.53
		Fulmar	0.07	0.02	0.13	24	6	47	11	41.96
		Manx shearwater	0.02	0	0.05	7	0	18	6	90.6
		Gannet	0.17	0.07	0.27	62	24	99	19	29.7

Table 0-4. Overview of apportioned total survey data for the WTG area +2km buffer. These data do not account for auk availability bias. Further information can be found in Annex C - Availability bias counts for Auks.

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
Mar-21	1	Kittiwake	6.56	4.87	8.39	3597	2673	4603	504	14.01
		Black-headed gull	0.01	0	0.03	6	0	18	6	95.44
		Common gull	0.01	0	0.03	7	0	18	6	92.7
		Great black-backed gull	0.02	0	0.05	12	0	30	8	65.04
		Herring gull	0.01	0	0.03	6	0	18	6	93.91
		Little auk	0	0	0	2	2	3	1	17.15
		Guillemot	8.2	6.73	10.02	4500	3692	5497	452	10.04
		Razorbill	5.43	4.58	6.26	2982	2512	3435	235	7.87
		Puffin	0.32	0.23	0.41	175	125	225	26	14.84
		Red-throated diver	0.41	0.23	0.6	223	127	331	53	23.62
		Fulmar	0.03	0	0.06	16	0	36	9	52.94
		Gannet	0.33	0.11	0.61	180	59	336	73	40.58
Apr-21	1	Kittiwake	11.54	8.89	14.31	6331	4880	7849	753	11.89
		Common gull	0.02	0	0.05	12	0	29	8	62.79
		Great black-backed gull	0.05	0.02	0.1	29	11	53	12	39.44

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Herring gull	0.02	0	0.06	13	0	31	9	62.84
		Lesser black-backed gull	0.04	0.01	0.08	24	6	42	10	41.53
		Sandwich tern	0.01	0	0.03	6	0	18	6	95.25
		Guillemot	26.69	19.89	35.67	14642	10915	19571	2187	14.94
		Razorbill	9.27	5.54	13.97	5085	3040	7666	1169	22.98
		Puffin	0.05	0.01	0.09	26	8	49	11	39.16
		Red-throated diver	0.32	0.18	0.48	178	97	265	43	23.96
		Great northern diver	0.01	0	0.03	7	0	18	6	93.34
		Fulmar	0.06	0.02	0.11	36	12	60	12	33.57
		Gannet	0.87	0.63	1.16	479	345	638	76	15.86
May-23	1	Kittiwake	2.51	1.06	4.83	1379	583	2648	572	41.42
		Common gull	0.01	0	0.03	7	0	18	6	90.9
		Great black-backed gull	0.01	0	0.03	6	0	18	6	99.51
		Lesser black-backed gull	0.01	0	0.03	6	0	18	6	95.41
		Sandwich tern	0.34	0.21	0.46	185	117	255	35	18.88
		Common tern	0.23	0.13	0.36	128	70	201	33	25.62

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Guillemot	5.76	4.31	7.9	3160	2366	4335	504	15.95
		Razorbill	0.62	0.33	0.92	338	181	506	85	24.86
		Puffin	0.03	0.01	0.08	19	5	43	12	58.9
		Red-throated diver	0.02	0	0.05	12	0	30	8	65.34
		Gannet	0.09	0.02	0.16	48	12	89	20	41.63
Jun-21	1	Kittiwake	1.13	0.55	2.02	620	302	1111	217	34.89
		Black-headed gull	0.01	0	0.03	7	0	18	6	89.92
		Little gull	0.01	0	0.03	7	0	18	6	95.63
		Common gull	0.02	0	0.05	12	0	29	8	67.63
		Herring gull	0.06	0.01	0.15	36	6	84	24	65.57
		Lesser black-backed gull	0.03	0	0.1	19	0	54	17	90.92
		Sandwich tern	0.03	0	0.09	18	0	48	13	72.12
		Common tern	0.03	0	0.08	18	0	43	12	63.16
		Arctic tern	0.02	0	0.05	13	0	29	7	57.47
		Guillemot	1.35	0.98	1.73	741	539	951	109	14.72
		Razorbill	0.27	0.16	0.39	147	90	215	33	21.89
		Puffin	0.04	0.01	0.07	20	6	41	10	48.87
		Fulmar	0.04	0.01	0.08	24	6	46	11	45.87
		Gannet	0.1	0.02	0.2	54	12	110	25	46.04

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
Jul-21	1	Kittiwake	3.55	1.87	6.1	1950	1026	3346	622	31.89
		Black-headed gull	0.01	0	0.03	6	0	18	6	98.35
		Little gull	0.02	0	0.07	13	0	37	13	99.1
		Common gull	0.01	0	0.03	7	0	18	6	95.63
		Herring gull	0.02	0	0.05	13	0	30	8	64.54
		Lesser black-backed gull	0.03	0	0.07	19	0	36	9	48.43
		Guillemot	9.6	6.74	13.13	5268	3698	7202	902	17.12
		Razorbill	2.92	1.4	4.96	1602	771	2723	497	30.98
		Puffin	0.33	0.22	0.43	182	123	238	30	16.23
		Fulmar	0.12	0.04	0.2	67	24	112	23	34.05
		Manx shearwater	0.04	0	0.09	20	0	48	13	64.72
		Gannet	0.24	0.07	0.51	133	40	280	64	47.9
Aug-21	1	Kittiwake	5.19	1.41	11.84	2847	776	6498	1584	55.63
		Oystercatcher	0.09	0	0.23	48	0	128	36	74.84
		Little gull	0.01	0	0.03	6	0	18	6	93.21
		Common tern	0.23	0.03	0.53	125	17	294	74	58.93
		Arctic tern	0.01	0	0.02	5	1	12	4	60.67
		Great skua	0.02	0	0.05	13	0	30	9	64.47
		Guillemot	19.67	9.56	32.49	10793	5246	17827	3041	28.17

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Razorbill	3.19	1.02	6.27	1749	562	3443	729	41.67
		Puffin	1.94	1.26	2.72	1066	690	1494	218	20.42
		Fulmar	0.03	0	0.09	19	0	48	14	71.67
		Gannet	0.2	0.11	0.28	109	63	155	24	22.06
Sep-21	1	Kittiwake	2.87	1.61	4.46	1574	882	2448	395	25.08
		Little gull	0.16	0.09	0.24	90	52	134	22	23.95
		Common gull	0	0	0	1	1	1	1	53.35
		Great black-backed gull	0.16	0.08	0.25	90	46	138	24	26.8
		Lesser black-backed gull	0.05	0.02	0.09	30	12	51	11	35.42
		Sandwich tern	0.02	0	0.05	13	1	30	8	58.77
		Common tern	4.4	3.23	5.8	2414	1772	3180	358	14.81
		Arctic tern	0.06	0.02	0.12	34	9	68	16	45.82
		Arctic skua	0.06	0.01	0.12	31	6	65	15	48.03
		Guillemot	21.56	16.77	27.55	11829	9201	15117	1498	12.66
		Razorbill	1.71	1.14	2.29	939	628	1256	159	16.88
		Puffin	1.4	1.09	1.72	770	601	947	88	11.34
		Fulmar	0.02	0	0.05	12	0	30	8	65.99
		Gannet	0.16	0.09	0.24	90	50	132	22	23.86
Oct-21	1	Kittiwake	0.15	0.06	0.26	84	36	141	28	32.6

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Black-headed gull	0.04	0	0.1	24	0	53	13	54.1
		Little gull	0.62	0.41	0.88	342	225	481	67	19.55
		Common gull	0.04	0.01	0.09	25	6	48	11	43.93
		Great black-backed gull	0.15	0.01	0.39	84	6	214	61	73.29
		Herring gull	0.01	0	0.03	6	0	18	6	99.85
		Lesser black-backed gull	0.01	0	0.03	7	0	18	6	92.58
		Arctic skua	0.01	0	0.03	6	0	18	6	97.5
		Guillemot	7.76	6.35	9.13	4257	3486	5012	403	9.47
		Razorbill	1.18	0.71	1.8	647	388	986	153	23.61
		Puffin	1.48	1.15	1.93	811	629	1057	107	13.14
		Red-throated diver	0.03	0	0.07	19	0	37	10	51.33
		Gannet	0.22	0.12	0.33	120	68	180	29	23.98
Nov-21	1	Kittiwake	0.24	0.15	0.33	132	81	184	27	19.76
		Great black-backed gull	0.07	0.01	0.14	37	6	77	18	49.47
		Lesser black-backed gull	0.01	0	0.03	6	0	18	6	94.55
		Guillemot	6.34	5.14	7.72	3478	2820	4235	364	10.45

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Razorbill	2.99	2.23	3.79	1640	1225	2080	220	13.42
		Puffin	0.64	0.51	0.77	349	282	421	36	10.13
		Red-throated diver	0.01	0	0.03	7	0	18	6	95.11
		Gannet	0.3	0.15	0.49	166	83	269	51	30.63
Dec-21	1	Kittiwake	0.35	0.21	0.49	191	113	272	42	21.57
		Great black-backed gull	0.08	0.03	0.13	43	17	74	16	36.23
		Guillemot	3.5	3.06	3.99	1919	1678	2189	134	6.95
		Razorbill	2.79	2.02	3.63	1530	1106	1989	233	15.18
		Puffin	0.06	0.03	0.12	36	16	66	13	36.44
		Red-throated diver	0.02	0	0.05	13	0	30	8	65.67
		Fulmar	0.04	0	0.1	24	0	53	13	54.45
		Shag	0.02	0	0.05	13	0	30	8	64.32
Jan-22	1	Great black-backed gull	0.04	0.01	0.08	24	6	46	10	41.37
		Herring gull	0.02	0	0.05	13	0	30	9	65.7
		Guillemot	0.59	0.39	0.79	323	217	433	57	17.38
		Razorbill	0.72	0.41	1.05	393	227	578	91	22.99
		Fulmar	0.03	0	0.08	18	0	46	13	68.89

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Gannet	0.01	0	0.03	6	0	18	6	96.18
		Kittiwake	0.15	0.06	0.27	85	35	149	29	33.32
Feb-22	1	Common gull	0.01	0	0.03	6	0	18	6	98.02
		Great black-backed gull	0.01	0	0.03	6	0	18	6	95.44
		Guillemot	5.38	4.35	6.6	2953	2388	3622	326	11.04
		Razorbill	6.48	5.47	7.58	3554	3004	4158	298	8.37
		Puffin	0.01	0	0.01	4	2	7	2	32.7
		Red-throated diver	0.03	0.01	0.06	18	6	36	9	49.37
		Fulmar	0.02	0	0.05	10	0	30	10	95.29
		Gannet	0.04	0.01	0.09	25	6	52	12	48.29
		Shag	0.01	0	0.04	7	0	23	7	100.15
		Kittiwake	1.06	0.79	1.33	584	436	731	78	13.19
Mar-22	1	Little gull	0.01	0	0.03	7	0	18	7	97.76
		Common gull	0.18	0.07	0.3	98	41	165	33	32.87
		Great black-backed gull	0.02	0	0.05	12	0	30	8	66.52
		Herring gull	0.01	0	0.03	6	0	18	6	101.32
		Lesser black-backed gull	0.05	0	0.12	30	0	69	18	59.76

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		Guillemot	8.41	6.08	11.27	4612	3337	6186	727	15.76
		Razorbill	3.85	2.43	5.38	2114	1336	2951	406	19.19
		Puffin	0.48	0.3	0.68	261	167	373	56	21.37
		Red-throated diver	0.07	0.02	0.12	36	12	64	14	36.84
		Gannet	0.28	0.11	0.5	157	63	273	55	34.95
		Shag	0.01	0	0.03	6	0	18	6	94.09
		Kittiwake	5.65	3.49	8.35	3103	1916	4579	685	22.08
	2	Little gull	0.02	0	0.07	13	0	36	12	95.31
		Guillemot	10.27	8.47	12.4	5638	4648	6805	571	10.13
		Razorbill	1.7	1.22	2.18	935	671	1196	137	14.55
		Puffin	0.19	0.12	0.27	107	68	149	22	20.14
		Red-throated diver	0.21	0.11	0.32	115	61	174	30	25.53
		Fulmar	0.05	0	0.11	30	0	61	16	51.1
		Gannet	0.13	0.05	0.22	74	30	120	25	32.7
		Kittiwake	3.95	3.13	4.83	2166	1720	2650	240	11.07
Apr-22	1	Great black-backed gull	0.02	0	0.07	13	0	36	12	98.28
		Herring gull	0.03	0	0.09	18	0	48	13	72.09

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		Lesser black-backed gull	0.02	0	0.05	12	0	30	8	65.97
		Guillemot	29.66	24.08	35.71	16273	13213	19593	1587	9.75
		Razorbill	2.36	1.85	2.88	1295	1016	1581	145	11.12
		Puffin	0.04	0.01	0.08	25	8	46	10	40.32
		Red-throated diver	0.38	0.16	0.62	211	89	341	64	30.19
		Fulmar	0.18	0.09	0.29	97	47	160	29	29.91
		Manx shearwater	0.02	0	0.05	12	0	30	8	64.36
		Gannet	0.42	0.23	0.62	229	127	340	57	24.63
		Kittiwake	6.52	4.78	8.54	3579	2625	4686	537	15
	2	Great black-backed gull	0.01	0	0.03	6	0	18	6	102.57
		Herring gull	0.01	0	0.03	6	0	18	6	98.72
		Lesser black-backed gull	0.02	0	0.05	12	0	30	9	71.33
		Sandwich tern	0.28	0.12	0.48	157	69	263	51	32.27
		Common tern	0.16	0.07	0.27	90	39	146	28	30.28
		Arctic tern	0.06	0.02	0.09	31	13	53	11	33.46
		Guillemot	15.01	10.38	19.61	8235	5697	10762	1278	15.52
		Razorbill	1.55	1.04	2.11	849	569	1157	152	17.85

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		Puffin	0.14	0.07	0.22	77	39	121	22	28.2
		Red-throated diver	0.07	0.02	0.11	37	12	60	13	33.29
		Fulmar	0.08	0.02	0.14	42	12	75	17	39.87
		Gannet	2.26	1.28	3.41	1240	705	1870	296	23.87
		Kittiwake	10.18	7.76	12.53	5588	4255	6875	669	11.97
May-22	1	Common gull	0.01	0	0.04	7	0	23	7	92.66
		Herring gull	0.02	0	0.05	13	0	30	9	68.33
		Lesser black-backed gull	0.05	0	0.11	25	0	58	15	57.49
		Sandwich tern	0.28	0.09	0.53	154	47	289	62	40.05
		Arctic tern	0.16	0.09	0.24	90	52	130	21	22.69
		Guillemot	16.76	13.49	20.39	9196	7399	11188	1001	10.88
		Razorbill	3.43	2.6	4.29	1885	1429	2356	243	12.85
		Puffin	0.45	0.28	0.63	246	152	344	52	20.94
		Red-throated diver	0.01	0	0.03	7	0	18	6	91.28
		Fulmar	0.11	0.04	0.19	60	24	106	21	35.11
		Gannet	1.58	1.16	2.06	867	639	1128	126	14.52
		Kittiwake	7.46	6.01	8.9	4094	3299	4882	405	9.89

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	2	Great black-backed gull	0.01	0	0.03	6	0	19	6	98.49
		Herring gull	0.01	0	0.03	6	0	18	6	96.03
		Sandwich tern	0.17	0.09	0.27	91	48	147	27	29.11
		Common tern	0.24	0.1	0.43	134	54	237	46	34.12
		Arctic tern	0.01	0	0.04	8	1	21	7	84.71
		Guillemot	5.03	3.77	6.81	2758	2067	3737	444	16.07
		Razorbill	0.44	0.26	0.62	239	144	338	52	21.5
		Puffin	0.02	0	0.04	9	1	21	6	66.42
		Gannet	0.18	0.1	0.26	98	53	143	23	22.86
		Kittiwake	3.89	2.35	6.51	2136	1292	3574	660	30.9
Jun-22	1	Great black-backed gull	0.03	0	0.08	19	0	45	13	66.8
		Herring gull	0.04	0	0.12	25	0	66	18	73.81
		Lesser black-backed gull	0.03	0	0.09	19	0	48	13	69.58
		Sandwich tern	0.23	0.09	0.42	127	48	230	46	36.08
		Common tern	0.04	0	0.12	24	0	64	18	75.33
		Guillemot	2.74	1.32	5.18	1506	724	2843	631	41.89
		Razorbill	0.45	0.15	0.88	245	85	486	105	42.69
		Puffin	0.05	0.01	0.11	30	9	61	14	45.58

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		Fulmar	0.02	0	0.05	12	0	26	7	53.8
		Gannet	0.23	0.12	0.35	125	64	191	32	25.54
		Kittiwake	1.45	0.51	3.16	794	279	1732	398	50.05
	2	Curlew	0.01	0	0.03	6	0	18	6	99.38
		Kittiwake	4.92	2.94	7.65	2701	1614	4195	672	24.85
		Great black-backed gull	0.02	0	0.05	13	0	30	8	63.26
		Herring gull	0.39	0.12	0.74	213	66	409	90	42.14
		Lesser black-backed gull	0.03	0.01	0.07	19	6	36	10	50.02
		Sandwich tern	0.08	0.02	0.14	42	12	79	17	40.03
		Common tern	0.01	0	0.03	6	0	18	6	94.41
		Guillemot	4.35	3.29	5.68	2390	1803	3116	331	13.83
		Razorbill	0.28	0.09	0.57	153	48	312	69	45.1
		Fulmar	0.08	0.03	0.14	42	17	77	16	38.04
		Manx shearwater	0.01	0	0.03	6	0	18	6	97.53
		Gannet	0.74	0.36	1.2	407	195	661	121	29.75
Jul-22	1	Curlew	0.01	0	0.03	6	0	18	6	96.56
		Kittiwake	0.65	0.48	0.82	356	261	452	49	13.58
		Herring gull	0.07	0	0.17	37	0	92	26	68.65

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		Lesser black-backed gull	0.02	0	0.07	13	0	37	12	97.28
		Guillemot	2.03	1.39	2.71	1116	761	1487	185	16.56
		Razorbill	0.1	0.02	0.2	56	13	109	26	45.01
		Puffin	0.02	0	0.04	12	3	24	6	47.9
		Fulmar	0.01	0	0.03	6	0	18	6	100.15
		Gannet	0.44	0.21	0.7	241	114	386	71	29.2
	2	Kittiwake	1.44	0.72	2.55	791	396	1401	263	33.26
		Curlew	0.01	0	0.03	6	0	18	6	97.09
		Black-headed gull	0.01	0	0.03	6	0	18	6	95.01
		Common gull	0.02	0	0.05	13	0	30	8	65.05
		Great black-backed gull	0.03	0	0.1	19	0	54	18	94.22
		Herring gull	0.01	0	0.03	7	0	18	6	94.59
		Lesser black-backed gull	0.01	0	0.03	6	0	18	6	97.57
		Sandwich tern	0.01	0	0.03	7	0	19	6	94.98
		Common tern	0.03	0	0.07	18	0	40	10	53.45
		Guillemot	7.77	4.96	11.7	4265	2720	6421	987	23.14
		Razorbill	2.78	1.68	4.1	1524	924	2249	343	22.45
		Puffin	0.25	0.13	0.38	136	72	207	36	26.41

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		Fulmar	0.08	0.01	0.15	42	6	83	20	46.07
		Manx shearwater	0.12	0.04	0.21	66	22	117	25	37.75
		Gannet	0.62	0.42	0.84	342	233	463	61	17.58
Aug-22	1	Kittiwake	3.29	1.52	5.45	1808	834	2991	563	31.13
		Great black-backed gull	0.07	0	0.15	37	0	81	20	54.2
		Herring gull	0	0	0	1	0	2	1	94
		Lesser black-backed gull	0.12	0.01	0.24	65	6	135	33	50.27
		Common tern	0.14	0.02	0.34	77	11	188	50	64.95
		Arctic tern	0.02	0	0.06	12	1	31	10	80.76
		Guillemot	9.71	4.9	15.81	5329	2686	8675	1572	29.49
		Razorbill	0.13	0.03	0.25	70	19	139	33	46.22
		Puffin	0.1	0.03	0.17	53	17	95	21	39.45
		Fulmar	0.15	0.04	0.3	84	24	166	37	43.2
		Manx shearwater	0.25	0.04	0.59	140	24	322	79	56.38
		Gannet	0.33	0.16	0.49	179	90	272	49	27.34
	2	Kittiwake	0.88	0.27	1.88	485	149	1030	246	50.67
		Golden plover	0.04	0	0.17	25	0	92	25	100.47
		Curlew	0.02	0	0.07	13	0	36	12	96.27
		Little gull	0.01	0	0.03	7	0	19	7	101.74

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		Great black-backed gull	0.01	0	0.03	7	0	18	6	97.46
		Lesser black-backed gull	0.03	0	0.08	19	0	47	13	65.87
		Common tern	0.12	0.05	0.2	67	29	113	23	33.73
		Guillemot	3.32	2.03	4.81	1824	1115	2642	402	22.02
		Razorbill	0.38	0.11	0.77	211	60	423	97	45.7
		Puffin	0.03	0	0.05	14	2	28	7	48.92
		Fulmar	0.01	0	0.03	6	0	18	6	97.61
		Manx shearwater	0.09	0	0.24	49	0	132	40	80.55
		Gannet	0.09	0.03	0.15	48	18	81	17	34.65
Sep-22	1	Kittiwake	1.45	0.3	3.17	798	164	1740	425	53.21
		Little gull	0.45	0.29	0.61	248	161	337	46	18.48
		Common gull	0.04	0	0.11	25	0	60	16	62.08
		Great black-backed gull	0.17	0	0.45	93	0	248	72	77.45
		Herring gull	0.01	0	0.04	7	0	23	7	100.07
		Lesser black-backed gull	0.03	0	0.07	15	0	40	11	73.5
		Common tern	0.05	0	0.12	30	0	64	17	55.73
		Great skua	0.01	0	0.03	7	0	18	6	97.1

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		Guillemot	7.71	4.26	12.44	4230	2336	6827	1152	27.23
		Razorbill	3.07	1.39	5.41	1683	762	2970	585	34.74
		Puffin	0.26	0.16	0.38	143	87	207	31	21.28
		Fulmar	0.01	0	0.03	6	0	19	6	97.56
		Sooty shearwater	0.18	0	0.51	98	0	282	86	87.4
		Manx shearwater	0.87	0.05	2.02	478	30	1109	288	60.14
		Gannet	0.26	0.12	0.45	140	66	247	47	32.88
	2	Kittiwake	0.04	0	0.1	24	0	54	14	57.91
		Little gull	0.09	0	0.19	49	0	107	27	54.64
		Great black-backed gull	0.06	0.01	0.13	32	6	74	19	59.73
		Guillemot	1.67	1.24	2.21	919	679	1212	139	15.06
		Razorbill	0.14	0.04	0.27	80	22	149	33	41.02
		Puffin	0.14	0.05	0.23	75	27	129	27	35.62
		Gannet	0.16	0.07	0.29	90	41	159	30	32.47
Oct-22	1	Kittiwake	0.28	0.19	0.37	156	107	205	26	16.22
		Black-headed gull	0.07	0	0.15	37	0	84	23	59.86
		Little gull	0.01	0	0.04	7	0	24	7	94.9
		Common gull	0.02	0	0.05	13	1	30	8	63.76
		Great black-backed gull	0.01	0	0.03	7	0	18	6	97.57

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		Herring gull	0.01	0	0.03	6	0	18	6	95.69
		Guillemot	2.76	2.03	3.58	1515	1116	1964	209	13.74
		Razorbill	0.48	0.22	0.78	265	121	426	78	29.37
		Puffin	0.32	0.15	0.53	174	85	290	55	31.55
		Red-throated diver	0.01	0	0.03	6	0	18	6	94.03
		Fulmar	0.01	0	0.04	7	0	23	7	101.09
		Gannet	0.28	0.2	0.38	157	109	208	25	15.99
Nov-22	1	Kittiwake	0.64	0.41	0.92	353	228	506	72	20.3
		Little gull	0.03	0	0.08	19	0	47	13	69.05
		Great black-backed gull	0.05	0	0.11	31	0	60	16	50.7
		Herring gull	0.02	0	0.05	12	0	30	8	64.83
		Pomarine skua	0.01	0	0.03	6	0	18	6	93.79
		Guillemot	2.09	1.24	3.05	1147	682	1672	258	22.49
		Razorbill	0.74	0.37	1.21	404	204	664	120	29.6
		Puffin	0.16	0.07	0.28	90	39	154	30	33.58
		Gannet	1.5	0.87	2.3	825	477	1265	200	24.19
Dec-22	1	Kittiwake	0.62	0.45	0.82	341	250	448	53	15.3
		Common gull	0.07	0.01	0.14	37	6	80	19	51.57

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		Great black-backed gull	0.09	0.03	0.18	53	17	102	24	45.41
		Herring gull	0.1	0.05	0.15	54	29	81	14	26.05
		Guillemot	4.63	3.9	5.4	2539	2138	2961	210	8.26
		Razorbill	2.3	1.78	2.96	1264	976	1623	165	13.02
		Puffin	0.24	0.1	0.4	133	56	219	43	32.08
		Red-throated diver	0.03	0.01	0.07	18	6	36	9	49.09
		Fulmar	0.03	0	0.08	18	0	42	13	71.06
		Shag	0.01	0	0.03	7	0	18	6	93.69
Jan-23	1	Little gull	0	0	0	1	0	1	1	101.23
		Common gull	0.07	0.01	0.14	37	6	78	19	50.19
		Great black-backed gull	0.18	0.05	0.37	102	30	204	47	46.37
		Herring gull	0.06	0.01	0.12	32	5	64	16	48.79
		Guillemot	2.25	0.69	4.32	1234	377	2370	516	41.81
		Razorbill	1.38	0.65	2.19	757	355	1203	219	28.88
		Red-throated diver	0.11	0.03	0.18	60	18	101	22	35.78
		Fulmar	0.17	0.02	0.43	96	12	238	63	65.62
		Gannet	0.04	0	0.1	25	0	53	14	56.67

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		Cormorant	0.02	0	0.06	13	0	36	12	94.96
		Kittiwake	1.3	0.67	1.98	714	368	1089	188	26.33
Feb-23	1	Common gull	0.05	0.02	0.09	30	12	53	11	36.51
		Guillemot	3.15	2.09	4.37	1731	1147	2399	323	18.65
		Razorbill	10.19	6.69	13.95	5594	3669	7653	1021	18.25
		Puffin	0.19	0.05	0.35	103	28	191	43	41.32
		Red-throated diver	0.07	0.01	0.14	38	6	78	20	52.16
		Fulmar	0.02	0	0.05	13	0	30	9	66.49
		Gannet	0.21	0.13	0.28	113	75	153	21	18.14
		Kittiwake	3.07	2.27	3.95	1683	1245	2170	238	14.14
Mar-23	1	Common gull	0.03	0	0.07	18	0	36	10	51.51
		Great black-backed gull	0.06	0	0.17	35	0	95	28	78.18
		Herring gull	0.07	0.02	0.12	37	12	66	14	37.5
		Lesser black-backed gull	0.02	0	0.05	13	0	30	9	70.57
		Guillemot	8.47	6.23	10.93	4646	3416	5995	659	14.16
		Razorbill	6.77	4.23	9.67	3714	2319	5304	797	21.44
		Puffin	0.14	0.06	0.24	78	36	130	24	30.18

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Red-throated diver	0.2	0.08	0.34	108	47	188	38	34.74
		Gannet	0.74	0.39	1.18	408	216	646	112	27.44
		Kittiwake	5.58	4.09	7.34	3060	2244	4028	458	14.94
Apr-23	1	Common gull	0.2	0.1	0.31	110	58	170	29	26.14
		Great black-backed gull	0.09	0	0.24	49	0	132	36	73.97
		Herring gull	0.03	0	0.09	18	0	48	13	72.73
		Lesser black-backed gull	0.02	0	0.05	12	0	30	8	64.54
		Common tern	0.01	0	0.03	6	0	19	6	99.15
		Arctic tern	0.01	0	0.03	6	0	18	6	91.87
		Guillemot	11.71	8.95	15.41	6427	4913	8457	925	14.38
		Razorbill	2.88	2.1	3.78	1582	1155	2077	232	14.65
		Puffin	0.19	0.12	0.26	102	65	144	21	20.65
		Red-throated diver	0.22	0.14	0.31	122	77	172	25	19.88
		Fulmar	0.02	0	0.05	13	0	29	8	62.62
		Gannet	0.82	0.34	1.36	449	187	745	146	32.49
		Cormorant	0.01	0	0.03	7	0	18	6	96.03
		Kittiwake	7.54	5.61	9.72	4138	3078	5335	581	14.04

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
May-23	1	Whooper swan	0.03	0	0.1	18	0	54	17	95.08
		Little gull	0.06	0	0.17	31	0	91	31	99.85
		Great black-backed gull	0.02	0	0.05	13	0	30	9	64.23
		Herring gull	0.11	0	0.29	61	0	160	46	75.27
		Sandwich tern	0.39	0.23	0.56	213	126	306	48	22.16
		Common tern	0.22	0.12	0.35	121	65	190	32	26.55
		Guillemot	5.13	1.59	11.8	2816	870	6473	1751	62.19
		Razorbill	0.25	0.1	0.46	136	55	254	52	38.23
		Puffin	0.18	0.1	0.26	100	53	143	24	23.56
		Red-throated diver	0.02	0	0.05	12	0	30	8	68.05
		Fulmar	0.05	0.01	0.11	31	6	59	14	43.14
		Gannet	0.02	0	0.05	13	0	30	8	64.37
		Kittiwake	1.48	0.45	3.31	814	249	1818	445	54.59
Jun-23	1	Whimbrel	0.01	0	0.03	6	0	19	6	99.64
		Curlew	0.01	0	0.03	6	0	18	6	100.58
		Common gull	0	0	0	1	0	1	1	99.93
		Great black-backed gull	0.02	0	0.05	12	0	30	8	65.56
		Herring gull	0.31	0.15	0.5	172	83	276	50	28.57

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Lesser black-backed gull	0.42	0.26	0.58	232	142	318	45	19.17
		Guillemot	2.3	1.44	3.33	1264	792	1826	269	21.26
		Razorbill	0.67	0.37	0.97	367	202	531	86	23.21
		Puffin	0.08	0.03	0.14	46	18	80	16	34.69
		Fulmar	0.1	0.04	0.17	58	23	96	20	33.25
		Manx shearwater	0.04	0	0.1	24	0	58	15	61.99
		Gannet	0.65	0.45	0.9	355	246	497	66	18.6
		Kittiwake	3.32	2.56	4.12	1825	1406	2260	221	12.08
Jul-23	1	Common gull	0.02	0	0.07	12	0	36	12	95.21
		Great black-backed gull	0.01	0	0.03	7	0	19	6	93.41
		Herring gull	0.69	0.01	2.05	382	6	1123	357	93.54
		Lesser black-backed gull	0.17	0	0.53	95	0	292	92	96.51
		Sandwich tern	0.01	0	0.03	7	0	18	6	91.84
		Guillemot	2.34	1.49	3.26	1284	818	1787	249	19.39
		Razorbill	1.1	0.57	1.7	605	315	934	160	26.44
		Puffin	0.31	0.17	0.46	169	94	255	41	24.03
		Gannet	0.04	0	0.1	25	0	54	14	56.88
		Kittiwake	1.82	0.26	4.69	1000	142	2574	771	77.08

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
Aug-23	1	Black-headed gull	0.03	0	0.08	19	0	46	13	67.84
		Common gull	0.01	0	0.03	6	0	19	6	101.53
		Great black-backed gull	0.03	0.01	0.07	19	6	41	10	51.4
		Lesser black-backed gull	0.01	0	0.03	6	0	18	6	93.86
		Sandwich tern	0.02	0	0.06	12	0	36	11	94.13
		Common tern	0.3	0.05	0.79	164	30	434	102	62.06
		Arctic tern	0	0	0	1	0	1	1	71
		Great skua	0.01	0	0.03	7	0	18	6	96.24
		Guillemot	10.73	8.89	13.08	5889	4876	7176	610	10.36
		Razorbill	4.83	2.23	8.29	2652	1226	4546	872	32.86
		Puffin	1.01	0.66	1.48	554	361	815	119	21.34
		Fulmar	0.12	0.04	0.22	67	24	119	25	36.45
		Manx shearwater	0.01	0	0.03	6	0	18	6	93.9
		Gannet	0.45	0.28	0.64	247	153	352	55	21.99
		Kittiwake	1.75	1.24	2.41	961	678	1325	161	16.73

Table 0-5 Overview of apportioned sitting survey data for the WTG area +2km buffer. These data do not account for auk availability bias. Further information can be found in Annex C - Availability bias counts for Auks.

