Environmental Impact Assessment Report

NISA

North Irish Sea Array

Volume 9: Appendices (Offshore)

Appendix 15.1 Offshore and Intertidal Ornithology Technical Baseline

Statkraft

CIP Copenhagen Infrastructure Partners

GoBe APEM Group

ARUP

North Irish Sea Array Wind Farm Ltd

Volume 9: Offshore and Intertidal Ornithology Technical Appendix

North Irish Sea Array Offshore Wind Farm

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Acronyms

Term	Definition
BDMPS	Biologically Defined Minimum Population Scales
BTO	British Trust for Ornithology
BWI	BirdWatch Ireland
CIEEM	Chartered Institute of Ecology and Environmental Management
CRM	Collision Risk Modelling
DAS	Digital Aerial Survey
ECC	Export Cable Corridor
EIA	Environmental Impact Assessment
ESAS	European Seabirds at Sea
FAME	Future of the Atlantic Marine Environment
HPAI	Highly Pathogenic Avian Influenza
HRA	Habitats Regulations Assessment
IUCN	International Union for Conservation of Nature
JNCC	Joint Nature Conservation Committee
MAC	Maritime Area Consent
NEWS	Non-Estuarine Waterbird Surveys
NIS	Natura Impact Statement
NISA	North Irish Sea Array
NPWS	National Parks and Wildlife Service
NWIS	North West Irish Sea
OWF	Offshore Wind Farm
RSPB	Chartered Institute of Ecology and Environmental Management
SMP	Seabird Monitoring Programme
SNCB	Statutory Nature Conservation Bodies
SOSS	Strategic Ornithological Support Services
SPA	Special Protection Areas
UK	United Kingdom
WWT	Wildfowl and Wetlands Trust

1 Introduction

1.1.1 This document has been prepared by Arup and GoBe Consultants Limited (GoBe) on behalf of North Irish Sea Array Windfarm Limited (NISA Ltd).

1.1.2 The North Irish Sea Array (hereafter 'proposed development') Offshore Wind Farm (OWF) is proposed for construction 11.3 km off the east coast of Ireland (at their nearest points to the mainland). The project will consist of offshore wind turbines, an offshore converter station, inter-array cables and on- and offshore cables taking power to an onshore converter station. The area considered in the context of offshore ornithological receptors includes the entire array area, covering 89 km^2, an asymmetric 4 km buffer surrounding the array area, and the offshore Export Cable Corridor (ECC) covering a further 67.8 km^2.

1.1.3 This section outlines the background to the proposed development and the need to characterise the baseline environment for offshore ornithological species. The baseline will provide a *"necessary benchmark against which change may be predicated, detected, mitigated and measured when seeking to detect change as a result of impact from a project"* (DCCAE, 2018). This includes information on the site and the potential impact footprint, a comprehensive account of species that are expected to be present, their abundance and spatial and temporal distribution characterised from site-specific data collection.

1.1.4 The aim of this report is to present the findings from a desk-based data review and site-based baseline offshore ornithological surveys. These findings are used to determine those receptors which characterise the baseline environment and are of relevance to the assessment of potential impacts from the proposed development within Volume 3, Chapter 15: Offshore and Intertidal Ornithology, hereafter the 'Offshore and Intertidal Ornithology Chapter').

1.1.5 As birds rely on and interact with other habitats and species this section should be read alongside the following chapters (and their associated appendices) of this Environmental Impact Assessment Report (EIAR):

- Volume 3, Chapter 13: Fish and Shellfish Ecology (in terms of key prey resources available to birds) (hereafter the 'Fish and Shellfish Chapter'); and
- Volume 3, Chapter 12: Benthic Subtidal and Intertidal Ecology (in terms of relevant habitat and key prey resources available to birds) (hereafter the 'Benthic Ecology Chapter'); and
- Volume 4, Chapter 23: Biodiversity (which covers onshore ecology for onshore birds)

2 Methodology

2.1 Introduction

2.1.1 The proposed development will comprise offshore wind turbine generators (WTGs), offshore converter station, inter-array cables, interconnector cables and offshore and onshore export cables taking power to an onshore converter station. The proposed development site is located approximately 11.3 km off the east coast of Ireland at their nearest points to the mainland.

2.2 Study Area

2.2.1 The offshore and intertidal ornithology study area was initially identified at the scoping phase as the Maritime Area Consent (MAC) boundary plus 4km buffer, in line with Department of Communications, Climate Action and Environment (DCCAE) (now the Department of the Environment, Climate and Communications; DECC) Guidance (DCCAE, 2017). This initial study area was used to scope the survey methodologies and inform baseline data gathering. The extent of the digital aerial survey (DAS) that has been undertaken is the MAC Boundary with a 4km buffer but excludes the offshore Export Cable Corridor (ECC). This baseline data and other sources (refer to Section 2.10) have been used to generate abundance and density estimates for each species. Regional and/or the biogeographical population data has also been considered. This allows consideration of the mobile nature of the ornithology species when determining potential receptors and their baseline characterisation.

2.2.2 There are four study areas used within this chapter for the purposes of the impact assessment, which are based on a Zone of Influence (ZoI) that is dependent on the results of the baseline data gathering, the nature of the impact, and the sensitivity of the species to that impact. The study areas are:

- The study area for disturbance and displacement impacts to seabird species (excluding ducks and divers) from activities and infrastructure in the array area, is the array area plus a 2km buffer;
- The study area for disturbance and displacement impacts to seaducks and divers from activities and infrastructure within the ECC is limited to the ECC only;
- The study area for disturbance and displacement impacts to birds found within the intertidal and nearshore area (assessed qualitatively), is the ECC only; and
- The study area for collision impacts to seabirds is limited to the array area only.

2.2.3 During the breeding season, the Irish Sea region provides foraging, loafing and preening habitat for a range of seabirds, including (but not limited to) gannet, *Morus bassanus*, various gull species, including kittiwake, *Rissa tridactyla*, several species of auk and terns. During the non-breeding season, the region supports numerous species; divers and seaducks reside in more inshore waters, while auks are found further offshore. The Irish Sea is also subject to pronounced passages of birds travelling to and from mainland Britain, Europe and further afield (Stienen *et al.,* 2007). This includes the migratory movements of non-seabirds such as waders, wildfowl, passerines and non-passerines. Due to the mix of birds present, the array area is used at different times of the year by birds (i) overwintering in the area; (ii) foraging from nearby breeding coastal colonies; and (iii) on autumn migration dispersal and spring migration return.

2.3 Data Collection and Collation

2.3.1 Data to inform the characterisation of the study area has been collated by combining information from a series of site-specific surveys supplemented with a thorough desk-based study of published data. Data were drawn from previous site surveys, studies commissioned by the proposed development and existing published datasets (Table 2.1).

2.3.2 In addition to the data sources identified relevant to the Irish Sea and study area, consideration has been given to relevant scientific literature and research material in relation to ornithology.

2.3.3 More details on the various datasets used in this report is provided in Section 2.4 below.

2.4 Baseline Environment

2.4.1 The data sources in Table 2.1 were considered when determining the ornithology baseline.

Table 2.1: Data sources considered in the development of the ornithology baseline.

Source	Date	Summary	Temporal and spatial coverage
Existing project survey data			
NISA – Digital aerial survey (DAS) data	2020-2022	DASs conducted by APEM Ltd. on a monthly basis between May 2020 and October 2022.	Maritime Area Consent (MAC) plus 4 km buffer. A total of 16 transects with 2.3 km spacing totaling 15% coverage of the survey area.
NISA – Boat-based survey data	2019 - 2020	Vessel surveys were conducted in November 2019, January 2020, March 2020, August 2020, June 2021, July 2021, and July 2022.	Maritime Area Consent (MAC) plus 4km buffer. Variable transects and coverage.
NISA – Landfall surveys	2021 - 2022	Intertidal bird surveys were conducted at the selected landfall site.	Includes the intertidal area and immediate onshore area of the landfall.
NISA – Coastal vantagepoint surveys	2019 - 2021	Vantagepoint surveys conducted at two locations to supplement DAS data.	Includes the intertidal area and out to the

			array area at the north and south edge at each location respectively.
Existing offshore windfarm 'grey literature'	Various dates	Information obtained from various offshore windfarm Environmental Statements (i.e. Awel-y-Mor and Mona OWF).	Includes data across the broader region for the array area.
Relevant literature on seabird distribution, population sizes, migration routes and foraging ranges			
JNCC Report No. 267 (Pollock et al. 1997)	1997	ESAS survey data collected between 1980 and 1997 in Irish waters, including a period of intensive surveys between 1994 and 1997, which targeted areas around Ireland with poor survey coverage. Used to provide historic context for the wider Irish Sea.	Offshore waters around Ireland, within and beyond Ireland's continental shelf.
ObSERVE (Jessop et al. 2018)	2018	Visual aerial surveys of the western Irish Sea. Four surveys: summer 2015, winter 2015, summer 2016 and winter 2016.	Offshore waters around Ireland, within and beyond Ireland's continental shelf.
Designated sites	Various dates	Information of Special Protection Areas (SPAs) and other designations relevant to Important Ornithological Features (IOFs) with potential connectivity to NISA. Key source of information will be Natural England designated sites portal.	Country wide information on designated sites.
Seabird Monitoring Programme (SMP) (BTO, 2023)	2015-2020	Online database of seabird colony counts in Ireland and UK – most recent data from Seabirds Count national census 2015-2020. Used to provide SPA reference populations for the EIAR.	Colony counts in Ireland and UK
NPWS Published Report (Cummins et al. 2019)	2019	The Status of Ireland's Breeding Seabirds: Birds Directive Article 12 Reporting 2013 – 2018. Used to provide SPA reference populations for the EIAR.	Ireland
British Trust for Ornithology (BTO) Wetland Bird Survey (WeBS) and Non-Estuarine Waterbird Surveys (NEWS)	Annual Reports	Annual survey reports of wetland waterbirds and intertidal birds. Though collected in the west coast of the UK can be drawn upon to consider the wider regional scale (e.g. potential movements of birds through the Irish Sea on migrations).	Coverage of UK intertidal and wetland zones.
Regional and national bird reports and atlases	Various	Atlases covering breeding and non-breeding birds within relevant areas, e.g. Birds in Ireland (Hutchinson, 2010), North-west European waters (Stone *et al.*, 1995) and in Europe (BirdLife international, 2004).	Coverage across region at various intertidal and wetland and coastal areas.
Review of seabird foraging ranges - Woodward *et al.*, (2019)	2019	BTO report updating foraging ranges of seabirds. These are used to consider connectivity with both designated sites and other OWFs. This report provides an update from previous information on foraging ranges from Thaxter *et al.*, (2012).	Review of foraging ranges covered available information across the globe.
Literature on seabird foraging movements	Various	Various sources on seabird foraging (e.g. tracking data), including the FAME Project (Baer	Various sources in Ireland.

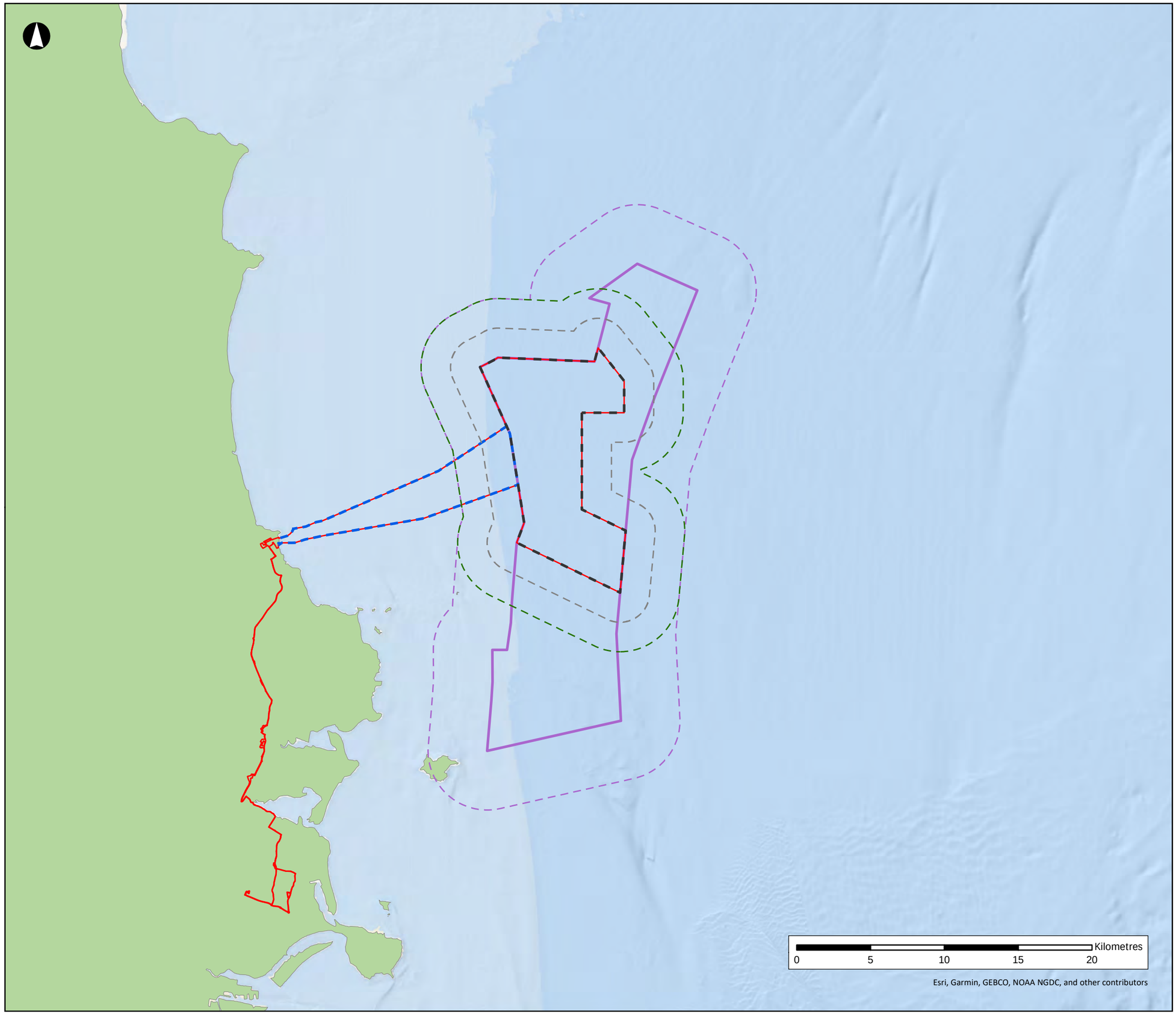
		& Newton, 2012) and tern tracking data at Rockabill Island (Perrow *et al.*, 2019)	
Non-breeding season populations of seabirds in UK waters: Population sizes for Biologically Defined Minimum Population Scales (BDMPS) – Furness (2015)	2015	Furness 2015 provides regional non-breeding season population sizes for relevant offshore ornithological receptors. Though focussed on UK waters, population sizes in UK Western Waters are considered relevant to Ireland.	Coverage across the UK.
The status of Ireland's Breeding Seabirds: Birds Directive Article 12 Reporting 2013 – 2018 – Cummins *et al.*(2019)	2019	NPWS commissioned report providing data on breeding seabird population sizes and trends of Ireland's breeding seabird species.	Coverage across Ireland
Literature on migratory bird populations and movements relevant to NISA	Various	Various sources on migratory birds and movements, including 'The Migration Atlas: Movements of the birds of Britain and Ireland' (Wernham *et al.*, 2002), and literature on the risk of OWF developments to migratory birds (Wright *et al.*, 2012).	UK and Ireland.
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 NISA IOFs.
JNCC review of seabird demographic rates (Horswill and Robinson 2015)	2015	Information on demographic rates of seabirds, used to inform the EIAR assessment.	Predominantly UK based, with data from further afield also considered.
Relevant literature on the vulnerability of birds to OWFs			
Potential impacts of offshore windfarms on birds	Various dates	Various peer reviewed scientific literature regarding the potential impacts from OWF e.g. (Garthe and Hüppop, 2004; Drewitt and Langston, 2006; Stienen et al., 2007; Speakman et al., 2009; Langston, 2010; Band, 2012; Cook et al., 2012; Furness and Wade, 2012; Wright et al., 2012; Furness et al., 2013; Johnston et al., 2014a,b; Cook et al., 2014; Dierschke et al., 2017; Jarrett et al., 2018; Leopold & Verdaat, 2018; Mendel et al., 2019);	Generic information applicable to the proposed development IOFs.
Potential impacts resulting from highly pathogenic avian influenza (HPAI)	Various	Various literature regarding the impacts of HPAI on seabird species is considered in relation to potential additional impacts on ornithological receptors assessed in this EIAR. These include: Paradell *et al.*, (2023), Lane *et al.*, (2023), Pearce-Higgins *et al.*, 2022). Available information on HPAI from sources such as Birdwatch Ireland and the BTO is also considered wherever relevant.	Ireland and further afield.

2.5 Site-specific surveys

2.5.1 The requirement for data gathering to inform the baseline to detect any impact attributable to the development from natural levels or other developments is provided by DCCAE (2018) Guidance Part 1. The DCCAE Guidance recommends that three years of ornithological baseline surveys should be undertaken where no data previously exist, or a reduced period of two years depending on the sensitivity of site and availability of existing data (DCCAE, 2018). The approach taken is in line with the guidance and requirements in the UK industry. The proposed development also has supplementary vessel-based data to help inform the baseline. In accordance with these requirements, the sections below provide details of all site specific surveys undertaken across the study area.

2.5.2 Monthly boat-based ornithology and marine mammal surveys were initially planned as the primary method of at-sea data collection at the proposed development. However, boat-based surveys were no longer possible due to restrictions on social distancing and travel as a result of Covid-19 global pandemic in spring 2020. In accordance with Irish Government guidance the principal survey method was switched to DAS, with surveys commencing in March 2020. However, five additional supplementary vessel surveys were also conducted in 2021 and 2022 after the commencement of DAS data collection.

2.5.3 The original site-specific DAS survey extent mirrored the array area within the foreshore licence plus a 4km buffer. The DAS survey extent was updated in November 2020 to include the entire Maritime Area of Consent (MAC) boundary (which included the small area beyond 12nm that was not within the original site specific DAS survey extent) plus a 4km buffer (MAC presented as pink in Figure 2.1) plus a 4 km buffer area. This resulted in 16 transects across the area for original surveys, spaced 2.3 km apart with a minimum of 15% coverage in the original survey area. Notably the revised site boundary lies fully within the survey area covered during the year 1 baseline surveys. In the updated survey area, data were collected across 18 transect lines, also spaced 2.3km apart with a minimum coverage of 15%. The final area array is a subset of the full survey area as shown in Figure 2.1.



Proposed Development Boundary
Array Area
2km Buffer from Array Area
4km Buffer from Array Area
Offshore Export Cable Corridor
MAC Boundary (Array Area Only)
4km Buffer from MAC Boundary (Array Area Only)

NISA
North Irish Sea Array

ARUP GoBe

Project
North Irish Sea Array Offshore Wind Farm

Figure Title
Ornithological Study Area

Job No: 281240	Datum: WGS84 Projection: UTM30N
Date: May 2024	Figure No: 2.1
Scale: 1:250,000 @A3	
Status: Issue	

2.6 Vessel Surveys

2.6.1 As part of the baseline characterisation for the proposed development, vessel surveys have been undertaken across seven months, with three surveys undertaken between November 2019 and March 2020, followed by a further four supplementary surveys in August 2020, June 2021, July 2021 and July 2022, corresponding to the bird breeding seasons (details presented in Table 2.2). Vessels were conducted using European Seabirds at Sea (ESAS) methods, undertaken by accredited and experienced bird surveys. This methodology is widely used to record the distribution of seabirds, and has been widely adapted into baseline recording for offshore wind developments.

- During Survey 6 (21st July 2021), data was collected for all observed species, and a second survey (23rd July 2021) focused on collecting flight height data, and focussed only on flying gulls, terns and gannets. This data was collected to provide an additional dataset that can be used to compare site-specific data against both generic flight heights available in the literature and against flight height data collected obtained using DAS. Birds in flight were recorded as follows:
- Flight heights of <10m recorded to the nearest metre;
- Flight heights of 10 to 50m recorded to the nearest 5m;
- Flight heights of 50 to 100m recorded to the nearest 10m; and
- Flight heights of >100m recorded to the nearest 20m.

2.6.2 Data on the recorded species is presented in Section 2.15**Error! Reference source not found.**, with flight height data presented in Section Vessel surveys.

2.6.3 Additionally, Survey 7 (July 2022) was undertaken as a supplementary survey with the aim of gathering flight height data of relevant species, and identifying species which are more recorded on DAS to a species group (e.g. unidentified tern species'). Consequently, data on less abundant species (e.g. common scoter *Melanitta nigra*) is not presented for this survey.

Table 2.2: Timings of vessel surveys undertaken for the proposed development.

Aerial survey number	Date	Timing
1	28th November 2019	08:08 – 16:44
	29th November 2019	07:59 – 16:53
2	18th January 2020	08:24 – 16:28
	19th January 2020	09:02 – 16:31
	20th January 2020	09:55 – 14:14
3	5th March 2020	10:10 – 17:32
	6th March 2020	07:38 – 14:19
4	6th August 2020	06:39 – 13:33
	7th August 2020	06:36 – 12:40
5	21st June 2021	08:23 – 16:48
6	21st July 2021	10:37 – 14:47
	23rd July 2021	10:07 – 16:50
7	27th July 2022	12:41 – 19:51
	28th July 2022	07:43 - 15:21

2.7 DAS

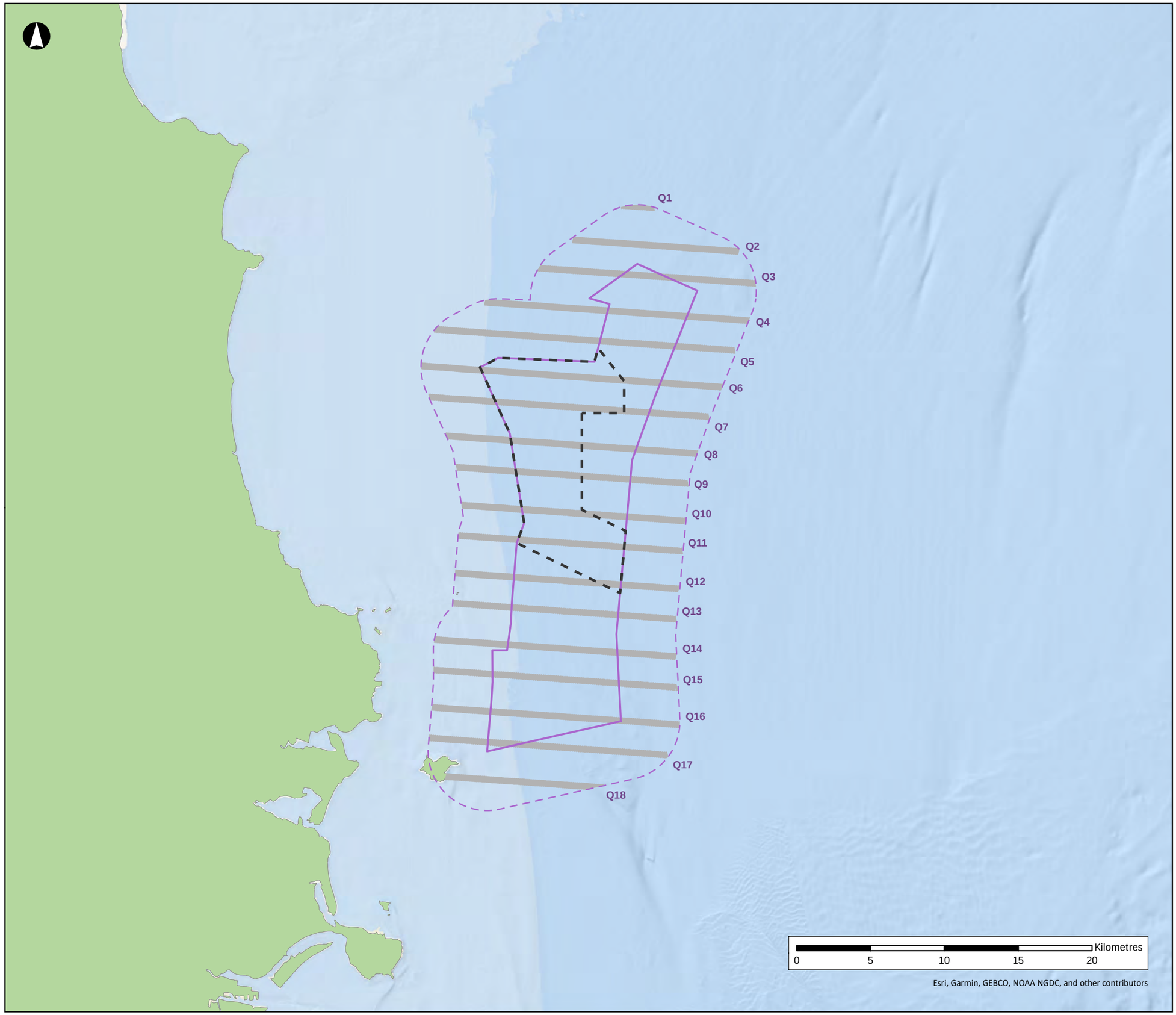
2.7.1 APEM Ltd began a 29-month programme of baseline DASs in May 2020 that were completed in October 2022, the survey dates are presented in Table 2.3: Date and timings of the DAS conducted by APEM Ltd between May 2020 and October 2022.. Data was collected via monthly transect surveys across the full MAC area of 195.9km^2 and a 4km buffer surrounding the site. Since these surveys were undertaken, there has been a reduction to the proposed development boundary. Consequently, the assessment focussed on the refined array area and appropriate buffer, not the full survey area (MAC + 4km buffer). All survey methodologies and data analysis was undertaken in line with guidance that is accepted in other markets (e.g. the UK).

- The data collected were 1.5 cm ground survey distance digital still images, by a twin-engine aircraft flying at an altitude of 1,300 feet at a speed of approximately 120 knots. Images were collected along 18 transects across the project site and 4km buffer, with a minimum of 15% of the sea surface covered, during each survey, for analysis. Surveys were also conducted under the following environmental conditions.
- Cloud base: >1,700 feet;
- Visibility: >5 km;
- Windspeed: <30 knots;
- Sea state: 4 or less (Beaufort 5 or 6); and
- No icing conditions.

Table 2.3: Date and timings of the DAS conducted by APEM Ltd between May 2020 and October 2022.

Aerial survey number	Date	Timing
1	13 May 2020	08:10 – 10:30
2	02 June 2020	16:26 – 18:20
6	18 July 2020	16:44 – 18:21
4	15 August 2020	12:51 – 14:42
5	10 September 2020	11:58 – 13:41
6	17 October 2020	11:11 – 12:48
7	13 November 2020	09:49 – 12:03
8	12 December 2020	12:11 – 13:59
9	21 February 2021	11:49 – 13:41
10	19 March 2021	13:16 – 15:19
11	07 April 2021	08:43 – 10:30
12	14 May 2021	08:54 – 10:41
13	03 June 2021	10:55 – 12:40
14	05 July 2021	12:18 – 14:04
15	22 August 2021	13:08 – 15:07
16	05 September 2021	09:48 – 11:27 & 14:03 – 14:13
17	08 October 2021	11:31 – 13:35
18	05 November 2021	12:55 – 14:46
19	05 December 2021	10:28 – 12:22
20	11 January 2022	10:26 – 12:29
21	11 February 2022	10:38 – 12:20

22	05 March 2022	09:45 – 11:41
23	01 April 2022	09:42 – 11:16
24	12 May 2022	13:40 – 15:23
25	04 June 2022	10:07 – 12:12
29	04 July 2022	11:51 – 13:39
27	06 August 2022	09:09 – 10:53
28	01 September 2022	13:04 – 14:48
29	01 October 2022	10:50 – 12:52



Array Area
MAC Boundary (Array Area Only)
4km Buffer from MAC Boundary (Array Area Only)
Survey Transect

NISA
North Irish Sea Array

ARUP GoBe

Project
North Irish Sea Array Offshore Wind Farm

Figure Title
Ornithological Digital Survey Area and Transect

Job No: 281240	Datum: WGS84 Projection: UTM30N
Date: May 2024	Figure No: 2.2
Scale: 1:250,000 @A3	
Status: Issue	

2.7.2 Seabirds were identified to species level during image analysis, where identification to species level was not possible individuals were classified to the lowest taxonomic level. The grouping levels used for this process is presented in Table 2.4 below. To ensure the accuracy of the species identification APEM Ltd conducted internal quality assurance, this also guaranteed any missed individuals were included in the data. The data collected during the DAS provided the information listed below.

- Date and time of each seabird and recorded during a survey;
- Corresponding coordinates for each seabird recorded;
- Age, sex and moult status of seabirds, where possible;
- Additional behavioural information whether a bird is sitting, flying, or diving; and
- Estimated flight heights, where possible.

2.7.3 As per the Image Analysis section above unidentified species were identified to the lowest taxonomic level/species group. To assign these individuals to a species, and avoid underestimating the species abundance, the ratios of identified birds within the corresponding species groups were used and in turn used to adjust the density estimates for each species. Smaller groups were apportioned first and in turn used to calculate ratios within the larger groups (Table 2.4). For example, records of 'guillemot/razorbill' were apportioned according to the ratio of guillemot and razorbill within the dataset. The adjusted numbers of guillemot and razorbill were then used in conjunction with the puffin observations to calculate the ratios to apportion the 'unidentified auk species', the subsequent adjusted numbers were combined with the observations of Manx shearwater to divide the 'unidentified auk/shearwater' species group. This hierarchical approach assumed that all species within a group are equally likely to be apportioned to an unidentified group and that the ratios of different species within groups did not vary across the survey period.

Table 2.4: Bird grouping levels where identification to species level was not possible.

Species	Species Grouping Level 1	Species Grouping Level 2	Species Grouping Level 3
Kittiwake *Rissa tridactyla*	Small gull species	NA	Unknown gull species
Little gull *Hydrocoloeus minutus*			
Common gull *larus canus*			
Great black-backed gull *Larus marinus*	Black-backed gull species	Large gull species	
Lesser black-backed gull *Larus fuscus*			
Herring gull *Larus argentatus*	NA		
Sandwich tern *Thalasseus sandvicensis*	NA	Tern species	NA
Common tern *Sterna hirundo*	Arctic/common ('commic') tern		
Arctic tern *Sterna paradisaea*			
Guillemot *Uria aalge*	Guillemot/razorbill	Auk species	NA
Razorbill *Alca torda*			
Black guillemot *Cepphus grylle*	NA		
Puffin *Fratercula arctica*	NA		
Cormorant *Phalacrocorax carbo*	Cormorant/shag	NA	NA
Shag *Phalacrocorax aristotelis*			

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

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

$$N = i\mathrm{A}$$

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

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

2.7.8 All analyses and data manipulation carried out by APEM were conducted in the R programming language (R Development Core Team, 2012) and non-parametric 95% confidence intervals were generated using the 'boot' library of function (Canty & Ripley, 2017). This results in species-specific monthly abundance estimates being calculated from the raw count data, with upper and lower confidence limits. Where appropriate, a level of precision is also presented for each monthly abundance estimate. Dividing the monthly abundance estimates by the size of the area covered calculates the associated density (e.g. birds per km^2) for any given species.

Correction of availability bias

2.7.9 Seabirds that spent periods of time underwater, particularly auk species (such as guillemot and razorbill) that perform frequent foraging dives, were not always detectable at the surface. To account for this 'availability bias' a fixed species-specific correction factor was applied to each record of an auk on the sea during DAS. These correction factors were based upon estimates of the proportion of time auk species spend on the surface reported in Thaxter et al (2010) during chick rearing. They were calculated at 0.7595 and 0.8182 for guillemot and razorbill, respectively. Data from loggers in Spencer (2012) provides an estimate for puffin of 0.8584.

Collection of flight height data

2.7.10 Where possible, flight heights of flying birds were also obtained from DAS data. This was calculated trigonometrically using the size of the bird in the image. Since this requires the full length of the bird to be visible in the image, it was therefore not possible to calculate this for all flying species recorded.

2.8 Coastal vantage-point surveys

2.8.1 To supplement the main programme of offshore bird surveys, a series of coastal Vantage Point (VP) surveys were also carried out. The aim of these surveys was to better quantify the movements of migratory species, such as migratory waterfowl, as they travel along the east Irish coast. Surveys were therefore undertaken in the migration seasons, covering two autumn migratory periods and two spring migratory periods.

2.8.2 Surveys were undertaken at two coastal VP locations:

- VP1: Clogherhead (Grid reference O 17487 84276); and
- VP2: Rush/Drumanagh Head (Grid reference O 27495 56247).

2.8.3 Surveys were conducted only during favourable conditions, with no surveys undertaken in periods where weather conditions may preclude migration (e.g. high winds, poor visibility, snowfall). Surveyors systematically scanned a 180° arc (including overhead) for birds in flight for two three-hour stints per survey day, with a 30-minute break between three-hour watches to reduce fatigue and maintain visual acuity.

2.8.4 The survey periods assessed were designed to overlap with the migratory seasons for many bird species. These included:

- Six survey visits between September 2019 and early December 2019;
- Six survey visits between March 2020 and May 2020;
- Six survey visits between September 2020 and November 2020; and
- Six survey visits between March 2021 and May 2021;

2.8.5 The number of species recorded across VP surveys is presented in section 1.1.

2.9 Landfall surveys

2.9.1 To characterise the baseline environment in terms of ornithological receptors at the proposed landfall site(s), surveys have been conducted since January 2021. Initially, three areas were considered though from October 2021 onwards, surveys were conducted at a single site covering a stretch of coast between Ballbriggan and the mouth of the river Delvin. Results for this area only are presented in Section 2.9, with 24-months of data incorporating raw counts of all bird species seen between January 2021 and December 2022.

2.9.2 The surveys were undertaken based upon the Irish Wetland Bird Survey (I-WeBS) method, which is a long-standing national survey of waterbirds that takes place annually, but which focusses on the non-breeding period (September to March). Target species were waders, waterfowl, divers, grebes, gulls and seabirds, with herons/egrets and raptors also recorded.

2.9.3 The length of the survey area (site plus 500m buffer to north and south) was walked by an experienced ornithologist, with counts made from suitable vantage points along the coast such that the full length of the survey area was covered, taking care not to double count any already recorded birds. All species within 1km of the coast (offshore) were recorded, though birds up to 2km offshore were recorded where visible. Onshore, all target species were recorded when they were present within 100m of the coast.

2.10 Desktop data sources

ObSERVE (Jessop et al. 2018)

2.10.1 From 2015-2016, offshore aerial surveys were conducted during the summer and winter months in Ireland (Rogan *et al.* 2018), collecting data on the distributions and abundances of seabird species present within the survey area. In 2016, additional inshore/coastal surveys were conducted in both the winter and summer months (Jessop *et al.* 2018). This data can be used to provide recent context for inter-seasonal changes in seabird abundance and distribution at a regional scale across the Irish Sea.

2.10.2 The survey design included a study area consisting of offshore waters around Ireland, both within and beyond Ireland's continental shelf. This study area was initially divided into five strata in 2015, with a further three inshore strata added in 2016. Two zigzag transects were flown within each stratum, with observations recorded and conducted following a standardised protocol designed for aerial surveys. In the case of cetacean sightings, the protocol used was designed using a line-transect methodology, with observer effort restriction to approximately 500 m either side of the aircraft. Two randomly placed transect lines were generated for each stratum. The line-transect positions and start points were changed each year to provide two independent datasets per season per stratum, also providing a more representative coverage of the survey area. In 2015, the total distance flown was 16,802 km within a survey area measuring 297,480 km^2 and in 2016 the distance flown totalled at 20,295 km within a survey area measuring 339,377 km^2.

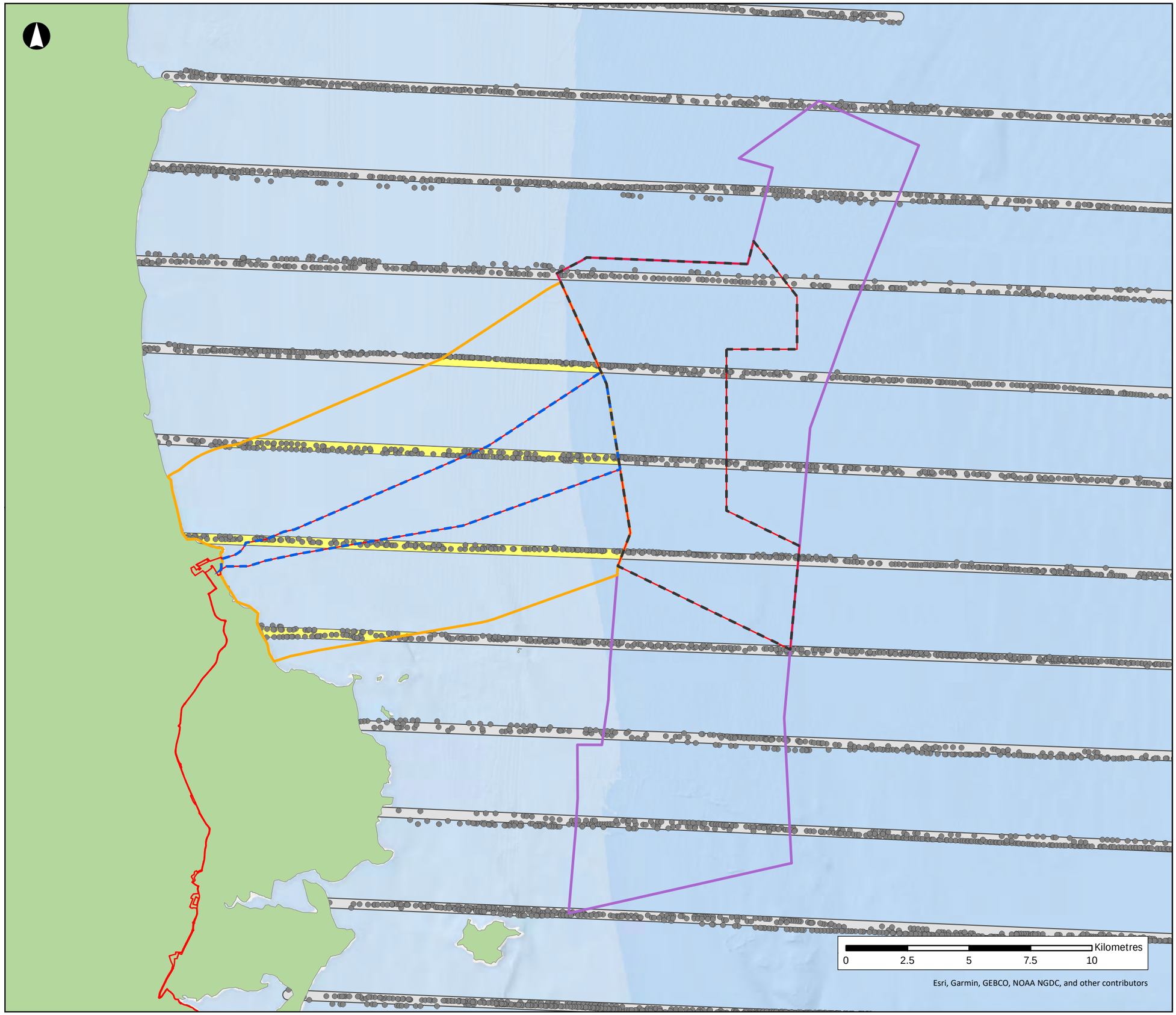
2.10.3 During all four surveys, four observers were on board the aircraft, with two on each side of the aircraft. The aircrafts position was recorded every two seconds through the use of an on-board GPS. Observers recorded all sightings of marine fauna, as well as Beaufort Sea State, cloud cover, glare extent and severity, the corresponding declination angle of the aircraft to the animal sighted, species, sighting time, group size, presence of calves and behaviours observed.

2.10.4 This data was used to determine the density of divers and common scoter within the ECC to assess vessel disturbance. It was also used to inform the distribution of species throughout the North-west Irish Sea (NWIS) cSPA.

2.10.5 Due to the positioning of transects, data from Jessop *et al*. (2018) had relatively low coverage (4%) of the offshore ECC. It was therefore deemed appropriate to include data from the ECC plus 4km buffer to obtain density estimates and data on species presence, noting that the relevant ECC study area remains the offshore ECC only, with no surrounding buffer. Although these data cover a wider spatial extent, by incorporating a 4km buffer on the ECC, coverage of the area (ECC +4km buffer) was increased to >10% (10.5%) increasing the confidence in the data. The coverage of survey transects and the resulting densities are provided in Figure 2.3 and Table 2.5, respectively. Please see sections on red-throated diver, great northern diver and common scoter for further information on specific species.

Table 2.5: The raw count, mean densities and estimated abundance of birds in the ECC plus 4km buffer for red-throated diver, great northern diver and common scoter.

Species	Raw count of birds detected	Mean density (birds/km^2)	Estimated abundance
Common scoter	61	3.38	579.2
Scoter species	12	0.66	113.9
Diver species	25	1.39	237.4



Proposed Development Boundary
Array Area
MAC Boundary (Array Area Only)
Offshore Export Cable Corridor
4km Buffer from Offshore Export Cable Corridor
200m Buffer from Interpolated ObSERVE Transect Line
200m Buffer from Interpolated ObSERVE Transect Line (within 4km Buffer from ECC)
ObSERVE Survey Points

NISA
North Irish Sea Array

ARUP GoBe

Project
North Irish Sea Array Offshore Wind Farm

Figure Title
Survey Coverage of the Offshore ECC from the ObSERVE dataset

Job No: 281240	Datum: WGS84 Projection: UTM30N
Date: May 2024	Figure No: 2.3
Scale: 1:150,000 @A3	
Status: Issue	

2.10.6 The BirdLife International Seabird Tracking Database contains tracking data for over 150 bird species across over 400 colonies. Included within this are several tracking datasets of key species relevant to the proposed development from Irish colonies (e.g., Gannet, guillemot, razorbill and kittiwake at Lambay Island). Where possible, tracking data were used to inform spatial habitat use by seabirds in close proximity to the proposed development, helping to determine potential foraging overlap with the array area. Further information can be found in the species sections.

Other datasets

2.10.7 In addition to the above datasets, consideration was also given to a range of available literature and datasets, including tern tracking data from Perrow *et al*. (2019), colony sizes and population trends from the JNCC SMP database, from Cummins *et al*. (2019) and Burnell *et al.* (2023), and older ESAS survey data collected between 1980 and 1997, presented in Pollock *et al*. (1997).

2.11 Definition of Seasons

2.11.1 A monthly definition of seabird breeding or non-breeding season is not included in the Irish guidance (DCCAE, 2017, DCCAE, 2018). Two options were therefore considered for determining a breakdown of months for the breeding and non-breeding seasons for seabird species covered in this technical report. The first option considered was to follow the season definitions published by NatureScot (NatureScot, 2020), which have been used in assessments of offshore wind farms in Scotland. The second option was to use those presented in Furness (2015).

2.11.2 It was considered that there may be differences in season timings with the NatureScot definitions due to differences in day length and temperature between seabird colonies in Ireland and the Scottish colonies for which these definitions were drawn up. It was therefore decided to use season definitions presented in Furness (2015), which were based on colony attendance data from the whole of the UK, as this was considered likely to be more representative of the seasons in Ireland. These definitions were agreed between Irish Phase One Projects in the Irish Phase One Methodology Statement (Appendix 15.7) Furness (2015) has also been used as the recommended source of season definitions for all wind farms in England demonstrating that this approach is not novel. Where species were not included in Furness (2015), season definitions from NatureScot (2020) were used as an alternative.

- Within this Technical report, six bio-seasons are defined: spring migration, migration-free breeding, autumn migration, migration-free winter, full breeding and non-breeding. These bio-seasons can be applied to different periods within the annual cycle for most seabird species, though not all six are applicable for all species depending on the species-specific biology and life-history:
- Spring (Return) migration: birds are migrating to breeding grounds;
- Migration-free breeding: birds are attending colonies, nesting and provisioning young;
- Autumn (Post-breeding) migration: birds are either migrating to wintering areas or dispersing from colonies;
- Migration-free winter: non-breeding birds are over-wintering in an area;

- Non-breeding: extended bio-season from modal departure from the colony at the end of breeding to modal return to the colony the following year; and
- Breeding: extended bio-season from modal arrival of breeding birds to the colony to modal departure from the colony.

2.11.3 For guillemot, the Furness approach to bio-seasons is not considered the most ecologically relevant. Though Furness (2015) suggest a breeding season of May to July, project-specific DAS data showed earlier post-breeding dispersal from breeding colonies. Available literature (e.g., Dunn et al. 2020) indicate that birds during this period and at the early stages of the breeding season are not under the same energy constraints as in the core breeding season because they do not have to tend to a nest or provision for young. The large peak in guillemot abundance in July is therefore highly likely to be a result of post-breeding dispersal of guillemots from colonies across the wider regional population (as opposed to being breeding birds). Therefore, a more ecologically relevant breeding season of April to June is used for NISA, in addition to the standard seasonal definitions agreed between Irish Phase One Projects in the Method Statement (Appendix 15.7). See common guillemot section for further details. Season definitions used in this assessment are presented in Table 2.6 below.

Table 2.6: Definitions of breeding and non-breeding season used in this assessment (Furness, 2015).

Species	Autumn migration	Spring migration	Migration-free winter	Breeding	Non-breeding
Common scoter[1]	-	-	-	NA	Sep-Apr
Kittiwake	Sep-Dec	Jan-Feb	-	Mar-Aug	-
Black-headed gull[2]	-	-	-	Apr – Aug	Sep-Mar
Common gull[1]	-	-	-	Apr – Aug	Sep-Apr
Great black-backed gull	-	-	-	Apr-Aug	Sep-Mar
Herring gull	-	-	-	Mar-Aug	Sep-Feb
Lesser black-backed gull	Sep-Oct	Mar	Nov-Feb	Apr-Aug	-
Roseate tern *Sterna dougallii*	Sep	Apr	-	May-Aug	-
Common tern	Sep	Apr	-	May-Aug	-
Arctic tern	Sep	Apr	-	May-Aug	-
Guillemot (proposed development approach)	-	-	-	Apr-Jun	Jul-Mar
Guillemot (Furness 2015 approach)	-	-	-	Mar-Jul	Aug-Feb
Razorbill	Aug-Oct	Jan-Mar	Nov-Dec	Apr-Jul	-
Puffin	-	-	-	Apr-Jul	Aug-Mar
Red-throated diver *Gavia stellata*	Sep-Nov	Feb-Apr	Dec-Jan	Mar-Aug	Sep-Apr
Great northern diver	-	-	-	NA	Sep-May
Fulmar *Fulmarus glacialis*	Sep-Oct	Apr	Nov	Jan-Aug	-
Manx shearwater *Puffinus puffinus*	Sep-Oct	Mar	-	Apr-Aug	-
Northern gannet	Sep-Nov	Dec-Feb	-	Mar-Sep	-

1 https://www.nature.scot/sites/default/files/2018-11/Guidance%20-%20Suggested%20seasonal%20definitions%20for%20birds%20in%20the%20Scottish%20Marine%20Environment.pdf
2 Not in Furness (2015), bio-seasons based on Kober et al., (2010)

2.12 Reference Populations

Non-breeding regional populations

2.12.1 Across OWFs in the UK, regional populations for use in Environmental Impact Assessments (EIA) are based on those presented in Furness (2015). Though Furness (2015) provides regional populations within the Irish Sea, these do not account for the higher Irish component of the population relevant to the assessment for the proposed development. Therefore, where available, regional populations provided by Furness (2015) are used as a basis of the assessment, with adjustments made as outlined in this section to make populations appropriate for the east coast of Ireland (as opposed to the west coast of the UK). Furness populations for relevant species are presented in Table 2.7 below.

2.12.2 For most species, two regional populations are available (one for the east coast of the UK/in the North Sea, and one for the west coast/in the Irish Sea). For great black-backed gull *Larus marinus*, two west coast regions are defined; 'West of Scotland', and 'South-west and Channel'. Though the proposed development is located within the 'South-west and Channel' region, it is sufficiently far north that birds from the 'West of Scotland' region are also considered relevant, and therefore a combined population was used from these two regions.

2.12.3 The exceptions to this methodology are black-headed gull and common gull, which are not detailed in Furness (2015). For both these species, the all Ireland population from Stoud *et al*. (2016) was used, with data based on a review of UK SPAs. Additionally, for common scoter a precautionary approach was taken by using the peak abundance estimated from Jessop data and using this as a regional population. This was done due to a reliable common scoter population not being presented in Furness (2015).

Table 2.7: Non-breeding regional populations from Furness (2015).

Species	Region	Autumn migration	Spring Migration	Migration -free winter	Non-breeding
Kittiwake	UK western waters plus Channel	911,586	691,526		
Great black-backed Gull	UK South-west & Channel + UK West of Scotland				52,122
Herring Gull	UK Western waters				173,299
Lesser black-backed Gull	UK Western waters	163,304	163,304	41,159	
Roseate Tern	UK Western waters	2,100	2,100		
Common Tern	UK Western waters	64,659	64,659		
Arctic tern	UK Western waters	71,398	71,398		
Guillemot	UK Western waters				1,139,220
Razorbill	UK Western waters	606,914	606,914	341,422	
Puffin	UK Western waters	304,557	304,557	304,557	
Red-throated diver	UK Western Waters plus Channel / NW England & Wales	4,373	4,373	1,657	
Great northern diver *Gavia immer*	NW England & Wales				300
Fulmar	UK western waters plus Channel	828,194	828,194	556,367	
Manx shearwater	UK western waters plus Channel	1,580,895	1,580,895		

Gannet	UK Western waters	545,954	661,888		

2.12.4 To account for coverage of waters within the Western Irish Sea, populations from Furness were altered using the following approach:

- Removal of the Irish (RoI) component of the Furness (2015) regional populations; and
- Addition of an adapted Irish component derived from Irish (RoI) seabird population estimates presented in Burnell *et al.* (2023).

2.12.5 To remove the Irish (RoI) component of a BDMPS region population the total number of immatures and adults in that BDMPS region deriving from Irish source populations were calculated with reference to Tables in Appendix A of Furness (2015). The parameters used to calculate the total numbers of immatures and adults from the relevant BDMPS region for each species are presented in Table 2.8.

Table 2.8: Parameters used to calculate the Irish component of BDMPS populations in Furness (2015).