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
Mar-21	1	Kittiwake	4.78	3.46	6.33	2621	1900	3474	408	15.56
		Little auk	0	0	0	2	2	3	1	16.32
		Guillemot	7.84	6.48	9.43	4303	3557	5173	430	9.98
		Razorbill	5.22	4.39	6.02	2865	2409	3306	222	7.74
		Puffin	0.28	0.19	0.39	155	103	212	28	17.65
		Red-throated diver	0.4	0.24	0.59	218	131	324	52	23.7
		Fulmar	0.03	0	0.06	17	0	35	9	51.8
		Gannet	0.16	0.01	0.41	90	6	227	62	68.58
Apr-21	1	Kittiwake	6.72	4.68	9.02	3689	2568	4950	603	16.34
		Great black-backed gull	0.05	0.02	0.09	29	11	52	11	37.9
		Herring gull	0.02	0	0.05	14	0	30	8	59.63
		Guillemot	25.51	18.71	33.56	13998	10267	18415	2136	15.26
		Razorbill	8.96	5.08	14.03	4916	2786	7698	1278	25.98
		Puffin	0.04	0.01	0.07	20	4	38	9	42.38

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Red-throated diver	0.32	0.18	0.5	177	100	273	46	25.57
		Great northern diver	0.01	0	0.03	7	0	18	6	93.24
		Fulmar	0.02	0	0.05	13	0	30	8	63.92
		Gannet	0.38	0.22	0.59	207	124	324	53	25.66
May-21	1	Kittiwake	1.2	0.73	1.73	656	399	948	143	21.78
		Sandwich tern	0.01	0	0.03	6	0	18	6	95.09
		Common tern	0.06	0	0.17	36	0	96	25	70.7
		Guillemot	5.56	4.22	7.33	3049	2314	4020	445	14.57
		Razorbill	0.54	0.3	0.8	294	168	437	70	23.76
		Puffin	0.03	0.01	0.08	19	5	46	12	61
		Red-throated diver	0.02	0	0.05	13	0	30	8	65.87
		Gannet	0.02	0	0.05	12	0	30	8	66.54
Jun-21	1	Kittiwake	0.39	0.21	0.61	214	115	334	56	25.82

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Herring gull	0.01	0	0.03	6	0	18	6	95.88
		Guillemot	1.32	0.96	1.69	724	529	930	104	14.26
		Razorbill	0.24	0.15	0.36	134	80	195	30	21.8
		Puffin	0.04	0.01	0.08	20	7	42	10	47.21
		Fulmar	0.03	0	0.07	18	0	36	10	52.87
		Gannet	0.02	0	0.05	12	0	29	8	62.88
Jul-21	1	Kittiwake	1.56	0.27	3.56	856	150	1956	485	56.61
		Lesser black-backed gull	0.01	0	0.03	6	0	18	6	98.3
		Guillemot	9.34	6.29	12.79	5126	3453	7020	905	17.66
		Razorbill	2.81	1.31	4.68	1543	717	2567	478	30.94
		Puffin	0.33	0.22	0.43	181	121	237	31	16.73
		Fulmar	0.07	0.02	0.12	37	12	64	14	36.72
		Manx shearwater	0.04	0	0.09	20	0	48	13	64.68
		Gannet	0.07	0.02	0.12	37	12	66	15	40.48
Aug-21	1	Kittiwake	1.7	0.36	3.52	934	197	1929	449	48.03
		Great skua	0.01	0	0.03	6	0	18	6	94.17
		Guillemot	19.16	9.06	29.89	10511	4971	16400	2941	27.97
		Razorbill	3.27	1.23	5.87	1793	674	3220	694	38.68

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Puffin	1.88	1.17	2.71	1033	641	1489	219	21.14
		Fulmar	0.03	0	0.09	19	0	48	14	71.88
		Gannet	0.07	0.02	0.12	37	12	65	14	36.25
Sep-21	1	Kittiwake	2.02	0.94	3.28	1110	517	1797	342	30.75
		Little gull	0.03	0	0.07	19	1	37	10	52.82
		Common gull	0	0	0	1	1	1	1	54.4
		Great black-backed gull	0.11	0.05	0.16	60	29	91	17	28.24
		Lesser black-backed gull	0.03	0	0.06	18	0	36	9	49.97
		Common tern	1.89	1	2.95	1039	547	1619	268	25.72
		Arctic skua	0.03	0	0.09	19	0	51	14	73.61
		Guillemot	21.28	16.79	26.56	11674	9211	14570	1386	11.87
		Razorbill	1.7	1.17	2.33	933	641	1276	163	17.47
		Puffin	1.4	1.11	1.73	771	608	949	90	11.63
		Fulmar	0.02	0	0.05	12	0	30	8	65.21
		Gannet	0.1	0.04	0.16	55	23	90	19	33.6
Oct-21	1	Kittiwake	0.06	0.01	0.11	31	6	58	13	42.75

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Little gull	0.08	0	0.19	43	0	102	26	61.03
		Great black-backed gull	0.14	0.01	0.38	78	6	210	63	80.06
		Guillemot	7.3	5.97	8.77	4006	3277	4812	393	9.8
		Razorbill	1.01	0.64	1.39	555	353	763	105	18.87
		Puffin	1.45	1.13	1.86	796	622	1023	107	13.41
		Red-throated diver	0.03	0	0.07	19	0	36	10	50.51
		Gannet	0.13	0.05	0.21	73	30	118	22	30.42
Nov-21	1	Kittiwake	0.09	0.03	0.17	49	18	93	20	40.05
		Great black-backed gull	0.02	0	0.07	13	0	36	12	90.43
		Guillemot	6.24	5.04	7.54	3422	2764	4140	356	10.4
		Razorbill	2.93	2.19	3.66	1609	1201	2006	205	12.7
		Puffin	0.64	0.51	0.77	349	278	422	38	10.8
		Red-throated diver	0.01	0	0.03	6	0	18	6	97.2
		Gannet	0.19	0.05	0.39	102	30	214	48	47.05
Dec-21	1	Kittiwake	0.03	0	0.09	18	0	48	13	72.23

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Great black-backed gull	0.04	0	0.1	25	0	54	14	54.74
		Guillemot	3.34	2.89	3.86	1831	1586	2119	139	7.56
		Razorbill	2.78	2	3.62	1528	1100	1989	232	15.18
		Puffin	0.06	0.03	0.12	36	17	65	13	36.67
		Red-throated diver	0.01	0	0.03	6	0	18	6	94.02
		Fulmar	0.03	0	0.06	18	0	36	9	49.51
		Shag	0.01	0	0.03	6	0	18	6	96.36
Jan-22	1	Kittiwake	0.03	0	0.07	18	0	36	10	51.73
		Great black-backed gull	0.03	0	0.07	18	0	40	10	53.29
		Herring gull	0.01	0	0.04	6	0	23	6	99.56
		Guillemot	0.57	0.38	0.77	311	206	425	56	17.85
		Razorbill	0.7	0.4	1.06	384	218	581	92	23.95
		Fulmar	0.01	0	0.03	7	0	18	6	92.41
Feb-22	1	Kittiwake	0.59	0.4	0.8	323	222	442	58	17.68
		Great black-backed gull	0.01	0	0.03	6	0	18	6	96.23
		Guillemot	4.93	3.89	6.05	2708	2136	3322	306	11.28

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Razorbill	6.47	5.5	7.49	3551	3019	4110	280	7.87
		Puffin	0.01	0	0.01	4	2	7	2	34.65
		Red-throated diver	0.03	0.01	0.07	19	6	36	9	48.33
		Fulmar	0.01	0	0.02	4	0	12	4	96.24
		Gannet	0.01	0	0.03	7	0	18	6	88.84
Mar-22	1	Kittiwake	3.08	1.8	4.74	1691	989	2601	419	24.77
		Common gull	0.11	0.02	0.2	60	12	109	24	39.4
		Great black-backed gull	0.02	0	0.05	13	0	30	9	64.3
		Herring gull	0.01	0	0.03	7	0	18	6	93.85
		Lesser black-backed gull	0.02	0	0.07	13	0	36	12	94.89
		Guillemot	7.99	5.68	10.83	4382	3115	5941	725	16.53
		Razorbill	3.66	2.37	5.12	2009	1303	2812	397	19.72
		Puffin	0.48	0.3	0.68	261	165	375	56	21.12
		Red-throated diver	0.07	0.02	0.11	36	12	63	14	37.67

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Gannet	0.15	0.01	0.32	84	6	176	44	52.36
		Shag	0.01	0	0.03	7	0	18	6	93.35
	2	Kittiwake	1.68	1.3	2.04	920	715	1120	104	11.22
		Guillemot	9.69	7.85	11.92	5319	4306	6540	584	10.97
		Razorbill	1.69	1.21	2.16	928	666	1186	131	14.06
		Puffin	0.19	0.12	0.27	107	65	151	22	20.59
		Red-throated diver	0.21	0.11	0.32	116	60	179	31	26.64
		Fulmar	0.05	0.01	0.11	30	6	61	16	50.74
		Gannet	0.06	0	0.15	36	0	80	21	57.43
Apr-22	1	Kittiwake	4.29	2.91	6	2352	1595	3294	458	19.43
		Great black-backed gull	0.02	0	0.06	13	0	36	12	93.92
		Herring gull	0.01	0	0.03	6	0	18	6	103.31
		Guillemot	26.25	20.96	32.15	14400	11498	17637	1565	10.87
		Razorbill	1.92	1.42	2.5	1053	782	1372	149	14.08
		Puffin	0.04	0.01	0.08	25	8	46	10	39.82

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Red-throated diver	0.33	0.15	0.56	184	81	308	60	32.28
		Fulmar	0.08	0.03	0.14	42	17	75	16	37.86
		Manx shearwater	0.01	0	0.03	7	0	18	6	92.89
		Gannet	0.22	0.07	0.39	119	41	212	44	36.42
	2	Kittiwake	4.73	3.03	6.56	2597	1665	3602	491	18.88
		Guillemot	13.97	9.53	18.67	7663	5227	10242	1289	16.81
		Razorbill	1.37	0.9	1.91	749	494	1050	146	19.45
		Puffin	0.11	0.05	0.19	63	27	105	20	31.78
		Red-throated diver	0.07	0.02	0.11	37	13	60	12	31.53
		Fulmar	0.04	0.01	0.09	24	6	47	11	45.38
		Gannet	1.71	0.82	2.71	936	450	1488	275	29.28
May-22	1	Kittiwake	3.83	3.24	4.48	2102	1777	2458	175	8.31
		Lesser black-backed gull	0.02	0	0.06	12	0	36	12	93.97
		Sandwich tern	0.02	0	0.07	13	0	36	12	98.17

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Guillemot	16.69	13.3	20.3	9160	7295	11137	966	10.54
		Razorbill	3.25	2.48	4.02	1783	1359	2206	219	12.27
		Puffin	0.43	0.27	0.62	238	150	340	49	20.36
		Red-throated diver	0.01	0	0.03	6	0	18	6	97.21
		Fulmar	0.08	0.01	0.16	43	6	86	21	47.53
		Gannet	0.91	0.58	1.28	502	319	701	98	19.48
	2	Kittiwake	1.96	1.41	2.59	1078	777	1424	159	14.73
		Guillemot	4.85	3.71	6.53	2661	2035	3585	419	15.73
		Razorbill	0.42	0.26	0.61	233	141	338	52	22.09
		Puffin	0.01	0	0.04	9	0	21	6	69.78
		Gannet	0.11	0.04	0.17	60	24	96	18	29.66
Jun-22	1	Kittiwake	0.39	0.16	0.7	216	90	387	77	35.61
		Great black-backed gull	0.02	0	0.05	12	0	27	7	56.51
		Herring gull	0.03	0	0.08	18	0	42	13	68.67
		Lesser black-backed gull	0.01	0	0.03	6	0	18	6	94.6
		Guillemot	2.57	1.26	4.82	1409	690	2645	579	41.09

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Razorbill	0.43	0.14	0.86	237	80	474	101	42.32
		Puffin	0.03	0.01	0.07	19	5	37	9	44.71
		Fulmar	0.01	0	0.03	7	0	15	4	63.68
		Gannet	0.16	0.06	0.26	89	36	144	29	32.54
	2	Kittiwake	2.41	1.49	3.39	1320	820	1858	273	20.62
		Great black-backed gull	0.01	0	0.03	6	0	18	6	93.8
		Herring gull	0.33	0.07	0.64	179	41	350	79	43.96
		Lesser black-backed gull	0.01	0	0.03	6	0	18	6	95.69
		Guillemot	4.26	3.23	5.5	2336	1773	3018	322	13.76
		Razorbill	0.26	0.09	0.5	144	48	276	62	42.62
		Fulmar	0.03	0	0.08	18	0	46	13	69.37
		Gannet	0.64	0.31	1.04	351	168	568	105	29.68
Jul-22	1	Kittiwake	0.17	0.06	0.28	92	36	156	31	33.8
		Herring gull	0.02	0	0.07	13	0	36	12	98.17
		Guillemot	1.96	1.38	2.61	1077	758	1433	176	16.35
		Razorbill	0.08	0.01	0.16	42	7	90	23	54.56
		Puffin	0.02	0	0.04	11	3	23	6	48.59
		Fulmar	0.01	0	0.04	7	0	23	7	96.04

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Gannet	0.15	0.08	0.24	84	42	130	23	27.16
	2	Kittiwake	0.39	0.13	0.79	217	70	433	96	44.11
		Great black-backed gull	0.03	0	0.1	19	0	54	18	93.62
		Herring gull	0.01	0	0.03	6	0	18	6	98.53
		Guillemot	7.63	4.85	11.49	4187	2662	6306	965	23.04
		Razorbill	2.73	1.64	4.01	1500	903	2203	332	22.09
		Puffin	0.21	0.12	0.32	118	67	176	28	23.68
		Fulmar	0.08	0.02	0.16	43	12	86	20	45.93
		Manx shearwater	0.11	0.03	0.2	60	17	109	24	39.49
		Gannet	0.32	0.16	0.49	175	89	271	48	27.27
Aug-22	1	Kittiwake	1.69	0.5	2.98	928	276	1636	352	37.87
		Great black-backed gull	0.04	0	0.12	25	0	64	18	72.18
		Herring gull	0	0	0	1	0	2	1	96.23
		Lesser black-backed gull	0.01	0	0.03	7	0	18	6	90.45
		Guillemot	9.41	4.76	15.54	5163	2609	8524	1539	29.8
		Razorbill	0.13	0.03	0.25	70	18	135	32	44.66

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Puffin	0.1	0.03	0.17	53	16	95	21	40.19
		Fulmar	0.14	0.02	0.29	79	11	162	39	49.26
		Manx shearwater	0.13	0.01	0.27	73	6	149	36	49.26
		Gannet	0.17	0.07	0.28	93	37	154	30	32.14
	2	Kittiwake	0.64	0.09	1.57	350	48	860	239	68.35
		Lesser black-backed gull	0.01	0	0.03	6	0	18	6	92.9
		Guillemot	3.31	2.07	4.95	1818	1134	2715	408	22.41
		Razorbill	0.39	0.1	0.78	214	57	430	97	45.13
		Puffin	0.03	0	0.05	14	2	30	7	49.45
		Fulmar	0.01	0	0.03	6	0	18	6	98.88
		Manx shearwater	0.09	0	0.24	50	0	132	41	80.74
		Gannet	0.06	0.01	0.11	31	6	60	15	46.52
Sep-22	1	Kittiwake	0.6	0.03	1.69	328	18	925	290	88.43
		Little gull	0.03	0	0.07	18	0	37	10	52.17
		Common gull	0.01	0	0.03	7	0	19	7	101.32
		Great black-backed gull	0.15	0	0.42	83	0	232	70	84.73

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Herring gull	0.01	0	0.03	6	0	19	6	102.35
		Lesser black-backed gull	0.01	0	0.06	9	0	31	9	100.14
		Guillemot	7.58	4.17	11.92	4157	2291	6538	1116	26.85
		Razorbill	3.02	1.28	5.36	1657	704	2939	609	36.73
		Puffin	0.26	0.16	0.37	142	90	206	31	21.55
		Fulmar	0.01	0	0.03	7	0	19	6	90.3
		Sooty shearwater	0.18	0	0.58	98	0	319	85	87.33
		Manx shearwater	0.85	0.02	2.05	467	9	1125	287	61.52
		Gannet	0.2	0.06	0.38	108	35	210	45	41.69
	2	Great black-backed gull	0.03	0	0.08	18	0	46	13	70.56
		Guillemot	1.65	1.17	2.15	906	642	1181	139	15.34
		Razorbill	0.13	0.04	0.25	74	24	135	30	40.19
		Puffin	0.14	0.05	0.23	76	30	129	26	34.14
		Gannet	0.02	0	0.05	13	0	30	8	65.83
Oct-22	1	Kittiwake	0.08	0.03	0.12	42	18	65	13	28.95
		Great black-backed gull	0.01	0	0.03	7	0	18	6	92.78

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Herring gull	0.01	0	0.03	7	0	19	6	93.01
		Guillemot	2.4	1.6	3.3	1317	878	1814	234	17.76
		Razorbill	0.43	0.18	0.73	239	100	401	80	33.43
		Puffin	0.29	0.11	0.52	161	64	288	58	36
		Red-throated diver	0.01	0	0.03	6	0	18	6	94.43
		Gannet	0.03	0	0.06	18	0	36	9	50.17
Nov-22	1	Kittiwake	0.25	0.13	0.4	139	72	218	39	27.69
		Little gull	0.01	0	0.03	6	0	18	6	93.7
		Great black-backed gull	0.03	0	0.07	19	0	36	9	48.06
		Herring gull	0.01	0	0.03	6	0	18	6	95.02
		Guillemot	2.08	1.26	3.04	1141	691	1667	247	21.56
		Razorbill	0.73	0.38	1.19	400	208	654	119	29.74
		Puffin	0.17	0.07	0.28	93	41	154	31	32.79
		Gannet	0.81	0.39	1.29	445	214	711	129	28.95
Dec-22	1	Kittiwake	0.1	0.05	0.15	54	29	84	15	27.1
		Common gull	0.03	0	0.1	18	0	54	18	98.01

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Great black-backed gull	0.06	0	0.14	31	0	77	21	68.38
		Herring gull	0.03	0	0.07	18	0	36	10	51.64
		Guillemot	3.93	3.4	4.55	2159	1865	2494	161	7.46
		Razorbill	2.24	1.76	2.83	1230	964	1553	158	12.84
		Puffin	0.24	0.1	0.41	131	55	223	43	32.15
		Red-throated diver	0.03	0.01	0.06	19	6	36	9	48.36
		Fulmar	0.03	0	0.08	18	0	47	12	67.32
		Shag	0.01	0	0.03	7	0	18	6	92.52
Jan-23	1	Kittiwake	0.6	0.28	0.94	332	156	519	92	27.5
		Little gull	0	0	0	1	0	1	1	102.44
		Great black-backed gull	0.05	0	0.12	28	0	65	17	59.85
		Herring gull	0.02	0	0.07	14	0	40	12	84.03
		Guillemot	1.98	0.6	3.89	1089	331	2137	485	44.53
		Razorbill	1.35	0.64	2.14	741	353	1173	213	28.74
		Red-throated diver	0.1	0.03	0.16	54	18	91	19	35.3

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Fulmar	0.06	0.01	0.13	36	6	71	17	47.87
		Cormorant	0.02	0	0.06	12	0	36	12	93.87
Feb-23	1	Kittiwake	1.86	1.24	2.5	1023	683	1375	177	17.28
		Guillemot	2.97	1.96	4.16	1630	1078	2281	321	19.67
		Razorbill	9.68	6.42	12.82	5313	3524	7032	904	17
		Puffin	0.18	0.06	0.35	102	33	190	42	41.29
		Red-throated diver	0.07	0.01	0.14	37	6	79	20	54.22
		Gannet	0.03	0	0.09	18	0	48	13	73.21
Mar-23	1	Kittiwake	3.72	2.37	5.16	2039	1301	2834	402	19.69
		Common gull	0.01	0	0.03	7	0	18	7	96.31
		Great black-backed gull	0.06	0	0.16	31	0	90	29	92.89
		Herring gull	0.06	0.02	0.1	31	12	53	11	35.32
		Guillemot	7.43	5.25	9.97	4079	2879	5473	655	16.05
		Razorbill	5.83	3.42	8.74	3198	1879	4797	766	23.93
		Puffin	0.09	0.03	0.16	48	18	86	18	36.66

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Red-throated diver	0.2	0.08	0.34	109	42	186	37	34.08
		Gannet	0.51	0.19	0.92	278	107	503	104	37.42
Apr-23	1	Kittiwake	5.09	3.57	6.91	2794	1958	3791	482	17.22
		Common gull	0.05	0	0.12	30	1	64	16	52.06
		Great black-backed gull	0.08	0	0.21	44	0	118	35	79.34
		Herring gull	0.03	0	0.08	18	0	47	13	70.56
		Lesser black-backed gull	0.02	0	0.04	12	0	25	8	61.99
		Guillemot	11.64	9.15	15.14	6387	5020	8305	847	13.26
		Razorbill	2.82	2.04	3.74	1550	1120	2052	235	15.16
		Puffin	0.19	0.12	0.27	104	66	151	23	21.3
		Red-throated diver	0.21	0.13	0.29	115	72	157	23	19.58
		Fulmar	0.02	0	0.05	12	0	30	8	66.6
		Gannet	0.67	0.27	1.13	367	151	620	125	33.88
		Cormorant	0.01	0	0.03	6	0	19	6	99.02

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
May-23	1	Whooper swan	0.03	0	0.1	19	0	54	17	92.39
		Kittiwake	0.84	0.22	1.85	459	120	1015	236	51.28
		Little gull	0.06	0	0.16	33	0	91	30	91.11
		Herring gull	0.04	0	0.11	24	0	58	15	59.95
		Guillemot	4.86	1.53	11.32	2668	842	6213	1681	63.01
		Razorbill	0.23	0.07	0.44	125	41	243	53	42.42
		Puffin	0.15	0.07	0.23	83	40	129	23	27.77
		Red-throated diver	0.02	0	0.05	12	0	30	8	66.21
		Fulmar	0.02	0	0.07	13	0	36	12	93.78
		Gannet	0.01	0	0.03	7	0	18	6	92.64
Jun-23	1	Kittiwake	2.09	1.46	2.72	1146	802	1492	175	15.26
		Common gull	0	0	0	1	0	1	1	102.62
		Great black-backed gull	0.02	0	0.05	12	0	30	8	66.3
		Herring gull	0.19	0.1	0.27	104	57	149	24	22.54
		Lesser black-backed gull	0.26	0.14	0.41	145	76	224	38	25.75

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Guillemot	2.23	1.49	3.13	1224	817	1720	227	18.48
		Razorbill	0.66	0.37	0.98	363	204	540	85	23.39
		Puffin	0.06	0.01	0.12	34	7	67	16	44.75
		Fulmar	0.07	0.02	0.13	40	12	71	15	37.4
		Manx shearwater	0.05	0	0.11	25	0	59	16	62.53
		Gannet	0.48	0.28	0.79	266	153	434	70	26.06
Jul-23	1	Kittiwake	1.34	0.09	3.63	736	48	1992	585	79.45
		Common gull	0.02	0	0.07	12	0	36	12	101.76
		Great black-backed gull	0.01	0	0.03	7	0	19	7	98.19
		Herring gull	0.69	0	2.03	381	0	1112	340	89.35
		Lesser black-backed gull	0.16	0	0.5	88	0	276	91	102.59
		Guillemot	2.3	1.43	3.2	1260	784	1755	250	19.84
		Razorbill	1.08	0.56	1.7	592	309	931	158	26.65
		Puffin	0.31	0.17	0.45	170	94	248	41	24.13
		Gannet	0.01	0	0.03	7	0	19	6	95.28
Aug-23	1	Kittiwake	1.07	0.7	1.5	589	387	826	116	19.6

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Great black-backed gull	0.01	0	0.03	7	0	18	6	93.72
		Guillemot	10.6	8.78	13.15	5814	4818	7215	610	10.48
		Razorbill	4.9	2.27	8.46	2686	1246	4640	886	32.98
		Puffin	1.02	0.66	1.46	559	361	802	119	21.3
		Fulmar	0.06	0	0.15	31	0	85	24	76.88
		Gannet	0.23	0.1	0.4	128	54	222	42	32.92

Table 0-6 Overview of apportioned flying survey data for the WTG area +2km buffer. These data do not account for auk availability bias. Further information can be found in Annex C - Availability bias counts for Auks.

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
Mar-21	1	Kittiwake	1.83	1.28	2.46	1003	704	1349	167	16.64

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Black-headed gull	0.01	0	0.03	6	0	18	6	97.36
		Common gull	0.01	0	0.03	6	0	18	6	100.12
		Great black-backed gull	0.02	0	0.05	13	0	30	9	66.26
		Herring gull	0.01	0	0.03	7	0	18	6	95.87
		Guillemot	0.35	0.17	0.55	193	96	304	55	28.23
		Razorbill	0.21	0.1	0.34	118	57	188	35	28.88
		Puffin	0.04	0	0.08	21	0	47	13	60.73
		Red-throated diver	0.01	0	0.03	6	0	18	6	93.93
		Gannet	0.14	0.05	0.24	78	30	133	27	34.23
Apr-21	1	Kittiwake	4.7	3.61	5.77	2579	1979	3164	300	11.64
		Common gull	0.02	0	0.05	13	0	29	8	61.52
		Lesser black-backed gull	0.04	0.01	0.08	25	6	46	11	41.66
		Sandwich tern	0.01	0	0.03	7	0	18	6	96.31
		Guillemot	1.01	0.44	1.75	555	243	959	179	32.16
		Razorbill	0.46	0.19	0.84	253	102	461	93	36.65
		Puffin	0.01	0	0.04	6	0	23	6	99.93

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Fulmar	0.04	0.01	0.09	24	6	47	12	47.32
		Gannet	0.48	0.33	0.62	263	183	343	41	15.58
May-21	1	Kittiwake	1.37	0.3	3.25	755	163	1785	455	60.24
		Common gull	0.01	0	0.03	6	0	18	6	97.31
		Great black-backed gull	0.01	0	0.03	6	0	18	6	94.76
		Lesser black-backed gull	0.01	0	0.03	7	0	18	6	94.95
		Sandwich tern	0.33	0.21	0.45	179	115	250	36	19.6
		Common tern	0.17	0.11	0.23	92	61	126	17	18.26
		Guillemot	0.23	0.03	0.54	126	18	299	79	62.91
		Razorbill	0.09	0.01	0.18	47	6	102	25	53.26
		Gannet	0.07	0	0.15	36	0	82	21	56.64
Jun-21	1	Kittiwake	0.73	0.22	1.49	401	119	819	200	49.75
		Black-headed gull	0.01	0	0.03	7	0	18	6	93.58
		Little gull	0.01	0	0.03	6	0	18	6	95.27
		Common gull	0.02	0	0.05	13	0	30	8	62.64
		Herring gull	0.05	0	0.15	31	0	81	23	74.23

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Lesser black-backed gull	0.03	0	0.1	19	0	53	17	90.79
		Sandwich tern	0.03	0	0.08	18	0	46	13	71.2
		Common tern	0.03	0	0.08	18	0	42	12	66.55
		Arctic tern	0.02	0	0.05	12	0	27	7	58.49
		Guillemot	0.04	0	0.09	24	0	51	13	53.21
		Razorbill	0.02	0	0.05	12	0	30	8	66.71
		Fulmar	0.01	0	0.03	6	0	18	6	100.25
		Gannet	0.08	0	0.17	43	0	92	24	56.53
Jul-21	1	Kittiwake	2.02	1.51	2.65	1109	827	1453	163	14.69
		Black-headed gull	0.01	0	0.03	6	0	18	6	93.6
		Little gull	0.02	0	0.07	13	0	36	12	96.08
		Common gull	0.01	0	0.03	7	0	18	6	95.37
		Herring gull	0.02	0	0.05	13	0	30	8	65.89
		Lesser black-backed gull	0.02	0	0.05	13	0	30	8	61.24
		Guillemot	0.17	0.06	0.31	96	35	169	36	36.94
		Razorbill	0.1	0.05	0.15	54	29	83	15	27.11
		Fulmar	0.05	0.01	0.11	30	6	59	13	43.92

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Gannet	0.17	0.03	0.37	92	18	203	52	56.49
Aug-21	1	Oystercatcher	0.09	0	0.24	49	0	130	35	72.21
		Kittiwake	3.44	0.82	8.04	1890	449	4410	1141	60.35
		Little gull	0.01	0	0.03	7	0	18	6	90.82
		Common tern	0.23	0.03	0.54	127	18	298	75	58.43
		Arctic tern	0.01	0	0.02	6	1	12	4	60.85
		Great skua	0.01	0	0.04	7	0	23	7	101.31
		Gannet	0.13	0.06	0.2	72	36	112	20	26.85
Sep-21	1	Kittiwake	0.87	0.64	1.13	476	351	619	69	14.47
		Little gull	0.13	0.05	0.21	72	30	118	23	30.77
		Great black-backed gull	0.05	0.01	0.11	31	6	59	13	43.08
		Lesser black-backed gull	0.02	0	0.05	12	0	30	9	71.14
		Sandwich tern	0.02	0	0.05	13	0	30	8	60.78
		Common tern	2.51	1.66	3.49	1379	912	1913	251	18.16
		Arctic tern	0.06	0.01	0.12	33	8	67	16	46.56
		Arctic skua	0.02	0	0.05	13	0	29	8	61.52
		Gannet	0.07	0.01	0.14	37	6	77	19	51.54
Oct-21	1	Kittiwake	0.1	0.03	0.18	55	18	99	22	40.22

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Black-headed gull	0.04	0	0.1	24	0	54	14	55.49
		Little gull	0.54	0.36	0.75	294	196	410	57	19.1
		Common gull	0.04	0.01	0.09	24	6	47	11	45.14
		Great black-backed gull	0.01	0	0.03	6	0	18	6	95.43
		Herring gull	0.01	0	0.03	6	0	19	6	100.41
		Lesser black-backed gull	0.01	0	0.04	7	0	23	6	93.62
		Arctic skua	0.01	0	0.03	6	0	18	6	94.04
		Guillemot	0.37	0.13	0.75	206	72	414	90	43.51
		Razorbill	0.17	0	0.45	93	3	249	78	83.27
		Puffin	0.02	0	0.07	13	0	36	12	91.58
		Gannet	0.09	0.04	0.14	49	23	79	15	30.8
Nov-21	1	Kittiwake	0.15	0.09	0.23	85	48	128	21	24.14
		Great black-backed gull	0.04	0.01	0.08	25	6	46	10	39.3
		Lesser black-backed gull	0.01	0	0.03	7	0	18	6	92.74
		Guillemot	0.15	0.06	0.25	84	36	139	27	31.57
		Razorbill	0.08	0.03	0.14	44	17	77	16	35.34

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Gannet	0.1	0.04	0.15	54	24	84	16	28.95
Dec-21	1	Kittiwake	0.32	0.19	0.44	174	107	242	35	19.96
		Great black-backed gull	0.03	0	0.07	19	0	41	10	53.34
		Guillemot	0.15	0.07	0.24	85	42	133	25	28.43
		Red-throated diver	0.01	0	0.03	6	0	18	6	91.71
		Fulmar	0.01	0	0.03	7	0	18	6	95.66
		Shag	0.01	0	0.03	6	0	18	6	93.36
Jan-22	1	Kittiwake	0.12	0.04	0.22	68	24	120	25	36.61
		Great black-backed gull	0.01	0	0.03	7	0	18	6	88.35
		Herring gull	0.01	0	0.03	6	0	18	6	97.46
		Guillemot	0.02	0	0.05	12	0	29	8	65
		Fulmar	0.02	0	0.05	12	0	30	8	66.71
		Gannet	0.01	0	0.03	7	0	18	6	90.63
Feb-22	1	Kittiwake	0.48	0.3	0.67	265	167	366	52	19.63
		Common gull	0.01	0	0.03	6	0	18	6	96.7
		Guillemot	0.43	0.23	0.66	236	126	361	64	26.8
		Razorbill	0.01	0	0.03	6	0	18	6	93.11

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Fulmar	0.01	0	0.03	6	0	18	6	98.15
		Gannet	0.03	0	0.07	18	0	41	10	56.18
		Shag	0.01	0	0.03	7	0	18	7	98.39
Mar-22	1	Kittiwake	2.43	1.43	3.68	1336	784	2019	317	23.67
		Little gull	0.01	0	0.03	7	0	18	6	91.61
		Common gull	0.07	0.02	0.13	36	11	71	16	43.76
		Lesser black-backed gull	0.03	0	0.07	19	0	40	10	52.49
		Guillemot	0.36	0.18	0.6	200	100	330	60	29.93
		Razorbill	0.16	0.05	0.3	90	29	166	34	38.03
		Gannet	0.13	0.04	0.24	72	24	131	28	38.21
	2	Kittiwake	2.24	1.61	2.85	1227	886	1564	177	14.4
		Little gull	0.02	0	0.07	12	0	36	12	103.87
		Guillemot	0.5	0.26	0.84	276	141	463	81	29.29
		Razorbill	0.01	0	0.03	6	0	18	6	97.29
		Puffin	0	0	0.01	2	0	4	2	95.67
		Gannet	0.07	0.03	0.11	37	18	59	12	31.49
Apr-22	1	Kittiwake	2.3	1.82	2.83	1261	1001	1552	143	11.31
		Herring gull	0.02	0	0.06	12	0	36	12	98.74

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Lesser black-backed gull	0.02	0	0.05	12	0	29	8	65.15
		Guillemot	3.36	2.78	3.97	1845	1528	2178	168	9.09
		Razorbill	0.43	0.25	0.59	236	138	326	48	20.24
		Red-throated diver	0.04	0.01	0.09	23	6	47	12	48.65
		Fulmar	0.1	0.03	0.18	54	18	97	21	37.56
		Manx shearwater	0.01	0	0.03	7	0	18	6	92.56
		Gannet	0.19	0.1	0.3	107	53	163	29	26.8
	2	Kittiwake	5.46	4.11	6.94	2995	2253	3810	401	13.38
		Great black-backed gull	0.01	0	0.04	6	0	24	7	102.96
		Herring gull	0.01	0	0.03	7	0	18	7	98.12
		Lesser black-backed gull	0.02	0	0.05	13	0	30	9	67.36
		Sandwich tern	0.28	0.12	0.47	154	65	259	50	32.35
		Common tern	0.17	0.07	0.26	91	42	145	28	30.18
		Arctic tern	0.06	0.02	0.09	31	13	52	11	33.1
		Guillemot	0.83	0.5	1.23	457	273	675	103	22.55
		Razorbill	0.19	0.01	0.46	105	8	254	64	60.71

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Puffin	0.03	0	0.07	15	0	41	12	79.79
		Fulmar	0.03	0	0.06	18	0	36	9	49.98
		Gannet	0.54	0.29	0.87	294	161	477	84	28.35
May-22	1	Kittiwake	3.62	2.78	4.59	1985	1524	2519	260	13.08
		Common gull	0.01	0	0.03	6	0	18	6	94.07
		Herring gull	0.02	0	0.05	13	0	30	9	64.36
		Lesser black-backed gull	0.02	0	0.05	12	0	30	9	68.41
		Sandwich tern	0.26	0.08	0.49	143	42	270	57	39.79
		Arctic tern	0.16	0.1	0.24	90	53	133	21	22.98
		Guillemot	0.12	0.03	0.22	66	18	123	28	41.58
		Razorbill	0.16	0	0.39	90	0	216	58	64.21
		Fulmar	0.03	0	0.07	18	0	36	10	52.91
		Gannet	0.66	0.45	0.9	362	245	496	64	17.58
	2	Kittiwake	1.95	0.74	4.04	1069	407	2216	536	50.11
		Great black-backed gull	0.01	0	0.03	6	0	18	6	97.28
		Herring gull	0.01	0	0.03	7	0	18	6	93.99
		Sandwich tern	0.17	0.08	0.27	92	46	149	27	28.34
		Common tern	0.24	0.09	0.42	133	53	229	45	33.33

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Arctic tern	0.01	0	0.04	8	1	20	6	83.88
		Guillemot	0.19	0.03	0.47	107	18	257	65	60.55
		Razorbill	0.01	0	0.03	7	0	19	6	83.61
		Gannet	0.07	0.02	0.12	37	12	66	16	41.63
Jun-22	1	Kittiwake	1.03	0.31	2.26	568	169	1242	309	54.29
		Great black-backed gull	0.01	0	0.03	7	0	18	6	95.96
		Herring gull	0.01	0	0.03	6	0	18	6	102.58
		Lesser black-backed gull	0.02	0	0.06	13	0	36	12	88.31
		Sandwich tern	0.23	0.09	0.42	129	48	230	48	37
		Common tern	0.05	0	0.13	25	0	69	19	74.39
		Guillemot	0.15	0.03	0.35	83	18	192	49	59.08
		Razorbill	0.01	0	0.03	7	0	19	6	92.33
		Puffin	0.02	0	0.05	13	0	30	9	66.61
		Fulmar	0.01	0	0.03	6	0	18	6	92.17
		Gannet	0.07	0	0.15	36	0	85	24	65.97
	2	Curlew	0.01	0	0.03	7	0	18	6	89.05
		Kittiwake	2.5	1.22	4.5	1373	668	2469	500	36.37

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		Great black-backed gull	0.01	0	0.03	7	0	18	6	90.02
		Herring gull	0.04	0	0.09	24	0	51	13	54.98
		Lesser black-backed gull	0.02	0	0.05	12	0	30	9	69.08
		Sandwich tern	0.08	0.02	0.14	43	12	77	17	40.1
		Common tern	0.01	0	0.04	7	0	23	6	95.8
		Guillemot	0.1	0	0.25	56	0	137	40	71.59
		Razorbill	0.02	0	0.06	13	0	36	12	94.91
		Fulmar	0.04	0	0.1	25	0	54	14	54.54
		Manx shearwater	0.01	0	0.03	6	0	18	6	97.93
		Gannet	0.09	0.02	0.16	48	12	89	19	39.76
Jul-22	1	Curlew	0.01	0	0.03	6	0	18	6	94.2
		Kittiwake	0.48	0.34	0.65	264	185	355	44	16.44
		Herring gull	0.04	0	0.11	25	0	60	16	65.18
		Lesser black-backed gull	0.02	0	0.07	12	0	36	12	96.03
		Guillemot	0.06	0	0.14	31	0	77	19	62.19
		Razorbill	0.02	0	0.07	13	0	36	12	95.42
		Gannet	0.28	0.1	0.5	152	53	273	56	36.7

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
	2	Curlew	0.01	0	0.03	7	0	19	6	95.97
		Kittiwake	1.07	0.51	1.82	588	282	1000	190	32.27
		Black-headed gull	0.01	0	0.03	6	0	18	6	92.37
		Common gull	0.02	0	0.05	13	0	30	8	60.26
		Lesser black-backed gull	0.01	0	0.03	6	0	18	6	95.97
		Sandwich tern	0.01	0	0.03	6	0	18	6	97.85
		Common tern	0.03	0	0.07	18	0	36	10	50.67
		Guillemot	0.15	0.05	0.26	81	30	145	31	37.55
		Razorbill	0.03	0	0.09	20	0	50	14	69.29
		Puffin	0.03	0	0.09	19	0	48	14	72.61
		Gannet	0.31	0.19	0.43	169	106	237	33	19.43
Aug-22	1	Kittiwake	1.62	0.72	2.74	888	397	1502	282	31.66
		Great black-backed gull	0.02	0	0.07	13	0	36	12	96.41
		Lesser black-backed gull	0.11	0	0.26	63	0	141	37	58.84
		Common tern	0.14	0.01	0.35	78	7	193	51	65.61
		Arctic tern	0.02	0	0.06	12	1	31	10	82.09

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		Guillemot	0.01	0	0.03	7	0	18	6	91.98
		Fulmar	0.01	0	0.03	6	0	18	6	97.1
		Manx shearwater	0.03	0	0.08	18	0	47	13	71.03
		Gannet	0.14	0.04	0.27	79	25	147	32	39.82
	2	Golden plover	0.05	0	0.13	26	0	72	25	96.03
		Curlew	0.02	0	0.07	13	0	36	12	96.53
		Kittiwake	0.23	0.1	0.4	125	54	217	42	33.31
		Little gull	0.01	0	0.03	7	0	18	6	97.34
		Great black-backed gull	0.01	0	0.04	7	0	23	7	99.35
		Lesser black-backed gull	0.02	0	0.06	12	0	36	12	92.36
		Common tern	0.12	0.05	0.21	66	29	114	23	34.52
		Gannet	0.03	0	0.06	18	0	36	9	50.59
Sep-22	1	Kittiwake	0.88	0.23	1.97	484	126	1081	263	54.28
		Little gull	0.42	0.26	0.56	232	144	310	44	19.01
		Common gull	0.03	0	0.09	19	0	47	14	74.45
		Great black-backed gull	0.02	0	0.08	12	0	45	13	103.84

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Lesser black-backed gull	0.01	0	0.03	7	0	18	7	100.13
		Common tern	0.05	0	0.11	31	0	61	16	52.13
		Great skua	0.01	0	0.03	7	0	19	7	100.8
		Guillemot	0.08	0.02	0.14	42	12	75	16	38.31
		Razorbill	0.03	0.01	0.06	18	6	36	9	49.23
		Sooty shearwater	0.01	0	0.03	7	0	18	6	95.62
		Manx shearwater	0.06	0	0.14	32	0	76	20	62.9
		Gannet	0.06	0.01	0.12	31	6	65	15	49.02
	2	Kittiwake	0.04	0	0.1	24	0	54	14	55.08
		Little gull	0.09	0	0.2	49	0	110	27	55.71
		Great black-backed gull	0.02	0	0.05	13	0	30	9	68.56
		Guillemot	0.02	0	0.05	13	0	29	8	66.08
		Razorbill	0.01	0	0.03	7	0	18	6	93.95
		Gannet	0.13	0.04	0.25	73	24	139	30	41.14
Oct-22	1	Kittiwake	0.2	0.13	0.28	113	72	155	21	18.11
		Black-headed gull	0.07	0	0.17	39	0	92	23	59.36
		Little gull	0.01	0	0.03	7	0	19	6	93.84

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		Common gull	0.02	0	0.05	13	0	30	8	62.26
		Guillemot	0.36	0.14	0.68	199	77	371	76	38.17
		Razorbill	0.04	0.01	0.09	24	7	52	12	51.04
		Fulmar	0.01	0	0.03	7	0	18	7	96.36
		Gannet	0.25	0.17	0.34	138	96	188	25	17.56
Nov-22	1	Kittiwake	0.39	0.24	0.55	212	133	301	41	19.23
		Little gull	0.02	0	0.07	12	0	36	12	98.71
		Great black-backed gull	0.02	0	0.05	12	0	30	8	67.18
		Herring gull	0.01	0	0.03	7	0	18	6	92.97
		Pomarine skua	0.01	0	0.03	7	0	18	6	91.95
		Guillemot	0.02	0	0.07	12	0	36	12	95.07
		Razorbill	0.01	0	0.03	7	0	18	6	90.38
		Gannet	0.68	0.43	0.96	373	234	527	76	20.14
Dec-22	1	Kittiwake	0.52	0.35	0.7	286	191	384	51	17.58
		Common gull	0.03	0	0.07	18	0	36	10	53.52
		Great black-backed gull	0.04	0.01	0.08	25	6	46	10	39.45
		Herring gull	0.07	0.02	0.12	36	12	65	13	36.18
		Guillemot	0.68	0.32	1.07	373	178	587	108	28.86

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Razorbill	0.08	0.02	0.14	43	12	78	17	37.67
Jan-23	1	Kittiwake	0.69	0.31	1.1	377	172	607	108	28.54
		Common gull	0.06	0.01	0.14	36	6	78	20	54.36
		Great black-backed gull	0.13	0.02	0.31	70	11	168	45	64.01
		Herring gull	0.03	0	0.08	20	0	46	13	63.82
		Guillemot	0.16	0	0.45	89	0	247	74	82.81
		Razorbill	0.03	0	0.09	20	0	49	14	69.72
		Fulmar	0.11	0	0.37	61	0	203	54	89.83
		Gannet	0.04	0	0.1	24	0	53	14	56.49
Feb-23	1	Kittiwake	1.17	0.74	1.69	643	405	925	138	21.36
		Common gull	0.06	0.02	0.1	31	12	53	11	34.73
		Guillemot	0.19	0.09	0.3	103	50	163	30	28.81
		Razorbill	0.41	0.2	0.65	225	109	355	63	28.02
		Fulmar	0.02	0	0.05	13	0	30	8	64.01
		Gannet	0.17	0.12	0.24	96	65	130	18	18.07
Mar-23	1	Kittiwake	1.91	1.24	2.67	1050	681	1468	198	18.78
		Common gull	0.02	0	0.05	13	0	30	9	65.89
		Great black-backed gull	0.01	0	0.03	7	0	18	6	91.64

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Herring gull	0.01	0	0.03	6	0	18	6	96.8
		Lesser black-backed gull	0.02	0	0.05	12	0	30	9	68.7
		Guillemot	1.04	0.79	1.3	573	434	716	75	12.99
		Razorbill	0.78	0.58	0.99	428	321	546	58	13.56
		Puffin	0.05	0	0.13	30	0	72	19	62.54
		Gannet	0.23	0.14	0.34	127	75	187	30	22.93
Apr-23	1	Kittiwake	2.35	1.78	2.96	1289	977	1622	162	12.54
		Common gull	0.14	0.05	0.25	78	30	138	28	35.58
		Great black-backed gull	0.01	0	0.03	6	0	18	6	99.51
		Common tern	0.01	0	0.03	6	0	18	6	99.11
		Arctic tern	0.01	0	0.03	7	0	18	6	91.12
		Guillemot	0.08	0.02	0.16	42	12	87	20	47.17
		Razorbill	0.08	0.02	0.16	42	12	86	21	49.91
		Red-throated diver	0.01	0	0.03	7	0	18	6	92.75
		Gannet	0.14	0.08	0.22	79	42	119	20	24.36
	1	Kittiwake	0.63	0.16	1.47	346	90	805	210	60.51

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
May-23		Great black-backed gull	0.02	0	0.05	13	0	30	9	69.54
		Herring gull	0.06	0	0.2	36	0	107	35	98.08
		Sandwich tern	0.38	0.22	0.56	212	122	307	48	22.27
		Common tern	0.22	0.11	0.34	119	63	185	32	26.27
		Guillemot	0.11	0.03	0.23	61	17	128	29	47.78
		Razorbill	0.02	0	0.07	13	0	37	11	86.95
		Puffin	0.03	0	0.09	19	0	48	14	72.36
		Fulmar	0.03	0	0.07	18	0	37	10	52.22
		Gannet	0.01	0	0.03	6	0	19	6	98.63
Jun-23	1	Whimbrel	0.01	0	0.03	7	0	18	7	95.18
		Curlew	0.01	0	0.03	6	0	18	6	99.86
		Kittiwake	1.25	0.93	1.61	687	511	884	96	13.94
		Common gull	0	0	0	1	0	1	1	98.83
		Herring gull	0.12	0.03	0.24	66	18	132	30	44.98
		Lesser black-backed gull	0.15	0.09	0.23	85	48	128	20	23.71
		Guillemot	0.07	0	0.2	37	0	108	34	90.72
		Razorbill	0.01	0	0.03	7	0	18	6	95.34
		Puffin	0.02	0	0.05	12	0	29	8	63.14

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Fulmar	0.03	0	0.07	19	0	36	10	50.54
		Gannet	0.15	0.08	0.24	85	42	132	23	27.16
Jul-23	1	Kittiwake	0.49	0.12	1.17	267	65	644	168	63.08
		Herring gull	0.01	0	0.03	7	0	19	7	95.01
		Lesser black-backed gull	0.01	0	0.03	6	0	18	6	94.83
		Sandwich tern	0.01	0	0.03	7	0	18	6	92
		Guillemot	0.08	0.04	0.12	42	23	64	11	26.08
		Razorbill	0.03	0	0.08	18	0	42	12	66.93
		Gannet	0.03	0	0.09	19	0	48	14	74.92
Aug-23	1	Kittiwake	0.66	0.49	0.87	363	268	476	54	14.85
		Black-headed gull	0.03	0	0.08	18	0	46	13	69.42
		Common gull	0.01	0	0.03	7	0	18	6	95.69
		Great black-backed gull	0.02	0	0.05	12	0	30	8	63.39
		Lesser black-backed gull	0.01	0	0.03	6	0	18	6	93.62
		Sandwich tern	0.02	0	0.07	13	0	36	12	95.41
		Common tern	0.3	0.06	0.69	166	35	379	99	59.77

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Arctic tern	0	0	0	1	0	1	1	73.7
		Great skua	0.01	0	0.03	7	0	18	6	91.27
		Guillemot	0.03	0	0.06	18	0	36	9	50.42
		Razorbill	0.02	0	0.05	12	0	30	8	66.96
		Fulmar	0.07	0.03	0.11	37	18	59	11	29.26
		Manx shearwater	0.01	0	0.03	6	0	18	6	94.46
		Gannet	0.22	0.14	0.3	121	76	166	24	19.48

Table 0-7. Overview of apportioned total survey data for the WTG area +4km buffer. These data do not account for auk availability bias. Further information can be found in Annex C - Availability bias counts for Auks.

Month-year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
	1	Kittiwake	5.9	4.54	7.28	4473	3443	5519	548	12.24

Month-year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
Mar-21		Black-headed gull	0.01	0	0.02	6	0	19	6	97.99
		Common gull	0.05	0.01	0.09	36	6	71	17	45.76
		Great black-backed gull	0.03	0	0.08	25	0	64	18	74.64
		Herring gull	0.02	0	0.04	12	0	30	8	64.18
		Lesser black-backed gull	0.01	0	0.02	7	0	19	6	97.35
		Little auk	0.01	0	0.03	9	3	21	6	64.3
		Guillemot	7.95	6.61	9.49	6022	5011	7194	567	9.4
		Razorbill	5.21	4.49	5.93	3949	3399	4490	280	7.08
		Puffin	0.33	0.24	0.44	251	180	337	41	16.08
		Red-throated diver	0.33	0.2	0.49	253	155	372	57	22.31
		Fulmar	0.07	0	0.18	57	0	137	38	66.2
		Gannet	0.29	0.12	0.51	217	89	384	77	35.07
Apr-21	1	Kittiwake	10.02	7.89	12.4	7595	5977	9394	876	11.53
		Common gull	0.02	0	0.04	13	0	30	8	61.62
		Great black-backed gull	0.04	0.01	0.07	30	11	53	12	38.29
		Herring gull	0.03	0	0.05	20	2	42	11	51.38

Month-year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Lesser black-backed gull	0.04	0.02	0.07	30	12	54	12	37.18
		Sandwich tern	0.01	0	0.02	7	0	19	7	97.61
		Guillemot	22.74	17.48	29.67	17231	13243	22482	2365	13.72
		Razorbill	8.11	5.21	11.65	6148	3948	8828	1223	19.89
		Puffin	0.03	0.01	0.07	27	9	50	11	39.6
		Red-throated diver	0.26	0.14	0.39	197	108	296	51	25.41
		Great northern diver	0.01	0	0.02	6	0	18	6	92.43
		Fulmar	0.07	0.03	0.12	55	24	88	17	30.84
		Gannet	0.89	0.64	1.16	675	489	877	103	15.15
May-21	1	Kittiwake	2.2	1.1	4.02	1665	833	3050	590	35.39
		Common gull	0.01	0	0.02	6	0	18	6	98.03
		Great black-backed gull	0.01	0	0.02	6	0	18	6	95.65
		Lesser black-backed gull	0.01	0	0.02	7	0	18	6	95.58

Month-year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Sandwich tern	0.28	0.18	0.39	214	138	298	41	19.14
		Common tern	0.18	0.1	0.27	134	73	205	35	25.8
		Guillemot	5.15	4.08	6.54	3903	3094	4953	482	12.33
		Razorbill	0.64	0.39	0.93	483	293	702	107	22.01
		Puffin	0.03	0.01	0.07	24	6	50	12	50.72
		Red-throated diver	0.02	0	0.04	13	0	30	8	62.88
		Gannet	0.08	0.03	0.13	61	24	103	20	32.41
Jun-21	1	Kittiwake	1.07	0.62	1.73	813	469	1314	230	28.26
		Black-headed gull	0.01	0	0.02	7	0	18	6	94.69
		Little gull	0.01	0	0.02	7	0	19	7	99.68
		Common gull	0.02	0	0.04	13	0	30	8	65.56
		Herring gull	0.05	0	0.12	36	0	88	24	66.74
		Lesser black-backed gull	0.03	0	0.09	25	0	66	18	72.15
		Sandwich tern	0.06	0.02	0.11	48	18	85	18	36.6
		Common tern	0.03	0	0.07	25	2	55	14	53.83
		Arctic tern	0.02	0	0.03	12	0	27	7	55.68

Month-year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Guillemot	1.35	1.05	1.66	1021	796	1256	121	11.84
		Razorbill	0.29	0.18	0.4	220	137	304	43	19.16
		Puffin	0.04	0.01	0.07	29	10	54	12	40.99
		Fulmar	0.04	0.02	0.07	31	12	55	12	39.35
		Gannet	0.1	0.03	0.18	73	24	139	31	41.75
Jul-21	1	Kittiwake	3.27	1.94	5.25	2481	1472	3983	653	26.3
		Black-headed gull	0.01	0	0.02	6	0	18	6	94.82
		Little gull	0.02	0	0.05	13	0	36	12	98.06
		Common gull	0.02	0	0.04	13	0	30	9	69.96
		Herring gull	0.02	0	0.04	13	0	30	8	64.47
		Lesser black-backed gull	0.03	0.01	0.06	24	6	47	11	43.51
		Sandwich tern	0.01	0	0.02	6	0	18	6	93.62
		Guillemot	9	6.46	11.92	6821	4893	9030	1065	15.6
		Razorbill	3.04	1.68	4.67	2304	1270	3542	591	25.65
		Puffin	0.31	0.23	0.4	238	174	301	33	13.78
		Fulmar	0.09	0.03	0.15	67	24	115	24	35.96
		Manx shearwater	0.15	0.01	0.39	110	9	295	83	74.95

Month-year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Gannet	0.27	0.11	0.48	205	87	362	71	34.48
Aug-21	1	Oystercatcher	0.06	0	0.17	49	0	130	37	73.78
		Kittiwake	5.74	1.94	11.14	4351	1473	8440	1885	43.33
		Little gull	0.02	0	0.04	13	0	30	9	67.31
		Great black-backed gull	0.02	0	0.05	12	0	36	12	95.98
		Common tern	0.48	0.07	1.13	367	56	853	220	59.94
		Arctic tern	0.02	0	0.06	17	2	43	12	67.27
		Great skua	0.02	0	0.04	12	0	30	8	68.01
		Guillemot	25.79	12.38	41.96	19544	9382	31800	5645	28.88
		Razorbill	4.29	1.57	7.59	3250	1188	5751	1192	36.68
		Puffin	1.95	1.36	2.65	1478	1034	2011	249	16.83
		Fulmar	0.02	0	0.06	19	0	49	14	73.24
		Manx shearwater	0.01	0	0.02	6	0	18	6	100.04
		Gannet	0.21	0.14	0.29	162	105	220	30	18.12
Sep-21	1	Kittiwake	2.48	1.55	3.5	1880	1171	2651	386	20.49
		Little gull	0.13	0.08	0.19	98	58	141	22	22.32
		Common gull	0.01	0	0.02	7	1	19	6	95.27
		Great black-backed gull	0.23	0.09	0.43	176	69	325	68	38.55

Month-year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Herring gull	0.01	0	0.02	7	0	19	6	93.57
		Lesser black-backed gull	0.05	0.02	0.08	36	12	60	13	34.62
		Sandwich tern	0.02	0	0.04	14	1	30	8	57.85
		Common tern	4.01	3.03	5.03	3042	2293	3810	393	12.9
		Arctic tern	0.06	0.02	0.12	50	14	88	19	38.69
		Arctic skua	0.04	0.01	0.08	31	6	60	15	46.37
		Guillemot	23.92	17.48	31.61	18125	13247	23956	2644	14.59
		Razorbill	1.79	1.34	2.3	1359	1015	1741	190	13.94
		Puffin	1.31	1.04	1.62	992	787	1226	110	11.02
		Fulmar	0.02	0.01	0.05	19	6	36	9	47.67
		Gannet	0.18	0.12	0.24	139	90	184	24	16.94
Oct-21	1	Kittiwake	0.14	0.08	0.22	110	59	169	29	26.18
		Black-headed gull	0.06	0.02	0.11	49	12	86	19	38.87
		Little gull	0.86	0.62	1.15	649	473	871	99	15.22
		Common gull	0.03	0.01	0.06	24	6	47	11	43.53
		Great black-backed gull	0.12	0.01	0.3	90	6	228	63	70.08
		Herring gull	0.02	0	0.04	13	0	30	9	68.05

Month-year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Lesser black-backed gull	0.01	0	0.02	7	0	18	6	93.02
		Arctic skua	0.01	0	0.02	6	0	18	6	101.01
		Guillemot	7.43	6.28	8.67	5631	4758	6571	467	8.29
		Razorbill	1.24	0.87	1.7	941	656	1286	166	17.6
		Puffin	1.31	1.04	1.65	995	786	1248	120	11.97
		Red-throated diver	0.02	0	0.05	18	0	36	10	51.92
		Gannet	0.22	0.11	0.33	164	88	248	42	25.14
Nov-21	1	Kittiwake	0.26	0.2	0.33	200	150	248	25	12.51
		Little gull	0.03	0	0.08	25	0	59	16	62.81
		Great black-backed gull	0.06	0.02	0.11	43	12	80	19	42.6
		Lesser black-backed gull	0.01	0	0.02	7	0	18	6	96.18
		Guillemot	6.25	5.05	7.54	4737	3825	5716	463	9.78
		Razorbill	3.08	2.48	3.65	2338	1879	2765	227	9.69
		Puffin	0.59	0.49	0.69	444	373	522	39	8.64
		Red-throated diver	0.01	0	0.02	7	0	18	6	93.28
		Fulmar	0.01	0	0.02	7	0	18	6	94.78

Month-year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Gannet	0.36	0.15	0.62	274	117	470	94	34.27
Dec-21	1	Kittiwake	0.37	0.25	0.51	278	191	388	51	18.09
		Great black-backed gull	0.1	0.05	0.16	73	36	118	22	29.28
		Guillemot	3.44	2.95	3.93	2604	2240	2979	188	7.21
		Razorbill	2.55	1.92	3.26	1936	1457	2472	259	13.34
		Puffin	0.07	0.03	0.14	57	23	108	23	40.65
		Red-throated diver	0.03	0	0.07	25	0	53	14	54.65
		Fulmar	0.03	0.01	0.07	25	6	54	14	53.54
		Shag	0.02	0	0.06	19	0	48	13	70.59
Jan-22	1	Kittiwake	0.17	0.09	0.25	127	70	192	32	25.03
		Great black-backed gull	0.03	0.01	0.06	25	6	48	12	44.99
		Herring gull	0.02	0	0.05	19	0	37	10	53.62
		Guillemot	0.58	0.4	0.77	438	304	584	73	16.49
		Razorbill	0.65	0.42	0.92	493	321	698	98	19.84
		Fulmar	0.03	0	0.07	25	0	54	14	56.13
		Gannet	0.01	0	0.02	6	0	18	6	97.14
		Shag	0.01	0	0.02	6	0	18	6	94.45
Feb-22	1	Kittiwake	1.51	1.08	2.09	1141	820	1583	197	17.22

Month-year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Common gull	0.04	0	0.11	31	1	81	24	75.19
		Great black-backed gull	0.02	0	0.04	13	0	30	8	62.31
		Guillemot	4.77	3.77	5.82	3616	2858	4413	397	10.96
		Razorbill	6	5.19	6.87	4544	3933	5206	325	7.13
		Puffin	0.01	0	0.03	11	3	25	7	57.06
		Red-throated diver	0.02	0.01	0.05	19	6	36	9	48.99
		Fulmar	0.02	0	0.06	17	0	43	11	67.58
		Gannet	0.03	0.01	0.06	24	6	47	11	43.32
		Shag	0.01	0	0.02	7	0	19	6	94.02
Mar-22	1	Kittiwake	4.89	3.22	7.03	3702	2438	5329	756	20.4
		Black-headed gull	0.01	0	0.02	7	0	19	7	98.85
		Little gull	0.01	0	0.02	7	0	18	6	97.28
		Common gull	0.13	0.05	0.21	95	41	160	32	32.99
		Great black-backed gull	0.02	0	0.04	13	0	30	8	64.23
		Herring gull	0.01	0	0.02	6	0	18	6	97.17
		Lesser black-backed gull	0.04	0	0.09	30	0	71	19	62.94

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		Guillemot	7.74	5.49	10.2	5864	4162	7726	916	15.61
		Razorbill	3.64	2.32	4.91	2757	1755	3720	496	17.96
		Puffin	0.38	0.24	0.52	288	184	397	55	18.94
		Red-throated diver	0.05	0.02	0.08	36	12	65	14	37.5
		Gannet	0.29	0.12	0.47	219	92	354	67	30.55
		Shag	0.01	0	0.02	7	0	18	6	96.27
	2	Kittiwake	3.84	3.09	4.59	2913	2340	3480	287	9.84
		Little gull	0.02	0	0.05	12	0	36	12	94.77
		Guillemot	9.59	8.02	11.08	7269	6076	8400	579	7.96
		Razorbill	1.73	1.24	2.24	1310	941	1698	197	14.97
		Puffin	0.18	0.13	0.25	140	95	186	24	16.7
		Red-throated diver	0.18	0.09	0.26	133	70	195	33	24.71
		Fulmar	0.06	0.02	0.1	43	17	76	16	37.73
		Gannet	0.18	0.09	0.26	134	71	201	34	25.28
Apr-22	1	Kittiwake	6.2	4.83	7.68	4700	3659	5823	553	11.76
		Black-headed gull	0.01	0	0.02	7	0	19	6	93.75
		Great black-backed gull	0.02	0	0.05	13	0	36	12	95.97

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		Herring gull	0.04	0.01	0.08	31	6	63	15	47.96
		Lesser black-backed gull	0.02	0	0.04	12	0	30	9	67.2
		Guillemot	29.11	24.03	34.84	22058	18210	26403	2081	9.43
		Razorbill	2.3	1.81	2.84	1743	1370	2154	201	11.52
		Puffin	0.04	0.01	0.06	28	11	50	10	35.47
		Red-throated diver	0.34	0.19	0.5	256	147	379	62	24.07
		Fulmar	0.2	0.12	0.29	150	90	218	33	21.61
		Manx shearwater	0.02	0	0.06	19	0	47	13	66.84
		Gannet	0.45	0.23	0.71	345	178	538	92	26.5
	2	Kittiwake	8.95	7.06	10.59	6782	5353	8025	691	10.18
		Great black-backed gull	0.01	0	0.02	6	0	18	6	97.08
		Herring gull	0.02	0	0.04	12	0	30	9	71.15
		Lesser black-backed gull	0.02	0	0.04	12	0	30	8	65.24
		Sandwich tern	0.29	0.17	0.44	222	131	331	53	23.82
		Common tern	0.16	0.07	0.26	124	55	201	37	29.85

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		Arctic tern	0.04	0.02	0.08	34	15	58	12	33.14
		Guillemot	14.25	10.74	17.89	10802	8141	13555	1347	12.47
		Razorbill	1.64	1.1	2.21	1246	838	1678	216	17.26
		Puffin	0.15	0.08	0.23	114	59	173	31	26.45
		Red-throated diver	0.05	0.02	0.08	37	12	61	13	32.66
		Fulmar	0.05	0.02	0.1	42	12	78	18	41.37
		Gannet	2.08	1.31	3	1574	993	2275	334	21.21
May-22	1	Kittiwake	6.7	5.75	7.72	5079	4358	5851	390	7.67
		Common gull	0.01	0	0.02	6	0	18	6	97.6
		Herring gull	0.02	0	0.04	12	0	30	8	64.88
		Lesser black-backed gull	0.03	0	0.07	24	0	53	14	56.59
		Sandwich tern	0.26	0.1	0.44	197	78	336	66	33.49
		Arctic tern	0.16	0.09	0.24	120	71	183	30	24.81
		Guillemot	16.18	13.17	19.4	12265	9981	14699	1193	9.73
		Razorbill	3.29	2.49	4.19	2493	1885	3173	340	13.63
		Puffin	0.44	0.29	0.59	335	224	450	60	17.72
		Red-throated diver	0.02	0	0.05	18	0	36	9	49.69

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		Fulmar	0.08	0.03	0.13	61	24	102	21	34.19
		Gannet	1.52	1.15	1.9	1151	872	1440	149	12.94
	2	Kittiwake	3.55	2.33	5.45	2690	1765	4129	640	23.78
		Great black-backed gull	0.01	0	0.02	7	0	19	6	92.63
		Herring gull	0.02	0	0.05	13	0	36	12	94.87
		Lesser black-backed gull	0.02	0	0.04	13	0	30	9	67.13
		Sandwich tern	0.13	0.07	0.2	97	53	150	26	26.55
		Common tern	0.21	0.09	0.33	156	70	251	48	30.6
		Arctic tern	0.01	0	0.03	8	1	20	6	81.88
		Guillemot	4.77	3.72	6.07	3618	2821	4598	462	12.74
		Razorbill	0.44	0.32	0.57	336	245	436	52	15.35
		Puffin	0.01	0	0.03	11	2	24	6	57.76
		Red-throated diver	0.01	0	0.02	6	0	19	6	99.15
		Gannet	0.27	0.16	0.4	205	123	301	46	22.05
Jun-22	1	Kittiwake	1.59	0.75	3.01	1209	567	2278	454	37.55
		Great black-backed gull	0.02	0	0.06	19	0	48	13	67.7

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		Herring gull	0.04	0	0.11	32	0	87	24	76.79
		Lesser black-backed gull	0.02	0	0.06	19	0	48	13	71.41
		Sandwich tern	0.19	0.08	0.33	147	61	251	50	33.66
		Common tern	0.05	0	0.11	38	0	86	22	56.32
		Guillemot	2.78	1.61	4.72	2107	1218	3577	667	31.62
		Razorbill	0.42	0.18	0.76	322	135	577	112	34.59
		Puffin	0.05	0.01	0.09	37	11	70	15	40.85
		Fulmar	0.02	0	0.05	19	3	36	9	45.45
		Gannet	0.24	0.15	0.34	183	111	262	40	21.59
	2	Curlew	0.01	0	0.02	7	0	19	6	90.81
		Kittiwake	4.3	2.86	6.21	3256	2169	4705	640	19.65
		Great black-backed gull	0.04	0.01	0.08	31	6	61	14	45.68
		Herring gull	0.38	0.17	0.63	286	127	482	95	33.2
		Lesser black-backed gull	0.04	0.01	0.08	30	6	60	15	47.47
		Sandwich tern	0.09	0.03	0.16	66	24	119	24	36.1
		Common tern	0.01	0	0.02	7	0	19	6	97.78