Species	Region	Irish population (adults)	Proportion occurring within BDMPS (Ad/Imm)	Immature: Adult ratio
Kittiwake	UK western waters plus Channel	40,000	(0.3/0.2)	0.88
Great black-backed Gull	UK South-west & Channel + UK West of Scotland	4000	(0.1/0.3)	1.26
Herring Gull	UK Western waters	10000	(0.3/0.4)	1.09
Lesser black-backed Gull	UK Western waters	7600	PBM & RM: (0.4/0.2)	
Roseate Tern	UK Western waters	5000	(0.3/0.3)	0.58
Common Tern	UK Western waters	MFW: (0.2/0.05)	0.68	
Arctic tern	UK Western waters	5400	(0.4/0.4)	0.67
Guillemot	UK Western waters	0	NA	0.74
Razorbill	UK Western waters	34000	(0.1/0.1	0.75
Puffin	UK Western waters	40000	(0.1/0.1)	1.04
Red-throated diver	UK Western Waters plus Channel / NW England & Wales	0	NA	0.74
Great northern diver	NW England & Wales	NA[3]	NA	1.1
Fulmar	UK western waters plus Channel	0	NA	0.62
Manx shearwater	UK western waters plus Channel	NA[4]	NA	0.84
Gannet	UK Western waters	72000	PBM: (0.2/0.3)	
Cormorant	SW England and Wales	RM: (0.3/0.3)	0.81	
Shag	SW England and Wales	8200	(0/0.02)	1.17

2.12.6 From this, the Irish (RoI) component of the regional populations in Furness (2015) were calculated from the sum of adult and immature birds where:

- The number of adults = Irish population (adults) * Proportion in BDMPS (adults); and

[3] No BDMPS population source table provided in Furness, 2015
[4] UK BDMPS population only used in assessment

- The number of immatures = Irish population (adults) * Proportion in BDMPS (immatures) * Imm:Ad

2.12.7 The total resulting Irish component which was removed is presented in Table 2.9 below.

Table 2.9: Irish population component removed from the Furness (2015) BDMPS populations.

Species	Region	Autumn migration	Spring Migration	Migration-free winter	Non-breeding
Kittiwake	UK western waters plus Channel	19,040	19,040	-	-
Great black-backed Gull	UK South-west & Channel + UK West of Scotland	-	-	-	3,320
Herring Gull	UK Western waters	-	-	-	7,360
Lesser black-backed Gull	UK Western waters	4,074	4,074	1,778	-
Roseate Tern	UK Western waters	2,100	2,100	2,100	-
Common Tern	UK Western waters	3,607	3,607	3,607	-
Arctic tern	UK Western waters	2,370	2,370	2,370	-
Guillemot	UK Western waters	-	-	-	0
Razorbill	UK Western waters	5,950	5950	5,950	-
Puffin	UK Western waters	8,160	8,160	8,160	-
Red-throated diver	UK Western Waters plus Channel / NW England & Wales	0	0	0	-
Fulmar	UK western waters plus Channel	0	0	0	-
Manx shearwater	UK western waters plus Channel	0	0	-	-
Gannet	UK Western waters	31,896	39,096	-	-

2.12.8 To calculate the Adapted Irish (RoI) component of the revised bio-seasonal regional population estimates which were added to the Furness, 2015, BDMPS population, Irish (RoI) seabird populations from Burnell *et al*. (2023) were calculated for the east and south-east coast of Ireland. This incorporated seabird counts between County Louth to County Cork (For County Cork, only south coast colonies between Youghal and Mizen Head were included). Since these counts only included adults, the number of immatures was added to the population by multiplying total by the Imm:Ad ratio. The resulting Irish component is presented in Table 2.10 below.

Table 2.10: Irish population component added to the Furness (2015) BDMPS populations based on Burnell *et al*. (2023)

Species	East and South coast ROI population (adults) from Burnell *et al*. (2023)	Imm:Ad ratio (Horswill and Robinson, 2015)	East and South coast ROI population (adults and immatures)
Kittiwake	21,418	0.898	40,651
Great black-backed Gull	1,814	1.538	4,604
Herring Gull	8,926	1.370	21,155
Lesser black-backed Gull	6,540	0.876	12,269
Roseate Tern	3,748	0.701	6,375
Common Tern	7,612	0.701	12,948
Arctic tern	2,120	0.511	3,203
Guillemot	100,941	0.916	193,403

Razorbill	16,785	0.876	31,489
Puffin	2,188	0.842	4,030
Red-throated diver	-	-	-
Great northern diver	-	-	-
Fulmar	7,484	1.083	15,589
Manx shearwater	2,170	1.132	4,626
Gannet	11,996	0.761	21,125

2.12.9 For red-throated diver and great northern diver, the Irish population was based on digital aerial survey data in Jessop *et al.*, (2018). This data was only collected to the level of Diver species, and therefore this was apportioned to red-throated diver and great northern diver according to the proportion of the population in the region based on Furness (2015). This is outlined in Table 2.11.

Table 2.11: Calculation of Western Irish Sea diver populations based on Jessop et al. (2018).

Bio-season	Total estimated Western Irish Sea abundance (all divers)	Proportion of red-throated divers	Proportion of great northern divers	No. red-throated divers	No. great northern divers
Autumn migration (and Spring migration)	8,916	0.9358	0.0642	8,344	572
Migration-free Winter	2,942	0.8467	0.1533	2,491	451

2.12.10 The resulting non-breeding regional populations are presented in Table 2.12 below.

Table 2.12: Final non-breeding bio-season regional populations relevant for the proposed development.

Species	Non-breeding	Autumn migration	Spring migration	Winter
Common scoter[5]	8,616	-	-	-
Kittiwake	-	933,197	713,137	-
Black-headed gull[6]	100,000	-	-	-
Common gull[7]	-	67,500	67,500	
Great black-backed gull	53,406	-	-	-
Herring gull	187,094	-	103,941	186,502
Lesser black-backed gull	-	171,500	171,500	53,368
Roseate tern	-	6,375	6,375	-
Common tern	-	74,000	74,000	-
Arctic tern	-	72,238	72,238	-
Guillemot	1,332,623	-	-	-
Razorbill	-	632,453	632,453	366,961
Puffin	-	-	300,427	
Red-throated diver	-	12,717	12,717	4,148
Great northern diver	871	-	-	-
Fulmar	-	843,783	843,783	571,956
Manx shearwater	-	1,585,521	1,585,521	-
Gannet	596,525	535,183	643,917	-

Breeding regional populations

2.12.11 In the breeding bio-season, two approaches are available to calculate the regional population size:

- Method 1: Taking colony counts of all colonies within mean maximum foraging range plus one standard deviation (based on Woodward et al., 2019) and adding the number of immatures from the non-breeding season preceding the breeding season, calculated based on the proportion of immatures from the relevant regional population (using adult proportions from Horswill and Robinson 2015); and
- Method 2: Taking colony counts of all colonies within mean maximum foraging range plus one standard deviation (based on Woodward et al., 2019) and adjusting these based on the number of immatures per adult calculated from Horswill and Robinson (2015).

2.12.12 The first approach (Method 1) is considered more ecologically relevant because it accounts for the breeding adult population, which are constrained by the necessity to tend to a nest (i.e. their foraging range), and the remaining regional population of immature birds and non-breeders that do not have the same constraints during the breeding season. Evidence suggests that large proportion of these birds are likely to remain in the region, and use the area for foraging during the breeding season and therefore should be considered as part of the regional population. Both populations are presented in Table 2.13 below.

[5] Based on Jessop et al 2018 aerial survey data
[6] Based on Stroud et al 2016 all Ireland population
[7] Based on Stroud et al 2016 all Ireland population

2.12.13 For fulmar, a slightly different approach was undertaken based on knowledge of their behaviour and expert judgement. Fulmar foraging behaviour changes radically between the incubation period and the chick rearing period. During chick rearing, fulmars are constrained by the need to return to the nest to feed young. As such, the average foraging range during this period is substantially reduced in comparison with incubation. Studies of Norwegian birds showed a chick rearing average foraging range of 60km (Weimerskirch et al., 2001). Birds tracked from colonies in Orkney during chick rearing showed median ranges of 6km (males) and 5km (females), compared to median ranges of 475km (males) and 702km (females) during incubation. (Edwards 2015). Fulmar occurrence in the project area is highest during the chick rearing period (defined as July 1 – Aug 20 in Orkney by Edwards) and into September, possibly corresponding with occurrences of locally fledged birds. As fulmar presence is so low in the project area during the incubation period (total of 10 birds across three years in the array area pls 4km buffer), potential impacts will be similarly low. For the chick rearing period, impacts can be assessed against colonies within a precautionary foraging range of 100km.

Table 2.13: Final breeding bio-season regional populations relevant for the proposed development

Species	Regional population	
	Breeding method 1	Breeding method 2
Common scoter	-	-
Kittiwake	412,374	142,464
Black-headed gull	32,000	-
Common gull	-	-
Great black-backed gull	33,422	2,685
Herring gull	119,304	26,459
Lesser black-backed gull	120,320	75,470
Roseate tern	5,911	5,586
Common tern	34,574	6,949
Arctic tern	24,532	178
Guillemot	736,212	190,073
Razorbill	321,633	49,298
Puffin	180,693	79,939
Red-throated diver	-	-
Great northern diver	-	-
Fulmar	6,249	441,767
Manx shearwater	2,727,371	2,121,049
Gannet	637,440	632,514

2.13 Designated sites

2.13.1 Six designated sites have been identified which are considered highly relevant to the ornithology EIAR assessment based on their proximity to the proposed development, and the features for which they are designated (noting that these four sites and all other SPAs with potential connectivity to the proposed development are fully considered within the NIS). These SPAs correspond with those highlighted in the Site Synopsis for the North-West Irish Sea candidate SPA. These include:

- North-West Irish Sea candidate SPA (cSPA);
- Rockabill SPA;
- Lambay Island SPA;
- Ireland's Eye SPA;
- Skerries Island SPA; and
- Boyne Estuary SPA;

2.13.2 The offshore development area is located within the North-West Irish Sea cSPA, which covers an area of 2,333km2 and is designated for 21 bird species, including four tern species, three auk species, seven gull species, two diver species, fulmar (*Fulmaris glacialis*), Manx shearwater (*Puffinus puffinus*), shag, cormorant (*Corvus marinus*) and common scoter (*Melanitta nigra*). All designated species have been considered in the ornithology assessment. Notable exceptions to this include cormorant and shag which are not considered at risk of collision effects (based on flight height data) or displacement impacts (with evidence of birds even being attracted to OWFs and roosting on the structures) (Bradbury et al. 2014, Dierschke et al. 2016). Furthermore, no cormorants were identified in 29-months of DAS data, and only one shag. Similarly, only one Sandwich tern (*Thalasseus sandvicensis*) was recorded and therefore no likely significant effects on this species are expected.

2.13.3 The Rockabill SPA is also located within close proximity (0.2km) to the array area and is designated for three tern species and purple sandpiper. Consideration to tern species is given through an assessment on collision risk, with purple sandpiper assessed in the migratory collision risk assessment. Notably purple sandpiper is considered low risk, with no birds recorded during DAS surveys and vantagepoint surveys, and low numbers recorded during landfall surveys (as presented in the Technical Baseline). Although the boundary of Rockabill SPA is located just 0.2km from the proposed development, the island, where purple sandpiper will be over-wintering, is over 3.7km away and therefore beyond the disturbance range for this species of approximately 300m (Goodship & Furness, 2022).

2.13.4 The Lambay Island SPA is located 22.2km from the array area, and is designated for ten species (fulmar, cormorant, shag, greylag goose (*Anser anser*), lesser black-backed gull (*Larus fuscus*), herring gull (*Larus argentatus*), kittiwake (*Rissa tridactyla*), guillemot (*Uria aalge*), razorbill (*Alca torda*) and puffin (*Fratercula arctica*)). With the exception of cormorant and shag which are not considered vulnerable to OWF impacts (as discussed above), and greylag goose which was screened out of the migratory collision risk assessment due to low risk and the mCRM calculations predicting zero percent of the population likely to be at collision risk, all designated species have been considered in the ornithology assessment.

2.13.5 The Ireland's Eye SPA is located 33.0km from the array area, and is designated for five species (cormorant, herring gull, kittiwake, guillemot and razorbill). With the exception of cormorant, which is not considered vulnerable to OWF impacts, all designated species have been considered in the ornithology assessment.

2.13.6 The Skerries Island SPA is located 18.5km from the array area and has breeding season connectivity for herring gull qualifying interest. Shag and cormorant are not considered to be vulnerable to impacts from OWFs and are therefore scoped out of the assessment. Three qualifying wintering waterbird interests from this SPA may pass through the array area twice per annum on migration and are assessed within the ornithology assessment.

2.13.7 The Boyne Estuary SPA is primarily designated for non-seabird species which have limited connectivity to the proposed development. All species are considered to have low vulnerability to OWF impacts. The SPA is beyond the displacement ranges for wintering waterbirds from ECC construction activity. However, some qualifying interests from this SPA may pass through the array area twice per annum on migration. Little tern is the only qualifying seabird species at this SPA and has no breeding season connectivity with the array area due to their small foraging ranges coastal distribution.

2.14 Species Accounts

2.14.1 An account for species is provided below, summarising the main findings of the baseline surveys. A full account is provided for key species, considered to be those which were recorded in high numbers/frequencies during surveys and/or are considered sensitive to OWF developments. Monthly raw counts, abundance estimates and density estimates are provided where possible within the array area and a 2km buffer, with a 4km buffer presented for red-throated diver to reflect what will be used within the displacement assessment. Numbers presented have been apportioned and corrected for availability bias where appropriate, as outlined on page 14.

2.14.2 Where possible, density maps, flight directions and information on spatial habitat use from available tracking studies is provided for key species. Full results from the DAS data are provided in Appendix A.

2.15 Results

Kittiwake

General overview

2.15.1 Kittiwake were one of the most abundant seabird species in Ireland with an estimated population size of 24,728 breeding pairs (2015-2018). However, kittiwake populations have been declining across the UK and this same trend has been recorded in Ireland with a 32% population decline since 2000. As a result, kittiwake are red listed in Ireland and have a European International Union for Conservation of Nature (IUCN) red-list status of vulnerable. Kittiwakes mostly prey on small fish species such as lesser sandeels and clupeids, as well as fishery discards (Forrester et al., 2007).

2.15.2 Kittiwake breeding season is between March to August, with a migration free breeding period between May and July (Furness, 2015). They have relatively large mean-maximum foraging range (± 1 SD) compared to other gull species of 156.1 ± 144.5km (Woodward *et al.*, 2019). Kittiwakes disperse large distances during the non-breeding season, spending time offshore in the North Atlantic or south around the Bay of Biscay.

Abundance and density

2.15.3 Kittiwakes were recorded in the array area in 28 of 29 months. Raw counts ranged from 1 (June and July 2020) to 224 (January 2022), with abundance and density peaking at 1,105 birds and 12.48 birds/km^2 respectively (Table 2.14).

2.15.4 In the array area plus 2km buffer, raw counts ranged from 1 (July 2021) to 297 (January 2022), with abundance and density peaking at 1,481 birds and 7.36 birds/km^2 respectively (Table 2.15).

Table 2.14: Kittiwake raw counts estimated abundance and estimated density in the array area.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	2	1	1	10	5	23	5	15
Calendar year 2 (2021)	-	4	55	6	8	3	0	13	42	19	38	42
Calendar year 3 (2022)	224	30	2	6	3	2	74	4	5	16	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	8	5	5	48	24	107	23	74
Calendar year 2 (2021)	-	19	266	29	39	14	0	61	202	91	197	201
Calendar year 3 (2022)	1,105	143	10	28	14	9	362	19	24	75	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.09	0.06	0.06	0.54	0.27	1.21	0.26	0.84
Calendar year 2 (2021)	-	0.21	3.00	0.33	0.44	0.16	0.00	0.69	2.28	1.03	2.23	2.27
Calendar year 3 (2022)	12.48	1.62	0.11	0.32	0.16	0.10	4.09	0.21	0.27	0.85	-	-

Table 2.15: Kittiwake raw counts, estimated abundance and estimated density in the array area plus 2km buffer.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	6	2	5	19	13	38	27	54
Calendar year 2 (2021)	-	11	102	19	9	5	1	39	75	47	101	159
Calendar year 3 (2022)	297	74	23	21	4	3	205	11	9	191	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	24	10	25	102	65	183	123	267
Calendar year 2 (2021)	-	55	519	94	45	25	5	193	377	237	555	834
Calendar year 3 (2022)	1,481	374	113	105	20	15	1,009	52	45	940	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.12	0.05	0.12	0.51	0.32	0.91	0.61	1.33
Calendar year 2 (2021)	-	0.27	2.58	0.47	0.22	0.12	0.02	0.96	1.87	1.18	2.76	4.14
Calendar year 3 (2022)	7.36	1.86	0.56	0.52	0.10	0.07	5.01	0.26	0.22	4.67	-	-

2.15.5 ESAS surveys, which took place in Irish waters between 1980 and 1997, recorded the highest densities of kittiwake (>5 birds/km^2) off the Dublin coast directly after the breeding season in August and September. High densities were also recorded in April and May, directly before breeding season. Lowest densities were recorded between October and January.

2.15.6 ObSERVE aerial surveys (2016) detected 2,421 kittiwake across summer, autumn and winter. Highest abundance was estimated to be in autumn with 13,892 (95% CIs 11,314 – 17,057) kittiwake, compared to 1,453 (95% CIs 908 – 2,326) birds in winter and 628 (95% CIs 425 - 929) during the summer.

Bio-season peak estimates

2.15.7 Kittiwake were present across all three bio-seasons. Presence was greatest in the spring migration bio-season (January to February), with a mean peak abundance of 562 birds, and a mean peak density of 6.35 birds/km^2 in the array area (Table 2.16).

Table 2.16: Kittiwake bio-season mean peak abundance and density estimates in the array area and array area plus 2km buffer.

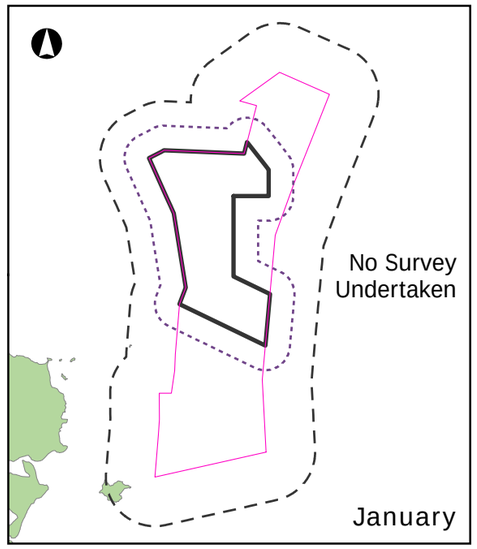
BDMPS Bio-seasons	Months	Array area		Array area plus 2km buffer	
		Bio-season peak abundance (n)	Bio-season peak density (n/km^2)	Bio-season peak abundance (n)	Bio-season peak density (n/km^2)
Breeding	Mar-Aug	225	2.54	543	2.70
Autumn migration	Sep-Dec	128	1.45	680	3.38
Spring migration	Jan-Feb	562	6.35	768	3.82

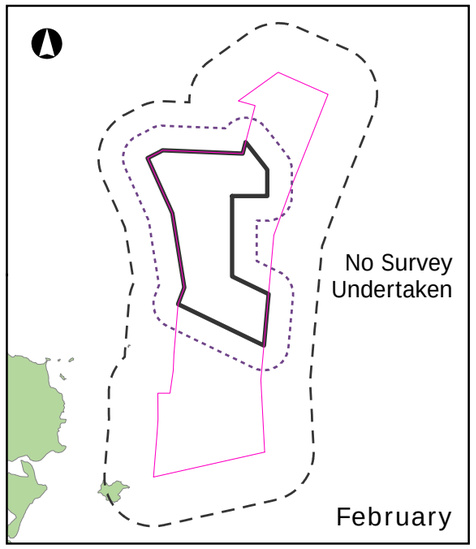
Spatial density distribution and flight direction

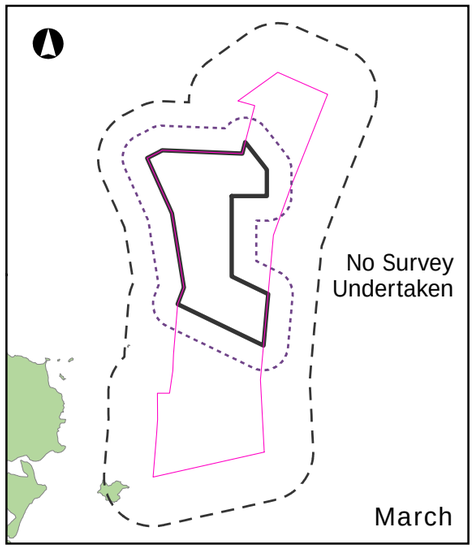
2.15.8 Density maps based on DAS data are presented in Figure 2.4 to Figure 2.6 below. Kittiwakes were recorded throughout the survey area. Across all bio-seasons, densities were highest in the west/south-west of the survey area, though in the breeding season a high density of birds was also encountered in the east and south-east, predominantly located outside the array area (i.e. within the 4km buffer).

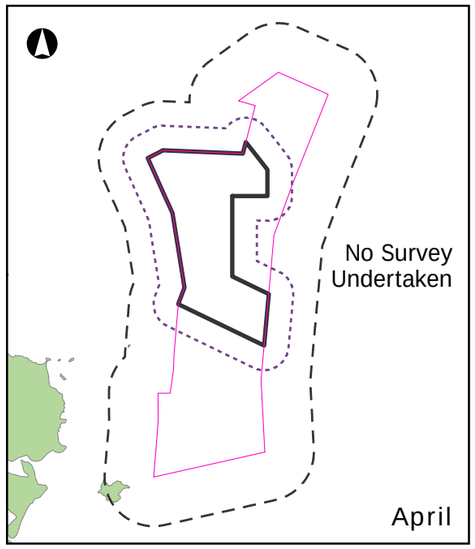
2.15.9 Density data from Jessop *et al*. (2018) also shows a relatively high density of birds in close proximity to NISA during the Autumn migration bio-season, though during other bio-seasons, densities were higher to the south of the project.

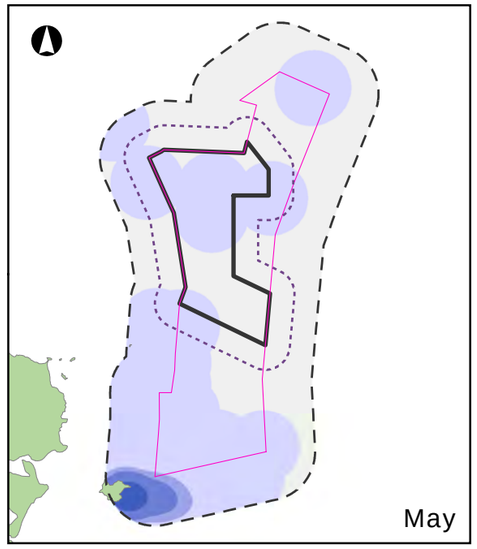
2.15.10 The flight direction recorded during the DAS surveys was varied throughout, with five months recording a significant number of flying birds. In August and September 2021, the predominant direction was southwest and south while in November 2021 it was a westerly direction and in December 2021 it was predominantly north westerly. In July 2022 the majority of flying birds was recorded flying west or southwest (Figure 2.7).

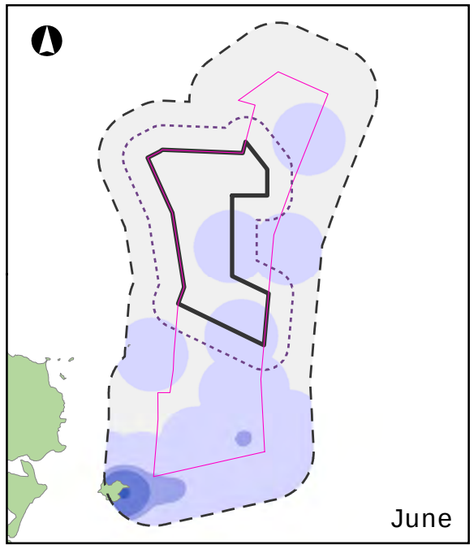


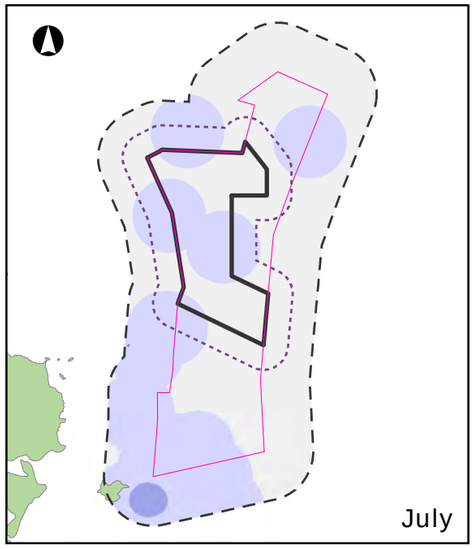


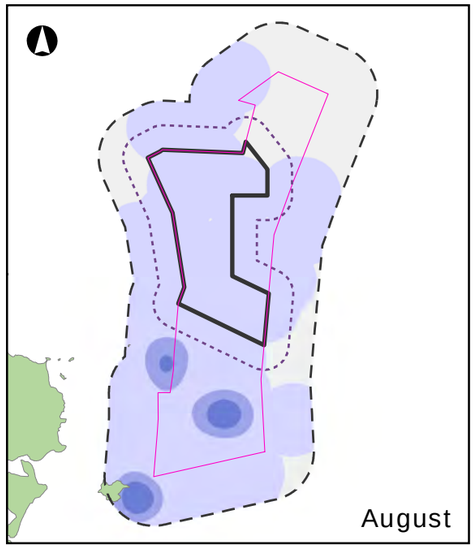


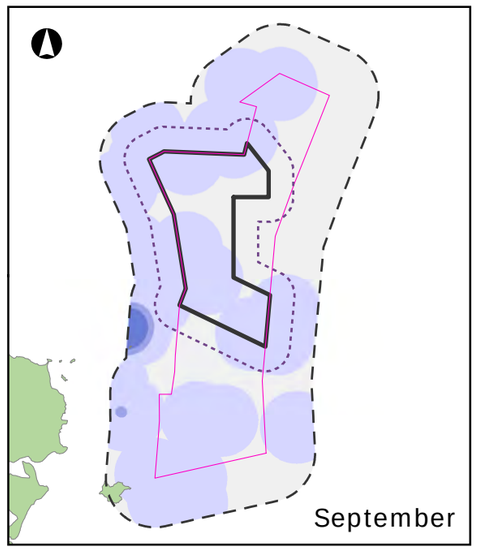


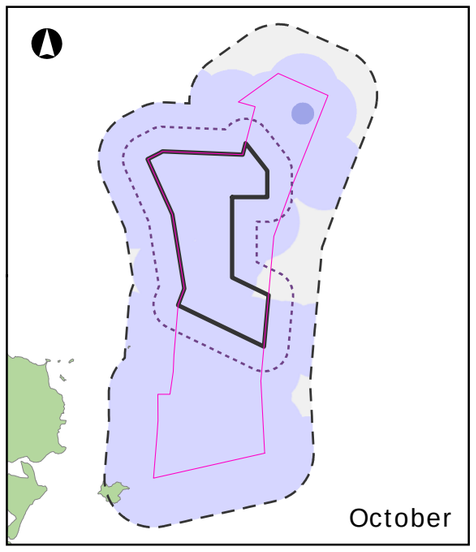


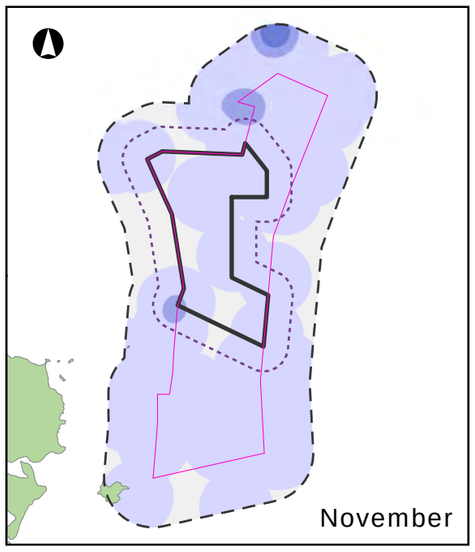


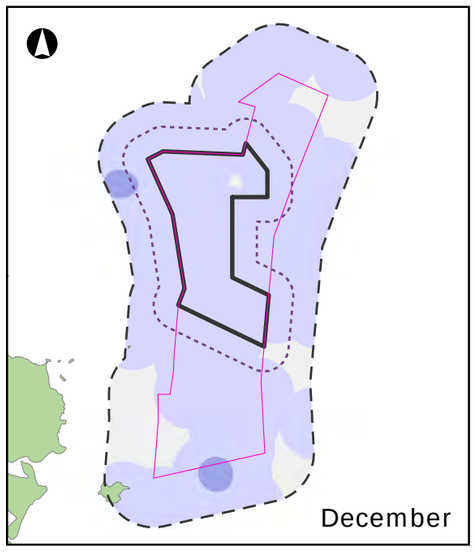












Array Area
2km Buffer from Array Area
MAC Boundary (Array Area Only)
4km Buffer from MAC Boundary (Array Area Only)

Kittiwake Density (per km^2)
0
0 - 10
10 - 20
20 - 50
50 - 75
75 - 100
100 - 256

Kilometres
0 2 4 6 8 10

NISA
North Irish Sea Array

ARUP GoBe

Project
North Irish Sea Array Offshore Wind Farm

Figure Title
Kittiwake Density Heatmap 2020

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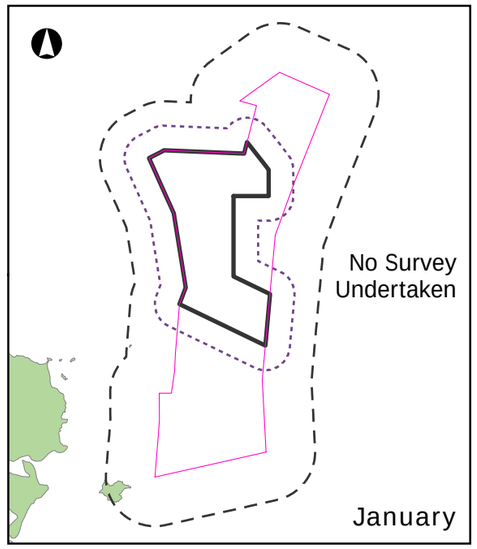
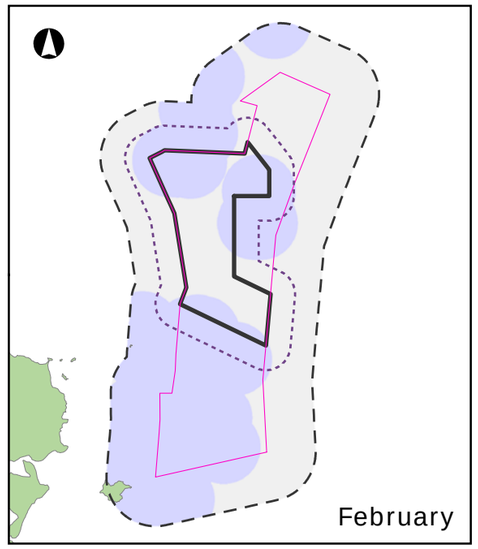
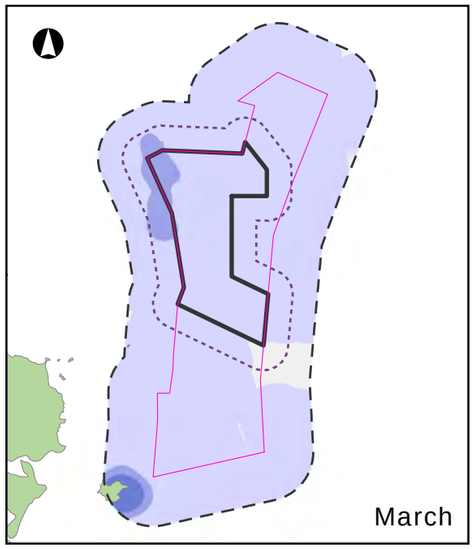
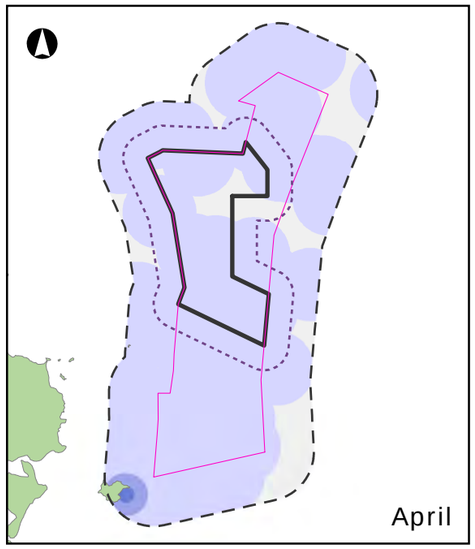
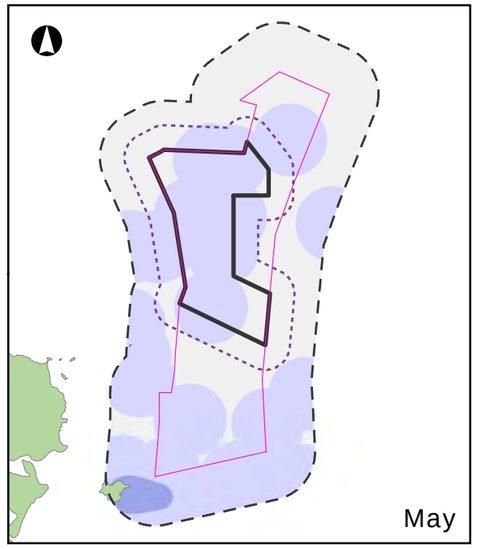
Date: May 2024	Figure No: 2.4
Scale: 1:500,000 @A3	
Status: Issue	

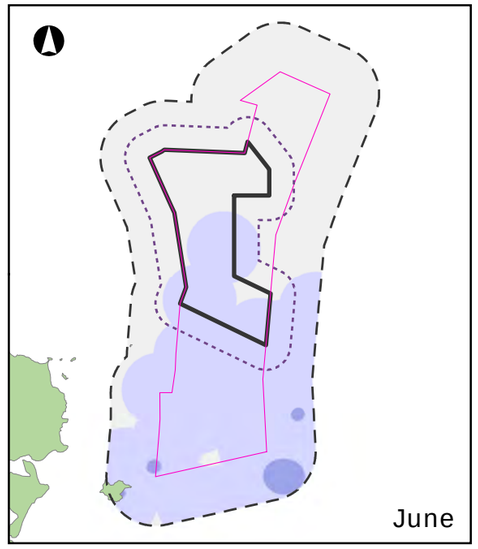


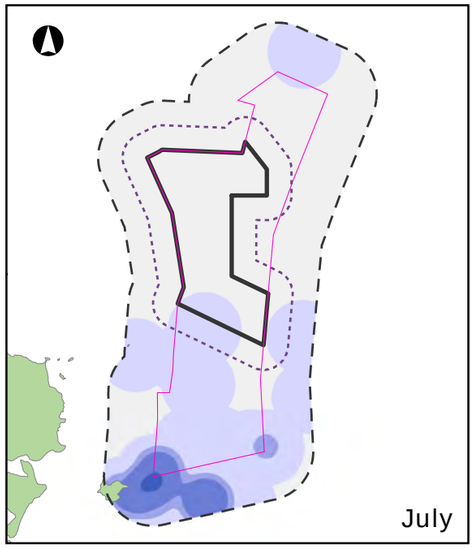


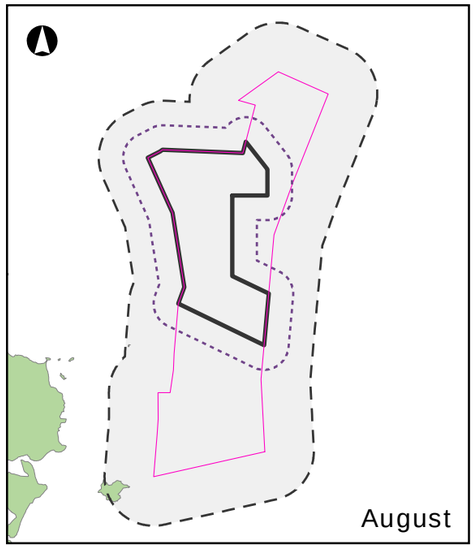


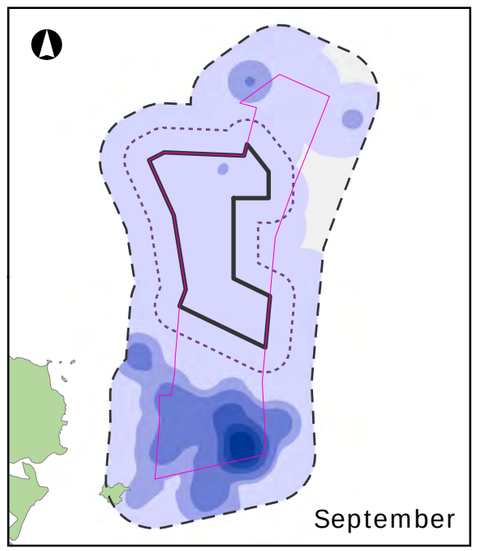


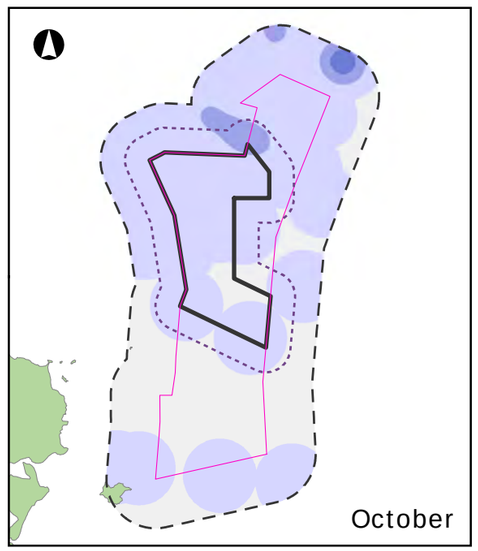


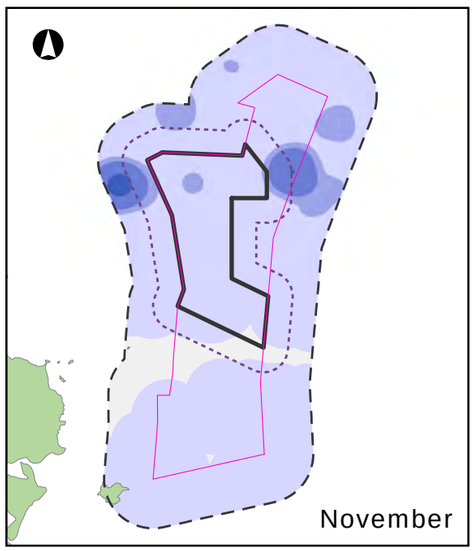


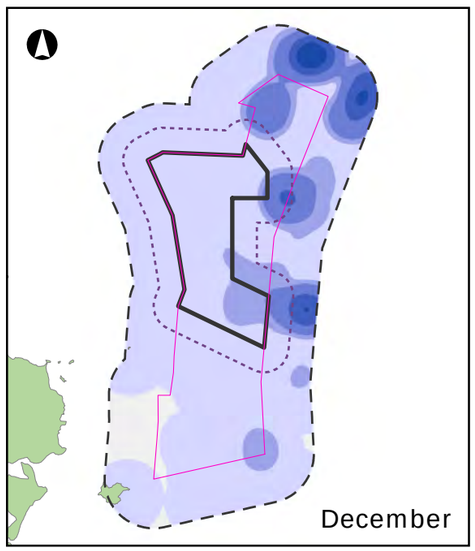












Array Area
2km Buffer from Array Area
MAC Boundary (Array Area Only)
4km Buffer from MAC Boundary (Array Area Only)

Kittiwake Density (per km^2)
0
0 - 10
10 - 20
20 - 50
50 - 75
75 - 100
100 - 256

Kilometres
0 2 4 6 8 10

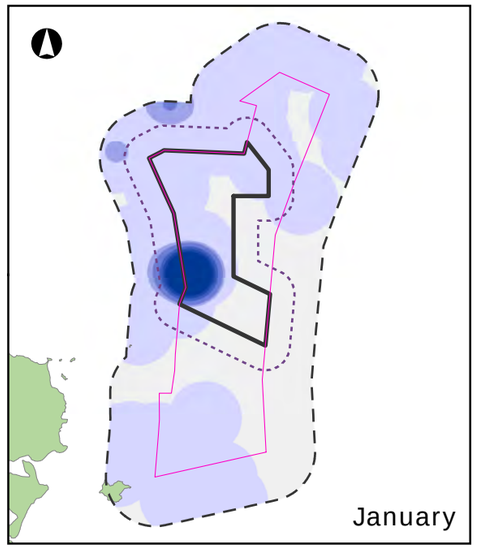
NISA
North Irish Sea Array

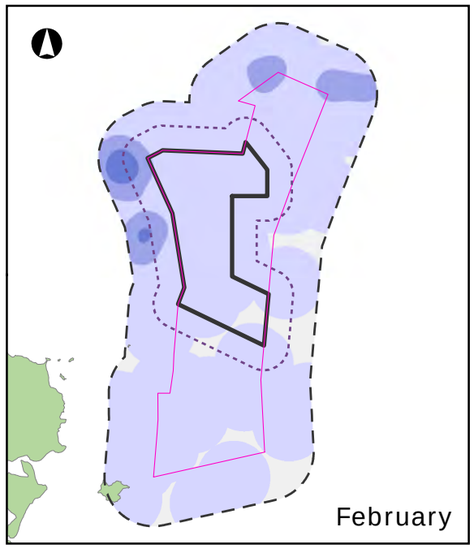
ARUP GoBe

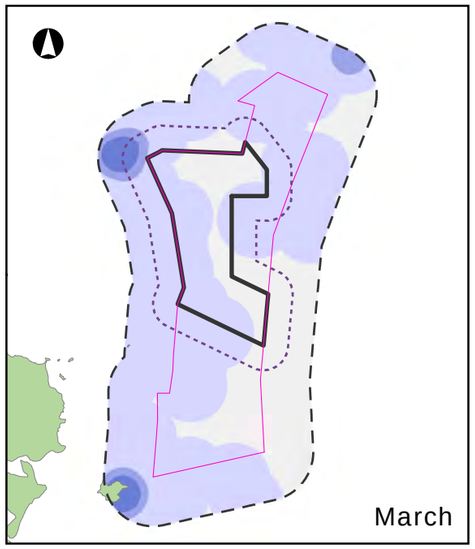
Project
North Irish Sea Array Offshore Wind Farm

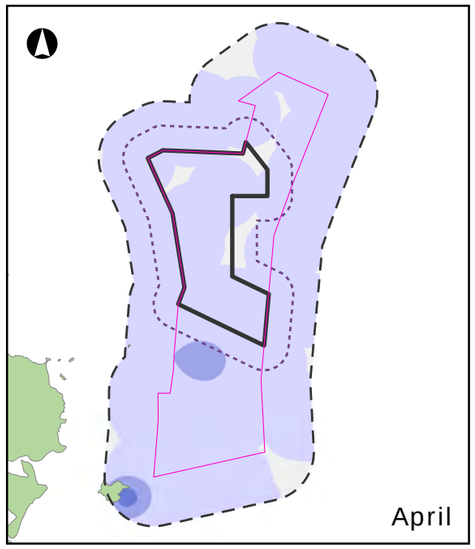
Figure Title
Kittiwake Density Heatmap 2021

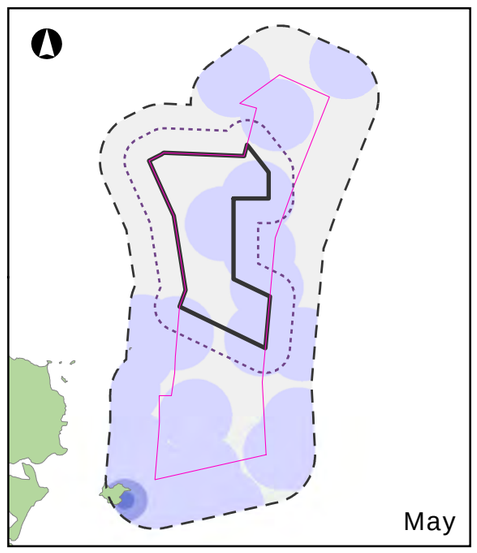
Job No: 281240	Datum: WGS84 Projection: UTM30N
Date: May 2024	Figure No: 2.5
Scale: 1:500,000 @A3	
Status: Issue	

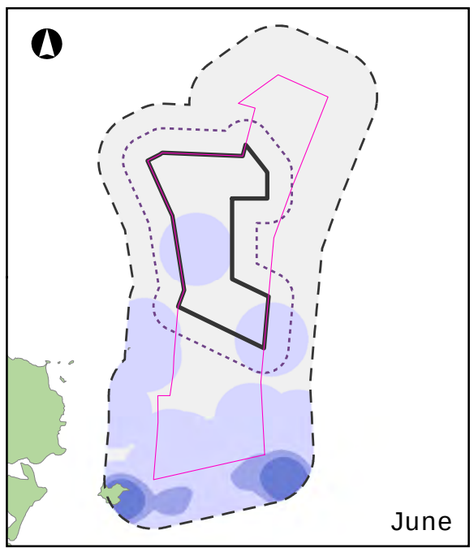


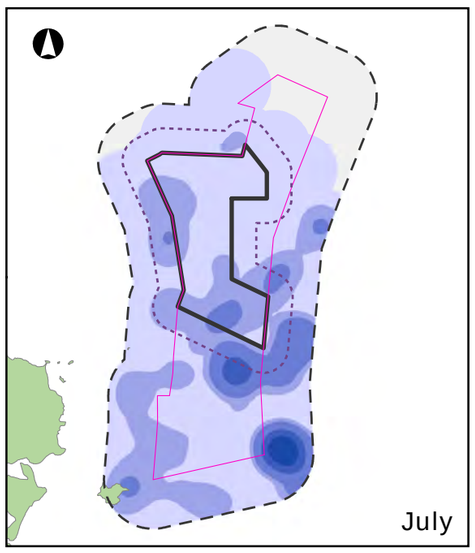


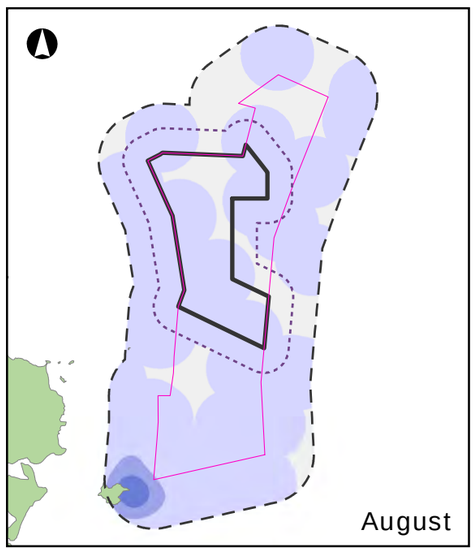


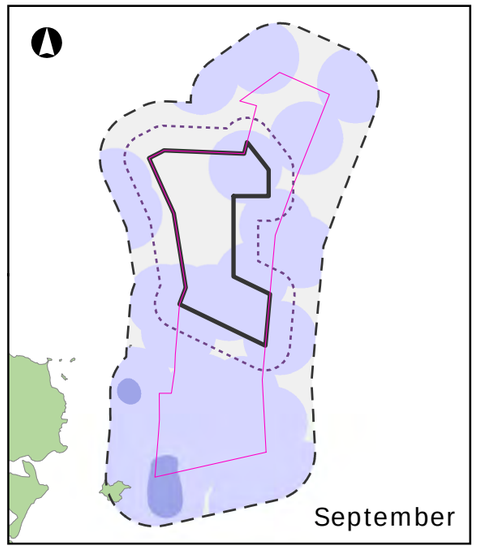


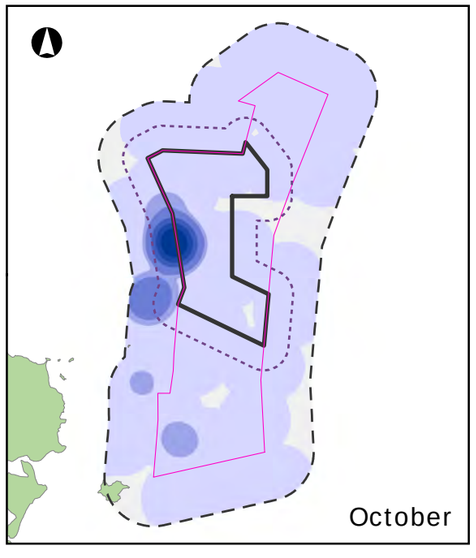


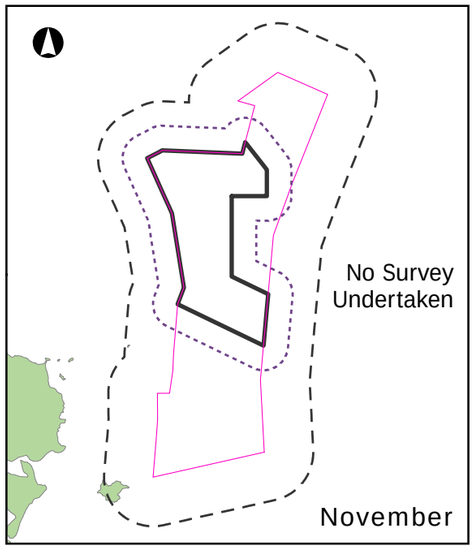


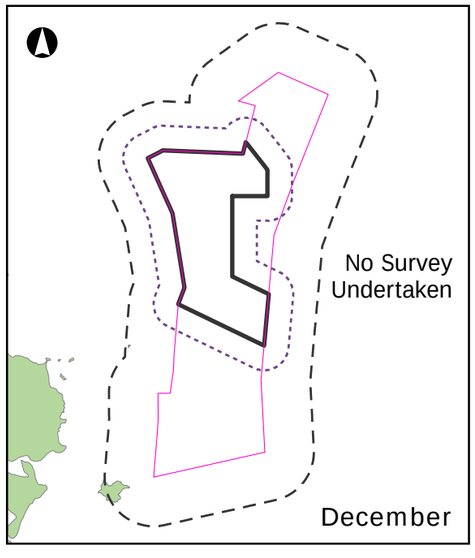












Array Area
2km Buffer from Array Area
MAC Boundary (Array Area Only)
4km Buffer from MAC Boundary (Array Area Only)