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		Guillemot	4.5	3.54	5.52	3410	2684	4185	378	11.08
		Razorbill	0.29	0.11	0.5	217	82	379	78	36.09
		Fulmar	0.06	0.02	0.1	44	18	78	17	38.75
		Manx shearwater	0.01	0	0.02	7	0	19	6	92.24
		Gannet	0.64	0.37	0.96	484	278	725	114	23.44
Jul-22	1	Curlew	0.01	0	0.02	6	0	18	6	97.22
		Kittiwake	0.95	0.59	1.51	717	447	1146	182	25.27
		Herring gull	0.05	0	0.12	37	0	95	26	70.65
		Lesser black-backed gull	0.02	0	0.05	12	0	36	12	94.42
		Guillemot	2.56	1.86	3.34	1938	1410	2529	291	14.99
		Razorbill	0.33	0.15	0.59	253	112	445	89	34.99
		Puffin	0.06	0.02	0.11	49	18	86	18	37.35
		Fulmar	0.01	0	0.03	7	0	23	6	98.74
		Manx shearwater	0.02	0	0.05	13	0	37	13	99.34
		Gannet	0.49	0.29	0.7	370	222	531	79	21.35
	2	Curlew	0.01	0	0.02	6	0	18	6	98.92
		Kittiwake	1.65	0.97	2.49	1248	734	1889	301	24.05

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		Black-headed gull	0.02	0	0.04	13	0	30	9	66.73
		Common gull	0.03	0.01	0.06	24	6	48	11	43.54
		Great black-backed gull	0.02	0	0.07	18	0	54	18	95.57
		Herring gull	0.01	0	0.02	6	0	18	6	94.37
		Lesser black-backed gull	0.03	0	0.07	25	0	53	14	55.7
		Sandwich tern	0.01	0	0.02	7	0	18	6	97.66
		Common tern	0.02	0	0.05	19	0	41	10	52.07
		Guillemot	8.71	5.69	12.18	6597	4310	9230	1316	19.94
		Razorbill	3.69	2.4	5.21	2797	1816	3951	558	19.95
		Puffin	0.29	0.17	0.43	217	131	326	50	23.13
		Fulmar	0.08	0.03	0.13	60	24	103	20	33.71
		Manx shearwater	0.44	0.18	0.82	333	137	619	129	38.79
		Gannet	0.72	0.54	0.97	550	407	733	84	15.19
Aug-22	1	Kittiwake	3.1	1.41	5.27	2349	1071	3995	753	32.02
		Great black-backed gull	0.06	0.01	0.11	42	6	85	21	49.03

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		Herring gull	0	0	0	1	0	2	1	94.63
		Lesser black-backed gull	0.09	0.02	0.19	72	18	142	33	45.3
		Common tern	0.15	0.03	0.33	111	23	251	60	53.68
		Arctic tern	0.01	0	0.04	12	0	32	10	83.06
		Guillemot	11.36	6.99	17.27	8609	5299	13091	1911	22.19
		Razorbill	0.18	0.08	0.29	134	62	219	40	29.42
		Puffin	0.09	0.04	0.15	71	33	114	21	29.9
		Fulmar	0.12	0.03	0.23	91	24	178	39	43.29
		Manx shearwater	0.21	0.05	0.46	161	35	351	83	51.76
		Gannet	0.38	0.23	0.55	291	174	419	66	22.61
	2	Golden plover	0.1	0	0.25	73	0	188	51	70.26
		Curlew	0.02	0	0.05	12	0	36	12	97.22
		Kittiwake	1.29	0.34	2.76	982	260	2093	505	51.39
		Little gull	0.01	0	0.02	7	0	19	6	92.33
		Great black-backed gull	0.01	0	0.03	7	0	24	7	98.62
		Lesser black-backed gull	0.02	0	0.06	18	0	47	12	66.49
		Common tern	0.22	0.08	0.4	169	58	306	67	39.24

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		Guillemot	3.88	2.44	5.67	2941	1851	4299	632	21.49
		Razorbill	0.35	0.12	0.65	264	88	490	104	39.28
		Puffin	0.03	0.01	0.06	21	4	44	10	47.34
		Fulmar	0.01	0	0.02	6	0	18	6	93.76
		Manx shearwater	0.06	0	0.18	48	0	134	39	80.56
		Gannet	0.11	0.05	0.18	85	42	135	24	28.1
Sep-22	1	Kittiwake	1.97	0.41	4.01	1494	315	3037	705	47.17
		Little gull	0.4	0.26	0.55	301	196	415	56	18.42
		Common gull	0.03	0	0.08	24	0	58	15	62.77
		Great black-backed gull	0.16	0.01	0.41	121	6	310	82	67.73
		Herring gull	0.01	0	0.02	7	0	18	7	98.76
		Lesser black-backed gull	0.05	0	0.12	38	0	88	23	59.07
		Common tern	0.05	0.01	0.09	37	6	72	17	46.07
		Great skua	0.01	0	0.03	7	0	23	7	99.12
		Guillemot	8.06	5.01	11.46	6105	3800	8686	1258	20.6
		Razorbill	3.59	1.89	5.38	2719	1429	4076	719	26.42
		Puffin	0.25	0.16	0.35	190	121	265	37	19.4

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		Red-throated diver	0.01	0	0.02	6	0	18	6	93.79
		Fulmar	0.02	0	0.04	12	0	30	8	65.97
		Sooty shearwater	0.14	0	0.38	105	0	287	87	82.11
		Manx shearwater	0.7	0.11	1.49	530	83	1130	281	52.96
		Gannet	0.25	0.13	0.42	192	98	321	58	29.83
	2	Kittiwake	0.03	0	0.07	25	0	54	14	55.46
		Little gull	0.08	0.02	0.16	61	12	120	28	45.93
		Great black-backed gull	0.06	0	0.14	43	0	108	30	69.51
		Herring gull	0.01	0	0.02	6	0	18	6	98.82
		Guillemot	1.74	1.36	2.18	1317	1032	1654	162	12.24
		Razorbill	0.18	0.07	0.31	135	56	238	49	35.95
		Puffin	0.13	0.06	0.21	98	44	160	31	31.44
		Gannet	0.15	0.07	0.25	113	53	187	36	31.44
Oct-22	1	Kittiwake	0.26	0.17	0.33	196	132	253	31	15.58
		Black-headed gull	0.05	0	0.12	40	2	89	23	57
		Little gull	0.01	0	0.03	8	0	24	7	86.85

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		Common gull	0.02	0	0.04	13	1	30	8	60.6
		Great black-backed gull	0.01	0	0.02	6	0	18	6	94.73
		Herring gull	0.01	0	0.02	7	0	18	6	92.94
		Common tern	0.01	0	0.02	7	0	19	6	93.73
		Guillemot	2.94	2.36	3.59	2226	1790	2723	239	10.73
		Razorbill	0.51	0.31	0.74	390	238	564	85	21.6
		Puffin	0.32	0.16	0.51	240	124	383	68	28.1
		Red-throated diver	0.01	0	0.02	7	0	19	6	95.24
		Fulmar	0.02	0	0.04	13	0	30	8	65.75
		Gannet	0.31	0.22	0.4	235	171	302	34	14.31
Nov-22	1	Kittiwake	0.73	0.5	0.99	555	378	753	97	17.33
		Little gull	0.07	0.02	0.13	50	13	102	24	46.4
		Great black-backed gull	0.06	0.02	0.1	44	13	80	18	40.68
		Herring gull	0.02	0	0.04	12	0	30	8	65.55
		Pomarine skua	0.01	0	0.02	7	0	19	6	94.5
		Guillemot	2.35	1.46	3.35	1784	1103	2536	368	20.61
		Razorbill	0.94	0.51	1.54	714	383	1165	205	28.7

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		Puffin	0.22	0.1	0.36	169	79	274	51	29.92
		Gannet	1.5	0.87	2.16	1139	662	1640	258	22.66
Dec-22	1	Kittiwake	0.56	0.42	0.71	421	316	541	59	13.89
		Common gull	0.06	0.02	0.12	48	12	89	21	42.63
		Great black-backed gull	0.09	0.03	0.16	67	25	119	24	35.12
		Herring gull	0.09	0.04	0.14	67	30	108	20	29.54
		Guillemot	4.32	3.7	5	3275	2802	3788	260	7.93
		Razorbill	2.19	1.77	2.68	1664	1341	2034	173	10.37
		Puffin	0.24	0.11	0.39	180	86	293	52	28.86
		Red-throated diver	0.04	0	0.08	30	0	62	16	53.88
		Fulmar	0.05	0.02	0.09	37	12	66	15	40.89
		Shag	0.01	0	0.02	7	0	18	6	95.16
Jan-23	1	Kittiwake	1.16	0.7	1.68	879	530	1274	191	21.68
		Little gull	0.01	0	0.02	6	0	18	6	97.57
		Common gull	0.06	0.02	0.11	43	12	83	19	44.9
		Great black-backed gull	0.16	0.06	0.3	118	45	226	48	40.05
		Herring gull	0.05	0.01	0.1	39	9	74	17	42.87
		Guillemot	2.28	0.99	3.91	1730	751	2960	564	32.55

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		Razorbill	1.24	0.64	1.91	941	487	1451	242	25.69
		Red-throated diver	0.1	0.04	0.16	73	30	118	23	31.25
		Fulmar	0.18	0.04	0.42	140	29	318	73	52.27
		Gannet	0.03	0	0.07	24	0	53	13	55.19
		Cormorant	0.02	0	0.05	13	0	36	12	95.86
Feb-23	1	Kittiwake	2.77	2.09	3.55	2101	1586	2694	284	13.5
		Common gull	0.05	0.02	0.08	37	18	60	12	31.38
		Great black-backed gull	0.01	0	0.02	6	0	18	6	96.08
		Guillemot	3.08	2.27	4.06	2336	1721	3075	352	15.07
		Razorbill	8.78	6.19	11.61	6652	4689	8801	1014	15.23
		Puffin	0.17	0.07	0.29	127	50	223	46	35.65
		Red-throated diver	0.06	0.01	0.12	43	6	88	21	48.88
		Fulmar	0.02	0	0.04	12	0	30	8	66.2
		Gannet	0.22	0.15	0.29	168	118	223	29	16.7
Mar-23	1	Kittiwake	5.32	4.19	6.63	4028	3177	5025	473	11.74
		Common gull	0.04	0.01	0.07	31	12	54	12	39.61
		Great black-backed gull	0.05	0	0.13	37	0	100	29	76.81

Month-year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Herring gull	0.06	0.02	0.11	48	18	81	17	33.89
		Lesser black-backed gull	0.02	0	0.04	13	0	30	9	67.9
		Guillemot	7.58	5.96	9.2	5744	4520	6970	627	10.91
		Razorbill	6	4.08	8.19	4550	3094	6206	800	17.58
		Puffin	0.12	0.06	0.19	91	42	144	28	30.37
		Red-throated diver	0.18	0.08	0.29	134	60	218	41	30.66
		Gannet	0.65	0.39	0.98	494	299	744	115	23.26
Apr-23	1	Kittiwake	6.32	4.85	8.08	4790	3678	6121	621	12.96
		Common gull	0.16	0.08	0.24	119	60	181	31	25.82
		Great black-backed gull	0.06	0	0.17	49	0	132	36	73.7
		Herring gull	0.02	0	0.06	19	0	42	12	65.46
		Lesser black-backed gull	0.02	0	0.05	18	0	36	10	50.49
		Common tern	0.01	0	0.02	6	0	18	6	92.86
		Arctic tern	0.01	0	0.02	7	0	18	6	94.53
		Guillemot	10.39	8.24	12.89	7870	6247	9768	913	11.6
		Razorbill	2.58	1.99	3.25	1954	1506	2466	244	12.49
		Puffin	0.15	0.1	0.21	112	73	161	22	19.55

Month-year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Red-throated diver	0.18	0.1	0.27	139	77	205	33	23.82
		Fulmar	0.02	0	0.05	19	0	37	10	50.56
		Gannet	0.66	0.33	1.05	502	252	796	143	28.5
		Cormorant	0.01	0	0.02	7	0	19	7	99.96
May-23	1	Whooper swan	0.02	0	0.07	19	0	55	18	92.41
		Kittiwake	1.21	0.4	2.67	918	302	2027	486	52.98
		Little gull	0.04	0	0.12	32	0	91	29	91.81
		Common gull	0.02	0	0.04	12	0	30	8	66.3
		Great black-backed gull	0.02	0	0.04	12	0	30	9	67.8
		Herring gull	0.1	0.01	0.24	73	6	181	48	66.35
		Lesser black-backed gull	0.01	0	0.02	7	0	19	6	97.94
		Sandwich tern	0.36	0.21	0.53	276	163	405	62	22.29
		Common tern	0.17	0.09	0.25	127	70	193	32	25.21
		Guillemot	4.4	1.8	9.22	3333	1367	6985	1720	51.62
		Razorbill	0.2	0.09	0.36	153	68	271	55	35.55
		Puffin	0.17	0.09	0.25	126	69	186	31	24.27

Month-year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Red-throated diver	0.02	0	0.04	13	0	30	9	66.44
		Fulmar	0.05	0.02	0.09	38	12	69	15	39.45
		Gannet	0.02	0	0.04	12	0	30	8	65.3
Jun-23	1	Whimbrel	0.01	0	0.02	6	0	19	7	105.47
		Curlew	0.01	0	0.02	7	0	19	6	96.54
		Kittiwake	3.57	2.85	4.29	2705	2163	3254	283	10.45
		Common gull	0.02	0	0.04	13	0	31	9	66.77
		Great black-backed gull	0.02	0	0.04	13	0	30	9	63.49
		Herring gull	0.26	0.14	0.39	197	108	299	50	24.98
		Lesser black-backed gull	0.36	0.23	0.5	277	175	377	51	18.29
		Guillemot	2.2	1.46	3	1666	1105	2271	307	18.39
		Razorbill	0.61	0.35	0.89	463	267	676	107	22.98
		Puffin	0.1	0.05	0.15	77	36	118	21	27.35
		Fulmar	0.1	0.05	0.16	77	37	121	22	27.89
		Manx shearwater	0.04	0	0.08	30	0	64	16	52.17
		Gannet	0.57	0.4	0.8	432	302	608	77	17.83
Jul-23	1	Kittiwake	1.67	0.42	3.95	1269	317	2997	767	60.44

Month-year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Common gull	0.02	0	0.06	18	0	48	14	73.79
		Great black-backed gull	0.02	0	0.05	13	0	37	12	92.97
		Herring gull	0.53	0.02	1.54	399	18	1168	362	90.63
		Lesser black-backed gull	0.15	0	0.41	116	0	314	94	81.67
		Sandwich tern	0.01	0	0.02	7	0	18	6	93.86
		Guillemot	3.2	2.22	4.28	2425	1682	3244	399	16.44
		Razorbill	2.19	0.94	3.62	1657	714	2742	528	31.86
		Puffin	0.33	0.17	0.5	247	133	376	62	24.89
		Manx shearwater	0.03	0	0.08	24	0	60	18	74.04
		Gannet	0.06	0.02	0.1	43	12	76	16	37.22
Aug-23	1	Kittiwake	1.78	1.24	2.4	1347	937	1820	235	17.45
		Black-headed gull	0.02	0	0.06	18	0	47	13	70.8
		Common gull	0.01	0	0.02	6	0	18	6	96.25
		Great black-backed gull	0.02	0	0.05	19	0	41	10	51.92

Month-year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Lesser black-backed gull	0.01	0	0.02	6	0	18	6	92.05
		Sandwich tern	0.02	0	0.05	12	0	36	12	99.74
		Common tern	0.39	0.11	0.78	299	87	594	128	42.71
		Arctic tern	0	0	0	2	1	3	1	51.27
		Great skua	0.01	0	0.02	7	0	19	6	97.86
		Guillemot	12.37	9.35	16.01	9374	7087	12131	1315	14.02
		Razorbill	5.62	2.96	8.95	4260	2245	6785	1176	27.61
		Puffin	1.15	0.77	1.66	873	583	1255	176	20.16
		Fulmar	0.09	0.03	0.18	72	24	136	29	40.34
		Manx shearwater	0.01	0	0.02	7	0	18	6	93.83
		Gannet	0.39	0.25	0.54	296	190	408	56	18.73

Table 0-8 Overview of apportioned sitting survey data for the WTG area +4km buffer. These data do not account for auk availability bias. Further information can be found in Annex C - Availability bias counts for Auks.

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
Mar-21	1	Kittiwake	4.21	3.21	5.41	3191	2430	4100	431	13.49
		Great black-backed gull	0.02	0	0.05	12	0	36	12	94.5
		Little auk	0.01	0	0.03	9	3	21	6	66.19
		Guillemot	7.61	6.28	9.06	5769	4757	6864	536	9.29
		Razorbill	4.98	4.33	5.63	3777	3285	4269	253	6.7
		Puffin	0.31	0.21	0.41	234	161	315	39	16.63
		Red-throated diver	0.33	0.2	0.5	248	149	379	57	22.88
		Fulmar	0.06	0	0.16	49	0	124	33	67.5
		Gannet	0.13	0.02	0.34	98	12	256	65	66.54
Apr-21	1	Kittiwake	5.92	4.2	7.86	4489	3186	5955	705	15.7
		Great black-backed gull	0.04	0.01	0.07	30	11	52	12	38.45
		Herring gull	0.02	0	0.04	14	0	32	9	61.61
		Guillemot	21.94	16.45	28.62	16627	12465	21684	2336	14.05
		Razorbill	7.59	4.96	10.85	5754	3757	8219	1174	20.4
		Puffin	0.03	0	0.05	22	4	41	10	43.61

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Red-throated diver	0.26	0.14	0.4	200	108	300	48	23.89
		Great northern diver	0.01	0	0.03	7	0	23	6	94.81
		Fulmar	0.02	0	0.04	13	0	30	9	66.64
		Gannet	0.37	0.22	0.55	284	165	414	66	23.17
May-21	1	Kittiwake	1	0.63	1.41	758	478	1065	155	20.36
		Sandwich tern	0.01	0	0.02	6	0	18	6	99.34
		Common tern	0.05	0	0.12	36	0	94	25	70.84
		Guillemot	4.98	3.96	6.24	3774	2998	4728	438	11.59
		Razorbill	0.55	0.32	0.78	414	242	594	92	22.23
		Puffin	0.03	0.01	0.07	25	6	54	13	49.63
		Red-throated diver	0.02	0	0.04	12	0	30	9	67.18
		Gannet	0.02	0	0.04	12	0	30	8	66.22
Jun-21	1	Kittiwake	0.44	0.27	0.62	331	203	470	72	21.56
		Herring gull	0.01	0	0.02	6	0	18	6	97.26
		Guillemot	1.28	0.98	1.58	971	742	1200	118	12.13
		Razorbill	0.27	0.18	0.38	209	134	287	41	19.48
		Puffin	0.04	0.01	0.07	28	9	52	11	38.87

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Fulmar	0.03	0.01	0.06	25	6	48	12	45.2
		Gannet	0.02	0	0.04	12	0	30	8	65.83
Jul-21	1	Kittiwake	1.28	0.37	2.65	974	277	2006	475	48.76
		Lesser black-backed gull	0.01	0	0.02	7	0	19	6	98.35
		Guillemot	8.87	6.22	11.69	6721	4715	8863	1075	15.99
		Razorbill	2.95	1.52	4.58	2233	1151	3469	595	26.65
		Puffin	0.32	0.23	0.41	239	178	308	34	14.11
		Fulmar	0.05	0.02	0.09	37	12	65	14	36.68
		Manx shearwater	0.14	0	0.35	103	0	266	79	76.01
		Gannet	0.09	0.02	0.17	67	18	130	29	42.47
Aug-21	1	Kittiwake	2.94	0.76	6.46	2225	577	4894	1102	49.54
		Great black-backed gull	0.02	0	0.05	12	0	36	12	99.77
		Great skua	0.01	0	0.02	7	0	18	6	93.76
		Guillemot	25.72	13.31	41.01	19488	10086	31078	5356	27.48
		Razorbill	4.34	1.54	7.66	3288	1166	5809	1202	36.56
		Puffin	1.96	1.37	2.6	1487	1039	1974	241	16.17
		Fulmar	0.02	0	0.07	19	0	52	14	73.79
		Gannet	0.08	0.03	0.14	61	25	104	20	32.86

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
Sep-21	1	Kittiwake	1.64	0.85	2.6	1243	641	1968	334	26.84
		Little gull	0.02	0	0.05	19	1	37	10	50.62
		Common gull	0.01	0	0.02	7	1	19	6	91.19
		Great black-backed gull	0.17	0.05	0.36	132	36	270	62	47.13
		Herring gull	0.01	0	0.02	7	0	19	6	89.46
		Lesser black-backed gull	0.02	0	0.05	18	0	36	9	48.18
		Common tern	1.5	0.85	2.24	1138	642	1696	276	24.24
		Arctic skua	0.02	0	0.06	18	0	47	13	72.14
		Guillemot	23.68	17.29	30.69	17945	13101	23259	2659	14.82
		Razorbill	1.81	1.32	2.29	1369	998	1737	190	13.87
		Puffin	1.31	1.05	1.58	996	795	1199	104	10.44
		Fulmar	0.02	0.01	0.05	18	6	36	9	49.63
		Gannet	0.11	0.06	0.17	85	46	128	22	24.82
Oct-21	1	Kittiwake	0.04	0.01	0.08	31	7	60	14	43.18
		Little gull	0.12	0.03	0.23	90	23	176	40	44.25
		Great black-backed gull	0.12	0.01	0.29	88	6	220	64	72.96
		Guillemot	6.95	5.73	8.34	5267	4340	6320	517	9.8

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Razorbill	0.98	0.73	1.23	740	550	935	101	13.63
		Puffin	1.3	1.02	1.63	982	774	1235	122	12.37
		Red-throated diver	0.02	0	0.05	18	0	37	10	53.18
		Gannet	0.14	0.06	0.24	109	48	183	34	30.47
Nov-21	1	Kittiwake	0.09	0.04	0.14	67	32	106	19	28.3
		Great black-backed gull	0.02	0	0.06	19	0	42	13	66.97
		Guillemot	6.06	4.92	7.22	4591	3731	5468	440	9.57
		Razorbill	2.96	2.42	3.55	2246	1834	2688	222	9.84
		Puffin	0.59	0.49	0.69	447	371	521	38	8.4
		Red-throated diver	0.01	0	0.02	7	0	18	6	95.05
		Fulmar	0.01	0	0.02	7	0	19	7	101.29
		Gannet	0.21	0.08	0.38	159	59	286	59	36.95
Dec-21	1	Kittiwake	0.03	0	0.07	25	0	55	14	57.28
		Great black-backed gull	0.06	0.03	0.11	48	23	82	16	32
		Guillemot	3.21	2.71	3.73	2432	2056	2827	198	8.1
		Razorbill	2.57	1.98	3.25	1948	1499	2460	249	12.77

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Puffin	0.07	0.03	0.15	57	25	113	25	42.53
		Red-throated diver	0.02	0	0.06	19	0	47	13	67.07
		Fulmar	0.02	0	0.05	18	0	36	9	50.28
		Shag	0.01	0	0.02	7	0	18	6	92.72
Jan-22	1	Kittiwake	0.02	0	0.05	18	0	36	10	51.87
		Great black-backed gull	0.02	0	0.05	18	0	41	10	55.36
		Herring gull	0.01	0	0.02	7	0	18	6	93.19
		Guillemot	0.56	0.38	0.74	426	292	564	68	15.88
		Razorbill	0.64	0.4	0.88	482	307	671	95	19.7
		Fulmar	0.02	0	0.04	13	0	30	9	68.25
Feb-22	1	Kittiwake	0.94	0.57	1.47	714	430	1112	175	24.5
		Common gull	0.02	0	0.05	13	0	37	13	93.67
		Great black-backed gull	0.02	0	0.04	12	0	30	9	68.59
		Guillemot	4.16	3.27	5.2	3150	2480	3942	369	11.71
		Razorbill	5.95	5.15	6.76	4507	3899	5124	324	7.18
		Puffin	0.01	0	0.03	12	3	27	7	58.79

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Red-throated diver	0.02	0	0.05	19	0	36	10	51.66
		Fulmar	0.01	0	0.02	4	0	12	4	94.93
		Gannet	0.01	0	0.02	7	0	18	6	93.06
Mar-22	1	Kittiwake	2.68	1.72	4	2033	1305	3028	452	22.23
		Common gull	0.08	0.02	0.15	61	18	111	24	39.45
		Great black-backed gull	0.02	0	0.04	13	0	30	9	64.52
		Herring gull	0.01	0	0.02	6	0	18	6	97.59
		Lesser black-backed gull	0.02	0	0.05	13	0	36	12	93.21
		Guillemot	7.33	5.18	9.97	5553	3924	7555	903	16.26
		Razorbill	3.56	2.3	4.88	2696	1746	3699	486	18.01
		Puffin	0.38	0.24	0.54	290	185	411	59	20.19
		Red-throated diver	0.05	0.02	0.09	36	12	65	14	38.66
		Gannet	0.16	0.04	0.31	123	31	233	52	42.18
		Shag	0.01	0	0.02	6	0	18	6	95.4
	2	Kittiwake	1.78	1.39	2.18	1349	1057	1650	150	11.09
		Guillemot	9.08	7.63	10.77	6878	5783	8164	589	8.56

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Razorbill	1.71	1.25	2.23	1294	944	1692	199	15.33
		Puffin	0.17	0.13	0.23	132	95	172	21	15.57
		Red-throated diver	0.18	0.1	0.27	134	75	205	34	25.28
		Fulmar	0.06	0.02	0.1	42	12	75	17	38.34
		Gannet	0.06	0.02	0.13	49	12	96	21	43.19
Apr-22	1	Kittiwake	3.76	2.66	5.05	2848	2014	3825	468	16.41
		Great black-backed gull	0.01	0	0.05	12	0	36	12	102.24
		Herring gull	0.02	0	0.04	13	0	30	9	67.28
		Guillemot	26.06	21	31.45	19750	15910	23832	2022	10.23
		Razorbill	1.93	1.35	2.5	1462	1025	1893	221	15.08
		Puffin	0.04	0.01	0.07	28	11	51	11	36.29
		Red-throated diver	0.31	0.17	0.47	234	128	356	57	24.42
		Fulmar	0.1	0.05	0.15	73	41	112	19	24.96
		Manx shearwater	0.01	0	0.02	6	0	19	6	98.85
		Gannet	0.27	0.11	0.44	205	84	335	66	32.06
	2	Kittiwake	4.34	3.09	5.73	3287	2341	4341	515	15.66
		Herring gull	0.01	0	0.02	7	0	18	6	92.21

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Guillemot	13.48	9.91	17.05	10217	7507	12923	1386	13.56
		Razorbill	1.49	0.99	2.06	1127	750	1565	207	18.32
		Puffin	0.13	0.06	0.21	99	47	158	29	28.76
		Red-throated diver	0.05	0.02	0.08	37	18	59	12	31.42
		Fulmar	0.03	0.01	0.06	24	6	48	11	46.2
		Gannet	1.6	0.85	2.4	1210	642	1820	308	25.42
May-22	1	Kittiwake	3.5	3.02	3.98	2653	2292	3019	188	7.05
		Lesser black-backed gull	0.02	0	0.05	12	0	36	12	96.32
		Sandwich tern	0.02	0	0.05	12	0	36	12	94.72
		Guillemot	16	13.29	18.81	12122	10068	14254	1102	9.09
		Razorbill	3.18	2.43	4.09	2414	1844	3102	326	13.47
		Puffin	0.43	0.3	0.57	326	228	435	56	16.96
		Red-throated diver	0.02	0	0.04	12	0	30	8	63.02
		Fulmar	0.06	0.01	0.12	43	6	91	22	50.3
		Gannet	0.89	0.59	1.2	674	448	910	123	18.12
	2	Kittiwake	1.73	1.32	2.19	1313	1003	1659	168	12.76
		Herring gull	0.01	0	0.02	6	0	18	6	93.32

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Guillemot	4.57	3.58	5.77	3464	2714	4371	410	11.83
		Razorbill	0.43	0.3	0.56	330	230	429	52	15.52
		Puffin	0.01	0	0.03	10	2	24	6	58
		Red-throated diver	0.01	0	0.02	7	0	18	6	94.59
		Gannet	0.15	0.09	0.22	116	71	168	26	21.74
Jun-22	1	Kittiwake	0.64	0.29	1.04	487	223	791	145	29.79
		Great black-backed gull	0.02	0	0.03	12	0	27	7	54.17
		Herring gull	0.02	0	0.06	19	0	48	13	67.1
		Lesser black-backed gull	0.01	0	0.02	7	0	19	7	99.42
		Guillemot	2.69	1.52	4.61	2038	1154	3495	677	33.19
		Razorbill	0.41	0.18	0.74	311	134	565	112	35.83
		Puffin	0.03	0.01	0.06	24	6	45	11	42.39
		Fulmar	0.02	0	0.04	13	0	27	7	56.23
		Gannet	0.15	0.08	0.23	116	60	176	30	25.69
	2	Kittiwake	2.13	1.46	2.9	1617	1109	2197	277	17.12
		Great black-backed gull	0.02	0	0.06	18	0	47	13	69.57

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Herring gull	0.3	0.11	0.54	230	87	412	83	36.02
		Lesser black-backed gull	0.01	0	0.02	7	0	18	6	95.88
		Guillemot	4.4	3.5	5.33	3333	2649	4036	364	10.9
		Razorbill	0.26	0.12	0.46	201	88	352	71	35.12
		Fulmar	0.02	0	0.06	18	0	48	13	70.9
		Gannet	0.55	0.28	0.88	415	216	665	113	27.09
Jul-22	1	Kittiwake	0.21	0.09	0.35	157	65	267	52	32.96
		Herring gull	0.02	0	0.05	13	0	36	12	96.38
		Guillemot	2.51	1.86	3.32	1905	1410	2513	278	14.56
		Razorbill	0.3	0.12	0.54	226	88	408	85	37.37
		Puffin	0.06	0.02	0.11	48	18	87	18	37.88
		Fulmar	0.01	0	0.02	6	0	19	7	102.56
		Manx shearwater	0.02	0	0.05	12	0	36	12	101.79
		Gannet	0.19	0.11	0.27	145	84	206	33	22.37
	2	Kittiwake	0.33	0.13	0.62	248	95	472	99	40.01
		Great black-backed gull	0.02	0	0.07	19	0	54	18	96.85
		Herring gull	0.01	0	0.02	7	0	18	6	91.71
		Guillemot	8.56	5.25	12.23	6487	3976	9264	1335	20.57

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Razorbill	3.71	2.34	5.17	2811	1777	3921	554	19.68
		Puffin	0.26	0.16	0.36	195	124	276	40	20.17
		Fulmar	0.07	0.02	0.12	54	19	95	19	35.51
		Manx shearwater	0.41	0.14	0.8	310	109	606	134	43.05
		Gannet	0.36	0.24	0.48	272	185	367	48	17.48
Aug-22	1	Kittiwake	1.47	0.58	2.59	1115	436	1960	391	35.08
		Great black-backed gull	0.04	0	0.09	30	0	72	19	60.51
		Herring gull	0	0	0	1	0	2	1	95.86
		Lesser black-backed gull	0.01	0	0.02	6	0	18	6	91.16
		Guillemot	11.45	7.02	16.64	8679	5317	12606	1895	21.83
		Razorbill	0.18	0.09	0.28	138	69	214	38	27.24
		Puffin	0.09	0.04	0.15	70	33	113	21	29.91
		Fulmar	0.1	0.02	0.22	79	12	168	41	51.77
		Manx shearwater	0.12	0.02	0.26	92	18	200	46	49.92
		Gannet	0.24	0.11	0.38	179	83	290	55	30.64
	2	Kittiwake	1.01	0.16	2.37	762	119	1799	472	61.91
		Lesser black-backed gull	0.01	0	0.02	6	0	19	6	99.86

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Guillemot	3.89	2.48	5.59	2952	1881	4235	631	21.35
		Razorbill	0.35	0.12	0.65	266	94	490	102	38.36
		Puffin	0.03	0.01	0.05	20	4	40	10	47.56
		Fulmar	0.01	0	0.02	7	0	18	6	94.46
		Manx shearwater	0.07	0	0.19	52	0	144	42	81.97
		Gannet	0.06	0.01	0.12	43	6	92	22	50.69
Sep-22	1	Kittiwake	1.12	0.05	2.73	846	41	2066	557	65.75
		Little gull	0.02	0	0.05	19	0	41	10	51.73
		Common gull	0.01	0	0.02	7	0	19	7	98.16
		Great black-backed gull	0.11	0.01	0.31	88	6	234	68	77.63
		Herring gull	0.01	0	0.02	7	0	19	6	96.68
		Lesser black-backed gull	0.01	0	0.03	8	0	24	8	98.99
		Guillemot	8.14	5.07	11.87	6169	3841	8998	1342	21.75
		Razorbill	3.5	1.88	5.55	2654	1428	4203	717	26.99
		Puffin	0.25	0.17	0.36	190	127	270	37	19.09
		Red-throated diver	0.01	0	0.02	7	0	18	6	90.17
		Fulmar	0.01	0	0.02	7	0	18	6	97.34

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Sooty shearwater	0.13	0	0.35	96	0	263	81	84.62
		Manx shearwater	0.62	0.02	1.45	471	18	1100	284	60.24
		Gannet	0.19	0.07	0.34	145	53	262	56	38.43
	2	Great black-backed gull	0.02	0	0.06	19	0	47	13	68.4
		Guillemot	1.72	1.33	2.21	1306	1005	1672	168	12.82
		Razorbill	0.15	0.07	0.25	112	51	191	37	32.81
		Puffin	0.13	0.05	0.21	97	38	162	32	32.52
		Gannet	0.02	0	0.05	19	0	41	10	52.18
Oct-22	1	Kittiwake	0.05	0.02	0.09	42	18	66	13	29.1
		Great black-backed gull	0.01	0	0.02	7	0	18	6	90.87
		Herring gull	0.01	0	0.02	6	0	18	6	100.55
		Guillemot	2.6	1.99	3.26	1970	1508	2472	246	12.45
		Razorbill	0.48	0.26	0.73	365	200	553	90	24.62
		Puffin	0.29	0.14	0.47	222	109	360	65	29.02
		Red-throated diver	0.01	0	0.02	6	0	18	6	95.45
		Gannet	0.05	0.02	0.08	37	18	61	13	32.8
Nov-22	1	Kittiwake	0.28	0.15	0.43	210	116	325	52	24.75

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Little gull	0.01	0	0.02	7	0	19	6	95.52
		Great black-backed gull	0.02	0	0.05	19	0	37	10	51.36
		Herring gull	0.01	0	0.02	7	0	19	7	96.78
		Guillemot	2.32	1.41	3.26	1758	1065	2469	356	20.26
		Razorbill	0.93	0.51	1.46	708	389	1108	194	27.39
		Puffin	0.2	0.1	0.33	154	76	250	47	30.06
		Gannet	0.82	0.4	1.28	620	307	974	170	27.42
Dec-22	1	Kittiwake	0.1	0.06	0.15	79	47	114	18	22.14
		Common gull	0.02	0	0.07	18	0	54	17	96.38
		Great black-backed gull	0.05	0	0.1	37	0	78	20	54.34
		Herring gull	0.02	0	0.05	19	0	36	10	51.54
		Guillemot	3.75	3.21	4.35	2840	2436	3294	215	7.57
		Razorbill	2.13	1.73	2.59	1611	1310	1962	161	9.99
		Puffin	0.25	0.12	0.39	187	95	297	52	27.61
		Red-throated diver	0.04	0	0.09	30	0	66	17	54.06
		Fulmar	0.04	0.01	0.08	31	6	61	15	47.01
		Shag	0.01	0	0.02	7	0	18	6	93.44

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
Jan-23	1	Kittiwake	0.48	0.27	0.72	368	202	545	88	23.8
		Little gull	0.01	0	0.02	6	0	19	6	95.93
		Great black-backed gull	0.06	0.02	0.12	48	18	90	20	40.83
		Herring gull	0.03	0	0.06	20	0	47	13	64.59
		Guillemot	2.11	0.9	3.64	1598	684	2760	537	33.61
		Razorbill	1.22	0.64	1.83	924	485	1384	230	24.8
		Red-throated diver	0.09	0.04	0.14	67	30	106	20	29.75
		Fulmar	0.08	0.02	0.16	61	12	118	27	43.69
		Cormorant	0.02	0	0.05	13	0	36	12	98.03
Feb-23	1	Kittiwake	1.58	1.13	2.11	1198	857	1596	196	16.35
		Guillemot	2.73	1.99	3.76	2072	1505	2853	336	16.19
		Razorbill	8.24	5.93	10.85	6244	4494	8223	974	15.59
		Puffin	0.16	0.07	0.29	125	50	217	44	34.54
		Red-throated diver	0.06	0.01	0.11	43	6	85	20	46.56
		Gannet	0.02	0	0.06	18	0	48	13	70.46
Mar-23	1	Kittiwake	3.49	2.49	4.59	2643	1884	3482	408	15.41
		Common gull	0.01	0	0.02	6	0	18	6	97.64

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Great black-backed gull	0.04	0	0.12	30	0	90	28	95.89
		Herring gull	0.05	0.02	0.09	42	18	70	15	34.06
		Guillemot	6.68	5.13	8.5	5060	3886	6441	643	12.69
		Razorbill	5.35	3.48	7.48	4051	2638	5666	782	19.3
		Puffin	0.08	0.03	0.14	61	24	108	24	38.52
		Red-throated diver	0.17	0.08	0.29	133	60	220	42	31.29
		Gannet	0.45	0.2	0.74	338	156	563	107	31.68
Apr-23	1	Kittiwake	4.09	2.86	5.44	3102	2171	4125	510	16.42
		Common gull	0.05	0	0.11	36	1	81	21	57.48
		Great black-backed gull	0.06	0	0.16	44	0	120	36	82.17
		Herring gull	0.02	0	0.06	19	0	47	13	68.47
		Lesser black-backed gull	0.02	0.01	0.05	18	6	36	9	48.9
		Guillemot	10.2	8.2	12.98	7732	6212	9838	906	11.71
		Razorbill	2.52	1.87	3.23	1910	1417	2448	264	13.81
		Puffin	0.15	0.1	0.21	111	74	158	22	19.23
		Red-throated diver	0.18	0.09	0.26	133	72	194	31	22.96

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Fulmar	0.02	0	0.05	19	0	41	10	51.19
		Gannet	0.53	0.24	0.94	406	180	713	136	33.41
		Cormorant	0.01	0	0.02	6	0	18	6	97.56
May-23	1	Whooper swan	0.02	0	0.07	19	0	54	17	91.59
		Kittiwake	0.62	0.16	1.29	470	125	976	227	48.2
		Little gull	0.04	0	0.12	33	0	91	31	92.91
		Herring gull	0.05	0.01	0.1	38	6	75	18	45.84
		Guillemot	4.32	1.74	9.01	3272	1321	6826	1707	52.15
		Razorbill	0.18	0.07	0.34	135	50	256	55	40.35
		Puffin	0.13	0.06	0.21	101	48	159	30	29.12
		Red-throated diver	0.02	0	0.04	13	0	30	8	64.23
		Fulmar	0.02	0	0.06	18	0	47	13	68.33
		Gannet	0.01	0	0.02	7	0	19	6	92.24
Jun-23	1	Kittiwake	2.22	1.62	2.8	1683	1231	2120	232	13.76
		Common gull	0	0	0	1	0	1	1	99.75
		Great black-backed gull	0.02	0	0.04	13	0	31	9	69.47
		Herring gull	0.15	0.08	0.21	112	64	163	26	23.32

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Lesser black-backed gull	0.23	0.13	0.34	172	96	256	42	23.94
		Guillemot	2.15	1.41	2.94	1630	1066	2229	288	17.65
		Razorbill	0.61	0.35	0.88	466	264	671	108	23.07
		Puffin	0.08	0.03	0.14	60	22	108	22	36.78
		Fulmar	0.07	0.03	0.12	53	22	89	18	32.81
		Manx shearwater	0.04	0	0.08	30	0	65	17	56.3
		Gannet	0.41	0.24	0.64	311	179	485	81	26.03
Jul-23	1	Kittiwake	1.21	0.24	2.92	916	185	2213	594	64.79
		Common gull	0.02	0	0.06	18	0	47	13	69.78
		Great black-backed gull	0.01	0	0.02	7	0	19	6	92.19
		Herring gull	0.5	0.01	1.48	380	5	1120	353	92.9
		Lesser black-backed gull	0.13	0	0.37	96	0	279	93	96.99
		Guillemot	3.14	2.16	4.22	2383	1637	3200	407	17.08
		Razorbill	2.18	0.97	3.63	1654	739	2751	528	31.91
		Puffin	0.33	0.18	0.51	247	138	385	63	25.22
		Manx shearwater	0.03	0	0.09	25	0	71	20	80.11
		Gannet	0.02	0	0.05	19	0	41	10	53.95

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
Aug-23	1	Kittiwake	1.17	0.75	1.69	886	570	1282	188	21.23
		Great black-backed gull	0.01	0	0.02	7	0	19	6	95.43
		Guillemot	12.39	9.42	16.35	9391	7139	12391	1328	14.13
		Razorbill	5.55	2.81	8.98	4205	2129	6803	1221	29.04
		Puffin	1.13	0.75	1.61	858	567	1220	167	19.46
		Fulmar	0.05	0	0.13	36	0	100	30	81.8
		Gannet	0.18	0.09	0.29	138	65	223	41	29.55

Table 0-9 Overview of apportioned flying survey data for the WTG area +4km buffer. These data do not account for auk availability bias. Further information can be found in Annex C - Availability bias counts for Auks.

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
Mar-21	1	Kittiwake	1.66	1.2	2.18	1258	910	1650	189	14.96

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Black-headed gull	0.01	0	0.02	7	0	19	6	97.16
		Common gull	0.05	0.01	0.09	37	6	70	17	45.22
		Great black-backed gull	0.02	0	0.04	13	0	30	8	64.59
		Herring gull	0.02	0	0.04	12	0	30	8	63.14
		Lesser black-backed gull	0.01	0	0.02	7	0	18	6	96.39
		Guillemot	0.31	0.18	0.45	239	138	344	54	22.3
		Razorbill	0.22	0.14	0.3	168	105	228	32	19.02
		Puffin	0.03	0	0.07	21	0	51	13	60.75
		Red-throated diver	0.01	0	0.02	6	0	18	6	95.7
		Fulmar	0.01	0	0.02	7	0	18	6	92.74
		Gannet	0.14	0.07	0.22	109	54	170	31	27.96
Apr-21	1	Kittiwake	4.21	3.37	5.01	3189	2555	3794	312	9.76
		Common gull	0.02	0	0.04	13	0	30	8	63.15
		Herring gull	0.01	0	0.02	6	0	18	7	102.31
		Lesser black-backed gull	0.04	0.02	0.07	31	12	53	11	35.67
		Sandwich tern	0.01	0	0.03	7	0	23	7	94.26

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Guillemot	0.89	0.42	1.52	678	319	1151	219	32.2
		Razorbill	0.42	0.17	0.73	316	129	555	111	34.96
		Puffin	0.01	0	0.02	6	0	18	6	96.46
		Fulmar	0.06	0.02	0.1	43	13	77	17	38.33
		Gannet	0.48	0.36	0.6	367	275	454	48	12.9
May-21	1	Kittiwake	1.13	0.34	2.45	854	261	1857	456	53.39
		Common gull	0.01	0	0.02	7	0	18	6	94.89
		Great black-backed gull	0.01	0	0.02	6	0	18	6	99.73
		Lesser black-backed gull	0.01	0	0.03	7	0	24	7	98.8
		Sandwich tern	0.27	0.17	0.38	209	131	289	41	19.46
		Common tern	0.13	0.08	0.18	99	64	140	21	20.43
		Guillemot	0.18	0.03	0.42	140	24	321	79	56.37
		Razorbill	0.1	0.02	0.18	74	18	137	31	41.32
		Gannet	0.06	0.02	0.12	48	12	93	21	43.91
Jun-21	1	Kittiwake	0.62	0.24	1.24	471	186	941	207	43.89
		Black-headed gull	0.01	0	0.02	6	0	18	6	97.03
		Little gull	0.01	0	0.02	7	0	18	6	93.09

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Common gull	0.02	0	0.04	13	0	30	8	62.21
		Herring gull	0.04	0	0.1	30	0	78	22	71.69
		Lesser black-backed gull	0.03	0	0.08	24	0	60	18	73.58
		Sandwich tern	0.06	0.02	0.11	48	18	86	18	36.43
		Common tern	0.03	0	0.07	26	2	57	14	54.96
		Arctic tern	0.02	0	0.04	13	0	30	8	58.49
		Guillemot	0.05	0.02	0.09	37	12	71	16	42.03
		Razorbill	0.02	0	0.04	13	0	30	8	61.52
		Fulmar	0.01	0	0.02	6	0	19	6	98.41
		Gannet	0.08	0.02	0.18	60	12	134	32	51.86
Jul-21	1	Kittiwake	1.94	1.52	2.42	1471	1155	1831	176	11.91
		Black-headed gull	0.01	0	0.02	7	0	18	6	94.46
		Little gull	0.02	0	0.06	13	0	47	13	100.38
		Common gull	0.02	0	0.04	13	0	30	9	68.05
		Herring gull	0.02	0	0.04	13	0	30	8	65.16
		Lesser black-backed gull	0.02	0	0.05	18	0	36	10	51.75
		Sandwich tern	0.01	0	0.02	7	0	18	6	92.16

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Guillemot	0.15	0.07	0.25	114	54	186	35	30.67
		Razorbill	0.08	0.04	0.12	61	30	92	16	26.2
		Fulmar	0.04	0.01	0.08	31	6	58	13	42.68
		Manx shearwater	0.01	0	0.02	7	0	18	6	94.88
		Gannet	0.17	0.07	0.33	131	51	254	54	41.2
Aug-21	1	Oystercatcher	0.06	0	0.17	48	0	132	36	74.7
		Kittiwake	2.95	0.93	6.35	2235	708	4813	1180	52.79
		Little gull	0.02	0	0.04	12	0	30	8	68.93
		Common tern	0.48	0.07	1.22	368	57	924	225	61.14
		Arctic tern	0.02	0	0.06	17	3	42	11	64.7
		Great skua	0.01	0	0.02	6	0	18	6	99.09
		Manx shearwater	0.01	0	0.02	7	0	18	6	93.13
		Gannet	0.13	0.08	0.2	102	58	150	24	23
Sep-21	1	Kittiwake	0.8	0.61	0.99	607	461	754	76	12.37
		Little gull	0.1	0.05	0.16	79	36	125	23	29.14
		Great black-backed gull	0.06	0.02	0.09	43	18	71	15	35
		Lesser black-backed gull	0.02	0	0.05	19	0	41	10	53.54
		Sandwich tern	0.02	0	0.04	13	1	30	8	57.34

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Common tern	2.51	1.88	3.22	1903	1423	2440	255	13.37
		Arctic tern	0.06	0.02	0.12	49	14	88	19	39.14
		Arctic skua	0.02	0	0.04	12	0	29	8	64.61
		Gannet	0.07	0.02	0.12	54	18	95	20	36.89
Oct-21	1	Kittiwake	0.1	0.05	0.16	78	36	125	24	29.72
		Black-headed gull	0.06	0.02	0.12	48	12	88	19	39.12
		Little gull	0.74	0.54	0.97	562	409	732	84	14.9
		Common gull	0.03	0.01	0.06	25	6	47	11	43.11
		Great black-backed gull	0.01	0	0.02	7	0	18	6	93.55
		Herring gull	0.02	0	0.04	13	0	30	9	67.74
		Lesser black-backed gull	0.01	0	0.02	7	0	19	7	97.19
		Arctic skua	0.01	0	0.02	6	0	18	6	99.31
		Guillemot	0.44	0.16	0.82	336	118	623	134	39.73
		Razorbill	0.25	0.03	0.58	190	20	440	114	59.94
		Puffin	0.02	0	0.05	13	0	36	12	94.41
		Gannet	0.07	0.03	0.12	55	24	89	17	30.55
Nov-21	1	Kittiwake	0.17	0.12	0.23	133	94	175	22	16.47

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		Little gull	0.03	0	0.08	24	0	59	16	63.79
		Great black-backed gull	0.03	0.01	0.06	25	6	46	10	39.49
		Lesser black-backed gull	0.01	0	0.02	7	0	18	6	91.98
		Guillemot	0.14	0.07	0.23	108	50	175	33	30.75
		Razorbill	0.1	0.04	0.18	79	32	140	28	35.05
		Gannet	0.15	0.05	0.28	111	40	212	47	41.77
Dec-21	1	Kittiwake	0.33	0.23	0.46	252	172	349	46	18.13
		Great black-backed gull	0.03	0.01	0.06	25	6	48	12	47.74
		Guillemot	0.23	0.13	0.37	176	96	283	49	27.58
		Red-throated diver	0.01	0	0.02	6	0	18	6	96.85
		Fulmar	0.01	0	0.02	7	0	18	6	95.68
		Shag	0.02	0	0.04	13	0	30	8	65.07
Jan-22	1	Kittiwake	0.15	0.07	0.23	110	54	175	30	27.14
		Great black-backed gull	0.01	0	0.02	6	0	19	6	96.09
		Herring gull	0.02	0	0.04	13	0	30	9	67.72
		Guillemot	0.02	0	0.04	13	0	30	8	64.51

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		Fulmar	0.02	0	0.04	12	0	30	8	65.16
		Gannet	0.01	0	0.02	6	0	18	6	94.77
Feb-22	1	Kittiwake	0.58	0.41	0.77	444	310	585	72	16.06
		Common gull	0.02	0	0.06	19	0	48	14	72.5
		Guillemot	0.57	0.26	1.04	430	198	788	160	37.23
		Razorbill	0.05	0	0.12	37	0	93	25	66.7
		Fulmar	0.02	0	0.04	13	0	30	9	68.25
		Gannet	0.02	0	0.05	18	0	41	10	54.86
		Shag	0.01	0	0.02	7	0	19	6	94.56
Mar-22	1	Kittiwake	2.22	1.42	3.14	1680	1079	2378	339	20.17
		Black-headed gull	0.01	0	0.03	6	0	23	7	102.45
		Little gull	0.01	0	0.02	7	0	18	6	93.24
		Common gull	0.05	0.01	0.09	36	12	70	16	43.56
		Lesser black-backed gull	0.02	0	0.05	19	0	36	10	51.4
		Guillemot	0.41	0.26	0.59	311	194	450	67	21.48
		Razorbill	0.12	0.04	0.22	91	30	164	36	39.11
		Gannet	0.13	0.05	0.21	97	41	161	31	31.35
	2	Kittiwake	2.04	1.53	2.61	1548	1160	1975	203	13.12

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		Little gull	0.02	0	0.05	12	0	36	12	99.39
		Guillemot	0.51	0.3	0.77	385	227	586	96	24.8
		Razorbill	0.01	0	0.02	6	0	18	6	93.71
		Puffin	0.01	0	0.03	9	0	22	7	71.62
		Gannet	0.11	0.05	0.17	85	42	133	23	26.6
Apr-22	1	Kittiwake	2.45	2.02	2.97	1854	1529	2248	183	9.88
		Black-headed gull	0.01	0	0.02	7	0	18	6	90.67
		Herring gull	0.02	0	0.06	18	0	47	13	70.8
		Lesser black-backed gull	0.02	0	0.04	12	0	30	8	67.33
		Guillemot	3.01	2.5	3.54	2281	1899	2686	207	9.07
		Razorbill	0.38	0.26	0.5	290	194	382	50	17.03
		Red-throated diver	0.03	0.01	0.06	24	6	48	11	45.74
		Fulmar	0.1	0.05	0.17	78	35	127	24	29.82
		Manx shearwater	0.02	0	0.04	13	0	30	8	62.7
		Gannet	0.18	0.1	0.28	139	74	211	35	24.95
	2	Kittiwake	4.59	3.57	5.75	3476	2709	4356	424	12.19

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		Great black-backed gull	0.01	0	0.02	6	0	18	6	98.17
		Herring gull	0.01	0	0.02	7	0	18	6	90.62
		Lesser black-backed gull	0.02	0	0.04	12	0	30	9	66.98
		Sandwich tern	0.29	0.16	0.44	222	122	334	54	24.3
		Common tern	0.16	0.08	0.26	122	58	195	37	29.76
		Arctic tern	0.05	0.02	0.08	35	13	60	12	34.43
		Guillemot	0.73	0.44	1.04	551	332	790	118	21.3
		Razorbill	0.17	0.03	0.36	127	25	272	66	51.65
		Puffin	0.02	0	0.05	15	0	41	12	84.06
		Fulmar	0.02	0	0.05	19	0	37	10	52.44
		Gannet	0.45	0.26	0.7	340	201	534	86	25.21
May-22	1	Kittiwake	3.17	2.54	3.86	2401	1927	2928	255	10.6
		Common gull	0.01	0	0.02	6	0	18	6	92.51
		Herring gull	0.02	0	0.04	13	0	30	8	63.71
		Lesser black-backed gull	0.02	0	0.04	12	0	30	8	67.62
		Sandwich tern	0.25	0.11	0.44	190	84	338	66	34.45
		Arctic tern	0.16	0.09	0.24	121	70	186	31	24.97

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		Guillemot	0.1	0.04	0.19	78	29	144	31	39
		Razorbill	0.12	0	0.31	90	0	233	63	70.1
		Red-throated diver	0.01	0	0.02	7	0	19	6	94.16
		Fulmar	0.02	0	0.05	19	0	42	10	52.42
		Gannet	0.61	0.44	0.81	465	336	612	71	15.16
	2	Kittiwake	1.8	0.85	3.28	1366	644	2488	529	38.69
		Great black-backed gull	0.01	0	0.02	7	0	18	6	95.91
		Herring gull	0.01	0	0.02	7	0	18	6	94.77
		Lesser black-backed gull	0.02	0	0.04	12	0	30	9	69.76
		Sandwich tern	0.13	0.07	0.2	97	54	152	27	26.97
		Common tern	0.21	0.1	0.33	158	77	253	47	29.41
		Arctic tern	0.01	0	0.03	8	1	20	6	84.56
		Guillemot	0.15	0.03	0.34	117	25	256	65	55.04
		Razorbill	0.01	0	0.03	7	0	20	6	85.35
		Gannet	0.12	0.06	0.19	89	42	147	27	30.26
Jun-22	1	Kittiwake	0.95	0.35	1.93	720	269	1461	319	44.19

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		Great black-backed gull	0.01	0	0.02	7	0	19	7	95.11
		Herring gull	0.02	0	0.05	13	0	37	12	93.35
		Lesser black-backed gull	0.02	0	0.05	12	0	36	12	96.24
		Sandwich tern	0.19	0.08	0.35	146	63	262	52	35.1
		Common tern	0.05	0	0.11	37	0	84	21	57.63
		Guillemot	0.11	0.02	0.26	84	18	196	52	61.01
		Razorbill	0.01	0	0.02	7	0	19	6	90.32
		Puffin	0.02	0	0.04	13	0	30	9	67.35
		Fulmar	0.01	0	0.02	7	0	19	6	93.87
		Gannet	0.09	0.02	0.18	67	18	134	30	43.41
	2	Curlew	0.01	0	0.02	6	0	18	6	95.12
		Kittiwake	2.2	1.27	3.73	1666	963	2823	487	29.23
		Great black-backed gull	0.02	0	0.04	12	0	30	8	66.89
		Herring gull	0.06	0.01	0.15	50	6	115	28	55.95
		Lesser black-backed gull	0.03	0	0.07	25	0	54	14	55.5
		Sandwich tern	0.09	0.02	0.15	66	18	117	25	38.08

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		Common tern	0.01	0	0.02	7	0	19	6	98.54
		Guillemot	0.11	0.02	0.23	80	18	175	43	52.78
		Razorbill	0.02	0	0.05	13	0	36	12	95.1
		Fulmar	0.03	0	0.07	25	0	54	14	56.99
		Manx shearwater	0.01	0	0.02	7	0	18	6	94.67
		Gannet	0.08	0.03	0.13	61	24	102	20	33.08
Jul-22	1	Curlew	0.01	0	0.02	7	0	18	6	95.08
		Kittiwake	0.72	0.44	1.11	549	336	845	133	24.2
		Herring gull	0.03	0	0.08	25	0	59	16	64.56
		Lesser black-backed gull	0.02	0	0.05	13	0	36	12	97.31
		Guillemot	0.04	0	0.09	31	0	69	19	60.39
		Razorbill	0.02	0	0.06	19	0	48	13	69.4
		Gannet	0.29	0.14	0.44	219	108	334	60	27.16
	2	Curlew	0.01	0	0.02	6	0	18	6	94.28
		Kittiwake	1.3	0.72	1.97	983	543	1493	239	24.27
		Black-headed gull	0.02	0	0.04	13	0	30	9	69.95
		Common gull	0.03	0.01	0.06	25	6	46	11	43.23

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		Lesser black-backed gull	0.03	0	0.07	24	0	54	14	56.27
		Sandwich tern	0.01	0	0.02	7	0	19	6	96.04
		Common tern	0.02	0	0.05	18	0	36	10	51.79
		Guillemot	0.14	0.06	0.24	107	42	184	37	34.66
		Razorbill	0.03	0	0.07	20	0	51	13	65.1
		Puffin	0.02	0	0.06	18	0	48	13	71.86
		Fulmar	0.01	0	0.02	7	0	19	7	97.16
		Manx shearwater	0.03	0	0.09	25	0	66	19	74.52
		Gannet	0.37	0.23	0.54	281	176	409	61	21.49
Aug-22	1	Kittiwake	1.6	0.71	2.67	1214	540	2026	389	32.03
		Great black-backed gull	0.02	0	0.05	13	0	36	12	96.16
		Lesser black-backed gull	0.09	0.01	0.18	68	6	140	35	51.39
		Common tern	0.14	0.03	0.3	108	23	230	55	50.96
		Arctic tern	0.01	0	0.04	11	0	32	10	87.59
		Guillemot	0.01	0	0.02	6	0	18	6	96.09
		Fulmar	0.02	0	0.04	12	0	30	9	68.04
		Manx shearwater	0.03	0	0.07	25	0	54	14	55.3

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		Gannet	0.14	0.07	0.22	105	53	166	31	28.96
	2	Golden plover	0.1	0	0.24	74	0	185	50	67.58
		Curlew	0.02	0	0.05	13	0	36	12	95.68
		Kittiwake	0.26	0.13	0.42	199	96	321	60	29.72
		Little gull	0.01	0	0.02	6	0	19	6	100.68
		Great black-backed gull	0.01	0	0.02	7	0	18	6	95.15
		Lesser black-backed gull	0.02	0	0.05	13	0	36	12	91.91
		Common tern	0.22	0.07	0.41	169	53	313	68	40.2
		Gannet	0.06	0.02	0.1	43	18	73	16	36.38
Sep-22	1	Kittiwake	0.86	0.31	1.71	655	238	1299	287	43.73
		Little gull	0.37	0.23	0.51	284	175	389	55	19.3
		Common gull	0.02	0	0.06	19	0	48	14	74.03
		Great black-backed gull	0.04	0	0.12	33	0	90	26	80.26
		Lesser black-backed gull	0.04	0	0.1	29	0	75	21	72.43
		Common tern	0.05	0.01	0.1	37	6	77	18	47.48
		Great skua	0.01	0	0.03	7	0	24	7	101.51

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Guillemot	0.06	0.02	0.11	49	18	83	17	34.02
		Razorbill	0.02	0	0.05	19	0	37	10	50.68
		Fulmar	0.01	0	0.02	6	0	19	6	96.94
		Sooty shearwater	0.01	0	0.02	6	0	18	6	99
		Manx shearwater	0.06	0.02	0.12	48	12	93	22	44.24
		Gannet	0.05	0.02	0.11	42	12	84	20	47.22
	2	Kittiwake	0.03	0	0.07	25	0	53	14	54.72
		Little gull	0.08	0.02	0.16	60	12	122	28	46.15
		Great black-backed gull	0.03	0	0.09	25	0	66	19	75.21
		Herring gull	0.01	0	0.02	6	0	18	6	101.99
		Guillemot	0.02	0	0.04	12	0	30	8	66.69
		Razorbill	0.02	0	0.06	18	0	43	13	69.25
		Gannet	0.12	0.05	0.21	92	36	161	32	34.83
Oct-22	1	Kittiwake	0.2	0.13	0.26	151	102	199	25	16.47
		Black-headed gull	0.05	0	0.11	39	2	86	22	56.46
		Little gull	0.01	0	0.03	7	0	20	6	84.94
		Common gull	0.02	0	0.04	13	1	30	8	60.57
		Common tern	0.01	0	0.02	6	0	18	6	96.98

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Guillemot	0.32	0.11	0.61	243	83	464	97	39.89
		Razorbill	0.03	0.01	0.07	24	7	50	12	49.87
		Fulmar	0.02	0	0.04	12	0	30	8	68.39
		Gannet	0.26	0.18	0.35	201	136	266	33	16.38
Nov-22	1	Kittiwake	0.44	0.3	0.58	333	228	441	56	16.77
		Little gull	0.06	0.01	0.13	44	6	96	24	53.29
		Great black-backed gull	0.03	0.01	0.06	25	6	49	11	43.02
		Herring gull	0.01	0	0.02	7	0	19	6	91.43
		Pomarine skua	0.01	0	0.02	7	0	19	6	97.42
		Guillemot	0.02	0	0.05	13	0	37	12	95.35
		Razorbill	0.01	0	0.02	7	0	19	6	93.48
		Puffin	0.02	0	0.05	13	0	37	13	102.42
		Gannet	0.68	0.42	0.97	514	317	732	104	20.16
Dec-22	1	Kittiwake	0.46	0.32	0.61	346	240	460	56	16.17
		Common gull	0.04	0.01	0.08	31	6	64	15	48.25
		Great black-backed gull	0.04	0.02	0.07	31	12	52	11	35.38
		Herring gull	0.06	0.02	0.12	50	18	90	19	38.5
		Guillemot	0.56	0.27	0.9	425	207	683	122	28.65

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Razorbill	0.06	0.02	0.1	43	12	78	18	40.59
		Fulmar	0.01	0	0.03	7	0	23	7	99.59
Jan-23	1	Kittiwake	0.67	0.39	1	509	293	758	120	23.38
		Common gull	0.06	0.02	0.11	43	12	84	20	45.72
		Great black-backed gull	0.09	0.01	0.22	71	11	168	46	64.44
		Herring gull	0.02	0	0.06	19	0	48	13	66.05
		Guillemot	0.14	0	0.36	104	0	275	76	72.4
		Razorbill	0.04	0	0.1	31	0	80	22	68.67
		Fulmar	0.1	0.01	0.26	79	6	198	53	67.16
		Gannet	0.03	0	0.07	24	0	53	14	56.07
Feb-23	1	Kittiwake	1.18	0.81	1.62	896	611	1226	157	17.5
		Common gull	0.05	0.02	0.08	37	18	64	12	32.86
		Great black-backed gull	0.01	0	0.02	6	0	19	6	99.92
		Guillemot	0.33	0.13	0.55	247	102	415	81	32.48
		Razorbill	0.49	0.26	0.75	373	196	566	98	26.29
		Fulmar	0.02	0	0.04	12	0	30	8	65.43
		Gannet	0.2	0.13	0.28	152	101	209	29	18.54
Mar-23	1	Kittiwake	1.85	1.39	2.39	1404	1054	1813	191	13.56

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Common gull	0.03	0.01	0.06	24	6	47	11	46.08
		Great black-backed gull	0.01	0	0.03	7	0	23	7	95.77
		Herring gull	0.01	0	0.02	7	0	18	6	98.05
		Lesser black-backed gull	0.02	0	0.04	12	0	30	9	71.26
		Guillemot	0.91	0.68	1.14	687	515	861	88	12.78
		Razorbill	0.66	0.51	0.83	501	384	627	64	12.73
		Puffin	0.04	0	0.09	31	0	72	20	63.38
		Gannet	0.21	0.13	0.31	162	97	237	35	21.47
Apr-23	1	Kittiwake	2.23	1.74	2.76	1688	1321	2094	201	11.89
		Common gull	0.11	0.05	0.19	85	35	141	28	33.13
		Great black-backed gull	0.01	0	0.02	6	0	18	6	97.55
		Common tern	0.01	0	0.02	6	0	18	6	101.71
		Arctic tern	0.01	0	0.02	7	0	18	6	92.35
		Guillemot	0.1	0.04	0.16	73	30	124	25	33.35
		Razorbill	0.06	0.02	0.12	43	12	89	21	48.48
		Red-throated diver	0.01	0	0.02	6	0	18	6	96.21

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Gannet	0.13	0.08	0.18	98	58	139	22	22.27
May-23	1	Kittiwake	0.58	0.17	1.28	440	130	971	237	53.74
		Common gull	0.02	0	0.04	13	0	30	9	66.24
		Great black-backed gull	0.02	0	0.04	13	0	30	9	66.98
		Herring gull	0.05	0	0.14	36	0	109	34	94.6
		Lesser black-backed gull	0.01	0	0.02	7	0	18	6	95.52
		Sandwich tern	0.36	0.2	0.52	272	155	394	64	23.42
		Common tern	0.17	0.09	0.25	128	67	193	32	24.73
		Guillemot	0.14	0.05	0.26	104	36	198	42	40.37
		Razorbill	0.02	0	0.05	14	0	38	12	84.48
		Puffin	0.03	0	0.09	25	0	67	19	73.84
		Fulmar	0.02	0.01	0.05	19	6	36	9	48.87
		Gannet	0.01	0	0.02	7	0	19	6	97.62
Jun-23	1	Whimbrel	0.01	0	0.02	6	0	19	6	101.19
		Curlew	0.01	0	0.02	6	0	19	6	100.18
		Kittiwake	1.29	0.99	1.6	981	747	1213	122	12.4
		Common gull	0.02	0	0.04	12	0	31	9	69.72
		Herring gull	0.11	0.05	0.2	86	36	154	31	35.03

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Lesser black-backed gull	0.14	0.09	0.19	103	66	146	21	19.53
		Guillemot	0.06	0	0.17	44	0	128	42	95.62
		Razorbill	0.01	0	0.02	7	0	19	7	98.37
		Puffin	0.02	0	0.05	19	0	37	10	49.69
		Fulmar	0.03	0.01	0.06	24	6	48	12	46.98
		Gannet	0.16	0.07	0.26	122	55	195	37	29.58
Jul-23	1	Kittiwake	0.56	0.15	1.16	428	112	879	209	48.91
		Great black-backed gull	0.01	0	0.02	7	0	18	6	97.26
		Herring gull	0.02	0	0.05	19	0	36	10	53.31
		Lesser black-backed gull	0.01	0	0.03	7	0	23	6	94.55
		Sandwich tern	0.01	0	0.02	7	0	18	6	90.2
		Guillemot	0.06	0.03	0.1	48	24	73	13	25.4
		Razorbill	0.03	0	0.07	25	0	54	14	53.88
		Gannet	0.03	0	0.07	24	0	54	15	60.99
Aug-23	1	Kittiwake	0.58	0.44	0.73	440	333	555	58	13.19
		Black-headed gull	0.02	0	0.06	18	0	43	12	65.11

Month-Year	Survey no.	Species	Density Estimate (n/km²)	Lower 95% Confidence Limit of Density	Upper 95% Confidence Limit of Density	Population Estimate (number)	Lower 95% Confidence Limit of Population Estimate (number)	Upper 95% Confidence Limit of Population Estimate (number)	Standard Deviation of Population Estimate (number)	CV (%)
		Common gull	0.01	0	0.02	7	0	18	6	94.48
		Great black-backed gull	0.02	0	0.04	13	0	30	8	64.74
		Lesser black-backed gull	0.01	0	0.02	7	0	18	6	91.43
		Sandwich tern	0.02	0	0.05	12	0	37	12	96.85
		Common tern	0.39	0.12	0.77	300	89	584	131	43.55
		Arctic tern	0	0	0	2	1	3	1	50.64
		Great skua	0.01	0	0.02	6	0	18	6	94.26
		Guillemot	0.02	0	0.05	19	0	37	10	49.89
		Razorbill	0.02	0	0.04	13	0	30	8	63.52
		Fulmar	0.05	0.02	0.08	36	18	60	12	31.41
		Manx shearwater	0.01	0	0.02	7	0	18	6	92.67
		Gannet	0.2	0.13	0.29	155	100	216	31	19.47

Annex C - Availability bias counts for Auks

218. In line with guidance, an availability bias correction has been undertaken to account for birds that are underwater and not visible during the surveys. These are the abundances taken forward into the assessments. For full details see 2.7 Data analysis.