Kittiwake Density (per km^2)
0
0 - 10
10 - 20
20 - 50
50 - 75
75 - 100
100 - 256

Kilometres
0 2 4 6 8 10

NISA
North Irish Sea Array

ARUP GoBe

Project
North Irish Sea Array Offshore Wind Farm

Figure Title
Kittiwake Density Heatmap 2022

Job No: 281240	Datum: WGS84 Projection: UTM30N
Date: May 2024	Figure No: 2.6
Scale: 1:500,000 @A3	
Status: Issue	

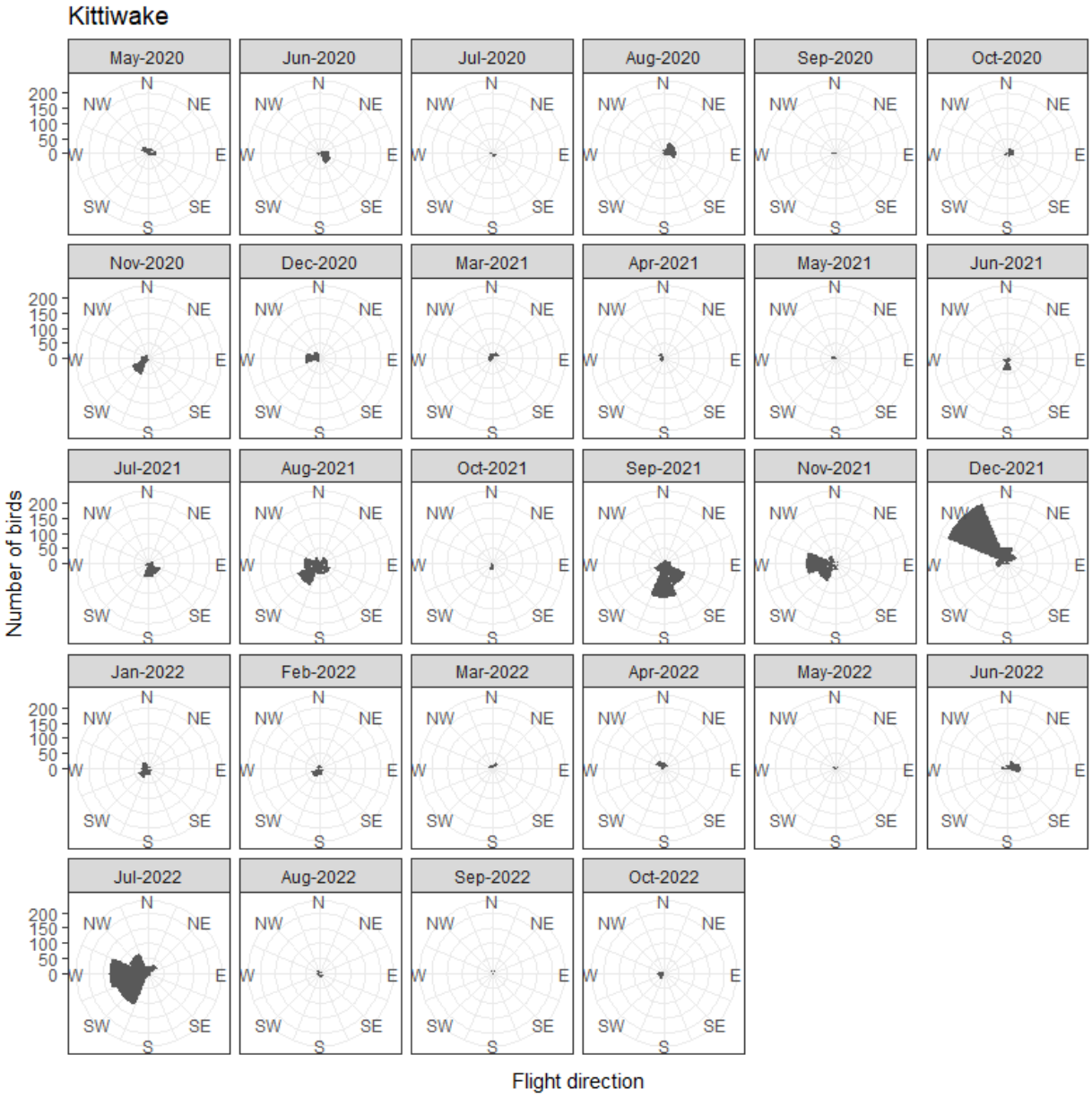
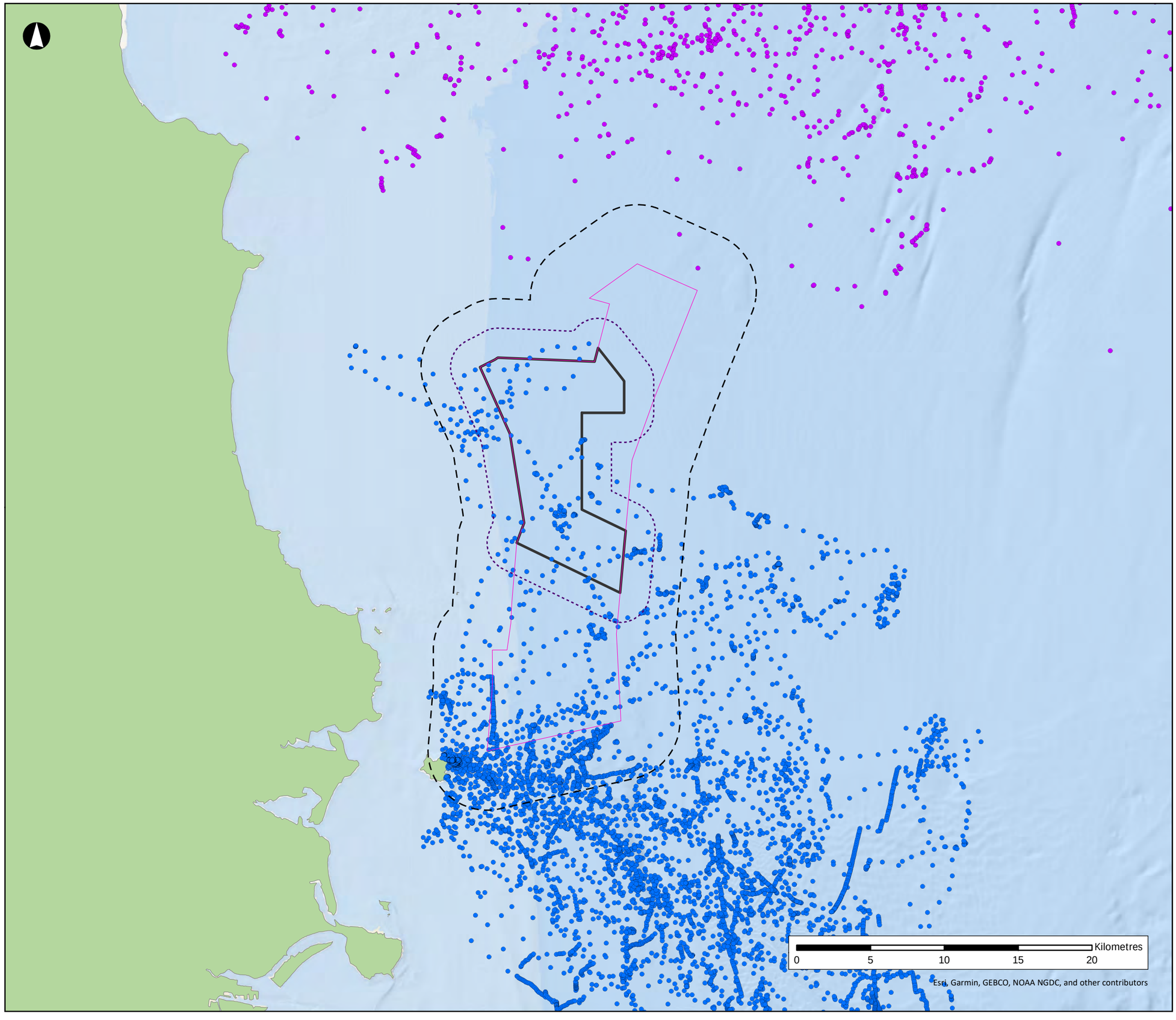


Figure 2.7: Kittiwake monthly flight directions in the ornithology study area.

Available tracking data

2.15.11 Tracking data is available from Lambay Island through the FAME Project (Baer & Newton, 2012), representing the largest cliff nesting colony for this species in Ireland. Over a 20-day period between 2010 and 2011, 14 kittiwakes were tracked from the Lambay breeding site. Birds were recorded up to 40km away from Lambay Island (though the mean foraging distance was 29.5km), with individuals predominantly moving south-east from the colony.

2.15.12 Tracking data is also available from Rockabill, which hosts a smaller colony of kittiwakes (~150-200 pairs) (Ruffino *et al.,* 2023). However, this data was based on a small number of individuals (n=4), with birds ranging widely from the colony. However, from the available data the array area was not frequently entered or used as a foraging hotspot.



Array Area
2km Buffer from Array Area
MAC Boundary (Array Area Only)
4km Buffer from MAC Boundary (Array Area Only)
Kittiwake Tracks from Lambay Island
Kittiwake Tracks from Maggie's Leap

NISA
North Irish Sea Array

ARUP GoBe

Project
North Irish Sea Array Offshore Wind Farm

Figure Title
Tracking Data sourced from BirdWatch Ireland (BWI) - Kittiwake

Job No: 281240	Datum: WGS84 Projection: UTM30N
Date: May 2024	Figure No: 2.8
Scale: 1:250,000 @A3	
Status: Issue	

Black-headed Gull

General overview

2.15.13 Black-headed gulls are found breeding in Ireland regularly, with an estimated breeding population of 7,810 pairs (2016 – 2018). A large proportion of these (>25%) breed inland (as opposed to coastally) (Cummins *et al*. 2019). In Ireland, breeding numbers have shown a general decline of 11% between 1985-88 and 2015/18, largely as a result of predation (Mitchell *et al*. 2004).

Abundance and density

2.15.14 Black-headed gulls were only recorded in the array area in two of 29 months. Raw counts ranged from 1 (July 2020) to 4 (November 2021), with abundance and density peaking at 20 birds and 0.23 birds/km^2 respectively (Table 2.17).

2.15.15 In the array area plus 2km buffer, raw counts ranged from 1 (July 2020 and October 2021) to 6 (February 2021), with abundance and density peaking at 30 birds and 0.15 birds/km^2 respectively (Table 2.18).

Table 2.17: Black-headed gull raw counts, estimated abundance and estimated density in the array area.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	0	0	1	0	0	0	0	0
Calendar year 2 (2021)	-	0	0	0	0	0	0	0	0	0	4	0
Calendar year 3 (2022)	0	0	0	0	0	0	0	0	0	0	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	0	0	5	0	0	0	0	0
Calendar year 2 (2021)	-	0	0	0	0	0	0	0	0	0	20	0
Calendar year 3 (2022)	0	0	0	0	0	0	0	0	0	0	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00
Calendar year 2 (2021)	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00
Calendar year 3 (2022)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-

Table 2.18: Black-headed gull raw counts, estimated abundance and estimated density in the array area plus 2km buffer.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	0	0	1	0	0	0	0	0
Calendar year 2 (2021)	-	6	0	0	0	0	0	0	0	1	4	0
Calendar year 3 (2022)	0	0	0	0	0	0	0	0	0	0	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	0	0	5	0	0	0	0	0
Calendar year 2 (2021)	-	30	0	0	0	0	0	0	0	5	21	0
Calendar year 3 (2022)	0	0	0	0	0	0	0	0	0	0	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
Calendar year 2 (2021)	-	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.11	0.00
Calendar year 3 (2022)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-

Common Gull

General overview

2.15.16 The common gull breeding population in Ireland has been relatively stable over the long-term with an estimated at 1,948 pairs between 2015 and 2018. The largest colonies are found to the north and west of Ireland. Populations have shown a general decline, with a 25% decline between 1069/78 and 2015/18 (Cummins *et al*., 2019).

2.15.17 The common gull breeding season is between March to August (SNH, 2017). During this time, adults stay relatively close to their nests with a mean-maximum foraging range of 50 km (although data to inform this is limited). Common gulls are Amber-listed in Ireland due to declines in their population over the long term (25% decline between 1980 and 2018) (Gilbert et al., 2021). Ireland is home to a large wintering population during the non-breeding season because birds from Europe move into the UK and Ireland (Gilbert et al., 2021).

Abundance and density

2.15.18 Common gulls were recorded in the array area in 10 of 29 months. Raw counts ranged from 1 (Across five months) to 27 (November 2021), with abundance and density peaking at 137 birds and 1.55 birds/km^2 respectively (Table 2.19).

2.15.19 In the array area plus 2km buffer, raw counts ranged from 1 (February and April 2020 and October 2022) to 42 (November 2021), with abundance and density peaking at 225 birds and 1.12 birds/km^2 respectively (Table 2.20).

Table 2.19: Common gull raw counts, estimated abundance and estimated density in the array area.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	0	0	0	0	0	0	0	2
Calendar year 2 (2021)	-	1	5	1	0	0	0	0	0	0	27	1
Calendar year 3 (2022)	8	8	1	0	0	0	0	0	0	1	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	0	0	0	0	0	0	0	10
Calendar year 2 (2021)	-	5	25	5	0	0	0	0	0	0	137	5
Calendar year 3 (2022)	39	38	5	0	0	0	0	0	0	5	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11
Calendar year 2 (2021)	-	0.06	0.28	0.06	0.00	0.00	0.00	0.00	0.00	0.00	1.55	0.06
Calendar year 3 (2022)	0.44	0.43	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.06	-	-

Table 2.20: Common gull raw counts, estimated abundance and estimated density in the array area plus 2km buffer.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	0	0	0	0	0	2	0	8
Calendar year 2 (2021)	-	1	14	1	0	0	0	0	0	0	42	5
Calendar year 3 (2022)	16	17	2	0	0	0	0	0	0	1	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	0	0	0	0	0	9	0	40
Calendar year 2 (2021)	-	5	71	5	0	0	0	0	0	0	225	26
Calendar year 3 (2022)	80	87	10	0	0	0	0	0	0	5	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.20
Calendar year 2 (2021)	-	0.02	0.35	0.02	0.00	0.00	0.00	0.00	0.00	0.00	1.12	0.13
Calendar year 3 (2022)	0.40	0.43	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.02	-	-

2.15.20 ESAS surveys, which took place in Irish waters between 1980 and 1997, recorded the highest densities of common gull off the Dublin coast between October and March. Low densities were recorded between April and May and no common gulls were recorded off the east Irish coast during the summer months (June to September).

2.15.21 The ObSERVE aerial surveys, which took place in 2016, recorded 2,726 herring and common gull off the east Irish coast (grouped because they could not be differentiated). In agreement with the ESAS surveys, the birds were observed more frequently in the autumn (35,015 birds) and winter (16,110 birds) months with lower densities during the summer (6,196 birds) (Jessopp et al., 2018). The coastal waters north of Dublin Bay were highlighted as being particularly important for common or herring gulls in all seasons. Abundance of common or herring gulls across the survey area was estimated at 6,196 (95% CIs 5,303 – 9,019) individuals in summer, 35,015 (95% CIs 14,829 – 82,680) birds in autumn, and 16,110 (95% CIs 11,489 – 22,590) birds in winter (Jessopp et al., 2018).

Spatial density distribution and flight direction

2.15.22 Common gulls were recorded throughout the survey area. Across both bio-seasons, densities were highest in the west of the survey area. Notably in the breeding season, the peak densities were recorded outside of the array area to the northwest of the array area.

2.15.23 The number of common gulls recorded flying was minimal in most months except November 2021 where the majority were recorded flying in a westerly direction, with smaller numbers flying in a south-westerly direction (Figure 2.9). Other months with low numbers of flying birds included November and December 2020, December 2021, January, February and March 2022 and all had a westerly element dominating the direction of flight (Figure 2.9).

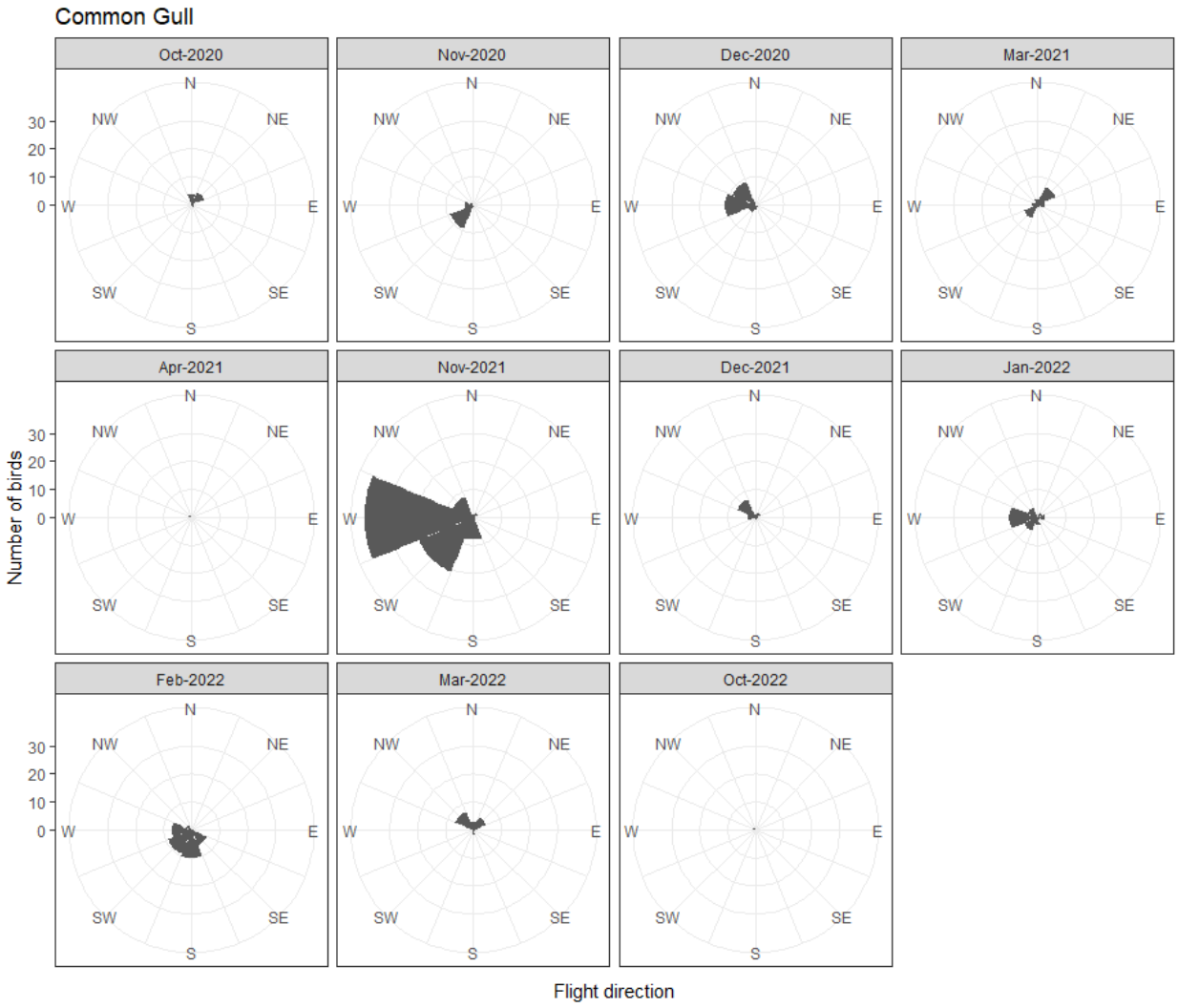


Figure 2.9: Common Gull monthly flight directions in the ornithology study area.

Great Black-backed Gull

General overview

2.15.24 The great black-backed gull breeding population in Ireland has been relatively stable over the long-term with an estimated at 3,081 pairs between 2015 and 2018. The largest colonies are situated on the west-coast.

2.15.25 The great black-backed gull breeding season is between March to August (Furness, 2015) (Table 2.6). During this time, adults stay relatively close to their nests with a mean-maximum foraging range of 73 km. The colonies in proximity to NISA are Lambay Island (99 pairs) and Ireland's Eye (127 pairs) (Cummins *et al.*, 2019). Great black-backed gulls do not migrate large distances and tend to remain close to their breeding colonies throughout the non-breeding season (Wernham *et al.*, 2002). The species is Green-listed in Ireland, in terms of its conservation status (Gilbert et al., 2021).

2.15.26 Great black-backed gulls were recorded in the array area in 20 of 29 months. Raw counts ranged from 1 (Across five months) to 45 (December 2020), with abundance and density peaking at 660 birds and 3.28 birds/km^2 respectively (Table 2.21).

2.15.27 In the array area plus 2km buffer, raw counts ranged from 1 (July 2020 and October 2021) to 6 (February 2021), with abundance and density peaking at 30 birds and 0.15 birds/km^2 respectively (Table 2.22).

Table 2.21: Great black-backed gull raw counts, estimated abundance, and estimated density in the array area.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	0	1	27	1	2	6	3	45
Calendar year 2 (2021)	-	8	8	0	0	0	0	6	3	1	19	9
Calendar year 3 (2022)	11	16	10	0	0	1	0	0	2	1	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	0	5	129	5	10	28	14	228
Calendar year 2 (2021)	-	41	38	0	0	0	0	56	14	5	113	46
Calendar year 3 (2022)	55	76	49	0	0	5	0	0	10	5	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.00	0.06	1.46	0.06	0.11	0.32	0.16	2.57
Calendar year 2 (2021)	-	0.46	0.43	0.00	0.00	0.00	0.00	0.63	0.16	0.06	1.27	0.52
Calendar year 3 (2022)	0.62	0.86	0.55	0.00	0.00	0.06	0.00	0.00	0.11	0.06	-	-

Table 2.22: Great black-backed gull raw counts, estimated abundance and estimated density in the array area plus 2km buffer.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	0	3	51	3	3	13	4	132
Calendar year 2 (2021)	-	15	14	3	0	4	1	9	24	3	32	46
Calendar year 3 (2022)	17	40	15	0	1	2	9	5	5	4	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	0	15	263	15	15	66	18	660
Calendar year 2 (2021)	-	78	70	15	0	20	5	72	132	15	229	268
Calendar year 3 (2022)	86	204	74	0	5	10	45	25	61	20	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.00	0.07	1.31	0.07	0.07	0.33	0.09	3.28
Calendar year 2 (2021)	-	0.39	0.35	0.07	0.00	0.10	0.02	0.36	0.65	0.07	1.14	1.33
Calendar year 3 (2022)	0.43	1.02	0.37	0.00	0.02	0.05	0.22	0.13	0.30	0.10	-	-

2.15.28 ESAS surveys which took place in Irish waters between 1980 and 1997 recorded low densities of great black-backed gulls off the east coast of Ireland between October and January, and no birds off the Irish east coast between February and June, although survey coverage was incomplete. Between July and September, great black-backed gulls were recorded off the east coast in low to moderate densities (Pollock et al., 1997).

Bio-season peak estimates

2.15.29 Great black-backed gulls were present across both bio-seasons. Presence was greatest in the non-breeding bio-season (September to March), with a mean peak abundance of 139 birds, and a mean peak density of 1,57 birds/km^2 in the array area (Table 2.23).

Table 2.23: Great black-backed gull bio-season mean peak abundance and density estimates in the array area and array area plus 2km buffer.

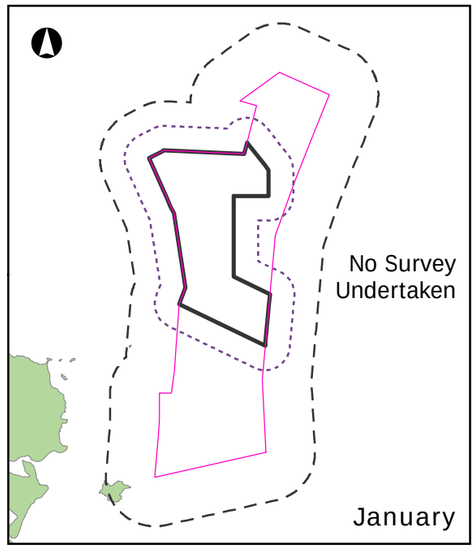
BDMPS Bio-seasons	Months	Array area		Array area plus 2km buffer	
		Bio-season peak abundance (n)	Bio-season peak density (n/km^2)	Bio-season peak abundance (n)	Bio-season peak density (n/km^2)
Breeding	Apr-Aug	63	0.72	127	0.63
Non-breeding	Sep-Mar	139	1.57	377	1.88

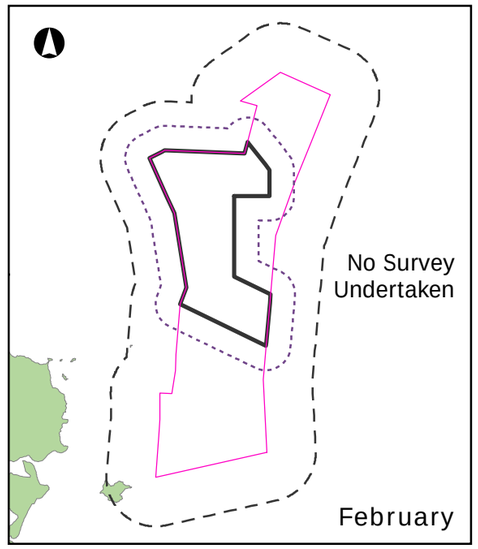
Spatial density distribution and flight direction

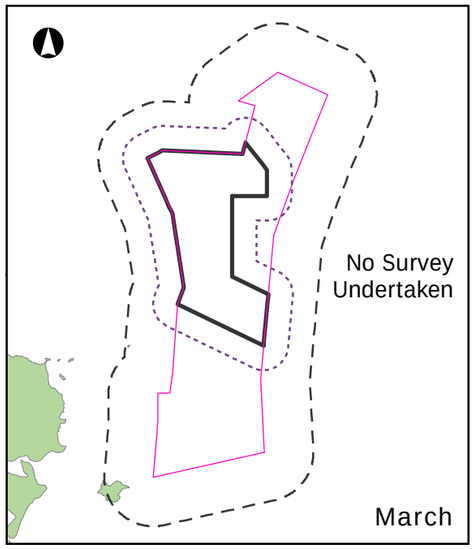
2.15.30 Density maps based on DAS data are presented in Figure 2.10 to Figure 2.11 below. Great black-backed gulls were recorded throughout the survey area, with highest densities in the south of the survey area in the breeding bio-season, and in the west in the non-breeding bio-season.

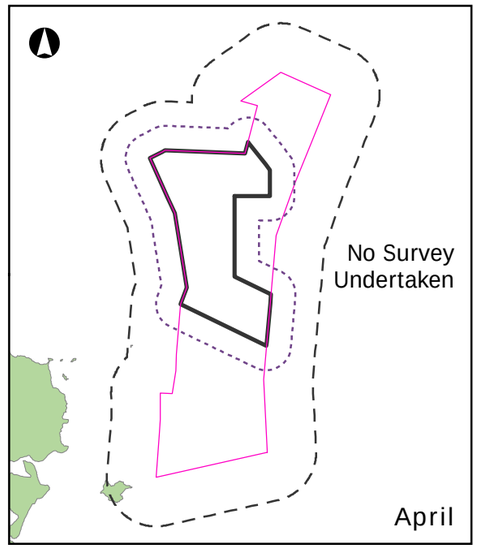
2.15.31 This trend was also evident in data from Jessop *et al*. (2018), with more birds around the south/south-west of the proposed development, though notably great and lesser black-backed gulls were not differentiated in this dataset.

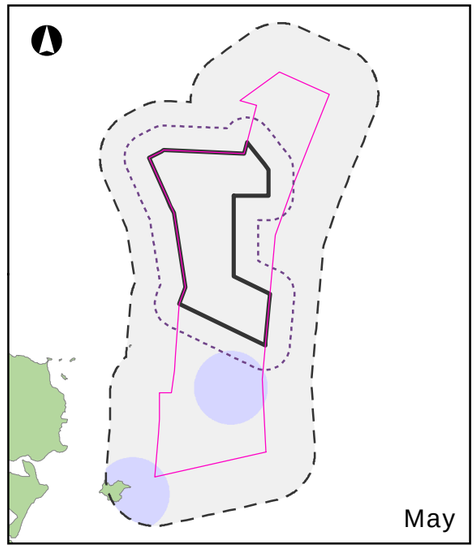
2.15.32 The flight direction was recorded during the DAS surveys with an obvious peak of flying birds recorded in December 2020, with the majority of birds flying in a westerly direction (Figure 2.13). June and July 2020 had small numbers of flying birds recorded and the flight direction for both months varied from southwest and westerly directions to east or southeast and in 2022 the predominant directions were easterly or north easterly in February, March and June (Figure 2.13).

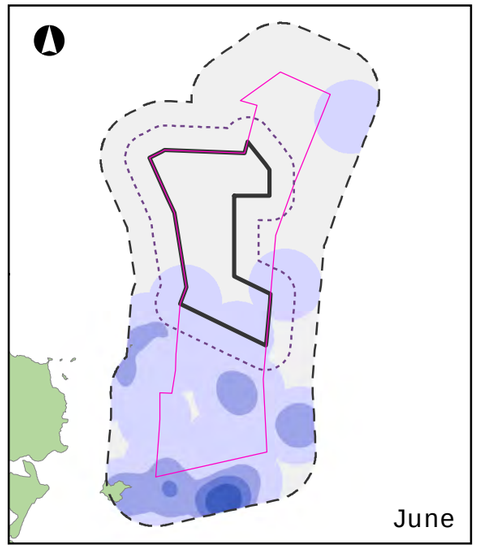


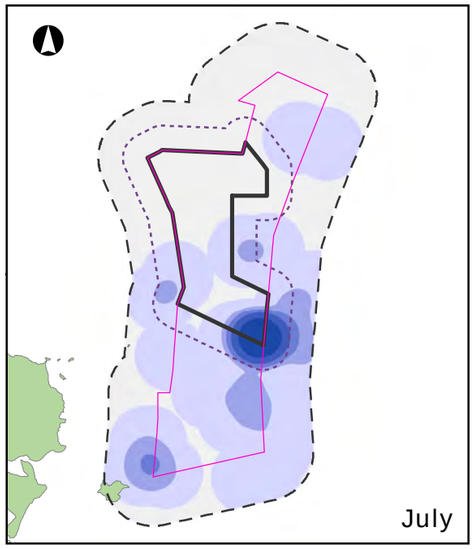


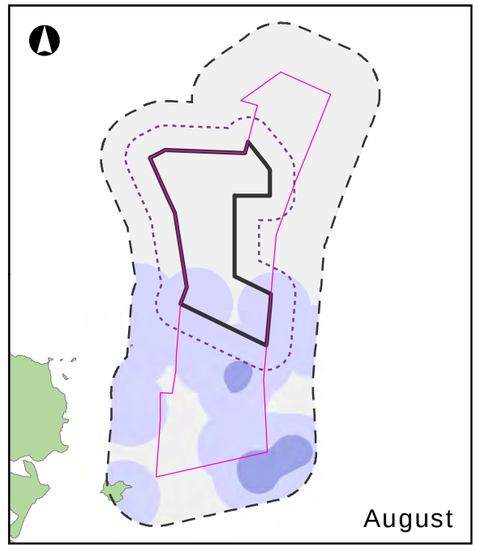


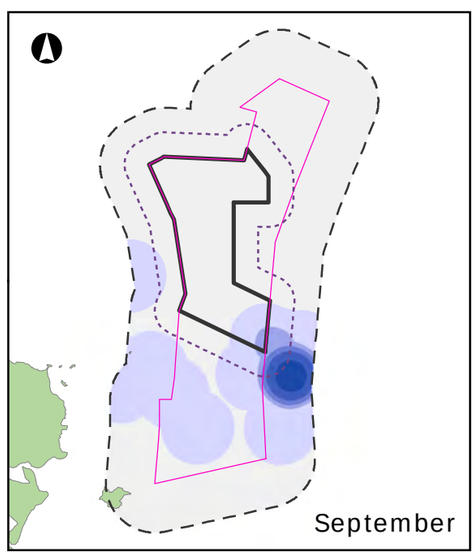


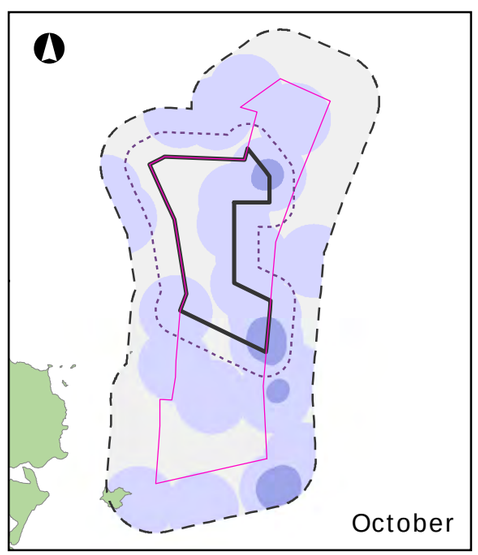


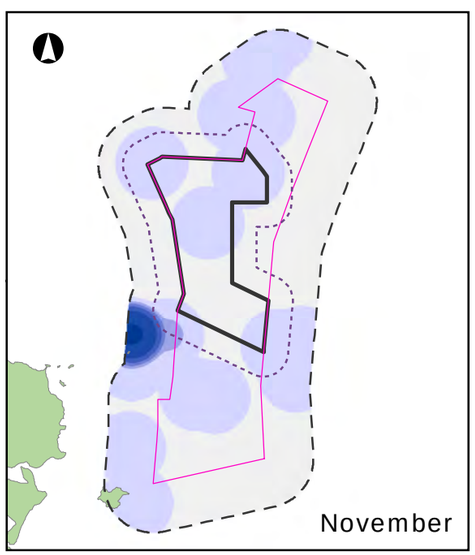


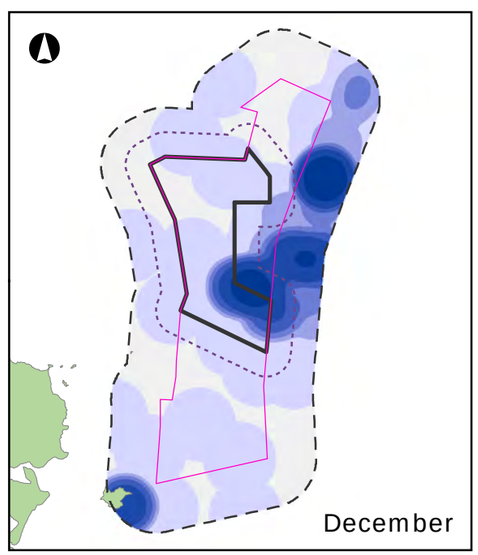












Array Area
2km Buffer from Array Area
MAC Boundary (Array Area Only)
4km Buffer from MAC Boundary (Array Area Only)

Great Black-backed Gull Density (per km^2)

- 0
- 0 - 2
- 2 - 5
- 5 - 10
- 10 - 20
- 20 - 50
- 50 - 118

Kilometres
0 2 4 6 8 10

NISA
North Irish Sea Array

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Figure Title
Great Black-backed Gull Density Heatmap 2020

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Date: May 2024	Figure No: 2.10
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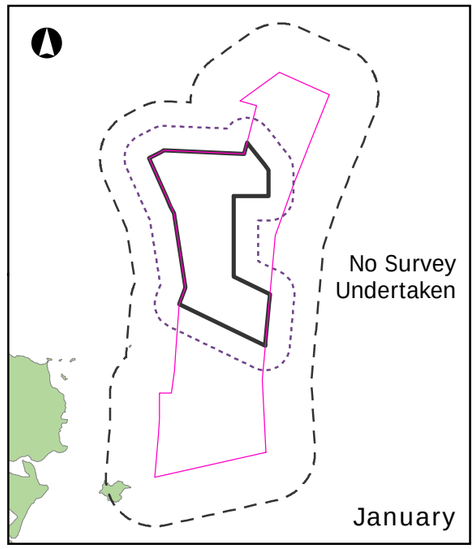

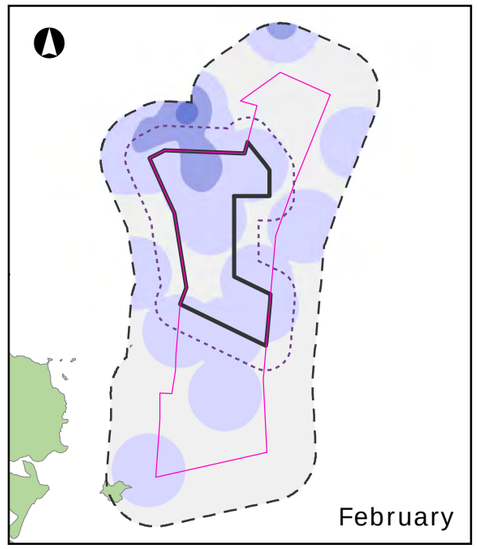

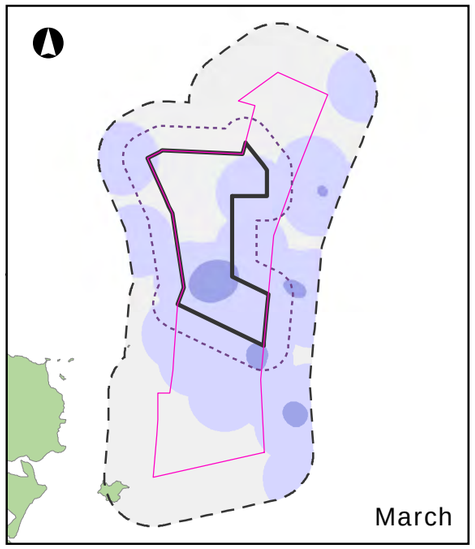

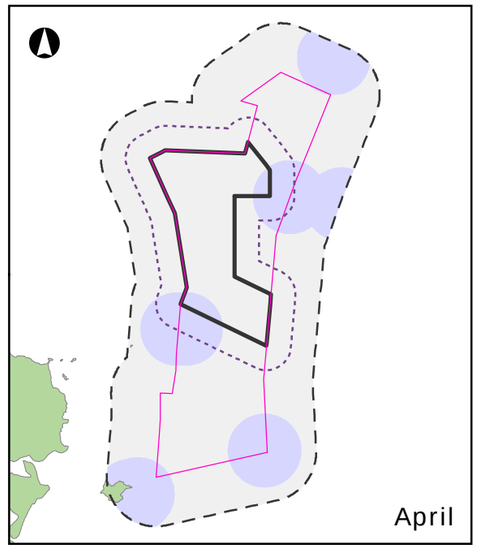

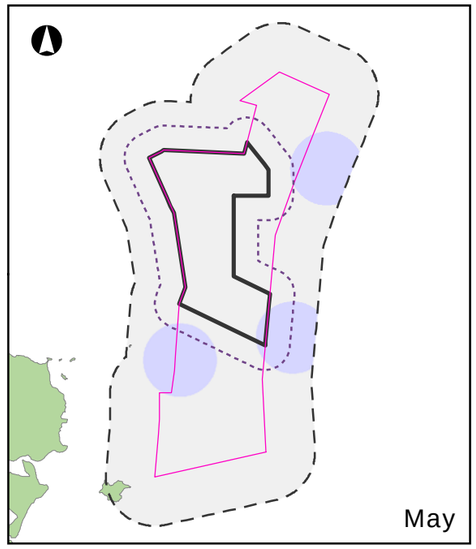

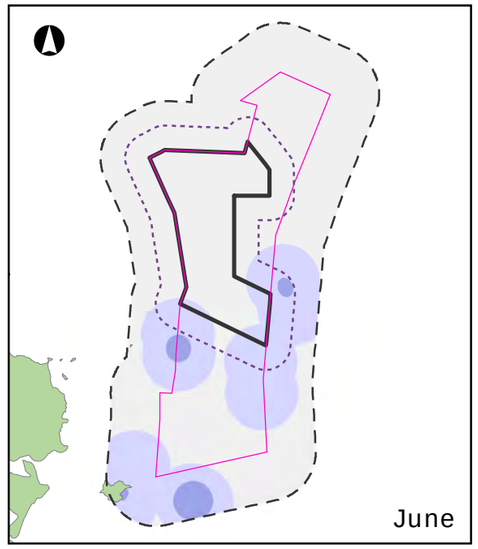

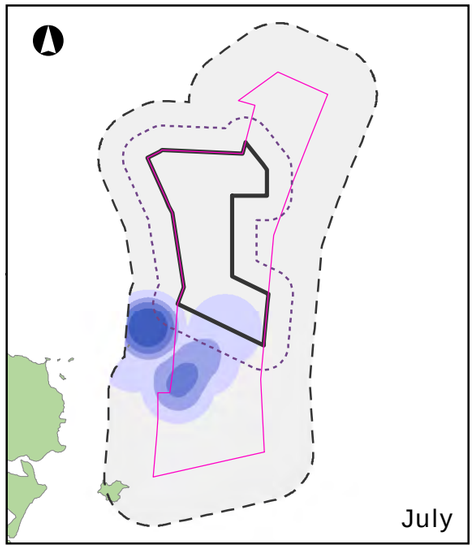

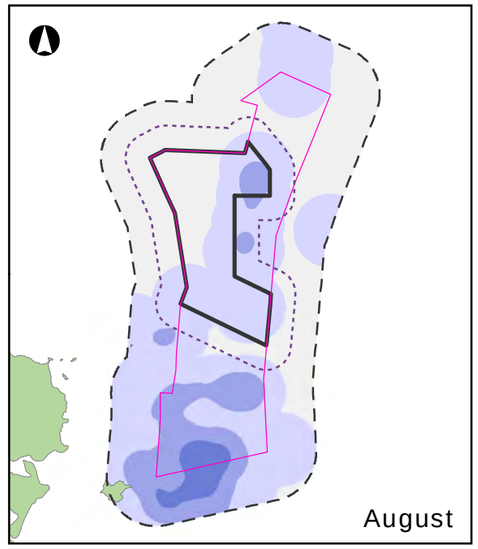

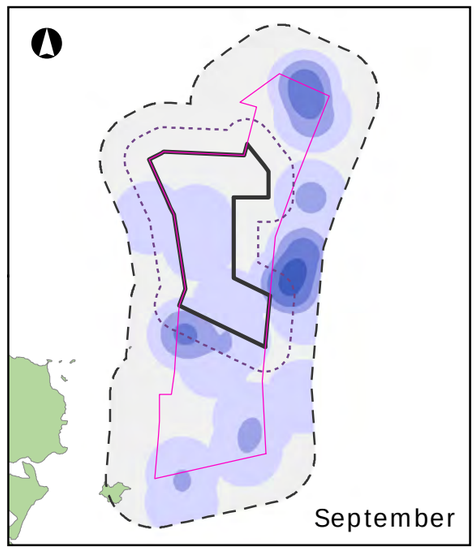

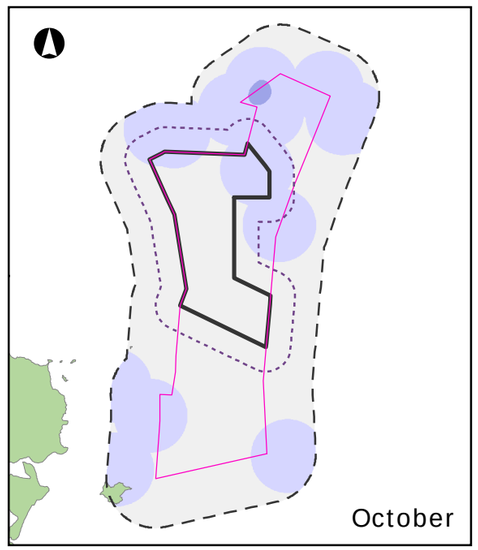

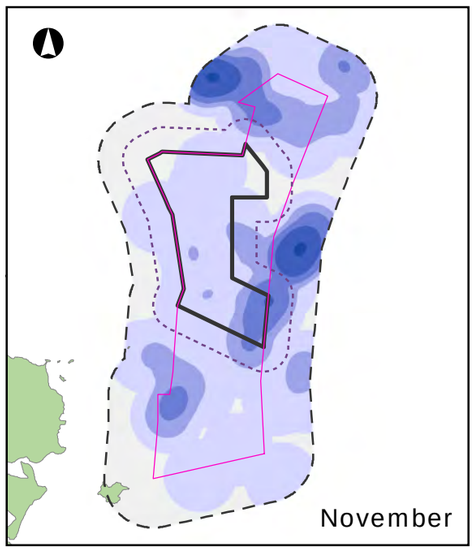

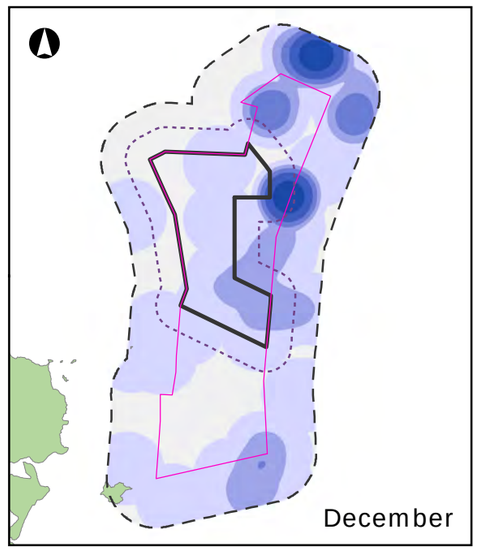

Array Area
2km Buffer from Array Area
MAC Boundary (Array Area Only)
4km Buffer from MAC Boundary (Array Area Only)

Great Black-backed Gull Density (per km^2)

- 0
- 0 - 2
- 2 - 5
- 5 - 10
- 10 - 20
- 20 - 50
- 50 - 118

Kilometres
0 2 4 6 8 10

NISA
North Irish Sea Array

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Figure Title
Great Black-backed Gull Density Heatmap 2021

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Date: May 2024	Figure No: 2.11
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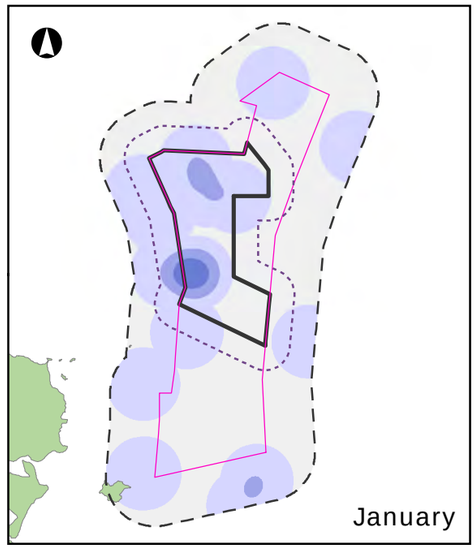