Table 0-1. Overview of survey data with availability bias for auks in the WTG area. This table presents both apportioned and unapportioned survey data.

Year	Month	Survey no.	Species	Adjusted Density Estimate nkm²	Adjusted Density Estimate nkm² LCL	Adjusted Density Estimate nkm² UCL	Adjusted Population Estimate number	Adjusted Lower 95 Confidence Limit of Population Estimate number	Adjusted Upper 95 Confidence Limit of Population Estimate number	Adjusted Standard Deviation of Population Estimate number	Adjusted CV (%)
Apportioned											
2021	March	1	Guillemot	9.4	7.29	11.81	3428	2655	4300	376	10.97%
	April	1	Guillemot	36.35	23.45	53.48	13248	8547	19492	2685	20.27%
	May	1	Guillemot	6.14	5.03	7.33	2238	1831	2675	208	9.29%
	June	1	Guillemot	1.64	1.15	2.12	601	417	773	86	14.31%
	July	3	Guillemot	13.09	9	17.56	4774	3284	6401	759	15.9%

Year	Month	Survey no.	Species	Adjusted Density Estimate nkm²	Adjusted Density Estimate nkm² LCL	Adjusted Density Estimate nkm² UCL	Adjusted Population Estimate number	Adjusted Lower 95 Confidence Limit of Population Estimate number	Adjusted Upper 95 Confidence Limit of Population Estimate number	Adjusted Standard Deviation of Population Estimate number	Adjusted CV (%)
	August	1	Guillemot	26.53	10.66	45.36	9671	3887	16531	3483	36.01%
	September	1	Guillemot	26.58	20.76	33.23	9689	7569	12109	1157	11.94%
	October	1	Guillemot	10.09	7.75	12.86	3676	2821	4688	413	11.24%
	November	1	Guillemot	7.77	6.13	9.57	2832	2235	3487	310	10.95%
	December	1	Guillemot	4.34	3.76	4.97	1583	1370	1813	100	6.32%
2022	January	1	Guillemot	0.73	0.45	1.03	269	165	377	49	18.22%
	February	1	Guillemot	7.31	5.31	9.6	2668	1936	3502	366	13.72%
	March	1	Guillemot	12.72	8.21	18.39	4632	2995	6702	943	20.36%
	March	2	Guillemot	12.83	9.71	16.15	4674	3544	5887	543	11.62%
	April	1	Guillemot	33.49	25.06	42.6	12201	9134	15527	1466	12.02%

Year	Month	Survey no.	Species	Adjusted Density Estimate nkm²	Adjusted Density Estimate nkm² LCL	Adjusted Density Estimate nkm² UCL	Adjusted Population Estimate number	Adjusted Lower 95 Confidence Limit of Population Estimate number	Adjusted Upper 95 Confidence Limit of Population Estimate number	Adjusted Standard Deviation of Population Estimate number	Adjusted CV (%)
	April	2	Guillemot	19.3	12.28	26.05	7035	4481	9497	1177	16.73%
	May	1	Guillemot	18.23	14.64	21.93	6644	5335	7996	670	10.08%
	May	2	Guillemot	4.12	3.25	5.03	1503	1188	1835	155	10.31%
	June	1	Guillemot	2.1	1.46	2.8	765	529	1019	118	15.42%
	June	2	Guillemot	5.44	3.79	7.08	1982	1381	2580	311	15.69%
	July	1	Guillemot	2.26	1.47	3.13	825	536	1141	145	17.58%
	July	2	Guillemot	8.37	6	11.26	3054	2188	4102	473	15.49%
	August	1	Guillemot	15.41	6.37	26.61	5616	2323	9695	1957	34.85%
	August	2	Guillemot	3.82	1.97	6.11	1390	722	2229	406	29.21%
	September	1	Guillemot	5.99	3.81	9.31	2185	1388	3394	525	24.03%

Year	Month	Survey no.	Species	Adjusted Density Estimate nkm²	Adjusted Density Estimate nkm² LCL	Adjusted Density Estimate nkm² UCL	Adjusted Population Estimate number	Adjusted Lower 95 Confidence Limit of Population Estimate number	Adjusted Upper 95 Confidence Limit of Population Estimate number	Adjusted Standard Deviation of Population Estimate number	Adjusted CV (%)
	September	2	Guillemot	1.97	1.33	2.79	722	487	1019	136	18.84%
	October	1	Guillemot	2.88	1.7	4.27	1055	622	1557	201	19.05%
	November	1	Guillemot	2.53	1.25	4.05	925	456	1475	252	27.24%
	December	1	Guillemot	5.58	4.61	6.61	2032	1684	2410	143	7.04%
2023	January	1	Guillemot	3.8	0.76	8.32	1387	279	3032	649	46.79%
	February	1	Guillemot	4.18	2.59	6.35	1523	949	2314	324	21.27%
	March	1	Guillemot	12.68	8.09	17.74	4623	2951	6464	847	18.32%
	April	1	Guillemot	16.42	11.52	23	5988	4201	8383	1117	18.65%
	May	1	Guillemot	2.08	1.7	2.44	756	620	891	59	7.8%
	June	1	Guillemot	2.39	1.49	3.39	871	545	1236	179	20.55%

Year	Month	Survey no.	Species	Adjusted Density Estimate nkm²	Adjusted Density Estimate nkm² LCL	Adjusted Density Estimate nkm² UCL	Adjusted Population Estimate number	Adjusted Lower 95 Confidence Limit of Population Estimate number	Adjusted Upper 95 Confidence Limit of Population Estimate number	Adjusted Standard Deviation of Population Estimate number	Adjusted CV (%)
	July	1	Guillemot	2.5	1.39	3.69	912	509	1345	206	22.59%
	August	1	Guillemot	12.25	10.7	13.87	4464	3903	5053	290	6.5%
2021	March	1	Razorbill	6.59	4.95	8.47	2403	1804	3091	310	12.9%
	April	1	Razorbill	13.13	6.22	21.52	4784	2268	7845	1399	29.24%
	May	1	Razorbill	0.75	0.32	1.24	274	117	454	78	28.47%
	June	1	Razorbill	0.31	0.12	0.54	116	44	200	33	28.45%
	July	3	Razorbill	3.65	1.33	6.95	1334	483	2529	516	38.68%
	August	1	Razorbill	3.42	1.01	6.76	1248	372	2464	526	42.15%
	September	1	Razorbill	2.15	1.38	3.03	783	505	1104	153	19.54%
	October	1	Razorbill	1.35	0.71	2.23	489	260	810	112	22.9%
	November	1	Razorbill	3.71	2.76	4.83	1357	1002	1760	189	13.93%
	December	1	Razorbill	3.57	2.37	5	1299	865	1821	235	18.09%
2022	January	1	Razorbill	1.09	0.59	1.65	400	216	604	99	24.75%
	February	1	Razorbill	7.99	6.6	9.35	2915	2408	3409	259	8.89%

Year	Month	Survey no.	Species	Adjusted Density Estimate nkm²	Adjusted Density Estimate nkm² LCL	Adjusted Density Estimate nkm² UCL	Adjusted Population Estimate number	Adjusted Lower 95 Confidence Limit of Population Estimate number	Adjusted Upper 95 Confidence Limit of Population Estimate number	Adjusted Standard Deviation of Population Estimate number	Adjusted CV (%)
	March	1	Razorbill	5.05	2.59	7.72	1843	944	2814	444	24.09%
	March	2	Razorbill	2.05	1.3	2.84	745	472	1034	142	19.06%
	April	1	Razorbill	2.44	1.36	3.64	893	495	1324	175	19.6%
	April	2	Razorbill	1.96	0.99	3.31	716	358	1206	168	23.46%
	May	1	Razorbill	3.81	2.6	5.31	1394	951	1937	216	15.49%
	May	2	Razorbill	0.4	0.16	0.67	145	57	244	49	33.79%
	June	1	Razorbill	0.29	0.06	0.57	109	24	211	50	45.87%
	June	2	Razorbill	0.38	0.1	0.75	138	38	273	61	44.2%
	July	1	Razorbill	0.1	0.01	0.3	42	4	108	24	57.14%
	July	2	Razorbill	3.39	1.71	5.52	1234	626	2014	341	27.63%
	August	1	Razorbill	0.22	0.06	0.44	82	23	163	38	46.34%
	August	2	Razorbill	0.33	0.07	0.67	121	29	246	59	48.76%
	September	1	Razorbill	1.81	0.88	2.89	662	319	1052	182	27.49%
	September	2	Razorbill	0.19	0.04	0.43	71	13	155	34	47.89%
	October	1	Razorbill	0.54	0.08	1.12	196	29	410	94	47.96%
	November	1	Razorbill	0.99	0.45	1.61	358	166	589	105	29.33%

Year	Month	Survey no.	Species	Adjusted Density Estimate nkm²	Adjusted Density Estimate nkm² LCL	Adjusted Density Estimate nkm² UCL	Adjusted Population Estimate number	Adjusted Lower 95 Confidence Limit of Population Estimate number	Adjusted Upper 95 Confidence Limit of Population Estimate number	Adjusted Standard Deviation of Population Estimate number	Adjusted CV (%)
	December	1	Razorbill	2.84	1.99	3.94	1034	725	1438	172	16.63%
2023	January	1	Razorbill	2.12	0.92	3.52	775	334	1286	245	31.61%
	February	1	Razorbill	15.57	10.08	21.66	5676	3677	7895	1026	18.08%
	March	1	Razorbill	9.91	4.93	15.62	3609	1796	5693	940	26.05%
	April	1	Razorbill	3.68	2.58	4.84	1340	942	1767	203	15.15%
	May	1	Razorbill	0.26	0.09	0.49	99	32	178	32	32.32%
	June	1	Razorbill	1.1	0.59	1.66	402	213	607	103	25.62%
	July	1	Razorbill	1.38	0.51	2.44	503	186	888	172	34.19%
	August	1	Razorbill	4.16	1.81	7.84	1518	659	2858	590	38.87%
2021	March	1	Puffin	0.33	0.16	0.54	121	59	197	27	22.31%
	April	1	Puffin	0.05	0	0.09	16	2	36	9	56.25%
	May	1	Puffin	0.06	0.01	0.13	21	3	49	13	61.9%
	June	1	Puffin	0.03	0	0.09	15	2	35	10	66.67%
	July	3	Puffin	0.36	0.23	0.49	132	87	179	24	18.18%
	August	1	Puffin	1.98	1.15	2.92	721	419	1066	169	23.44%
	September	1	Puffin	1.7	1.28	2.11	620	466	770	78	12.58%
	October	1	Puffin	1.74	1.35	2.21	637	493	804	78	12.24%

Year	Month	Survey no.	Species	Adjusted Density Estimate nkm²	Adjusted Density Estimate nkm² LCL	Adjusted Density Estimate nkm² UCL	Adjusted Population Estimate number	Adjusted Lower 95 Confidence Limit of Population Estimate number	Adjusted Upper 95 Confidence Limit of Population Estimate number	Adjusted Standard Deviation of Population Estimate number	Adjusted CV (%)
	November	1	Puffin	0.79	0.59	0.97	289	219	352	35	12.11%
	December	1	Puffin	0.06	0.02	0.09	22	10	36	7	31.82%
2022	January	1	Puffin	0	0	0	0	0	0	0	0
	February	1	Puffin	0.01	0	0.02	5	2	7	2	40%
	March	1	Puffin	0.56	0.3	0.91	205	111	333	56	27.32%
	March	2	Puffin	0.16	0.06	0.3	63	23	111	22	34.92%
	April	1	Puffin	0.05	0	0.09	17	2	35	9	52.94%
	April	2	Puffin	0.15	0.03	0.29	55	14	106	26	47.27%
	May	1	Puffin	0.59	0.35	0.89	217	127	325	52	23.96%
	May	2	Puffin	0	0	0	0	0	0	0	0
	June	1	Puffin	0.05	0	0.14	20	2	52	11	55%
	June	2	Puffin	0	0	0	0	0	0	0	0
	July	1	Puffin	0.02	0	0.05	8	0	16	5	62.5%
	July	2	Puffin	0.22	0.07	0.39	79	28	141	25	31.65%
	August	1	Puffin	0.07	0.02	0.13	27	9	48	10	37.04%
	August	2	Puffin	0.05	0.01	0.09	17	2	33	8	47.06%

Year	Month	Survey no.	Species	Adjusted Density Estimate nkm²	Adjusted Density Estimate nkm² LCL	Adjusted Density Estimate nkm² UCL	Adjusted Population Estimate number	Adjusted Lower 95 Confidence Limit of Population Estimate number	Adjusted Upper 95 Confidence Limit of Population Estimate number	Adjusted Standard Deviation of Population Estimate number	Adjusted CV (%)
	September	1	Puffin	0.29	0.14	0.47	105	50	169	31	29.52%
	September	2	Puffin	0.16	0.05	0.29	58	17	108	26	44.83%
	October	1	Puffin	0.31	0.07	0.71	116	27	261	63	54.31%
	November	1	Puffin	0.17	0.07	0.31	65	24	114	24	36.92%
	December	1	Puffin	0.33	0.12	0.59	121	44	218	45	37.19%
2023	January	1	Puffin	0	0	0	0	0	0	0	0
	February	1	Puffin	0.14	0.03	0.29	52	13	108	26	50%
	March	1	Puffin	0.11	0	0.28	43	0	102	22	51.16%
	April	1	Puffin	0.16	0.08	0.27	61	29	99	19	31.15%
	May	1	Puffin	0.19	0.06	0.39	71	21	141	25	35.21%
	June	1	Puffin	0.05	0	0.14	21	0	51	11	52.38%
	July	1	Puffin	0.34	0.15	0.54	122	55	193	37	30.33%
	August	1	Puffin	1.08	0.63	1.67	395	232	606	100	25.32%
Unapportioned											

Year	Month	Survey no.	Species	Adjusted Density Estimate nkm²	Adjusted Density Estimate nkm² LCL	Adjusted Density Estimate nkm² UCL	Adjusted Population Estimate number	Adjusted Lower 95 Confidence Limit of Population Estimate number	Adjusted Upper 95 Confidence Limit of Population Estimate number	Adjusted Standard Deviation of Population Estimate number	Adjusted CV (%)
2021	March	1	Guillemot	8.46	6.46	10.88	3085	2353	3963	367	11.9%
	April	1	Guillemot	34.99	21.81	50.91	12751	7949	18552	2625	20.59%
	May	1	Guillemot	5.77	4.73	6.87	2108	1722	2504	196	9.3%
	June	1	Guillemot	1.44	0.92	1.95	525	338	710	87	16.57%
	July	3	Guillemot	12.63	9.07	16.83	4602	3307	6137	707	15.36%
	August	1	Guillemot	24.82	9.4	45.08	9044	3425	16432	3347	37.01%
	September	1	Guillemot	25.25	19.5	30.99	9202	7105	11294	1082	11.76%
	October	1	Guillemot	9.26	6.95	11.94	3378	2533	4356	389	11.52%
	November	1	Guillemot	7.4	5.71	9.16	2697	2084	3339	303	11.23%
	December	1	Guillemot	3.97	3.31	4.58	1450	1205	1671	105	7.24%

Year	Month	Survey no.	Species	Adjusted Density Estimate nkm²	Adjusted Density Estimate nkm² LCL	Adjusted Density Estimate nkm² UCL	Adjusted Population Estimate number	Adjusted Lower 95 Confidence Limit of Population Estimate number	Adjusted Upper 95 Confidence Limit of Population Estimate number	Adjusted Standard Deviation of Population Estimate number	Adjusted CV (%)
2022	January	1	Guillemot	0.61	0.34	0.87	223	124	318	46	20.63%
	February	1	Guillemot	7.04	5.23	9.34	2564	1907	3403	361	14.08%
	March	1	Guillemot	12.19	8.01	17.68	4444	2921	6443	867	19.51%
	March	2	Guillemot	11.66	8.8	14.76	4246	3209	5381	507	11.94%
	April	1	Guillemot	33	25.07	41.06	12027	9136	14965	1394	11.59%
	April	2	Guillemot	19.07	12.65	26.18	6949	4613	9537	1163	16.74%
	May	1	Guillemot	17.65	14.17	21.11	6431	5165	7695	660	10.26%
	May	2	Guillemot	3.91	2.94	4.9	1427	1070	1786	162	11.35%
	June	1	Guillemot	2.07	1.44	2.67	753	525	976	108	14.34%
	June	2	Guillemot	5.33	3.67	7.05	1942	1340	2571	315	16.22%

Year	Month	Survey no.	Species	Adjusted Density Estimate nkm²	Adjusted Density Estimate nkm² LCL	Adjusted Density Estimate nkm² UCL	Adjusted Population Estimate number	Adjusted Lower 95 Confidence Limit of Population Estimate number	Adjusted Upper 95 Confidence Limit of Population Estimate number	Adjusted Standard Deviation of Population Estimate number	Adjusted CV (%)
	July	1	Guillemot	2.18	1.37	3.07	798	499	1119	144	18.05%
	July	2	Guillemot	8.01	5.89	10.74	2920	2146	3914	443	15.17%
	August	1	Guillemot	14.95	6.19	26.78	5450	2254	9760	1874	34.39%
	August	2	Guillemot	3.74	1.96	6.2	1364	716	2259	400	29.33%
	September	1	Guillemot	5.74	3.7	8.72	2094	1348	3180	475	22.68%
	September	2	Guillemot	1.83	1.2	2.57	668	436	937	133	19.91%
	October	1	Guillemot	2.62	1.5	3.92	952	548	1429	191	20.06%
	November	1	Guillemot	2.31	1.13	3.87	845	413	1409	241	28.52%
	December	1	Guillemot	5.09	4.09	6.15	1858	1490	2241	140	7.53%
2023	January	1	Guillemot	3.44	0.57	7.12	1255	205	2597	601	47.89%

Year	Month	Survey no.	Species	Adjusted Density Estimate nkm²	Adjusted Density Estimate nkm² LCL	Adjusted Density Estimate nkm² UCL	Adjusted Population Estimate number	Adjusted Lower 95 Confidence Limit of Population Estimate number	Adjusted Upper 95 Confidence Limit of Population Estimate number	Adjusted Standard Deviation of Population Estimate number	Adjusted CV (%)
	February	1	Guillemot	4.06	2.63	5.95	1481	954	2169	293	19.78%
	March	1	Guillemot	12.18	7.53	17.35	4439	2744	6327	824	18.56%
	April	1	Guillemot	16.14	11.01	23.14	5887	4011	8435	1154	19.6%
	May	1	Guillemot	2.04	1.71	2.38	746	624	865	56	7.51%
	June	1	Guillemot	2.31	1.37	3.3	844	500	1205	174	20.62%
	July	1	Guillemot	2.43	1.38	3.52	886	501	1283	200	22.57%
	August	1	Guillemot	11.97	10.44	13.58	4364	3808	4948	282	6.46%
2021	March	1	Razorbill	5.81	4.11	7.47	2123	1499	2728	293	13.8%
	April	1	Razorbill	12.73	6.04	21.13	4642	2203	7702	1389	29.92%
	May	1	Razorbill	0.61	0.2	1.11	225	71	409	77	34.22%
	June	1	Razorbill	0.23	0.07	0.42	85	28	156	28	32.94%
	July	3	Razorbill	3.4	1.18	6.51	1243	431	2372	517	41.59%

Year	Month	Survey no.	Species	Adjusted Density Estimate nkm²	Adjusted Density Estimate nkm² LCL	Adjusted Density Estimate nkm² UCL	Adjusted Population Estimate number	Adjusted Lower 95 Confidence Limit of Population Estimate number	Adjusted Upper 95 Confidence Limit of Population Estimate number	Adjusted Standard Deviation of Population Estimate number	Adjusted CV (%)
	August	1	Razorbill	3.07	0.79	5.88	1117	290	2143	499	44.67%
	September	1	Razorbill	1.98	1.22	2.82	724	447	1032	148	20.44%
	October	1	Razorbill	1.19	0.56	2.06	435	204	753	115	26.44%
	November	1	Razorbill	3.27	2.31	4.39	1195	838	1605	181	15.15%
	December	1	Razorbill	2.96	1.97	4.08	1080	717	1489	203	18.8%
2022	January	1	Razorbill	1	0.51	1.61	364	189	588	104	28.57%
	February	1	Razorbill	7.46	6.14	8.69	2718	2237	3167	237	8.72%
	March	1	Razorbill	4.69	2.39	7.31	1714	873	2667	427	24.91%
	March	2	Razorbill	1.85	1.17	2.6	673	429	952	131	19.47%
	April	1	Razorbill	2.32	1.27	3.49	845	463	1272	170	20.12%
	April	2	Razorbill	1.85	0.92	3.15	678	335	1146	160	23.6%
	May	1	Razorbill	3.69	2.44	5.18	1344	891	1891	218	16.22%
	May	2	Razorbill	0.38	0.13	0.68	139	51	248	50	35.97%
	June	1	Razorbill	0.24	0.02	0.53	88	7	193	50	56.82%
	June	2	Razorbill	0.37	0.07	0.7	133	29	253	59	44.36%
	July	1	Razorbill	0.09	0	0.28	35	0	102	24	68.57%

Year	Month	Survey no.	Species	Adjusted Density Estimate nkm²	Adjusted Density Estimate nkm² LCL	Adjusted Density Estimate nkm² UCL	Adjusted Population Estimate number	Adjusted Lower 95 Confidence Limit of Population Estimate number	Adjusted Upper 95 Confidence Limit of Population Estimate number	Adjusted Standard Deviation of Population Estimate number	Adjusted CV (%)
	July	2	Razorbill	3.14	1.67	5.09	1147	610	1855	317	27.64%
	August	1	Razorbill	0.22	0.06	0.45	82	21	165	39	47.56%
	August	2	Razorbill	0.32	0.07	0.65	117	27	235	55	47.01%
	September	1	Razorbill	1.74	0.84	2.89	636	308	1051	187	29.4%
	September	2	Razorbill	0.18	0.02	0.4	63	7	149	34	53.97%
	October	1	Razorbill	0.48	0.06	1.05	177	22	382	89	50.28%
	November	1	Razorbill	0.84	0.34	1.44	305	123	529	99	32.46%
	December	1	Razorbill	2.58	1.7	3.72	941	617	1359	182	19.34%
2023	January	1	Razorbill	2	0.82	3.14	730	298	1146	227	31.1%
	February	1	Razorbill	15.33	10.06	20.86	5584	3667	7602	966	17.3%
	March	1	Razorbill	9.49	5.16	14.78	3458	1882	5387	895	25.88%
	April	1	Razorbill	3.5	2.44	4.73	1278	892	1725	200	15.65%
	May	1	Razorbill	0.25	0.07	0.49	96	29	180	32	33.33%
	June	1	Razorbill	1.05	0.56	1.64	384	204	599	105	27.34%
	July	1	Razorbill	1.3	0.5	2.31	473	181	840	159	33.62%

Year	Month	Survey no.	Species	Adjusted Density Estimate nkm²	Adjusted Density Estimate nkm² LCL	Adjusted Density Estimate nkm² UCL	Adjusted Population Estimate number	Adjusted Lower 95 Confidence Limit of Population Estimate number	Adjusted Upper 95 Confidence Limit of Population Estimate number	Adjusted Standard Deviation of Population Estimate number	Adjusted CV (%)
	August	1	Razorbill	4.01	1.72	7.88	1466	629	2873	589	40.18%
2021	March	1	Puffin	0.24	0.1	0.43	90	41	156	24	26.67%
	April	1	Puffin	0.03	0	0.09	15	0	35	9	60%
	May	1	Puffin	0.03	0	0.12	15	0	42	14	93.33%
	June	1	Puffin	0.02	0	0.06	8	0	21	7	87.5%
	July	3	Puffin	0.21	0.1	0.33	77	41	121	21	27.27%
	August	1	Puffin	0.65	0.41	0.92	236	150	336	48	20.34%
	September	1	Puffin	0.97	0.68	1.27	351	247	461	55	15.67%
	October	1	Puffin	1.21	0.79	1.7	442	288	621	79	17.87%
	November	1	Puffin	0.58	0.4	0.78	212	144	287	36	16.98%
	December	1	Puffin	0.02	0	0.06	8	0	21	7	87.5%
2022	January	1	Puffin	0	0	0	0	0	0	0	0
	February	1	Puffin	0	0	0	0	0	0	0	0
	March	1	Puffin	0.28	0.09	0.54	104	35	195	42	40.38%
	March	2	Puffin	0.08	0	0.21	28	0	77	22	78.57%
	April	1	Puffin	0.03	0	0.09	15	0	34	9	60%

Year	Month	Survey no.	Species	Adjusted Density Estimate nkm²	Adjusted Density Estimate nkm² LCL	Adjusted Density Estimate nkm² UCL	Adjusted Population Estimate number	Adjusted Lower 95 Confidence Limit of Population Estimate number	Adjusted Upper 95 Confidence Limit of Population Estimate number	Adjusted Standard Deviation of Population Estimate number	Adjusted CV (%)
	April	2	Puffin	0.03	0	0.12	15	0	42	14	93.33%
	May	1	Puffin	0.47	0.2	0.76	169	73	277	52	30.77%
	May	2	Puffin	0	0	0	0	0	0	0	0
	June	1	Puffin	0.04	0	0.11	14	0	39	9	64.29%
	June	2	Puffin	0	0	0	0	0	0	0	0
	July	1	Puffin	0	0	0	0	0	0	0	0
	July	2	Puffin	0.19	0.07	0.35	71	27	130	24	33.8%
	August	1	Puffin	0.03	0	0.09	15	0	35	9	60%
	August	2	Puffin	0.02	0	0.06	7	0	21	7	100%
	September	1	Puffin	0.2	0.07	0.33	72	27	119	24	33.33%
	September	2	Puffin	0.08	0	0.2	29	0	71	21	72.41%
	October	1	Puffin	0.3	0.06	0.66	112	21	242	62	55.36%
	November	1	Puffin	0.08	0	0.17	29	0	64	16	55.17%
	December	1	Puffin	0.26	0.06	0.49	93	21	181	40	43.01%
2023	January	1	Puffin	0	0	0	0	0	0	0	0

Year	Month	Survey no.	Species	Adjusted Density Estimate nkm²	Adjusted Density Estimate nkm² LCL	Adjusted Density Estimate nkm² UCL	Adjusted Population Estimate number	Adjusted Lower 95 Confidence Limit of Population Estimate number	Adjusted Upper 95 Confidence Limit of Population Estimate number	Adjusted Standard Deviation of Population Estimate number	Adjusted CV (%)
	February	1	Puffin	0.03	0	0.09	15	0	35	10	66.67%
	March	1	Puffin	0.06	0	0.17	22	0	63	20	90.91%
	April	1	Puffin	0.02	0	0.06	7	0	21	7	100%
	May	1	Puffin	0.11	0	0.26	42	0	98	20	47.62%
	June	1	Puffin	0.04	0	0.11	15	0	40	10	66.67%
	July	1	Puffin	0.19	0.09	0.29	70	35	105	19	27.14%
	August	1	Puffin	0.58	0.19	1.14	211	69	417	87	41.23%

Table 0-2 Overview of survey data with availability bias for auks in the WTG area +2km. This table presents both apportioned and unapportioned survey data.