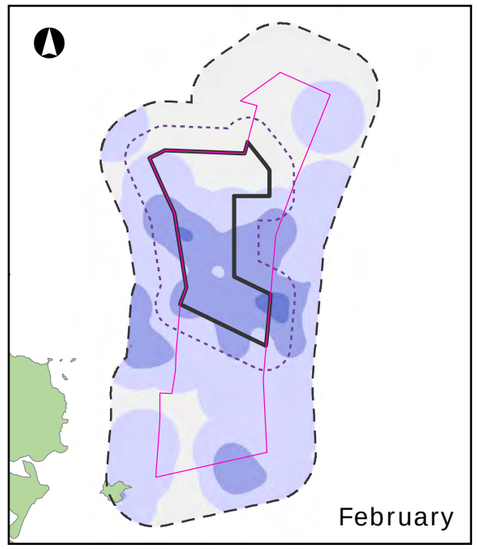

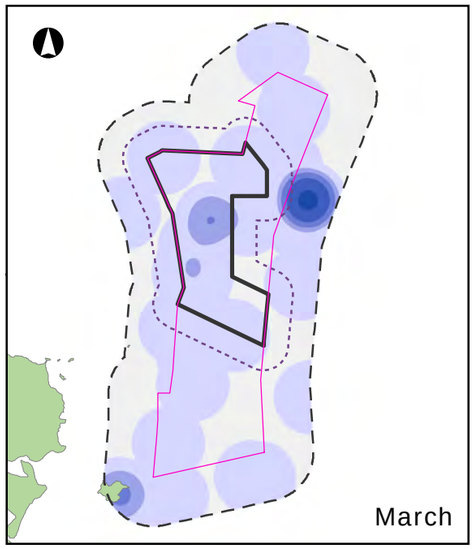

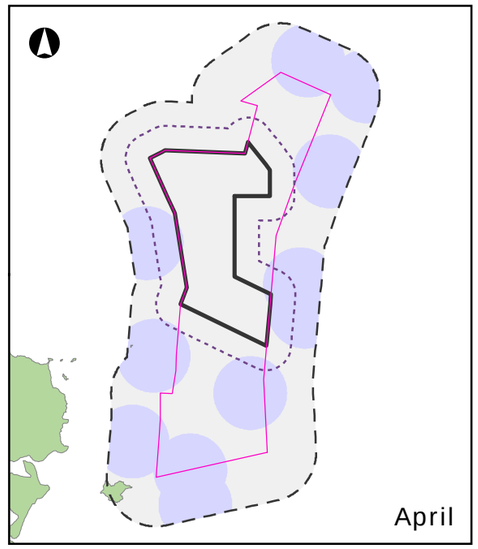

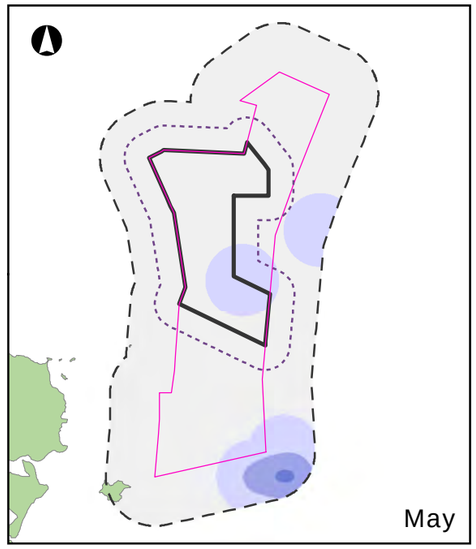

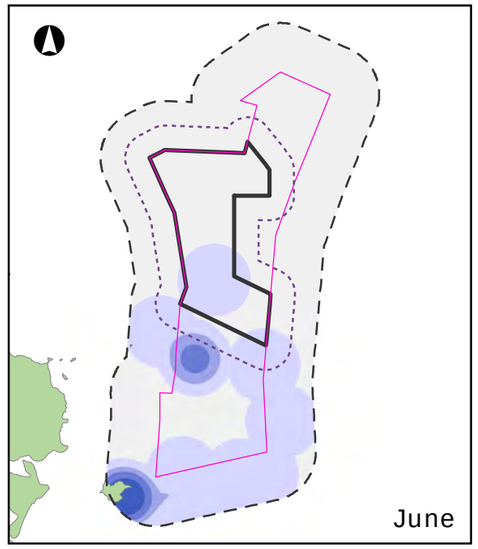

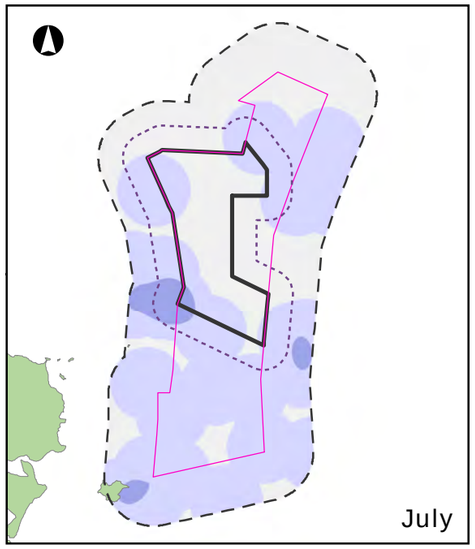

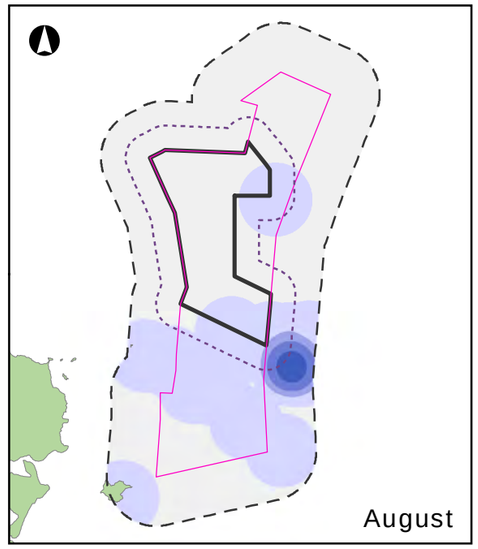

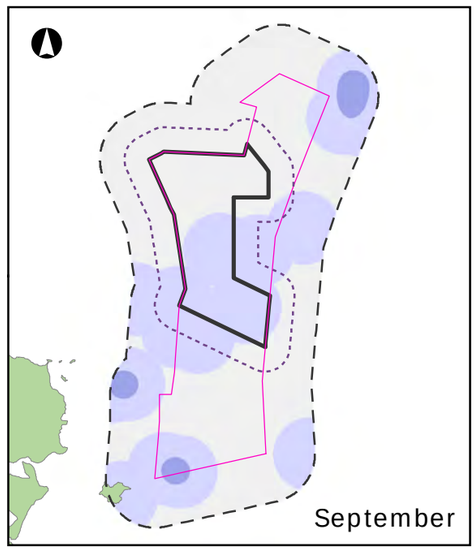

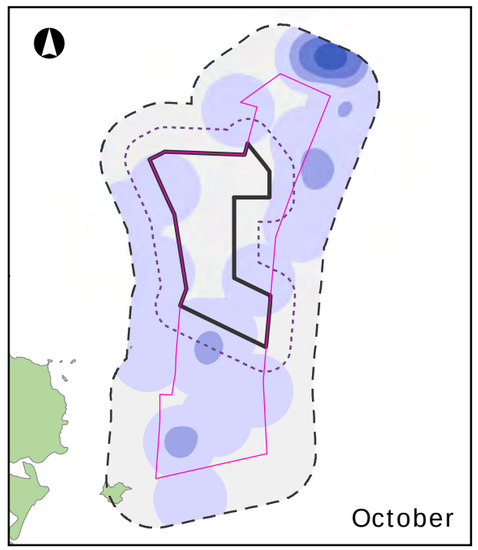

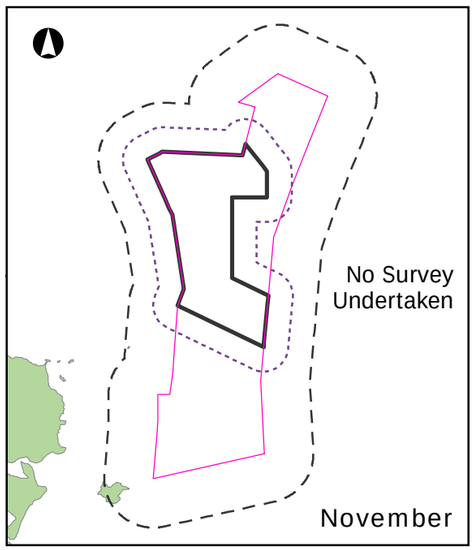

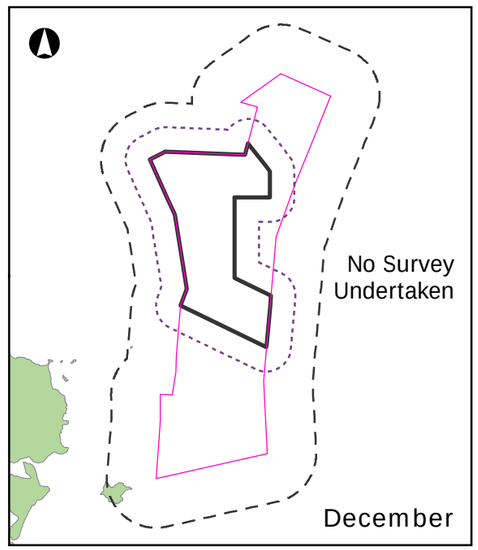

Array Area
2km Buffer from Array Area
MAC Boundary (Array Area Only)
4km Buffer from MAC Boundary (Array Area Only)

Great Black-backed Gull Density (per km^2)

- 0
- 0 - 2
- 2 - 5
- 5 - 10
- 10 - 20
- 20 - 50
- 50 - 118

Kilometres
0 2 4 6 8 10

NISA
North Irish Sea Array

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North Irish Sea Array Offshore Wind Farm

Figure Title
Great Black-backed Gull Density Heatmap 2022

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Date: May 2024	Figure No: 2.12
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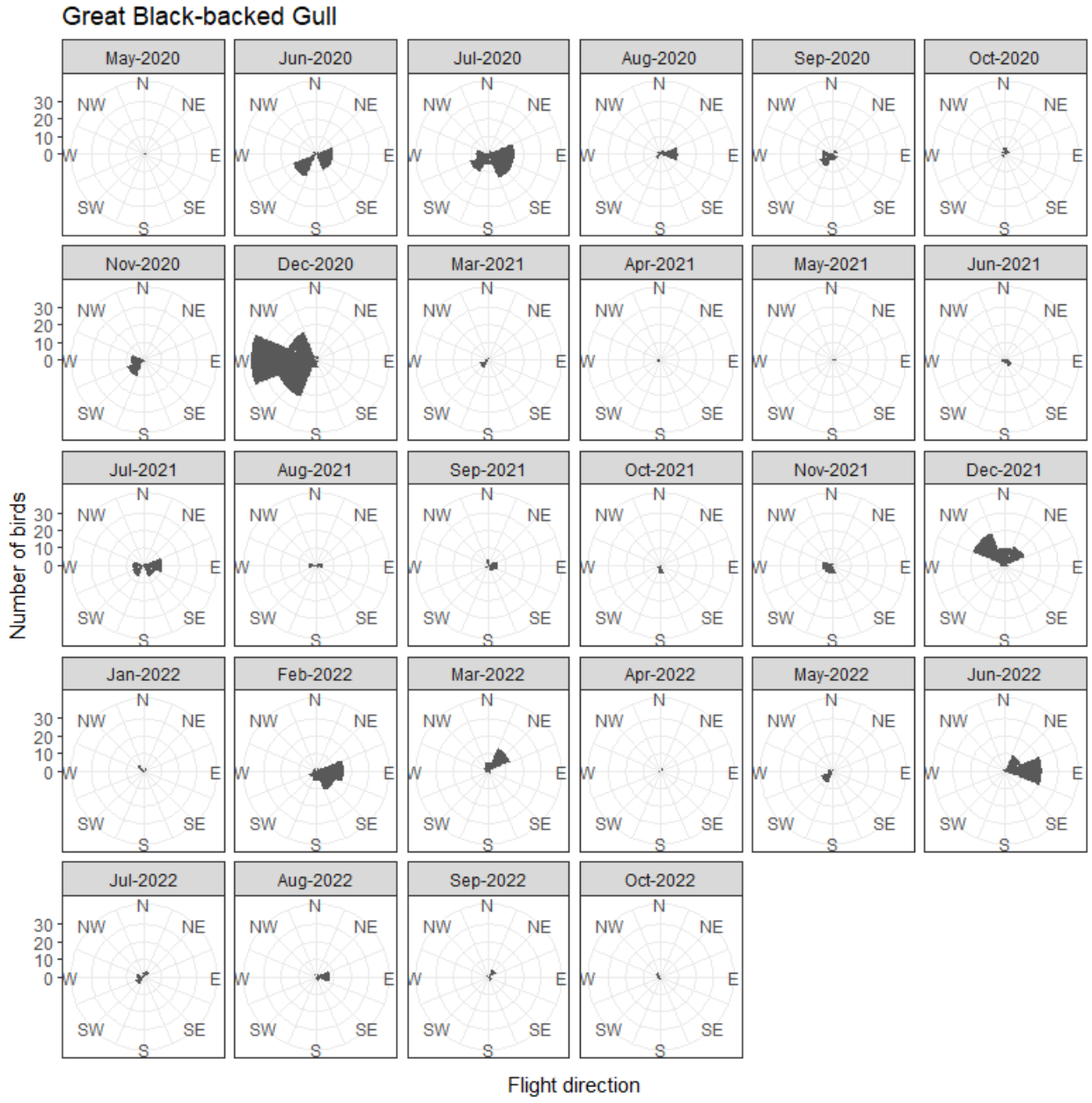


Figure 2.13: Great black-backed gull monthly flight directions in the ornithology study area.

Herring Gull

General overview

2.15.33 Ireland has an estimated breeding population of 10,333 herring gull pairs at coastal colonies (2015 - 2018). However, the population is widespread and if urban gulls were included it would increase this estimate considerably. The long-term population trend varies depending on the colony but has shown a slight decline in the breeding population of 29% in recent years (2000 - 2018) (Cummins *et al.*, 2019). This has led to herring gull becoming amber listed in Ireland (Gilbert *et al.*, 2021).

2.15.34 Herring gull breed between March to August (Furness, 2015). Their mean-maximum foraging range during this time is 58.8 ± 26.8km (Woodward et al., 2019). The following table presents the counts at colonies within the mean-maximum foraging range from the proposed development (Table 2.24). During the non-breeding season, the majority of Irish breeding birds remain in Irish waters (Wernham *et al.*, 2002). There may be some dispersal during this time and additional gulls arriving from Europe.

Abundance and density

2.15.35 Herring gulls were recorded in the array area in 24 of 29 months. Raw counts ranged from 1 (Across seven months) to 90 (January 2022), with abundance and density peaking at 498 birds and 5.63 birds/km^2 respectively (Table 2.25).

2.15.36 In the array area plus 2km buffer, raw counts ranged from 1 (Across four months) to 224 (December 2021), with abundance and density peaking at 1,284 birds and 6.38 birds/km^2 respectively (Table 2.26).

Bio-season peak estimates

2.15.37 Herring gulls were present across both bio-seasons. Presence was greatest in the non-breeding bio-season (September to February), with a mean peak abundance of 452 birds, and a mean peak density of 5.11 birds/km^2 in the array area (Table 2.24).

Table 2.24: Herring gull bio-season mean peak abundance and density estimates in the array area and array area plus 2km buffer.

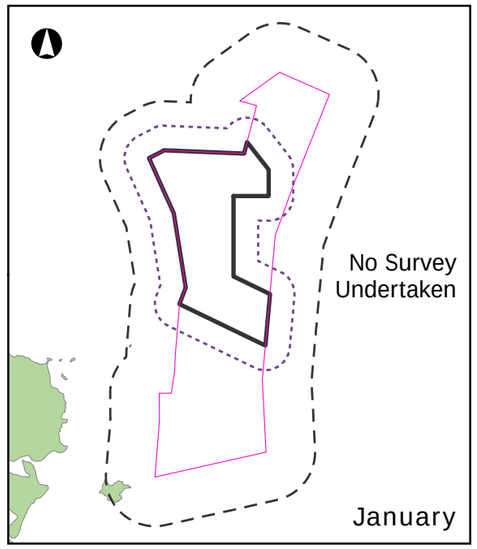
BDMPS Bio-seasons	Months	Array area		Array area plus 2km buffer	
		Bio-season peak abundance (n)	Bio-season peak density (n/km^2)	Bio-season peak abundance (n)	Bio-season peak density (n/km^2)
Breeding	Mar - Aug	151	1.71	339	1.68
Non-breeding	Sep - Feb	452	5.11	999	4.97

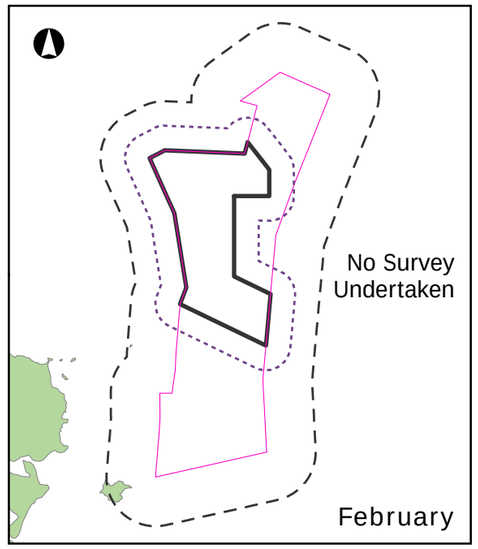
Spatial density distribution and flight direction

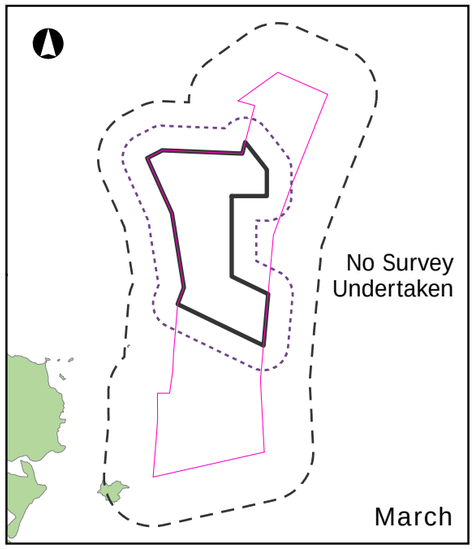
2.15.38 Density maps based on DAS data are presented in Figure 2.14 to Figure 2.15 below. Herring gulls were found throughout the survey area. In the breeding bio-season, highest densities were found in the south-east of the survey area, whereas in the non-breeding bio-season density hotspots were evident in both the north-east and south-east.

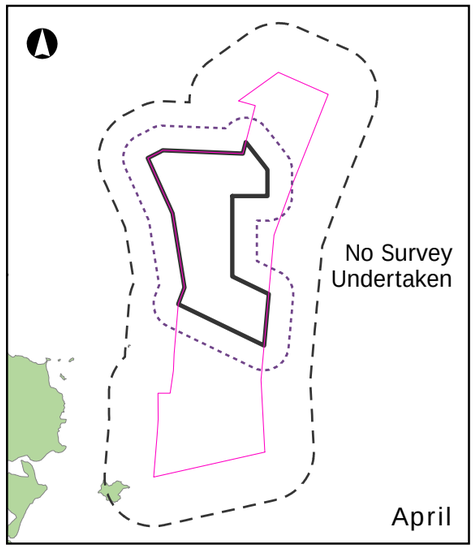
2.15.39 Data from Jessop *et al*. (2018) showed no clear trend in density distribution, though densities appeared slightly higher in close proximity to the coast (i.e. away from the proposed development). Notably herring gulls and common gulls were not differentiated in this dataset.

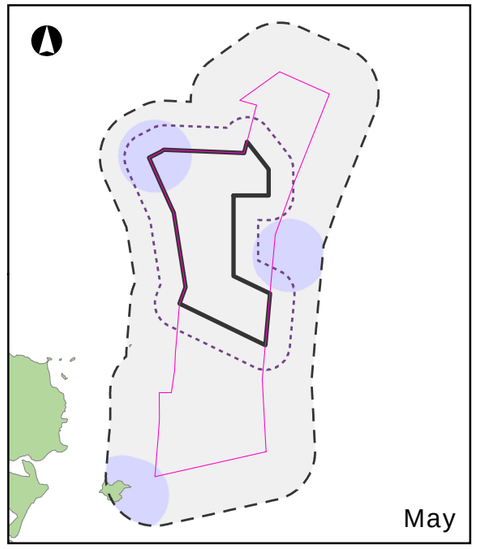
2.15.40 Flight direction was recorded during the DAS surveys, with three months representing most flying birds recorded. In July 2020 the predominant flight direction was south-westerly, in December 2020 it was westerly and in December 2021 it was north-westerly (Figure 2.17). Most other months had low numbers of flying birds recorded with varying directions of flight (Figure 2.17).

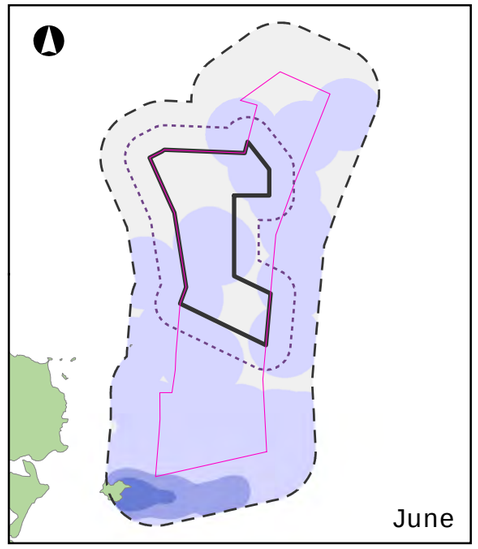


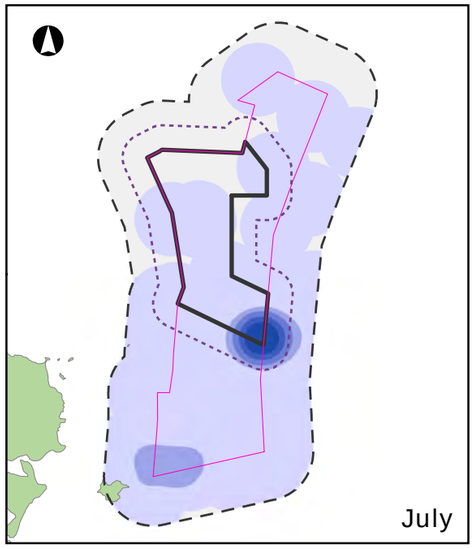


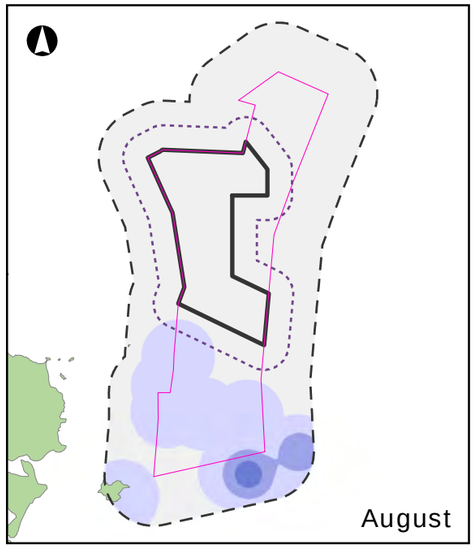


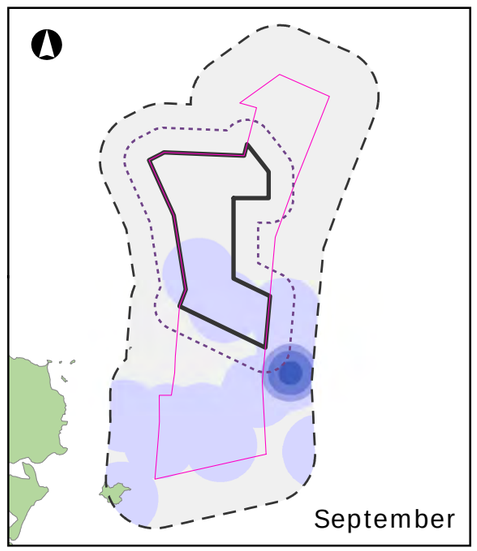


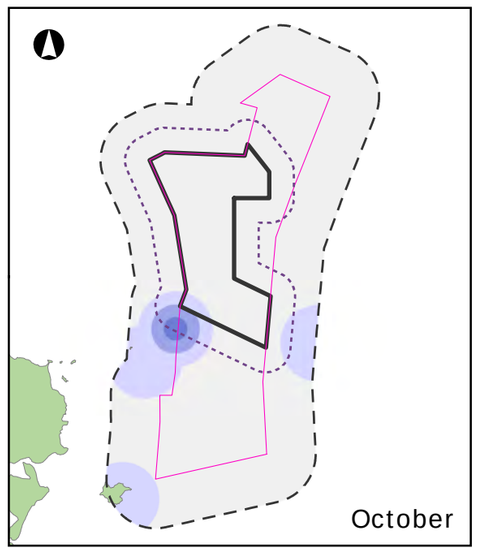


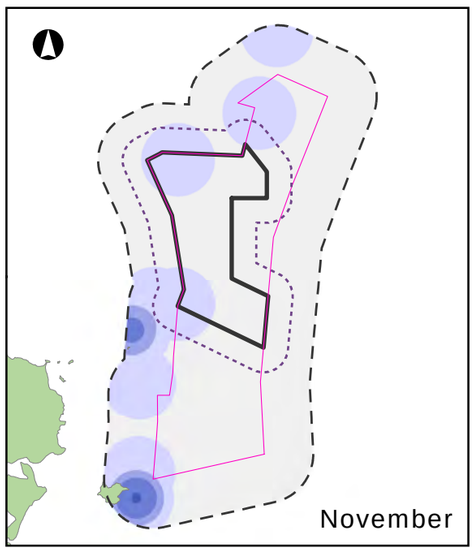


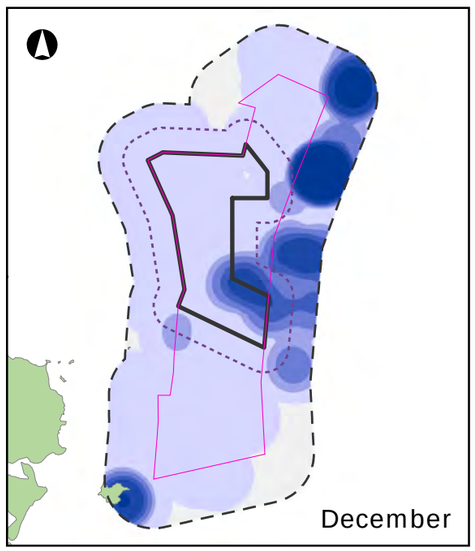












Array Area
2km Buffer from Array Area
MAC Boundary (Array Area Only)
4km Buffer from MAC Boundary (Array Area Only)

Herring Gull Density (per km^2)
0
0 - 10
10 - 25
25 - 50
50 - 75
75 - 150
150 - 822

Kilometres
0 2 4 6 8 10

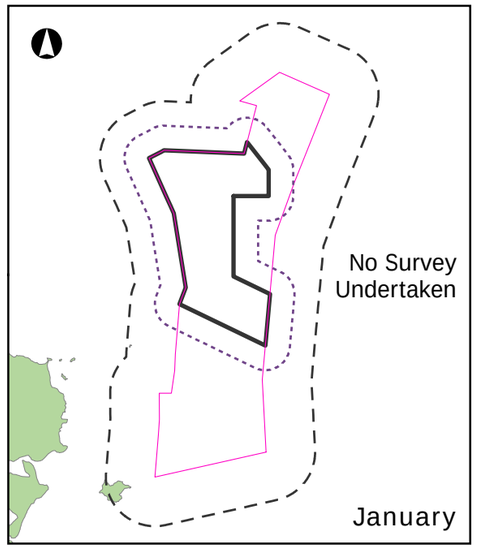
NISA
North Irish Sea Array

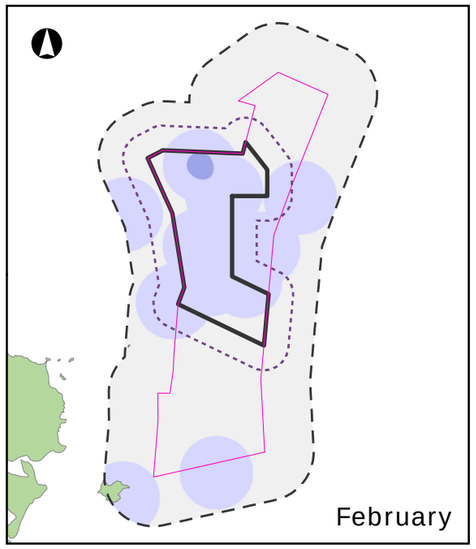
ARUP GoBe

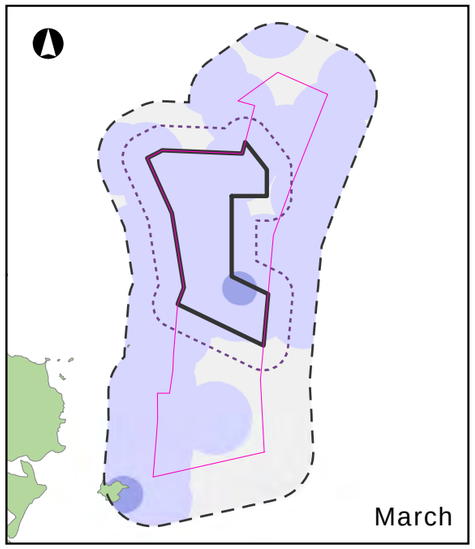
Project
North Irish Sea Array Offshore Wind Farm

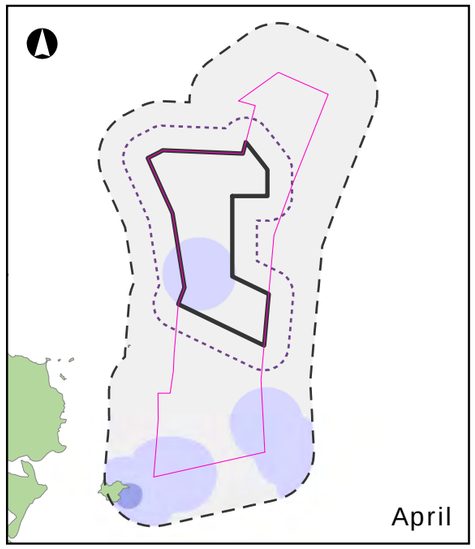
Figure Title
Herring Gull Density Heatmap 2020

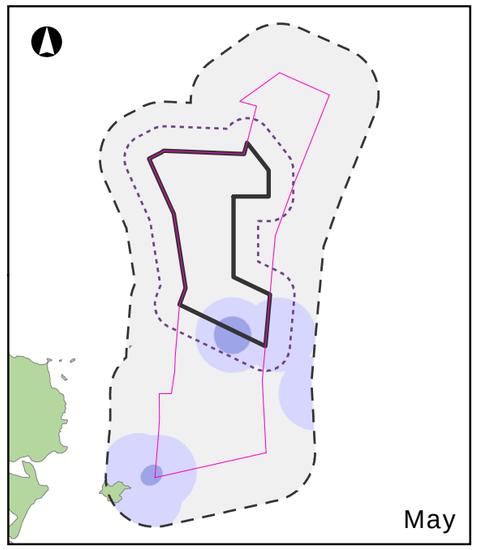
Job No: 281240	Datum: WGS84 Projection: UTM30N
Date: May 2024	Figure No: 2.14
Scale: 1:500,000 @A3	
Status: Issue	

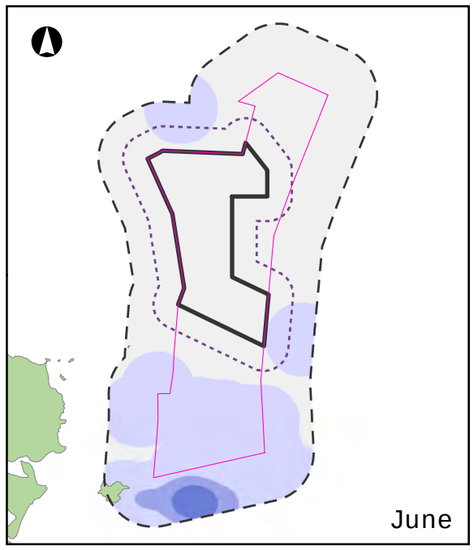


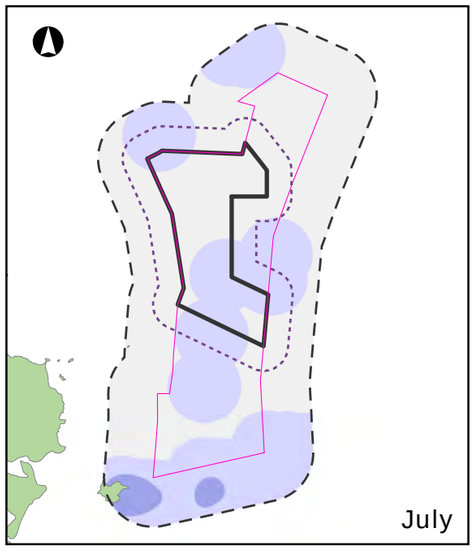


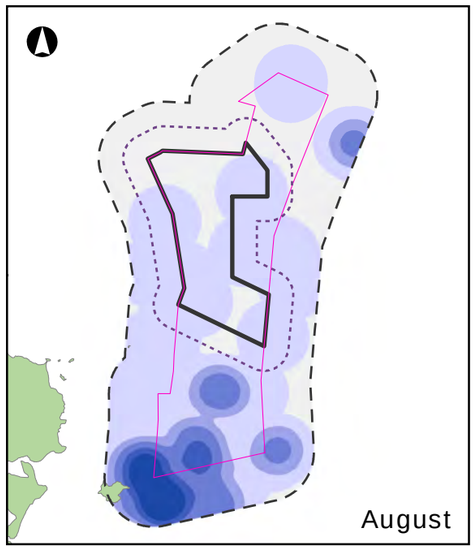


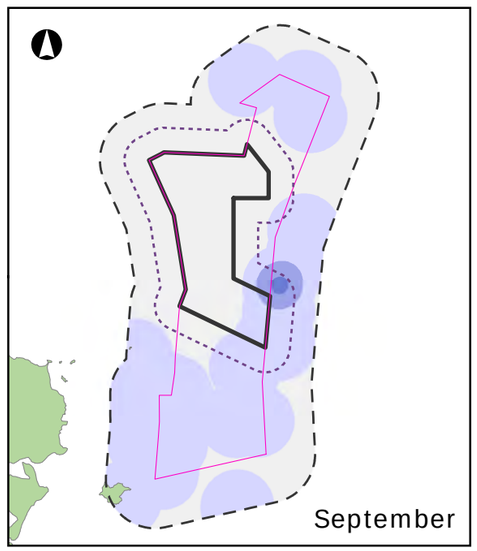


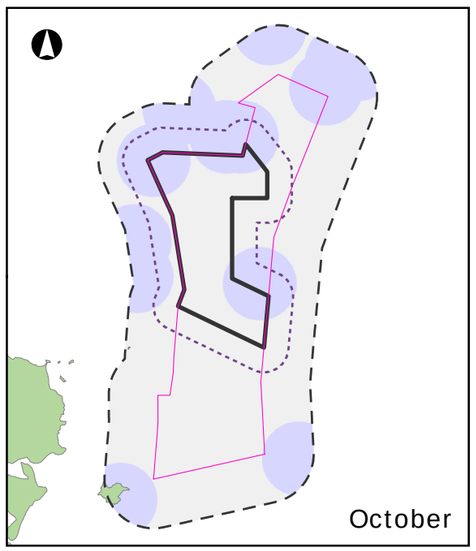


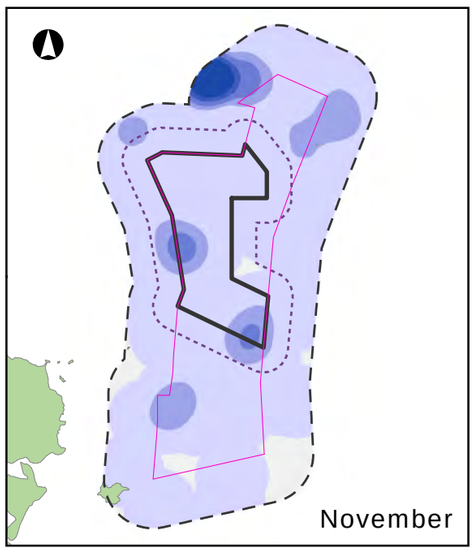


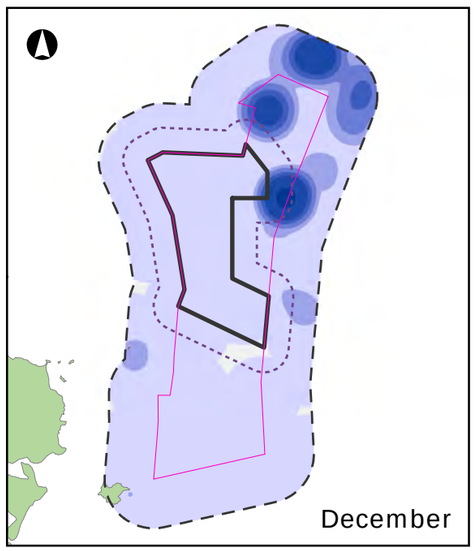












Array Area
2km Buffer from Array Area
MAC Boundary (Array Area Only)
4km Buffer from MAC Boundary (Array Area Only)

Herring Gull Density (per km^2)
0
0 - 10
10 - 25
25 - 50
50 - 75
75 - 150
150 - 822

Kilometres
0 2 4 6 8 10

NISA
North Irish Sea Array

ARUP GoBe

Project
North Irish Sea Array Offshore Wind Farm

Figure Title
Herring Gull Density Heatmap 2021

Job No: 281240	Datum: WGS84 Projection: UTM30N
Date: May 2024	Figure No: 2.15
Scale: 1:500,000 @A3	
Status: Issue	

January

February

March

April

May

June

July

August

September

October

No Survey Undertaken

November

No Survey Undertaken

December

Array Area

2km Buffer from Array Area

MAC Boundary (Array Area Only)

4km Buffer from MAC Boundary (Array Area Only)

Herring Gull Density (per km^2)

0

0 - 10

10 - 25

25 - 50

50 - 75

75 - 150

150 - 822

Kilometres

0 2 4 6 8 10

NISA

North Irish Sea Array

ARUP GoBe

Project

North Irish Sea Array Offshore Wind Farm

Figure Title

Herring Gull Density Heatmap 2022

Job No: 281240	Datum: WGS84 Projection: UTM30N
Date: May 2024	Figure No: 2.16
Scale: 1:500,000 @A3	
Status: Issue	

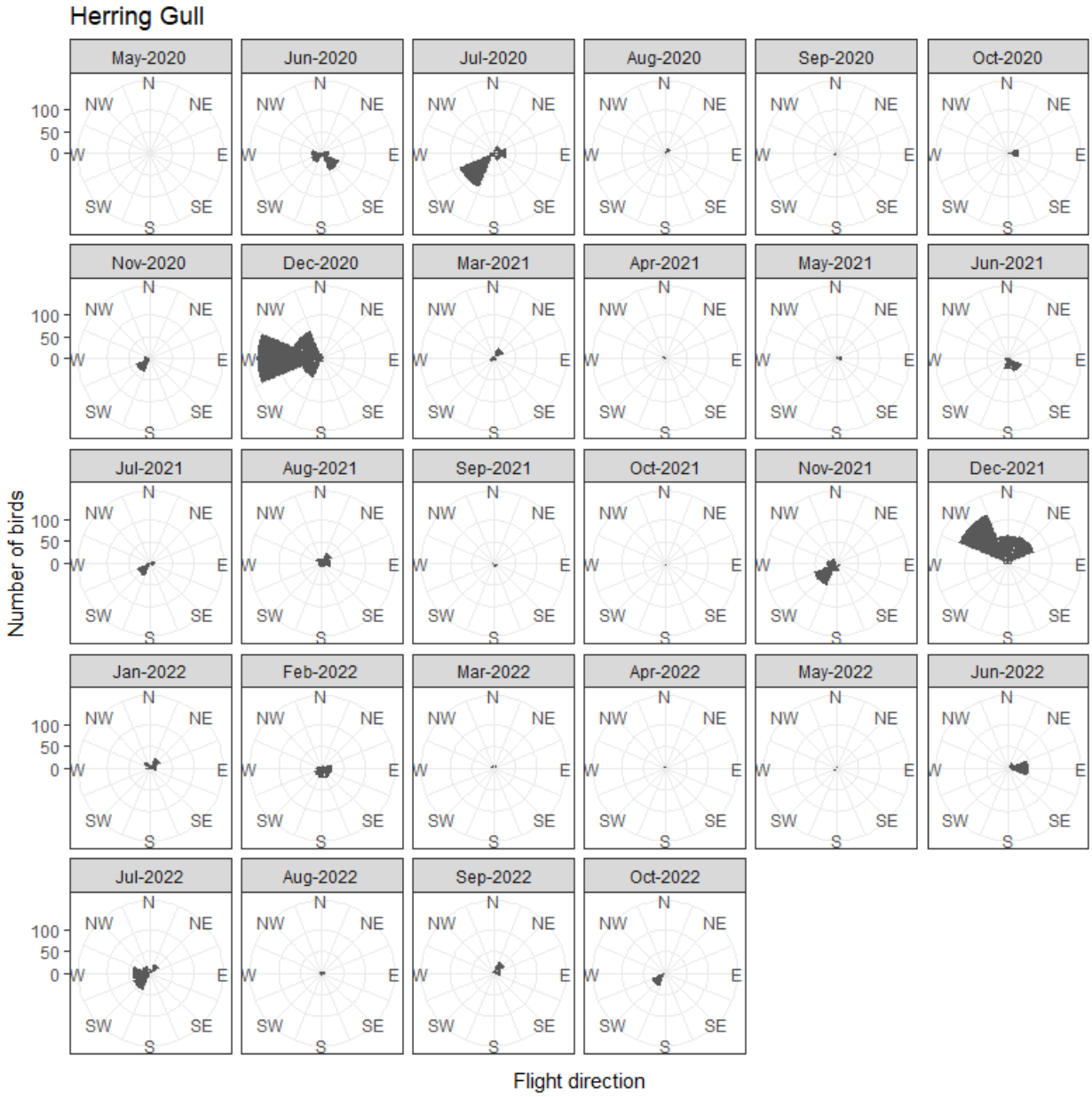


Figure 2.17: Herring Gull monthly flight directions in the ornithology study area.

Table 2.25: Herring gull raw counts, estimated abundance and estimated density in the array area.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	1	5	60	0	2	0	4	82
Calendar year 2 (2021)	-	18	27	1	0	0	1	3	0	1	84	26
Calendar year 3 (2022)	90	18	1	2	1	2	8	1	20	2	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	4	24	286	0	10	0	18	410
Calendar year 2 (2021)	-	93	128	5	0	0	5	23	0	5	498	137
Calendar year 3 (2022)	448	86	5	9	5	9	39	5	103	9	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.05	0.27	3.23	0.00	0.11	0.00	0.20	4.64
Calendar year 2 (2021)	-	1.06	1.45	0.06	0.00	0.00	0.06	0.26	0.00	0.06	5.63	1.55
Calendar year 3 (2022)	5.06	0.97	0.06	0.10	0.06	0.10	0.44	0.06	1.17	0.10	-	-

Table 2.26: Herring gull raw counts, estimated abundance and estimated density in the array area plus 2km buffer.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	1	10	139	0	3	31	4	238
Calendar year 2 (2021)	-	22	39	1	19	0	6	7	38	5	108	224
Calendar year 3 (2022)	104	85	1	3	1	3	25	12	33	33	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	4	50	695	0	15	145	18	1,190
Calendar year 2 (2021)	-	117	195	5	95	0	30	51	220	35	716	1,284
Calendar year 3 (2022)	524	437	5	15	5	15	126	59	218	162	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.02	0.25	3.45	0.00	0.07	0.72	0.09	5.91
Calendar year 2 (2021)	-	0.58	0.97	0.02	0.47	0.00	0.15	0.25	1.10	0.17	3.56	6.38
Calendar year 3 (2022)	2.60	2.17	0.02	0.07	0.02	0.07	0.63	0.29	1.08	0.80	-	-

2.15.42 ESAS surveys during the 1980s and 90s showed low densities of herring gull across the Irish east coast throughout the year, however their distribution was less widespread throughout the spring (Pollock *et al.,* 1997). Results from the 2016 ObSERVE aerial surveys are presented in the common gull section above.

Lesser Black-backed Gull

General overview

2.15.43 Ireland has an estimated breeding population of 7,112 herring gull pairs at coastal colonies (2015 - 2018). However, the population is widespread and if urban gulls were included it would increase this estimate considerably. The long-term population trend varies depending on the colony but evidence suggests that the population has been steadily increasing over the long-term (Cummins *et al.*, 2019). Lesser black-backed gull is Amber-listed in Ireland because more that 50% of the population is situated in fewer than 10 breeding colonies.

2.15.44 Lesser black-backed gull breed between April to August (Furness, 2015). Their mean-maximum foraging range during this time is 127 ± 109km (Woodward et al., 2019). During the non-breeding season, the majority of Irish breeding migrate south to north Africa leaving very few remaining in Irish waters (Wernham et al., 2002). There may be some dispersal during this time and additional gulls arriving from Europe.

Abundance and density

2.15.45 Lesser black-backed gull were recorded in the array area in five of 29 months. Raw counts ranged from 1 (Across three months) to 12 (July 2022), with abundance and density peaking at 57 birds and 0.64 birds/km^2 respectively Table 2.27).

2.15.46 In the array area plus 2km buffer, raw counts ranged from 1 (Across four months) to 14 (July 2020), with abundance and density peaking at 72 birds and 0.36 birds/km^2 respectively (Table 2.28).

Table 2.27: Lesser black-backed gull raw counts, estimated abundance and estimated density in the array area.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	0	0	12	0	0	1	0	0
Calendar year 2 (2021)	-	0	0	0	0	0	0	2	0	0	1	0
Calendar year 3 (2022)	0	0	0	0	0	0	1	0	0	0	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	0	0	57	0	0	5	0	0
Calendar year 2 (2021)	-	0	0	0	0	0	0	20	0	0	5	0
Calendar year 3 (2022)	0	0	0	0	0	0	5	0	0	0	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.00	0.00	0.64	0.00	0.00	0.06	0.00	0.00
Calendar year 2 (2021)	-	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.00	0.00	0.06	0.00
Calendar year 3 (2022)	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	-	-

Table 2.28: Lesser black-backed gull raw counts, estimated abundance and estimated density in the array area plus 2km buffer.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	0	2	14	0	0	1	0	1
Calendar year 2 (2021)	-	0	0	0	0	0	0	4	7	0	1	1
Calendar year 3 (2022)	0	0	0	0	0	0	4	3	0	0	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	0	10	72	0	0	5	0	5
Calendar year 2 (2021)	-	0	0	0	0	0	0	30	40	0	5	5
Calendar year 3 (2022)	0	0	0	0	0	0	21	15	0	0	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.00	0.05	0.36	0.00	0.00	0.02	0.00	0.03
Calendar year 2 (2021)	-	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.20	0.00	0.02	0.03
Calendar year 3 (2022)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-

2.15.47 Lesser black-backed gulls were not recorded between February and June off the east coast of Ireland during the ESAS surveys in Irish waters between 19080 and 1997, however low densities were recorded further east in the Irish sea during the surveys. During July to October low densities of lesser black-backed gull were recorded closer to the Irish east coast. Lesser black-backed gulls were largely absent from the Irish Sea between November to January (Pollock et al., 1997).

Bio-season peak estimates

2.15.48 Lesser back-backed gulls were present across three bio-seasons. Presence was greatest in the breeding bio-season (April to August), with a mean peak abundance of 27 birds, and a mean peak density of 0.31 birds/km^2 in the array area (Table 2.29).

Table 2.29: Lesser black-backed gull bio-season mean peak abundance and density estimates in the array area and array area plus 2km buffer.

BDMPS Bio-seasons	Months	Array area		Array area plus 2km buffer	
		Bio-season peak abundance (n)	Bio-season peak density (n/km^2)	Bio-season peak abundance (n)	Bio-season peak density (n/km^2)
Breeding	Apr - Aug	27	0.31	41	0.17
Autumn migration	Sep - Oct	2	0.02	15	0.07
Spring migration	Mar	0	0.00	0	0.00
Migration-free winter	Nov - Feb	0	0.02	3	0.02

Spatial density distribution and flight direction

2.15.49 Across all bio-seasons, lesser black-backed gulls were predominantly recorded in the east of the survey area, with the greatest density in the south-east in the breeding bio-season, and in the east in the non-breeding bio-seasons.

2.15.50 In data from Jessop *et al*. (2018), densities were highest around the south/south-west of the array area, though notably great and lesser black-backed gulls were not differentiated in this dataset.

2.15.51 The DAS data recorded flight directions of all flying birds during the surveys with several months recording a large proportion of flying birds (Figure 2.18). In June 2020 the flight direction varied greatly from southwest to easterly and south easterly and in July 2020 the predominant direction was southwest (Figure 2.18). In 2022 the majority of flying birds were recorded flying east in June and west in July and August (Figure 2.18).

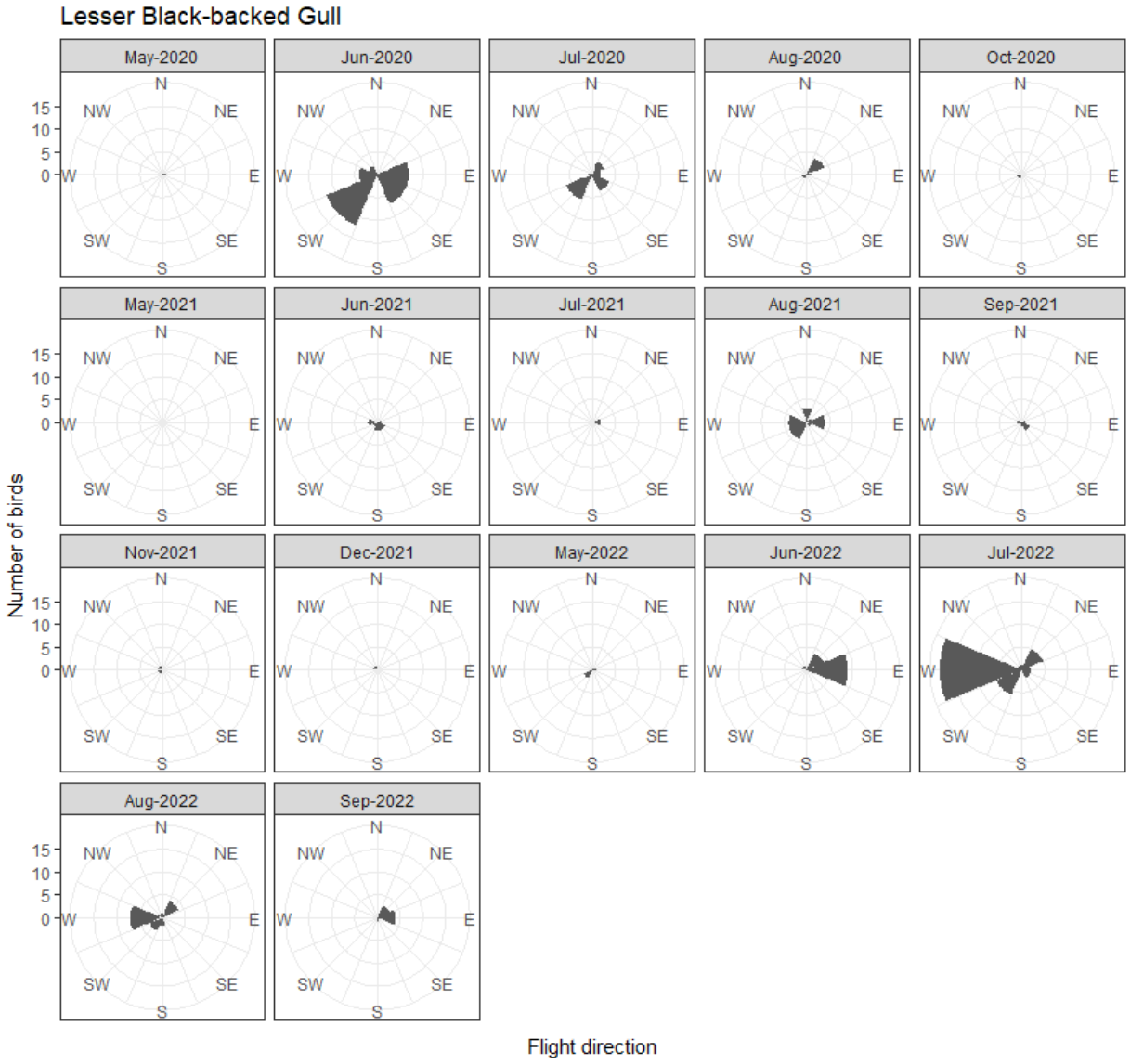


Figure 2.18: Lesser black-backed gull monthly flight directions in the ornithology study area.

Available tracking data

2.15.52 Tracking data is available for lesser black-backed gulls from Lambay Island. Though this was a small dataset (n=2), tracked birds foraged almost exclusively in the terrestrial environment with no overlap with the NISA array.

General overview

2.15.53 Roseate terns visit Ireland during the summer months to breed. The breeding population in Ireland is estimated at 1,820 pairs, concentrated at two main colonies, Rockabill Island and Lady's Island Lake, with Rockabill Island representing the largest Roseate tern colony in Europe. The population has shown an increase of 82% over the last 12 years based on the annual monitoring at both sites (Cummins et al., 2019). Roseate tern is Amber-listed in Ireland because the breeding range reduced by 46% between 1968 and 2011, and because more than 50% of the Irish breeding population is concentrated in less than 10 sites. The Irish population represents 40% of the European population and it is listed on Annex I of the EC Birds Directive.