Year	Month	Survey no.	Species	Adjusted Density Estimate nkm²	Adjusted Density Estimate nkm² LCL	Adjusted Density Estimate nkm² UCL	Adjusted Population Estimate number	Adjusted Lower 95 Confidence Limit of Population Estimate number	Adjusted Upper 95 Confidence Limit of Population Estimate number	Adjusted Standard Deviation of Population Estimate number	Adjusted CV (%)
Apportioned											
2021	March	1	Guillemot	10.67	8.7	12.97	5859	4779	7115	569	9.71%
	April	1	Guillemot	34.6	25.07	45.94	18986	13761	25205	2818	14.84%
	May	1	Guillemot	7.55	5.59	10.19	4140	3065	5592	591	14.28%
	June	1	Guillemot	1.78	1.26	2.32	977	697	1275	138	14.12%
	July	3	Guillemot	12.47	8.34	17.15	6845	4581	9412	1192	17.41%
	August	1	Guillemot	25.23	11.93	39.35	13839	6545	21593	3872	27.98%
	September	1	Guillemot	28.02	22.11	34.97	15371	12128	19184	1825	11.87%
	October	1	Guillemot	9.98	7.99	12.3	5481	4387	6750	525	9.58%

Year	Month	Survey no.	Species	Adjusted Density Estimate nkm²	Adjusted Density Estimate nkm² LCL	Adjusted Density Estimate nkm² UCL	Adjusted Population Estimate number	Adjusted Lower 95 Confidence Limit of Population Estimate number	Adjusted Upper 95 Confidence Limit of Population Estimate number	Adjusted Standard Deviation of Population Estimate number	Adjusted CV (%)
	November	1	Guillemot	8.37	6.7	10.18	4590	3675	5590	470	10.24%
	December	1	Guillemot	4.55	3.88	5.32	2496	2130	2923	185	7.41%
2022	January	1	Guillemot	0.77	0.5	1.06	421	271	589	74	17.58%
	February	1	Guillemot	6.92	5.35	8.63	3802	2938	4735	408	10.73%
	March	1	Guillemot	10.88	7.66	14.86	5970	4201	8152	956	16.01%
	March	2	Guillemot	13.26	10.6	16.53	7279	5811	9074	773	10.62%
	April	1	Guillemot	37.92	30.38	46.3	20805	16667	25400	2067	9.94%
	April	2	Guillemot	19.22	13.05	25.81	10547	7155	14160	1700	16.12%
	May	1	Guillemot	22.09	17.54	26.95	12127	9623	14787	1272	10.49%
	May	2	Guillemot	6.58	4.91	9.07	3611	2697	4977	555	15.37%

Year	Month	Survey no.	Species	Adjusted Density Estimate nkm²	Adjusted Density Estimate nkm² LCL	Adjusted Density Estimate nkm² UCL	Adjusted Population Estimate number	Adjusted Lower 95 Confidence Limit of Population Estimate number	Adjusted Upper 95 Confidence Limit of Population Estimate number	Adjusted Standard Deviation of Population Estimate number	Adjusted CV (%)
	June	1	Guillemot	3.53	1.69	6.7	1938	926	3675	764	39.42%
	June	2	Guillemot	5.71	4.25	7.49	3132	2334	4111	426	13.6%
	July	1	Guillemot	2.64	1.82	3.58	1449	998	1964	233	16.08%
	July	2	Guillemot	10.2	6.44	15.39	5594	3535	8448	1271	22.72%
	August	1	Guillemot	12.4	6.27	20.49	6805	3435	11241	2026	29.77%
	August	2	Guillemot	4.36	2.73	6.52	2394	1493	3575	537	22.43%
	September	1	Guillemot	10.06	5.51	15.83	5515	3028	8683	1469	26.64%
	September	2	Guillemot	2.19	1.54	2.88	1206	845	1584	183	15.17%
	October	1	Guillemot	3.52	2.25	5.02	1933	1233	2759	317	16.4%
	November	1	Guillemot	2.76	1.66	4.07	1514	910	2231	325	21.47%

Year	Month	Survey no.	Species	Adjusted Density Estimate nkm²	Adjusted Density Estimate nkm² LCL	Adjusted Density Estimate nkm² UCL	Adjusted Population Estimate number	Adjusted Lower 95 Confidence Limit of Population Estimate number	Adjusted Upper 95 Confidence Limit of Population Estimate number	Adjusted Standard Deviation of Population Estimate number	Adjusted CV (%)
	December	1	Guillemot	5.85	4.8	7.06	3216	2634	3871	238	7.4%
2023	January	1	Guillemot	2.77	0.79	5.57	1523	436	3061	643	42.22%
	February	1	Guillemot	4.1	2.67	5.78	2249	1469	3166	424	18.85%
	March	1	Guillemot	10.82	7.7	14.43	5944	4225	7922	866	14.57%
	April	1	Guillemot	15.41	12.07	20.09	8451	6622	11022	1115	13.19%
	May	1	Guillemot	6.51	2.04	15.13	3574	1126	8308	2213	61.92%
	June	1	Guillemot	3.01	1.96	4.32	1649	1076	2373	301	18.25%
	July	1	Guillemot	3.11	1.92	4.33	1701	1055	2375	329	19.34%
	August	1	Guillemot	13.99	11.56	17.37	7673	6344	9536	803	10.47%
2021	March	1	Razorbill	6.59	5.47	7.7	3620	3001	4229	274	7.57%

Year	Month	Survey no.	Species	Adjusted Density Estimate nkm²	Adjusted Density Estimate nkm² LCL	Adjusted Density Estimate nkm² UCL	Adjusted Population Estimate number	Adjusted Lower 95 Confidence Limit of Population Estimate number	Adjusted Upper 95 Confidence Limit of Population Estimate number	Adjusted Standard Deviation of Population Estimate number	Adjusted CV (%)
	April	1	Razorbill	11.41	6.4	17.99	6261	3507	9869	1565	25%
	May	1	Razorbill	0.75	0.38	1.16	406	211	636	89	21.92%
	June	1	Razorbill	0.31	0.18	0.49	176	98	268	38	21.59%
	July	3	Razorbill	3.53	1.65	5.87	1940	905	3220	584	30.1%
	August	1	Razorbill	4	1.5	7.17	2191	824	3935	848	38.7%
	September	1	Razorbill	2.08	1.43	2.85	1140	783	1560	199	17.46%
	October	1	Razorbill	1.4	0.78	2.15	771	434	1182	150	19.46%
	November	1	Razorbill	3.66	2.71	4.61	2011	1485	2529	251	12.48%
	December	1	Razorbill	3.4	2.44	4.42	1868	1344	2431	284	15.2%
2022	January	1	Razorbill	0.86	0.49	1.3	469	266	710	112	23.88%
	February	1	Razorbill	7.92	6.72	9.18	4346	3690	5041	342	7.87%
	March	1	Razorbill	4.63	2.95	6.56	2545	1622	3603	486	19.1%
	March	2	Razorbill	2.08	1.48	2.67	1140	814	1468	160	14.04%
	April	1	Razorbill	2.78	1.99	3.65	1523	1094	2003	188	12.34%
	April	2	Razorbill	1.86	1.11	2.79	1020	612	1537	190	18.63%
	May	1	Razorbill	4.13	3.03	5.3	2269	1661	2912	274	12.08%

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	May	2	Razorbill	0.52	0.32	0.78	292	172	432	64	21.92%
	June	1	Razorbill	0.54	0.17	1.08	297	98	598	124	41.75%
	June	2	Razorbill	0.34	0.11	0.67	189	59	373	77	40.74%
	July	1	Razorbill	0.12	0.01	0.27	64	9	146	31	48.44%
	July	2	Razorbill	3.37	2	4.99	1853	1104	2742	406	21.91%
	August	1	Razorbill	0.16	0.04	0.31	86	22	165	39	45.35%
	August	2	Razorbill	0.48	0.12	0.95	262	70	526	119	45.42%
	September	1	Razorbill	3.72	1.57	6.61	2043	866	3628	744	36.42%
	September	2	Razorbill	0.17	0.05	0.34	97	29	183	37	38.14%
	October	1	Razorbill	0.57	0.23	0.98	316	129	542	99	31.33%
	November	1	Razorbill	0.9	0.46	1.48	496	254	817	146	29.44%
	December	1	Razorbill	2.82	2.17	3.6	1546	1190	1976	194	12.55%
2023	January	1	Razorbill	1.68	0.78	2.71	926	431	1483	261	28.19%
	February	1	Razorbill	12.24	8.05	16.32	6719	4416	8949	1107	16.48%
	March	1	Razorbill	7.91	4.76	11.67	4337	2618	6409	938	21.63%

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	April	1	Razorbill	3.53	2.51	4.73	1936	1381	2594	288	14.88%
	May	1	Razorbill	0.3	0.09	0.61	166	50	334	66	39.76%
	June	1	Razorbill	0.82	0.45	1.23	451	249	678	104	23.06%
	July	1	Razorbill	1.35	0.68	2.16	742	378	1180	193	26.01%
	August	1	Razorbill	6.01	2.77	10.39	3295	1523	5701	1083	32.87%
2021	March	1	Puffin	0.37	0.22	0.53	202	120	294	35	17.33%
	April	1	Puffin	0.06	0.01	0.12	29	5	67	12	41.38%
	May	1	Puffin	0.03	0.01	0.09	22	6	54	14	63.64%
	June	1	Puffin	0.05	0.01	0.09	23	8	49	12	52.17%
	July	3	Puffin	0.38	0.26	0.5	211	141	276	36	17.06%
	August	1	Puffin	2.19	1.36	3.16	1203	747	1735	255	21.2%
	September	1	Puffin	1.63	1.29	2.02	898	708	1106	105	11.69%
	October	1	Puffin	1.71	1.32	2.24	940	725	1228	125	13.3%
	November	1	Puffin	0.75	0.59	0.9	407	324	492	44	10.81%
	December	1	Puffin	0.07	0.03	0.14	42	20	76	15	35.71%
2022	January	1	Puffin	0	0	0	0	0	0	0	0

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	February	1	Puffin	0.01	0	0.01	5	2	8	2	40%
	March	1	Puffin	0.56	0.35	0.79	304	192	437	65	21.38%
	March	2	Puffin	0.22	0.14	0.32	127	76	180	26	20.47%
	April	1	Puffin	0.05	0.01	0.09	29	9	54	12	41.38%
	April	2	Puffin	0.16	0.06	0.29	88	31	163	26	29.55%
	May	1	Puffin	0.5	0.31	0.72	277	175	396	57	20.58%
	May	2	Puffin	0.01	0	0.05	10	0	24	7	70%
	June	1	Puffin	0.05	0.01	0.13	35	6	73	14	40%
	June	2	Puffin	0	0	0	0	0	0	0	0
	July	1	Puffin	0.02	0	0.05	13	3	27	7	53.85%
	July	2	Puffin	0.27	0.14	0.46	156	78	253	35	22.44%
	August	1	Puffin	0.12	0.03	0.2	62	19	111	24	38.71%
	August	2	Puffin	0.03	0	0.06	16	2	35	8	50%
	September	1	Puffin	0.3	0.19	0.43	165	105	240	36	21.82%
	September	2	Puffin	0.16	0.06	0.27	89	35	150	30	33.71%
	October	1	Puffin	0.34	0.13	0.61	188	75	336	68	36.17%

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	November	1	Puffin	0.2	0.08	0.33	108	48	179	36	33.33%
	December	1	Puffin	0.28	0.12	0.48	153	64	260	50	32.68%
2023	January	1	Puffin	0	0	0	0	0	0	0	0
	February	1	Puffin	0.21	0.07	0.41	119	38	221	49	41.18%
	March	1	Puffin	0.15	0.03	0.32	86	21	172	28	32.56%
	April	1	Puffin	0.22	0.14	0.31	121	77	176	27	22.31%
	May	1	Puffin	0.2	0.08	0.36	116	47	198	30	25.86%
	June	1	Puffin	0.09	0.01	0.19	52	8	107	20	38.46%
	July	1	Puffin	0.36	0.2	0.52	198	110	289	48	24.24%
	August	1	Puffin	1.19	0.77	1.7	651	421	934	139	21.35%
Unapportioned											
2021	March	1	Guillemot	9.76	7.7	12.25	5359	4224	6720	583	10.88%
	April	1	Guillemot	33.55	24.12	45.25	18406	13236	24831	2737	14.87%
	May	1	Guillemot	7.19	5.23	9.72	3950	2870	5336	580	14.68%

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	June	1	Guillemot	1.57	1.07	2.1	864	583	1155	136	15.74%
	July	3	Guillemot	12.19	8.18	16.44	6691	4485	9017	1130	16.89%
	August	1	Guillemot	24.48	12.1	38.42	13427	6637	21081	3808	28.36%
	September	1	Guillemot	26.87	20.97	33.44	14745	11505	18350	1795	12.17%
	October	1	Guillemot	9.23	7.13	11.59	5069	3910	6357	537	10.59%
	November	1	Guillemot	7.82	6.24	9.53	4291	3425	5230	435	10.14%
	December	1	Guillemot	4.17	3.51	4.89	2287	1931	2685	173	7.56%
2022	January	1	Guillemot	0.64	0.39	0.9	355	221	492	66	18.59%
	February	1	Guillemot	6.62	5.04	8.39	3633	2766	4602	408	11.23%
	March	1	Guillemot	10.37	7.3	14.11	5686	4009	7738	912	16.04%

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	March	2	Guillemot	12.09	9.55	15.07	6635	5235	8268	701	10.57%
	April	1	Guillemot	37.12	29.78	45.65	20367	16339	25051	2107	10.35%
	April	2	Guillemot	18.97	12.86	25.27	10407	7057	13870	1628	15.64%
	May	1	Guillemot	21.28	17.29	25.75	11675	9487	14124	1185	10.15%
	May	2	Guillemot	6.31	4.6	8.67	3461	2528	4760	521	15.05%
	June	1	Guillemot	3.42	1.62	6.64	1879	891	3642	761	40.5%
	June	2	Guillemot	5.63	4.16	7.3	3090	2284	4010	409	13.24%
	July	1	Guillemot	2.6	1.74	3.51	1427	956	1925	223	15.63%
	July	2	Guillemot	9.58	6.19	14.77	5259	3392	8103	1221	23.22%
	August	1	Guillemot	12.27	6.25	20.04	6730	3434	10998	1970	29.27%

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	August	2	Guillemot	4.38	2.65	6.6	2407	1452	3619	544	22.6%
	September	1	Guillemot	9.62	5.05	15.66	5275	2771	8592	1415	26.82%
	September	2	Guillemot	2.1	1.49	2.74	1152	819	1505	170	14.76%
	October	1	Guillemot	3.15	2.01	4.48	1735	1102	2464	286	16.48%
	November	1	Guillemot	2.48	1.41	3.74	1360	770	2050	319	23.46%
	December	1	Guillemot	5.35	4.38	6.45	2939	2402	3540	219	7.45%
2023	January	1	Guillemot	2.57	0.63	5.18	1406	350	2845	611	43.46%
	February	1	Guillemot	3.92	2.57	5.48	2150	1412	3009	396	18.42%
	March	1	Guillemot	10.53	7.42	13.88	5778	4080	7617	842	14.57%
	April	1	Guillemot	15.17	11.42	19.78	8324	6270	10858	1168	14.03%

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	May	1	Guillemot	6.39	1.99	14.85	3507	1100	8147	2087	59.51%
	June	1	Guillemot	2.94	1.91	4.12	1618	1051	2259	300	18.54%
	July	1	Guillemot	2.91	1.78	4.15	1601	975	2277	332	20.74%
	August	1	Guillemot	13.74	11.53	16.73	7540	6325	9180	743	9.85%
2021	March	1	Razorbill	5.7	4.68	6.79	3127	2565	3727	268	8.57%
	April	1	Razorbill	11.13	6.44	16.88	6111	3534	9265	1420	23.24%
	May	1	Razorbill	0.62	0.28	0.98	339	152	541	85	25.07%
	June	1	Razorbill	0.2	0.09	0.34	115	49	194	32	27.83%
	July	3	Razorbill	3.27	1.41	5.6	1792	778	3069	580	32.37%
	August	1	Razorbill	3.68	1.12	7.11	2018	617	3901	837	41.48%
	September	1	Razorbill	1.93	1.34	2.63	1058	741	1443	181	17.11%
	October	1	Razorbill	1.21	0.64	1.92	667	350	1057	143	21.44%
	November	1	Razorbill	3.24	2.36	4.16	1781	1297	2281	245	13.76%

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	December	1	Razorbill	2.81	1.94	3.84	1546	1069	2108	269	17.4%
2022	January	1	Razorbill	0.76	0.42	1.14	414	229	627	106	25.6%
	February	1	Razorbill	7.4	6.07	8.63	4061	3337	4741	356	8.77%
	March	1	Razorbill	4.29	2.58	6.01	2359	1415	3299	456	19.33%
	March	2	Razorbill	1.84	1.28	2.39	1013	708	1314	152	15%
	April	1	Razorbill	2.58	1.81	3.39	1420	997	1862	180	12.68%
	April	2	Razorbill	1.78	0.99	2.65	976	543	1456	184	18.85%
	May	1	Razorbill	3.96	2.84	5.17	2172	1558	2836	272	12.52%
	May	2	Razorbill	0.49	0.27	0.74	266	148	407	61	22.93%
	June	1	Razorbill	0.47	0.13	0.98	263	76	544	117	44.49%
	June	2	Razorbill	0.31	0.1	0.63	178	51	349	71	39.89%
	July	1	Razorbill	0.11	0	0.28	57	0	150	33	57.89%
	July	2	Razorbill	3.04	1.75	4.59	1668	958	2516	400	23.98%
	August	1	Razorbill	0.15	0.02	0.31	83	16	166	40	48.19%
	August	2	Razorbill	0.45	0.11	0.89	247	57	493	116	46.96%
	September	1	Razorbill	3.41	1.38	6.28	1872	758	3451	687	36.7%

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	September	2	Razorbill	0.16	0.04	0.32	85	22	177	37	43.53%
	October	1	Razorbill	0.5	0.21	0.89	278	115	484	89	32.01%
	November	1	Razorbill	0.71	0.34	1.19	393	186	657	121	30.79%
	December	1	Razorbill	2.48	1.8	3.26	1353	992	1794	188	13.9%
2023	January	1	Razorbill	1.56	0.68	2.58	854	373	1415	258	30.21%
	February	1	Razorbill	12.19	8.03	16.4	6683	4405	8998	1114	16.67%
	March	1	Razorbill	7.68	4.58	11.25	4219	2516	6179	898	21.28%
	April	1	Razorbill	3.36	2.29	4.51	1840	1254	2477	294	15.98%
	May	1	Razorbill	0.3	0.09	0.63	165	50	344	69	41.82%
	June	1	Razorbill	0.82	0.44	1.22	449	243	673	105	23.39%
	July	1	Razorbill	1.26	0.61	2.02	695	332	1114	195	28.06%
	August	1	Razorbill	5.91	2.76	10.22	3244	1513	5607	1071	33.01%
2021	March	1	Puffin	0.26	0.14	0.44	146	75	243	34	23.29%
	April	1	Puffin	0.04	0	0.1	27	0	60	13	48.15%
	May	1	Puffin	0.02	0	0.08	15	0	42	14	93.33%
	June	1	Puffin	0.01	0	0.05	8	0	27	8	100%

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	July	3	Puffin	0.22	0.13	0.31	119	69	170	27	22.69%
	August	1	Puffin	0.98	0.62	1.35	535	340	742	106	19.81%
	September	1	Puffin	0.93	0.66	1.19	513	362	656	76	14.81%
	October	1	Puffin	1.12	0.72	1.58	615	397	866	115	18.7%
	November	1	Puffin	0.56	0.42	0.71	308	231	388	41	13.31%
	December	1	Puffin	0.03	0	0.09	21	0	54	15	71.43%
2022	January	1	Puffin	0	0	0	0	0	0	0	0
	February	1	Puffin	0	0	0	0	0	0	0	0
	March	1	Puffin	0.33	0.17	0.51	182	99	280	47	25.82%
	March	2	Puffin	0.1	0.02	0.2	56	14	110	26	46.43%
	April	1	Puffin	0.03	0	0.08	21	0	48	12	57.14%
	April	2	Puffin	0.07	0.01	0.19	41	7	99	19	46.34%
	May	1	Puffin	0.34	0.15	0.55	184	86	298	56	30.43%
	May	2	Puffin	0.01	0	0.03	7	0	21	7	100%
	June	1	Puffin	0.03	0	0.09	21	0	53	11	52.38%
	June	2	Puffin	0	0	0	0	0	0	0	0

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	July	1	Puffin	0	0	0	0	0	0	0	0
	July	2	Puffin	0.18	0.06	0.36	103	34	197	32	31.07%
	August	1	Puffin	0.08	0.01	0.15	42	7	82	20	47.62%
	August	2	Puffin	0.01	0	0.03	8	0	21	7	87.5%
	September	1	Puffin	0.17	0.08	0.28	99	47	156	30	30.3%
	September	2	Puffin	0.06	0	0.15	35	0	84	21	60%
	October	1	Puffin	0.3	0.1	0.58	169	56	319	68	40.24%
	November	1	Puffin	0.08	0.01	0.15	42	7	84	21	50%
	December	1	Puffin	0.17	0.05	0.33	99	28	181	41	41.41%
2023	January	1	Puffin	0	0	0	0	0	0	0	0
	February	1	Puffin	0.08	0	0.19	43	0	103	27	62.79%
	March	1	Puffin	0.05	0	0.18	33	0	98	23	69.7%
	April	1	Puffin	0.03	0	0.09	21	0	54	15	71.43%
	May	1	Puffin	0.13	0.03	0.25	74	21	141	24	32.43%
	June	1	Puffin	0.06	0	0.15	35	0	81	17	48.57%

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	July	1	Puffin	0.21	0.1	0.3	113	57	169	29	25.66%
	August	1	Puffin	0.62	0.26	1.08	339	143	593	119	35.1%

Annex D – Ornithological Census and Capture TrialThis document presents a census of seabird presence on 17 offshore platforms in the North Sea. It has been redacted to protect the breeding locations of sensitive species at offshore locations. These locations have been redacted at the request of the platform owners. The surveys were carried out in 2022 and 2023 and focused on any offshore platforms within 20km of the Project.

Outer Dowsing Offshore Wind

Outer Dowsing Offshore Wind

Ornithological Census

2483544

RSK biocensus
EXPERTS IN ECOLOGY

OCTOBER 2022

RSK GENERAL NOTES

Project No.: 2483544

Title: Outer Dowsing Offshore Wind (ODOW) – Ornithological Census 2022

Client: Outer Dowsing Offshore Wind

Date: October 2022

Office: Helsby

Status: Rev01

Author	Tom Smith	**Technical reviewer**	Prof Richard (Dez) Delahay
Signature	[redacted]	Signature	[redacted]
Date:	October 2022		October 2022

EXECUTIVE SUMMARY

1. This report presents the results of an ornithological assessment and in particular, a nesting kittiwake (*Rissa tridactyla*) survey carried out on 19 offshore structures in the southern North Sea. The report was commissioned by Outer Dowsing Offshore Wind (ODOW) to confirm the presence and status of nesting kittiwake colonies to inform future surveys and assessments.
2. The platforms are situated in the southern North Sea and therefore boat-based surveys were undertaken from the Independent.
3. Surveys were completed between 28th July and 1st August 2022.
4. Kittiwakes were recorded on six of the 19 platforms.
5. Updated surveys should be completed annually to provide accurate counts to inform impact assessments, mitigation proposals and additional survey requirements.

CONTENTS

1 INTRODUCTION

1.1 Purpose of this Report

This report presents the results of surveys to establish the presence of nesting birds, and in particular kittiwakes (*Rissa tridactyla*), on offshore structures in the southern North Sea. Outer Dowsing Offshore Wind (ODOW) commissioned surveys from RSK Biocensus to determine the presence of nesting birds on 19 offshore structures within or in close proximity to the proposed Outer Dowsing Offshore Windfarm.

1.2 Project Background

Nesting bird colonies on offshore assets have the potential to be affected by future windfarm development. Monitoring is therefore required to determine whether nesting birds are present at each of the assets within or in close proximity to the Outer Dowsing Offshore Windfarm and to inform future survey and assessment work. Due to recent observations at other platforms, the Offshore Petroleum Regulator for Environment & Decommissioning (OPRED) released an advice note on the risk of kittiwake presence on offshore installations (March 2021). OPRED also requested that the Joint Nature Conservation Committee (JNCC) provide an advice note on kittiwake survey methods for offshore installations (published March 2021).

2 OFFSHORE STRUCTURES

There are 19 offshore structures included within this monitoring survey as detailed in *Table 1* and locations shown in *Figure 1*. PLATFORM NAME REMOVED and PLATFORM NAME REMOVED are small platforms which constitute parts of the PLATFORM NAME REMOVED complex and therefore the table in *Appendix A* (Seabird recording form) only contains 17 entries.

Table 1. TABLE REMOVED**.**

3 METHODS

3.1 Ornithological Assessment

The ornithological assessments were undertaken by Dr Ken Neal and Tom Smith. Ken is an independent expert sub-contracted to RSK Biocensus. Summary details of their experience are provided below:

- Dr Ken Neal is an ecologist with over 23 years of experience. He is trained to JNCC-accredited European Seabirds at Sea (ESAS) standards for offshore boat-based bird and marine mammal surveys and recently completed similar surveys in the southern North Sea. Ken has recently completed BOSIET training (expires 2026).
- Tom Smith is an ecologist (full member of the Chartered Institute of Ecology and Environmental Management and a Chartered Environmentalist) with 20 years consultancy experience and specialises in ornithology. Tom works primarily in the UK but has also completed ornithological studies throughout Europe, the Middle East and Africa. This has also included extensive experience of habitat regulations assessments (HRA) for projects where impacts on sites of ornithological interest have been identified.

3.2 Nesting Kittiwake Survey

The surveys were undertaken in accordance with the Ornithological Monitoring Plan[1] issued to OPRED. Monitoring was undertaken by suitably qualified ornithologists (as detailed above) following the methodology described in the JNCC Advice note[2]. The advice note sets out 19 principals for surveys to ensure they are systematic and repeatable.

Boat-based methods from the Guard Vessel (GV) *Independent* were used as per the standard approach to seabird monitoring and set out in the JNCC Advice Note. This approach provides good visibility of potential nest locations from sea level.

The survey comprised a visual assessment of the platforms from the GV *Independent* vessel, maintaining a minimum distance of 500 m from the installations.

Once the vessel had approached to 500m from the platform, a circumnavigation was commenced at a speed of 4-6 knots which allowed the surveyor ample time to take photographs of the platform and to capture images (at maximum zoom) of any areas that appeared to support nesting kittiwakes. A Panasonic DC-FZ82 Lumic camera with up to

[1] RSK Biocensus (2022) Ornithological Monitoring Plan, July 2022

[2] Thompson, D (2021) Advice Note Seabird Survey Methods for Offshore Installations: Black-legged Kittiwake. JNCC, Peterborough

60 times optical zoom was used with images taken at a maximum resolution of 18 megapixels. The surveyor on deck maintained contact with the vessel skipper using UHF radio, a key part of which was to call out the cardinal point of each face of the platform in order that an accurate record of any nests could be made (but see Survey Constraints below). If any nests were noted on the first circumnavigation, a second was made with the vessel holding position as necessary to allow the surveyor to sketch the platform and estimate the number of nests.

The surveyor used 8x42 binoculars to survey the platform and a x28 telescope was also available (but see survey constraints below).

Standard recording forms were used detailing the numbers of nests recorded. Given the distance from the survey vessel details of trace nests, egg presence and chick age were noted where possible although the main objective of this single survey was to confirm breeding.

In addition to the recording of nest details, observational notes were also recorded. These included information on other species present, non-breeding individuals and observations of any behavioural responses to the presence of surveyors. This included video recording of bird behaviour during vessel approach and the survey.

Estimates of numbers of nests and numbers of kittiwakes plus other gulls made at sea were confirmed by inspection of the photographs.

Full methods are provided in the JNCC Advice Note.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/974338/Kittiwake_survey_advice_v2.1.pdf

Standard recording forms to be used during data collection can be downloaded here:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/974340/seabird_survey_reporting_forms_march2021.docx

3.3 Survey Constraints

Due to proximity agreements with the offshore operators, the *GV Independent* was not permitted to enter within 500 m of any platform. Whilst every effort was made to obtain detailed counts, this was not always possible given the distance. The counts may also have been impacted by the time of year of the survey, because by the third week in July most of the chicks were at or very close to fledging size and therefore often difficult to distinguish from adults at a distance of 500 m, particularly if the bird was at an angle where juvenile plumage could not be seen.

Whilst the weather was within suitable parameters for the survey, swell and wind-driven waves did create motion which was exacerbated by the distance from the vessel to the platform and therefore it was not possible to use the telescope to improve accuracy of nest counts. On Sunday 31st July, the wind dropped and the sea was flat-calm for a few hours but unfortunately coincident fog reduced visibility to less than 300 m.

The distance of the survey vessel from the platforms also precluded counting any nests which were underneath the superstructure though their presence was noted when relevant.

4 RESULTS AND RECOMMENDATIONS

4.1 Results

The results of the nesting bird surveys are provided in the standard installation seabird recording form (see *Appendix A*) and summarised below in *Table 2*. Kittiwakes were present on 15 platforms surveyed and nesting was recorded on at least six of the platforms (PLATFORM NAME REMOVED, PLATFORM NAME REMOVED, PLATFORM NAME REMOVED, PLATFORM NAME REMOVED, PLATFORM NAME REMOVED) with the possibility that they were also nesting on one more (PLATFORM NAME REMOVED– kittiwake present but no obvious nesting material present).

Nests were typically located on the steel 'I'-beams below the cellar deck, the exception being at the PLATFORM NAME REMOVED platforms where the main superstructure has been removed and the kittiwakes were nesting on structures on top of the legs. Nests were mainly composed of seaweed which often made them easier to spot as the silhouettes of fronds hanging down were quite conspicuous. The kittiwakes did not appear to favour any particular aspect of the platforms for nesting based on circumnavigation of the platforms. However, as noted on some platforms it is likely there is an underestimate of numbers due to distance and visibility. This would therefore need to be confirmed during subsequent monitoring surveys within 500m proximity of the platforms.

On the platforms with nests, there were large chicks at the point of fledging (or recently fledged) though it was not possible to establish individual nest productivity owing to the distance of the observations.

There were no immediately apparent trends in terms of which types of platforms supported nesting kittiwakes and which did not. Manned and unmanned platforms supported nests and a cursory examination of charts did not suggest that water depth or proximity of features such as sandbanks were factors.

Most of the platforms were used by a variety of roosting gulls, including kittiwakes, but many had to be recorded as 'large gull sp.' or 'black-backed gull sp.' as confident identification to species was not always possible from 500 m. It is likely, however, that the large majority were great black-backed gulls (*Larus marinus*). The PLATFORM NAME REMOVED platform was also being used by a small number of guillemots (*Uria aalge*) although it was unclear whether they were nesting, and one great cormorant (*Phalacrocorax carbo*) was also present.

Only the PLATFORM NAME REMOVED platform did not support any birds at all although this may have been due to disturbance from an adjacent jack-up rig that was presumably there to provide maintenance support.

Platform	Number of Nests	Survey notes
PLATFORM NAME REMOVED	0	Relatively large number of gulls on helideck (see PLATE REMOVED and Table 3).
PLATFORM NAME REMOVED	0	The superstructure of the rig has been removed and only legs remain.
PLATFORM NAME REMOVED	52 ± 4	The superstructure of the rig has been removed and only legs remain but structures on the tops of the legs have cavities that are being used by nesting kittiwakes.
PLATFORM NAME REMOVED	65	The superstructure of the rig has been removed and only legs remain but structures on the tops of the legs have cavities that are being used by nesting kittiwakes.
PLATFORM NAME REMOVED	n/a	Rig no longer present
PLATFORM NAME REMOVED	0	Apparently suitable ledges available for nesting but only roosting gulls present.
PLATFORM NAME REMOVED	32	There are more nests underneath superstructure but could not be seen to be enumerated and therefore count is likely an underestimate.
PLATFORM NAME REMOVED	0	
PLATFORM NAME REMOVED	0	
PLATFORM NAME REMOVED	?	A number of kittiwakes were seen on the sides of the PLATFORM NAME REMOVED (see PLATE REMOVED) but nesting material was not apparent in the photographs. However, observations from other surveys has indicated that kittiwakes can raise chicks on surprisingly sparse nests and it is therefore the possible that breeding occurred on PLATFORM NAME REMOVED cannot be ruled out. If present, they would be in small numbers.
PLATFORM NAME REMOVED	0	

PLATFORM NAME REMOVED	67+	There are more nests underneath superstructure but could not be seen to be enumerated and therefore count is likely an underestimate.
PLATFORM NAME REMOVED	0	
PLATFORM NAME REMOVED	17	Mostly on east side of structure on 'I' beam.
PLATFORM NAME REMOVED	0	
PLATFORM NAME REMOVED	Approximately 20	6+ nests were under a gantry carrying a blue container and could not be accurately counted owing to the shadow cast by the gantry, 14 on remainder of structure.
PLATFORM NAME REMOVED	0	

Table 2. Summary of kittiwake nest survey results.

Table 3. Numbers of birds recorded on offshore platforms.

Platform	Kittiwake	Black-backed gull sp.	Large gull sp.	Great black-backed gull	Guillemot	Cormorant	Notes
PLATFORM NAME REMOVED	150+		c.50				All birds were on the helideck and therefore not fully visible from sea level. All birds flushed and estimated from count in the air.
PLATFORM NAME REMOVED	21			1			

PLATFORM NAME REMOVED	40+*		4	1			
PLATFORM NAME REMOVED	80		2	10			
PLATFORM NAME REMOVED	4						
PLATFORM NAME REMOVED	64		1				
PLATFORM NAME REMOVED	17		2	8			
PLATFORM NAME REMOVED	39						
PLATFORM NAME REMOVED	55		4				
PLATFORM NAME REMOVED	20	50	2				Most large gulls on the horizontal crossbeams between the legs
PLATFORM NAME REMOVED	129	11	5		7	1	Approximately 20 Manx shearwater flushed off the sea from just inside 500 m exclusion zone
PLATFORM NAME REMOVED	7	5	5	2			

PLATFORM NAME REMOVED	56	6	2	13			Two harbour porpoises seen inside the 500 m exclusion zone
PLATFORM NAME REMOVED	48	17	18	2			
PLATFORM NAME REMOVED	124		6				
PLATFORM NAME REMOVED							Large jack-up rig adjacent to platform, no birds present anywhere on structures

*Difficult to get an accurate count owing to some birds being partially obscured by parts of the structure

4.2 Recommendations

Nesting kittiwakes were confirmed on six of the platforms during the surveys with the possibility of breeding at a further platform. It should be noted that birds are highly mobile and new colonies may form where existing colonies are displaced by decommissioning activities on other platforms. It is therefore recommended that a repeat survey is undertaken each year to update baseline data. In addition, for those platforms where breeding has been confirmed, where possible proximity agreements should be obtained so that the number of nests and their productivity can be accurately assessed to allow for more accurate counts to be obtained. With observations within 500m, future surveys should allow for detailed annotated plans of nest locations to be produced.

5 FIGURES

Figure 1 Location Plan 1 FIGURE REMOVED

6 PLATES

15 PLATES REMOVED

7 APPENDIX A - OFFSHORE INSTALLATION SEABIRD RECORDING FORM

a) Cloud cover: eighths
b) Sea state: Beaufort scale (Appendix 3)
c) Swell: low = less than 2m, moderate = 2 to 4m, and high = >4m
d) Sun strength: none, weak, moderate or strong
e) Rain: 1 = none, 2 = discontinuous light, 3 = discontinuous heavy, 4 = continuous light, 5 = continuous heavy
f) Wind speed and direction: Beaufort scale (Appendix 3) and cardinal points
g) Visibility: excellent = ≥10km, good = >5km, moderate = 1 – 5km, poor = <1km.