2.15.54 Roseate tern breeding season is between May to August (Furness, 2015) (Table 3). During the breeding season the mean-maximum foraging range of adults is 12.6 ± 10.6km (Woodward et al., 2019). Autumn migration season, roseate terns migrate south along the Atlantic seaboard to winter along the west coast of Africa around the Gulf of Guinea (Wernham et al., 2002).

Abundance and density

2.15.55 Roseate terns were recorded in the array area in two of 29 months, with two birds recorded in June 2020 and June 2021.Abundance and density peaked at 23 birds and 0.26 birds/km^2 respectively (Table 2.30).

2.15.56 In the array area plus 2km buffer, raw counts ranged from 1 (July 2021 and June 2022) to 6 (June 2020), with abundance and density peaking at 30 birds and 0.15 birds/km^2 respectively (Table 2.31).

Table 2.30: Roseate tern raw counts, estimated abundance, and estimated density in the array area.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	0	2	0	0	0	0	0	0
Calendar year 2 (2021)	-	0	0	0	0	2	0	0	0	0	0	0
Calendar year 3 (2022)	0	0	0	0	0	0	0	0	0	0	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	0	9	0	0	0	0	0	0
Calendar year 2 (2021)	-	0	0	0	0	23	0	0	0	0	0	0
Calendar year 3 (2022)	0	0	0	0	0	0	0	0	0	0	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00
Calendar year 2 (2021)	-	0.00	0.00	0.00	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.00
Calendar year 3 (2022)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-

Table 2.31: Roseate tern raw counts, estimated abundance, and estimated density in the array area plus 2km buffer.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	0	6	0	0	0	0	0	0
Calendar year 2 (2021)	-	0	0	0	0	3	1	0	0	0	0	0
Calendar year 3 (2022)	0	0	0	0	0	1	5	0	0	0	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	0	30	0	0	0	0	0	0
Calendar year 2 (2021)	-	0	0	0	0	15	5	0	0	0	0	0
Calendar year 3 (2022)	0	0	0	0	0	5	25	0	0	0	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00
Calendar year 2 (2021)	-	0.00	0.00	0.00	0.00	0.07	0.03	0.00	0.00	0.00	0.00	0.00
Calendar year 3 (2022)	0.00	0.00	0.00	0.00	0.00	0.02	0.12	0.00	0.00	0.00	-	-

The ESAS surveys which took place between 1980 and 1997 recorded six roseate terns in the Irish Sea between May and August (Pollock et al., 1997).

Bio-season peak estimates

Roseate terns were present only in the breeding bio-season (May to August), with a mean peak abundance of 11 birds, and a mean peak density of 0.12 birds/km^2 in the array area (Table 2.32).

Table 2.32: Roseate tern bio-season mean peak abundance and density estimates in the array area and array area plus 2km buffer.

BDMPS Bio-seasons	Months	Array area		Array area plus 2km buffer	
		Bio-season peak abundance (n)	Bio-season peak density (n/km^2)	Bio-season peak abundance (n)	Bio-season peak density (n/km^2)
Breeding	May - Aug	11	0.12	23	0.12
Autumn migration	Sep	0	0.00	0	0.00
Spring migration	Apr	0	0.00	0	0.00

Spatial density distribution and flight direction

2.15.57 In the breeding bio-season, birds were recorded across the south of the survey area, with the highest density of birds in the south-west, predominantly restricted to the buffer zone outside of the array area.

2.15.58 This trend was also evident from Jessop *et al*., (2018), with highest densities of birds around the south of NISA during the breeding season. Densities were also higher to the south of the proposed development, in close proximity to Lambay Island.

2.15.59 Flight directions for roseate terns were recorded during the DAS surveys with the predominant directions being west and northwest in May 2021, July and August 2022 (Figure 2.19). In July 2021 a significant number of birds were recorded flying south (Figure 2.19). All other months had minimal numbers of birds recorded flying.

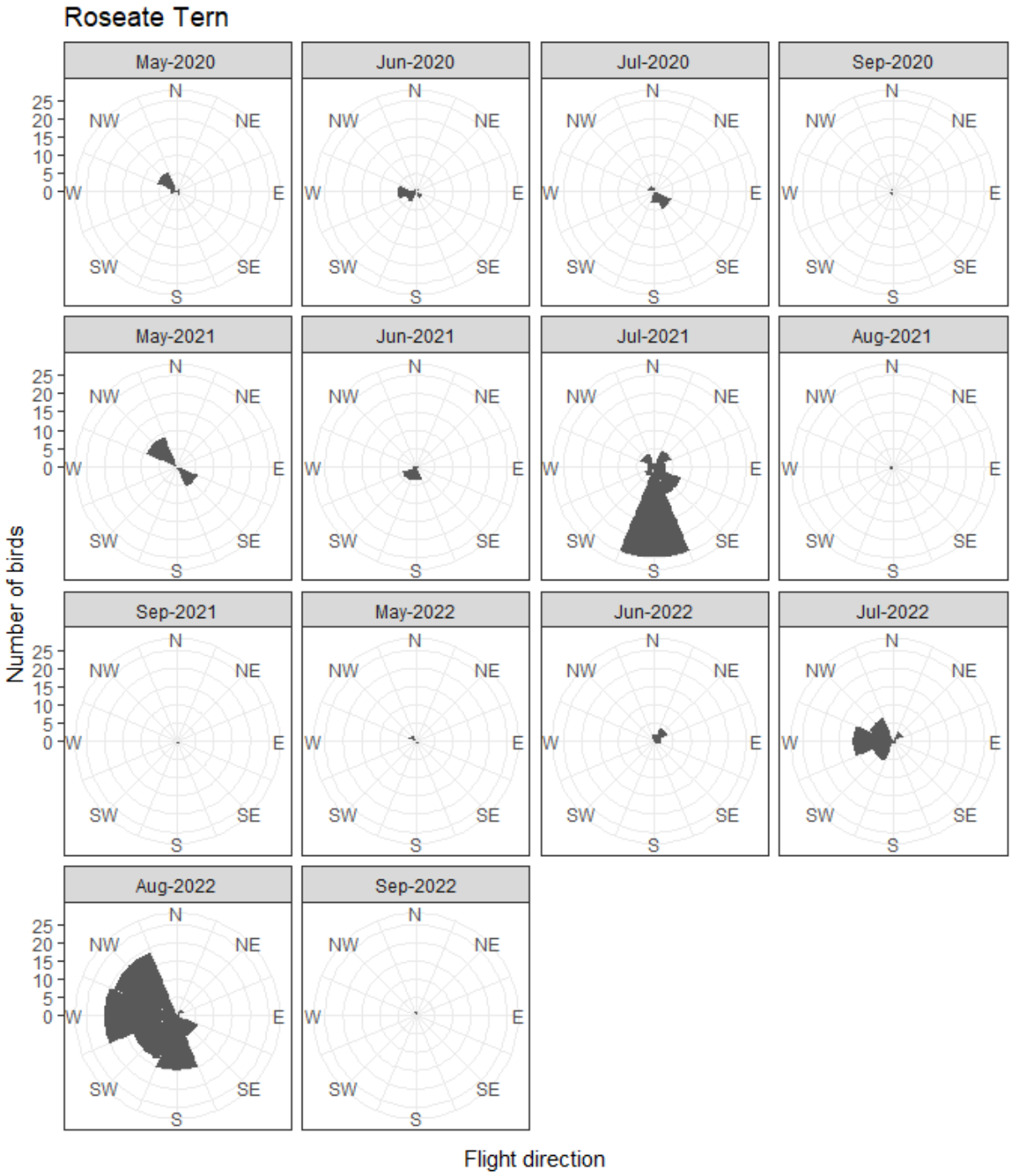


Figure 2.19: Roseate tern monthly flight directions in the ornithology study area.

Available tracking data

2.15.60 Tracking data from this colony also highlights high foraging usage of the area to the east and north-east of the site, resulting in potential overlap with the array area (Perrow et al. 2019). In addition, recent research has shown that Roseate tern populations breeding in the northern North Sea pass through the Irish sea during both northward and southbound migrations having passed overland across Great Britain rather than flying through the North Sea itself (Redfern & Bevan 2019). Consequently, there is potential for additional birds from further afield to be present within close proximity to the proposed development.

Common Tern

General overview

2.15.61 Common terns visit Ireland during the summer months to breed. The breeding population of Ireland has been steadily increasing over the long-term and was 5,058 pairs during 2016 to 2018 (Cummins et al., 2019). Their colonies are mainly coastal but there are also a couple of inland sites. The majority breed at two colonies, Rockabill (2,034 pairs, representing one of the largest colonies in Europe) and Lady's Island Lake (979 pairs) (SMP, 2020), which have seen steady population growth over the long term due to conservation efforts at these sites (Acampora et al., 2018). Although the overall population seems to be increasing common tern is Amber-listed and on Annex I of the EC Birds Directive in Ireland because the Irish breeding population is concentrated at 10 sites or less (Gilbert et al., 2021).

2.15.62 Common tern breeding season is between May to August (Furness, 2015) (Table 2.6). During the breeding season the mean-maximum foraging range of adults is 18.0 ± 8.9km (Woodward et al., 2019). Autumn migration season, common terns migrate south along the Atlantic seaboard to winter along the west coast of Africa (Wernham et al., 2002).

Abundance and density

2.15.63 Common terns were recorded in the array area in two of 29 months, with raw counts ranging from three (June 2022) to six (July 2022). Abundance and density peaked at 40 birds and 0.45 birds/km^2 respectively (Table 2.33).

2.15.64 In the array area plus 2km buffer, raw counts ranged from 1 (July 2021 aa August 2022) to 36 (July 2022), with abundance and density peaking at 178 birds and 0.88 birds/km2 respectively (Table 2.34).

Table 2.33: Common tern raw counts, estimated abundance, and estimated density in the array area.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	0	0	0	0	0	0	0	0
Calendar year 2 (2021)	-	0	0	0	0	0	0	0	0	0	0	0
Calendar year 3 (2022)	0	0	0	0	0	3	8	0	0	0	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	0	0	0	0	0	0	0	0
Calendar year 2 (2021)	-	0	0	0	0	0	0	0	0	0	0	0
Calendar year 3 (2022)	0	0	0	0	0	14	40	0	0	0	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Calendar year 2 (2021)	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Calendar year 3 (2022)	0.00	0.00	0.00	0.00	0.00	0.16	0.45	0.00	0.00	0.00	-	-

Table 2.34: Common tern raw counts, estimated abundance, and estimated density in the array area plus 2km buffer.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	0	0	0	0	0	0	0	0
Calendar year 2 (2021)	-	0	0	0	0	0	1	0	0	0	0	0
Calendar year 3 (2022)	0	0	0	0	0	6	36	1	0	0	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	0	0	0	0	0	0	0	0
Calendar year 2 (2021)	-	0	0	0	0	0	5	0	0	0	0	0
Calendar year 3 (2022)	0	0	0	0	0	30	178	5	0	0	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Calendar year 2 (2021)	-	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
Calendar year 3 (2022)	0.00	0.00	0.00	0.00	0.00	0.15	0.88	0.02	0.00	0.00	-	-

2.15.65 The ObSERVE 2016 aerial surveys were unable to differentiate between common and Arctic terns due to their similarities. Therefore, overall 1,235 common/Arctic terns were recorded during the survey of the east Irish coast during the summer and autumn. The mean density of common/Arctic terns was 0.49 birds/km^2 in summer, and 0.79 birds/km^2 in autumn. The estimates total abundance of common/Arctic terns across the survey area was 4,514 (95% CIs 3,883 – 5,247) individuals in summer, and 7,268 (95% CIs 5,178 – 10,202) birds in autumn (Jessopp et al., 2018).

Bio-season peak estimates

2.15.66 Common terns were present only in the breeding bio-season (May to August), with a mean peak abundance of 13 birds, and a mean peak density of 0.15 birds/km^2 in the array area (Table 2.35).

Table 2.35: Common tern bio-season mean peak abundance and density estimates in the NISA array area and array area plus 2km buffer.

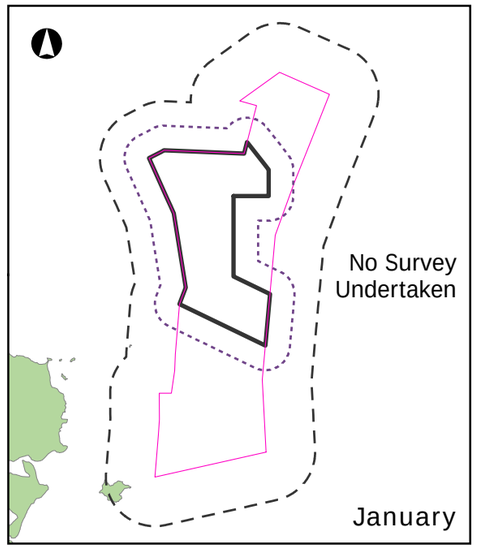
BDMPS Bio-seasons	Months	Array area		Array area plus 2km buffer	
		Bio-season peak abundance (n)	Bio-season peak density (n/km^2)	Bio-season peak abundance (n)	Bio-season peak density (n/km^2)
Breeding	May - Aug	13	0.15	61	0.29
Autumn migration	Sep	0	0.00	0	0.00
Spring migration	Apr	0	0.00	0	0.00

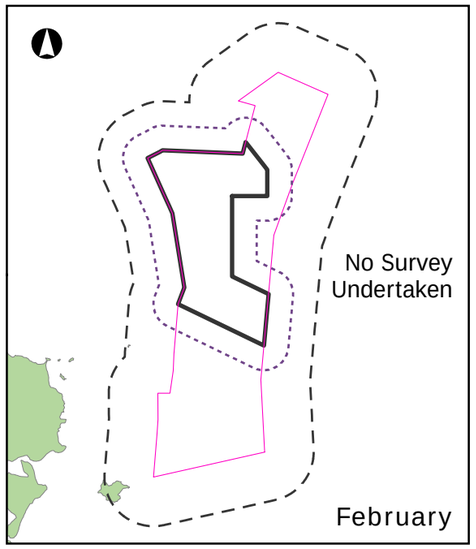
Spatial density distribution and flight direction

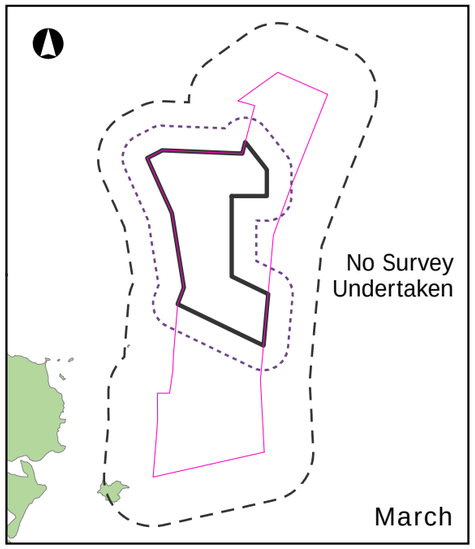
2.15.67 Density maps based on DAS data are presented in Figure 2.20 to Figure 2.21 below. In the breeding bio-season, birds were recorded in highest density in the south-west of the survey area, predominantly restricted to the buffer zone outside of the array area.

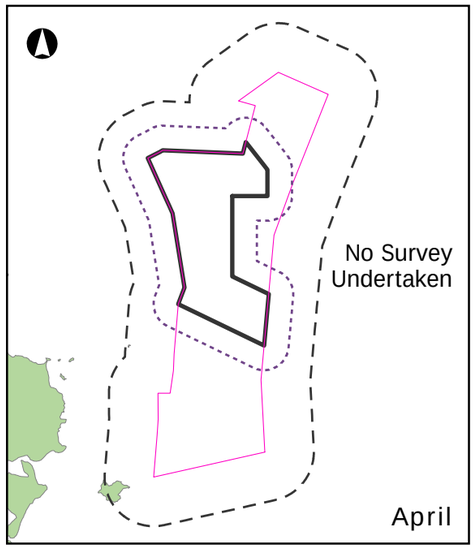
2.15.68 Data from Jessop *et al*. (2018) similarly found higher densities of birds towards the south-west of the proposed development during the breeding season, through during the Autumn migration bio-season birds were also present in higher densities towards the north-west of the proposed development (notably with minimal overlap with the survey area). Notably this dataset did not differentiate between Arctic and common terns.

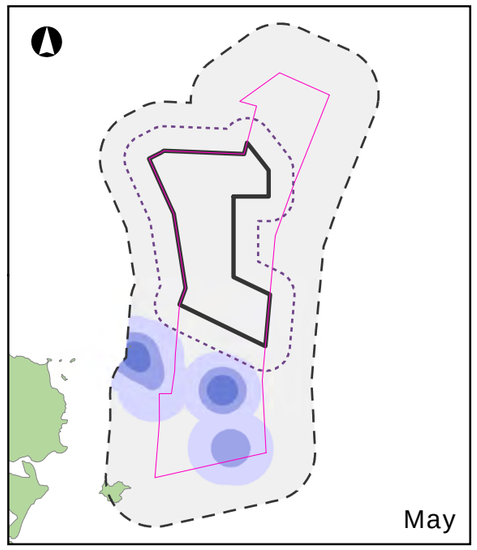
2.15.69 Flight directions of common tern recorded during the DAS surveys found that, much like with roseate terns, that the predominant direction of flight in May 2021, July and August 2022 was west or northwest and in July 2021 it was south (Figure 2.23). All other months had minimal numbers of birds recorded flying.

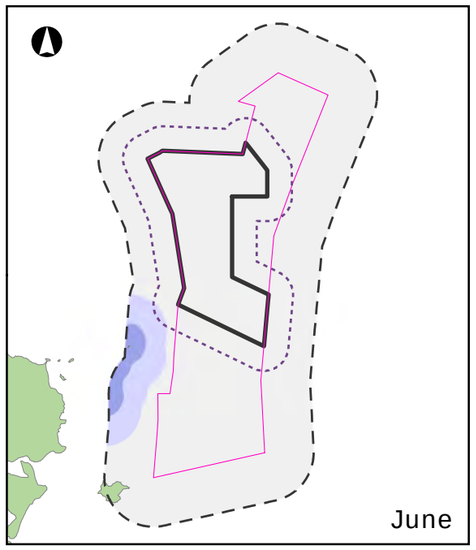


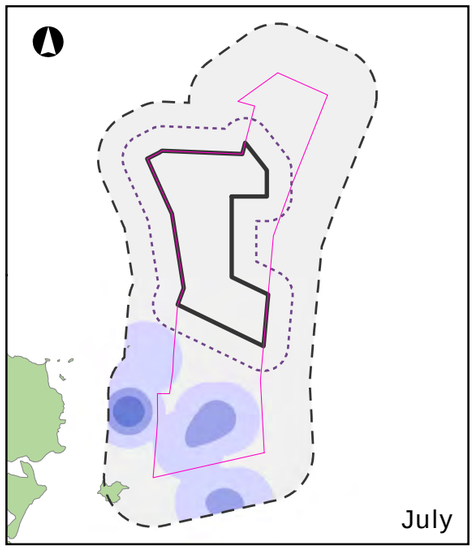


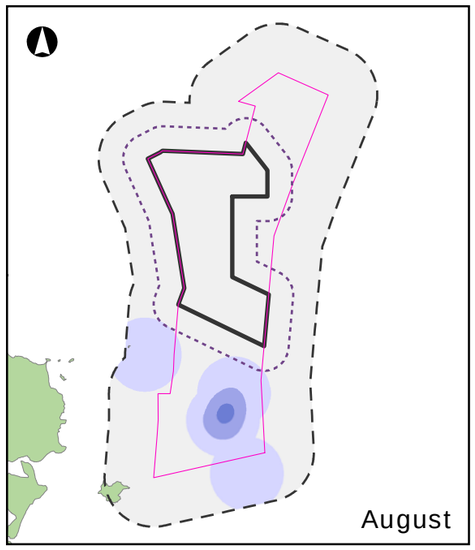


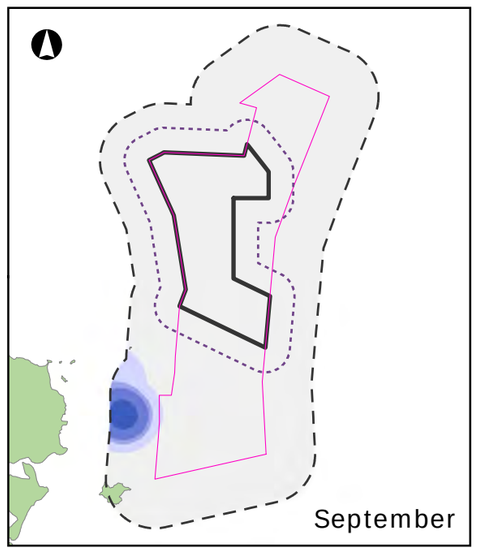


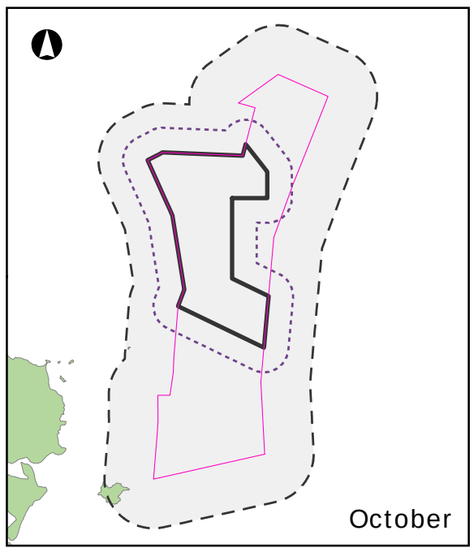


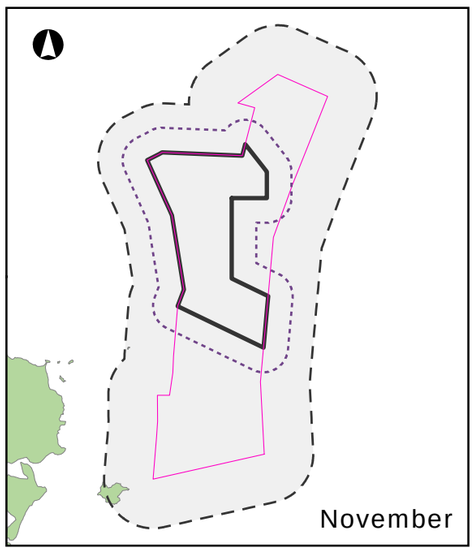


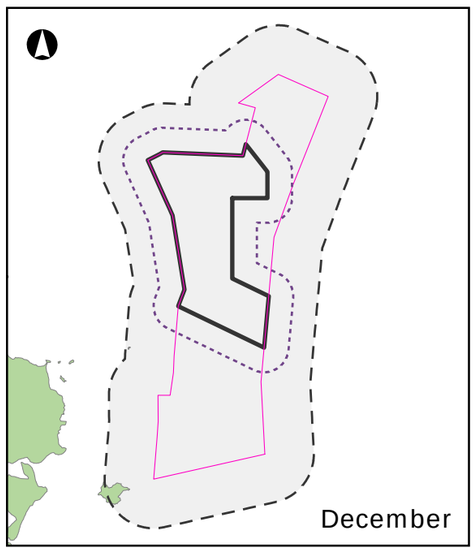












Array Area
2km Buffer from Array Area
MAC Boundary (Array Area Only)
4km Buffer from MAC Boundary (Array Area Only)

Common Tern Density (per km^2)

- 0
- 0 - 1
- 1 - 2
- 2 - 5
- 5 - 10
- 10 - 20
- 20 - 31

Kilometres
0 2 4 6 8 10

NISA
North Irish Sea Array

ARUP GoBe

Project
North Irish Sea Array Offshore Wind Farm

Figure Title
Common Tern Density Heatmap 2020

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Date: May 2024	Figure No: 2.20
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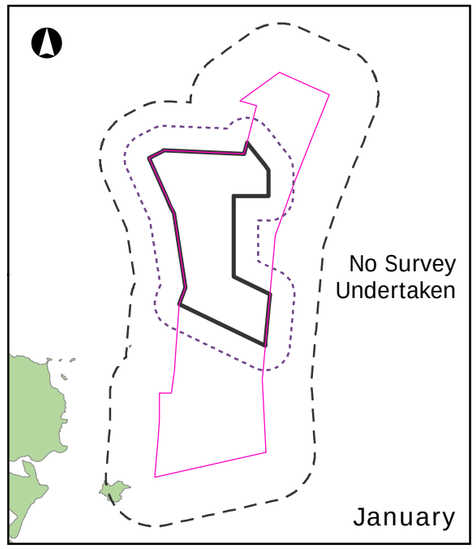
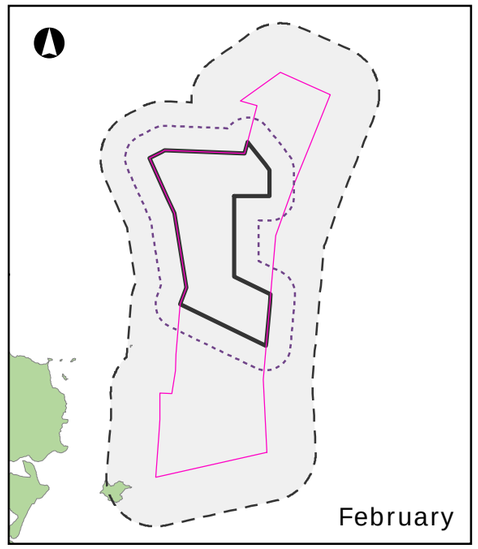
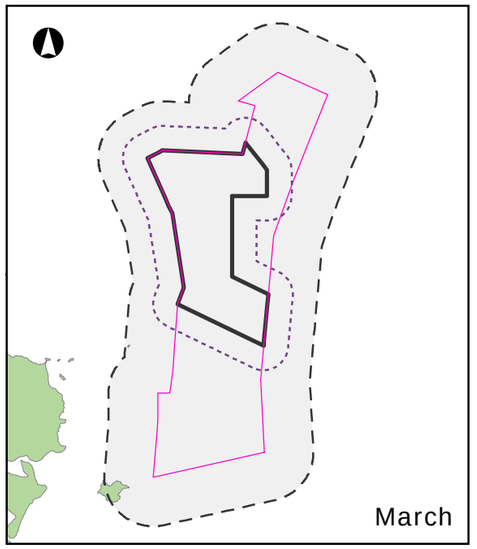
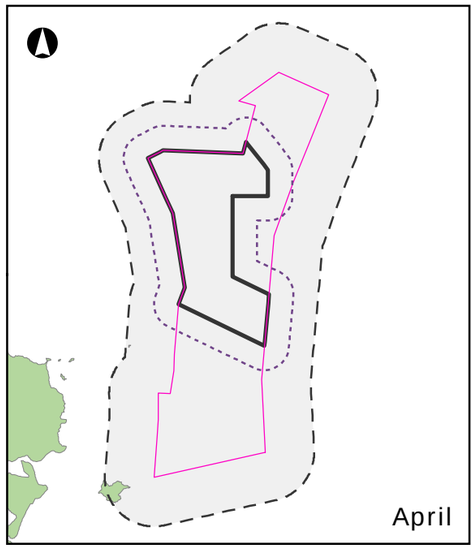
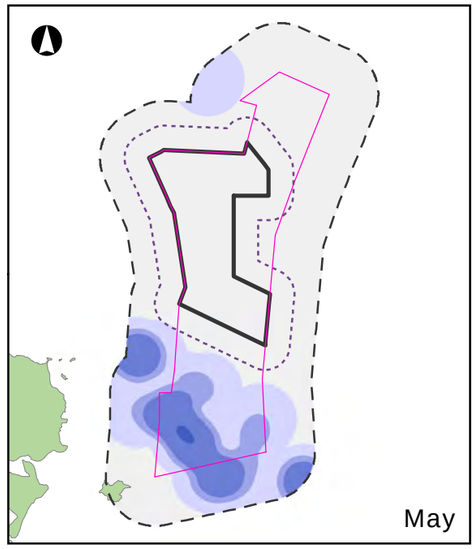
Status: Issue	

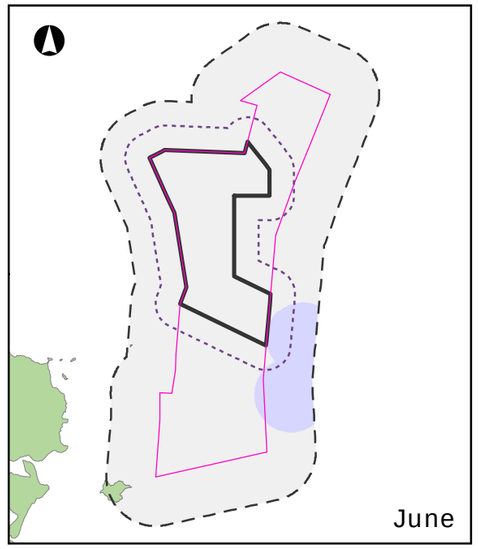


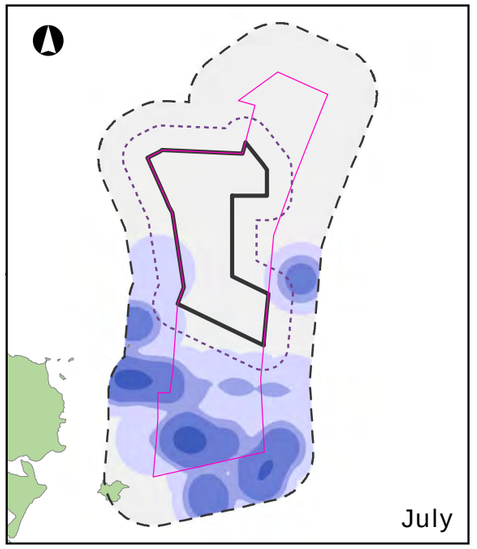


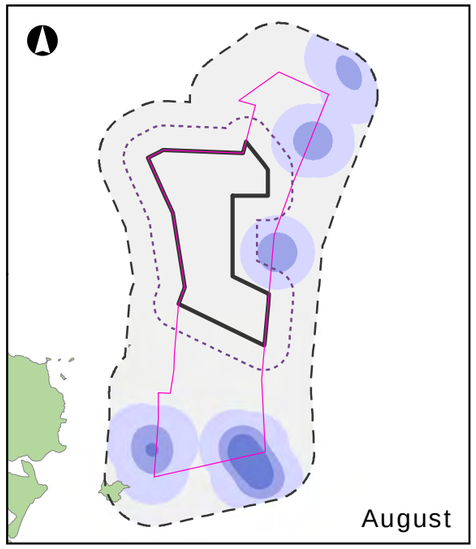


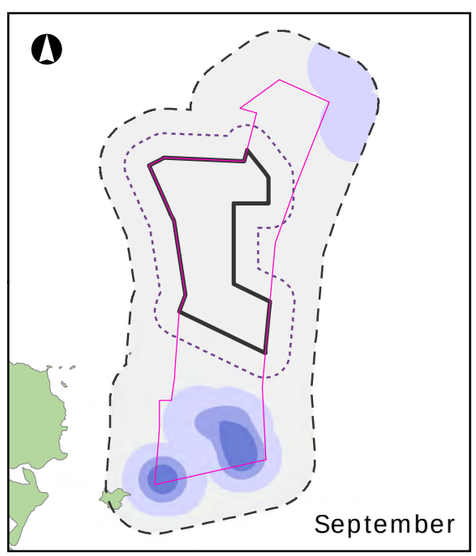


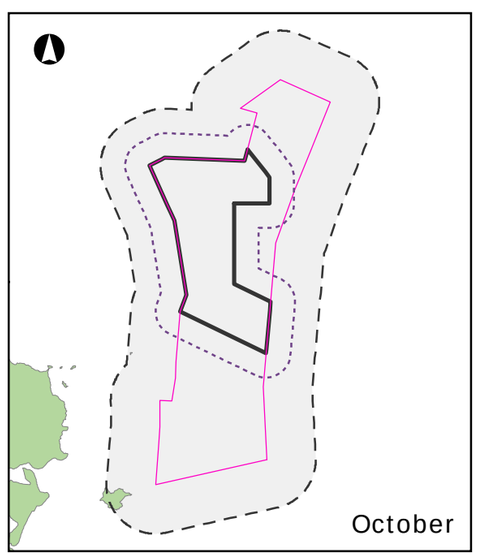


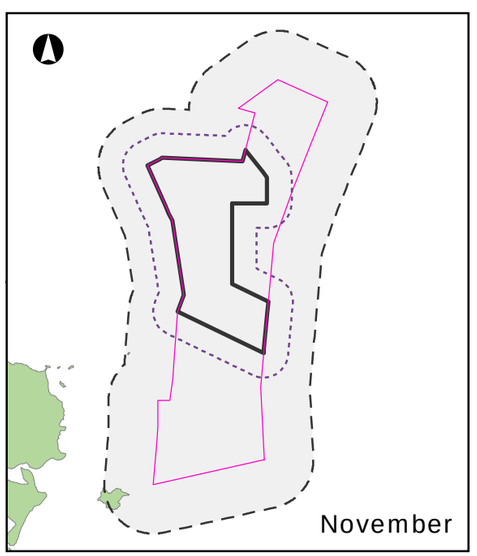


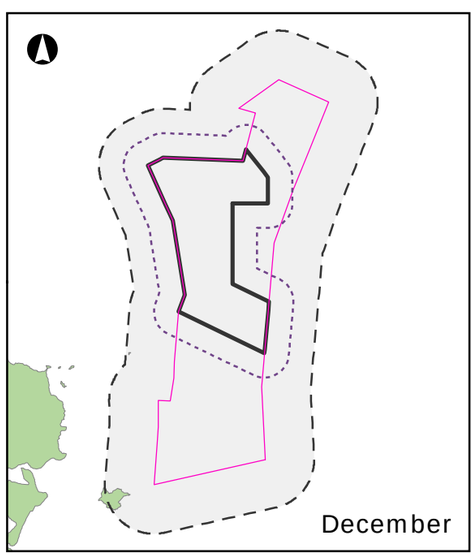












Array Area
2km Buffer from Array Area
MAC Boundary (Array Area Only)
4km Buffer from MAC Boundary (Array Area Only)

Common Tern Density (per km^2)

- 0
- 0 - 1
- 1 - 2
- 2 - 5
- 5 - 10
- 10 - 20
- 20 - 31

Kilometres
0 2 4 6 8 10

NISA
North Irish Sea Array

ARUP GoBe

Project
North Irish Sea Array Offshore Wind Farm

Figure Title
Common Tern Density Heatmap 2021

Job No: 281240	Datum: WGS84 Projection: UTM30N
Date: May 2024	Figure No: 2.21
Scale: 1:500,000 @A3	
Status: Issue	

January

February

March

April

May

June

July

August

September

October

No Survey Undertaken

November

No Survey Undertaken

December

Array Area
2km Buffer from Array Area
MAC Boundary (Array Area Only)
4km Buffer from MAC Boundary (Array Area Only)

Common Tern Density (per km^2)
0
0 - 1
1 - 2
2 - 5
5 - 10
10 - 20
20 - 31

Kilometres
0 2 4 6 8 10

NISA
North Irish Sea Array

ARUP GoBe

Project
North Irish Sea Array Offshore Wind Farm

Figure Title
Common Tern Density Heatmap 2022

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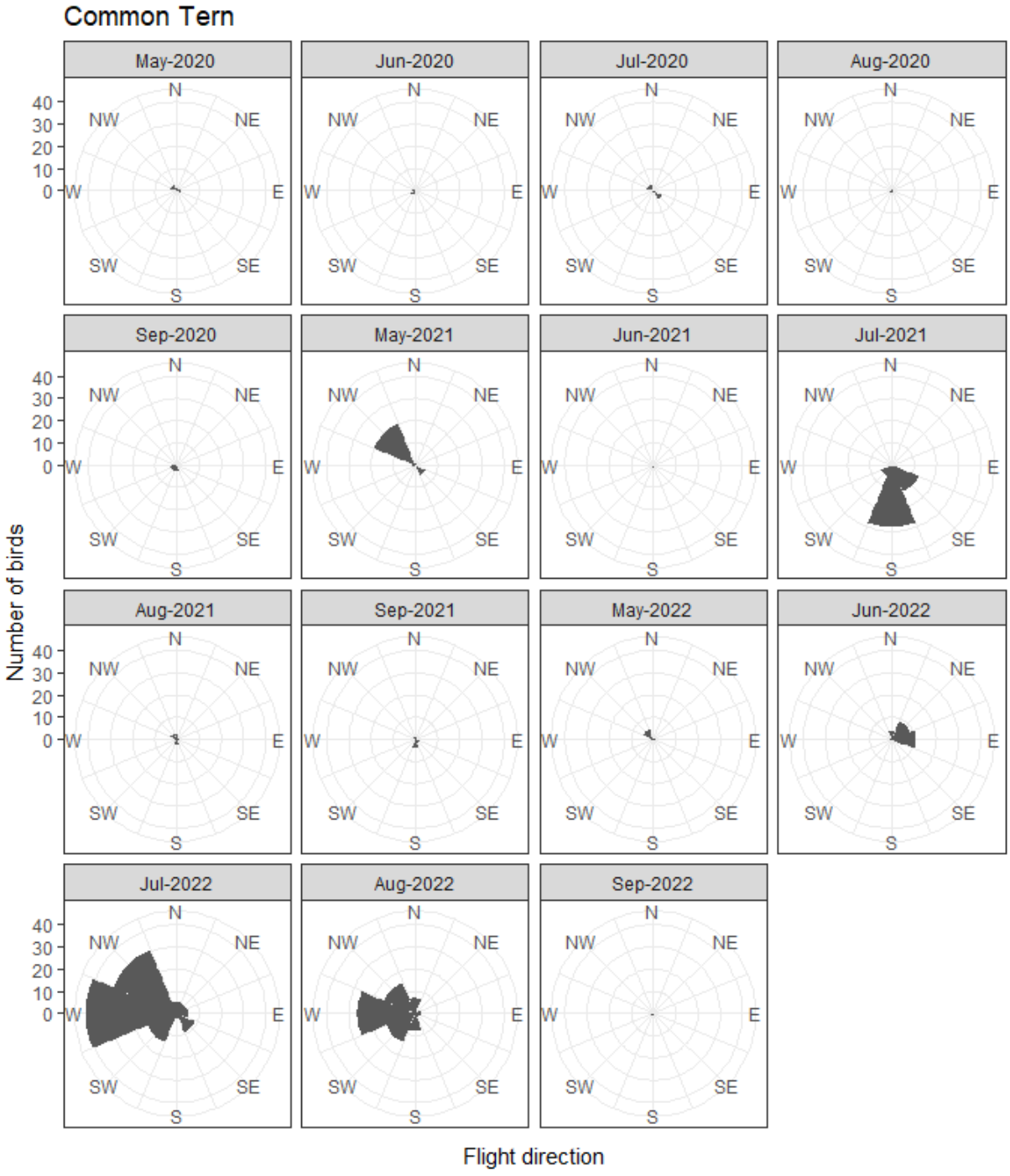


Figure 2.23: Common tern monthly flight directions in the ornithology study area.

Arctic tern

General overview

2.15.70 Arctic terns visit Ireland during the summer months to breed. The breeding population of Ireland has been steadily increasing over the long-term and was 2,778 pairs during 2016 to 2018 (Cummins et al., 2019). Their colonies are mainly coastal but there are also a couple of inland sites. Although the overall population seems to be increasing Arctic tern is Amber-listed and on Annex I of the EC Birds Directive in Ireland because the breeding range has been reduced by 44% between 1998 and 2018, and because much of the breeding population is concentrated in fewer than 10 sites (Gilbert et al., 2021).

2.15.71 The breeding season for Arctic tern is between May and early August (Furness, 2015) (Table 2.6). During the breeding season the mean-maximum foraging range of adults is 25.7 ± 14.8km (Woodward et al., 2019).

Abundance and density

2.15.72 Arctic terns were recorded in the array area in one of 29 months, with a raw counts of two individuals in July 2022 Abundance and density peaked at 10 birds and 0.11 birds/km2 respectively (Table 2.36).

2.15.73 In the array area plus 2km buffer, five individuals were recorded in June, July and August 2022 respectively, with abundance and density peaking at 25 birds and 0.12 birds/km2 respectively (Table 2.37).

Table 2.36: Arctic tern raw counts, estimated abundance and estimated density in the array area.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	0	0	0	0	0	0	0	0
Calendar year 2 (2021)	-	0	0	0	0	0	0	0	0	0	0	0
Calendar year 3 (2022)	0	0	0	0	0	0	2	0	0	0	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	0	0	0	0	0	0	0	0
Calendar year 2 (2021)	-	0	0	0	0	0	0	0	0	0	0	0
Calendar year 3 (2022)	0	0	0	0	0	0	10	0	0	0	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Calendar year 2 (2021)	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Calendar year 3 (2022)	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	-	-

Table 2.37: Arctic tern raw counts, estimated abundance and estimated density in the array area plus 2km buffer.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	0	0	0	0	0	0	0	0
Calendar year 2 (2021)	-	0	0	0	0	0	0	0	0	0	0	0
Calendar year 3 (2022)	0	0	0	0	0	5	5	5	0	0	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	0	0	0	0	0	0	0	0
Calendar year 2 (2021)	-	0	0	0	0	0	0	0	0	0	0	0
Calendar year 3 (2022)	0	0	0	0	0	25	25	24	0	0	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Calendar year 2 (2021)	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Calendar year 3 (2022)	0.00	0.00	0.00	0.00	0.00	0.12	0.12	0.12	0.00	0.00	-	-

Available tracking data

2.15.74 Though tracking data from Irish colonies is not currently available, recent research has shown that Arctic tern populations breeding in the northern North Sea pass through the Irish sea during both northward and southbound migrations having passed overland across Great Britain rather than flying through the North Sea itself (Redfern et al., 2020). Consequently, while there is no evidence of foraging overlap with the array area, there is potential for additional birds from further afield to be present within close proximity to NISA during migration seasons. However, based on the absence of Arctic terns within the DAS data presented in Table 2.36 and Table 2.37 during the migratory periods, there is minimal overlap between migrating birds and the array area. This is likely to be because terns tend to undertake migrations close to the coast (WWT & MacArthur Green, 2014).

Commic tern

2.15.75 Commic tern is a term used to refer to both Arctic and common terns. Owing to their similarity in DAS data imagery, it is often not possible to distinguish between these two species and in this case, they are grouped together. This section therefore considers the commic terns which were not possible to identify down to species level.

2.15.76 Within the array area, a total of 11 common terns were recorded and two Arctic terns. Recorded commic terns were therefore apportioned into species levels according to this ratio (i.e. apportioned common tern abundance = number of recorded common terns + the number of commic terns multiplied by 11/13) The remaining individuals were apportioned to Arctic tern. Apportioned numbers are added to those which were recorded at species level (i.e., the total number of common tern is equal to the individuals recorded as common tern, and the number of individuals which were apportioned from those recorded as commic tern).

Table 2.38: Commic tern raw counts, estimated abundance and estimated density in the array area.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	0	10	0	0	0	0	0	0
Calendar year 2 (2021)	-	0	0	0	0	4	8	2	1	0	0	0
Calendar year 3 (2022)	0	0	0	0	0	3	6	0	0	0	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	4	47	0	0	0	0	0	0
Calendar year 2 (2021)	-	0	0	0	0	44	45	47	5	0	0	0
Calendar year 3 (2022)	0	0	0	0	0	33	34	0	0	0	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.05	0.53	0.00	0.00	0.00	0.00	0.00	0.00
Calendar year 2 (2021)	-	0.00	0.00	0.00	0.00	0.50	0.51	0.53	0.06	0.00	0.00	0.00
Calendar year 3 (2022)	0.00	0.00	0.00	0.00	0.00	0.37	0.39	0.00	0.00	0.00	-	-

Table 2.39: Commic tern raw counts, estimated abundance and estimated density in the array area plus 2km buffer.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	0	10	0	0	0	0	0	0
Calendar year 2 (2021)	-	0	0	0	0	4	8	2	1	0	0	0
Calendar year 3 (2022)	0	0	0	0	0	3	6	0	0	0	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	4	47	0	0	0	0	0	0
Calendar year 2 (2021)	-	0	0	0	0	44	45	47	5	0	0	0
Calendar year 3 (2022)	0	0	0	0	0	33	34	0	0	0	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.05	0.53	0.00	0.00	0.00	0.00	0.00	0.00
Calendar year 2 (2021)	-	0.00	0.00	0.00	0.00	0.50	0.51	0.53	0.06	0.00	0.00	0.00
Calendar year 3 (2022)	0.00	0.00	0.00	0.00	0.00	0.37	0.39	0.00	0.00	0.00	-	-

Common guillemot

General overview

2.15.77 The breeding population of guillemot in Ireland is estimated at 177,388 individuals (2015-2018). The population seems to be showing strong growth in the south and west of Ireland (c. 50% since Seabird 2000) and modest growth in the north and east (c. 10% since Seabird 2000). The availability of the preferred prey species (young sprat and sandeels) in the different regions are likely to be driving the differences in population growth (Cummins et al., 2019). Numbers breeding at Lambay Island, Irelands largest colony and one of the closest colonies to the array area, have remained stable over the long term with a current population of 59,983 individuals (Cummins *et al.*, 2019). Guillemot are Amber listed in Ireland (Gilbert *et al.*, 2021) due to the majority of the population breeding at fewer than 10 sites.

2.15.78 Guillemot breed in dense, large colonies between March and July (Furness, 2015) (Table 2.6). During this time their mean-maximum foraging range is 73.2 ± 80.5 km (Woodward et al., 2019).

2.15.79 Autumn migration season, in July and August, adult guillemots either remain in the waters close to the breeding colonies, or disperse further afield (Wernham et al., 2002).

Abundance and density

2.15.80 Guillemots were recorded in the array area in 27 out of 29 months. Raw counts ranged from 15 (December 2020) to 2,702 (September 2021), with abundance and density peaking at 18,368 birds and 207.55 birds/km^2 respectively (Table 2.40).

2.15.81 In the array area plus 2km buffer, raw counts ranged from 30 (December 2020) to 4,748 (September 2021), with abundance and density peaking at 33,694 birds and 167.42 birds/km^2 respectively (Table 2.41).

Table 2.40: Common guillemot raw counts, estimated abundance, and estimated density in the array area.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	66	78	766	605	1,266	83	0	15
Calendar year 2 (2021)	-	0	491	70	136	87	143	1,816	2,702	265	305	132
Calendar year 3 (2022)	310	326	66	180	96	68	1,177	1,823	2,454	829	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	378	545	5,137	3,980	9,341	4,084	445	771
Calendar year 2 (2021)	-	294	3,500	623	913	610	928	11,858	18,368	2,205	3,074	1,345
Calendar year 3 (2022)	2,387	2,664	525	1,208	596	408	7,550	11,143	15,832	7,427	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	4.28	6.15	58.05	44.97	105.55	46.14	5.02	8.71
Calendar year 2 (2021)	-	3.32	39.55	7.04	10.32	6.89	10.48	133.99	207.55	24.92	34.74	15.20
Calendar year 3 (2022)	26.97	30.10	5.93	13.65	6.74	4.61	85.31	125.90	178.89	83.92	-	-

Table 2.41: Common guillemot raw counts, estimated abundance, and estimated density in the array area plus 2km buffer.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	140	188	1,761	1,410	3,180	189	0	30
Calendar year 2 (2021)	-	0	1,327	185	273	173	272	4,220	4,748	671	577	219
Calendar year 3 (2022)	579	625	199	292	241	177	2,852	4,672	4,671	1,760	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	807	1,423	12,828	9,618	24,076	7,357	942	1,487
Calendar year 2 (2021)	-	674	9,770	1,627	1,881	1,241	1,783	29,117	33,694	5,613	6,583	2,373
Calendar year 3 (2022)	4,573	5,299	1,599	2,136	1,576	1,122	18,512	29,261	31,525	15,277	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	4.01	7.07	63.74	47.79	119.62	36.55	4.68	7.39
Calendar year 2 (2021)	-	3.35	48.54	8.09	9.34	6.17	8.86	144.67	167.42	27.89	32.71	11.79
Calendar year 3 (2022)	22.72	26.33	7.94	10.61	7.83	5.57	91.98	145.39	156.64	75.91	-	-

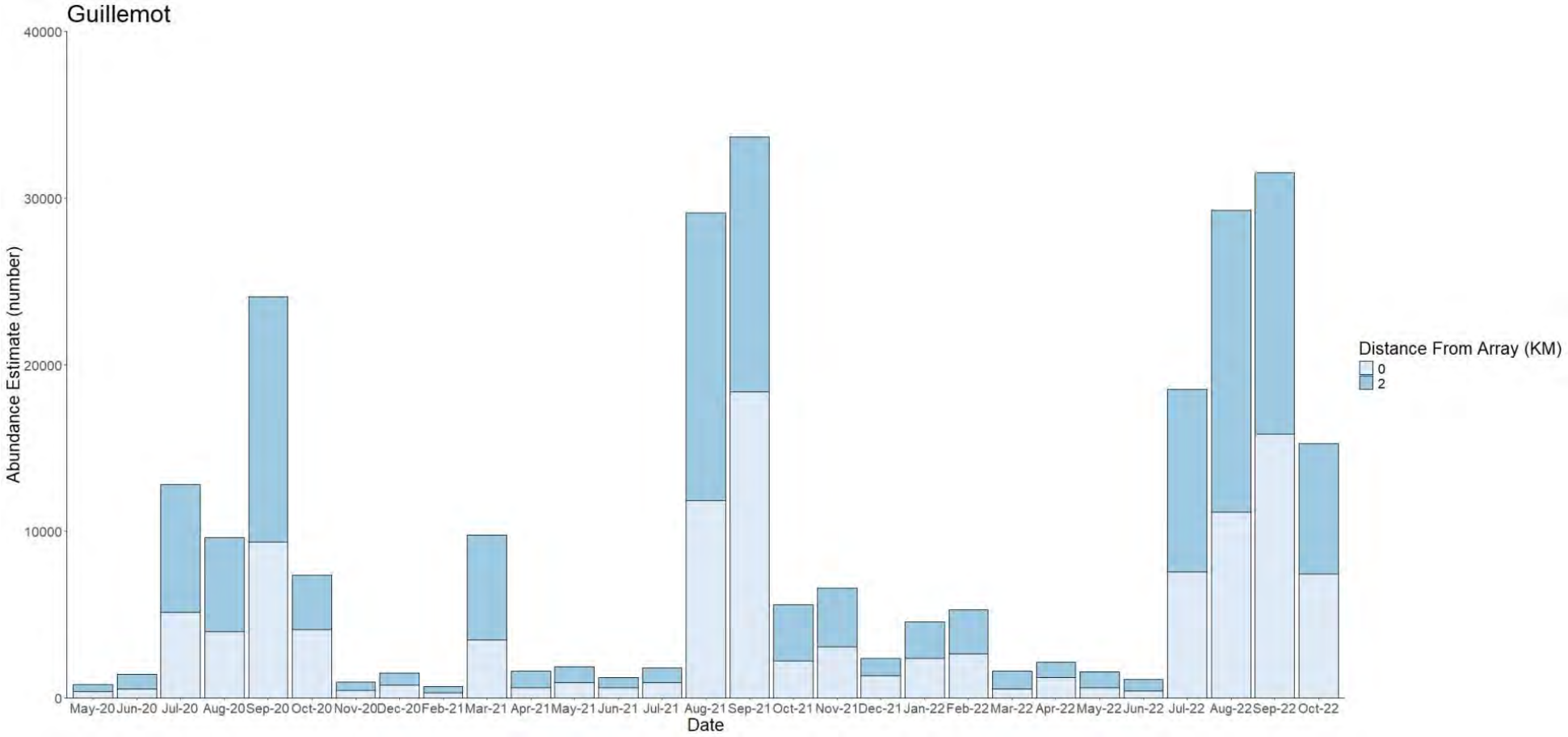


Figure 2.24: Monthly abundances of guillemot in the array area and Array Area plus 2km buffer.

2.15.82 Guillemot were the most abundant species in Irish waters recorded during the ESAS surveys between 1980 and 1997. The highest densities of guillemots (>5 birds/km^2) were recorded off the Irish east coast between July and September, when birds started to disperse from their breeding colonies. Moderate densities were recorded close to breeding colonies between March and June with lower densities between October and February (Pollock et al., 1997).

2.15.83 In March and April, moderate densities (2.00-4.99 birds/km2) were recorded off the Dublin coast, close to the breeding colonies. Moderate to high densities were recorded off the Irish east coast between May and June, with high concentrations (>5.00 birds/km2) off Wicklow at this time of year. Between July and September, high densities (>5.00 birds/km2) were recorded off the Irish east coast, with high to moderate densities elsewhere in the Irish Sea, as adults and juvenile birds moved offshore from the breeding colonies. Between October and February, guillemots were present in low to moderate densities off the Irish east coast (Pollock et al., 1997).

2.15.84 The ObSERVE aerial surveys in 2016 recorded 24,763 guillemots and razorbills (these could not be differentiated) in the survey area off the Irish east coast during the summer, autumn and winter. The abundance of guillemots and razorbills across the survey area was estimated at 36,255 individuals in summer (density = 3.95 birds/km^2), 159,503 birds in autumn (density = 17.4 birds/km^2), and 42,296 birds in winter (density = 4.61 birds/km^2) (Jessopp et al., 2018). Consistently high densities of sightings were recorded in proximity to breeding colonies at Bray Head, Howth Head and Ireland's Eye. During the autumn higher densities were recorded further north.

2.15.85 In addition, guillemot abundance was estimated using model-based approaches using MRSea. This generally predicted considerably lower abundances than the design-based methods presented above. See the Appendix 15.2: MRSea Modelling for Offshore Ornithology for further information.

Approach to guillemot bio-seasons

2.15.86 For guillemot, the Furness approach to bio-seasons is not considered the most ecologically relevant. Though Furness (2015) suggest a breeding season of March to July, project-site specific DAS data and available literature (e.g., Dunn *et al.*, 2020) demonstrates that birds at the early stages of this period are not under the same energy constraints as in the core breeding season.

2.15.87 The DAS data clearly shows large increases in guillemots using the array area and 2km buffer from July onwards (Figure 2.24). For example, the mean abundance of guillemots estimated to be present in the core breeding season (May and June) across the three breeding seasons covered by DAS data is 1,342 individuals, and this increases to a mean of 11,041 in July. This increase in abundance is highly likely to be due to guillemots dispersing from colonies in the wider region (including a proportion from local colonies), and continues to increase as birds disperse throughout the region into August and September with mean estimated abundances in the array area and 2km buffer of 22,665 and 29,765, respectively.

2.15.88 During the early stages of colony attendance there is no demand to return to the colony to relieve the other parent, or to provision the chick. Dunn *et al*. (2020) also demonstrated that colony attendance in March and April is lower than in May and through the rest of the breeding season. This can only be a result of adult birds either not attending the colony at all, or birds spending more time away from the colony (as a result of travelling further, or staying away for longer). Either option demonstrates that during the early breeding season guillemots are not under the same energetic constraints as when they have eggs or young, and as such are not limited by the mean max foraging ranges that are applicable to the incubation and chick-rearing period. If birds are not limited by mean max foraging ranges then they should not be considered in the same manner as those that are.

2.15.89 Dunn *et al*. (2022) presents a breeding cycle at the Isle of May where incubation begins in early May, and this is likely to be the case at similar latitudes (breeding is later further north, but not at a scale where similar latitudes could have substantially different timings, for example breeding in Iceland is approximately one week later than in the UK (Cramp *et al*. 1977 – 1994)). Dunn (2022) also demonstrated that energy gain in March and April was relatively consistent with earlier in the year, before reducing substantially through May and June, indicating a radical change in behaviour between these two periods. Therefore, Guillemots may be present at colonies in March and April, but we conclude that their behaviour in March and April is not consistent with their behaviour during incubation and chick rearing in May and June. Therefore, we conclude that where breeding season assessment is framed around incubation and chich-rearing mean max foraging ranges, March and April should not be considered as the breeding season.

2.15.90 On the Isle of May, the median fledging date varied between June 20th and July 10th and timings are likely to be similar across similar latitudes. Therefore, aggregations of birds in the offshore development area in July are highly likely to include large numbers of birds undergoing post-breeding dispersal (i.e. birds that have finished breeding, as opposed to being breeding birds). With a large but unknown proportion of birds present in July no longer considered as breeding, a more ecologically relevant breeding season of April to June is used as the proposed development approach.

Bio-season peak estimates

2.15.91 Guillemots were present across both bio-seasons, with highest abundance in the non-breeding season with a mean peak of 15,514 individuals and a density of 164.00 birds/km^2 in the array area (Table 2.42).

Table 2.42: Common guillemot bio-season mean peak abundance and density estimates in the array area and array area plus 2km buffer.

BDMPS Bio-seasons	Months	Array area		Array area plus 2km buffer	
		Bio-season mean peak abundance (n)	Bio-season mean peak density (n/km^2)	Bio-season mean peak abundance (n)	Bio-season mean peak density (n/km^2)
Breeding (Furness approach)	Mar – Jul	5,396	60.97	13,703	68.09

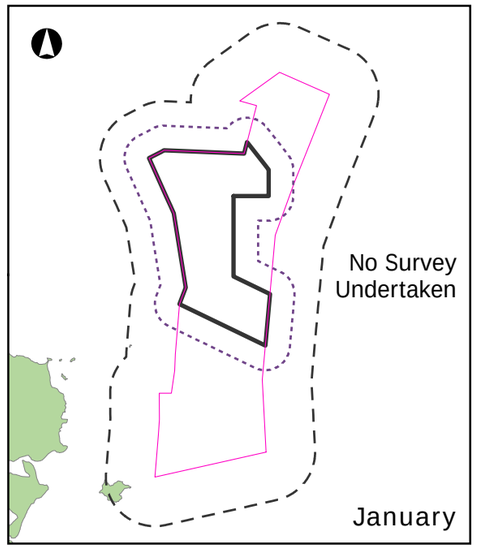
Breeding (Project approach)	Apr - Jun	889	10.04	1,813	9.01
Non-breeding	Aug - Feb	14,514	164.00	29,765	147.89

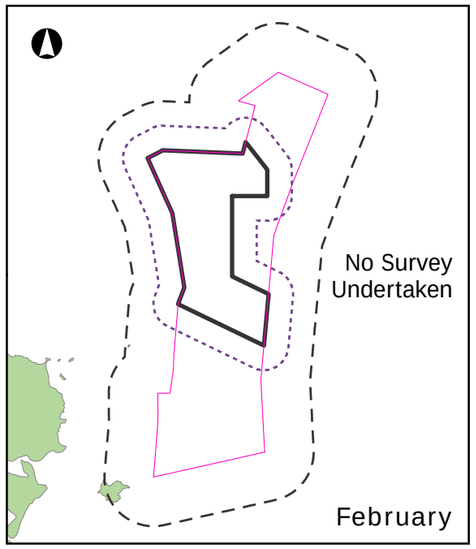
Spatial density distribution and flight direction

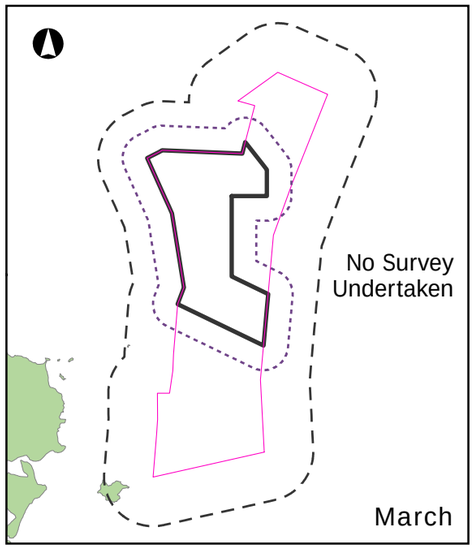
2.15.92 Density maps based on DAS data are presented in Figure 2.25 to Figure 2.26 below. Guillemots were distributed across the survey area in both the breeding and non-breeding bio-seasons, though across both seasons density was highest towards the east.

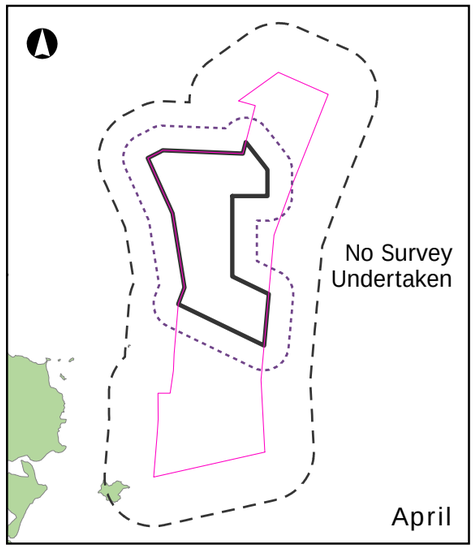
2.15.93 Data from Jessop *et al*. (2018) similarly showed that birds were widely distributed. During the breeding season, densities appeared slightly higher towards the south-west of the proposed development (mostly outside of the survey area), while during the Autumn migration bio-season, densities were highest to the north-west of the proposed development. Notably guillemots and razorbills were not differentiated within this dataset.

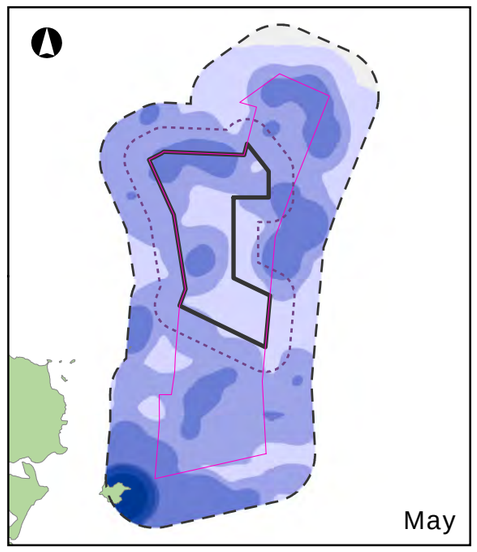
2.15.94 Flight directions recorded during the DAS surveys found that majority of the time the flight direction was variable for guillemots (Figure 2.28). There were some exceptions with flying directions in March 2022 being predominantly westerly and in July 2022 south-westerly (Figure 2.28). Both June 2020 and 2022 saw a large number of flying birds recorded and although the direction was variable there was a slight preference to the easterly direction (Figure 2.28), suggesting birds flying to and from colonies in search of food.

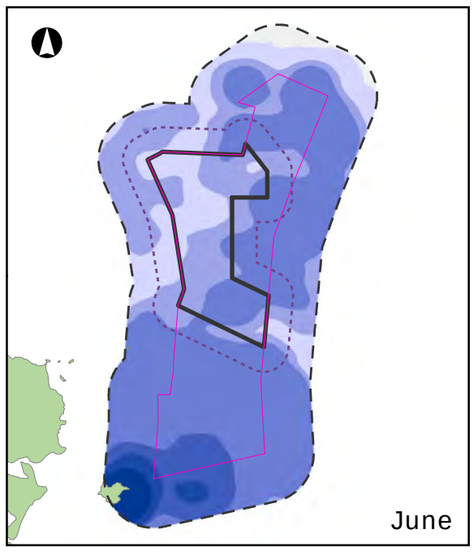


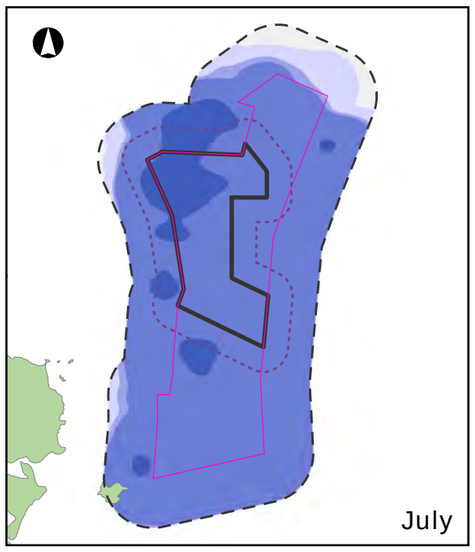


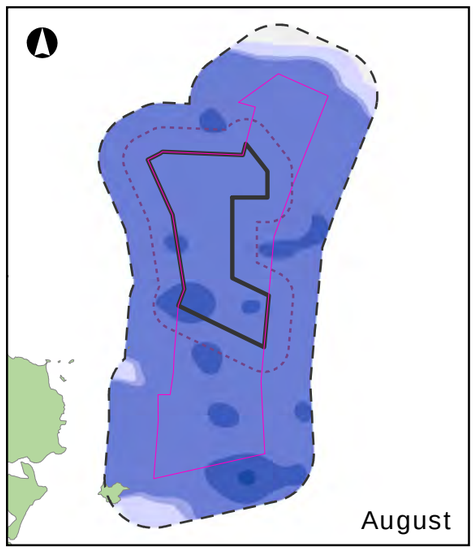


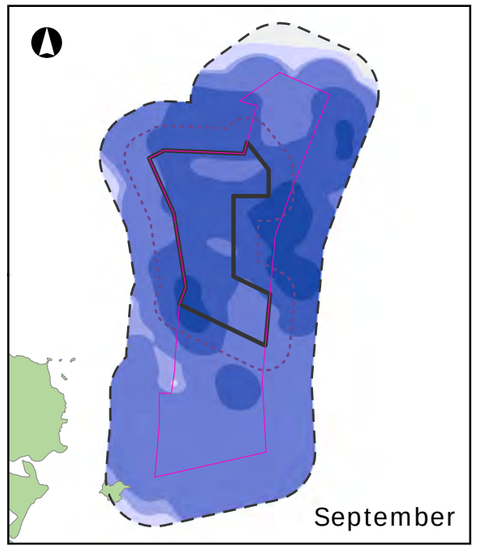


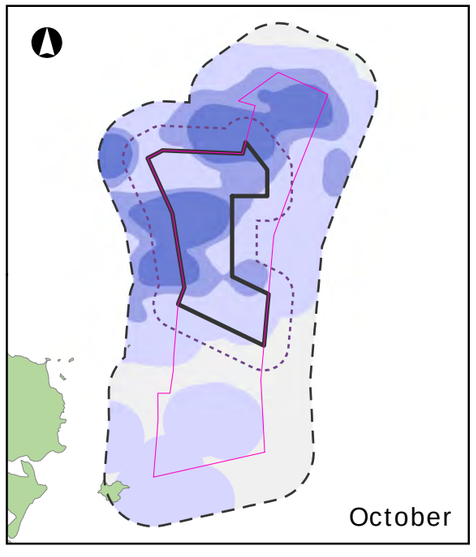


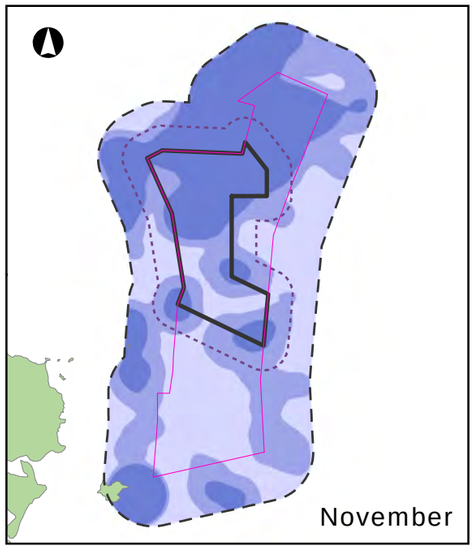


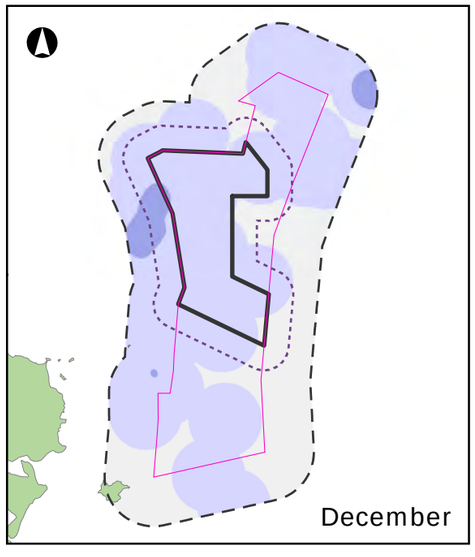












Array Area
2km Buffer from Array Area
MAC Boundary (Array Area Only)
4km Buffer from MAC Boundary (Array Area Only)

Guillemot Density (per km^2)

- 0
- 0 - 5
- 5 - 10
- 10 - 100
- 100 - 250
- 250 - 1,000
- 1,000 - 4,000

Kilometres
0 2 4 6 8 10

NISA
North Irish Sea Array

ARUP GoBe

Project
North Irish Sea Array Offshore Wind Farm

Figure Title
Guillemot Density Heatmap 2020

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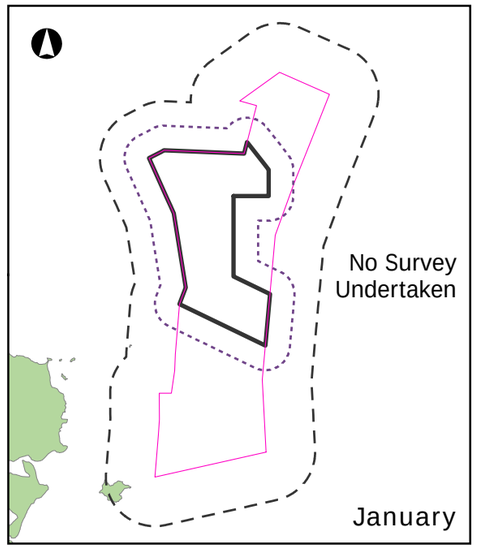
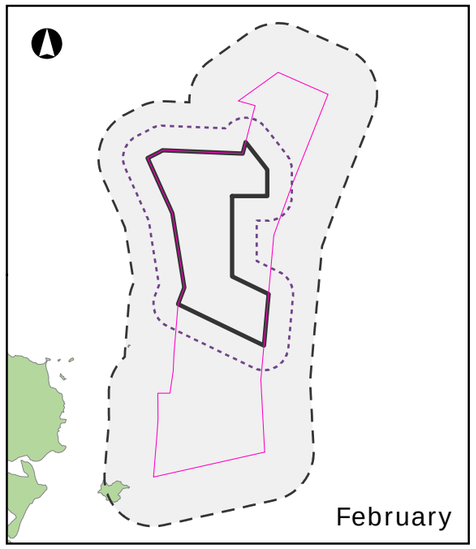
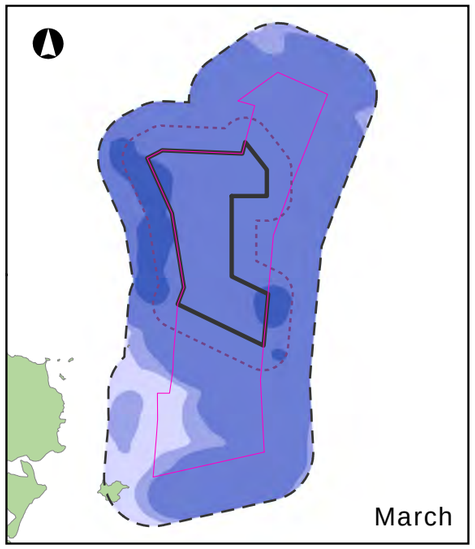
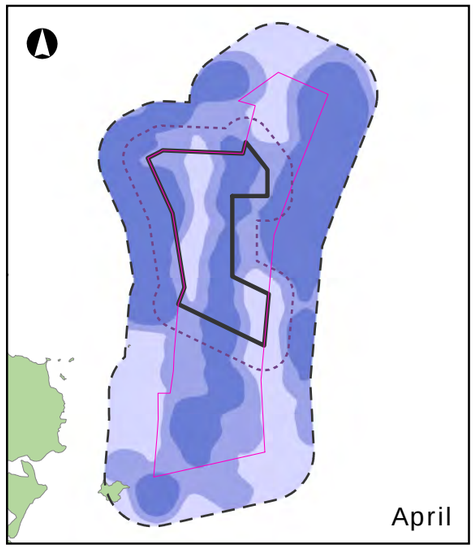
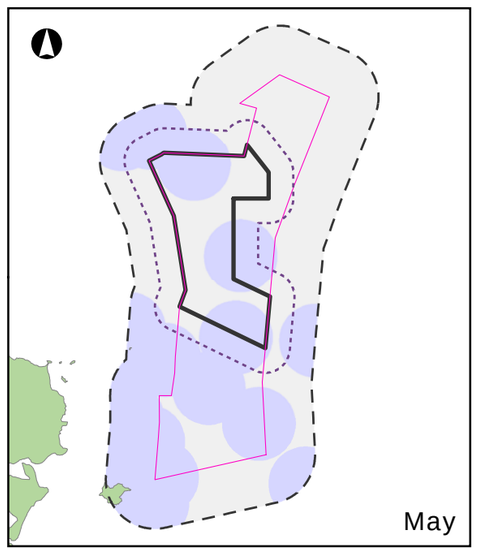
Date: May 2024	Figure No: 2.25
Scale: 1:500,000 @A3	
Status: Issue	

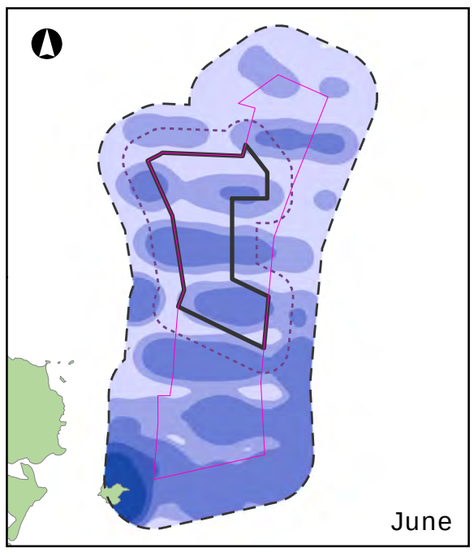


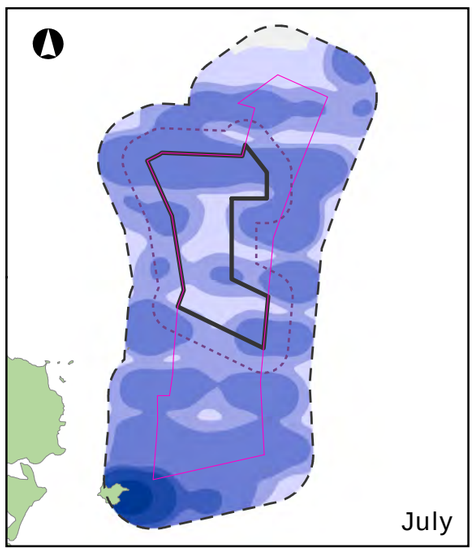


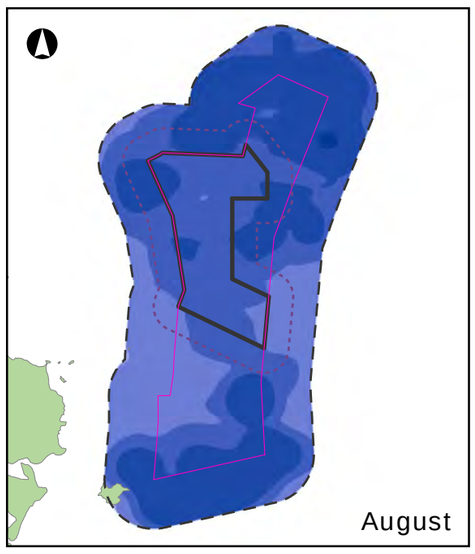


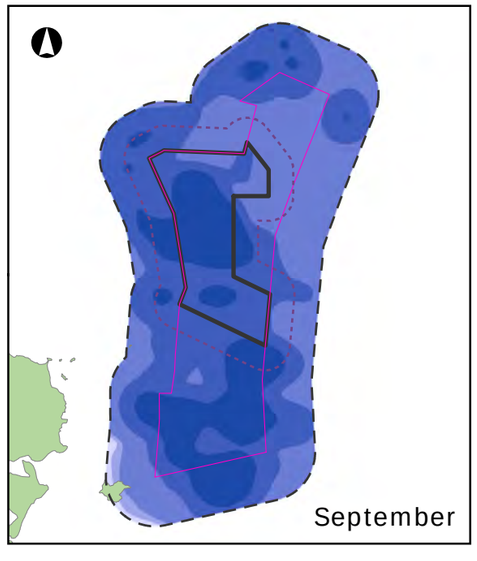


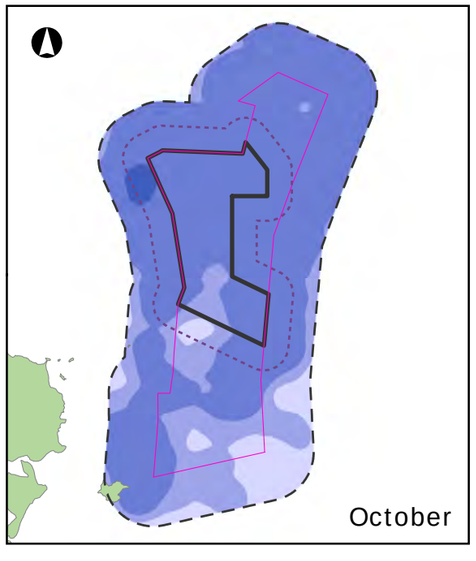


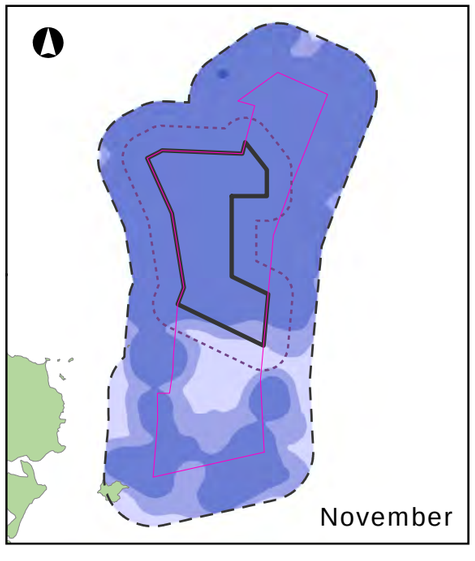


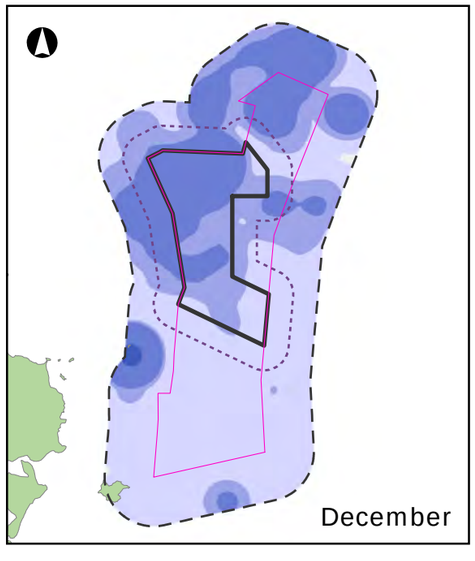












Array Area
2km Buffer from Array Area
MAC Boundary (Array Area Only)
4km Buffer from MAC Boundary (Array Area Only)

Guillemot Density (per km^2)
0
0 - 5
5 - 10
10 - 100
100 - 250
250 - 1,000
1,000 - 4,000

Kilometres
0 2 4 6 8 10

NISA
North Irish Sea Array

ARUP GoBe

Project
North Irish Sea Array Offshore Wind Farm

Figure Title
Guillemot Density Heatmap 2021

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Date: May 2024	Figure No: 2.26
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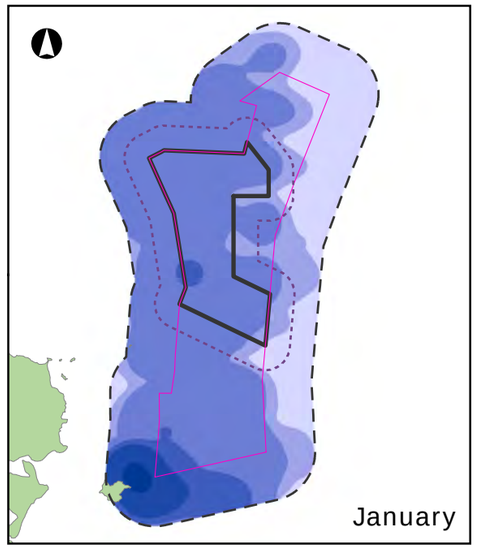
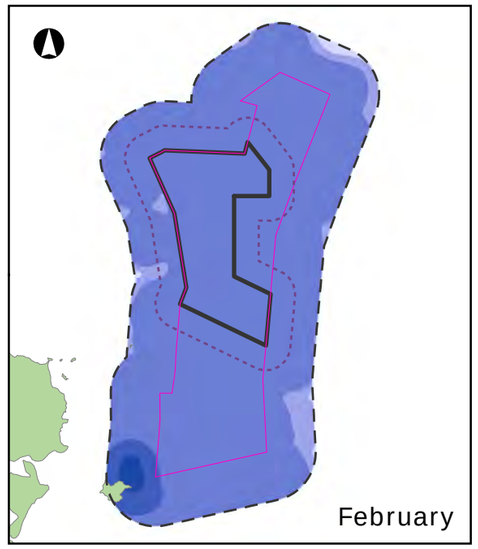
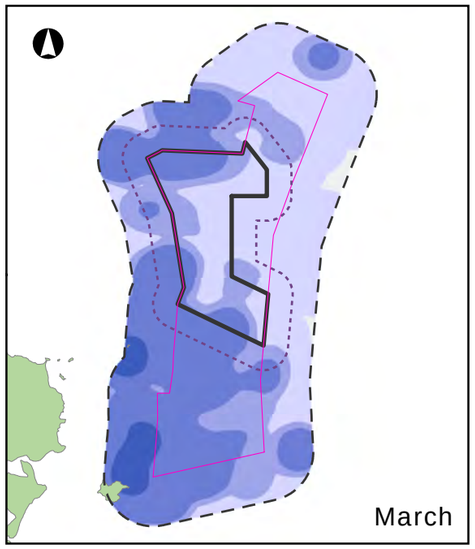
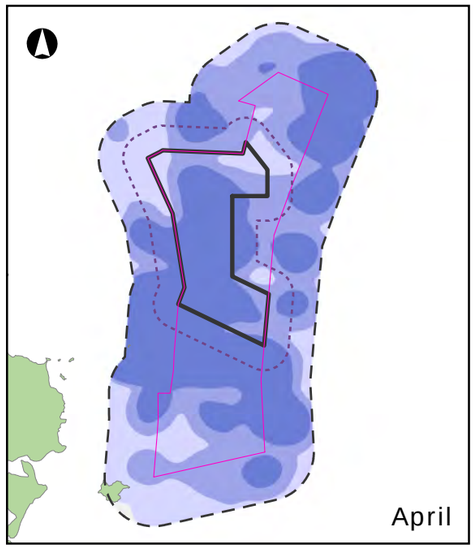
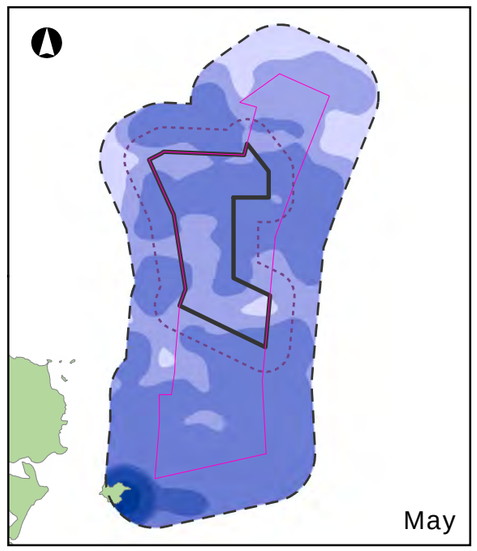
Status: Issue	

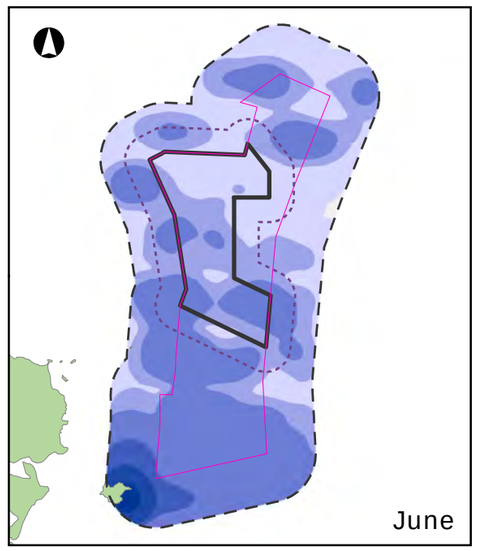


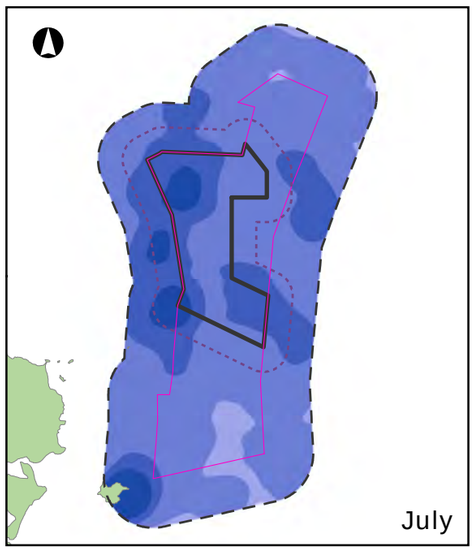


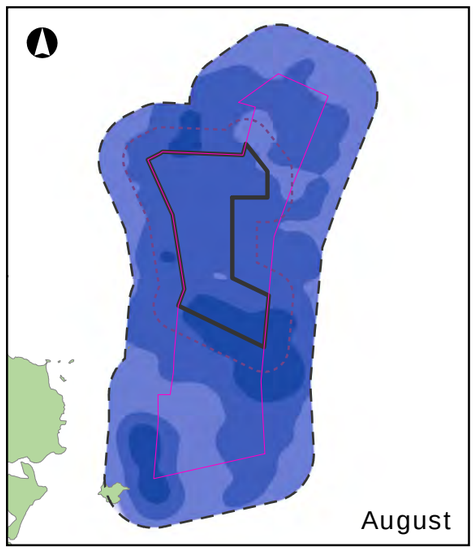


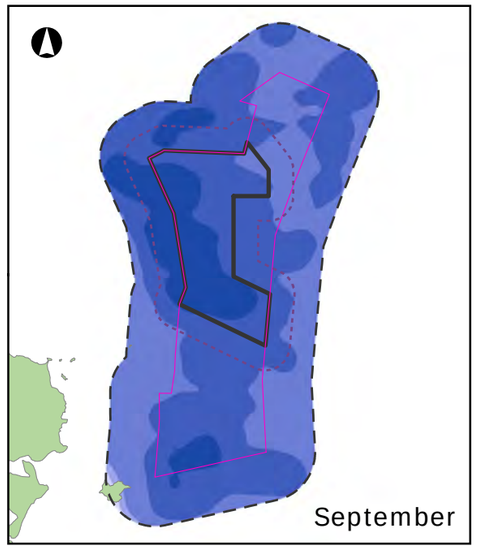


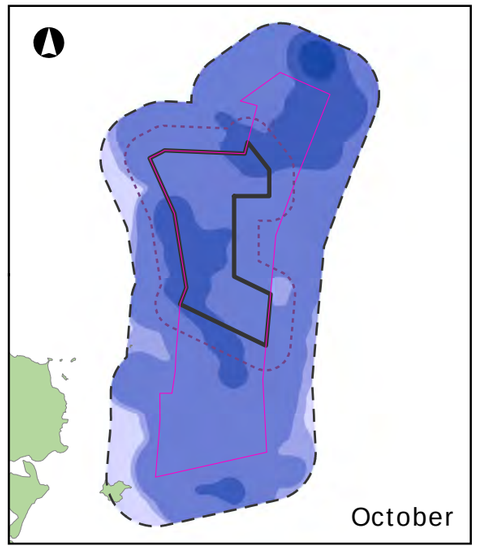


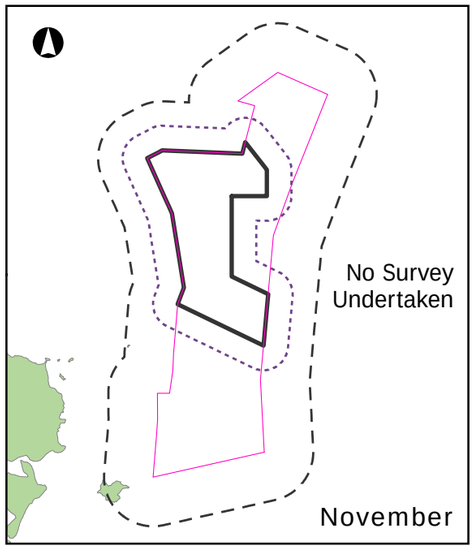


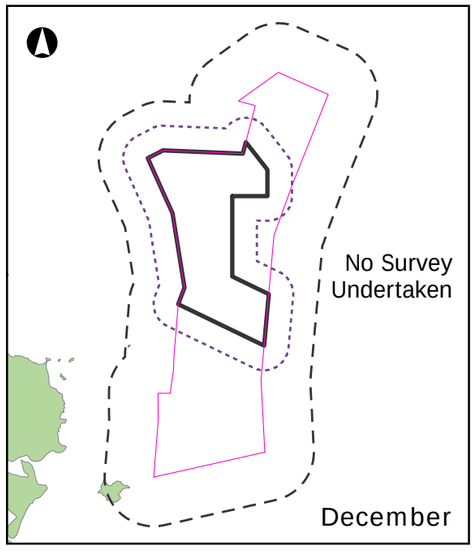












Array Area
2km Buffer from Array Area
MAC Boundary (Array Area Only)
4km Buffer from MAC Boundary (Array Area Only)

Guillemot Density (per km^2)
- 0
- 0 - 5
- 5 - 10
- 10 - 100
- 100 - 250
- 250 - 1,000
- 1,000 - 4,000

Kilometres
0 2 4 6 8 10

NISA
North Irish Sea Array

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North Irish Sea Array Offshore Wind Farm

Figure Title
Guillemot Density Heatmap 2022

Job No: 281240	Datum: WGS84 Projection: UTM30N
Date: May 2024	Figure No: 2.27
Scale: 1:500,000 @A3	
Status: Issue	

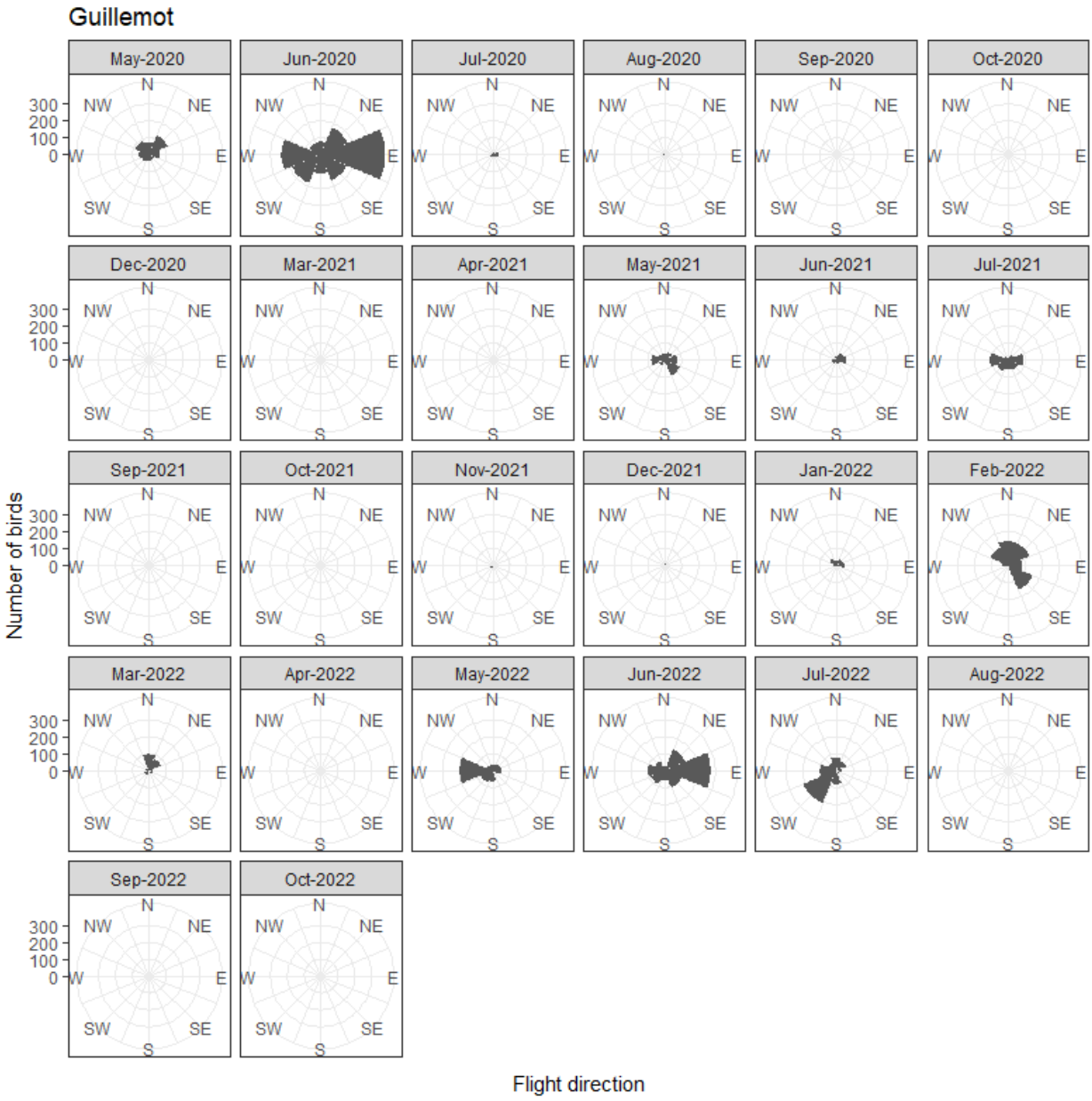
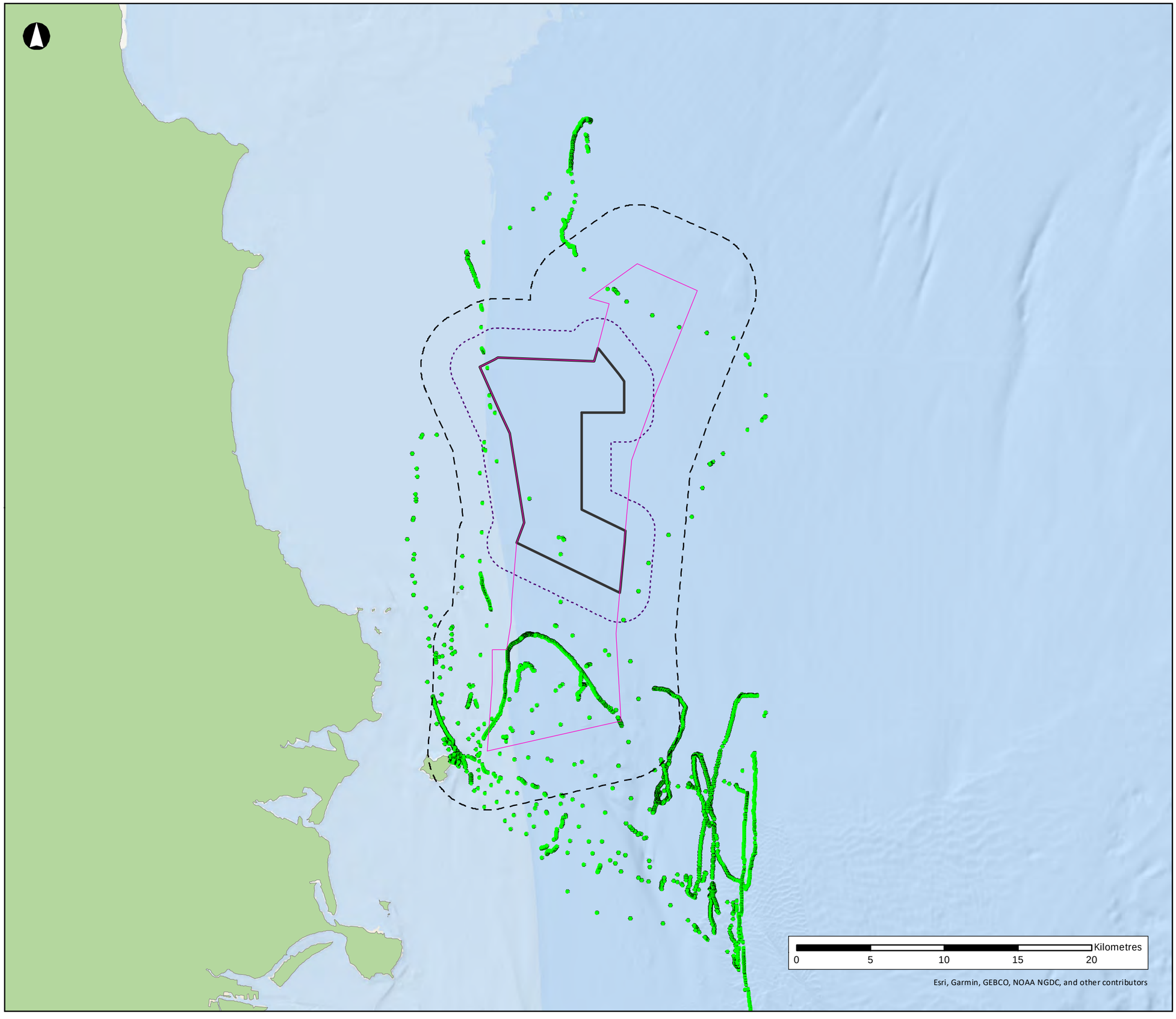


Figure 2.28: Guillemot monthly flight directions in the ornithology study area.

Available tracking data

2.15.95 Tracking data is available for guillemots from Lambay Island through the FAME dataset (Baer & Newton, 2012). Four individuals were tracked for a total of 10 days between 2010 and 2011, with individuals travelling up to 45km from Lambay Island, though most foraging activity was located within the mean foraging distance of 29km. Key foraging areas were located to the east of Lambay Island, resulting in minimal overlap with the array area, though notably this dataset was based on only four individuals which may not be representative of the whole colony.



Array Area
2km Buffer from Array Area
MAC Boundary (Array Area Only)
4km Buffer from MAC Boundary (Array Area Only)
Guillemot Tracks from Lambay Island

NISA
North Irish Sea Array

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Project
North Irish Sea Array Offshore Wind Farm

Figure Title
Tracking Data sourced from BirdWatch Ireland (BWI) - Guillemot

Job No: 281240	Datum: WGS84 Projection: UTM30N
Date: May 2024	Figure No: 2.29
Scale: 1:250,000 @A3	
Status: Issue	

General overview

2.15.96 Razorbill are generally less abundant than guillemot across Ireland with an estimated breeding population of 33,689 individuals (2015-2018). Both the breeding population and distribution have increased substantially since the 1980s. Similarly, to other species, more than 50% of the Irish razorbill breeding population is concentrated in 10 or less sites (Gilbert *et al.*, 2021), giving it a red-listed status in Ireland. It is also classified as being of global conservation concern by Birdlife International.

2.15.97 Razorbill breeding season is between April and July (Furness, 2015) (Table 2.6). During this time adults travel mean-maximum range of 88.7 ± 75.9 km to forage (Woodward *et al.*, 2019).

2.15.98 Post breeding and post-breeding moult period, razorbills winter as far as Iberia and Morocco (Wernham *et al.*, 2002).

Abundance and density

2.15.99 Razorbills were recorded in the array area in 24 out of 29 months. Raw counts ranged from one (May 2021 and August 2022) to 337 (October 2022), with abundance and density peaking at 2,779 birds and 31.41 birds/km2 respectively (Table 2.43).

2.15.100 In the array area plus 2km buffer, raw counts ranged from two (July 2021) to 790 (October 2022), with abundance and density peaking at 6,274 birds and 31.17 birds/km2 respectively (Table 2.44).