Location/ installation	Date of survey	Survey vessel	Name of surveyor	Cloud cover	Sea state	Swell	Sun	Rain	Wind (Beaufort & direction)	Visibility	Start time	End time	Comments/observations
PLATFORM NAME REMOVED	29/07/2022	GV Independent	K. Neal	6/8	2	Low	Moderate	1	F2 SE	Excellent	06:50	07:45	No breeding kittiwakes
PLATFORM NAME REMOVED	29/07/2022	GV Independent	K. Neal	4/8	2	Low	Moderate	1	F2 SE	Excellent	08:50	09:20	No breeding kittiwakes
PLATFORM NAME REMOVED	29/07/2022	GV Independent	K. Neal	4/8	3	Low	Moderate	1	3 E	Excellent	10:30	12:00	Nesting kittiwakes present
PLATFORM NAME REMOVED	29/07/2022	GV Independent	K. Neal	1/8	2	Low	Moderate	1	2 E	Excellent	12:50	14:05	Nesting kittiwakes present

PLATFORM NAME REMOVED	29/07/2022	GV Independent	K. Neal										Rig no longer present
PLATFORM NAME REMOVED	29/07/2022	GV Independent	K. Neal	1/8	2	Low	Strong	1	2 E	Excellent	16:20	16:55	No nesting kittiwakes, four loafing on flare boom
PLATFORM NAME REMOVED	30/07/2022	GV Independent	K. Neal	7/8	3	Low	Weak	1	4 SE	Excellent	06:30	07:50	Nesting kittiwakes on east and west sides
PLATFORM NAME REMOVED	30/07/2022	GV Independent	K. Neal	8/8	3	Low	Weak	1	3 SE	Excellent	08:30	09:05	No nesting kittiwakes
PLATFORM NAME REMOVED	30/07/2022	GV Independent	K. Neal	8/8	3	Low	Weak	2	3 SE	Good	10:25	11:00	No nesting kittiwakes
PLATFORM NAME REMOVED	30/07/2022	GV Independent	K. Neal	8/8	3	Low	Weak	2	3 SE	Good	11:40	12:45	Possibly nesting kittiwakes
PLATFORM NAME REMOVED	30/07/2022	GV Independent	K. Neal	7/8	2	Low	Weak	1	2 SE	Excellent	15:50	16:15	No nesting kittiwakes
PLATFORM NAME REMOVED	30/07/2022	GV Independent	K. Neal	7/8	2	Low	Weak	1	2 SE	Excellent	17:10	18:25	Nesting kittiwakes

PLATFORM NAME REMOVED	31/7/22	GV Independent	K. Neal	8/8	1	Low	Weak	1	F1 NW	Moderate	11:20	11:50	Delayed by fog, no nesting kittiwakes
PLATFORM NAME REMOVED	31/7/22	GV Independent	K. Neal	8/8	1	Low	Moderate	1	F1 NW	Good	13:00	13:50	Nesting kittiwakes
PLATFORM NAME REMOVED	31/7/22	GV Independent	K. Neal	8/8	3	Low	Weak	4	F4 NW	Moderate	15:20	15:50	No nesting kittiwakes
PLATFORM NAME REMOVED	31/7/22	GV Independent	K. Neal	8/8	3	Low	Weak	1	F4 N	Good	16:45	17:25	Nesting kittiwakes
PLATFORM NAME REMOVED	31/7/22	GV Independent	K. Neal	3/8	3	Low	Strong	1	F4 N	Excellent	20:20	20:35	One side obscured by jack-up rig. No nesting kittiwakes or any other birds present.

Outer Dowsing Offshore Wind

Outer Dowsing Offshore Wind

Ornithological Census and Capture Trial

2483544

JULY 2023

RSK biocensus
EXPERTS IN ECOLOGY

RSK GENERAL NOTES

Project No.: 2483544

Title: Outer Dowsing Offshore Wind – Ornithological Census and Capture Trial

Client: Outer Dowsing Offshore Wind

Date: 18th July 2023

Office: Helsby

Status: Rev 00

Switchboard: +44 (0)330 223 1074 Company contact: Enquiries@biocensus.co.uk

EXECUTIVE SUMMARY

1. This report presents the results of an ornithological assessment of 17 offshore platforms in the southern North Sea. Specifically, this assessment focuses on ascertaining the presence and status of nesting kittiwakes (*Rissa tridactyla*) colonies on these platforms. This report also presents the findings of the trialing of chumming methods to attract and catch kittiwakes in flight to enable potential tagging studies.
2. This report was commissioned by Outer Dowsing Offshore Wind (ODOW) to confirm the locations and sizes of any kittiwake colonies, to inform future mitigation measures to ensure adverse impacts on nesting kittiwakes are avoided during all phases of the proposed offshore windfarm, and to explore potential capture methods to facilitate population monitoring.
3. Field surveys to identify and assess kittiwake colonies were undertaken by boat between 12th and 15th June 2023, during which each platform was subject to a detailed inspection, and chumming and capturing methods were trialled at suitable locations.
4. Breeding kittiwake colonies were recorded on six of the 17 platforms, with occupied nests recorded as follows: PLATFORM NAME REMOVED – 40 nests; PLATFORM NAME REMOVED – 36 nests; PLATFORM NAME REMOVED – 69 nests; PLATFORM NAME REMOVED – 273 nests; PLATFORM NAME REMOVED – 402 nests; and PLATFORM NAME REMOVED – 16 nests.
5. No activity by kittiwakes or any other seabirds was recorded on two platforms. The remaining nine platforms had no observed kittiwake nests, although kittiwakes were recorded loafing on and around the platforms. Other seabirds were recorded on and adjacent to these platforms, including razorbills (*Alca torda*) and guillemots (*Uria aalge*) on PLATFORM NAME REMOVED and PLATFORM NAME REMOVED. Whilst no nests of these or any other seabird species were recorded, it is highly likely that guillemots were breeding but, owing to the lack of nesting material used by these species and the distance the observers were from the platforms, it was not possible to confirm this during the survey. Photos provided to RSK Biocensus show nesting guillemots were successful in laying eggs.
6. The results of the surveys will be required to inform environmental impact assessments for the construction and operation of the proposed offshore windfarm.
7. Due to the transient nature of breeding bird populations, updated surveys should be completed annually to provide accurate information on nesting seabird colonies on the platforms to inform mitigation proposals.
8. The chumming and capture technique trialled during this survey was unsuccessful, as chumming failed to attract kittiwakes. For future capturing attempts, boarding platforms and catching birds from their nest locations is considered likely to be the best option.

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TABLES

FIGURES

1.0 INTRODUCTION

1.1 Purpose of this Report

1.1.1 This report presents the results of an ornithological assessment of offshore platforms in the southern North Sea owned by PLATFORM NAMES REMOVED. Specifically, this assessment focuses on ascertaining the presence and status of nesting kittiwake (*Rissa tridactyla*) colonies on the following 17 offshore structures in proximity to the Outer Dowsing Offshore Windfarm (ODOW):

- PLATFORM NAME REMOVED
- PLATFORM NAME REMOVED
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- PLATFORM NAME REMOVED
- PLATFORM NAME REMOVED
- PLATFORM NAME REMOVED

1.1.2 The purpose of this report is to confirm the locations and sizes of any kittiwake colonies on these 17 platforms, and to inform future mitigation measures to ensure adverse impacts on nesting kittiwakes are avoided during all phases of construction of the proposed offshore windfarm. Any other specially protected and notable species (particularly any nesting seabird colonies) encountered were also recorded for consideration within future mitigation proposals where necessary. This survey was a repeat of the 2022 ODOW ornithological census survey (RSK Biocensus, 2022).

1.1.3 This survey was also used to trial the use of chumming from an offshore vessel to capture kittiwakes from the platforms. If successful, this technique could be used in future to tag

and ring kittiwakes to monitor their population dynamics; in particular, the level of connectivity between breeding populations using offshore platforms and those of relevant designated sites (e.g. Special Protection Areas (SPA)) for which the species has been identified as a qualifying interest.

1.1.4 The assessment described in this report has been undertaken in accordance with the methods prescribed within the *2023 Outer Dowsing Offshore Wind Ornithological Monitoring Plan* (RSK Biocensus, 2023), as well as the JNCC *Seabird Survey Methods for Offshore Installations: Black-legged kittiwakes* (Thompson, 2021).

1.2 Project Background

1.2.1 Whilst most UK seabirds favor natural nesting sites on offshore islands or mainland sea cliffs, several species have been recorded nesting on artificial offshore structures such as platforms; notably kittiwake[1]. These nesting bird colonies on offshore assets have the potential to be adversely affected by future windfarm development.

1.2.2 As such, monitoring is necessary to identify any colonies on assets in close proximity to the proposed ODOW, to inform future survey work and enable appropriate mitigation plans to be devised such that adverse impacts on seabird populations are avoided.

1.2.3 Following the emergence of this issue on offshore platforms elsewhere, the Offshore Petroleum Regulator for Environment and Decommissioning released an advice note on the risk of kittiwake presence on offshore installations (OPRED, 2021). OPRED also requested that the Joint Nature Conservation Committee produce an advice note on kittiwake survey methods for offshore installations (Thompson, 2021). These guidance documents form the basis of the monitoring approach adopted within this assessment.

1.2.4 The surveys described in this report comprise the second year of monitoring surveys undertaken by RSK Biocensus for the 17 assets. The findings of the previous surveys undertaken in July 2022 are presented in the *ODOW Survey Report 2022* (RSK Biocensus, 2022) and discussed in *Section 4.1.11* in the context of the 2023 survey results. In summary, kittiwake nests were recorded on six of the 17 platforms surveyed in 2022; specifically on PLATFORM NAME REMOVED (at least 52 nests), PLATFORM NAME REMOVED (65 nests), PLATFORM NAME REMOVED (32 nests), PLATFORM NAME REMOVED (at least 67 nests), PLATFORM NAME REMOVED (17 nests) and PLATFORM NAME REMOVED (approximately 20 nests).

[1] Further information on kittiwake breeding ecology and use of offshore platforms is provided in *Section 2* of the *2023 Offshore Ornithological Monitoring Plan* (RSK Biocensus, 2023).

2.0 OFFSHORE STRUCTURES

2.1.1 There are 17 assets[2] owned by PLATFORM NAME REMOVED within the southern North Sea (as indicated in *Table 1* and *Figure 1*) in proximity to the proposed ODOW. These were the same as the assets surveyed in 2022 with the exception of PLATFORM NAME REMOVED which was no longer present; instead an additional platform, PLATFORM NAME REMOVED, was surveyed. All 17 platforms listed below were subject to a detailed inspection for kittiwake and other nesting birds in 2023.

Table 1**. TABLE REMOVED**

[2] The three platforms together forming PLATFORM NAME REMOVED have been treated as one platform in this report, hence the change in the reported number of platforms surveyed between 2022 and 2023.

3.0 METHODS

3.1 Ornithological Assessment

3.1.1 Ornithological assessment of the 17 assets was undertaken by RSK Biocensus ecologists/ornithologists Tim Hounsome (leading field work) and Megan Kett-Brodie (assisting field work).

3.1.2 Dr Tim Hounsome is an ornithologist with nearly 30 years' experience in the field. He is a Fellow of the Chartered Institute of Ecology and Environmental Management and a Chartered Ecologist. Tim has worked primarily in the UK on both terrestrial and marine bird surveys. He is also a licensed bird ringer and has ringed thousands of birds, a large proportion of which have been seabirds. Tim chairs the Birds Survey Guidelines Steering Group which he established to standardise bird surveying in consultancy.

3.1.3 Megan is an ecologist with two years of experience in environmental science with a specialism in marine ecology and ornithology. Megan has conducted multiple UK offshore surveys of marine mammals and birds, including ten weeks of offshore work and six months' experience conducting seabird and marine mammal identification from aerial imagery. This also includes experience in assisting with undertaking appropriate assessments regarding the potential impacts of proposed offshore wind farm geophysical surveys in the Irish Sea.

3.2 Nesting Kittiwake Surveys

3.2.1 Field surveys of the 17 platforms for nesting kittiwakes were undertaken between the 12th and 15th June 2023 in accordance with the *ODOW Offshore Ornithological Monitoring Plan* (RSK Biocensus, 2023). This monitoring approach was based on the JNCC advice note detailing kittiwake survey methods for offshore installations (Thompson, 2021).

3.2.2 Surveys were undertaken by boat from the Marshall Art. Each asset was surveyed at least once (i.e. twice if necessary), during which the ornithologists inspected the asset on all sides and recorded and took photographs of each face. The vessel moved at a speed of 4-6 knots around the platform, allowing the surveyors to record the necessary data. In accordance with best practice guidance, platforms were inspected from a minimum distance of 200 metres (m) where possible, with some platforms accessible to a minimum distance of 500 m only (subject to proximity agreements). Inspection was aided by the use of binoculars and digital photography (Panasonic Lumix DC-FZ82) as necessary.

3.2.3 Standard JNCC recording procedures were followed, with the ornithologists using standard recording forms as provided within the JNCC advice note and producing annotated diagrams and photos of nest locations. Kittiwake observations were initially classified in accordance with JNCC guidance, with numbers of occupied nests, trace nests, eggs, chicks within each age group, estimated fledging dates and any non-breeding birds all recorded where possible. Counts of nests and birds taken in the field were later compared with photographs to ensure they were accurate.

3.2.4 Any other species present on or in close proximity to the platforms were recorded, including any nest locations.

3.2.5 Survey dates and weather conditions are presented in *Appendix A*. All surveys were undertaken in optimal weather conditions, with excellent visibility aiding accurate recording of kittiwake nest numbers and locations.

3.3 Kittiwake Capture Trial

3.3.1 During nesting kittiwake surveys, kittiwake capture techniques to enable ringing were trialed, with the intention of informing future monitoring of kittiwake populations; in particular, the level of connectivity between populations using offshore platforms and known terrestrial colonies including those of relevant designated sites.

3.3.2 As initial project discussions indicated that it would not be possible for bird ringers to access platforms directly, innovative options for kittiwake capture at sea were explored during conversations with experienced seabird ringers and surveyors. One option identified within this process was to attract kittiwakes by offering bait (a method known as chumming). Once kittiwakes were in sufficient proximity to the boat, they would be caught in flight using nets. Whilst this method has been successfully used from land (where it is known as fleyging), the effectiveness of fleyging to enable seabird ringing at sea is not widely understood.

3.3.3 Kittiwake capture was attempted at the PLATFORM NAME REMOVED, PLATFORM NAME REMOVED and PLATFORM NAME REMOVED platforms due to the high numbers of kittiwakes present. Chumming was attempted within 500 m of platforms initially, before moving outside of 500 m (i.e. hoping that kittiwakes would follow the bait), at which range kittiwakes would be captured by net.

3.4 Limitations

3.4.1 There were no limitations to the field survey timings or weather conditions. Whilst strong winds sometimes caused movement of the vessel, this instability was insufficient to negatively affect the accuracy of counts and observations.

Due to proximity agreements with the offshore operators, the boat was not permitted to enter within 500 m of certain platforms. Whilst every effort was made to obtain detailed counts and view all potential nest locations, this was not always possible given the distance from which aspects of platforms were viewed. Therefore, some nest counts should be considered an underestimation on the platforms where breeding occurred. In particular, visibility of PLATFORM NAME REMOVED was hindered by maintenance works. This is taken into consideration when evaluating the survey results.

3.4.2 It should be noted that ecological features (e.g. bird populations) are transient, and that the distributions and numbers of species may be subject to change. Seabirds in particular are highly mobile, and new features (e.g. platforms) that have not previously been used may be colonised in future years; particularly if colonies are displaced from nearby sites by development activities. It is therefore recommended that detailed survey data are collected annually by suitably experienced ornithologists.

4.0 RESULTS

4.1 Nesting Kittiwake Surveys

4.1.1 The results of the nesting kittiwake surveys undertaken between 12th and 15th June 2023 are summarised in *Table 2.* Detailed survey data are provided in *Appendix B.* Photographs from the surveys are provided in *Appendix C*.

Table 2. Summary of nesting kittiwake survey results

Asset	Occupied nests	Trace nests	Kittiwakes recorded loafing/roosting on platform
PLATFORM NAME REMOVED	0	0	8
PLATFORM NAME REMOVED	0	0	8
PLATFORM NAME REMOVED	0	0	11
PLATFORM NAME REMOVED	40	37	16
PLATFORM NAME REMOVED	36	37	11
PLATFORM NAME REMOVED	0	0	0
PLATFORM NAME REMOVED	69	0	17
PLATFORM NAME REMOVED	0	0	1
PLATFORM NAME REMOVED	0	0	0
PLATFORM NAME REMOVED	0	0	2
PLATFORM NAME REMOVED	0	0	6
PLATFORM NAME REMOVED	273	18	324
PLATFORM NAME REMOVED	402	27	283
PLATFORM NAME REMOVED	0	0	28
PLATFORM NAME REMOVED	16	1	31
PLATFORM NAME REMOVED	0	0	11
PLATFORM NAME REMOVED	0	0	3

4.1.2 Kittiwake nests were recorded on six of the 17 assets surveyed, with a total of 836 occupied nests recorded and an additional 120 trace nests recorded. Occupied nests were all at the incubation stage (i.e. 'apparently incubating adults'), with no chicks observed on any platforms.

4.1.3 The largest colony was recorded on PLATFORM NAME REMOVED, with 402 occupied nests and 27 trace nests recorded. The highest number of nests was recorded on the northern aspect, followed by the eastern aspect.

4.1.4 Occupied nests were also recorded on PLATFORM NAME REMOVED and PLATFORM NAME REMOVED, which were very similar decommissioned structures. The tops of the platform legs were readily used as nesting sites by kittiwakes, with the nests relatively evenly distributed on each leg.

4.1.5 The other three platforms used by nesting kittiwakes, PLATFORM NAME REMOVED, PLATFORM NAME REMOVED and PLATFORM NAME REMOVED, had occupied nests on the metal 'I beam' around the base of the body of the platform. Most nests were observed on the east and west sides of PLATFORM NAME REMOVED. Nests on PLATFORM NAME REMOVED were relatively evenly distributed, with slightly higher numbers of nests recorded on the northern and southern sides. PLATFORM NAME REMOVED had 12 nests on its western aspect and four nests on the underside of the platform.

4.1.6 Whilst no nesting kittiwakes were observed on all PLATFORM NAMES REMOVED, PLATFORM NAME REMOVED, PLATFORM NAME REMOVED, PLATFORM NAME REMOVED, PLATFORM NAMES REMOVED and PLATFORM NAME REMOVED, kittiwakes were observed flying around and loafing on all nine structures.

4.1.7 Both PLATFORM NAME REMOVED and PLATFORM NAME REMOVED had no seabird activity on or in the vicinity of the platforms. Whilst other bird species were recorded on many of the platforms, no other nesting species were recorded.

4.1.8 Full details of other species recorded on or in close proximity to platforms are provided in *Appendix B*. No nests of any other species were observed on any platforms. Records of razorbills (*Alca torda*) and guillemots (*Uria aalge*) were all from PLATFORM NAME REMOVED and PLATFORM NAME REMOVED, with the exception of one guillemot on PLATFORM NAME REMOVED. These species were observed roosting and loafing on platforms. Whilst guillemots observed sitting on platform ledges could possibly have been incubating, no eggs or chicks were observed. However, in addition to the surveys reported here, photographs were provided by the operator that show guillemot eggs on PLATFORM NAME REMOVED. It would therefore seem highly likely that guillemots are breeding on these platforms but, due to the distance of the observers, the low angle from the water looking up and the fact that these species do not construct significant nests, it was not possible to confirm breeding during the surveys described in this report.

4.1.9 Loafing and roosting on platforms was observed by the following species (total counts throughout the survey are provided in brackets):

- Cormorant (*Phalacrocorax carbo*) (2)
- Great black-backed gull (*Larus marinus*) (1)
- Lesser black-backed gull (*Larus fuscus)* (2)
- Herring gull (*Larus argentatus*) (111)
- Razorbill (13)

- Guillemot (458)

4.1.10 Loafing on the water or flying past in the vicinity of platforms was observed by the following species:

- Gannet (*Morus bassanus*) (1)
- Fulmar (*Fulmarus glacialis*) (2)

Comparison with 2022 survey data

4.1.11 Numbers of active nests recorded in 2023 are compared with those during the monitoring surveys of the platforms undertaken in 2022 in *Table 3* below.

Table 3. Comparison of 2022 and 2023 kittiwake nest data

Asset	Occupied nests (2022)	Occupied nests (2023)
PLATFORM NAME REMOVED	0	0
PLATFORM NAME REMOVED	0	0
PLATFORM NAME REMOVED	0	0
PLATFORM NAME REMOVED	52 ± 4	40
PLATFORM NAME REMOVED	65	36
PLATFORM NAME REMOVED	0	0
PLATFORM NAME REMOVED	32	69
PLATFORM NAME REMOVED	0	0
PLATFORM NAME REMOVED	0	0
PLATFORM NAME REMOVED	Possible (none confirmed)	0
PLATFORM NAME REMOVED	0	0
PLATFORM NAME REMOVED	67+	273
PLATFORM NAME REMOVED	Not surveyed	402
PLATFORM NAME REMOVED	0	0
PLATFORM NAME REMOVED	17	16
PLATFORM NAME REMOVED	0	0
PLATFORM NAME REMOVED	c.20	0

4.1.12 The number of occupied kittiwake nests recorded in 2023 was significantly higher than in 2022. This was largely due to the inclusion of PLATFORM NAME REMOVED, which was not surveyed in 2022. Significant colony size increases were recorded at PLATFORM NAME REMOVED and PLATFORM NAME REMOVED, although improved visibility of PLATFORM NAME REMOVED in 2023 compared with 2022 potentially contributed to the observed increase at PLATFORM NAME REMOVED. Improved visibility was achieved by being able to approach to within 200m of the assets compared to 500m in 2022. Reduced colony size was recorded at PLATFORM NAME REMOVED and PLATFORM NAME REMOVED. No kittiwake nests were recorded at PLATFORM NAME REMOVED, which had supported c.20 nests in 2022, although this was potentially attributable to maintenance works at PLATFORM NAME REMOVED which reduced visibility of suitable ledges during survey undertaken in 2023. The number of nests at PLATFORM NAME REMOVED was consistent between 2022 and 2023, and no assets recorded as not supporting breeding kittiwakes in 2022 were found to contain occupied nests in 2023.

4.2 Kittiwake Capture Trial

4.2.1 As described in *Section 3.3*, kittiwake capture through chumming and fleyging was attempted at the PLATFORM NAME REMOVED, PLATFORM NAME REMOVED and PLATFORM NAME REMOVED platforms due to the high numbers of kittiwakes present. The capture trial was unsuccessful at all platforms. Kittiwakes were not attracted by chumming, which only attracted one fulmar. Consequently, there was no opportunity to catch kittiwakes using this approach.

5.0 EVALUATION AND RECOMMENDATIONS

5.1.1 Nesting kittiwakes were recorded on six of the 17 platforms surveyed, with a total of 836 occupied nests recorded. This equates to 0.4% (although based on a potential under estimate count in 2023) of the UK breeding population as estimated in 2015 (Woodward *et al.*, 2020). Considering this, and the known regional status of the species, the breeding populations recorded on these assets are considered likely to be significant in the context of the kittiwake population in the North Sea.

5.1.2 Nesting kittiwakes were recorded on the same assets in 2023 as in 2022, with the exception of PLATFORM NAME REMOVED, on which no nests were confirmed in 2023. A significant increase in the number of nests recorded during the surveys in 2023 was attributable to the inclusion of PLATFORM NAME REMOVED (which supported the largest kittiwake colony), and an increase in the number of nests recorded at PLATFORM NAME REMOVED and PLATFORM NAME REMOVED.

Whilst no kittiwake nests were observed on PLATFORM NAME REMOVED, c.20 nests were recorded on PLATFORM NAME REMOVED in 2022, and visibility of suitable ledges during the surveys undertaken in 2023 was hindered by ongoing maintenance works. Kittiwake nesting on PLATFORM NAME REMOVED therefore remains possible.

5.1.3 Whilst no kittiwake nests were recorded on PLATFORM NAME REMOVED, PLATFORM NAME REMOVED, PLATFORM NAME REMOVED, PLATFORM NAME REMOVED, and PLATFORM NAMES REMOVED, as kittiwakes were observed in the vicinity of these platforms, if the platforms were to become more suitable for nesting kittiwakes may potentially nest on these assets in future years. PLATFORM NAME REMOVED and PLATFORM NAME REMOVED and PLATFORM NAME REMOVED generally lacked suitable nesting features, and therefore nesting on these platforms is considered unlikely unless the suitability of the platforms increases significantly.

5.1.4 Results of the surveys will be required to inform environmental impact assessments for the construction and operation of the proposed offshore windfarm. Mitigation plans may also include the provision of replacement nesting opportunities for kittiwake.

5.1.5 Whilst other seabird species were recorded on or in close proximity to assets, no nests of any other species were recorded. However, guillemots were recorded roosting and loafing on PLATFORM NAME REMOVED and PLATFORM NAME REMOVED, and as a result of photographic evidence of guillemot eggs provided from the operator it would seem highly likely that breeding is taking place on the platforms.

5.1.6 Due to the transient nature of breeding bird populations, updated surveys should be completed annually to provide accurate information on nesting seabird colonies on the platforms to inform mitigation proposals.

5.1.7 Regarding capture methods to enable kittiwake population monitoring, chumming and fleyging from the boat was unsuccessful and is therefore not considered to be a viable option. A potential alternative method would be for suitably experienced ornithologists to board the platforms directly and capture kittiwakes from their nests (using a noose or hook on a long pole). This method is used routinely for cliff-nesting kittiwakes and is

endorsed by the British Trust for Ornithology (BTO, the licensing body). If safe access by ornithologists can be achieved, kittiwake capture and ringing is recommended at PLATFORM NAME REMOVED and PLATFORM NAME REMOVED due the high numbers of kittiwakes present and the apparent accessibility of the nests.

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FIGURES

Figure 1. Location plan for surveyed PLATFORM NAMES & FIGURE REMOVED

APPENDIX A – SURVEY DETAILS

Survey dates and weather conditions for the nesting kittiwake surveys undertaken between the 12th and 15th June 2023 are provided below. Weather conditions were defined as follows:

a) Cloud cover: eighths
b) Sea state: Beaufort scale
c) Swell: low = less than 2m, moderate = 2 to 4m, and high = >4m
d) Sun strength: none, weak, moderate or strong
e) Rain: 1 = none, 2 = discontinuous light, 3 = discontinuous heavy, 4 = continuous light, 5 = continuous heavy
f) Wind speed and direction: Beaufort scale (Appendix 3) and cardinal points
g) Visibility: excellent = ≥10km, good = >5km, moderate = 1 – 5km, poor = <1km

Asset	Date	Cloud cover	Start time (BST)	End time (BST)	Sea state	Swell	Sun	Rain	Wind (Beaufort & direction)	Visibility	Comments/observations
PLATFORM NAME REMOVED	13/06/2023	0	06:55	07:12	1	Low	Strong	0	3 NE	Excellent	Kittiwakes loafing/roosting only
PLATFORM NAME REMOVED	13/06/2023	0	07:45	08:10	2	Low	Strong	0	3 NE	Excellent	Kittiwakes loafing/roosting only
PLATFORM NAME REMOVED	13/06/2023	0	08:47	09:15	2	Low	Strong	0	4 NE	Excellent	Kittiwakes loafing/roosting only

Asset	Date	Cloud cover	Start time (BST)	End time (BST)	Sea state	Swell	Sun	Rain	Wind (Beaufort & direction)	Visibility	Comments/observations
PLATFORM NAME REMOVED	13/06/2023	1	10:10	10:35	2	Low	Strong	0	4 NE	Excellent	40 occupied kittiwake nests
PLATFORM NAME REMOVED	13/06/2023	0	11:30	11:59	2	Low	Strong	0	4 NE	Excellent	36 occupied kittiwake nests
PLATFORM NAME REMOVED	13/06/2023	0	13:15	13:35	2	Low	Strong	0	4 NE	Excellent	No kittiwakes present
PLATFORM NAME REMOVED	13/06/2023	0	14:20	14:32	2	Low	Strong	0	3 NE	Excellent	69 occupied kittiwake nests
PLATFORM NAME REMOVED	13/06/2023	0	15:15	15:25	2	Low	Strong	0	4 NE	Excellent	Kittiwake loafing/roosting only
PLATFORM NAME REMOVED	13/06/2023	1	16:11	16:25	2	Low	Strong	0	4 NE	Excellent	No kittiwakes present
PLATFORM NAME REMOVED	14/06/2023	0	07:14	07:27	3	Low	Strong	0	5 E	Excellent	Kittiwakes loafing/roosting only
PLATFORM NAME REMOVED	14/06/2023	0	10:08	10:24	3	Low	Strong	0	3 NE	Excellent	Kittiwakes loafing/roosting only

Asset	Date	Cloud cover	Start time (BST)	End time (BST)	Sea state	Swell	Sun	Rain	Wind (Beaufort & direction)	Visibility	Comments/observations
PLATFORM NAME REMOVED	14/06/2023	0	12:06	12:34	2	Low	Strong	0	4 NE	Excellent	273 occupied kittiwake nests; guillemots and razorbills present
PLATFORM NAME REMOVED	14/06/2023	0	13:40	13:55	2	Low	Strong	0	4 NE	Excellent	402 occupied kittiwake nests; guillemots and razorbills present
PLATFORM NAME REMOVED	14/06/2023	0	16:03	16:21	2	Low	Strong	0	E 3	Excellent	Kittiwakes loafing/roosting only
PLATFORM NAME REMOVED	14/06/2023	0	16:35	16:55	2	Low	Strong	0	E 3	Excellent	16 occupied kittiwake nests
PLATFORM NAME REMOVED	14/06/2023	0	17:14	17:25	2	Low	Strong	0	NE 3	Excellent	Kittiwakes loafing/roosting only
PLATFORM NAME REMOVED	14/06/2023	0	18:18	18:35	2	Low	Strong	0	NE 3	Excellent	Kittiwakes loafing/roosting, no nests confirmed but recording hindered by maintenance works

APPENDIX B – SURVEY DATA

Full survey data from the nesting kittiwake surveys including all species undertaken between the 12th and 15th June 2023 are provided below. Kittiwake counts are provided for the north (N), east (E), south (S) and west (W) aspects of each asset can be provided on request.

Asset	Kittiwake (on nests and loafing)	Herring gull	Lesser black-backed gull	Large gull sp.	Great black-backed gull	Guillemot	Razorbill	Cormorant	Gannet	Fulmar	Notes
PLATFORM NAME REMOVED	8	0	0	0	0	0	0	0	0	0	Kittiwakes loafing on and flying around the platform. No nests.
PLATFORM NAME REMOVED	8	2	0	0	0	0	0	0	0	0	Few loafing kittiwakes and herring gulls around whole platform. No nests.
PLATFORM NAME REMOVED	11	11	0	0	0	0	0	0	0	0	Few loafing kittiwakes and herring gulls around whole platform. No nests.
PLATFORM NAME REMOVED	56+	1	0	0	0	0	0	1	0	0	Nesting and loafing kittiwakes. One roosting cormorant and one roosting herring gull. Kittiwake nesting observed at tops of platform legs. 40 occupied kittiwake nests and 37 trace nests.

Asset	Kittiwake (on nests and loafing)	Herring gull	Lesser black-backed gull	Large gull sp.	Great black-backed gull	Guillemot	Razorbill	Cormorant	Gannet	Fulmar	Notes
PLATFORM NAME REMOVED	47+	0	0	0	0	0	0	0	0	0	Nesting and loafing kittiwakes. Nesting at top of platform legs. 36 occupied kittiwake nests and 37 trace nests.
PLATFORM NAME REMOVED	0	0	0	0	0	0	0	0	0	0	No birds observed on or around platform.
PLATFORM NAME REMOVED	86	0	0	0	0	0	0	0	0	0	Nesting and loafing kittiwakes. 69 occupied kittiwake nests.
PLATFORM NAME REMOVED	1	0	0	0	0	0	0	0	0	0	1 loafing immature kittiwake. No nests.
PLATFORM NAME REMOVED	0	0	0	0	0	0	0	0	0	0	No birds observed loafing or nesting on or around platform.
PLATFORM NAME	2	0	0	0	0	0	0	0	0	0	2 loafing/roosting kittiwakes. No nests.

Asset	Kittiwake (on nests and loafing)	Herring gull	Lesser black-backed gull	Large gull sp.	Great black-backed gull	Guillemot	Razorbill	Cormorant	Gannet	Fulmar	Notes
REMOVED											
PLATFORM NAME REMOVED	6	1	0	2	1	0	0	0	0	0	Loafing herring gull/large gulls and kittiwakes. No nests.
PLATFORM NAME REMOVED	597+	30	0	3	0	181	9	0	0	2	Nests and birds covering all suitable ledges. Few immature kittiwakes and herring gulls. Guillemots tightly packed around ledges on the legs of the platforms and kittiwakes on I beam around whole platform. Birds feeding around platform including 2 fulmars. 273 occupied kittiwake nests and 18 trace nests.
PLATFORM NAME REMOVED	685	43	0	3	0	276	4	1	0	0	Nests and birds covering all suitable ledges. Few immature kittiwakes and herring gulls. Guillemots tightly packed around ledges on the legs of the platforms and kittiwakes on I beam around whole platform. Birds feeding around platform. 402 occupied kittiwake nests and 27 trace nests.
PLATFORM NAME	28	10	2	2	1	0	0	0	0	0	Immature and adult loafing kittiwakes, herring gulls and other large gull species. No nests.

Asset	Kittiwake (on nests and loafing)	Herring gull	Lesser black-backed gull	Large gull sp.	Great black-backed gull	Guillemot	Razorbill	Cormorant	Gannet	Fulmar	Notes
REMOVED											
PLATFORM NAME REMOVED	35	0	0	0	0	1	0	0	0	0	Few nests on west side and underneath, some loafing birds. 1 guillemot. 16 occupied kittiwake nests.
PLATFORM NAME REMOVED	11	13	0	0	0	0	0	0	0	0	Loafing kittiwakes and herring gulls. No nests.
PLATFORM NAME REMOVED	3	0	0	0	0	0	0	0	1	0	Limited visibility due to maintenance works. Few kittiwakes seen around platform and one gannet. No nests recorded.

APPENDIX C – SITE PHOTOGRAPHS

Photographs from the nesting kittiwake surveys undertaken between the 12th and 15th June 2023 are provided below.

36 PHOTOGRAPHS REMOVED