Table 2.43: Razorbill raw counts, estimated abundance, and estimated density in the array area.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	3	4	5	5	108	47	0	9
Calendar year 2 (2021)	-	0	23	4	1	0	0	78	32	34	160	123
Calendar year 3 (2022)	8	33	2	3	3	0	20	1	38	337	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	17	27	31	30	736	1,668	244	431
Calendar year 2 (2021)	-	23	150	34	7	0	0	471	201	249	1360	1179
Calendar year 3 (2022)	58	246	16	18	18	0	117	6	227	2,779	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.20	0.31	0.35	0.34	8.31	18.85	2.75	4.87
Calendar year 2 (2021)	-	0.25	1.69	0.38	0.08	0.00	0.00	5.32	2.27	2.81	15.36	13.33
Calendar year 3 (2022)	0.66	2.78	0.18	0.21	0.20	0.00	1.33	0.07	2.56	31.41	-	-

Table 2.44: Razorbill raw counts, estimated abundance, and estimated density in the array area plus 2km buffer.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	14	9	27	9	228	133	0	26
Calendar year 2 (2021)	-	0	53	4	4	0	2	176	71	108	265	291
Calendar year 3 (2022)	14	76	5	24	13	0	48	5	99	790	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	79	63	182	57	1,592	2,718	520	1,158
Calendar year 2 (2021)	-	78	359	33	26	0	12	1,121	466	820	1,397	3,000
Calendar year 3 (2022)	107	608	40	163	79	0	289	29	617	6,274	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.39	0.31	0.91	0.28	7.91	13.50	2.58	5.75
Calendar year 2 (2021)	-	0.39	1.78	0.16	0.13	0.00	0.06	5.57	2.31	4.07	6.94	14.90
Calendar year 3 (2022)	0.53	3.02	0.20	0.81	0.39	0.00	1.43	0.14	3.07	31.17	-	-

2.15.101 ESAS surveys which took place in Irish waters between 1980 and 1997 recorded low densities of razorbill off the east coast of Ireland between March and June. Similarly to guillemot, the highest abundance of razorbill was recorded off the Dublin coast between July and August, coinciding with birds leaving their breeding colonies. During September and October the distribution was more widespread leading to higher densities across the Irish Sea. Throughout November to February, razorbills were widely distributed across the Dublin coast and elsewhere in the Irish Sea at low densities (Pollock et al., 1997).

2.15.102 Historical surveys recorded razorbill throughout the year with peak abundances of 3,110 birds in September 2002 (Percival et al., 2002), and 2,685 and 1,450 birds in July and August 2010, respectively (Newton and Trewby, 2011). Results from the ObSERVE aerial surveys during 2016 are presented in the guillemot section.

2.15.103 In addition, razorbill abundance was estimated using model-based approaches using MRSea. This generally predicted slightly lower abundances than the design-based methods presented above. See the Appendix 15.2: MRSea Modelling for Offshore Ornithology for further information.

Bio-season peak estimates

2.15.104 Razorbills were present across all bio-seasons, with highest abundance in the autumn migration bio-season with a mean peak of 1,640 individuals and a density of 18.53 birds/km^2 in the array area (Table 2.45).

Table 2.45: Razorbill bio-season mean peak abundance and density estimates in the array area and array area plus 2km buffer.

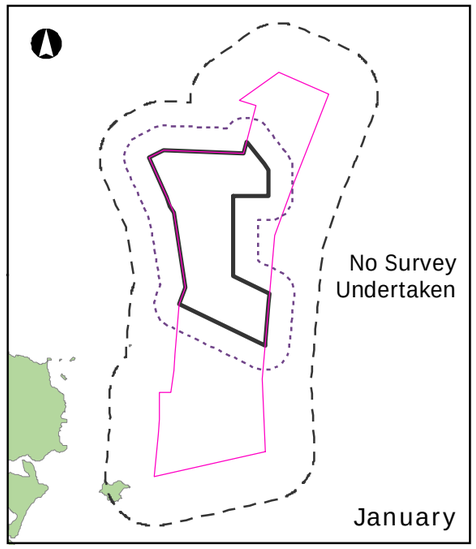
BDMPS Bio-seasons	Months	Array area		Array area plus 2km buffer	
		Bio-season peak abundance (n)	Bio-season peak density (n/km^2)	Bio-season peak abundance (n)	Bio-season peak density (n/km^2)
Breeding	Apr – Jul	61	0.69	168	0.83
Autumn migration	Aug – Oct	1,640	18.53	3,371	16.75
Spring migration	Jan – Mar	198	2.24	483	2.40
Winter	Nov - Dec	85	10.12	2,079	10.33

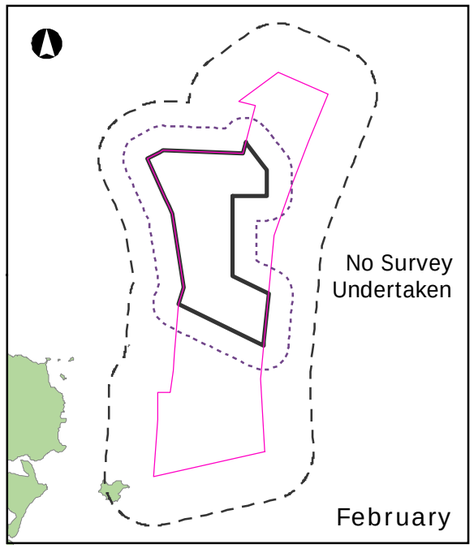
Spatial density distribution and flight direction

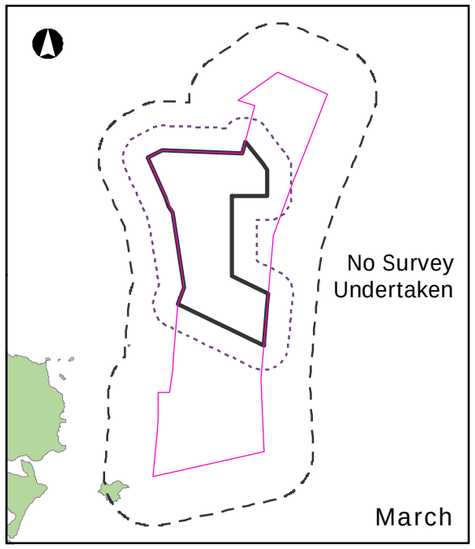
2.15.105 Density maps based on DAS data are presented in Figure 2.30 to Figure 2.32 below. Razorbills were distributed across the survey area in all bio-seasons. No clear trend was evident, with density hotspots varying across bio-seasons. In the breeding bio-season, the highest density was found in the south of the survey area. In the autumn and spring, density hotspots were found in the west and north-west respectively. In the winter bio-season, densities were highest in the north-east.

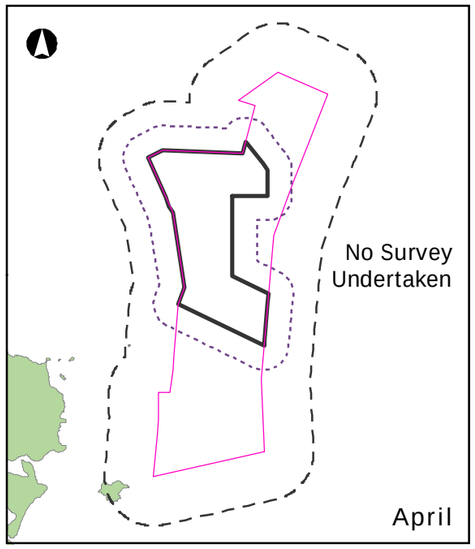
2.15.106 Data from Jessop *et al*. (2018) similarly showed that birds were widely distributed. During the breeding season, densities appeared slightly higher towards the south-west of the proposed development (mostly outside of the survey area), while during the Autumn migration bio-season, densities were highest to the north-west of the proposed development. Notably guillemots and razorbills were not differentiated within this dataset.

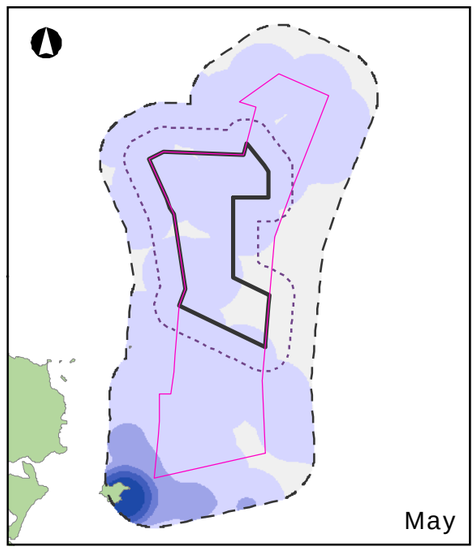
2.15.107 The flight direction data collected during the DAS surveys was minimal for the majority of the months surveyed (Figure 2.33) apart from October 2020 where large numbers were recorded flying south and in November 2021 where the majority were flying southwest (Figure 2.33). All other months had minimal numbers of birds recorded flying.

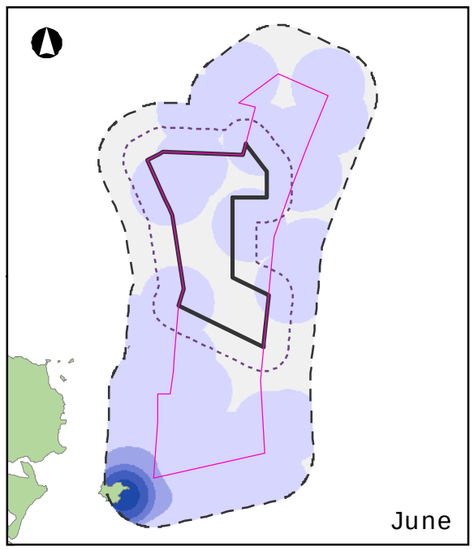


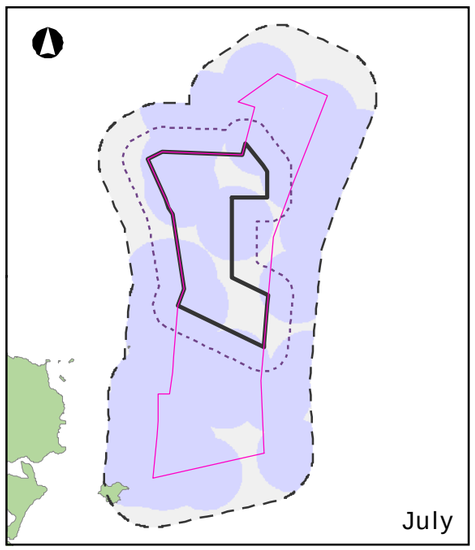


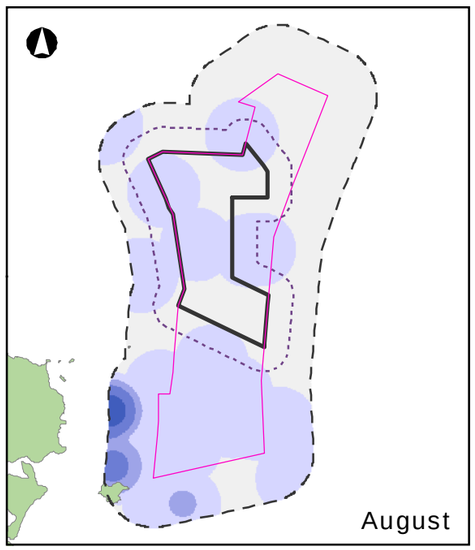


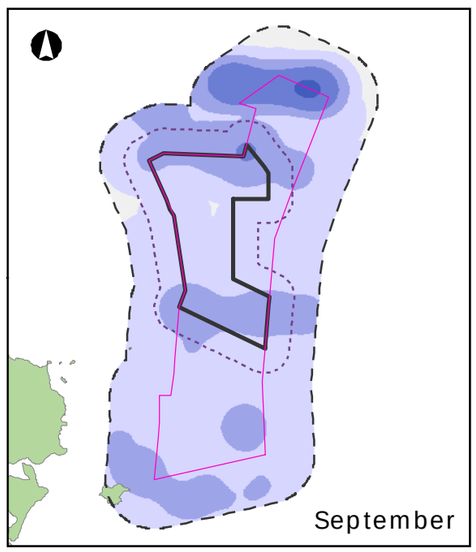


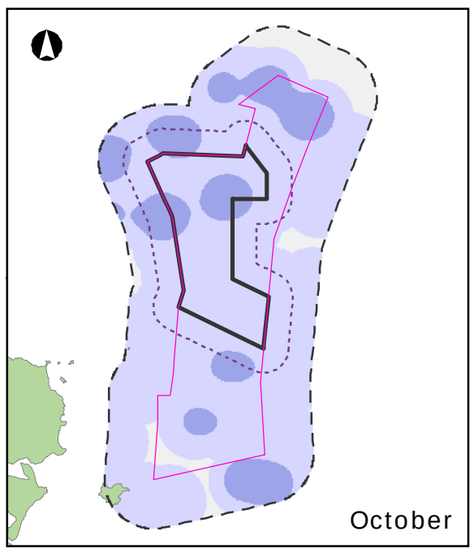


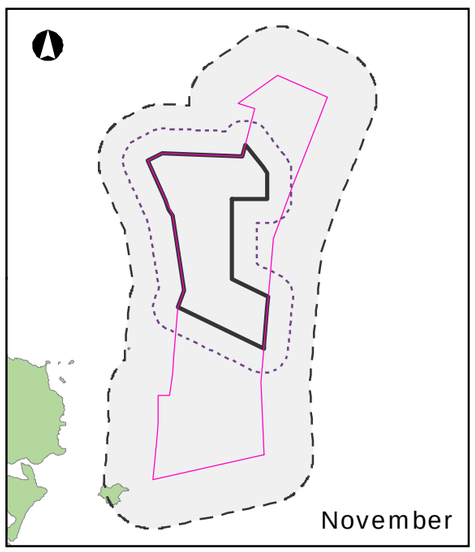


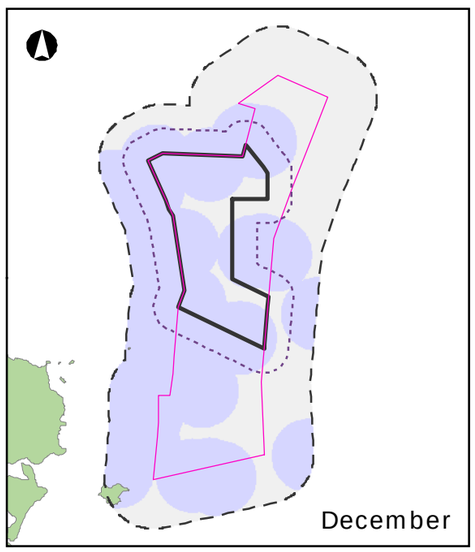












Array Area
2km Buffer from Array Area
MAC Boundary (Array Area Only)
4km Buffer from MAC Boundary (Array Area Only)

Razorbill Density (per km²)
0
0 - 10
10 - 40
40 - 100
100 - 200
200 - 400
400 - 595

Kilometres
0 2 4 6 8 10

NISA
North Irish Sea Array

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Project
North Irish Sea Array Offshore Wind Farm

Figure Title
Razorbill Density Heatmap 2020

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Date: May 2024	Figure No: 2.30
Scale: 1:500,000 @A3	
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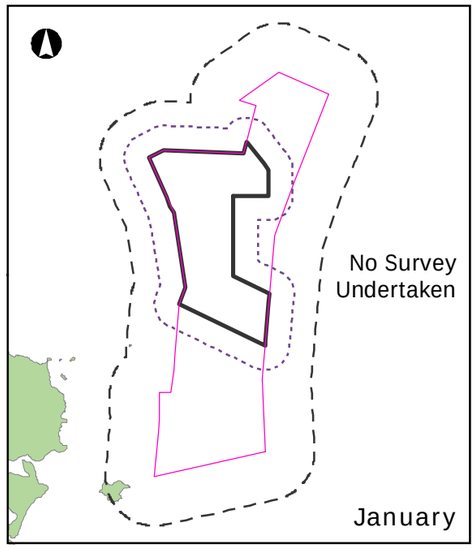
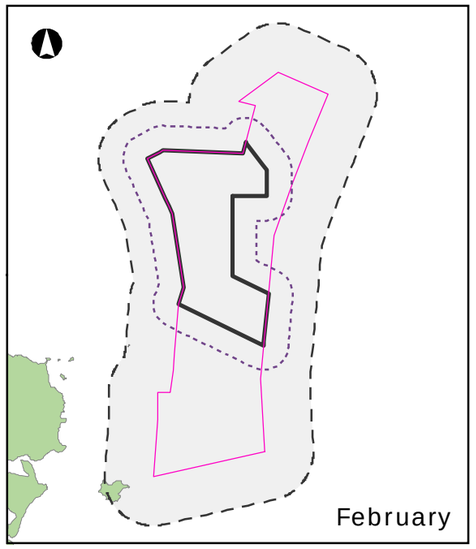
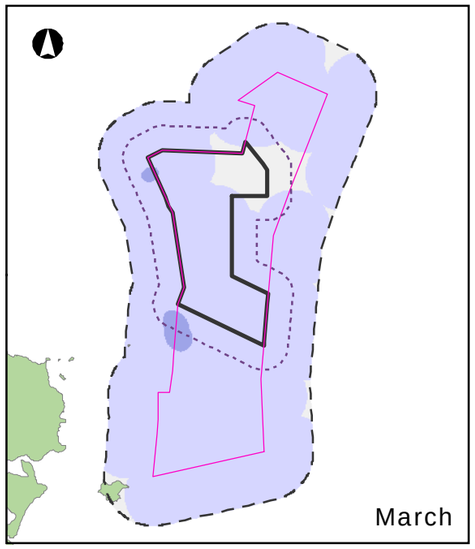
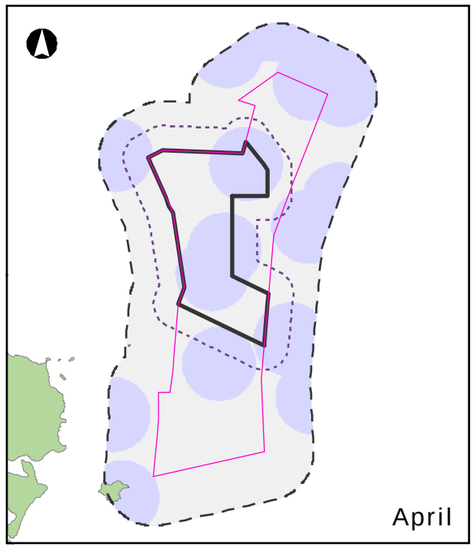
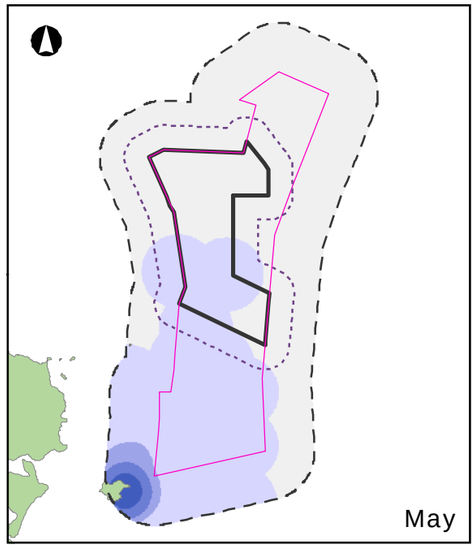
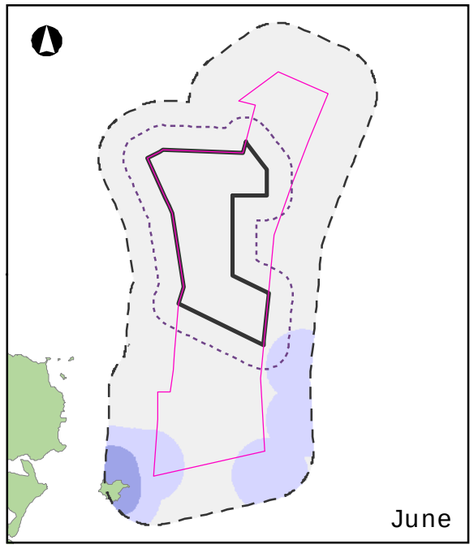


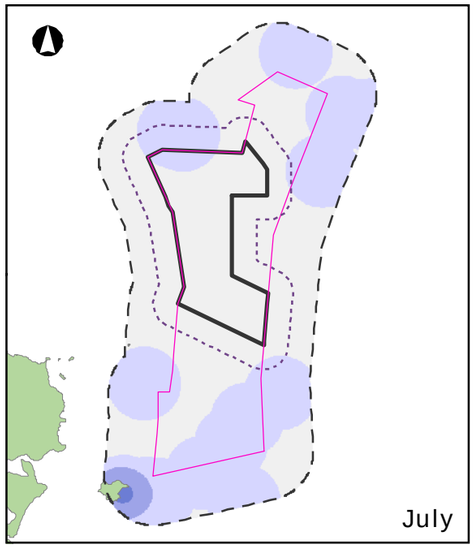


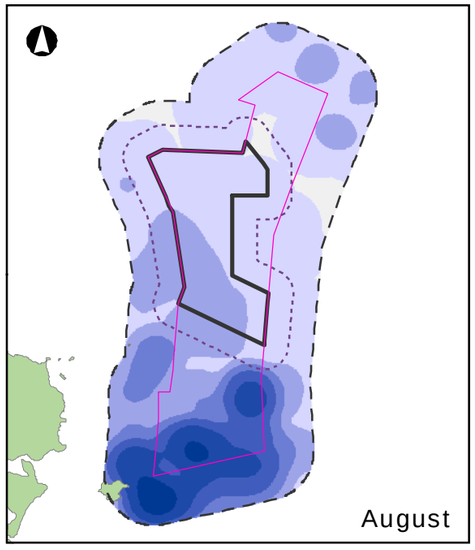


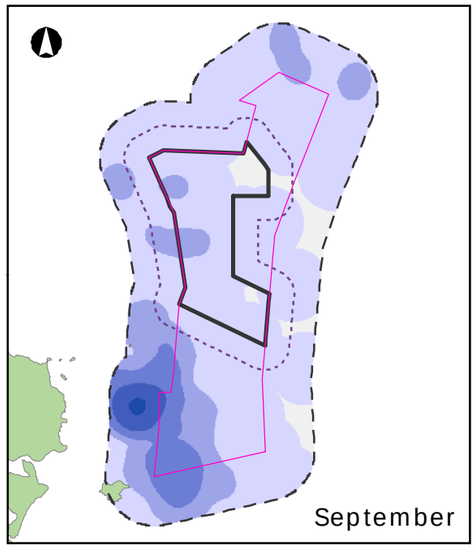


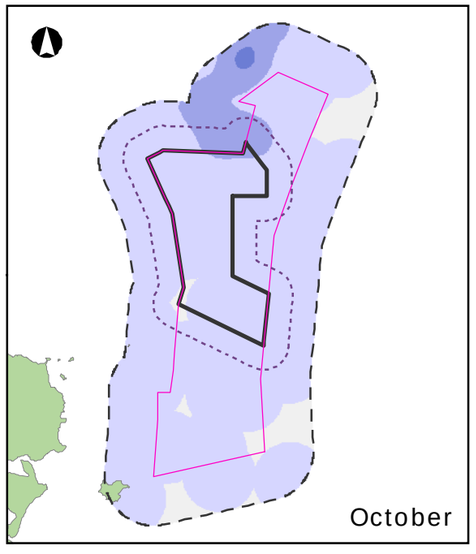


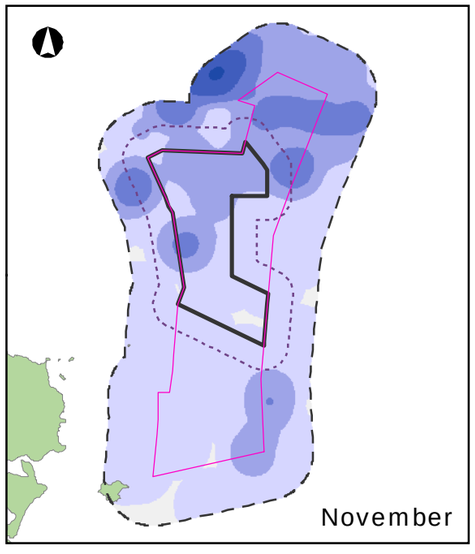


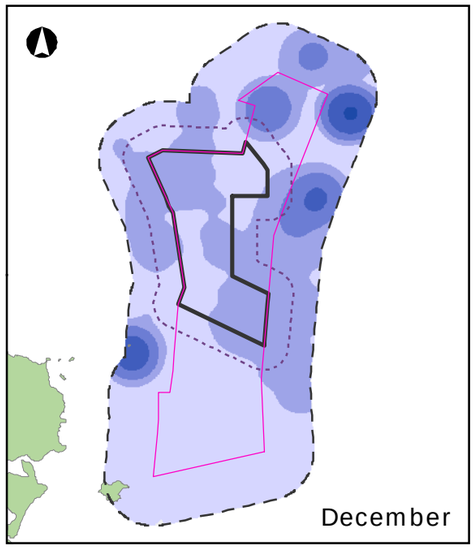












Array Area
2km Buffer from Array Area
MAC Boundary (Array Area Only)
4km Buffer from MAC Boundary (Array Area Only)

Razorbill Density (per km²)
0
0 - 10
10 - 40
40 - 100
100 - 200
200 - 400
400 - 595

Kilometres
0 2 4 6 8 10

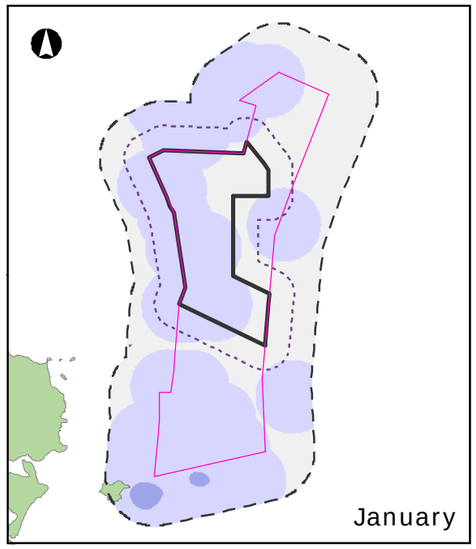
NISA
North Irish Sea Array

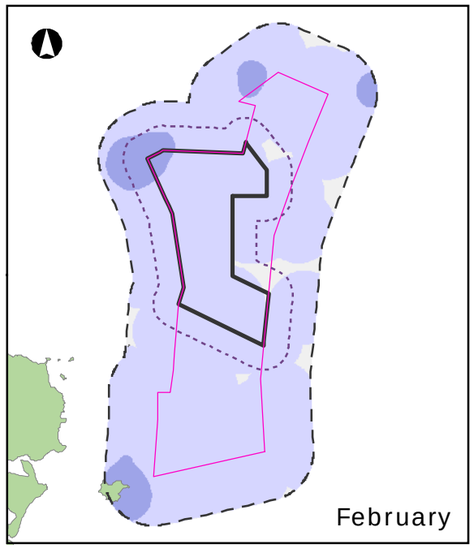
ARUP GoBe

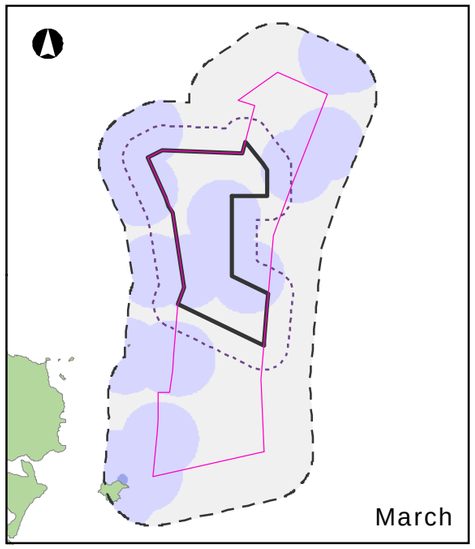
Project
North Irish Sea Array Offshore Wind Farm

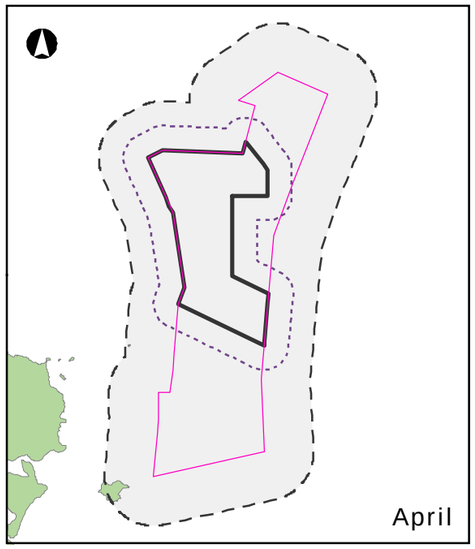
Figure Title
Razorbill Density Heatmap 2021

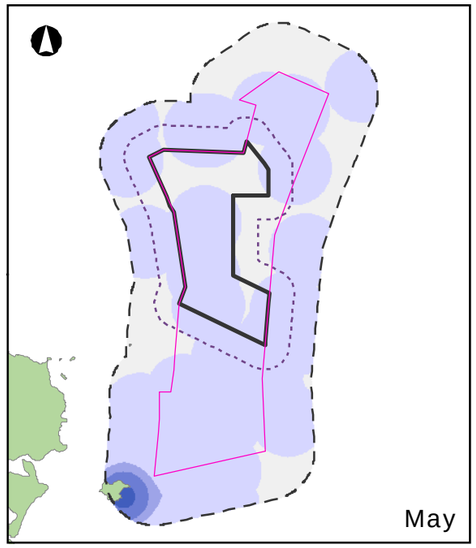
Job No: 281240	Datum: WGS84 Projection: UTM30N
Date: May 2024	Figure No: 2.31
Scale: 1:500,000 @A3	
Status: Issue	

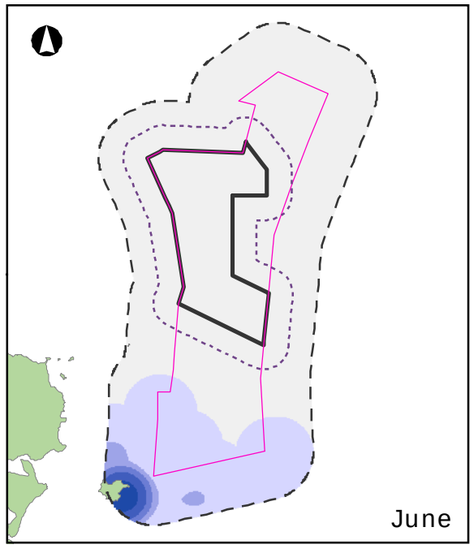


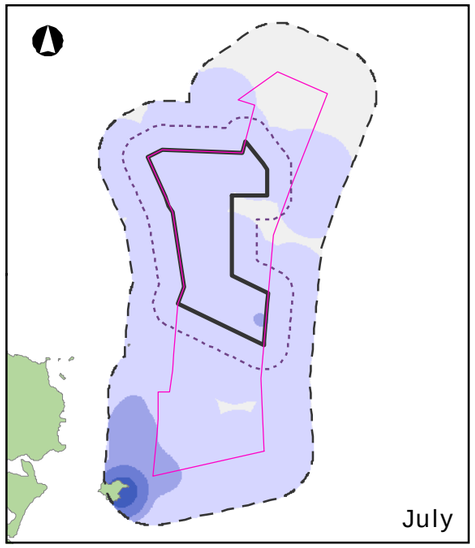


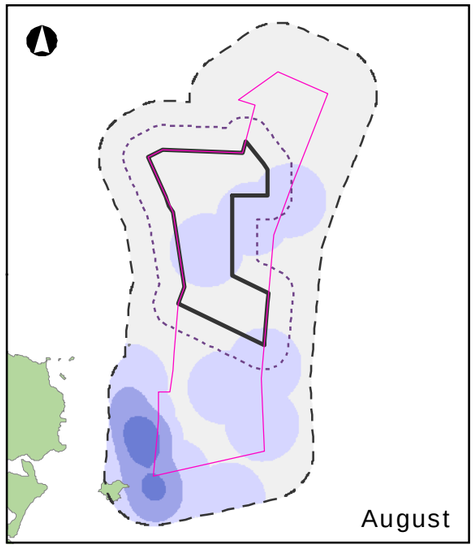


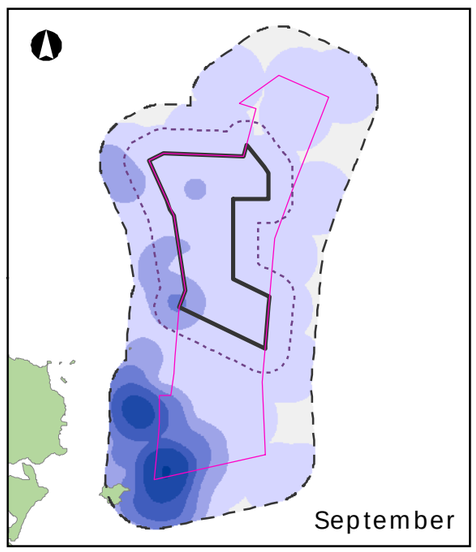


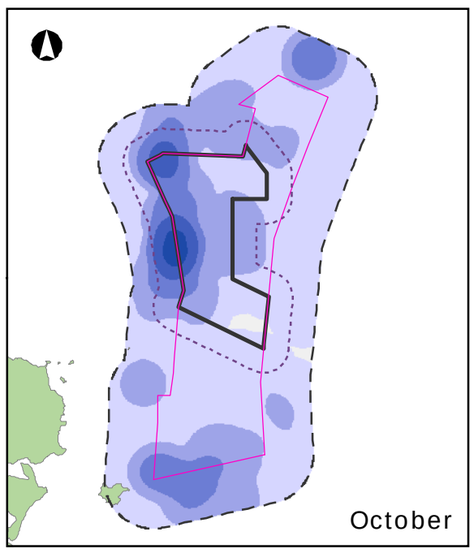


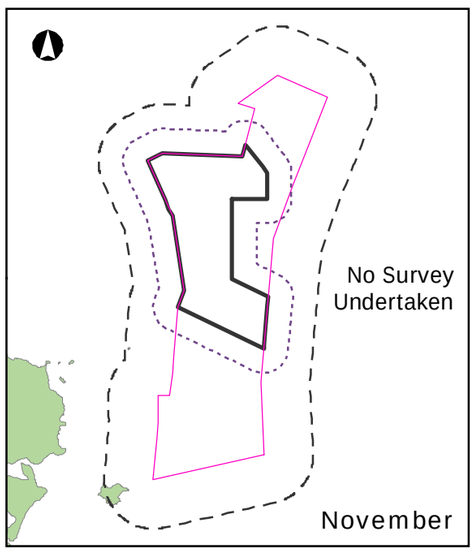


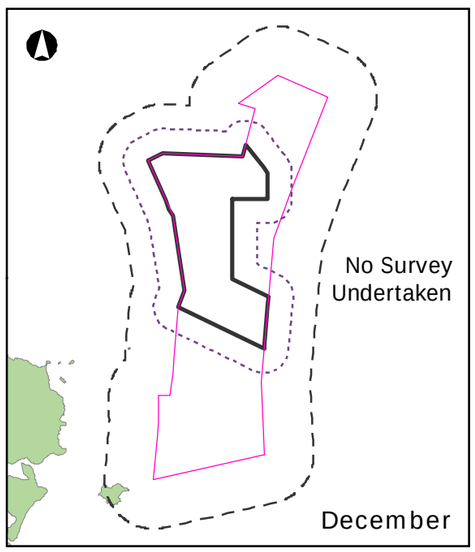












Array Area
2km Buffer from Array Area
MAC Boundary (Array Area Only)
4km Buffer from MAC Boundary (Array Area Only)

Razorbill Density (per km²)
0
0 - 10
10 - 40
40 - 100
100 - 200
200 - 400
400 - 595

Kilometres
0 2 4 6 8 10

NISA
North Irish Sea Array

ARUP GoBe

Project
North Irish Sea Array Offshore Wind Farm

Figure Title
Razorbill Density Heatmap 2022

Job No: 281240	Datum: WGS84 Projection: UTM30N
Date: May 2024	Figure No: 2.32
Scale: 1:500,000 @A3	
Status: Issue	

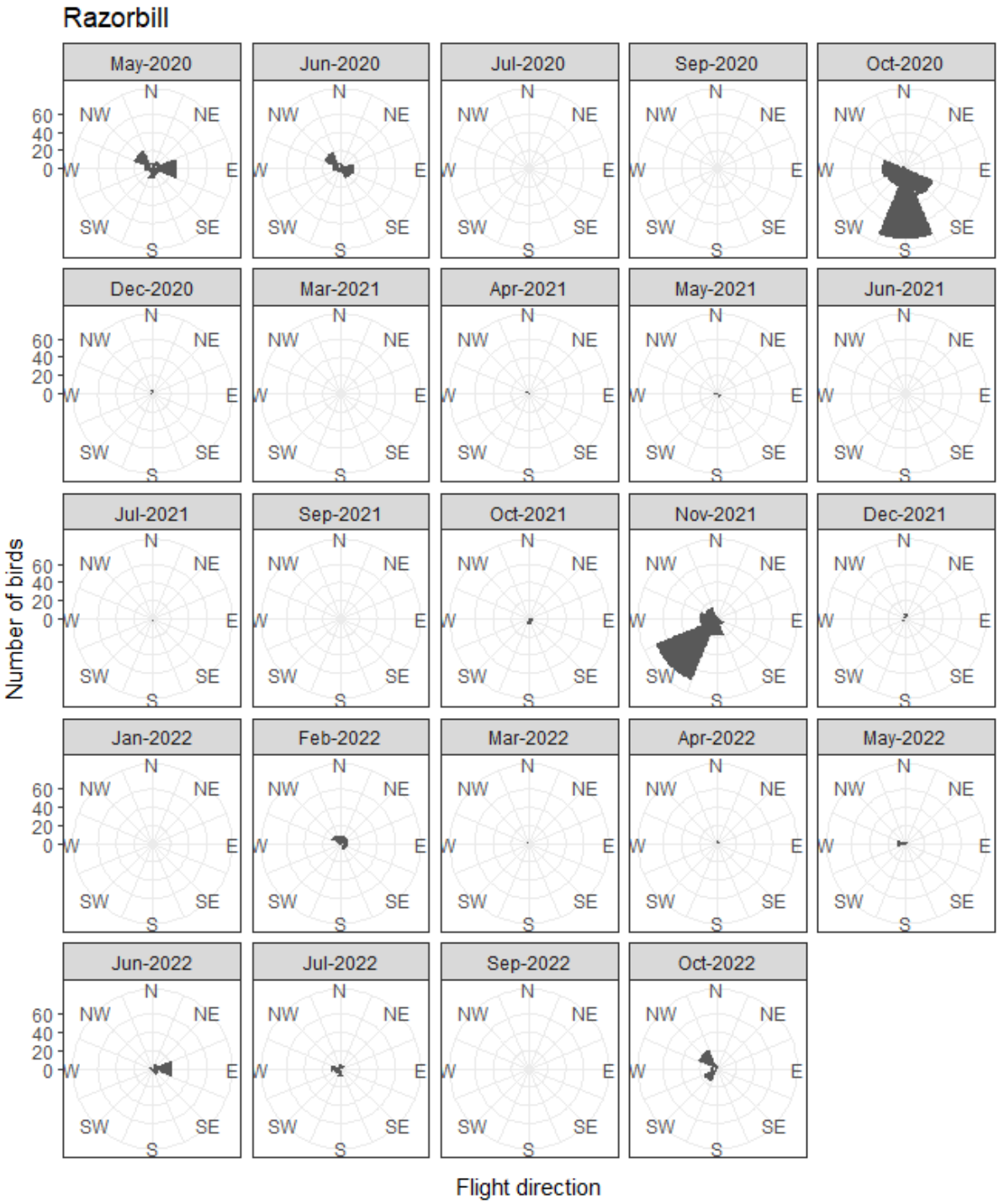
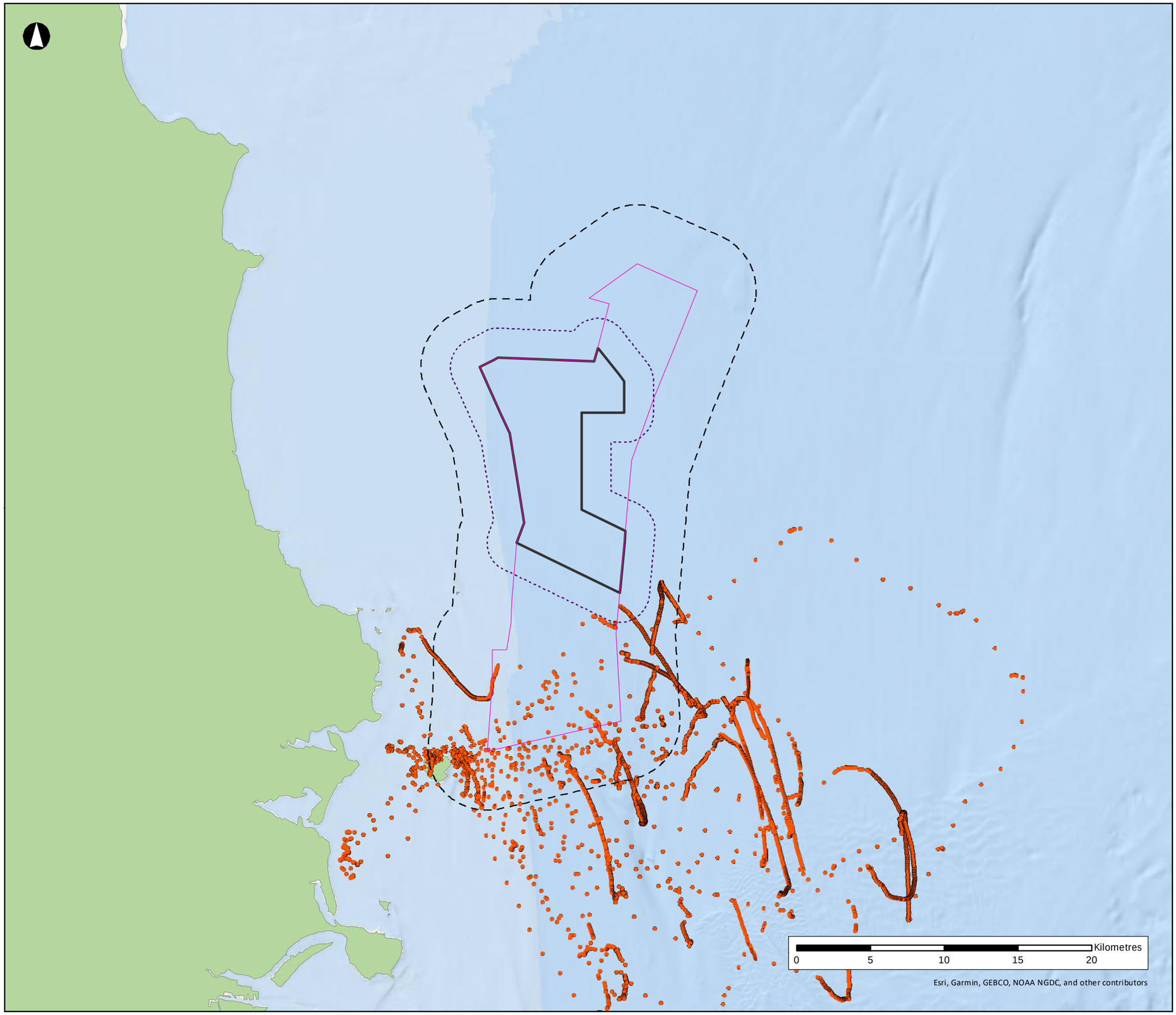


Figure 2.33: Razorbill monthly flight directions in the ornithology study area.

Available tracking data

2.15.108 Tracking data is available for razorbills from Lambay Island through the FAME dataset (Baer & Newton, 2012). Five individuals were tracked for a total of 16 days between 2010 and 2011, with individuals travelling up to 40km from Lambay Island, though most foraging activity was located within the mean foraging distance of 31km. Data on foraging usage was patchy, though razorbills predominantly appear to be foraging to the east of Lambay Island, resulting in no overlap with the array area, though notably this dataset was based on only five individuals which may not be representative of the whole colony.



Array Area
2km Buffer from Array Area
MAC Boundary (Array Area Only)
4km Buffer from MAC Boundary (Array Area Only)
Razorbill Tracks from Lambay Island

NISA
North Irish Sea Array

ARUP GoBe

Project
North Irish Sea Array Offshore Wind Farm

Figure Title
Tracking Data sourced from BirdWatch Ireland (BWI) - Razorbill

Job No: 281240	Datum: WGS84 Projection: UTM30N
Date: May 2024	Figure No: 2.34
Scale: 1:250,000 @A3	
Status: Issue	

Atlantic puffin

General overview

2.15.109 Puffins arrive in Ireland to breed between April to early August (Furness, 2015). Due to difficulty estimating the population of ground nesting species data from the most recent census is not available at this time. Previous surveys from 1998-2002 recorded 19,641 breeding pairs in Ireland (Cummins et al., 2019). Breeding colonies in proximity to the proposed development are Lambay Island (estimated 144 individuals, 2015) and Ireland's Eye (127 birds in 2015) (SMP, 2020). During the breeding season, adults may travel widely from their colonies to feed, with a mean maximum foraging range of 137.1 ± 128.3km (Woodward et al., 2019).

2.15.110 The species is Red-listed in Ireland, as it has been classified as being Vulnerable by the International Union for Conservation of Nature (IUCN), and because it has been classified as being of global conservation concern by Birdlife International (Gilbert et al., 2021).

Abundance and density

2.15.111 Puffins were recorded in the array area in seven out of 29 months. Raw counts ranged from one (across six months) to two (October 2022), with abundance and density peaking at 11 birds and 0.12 birds/km^2 respectively (Table 2.46).

2.15.112 In the array area plus 2km buffer, raw counts ranged from one (across six months) to four (May 2021), with abundance and density peaking at 24 birds and 0.12 birds/km^2 respectively (Table 2.47).

Table 2.46: Atlantic puffin raw counts, estimated abundance and estimated density in the array area.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	0	0	1	0	0	0	0	0
Calendar year 2 (2021)	-	0	0	0	1	1	0	0	1	0	1	0
Calendar year 3 (2022)	0	0	0	0	0	0	0	1	0	2	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	0	0	6	0	0	0	0	0
Calendar year 2 (2021)	-	0	0	0	6	6	0	0	6	0	6	0
Calendar year 3 (2022)	0	0	0	0	0	0	0	6	0	11	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00
Calendar year 2 (2021)	-	0.00	0.00	0.00	0.07	0.07	0.00	0.00	0.07	0.00	0.07	0.00
Calendar year 3 (2022)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.12	-	-

Table 2.47: Atlantic puffin raw counts, estimated abundance and estimated density in the array area plus 2km buffer.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	0	0	1	0	0	0	0	0
Calendar year 2 (2021)	-	0	1	0	4	1	0	0	2	0	1	0
Calendar year 3 (2022)	0	0	0	0	0	0	1	1	0	2	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	0	0	6	0	0	0	0	0
Calendar year 2 (2021)	-	0	6	0	24	6	0	0	12	0	6	0
Calendar year 3 (2022)	0	0	0	0	0	0	6	6	0	12	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
Calendar year 2 (2021)	-	0.00	0.03	0.00	0.12	0.03	0.00	0.00	0.06	0.00	0.03	0.00
Calendar year 3 (2022)	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.06	-	-

2.15.113 ESAS surveys reported very few birds in the Irish Sea in winter months, and low concentrations off the Irish east coast during the summer (Pollock et al., 1997). Evidence shows that puffins disperse across the North Atlantic post-breeding (Harris and Wanless, 2011).

2.15.114 In previous surveys, Percival et al. (2002) recorded only 15 Atlantic puffin with a peak count in June. Likewise, in 2010-2011 surveys, 12 puffins were recorded with a peak count of six birds in June (Newton and Trewby, 2011).

2.15.115 The ObSERVE aerial surveys (2016) recorded 26 puffin during the summer in proximity to Ireland's Eye and the Saltee Islands breeding colonies. The majority of observations were in water depths of between 30m and 60m. The estimated total abundance of puffin across the survey area was 229 (95% CIs 169 - 309) individuals during the summer with a density of 0.02 birds/km^2 (Jessopp et al., 2018).

Bio-season peak estimates

2.15.116 Puffin were present across both bio-seasons, with highest abundance in the breeding bio-season with a mean peak of six individuals and a density of 0.07 birds/km^2 in the array area (Table 2.48).

Table 2.48: Puffin bio-season mean peak abundance and density estimates in the array area and array area plus 2km buffer.

BDMPS Bio-seasons	Months	Array area		Array area plus 2km buffer	
		Bio-season peak abundance (n)	Bio-season peak density (n/km^2)	Bio-season peak abundance (n)	Bio-season peak density (n/km^2)
Breeding	Apr – Aug	6	0.07	12	0.02
Autumn migration	Sep – Mar	5	0.06	8	0.03

Red-throated diver

General overview

2.15.117 There is a very small population (nine pairs) of breeding red-throated diver in Ireland (Burke et al., 2020). However, the majority visit the Irish coast from Scotland, Iceland and Scandinavia over the winter months during the non-breeding season. Generally, the highest density of red-throat divers are found off the south-west coast (Balmer *et al.,* 2013).

2.15.118 Red-throated diver is Amber-listed in Ireland due to the breeding population being less than 100 pairs and because the non-breeding population has declined (between 25% to 49%) between 1994 and 2015/16. Additionally, red-throated diver is listed on Annex 1 of the EC Birds Directive and has an unfavourable conservation status in the Europe (Gilbert *et al.*, 2021).

Abundance and density

2.15.119 Red-throated divers were not recorded in the array area in any of the 29 months (Table 2.49).

2.15.120 In the array area plus 4km buffer, red-throated divers were recorded twice, with one individual in August and December 2020 respectively. Abundance and density were five individuals and 0.01 birds/km^2 in each month (Table 2.50).

Table 2.49: Red-throated diver raw counts, estimated abundance, and estimated density in the array area.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	0	0	0	0	0	0	0	0
Calendar year 2 (2021)	-	0	0	0	0	0	0	0	0	0	0	0
Calendar year 3 (2022)	0	0	0	0	0	0	0	0	0	0	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	0	0	0	0	0	0	0	0
Calendar year 2 (2021)	-	0	0	0	0	0	0	0	0	0	0	0
Calendar year 3 (2022)	0	0	0	0	0	0	0	0	0	0	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Calendar year 2 (2021)	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Calendar year 3 (2022)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-

Table 2.50: Red-throated diver raw counts, estimated abundance and estimated density in the array area plus 4km buffer.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	0	0	0	1	0	0	0	1
Calendar year 2 (2021)	-	0	0	0	0	0	0	0	0	0	0	0
Calendar year 3 (2022)	0	0	0	0	0	0	0	0	0	0	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	0	0	0	5	0	0	0	5
Calendar year 2 (2021)	-	0	0	0	0	0	0	0	0	0	0	0
Calendar year 3 (2022)	0	0	0	0	0	0	0	0	0	0	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01
Calendar year 2 (2021)	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Calendar year 3 (2022)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-

2.15.121 ESAS surveys reported very few birds in the Irish Sea during the winter months (September to March), however coverage of coastal areas during the surveys was fairly limited (Pollock et al., 1997). Evidence shows that puffins disperse across the North Atlantic post-breeding (Harris and Wanless, 2011).

2.15.122 In previous surveys, Percival et al. (2002) only recorded five red-throated diver and Newton and Trewby (2011) recorded 29 red-throated diver in 2010-2011 surveys, with a peak count of 22 birds in March.

2.15.123 The ObSERVE aerial surveys (2016) recorded 1,135 divers during the autumn and winter. It was assumed that most of these divers were either red-throated diver or great-northern diver. Sightings were concentrated in the shallower coastal waters (5-20m depth) of the Irish Sea. The mean density of divers across all surveys during the summer was 0.01 birds/km^2, 0.97 birds/km^2 in autumn, and 0.32 birds/km^2 in winter (Jessopp *et al.*, 2018). The mean peak densities per bio-season in the ECC plus a 4km buffer can be found in Table 2.5.

Northern fulmar

General overview

2.15.124 In Ireland, fulmar have a stable or increasing breeding population estimated at 32,899 pairs (Cummins et al., 2019). They are amber listed in Ireland.

2.15.125 Fulmar breed between January and August but the "migration free" period is considered between April and August (Furness, 2015). They have an extensive foraging range of 542.3 ± 657.9 km during the breeding season.

Abundance and density

2.15.126 Fulmars were recorded in the array area in five out of 29 months. Raw counts ranged from one (across four months) to two (September 2021), with abundance and density peaking at 10 birds and 0.11 birds/km^2 respectively (Table 2.51).

2.15.127 In the array area plus 2km buffer, raw counts ranged from one (across five months) to 11 (September 2021), with abundance and density peaking at 55 birds and 0.27 birds/km^2 respectively (Table 2.52).

Table 2.51: Northern fulmar raw counts, estimated abundance and estimated density in the array area.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	0	0	0	0	0	0	1	0
Calendar year 2 (2021)	-	1	0	0	0	0	0	1	2	0	0	0
Calendar year 3 (2022)	0	0	0	0	0	0	0	0	1	0	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	0	0	0	0	0	0	5	0
Calendar year 2 (2021)	-	5	0	0	0	0	0	5	10	0	0	0
Calendar year 3 (2022)	0	0	0	0	0	0	0	0	5	0	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00
Calendar year 2 (2021)	-	0.06	0.00	0.00	0.00	0.00	0.00	0.06	0.11	0.00	0.00	0.00
Calendar year 3 (2022)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	-	-

Table 2.52: Northern fulmar raw counts, estimated abundance and estimated density in the array area plus 2km buffer.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	0	1	1	0	1	0	1	0
Calendar year 2 (2021)	-	2	0	0	0	0	0	6	11	0	1	0
Calendar year 3 (2022)	0	0	0	0	0	0	0	0	2	0	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	0	5	5	0	5	0	5	0
Calendar year 2 (2021)	-	10	0	0	0	0	0	30	55	0	5	0
Calendar year 3 (2022)	0	0	0	0	0	0	0	0	10	0	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.00	0.02	0.02	0.00	0.02	0.00	0.02	0.00
Calendar year 2 (2021)	-	0.05	0.00	0.00	0.00	0.00	0.00	0.15	0.27	0.00	0.02	0.00
Calendar year 3 (2022)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	-	-

Manx shearwater

General overview

2.15.128 Irish waters are extremely important for Manx shearwater that breed at a small number of large colonies in the Irish sea and off the west-coast of the UK. Due to difficulty estimating the population of ground nesting species, such as shearwater, data from the most recent census is not available at this time. However, the previous count estimated the Irish population was 32,545 between 1998 and 2002 (Cummins et al., 2019). Manx shearwater are Amber-listed in Ireland because their numbers have declined by up to 69% (35% to 69%) between 1968 and 2011 (Gilbert et al., 2021).

2.15.129 Manx shearwater breed between April and August, but are completely migration free during June and July because some birds are still returning to colonies during April and May and leave the colonies in August (Furness, 2015). The mean-maximum foraging range during the breeding season is extensive (1,346.8 ± 1,018.7km) as birds range widely to feed (Woodward et al., 2019). However, the foraging range during chick rearing is considerably reduced (136.1 ± 88.7km) (Woodward et al., 2019).

2.15.130 Autumn migration season, Manx shearwaters from Ireland and the UK winter in the South Atlantic, primarily off the coast of Brazil (Wernham et al., 2002).

2.15.131 The nearest breeding colony to proposed development is on Lambay Island (estimated 25 pairs in 2002) (Newton, 2002), Other colonies that are within foraging range of the study area, include the Copeland Islands (4,850 pairs, 2007), Bardsey Island, Wales (16,183 pairs, 2001), Isle of Man (424 pairs, 2014), and Skomer, Midland Island and Skokholm, Wales (455,156 pairs, 2011) (SMP, 2021).

Abundance and density

2.15.132 Manx shearwater were recorded in the array area in 16 out of 29 months. Raw counts ranged from one (May and June 2021) to 427 (August 2022), with abundance and density peaking at 2,217 birds and 25.05 birds/km^2 respectively (Table 2.53).

2.15.133 In the array area plus 2km buffer, raw counts ranged from one (June 2020 and April 2021) to 1,058 (August 2022), with abundance and density peaking at 5,527 birds and 27.46 birds/km^2 respectively (Table 2.54).

Table 2.53: Manx shearwater raw counts, estimated abundance, and estimated density in the array area.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	1	1	44	239	56	0	0	0
Calendar year 2 (2021)	-	0	0	0	33	2	120	234	36	0	0	0
Calendar year 3 (2022)	0	0	0	0	3	18	142	427	81	3	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	4	5	210	1,152	267	0	0	0
Calendar year 2 (2021)	-	0	0	0	163	10	598	1,496	192	0	0	0
Calendar year 3 (2022)	0	0	0	0	14	123	722	2,217	630	14	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.05	0.06	2.37	13.02	3.02	0.00	0.00	0.00
Calendar year 2 (2021)	-	0.00	0.00	0.00	1.84	0.11	6.76	16.91	2.17	0.00	0.00	0.00
Calendar year 3 (2022)	0.00	0.00	0.00	0.00	0.16	1.39	8.16	25.05	7.12	0.16	-	-

Table 2.54: Manx shearwater raw counts, estimated abundance and estimated density in the array area plus 2km buffer.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	2	1	383	415	158	0	0	0
Calendar year 2 (2021)	-	0	0	1	73	4	186	458	119	0	0	0
Calendar year 3 (2022)	0	0	0	2	4	71	252	1,058	215	7	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	8	5	1,914	2,114	789	0	0	0
Calendar year 2 (2021)	-	0	0	5	364	23	934	2,935	718	5	0	0
Calendar year 3 (2022)	0	0	0	10	20	433	1,315	5,527	1,550	34	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.04	0.02	9.51	10.50	3.92	0.00	0.00	0.00
Calendar year 2 (2021)	-	0.00	0.00	0.02	1.81	0.11	4.64	14.58	3.57	0.02	0.00	0.00
Calendar year 3 (2022)	0.00	0.00	0.00	0.05	0.10	2.15	6.54	27.46	7.70	0.17	-	-

2.15.134 ESAS surveys recorded very few Max shearwater between September and March, low densities between March and June and the highest densities (>10 birds/km2), between July and September (Pollock et al., 1997).

2.15.135 In previous surveys, Percival et al. (2002) recorded Manx shearwaters between March and September, with an estimated peak of 3,764 birds in early August 2002. Likewise, in 2010-2011 surveys, peak count of 4,513 birds were recorded in mid-August (Newton and Trewby, 2011).

2.15.136 ObSERVE 2016 aerial surveys recorded a total of 4,736 individuals predominantly during the breeding season. Birds were generally recorded at least four km from shore, and showed a clear preference for deeper waters in the survey area. The abundance of Manx shearwaters across the survey area was estimated at 30,928 (95% CIs 26,815 – 35,671) individuals in summer, 10,566 (95% CIs 5,462 – 20,441) in autumn, and 114 (95% CIs 47-278) in winter (Jessopp et al., 2018).

Bio-season peak estimates

2.15.137 Manx shearwaters were present across the breeding and autumn migration bio-seasons only, with highest abundance in the breeding bio-season with a mean peak of 1,622 individuals and a density of 18.32 birds/km^2 in the array area (Table 2.55).

Table 2.55: Manx shearwater bio-season mean peak abundance and density estimates in the array area and array area plus 2km buffer.

BDMPS Bio-seasons	Months	Array area		Array area plus 2km buffer	
		Bio-season peak abundance (n)	Bio-season peak density (n/km^2)	Bio-season peak abundance (n)	Bio-season peak density (n/km^2)
Breeding	Apr – Aug	1,622	18.32	3,525	17.52
Autumn migration	Sep – Oct	363	4.10	1,019	5.06
Spring migration	Mar	0	0.00	0	0.00

Spatial density distribution and flight direction

2.15.138 Manx shearwaters were found throughout the survey area in the breeding and autumn migration bio-seasons. During the breeding bio-seasons, the highest density of birds was found towards the north and north-east of the survey area. During the autumn migration bio-season, densities were highest in the north and the west of the survey area.

2.15.139 Data from Jessop *et al.* (2018) similarly found birds to be present almost exclusively in the breeding and autumn migration bio-seasons, with higher densities in the breeding season, though no clear pattern in density was evident.

2.15.140 The majority of flying birds recorded during the DAS surveys were recorded during the summer months. In July 2021 and 2022 the predominant direction of flight was south east and south (Figure 2.35), while in August 2020, May 2021 and June 2022 the majority of flights were in a north easterly or easterly direction (Figure 2.35). In August 2022 the majority of flights were recorded flying in a westerly or north-westerly direction (Figure 2.35). All other months had minimal numbers of birds recorded flying.

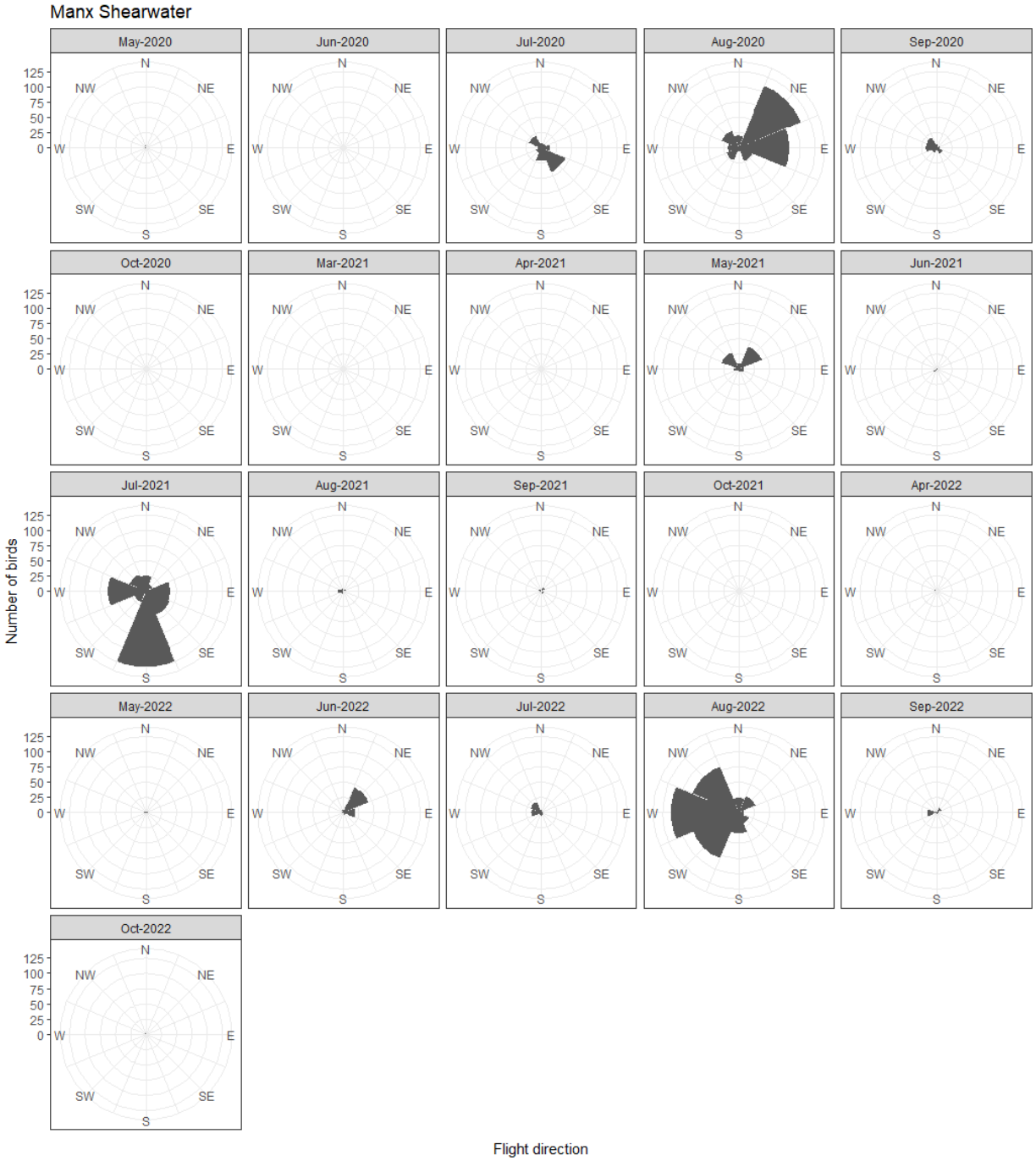


Figure 2.35 Manx shearwater monthly flight directions in the ornithology study area.

Northern gannet

General overview

2.15.141 The population of gannet in Irish waters is estimated at 47,946 pairs during 2013 and 2014. The population has increased by 30% since 2004 with the majority breeding at Little Skellig, off Kerry on the west coast. The two colonies closest to the proposed development are Lambay Island (926 pairs) and Ireland's Eye (547 pairs). The species is Amber-listed in Ireland, as 50% or more of the Irish breeding population is found at 10 breeding colonies or less (Gilbert et al., 2021).

2.15.142 Gannets breed between March to September, but the "migration free" breeding season is April to August (Furness, 2015) (Table 3). Their mean-maximum foraging range during the breeding season is 315.2 ± 194.2km (Woodward et al., 2019).

Abundance and density

2.15.143 Gannets were recorded in the array area in 22 out of 29 months. Raw counts ranged from one (May 2021 and January 2022) to 42 (September 2020), with abundance and density peaking at 200 birds and 2.26 birds/km^2 respectively (Table 2.56).

2.15.144 In the array area plus 2km buffer, raw counts ranged from one (December 2021 and January 2022) to 95 (September 2020), with abundance and density peaking at 475 birds and 2.36 birds/km^2 respectively (Table 2.54).

Table 2.56: Northern gannet raw counts, estimated abundance and estimated density in the array area.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	3	2	18	2	42	17	0	0
Calendar year 2 (2021)	-	3	0	0	1	2	0	10	37	21	2	0
Calendar year 3 (2022)	1	0	2	5	3	4	3	7	11	30	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	12	9	86	10	200	79	0	0
Calendar year 2 (2021)	-	14	0	0	5	10	0	47	178	100	10	0
Calendar year 3 (2022)	5	0	10	24	14	19	15	33	52	141	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.14	0.10	0.97	0.11	2.26	0.89	0.00	0.00
Calendar year 2 (2021)	-	0.16	0.00	0.00	0.06	0.11	0.00	0.53	2.01	1.13	0.11	0.00
Calendar year 3 (2022)	0.06	0.00	0.11	0.27	0.16	0.21	0.17	0.37	0.59	1.59	-	-

Table 2.57: Northern gannet raw counts, estimated abundance and estimated density in the array area plus 2km buffer.

Date	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Raw count (n)												
Calendar year 1 (2020)	-	-	-	-	7	6	63	7	95	39	2	2
Calendar year 2 (2021)	-	4	0	3	5	6	0	24	65	51	4	1
Calendar year 3 (2022)	1	0	3	6	7	14	8	17	22	71	-	-
Abundance estimate (n)												
Calendar year 1 (2020)	-	-	-	-	28	30	215	36	475	183	9	10
Calendar year 2 (2021)	-	20	0	15	25	30	0	119	327	257	21	5
Calendar year 3 (2022)	5	0	15	30	35	70	39	81	110	355	-	-
Density estimate (n/km^2)												
Calendar year 1 (2020)	-	-	-	-	0.14	0.15	1.07	0.18	2.36	0.91	0.04	0.05
Calendar year 2 (2021)	-	0.10	0.00	0.07	0.12	0.15	0.00	0.59	1.62	1.28	0.10	0.02
Calendar year 3 (2022)	0.02	0.00	0.07	0.15	0.17	0.35	0.19	0.40	0.55	1.76	-	-

2.15.145 Outside of the breeding season, gannets typically migrate southward wintering in the Bay of Biscay and off West Africa (Wernham et al., 2002).

2.15.146 ESAS surveys in Irish waters between 1980 and 1997 recorded gannets in low densities in the Irish Sea throughout the year, with a peak in numbers in the Irish Sea in September and October. Numbers were lowest in the Irish Sea between November and January (Pollock et al., 1997).

Bio-season peak estimates

2.15.147 Gannets were present across the breeding and autumn migration bio-seasons only, with highest abundance in the breeding bio-season with a mean peak of 1,622 individuals and a density of 18.32 birds/km^2 in the array area (Table 2.55).

Table 2.58: Northern gannet bio-season mean peak abundance and density estimates in the array area and array area plus 2km buffer.

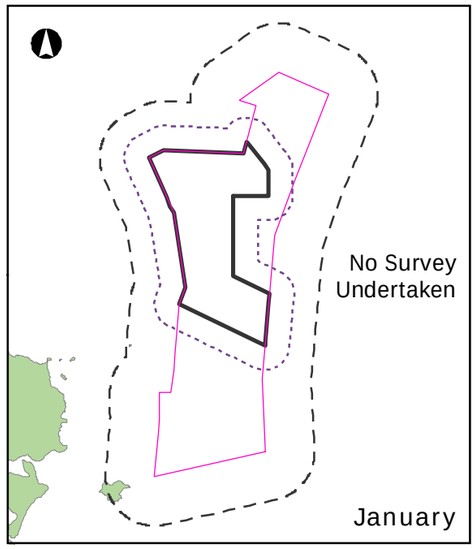
BDMPS Bio-seasons	Months	Array area		Array area plus 2km buffer	
		Bio-season peak abundance (n)	Bio-season peak density (n/km^2)	Bio-season peak abundance (n)	Bio-season peak density (n/km^2)
Breeding	Mar – Sep	143	1.62	304	1.51
Autumn migration	Oct - Nov	107	1.21	265	1.32
Spring migration	Dec - Feb	6	0.07	12	0.06

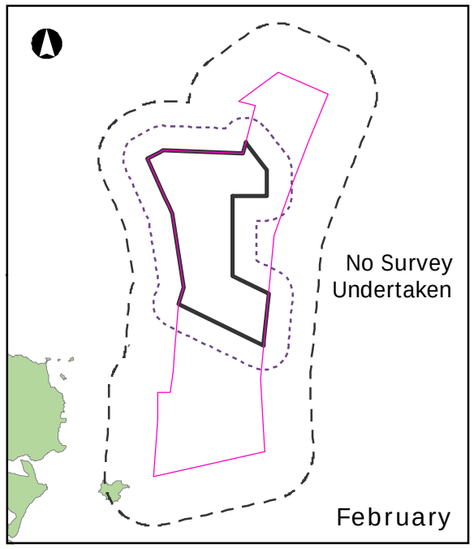
Spatial density distribution and flight direction

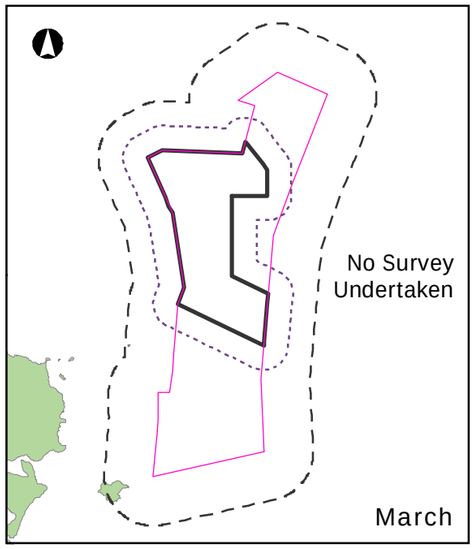
2.15.148 Density maps based on DAS data are presented in Figure 2.36 to Figure 2.38 below. Gannets showed no clear trend in spatial density distribution. In the breeding and autumn migration bio-seasons, individuals were distributed throughout the survey area, with highest densities in the south-west and south-east in the breeding bio-season, and across the west and north-east in the autumn migration bio-season. In the spring migration bio-season birds were more sparsely distributed, with hotspots in the east and north-west.

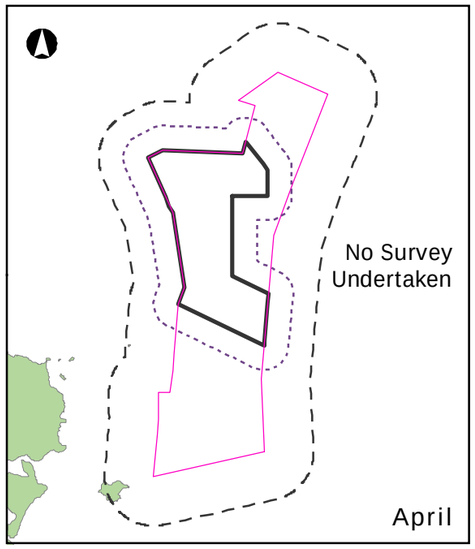
2.15.149 Data from Jessop *et al*. (2018) similarly found no clear pattern in spatial density distribution, though densities were higher during the breeding and autumn migration bio-seasons.

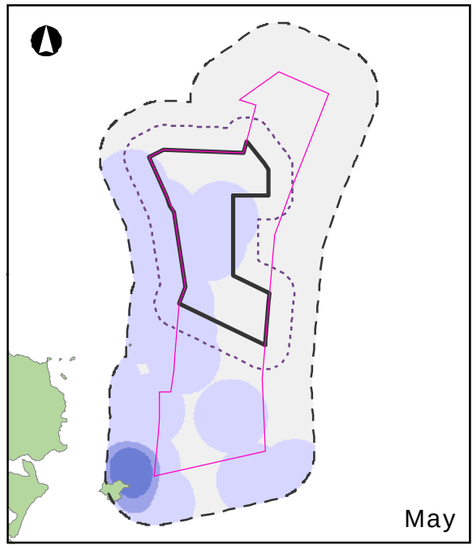
2.15.150 The flight direction data collected during the DAS surveys was generally highly variable most months, both in numbers and directions (Figure 2.39). There were several months that had a significant number of flying birds and a predominant flight direction including September 2020 (southwest), June and September 2021 (southeast /south) and September 2022 (northeast) (Figure 2.39).

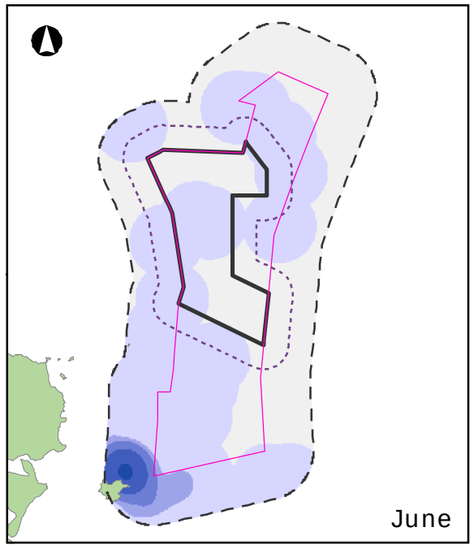


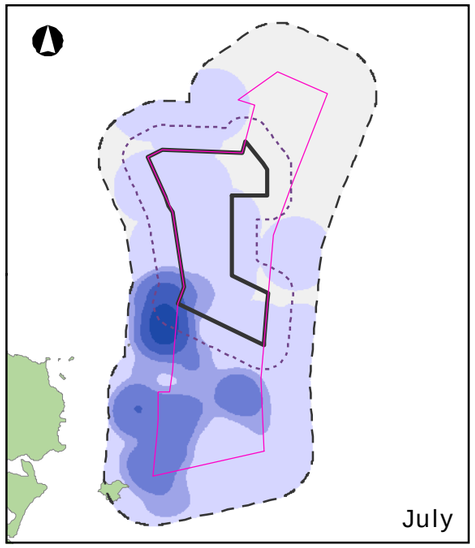


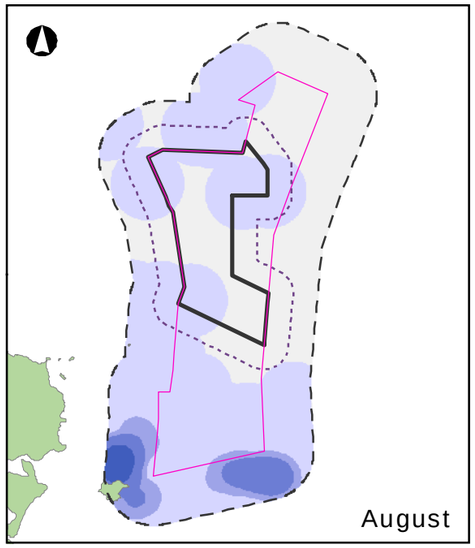


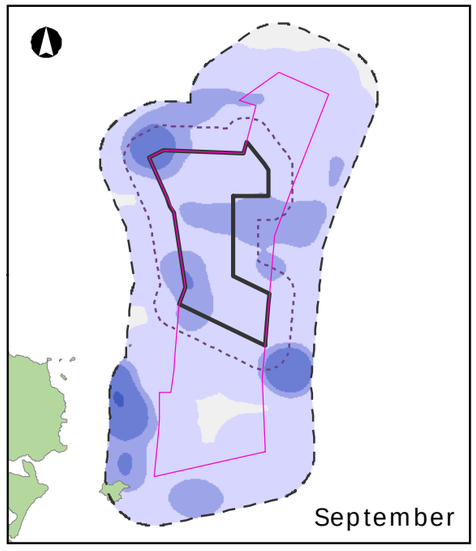


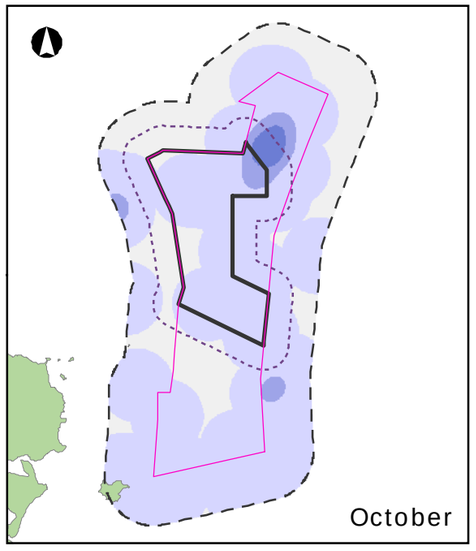


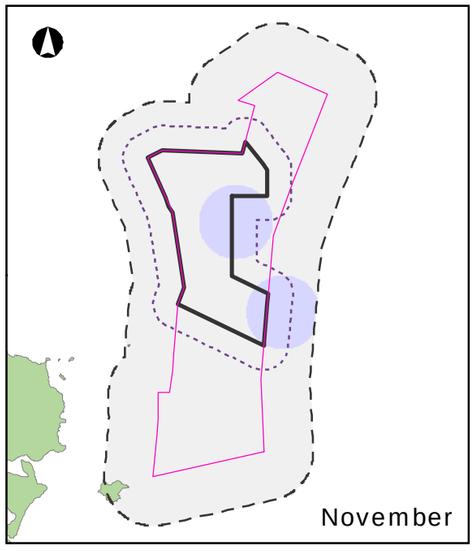


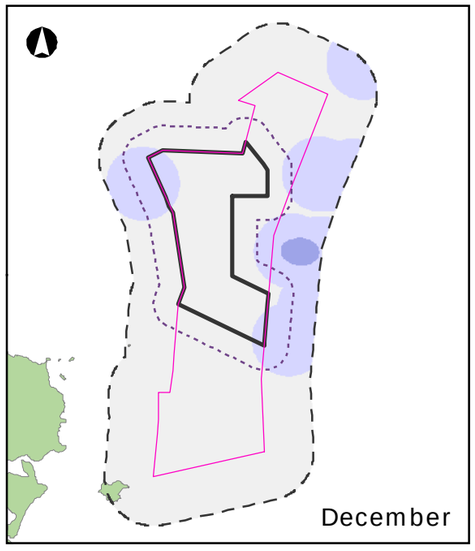












Array Area
2km Buffer from Array Area
MAC Boundary (Array Area Only)
4km Buffer from MAC Boundary (Array Area Only)

Gannet Density (per km^2)
0
0 - 5
5 - 10
10 - 25
25 - 50
50 - 100
100 - 178

Kilometres
0 2 4 6 8 10

NISA
North Irish Sea Array

ARUP GoBe

Project
North Irish Sea Array Offshore Wind Farm

Figure Title
Gannet Density Heatmap 2020

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Date: May 2024	Figure No: 2.36
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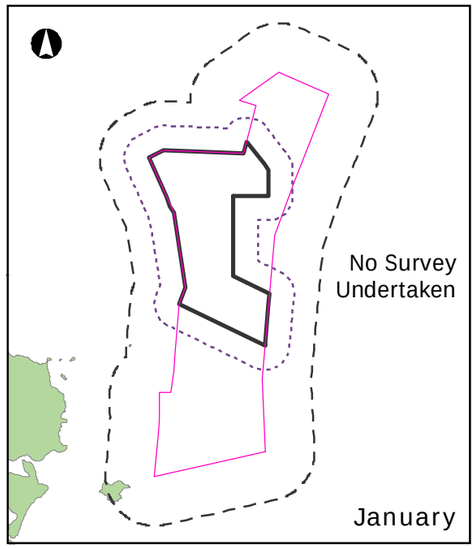
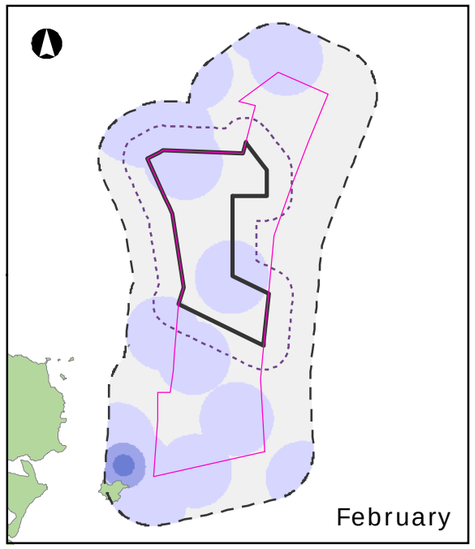
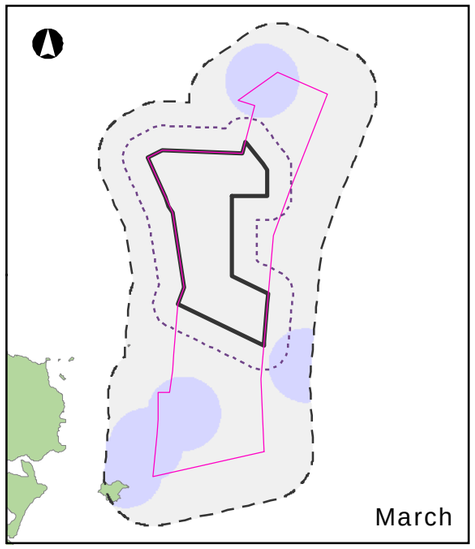
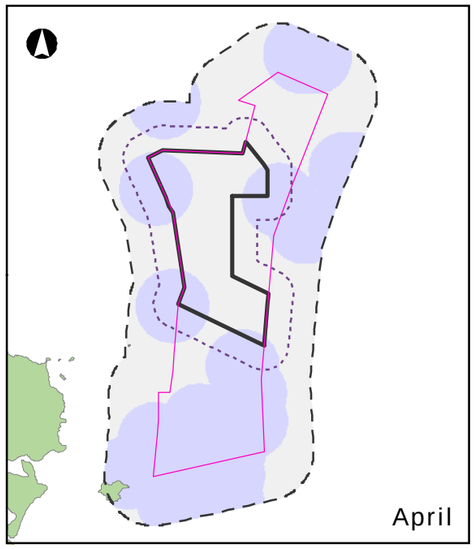
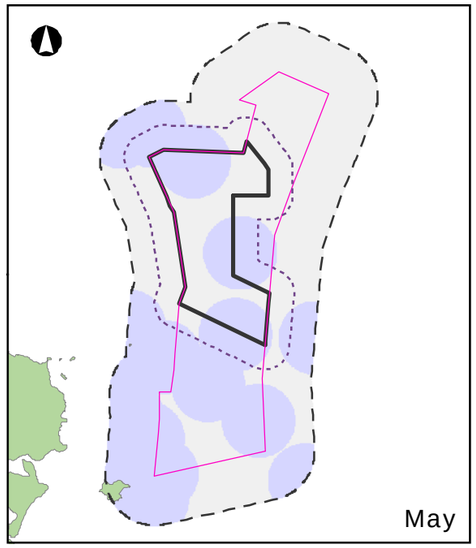
Status: Issue	

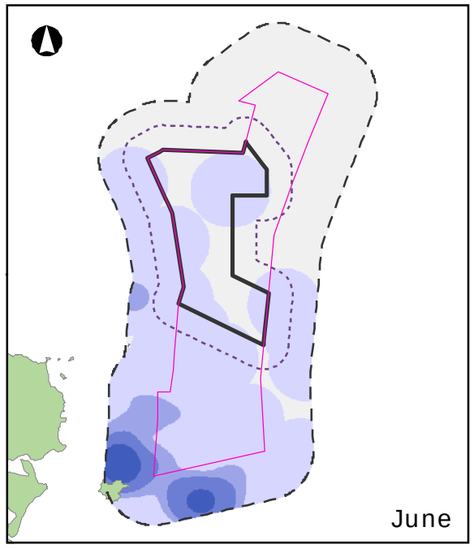


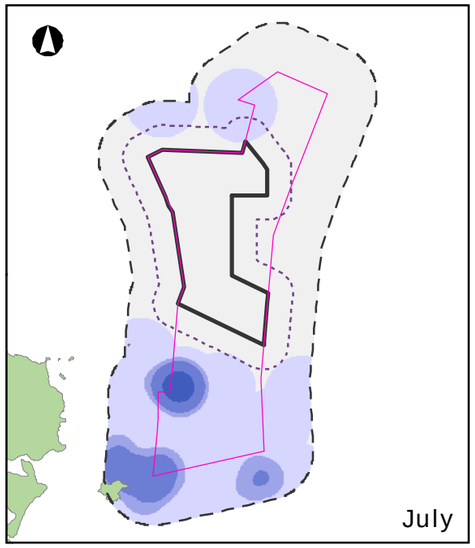


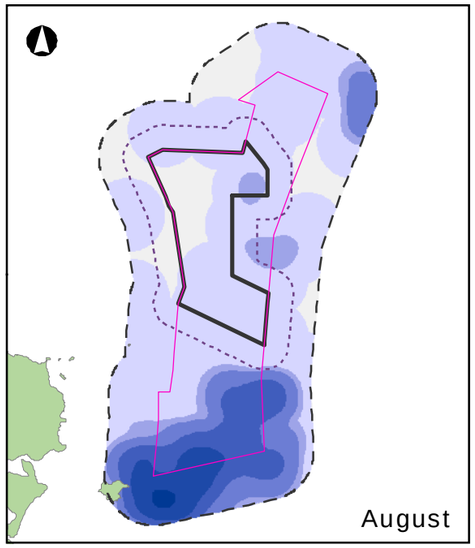


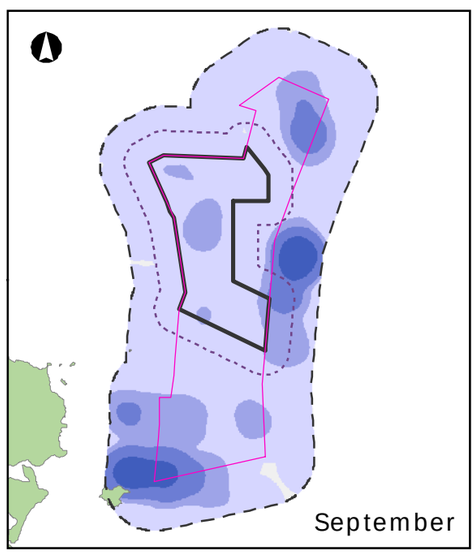


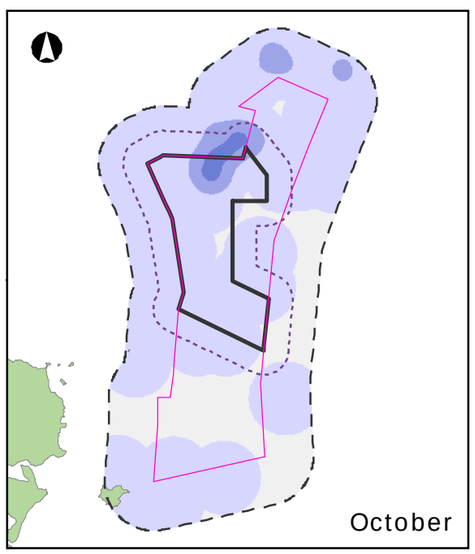


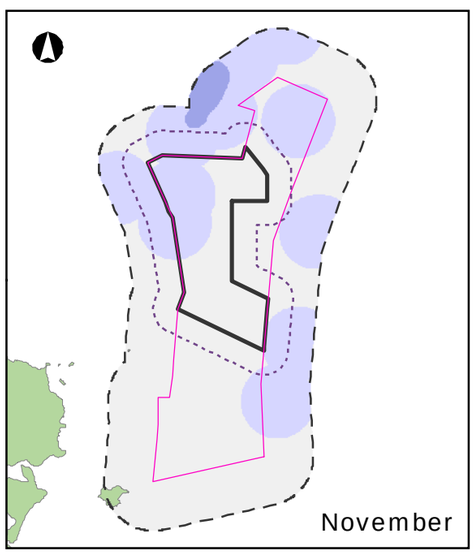


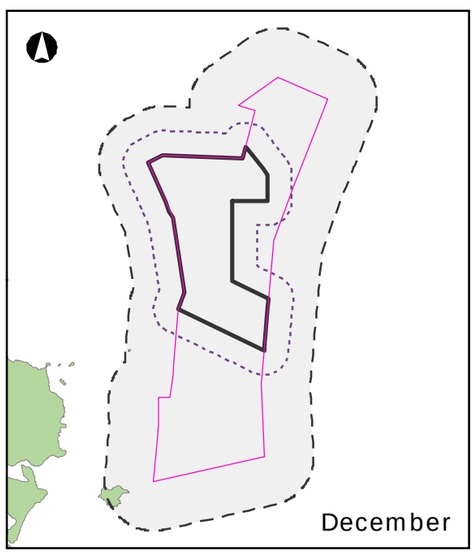












Array Area
2km Buffer from Array Area
MAC Boundary (Array Area Only)
4km Buffer from MAC Boundary (Array Area Only)

Gannet Density (per km^2)
0
0 - 5
5 - 10
10 - 25
25 - 50
50 - 100
100 - 178

Kilometres
0 2 4 6 8 10

NISA
North Irish Sea Array

ARUP GoBe

Project
North Irish Sea Array Offshore Wind Farm

Figure Title
Gannet Density Heatmap 2021

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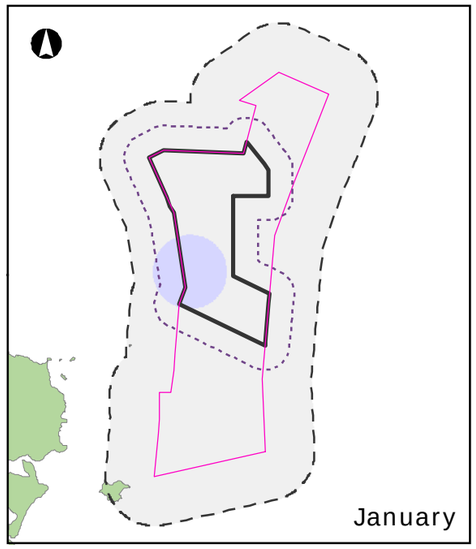
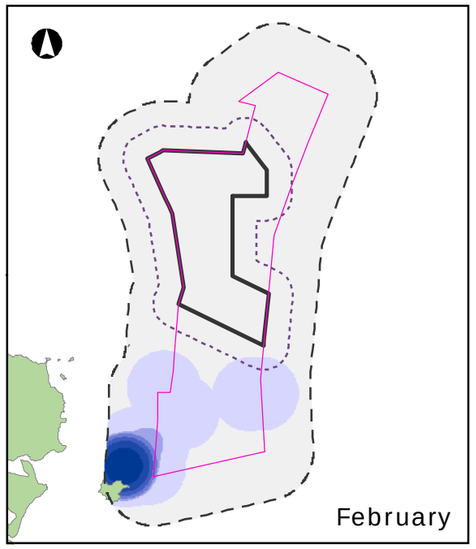
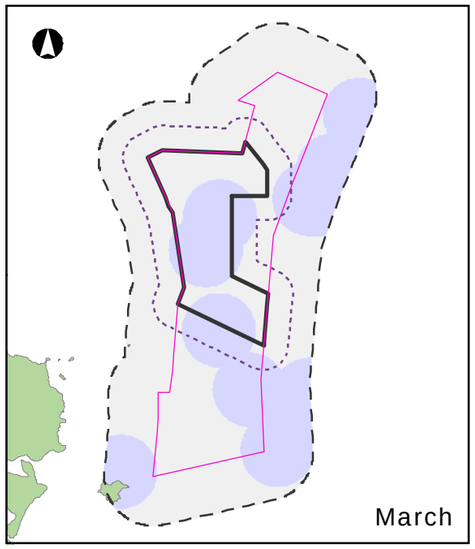
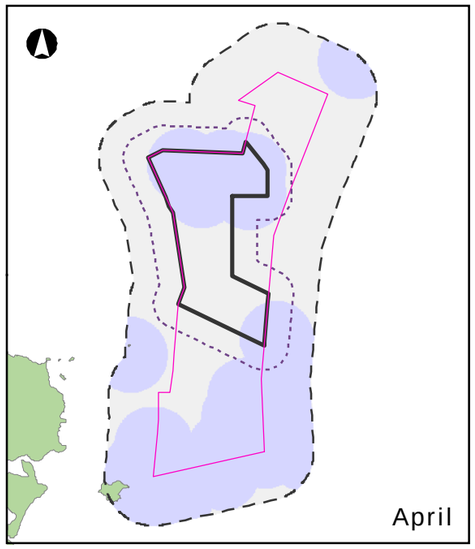
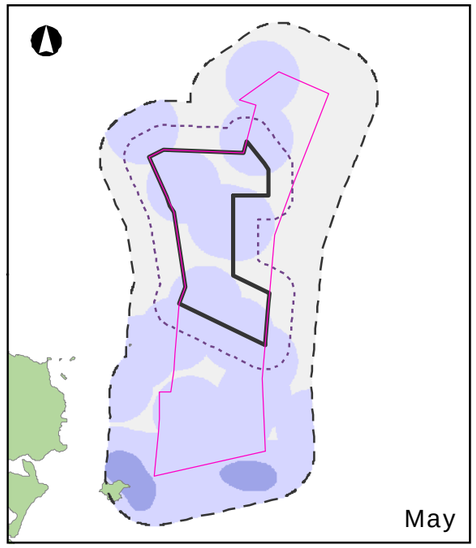
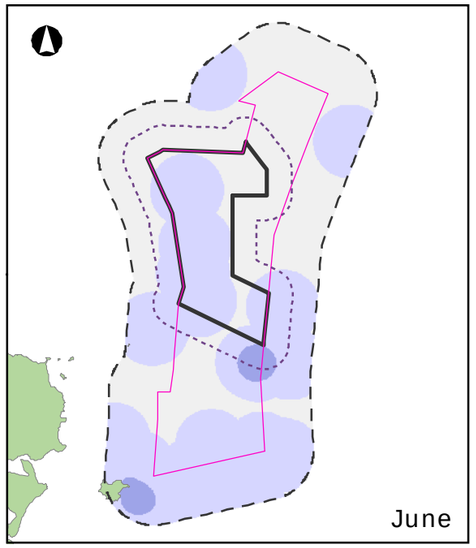


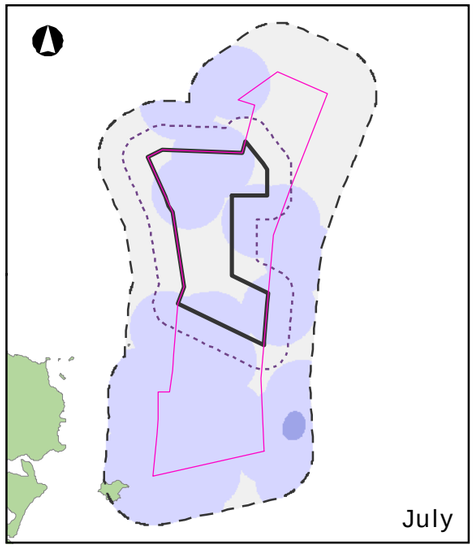


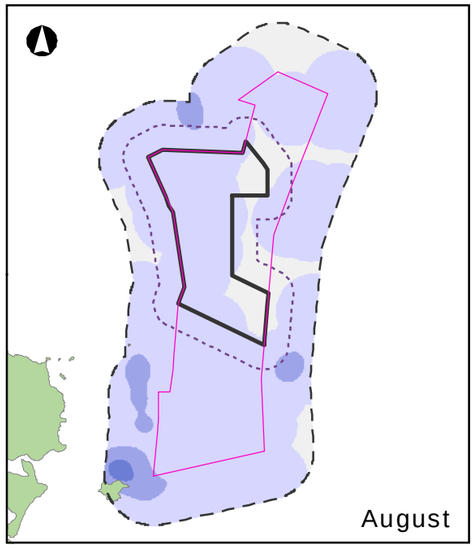


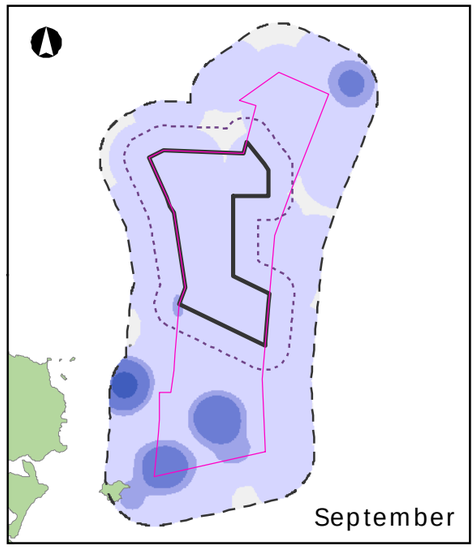


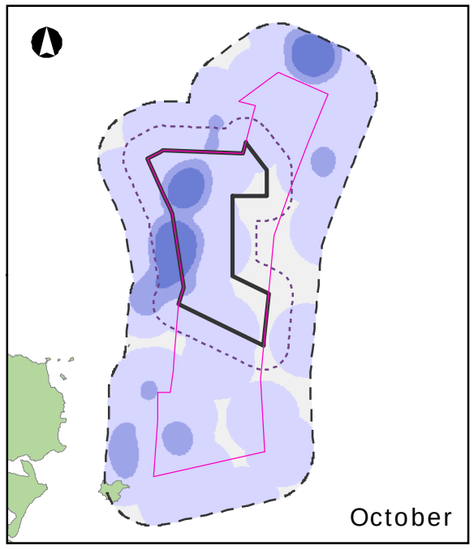


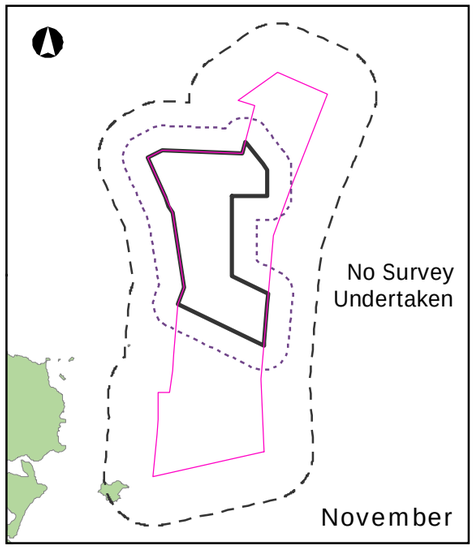


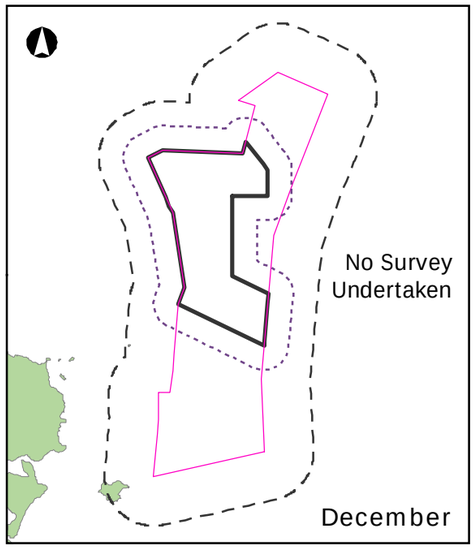












Array Area
2km Buffer from Array Area
MAC Boundary (Array Area Only)
4km Buffer from MAC Boundary (Array Area Only)

Gannet Density (per km^2)
0
0 - 5
5 - 10
10 - 25
25 - 50
50 - 100
100 - 178

Kilometres
0 2 4 6 8 10

NISA
North Irish Sea Array

ARUP GoBe

Project
North Irish Sea Array Offshore Wind Farm

Figure Title
Gannet Density Heatmap 2022

Job No: 281240	Datum: WGS84 Projection: UTM30N
Date: May 2024	Figure No: 2.38
Scale: 1:500,000 @A3	
Status: Issue	

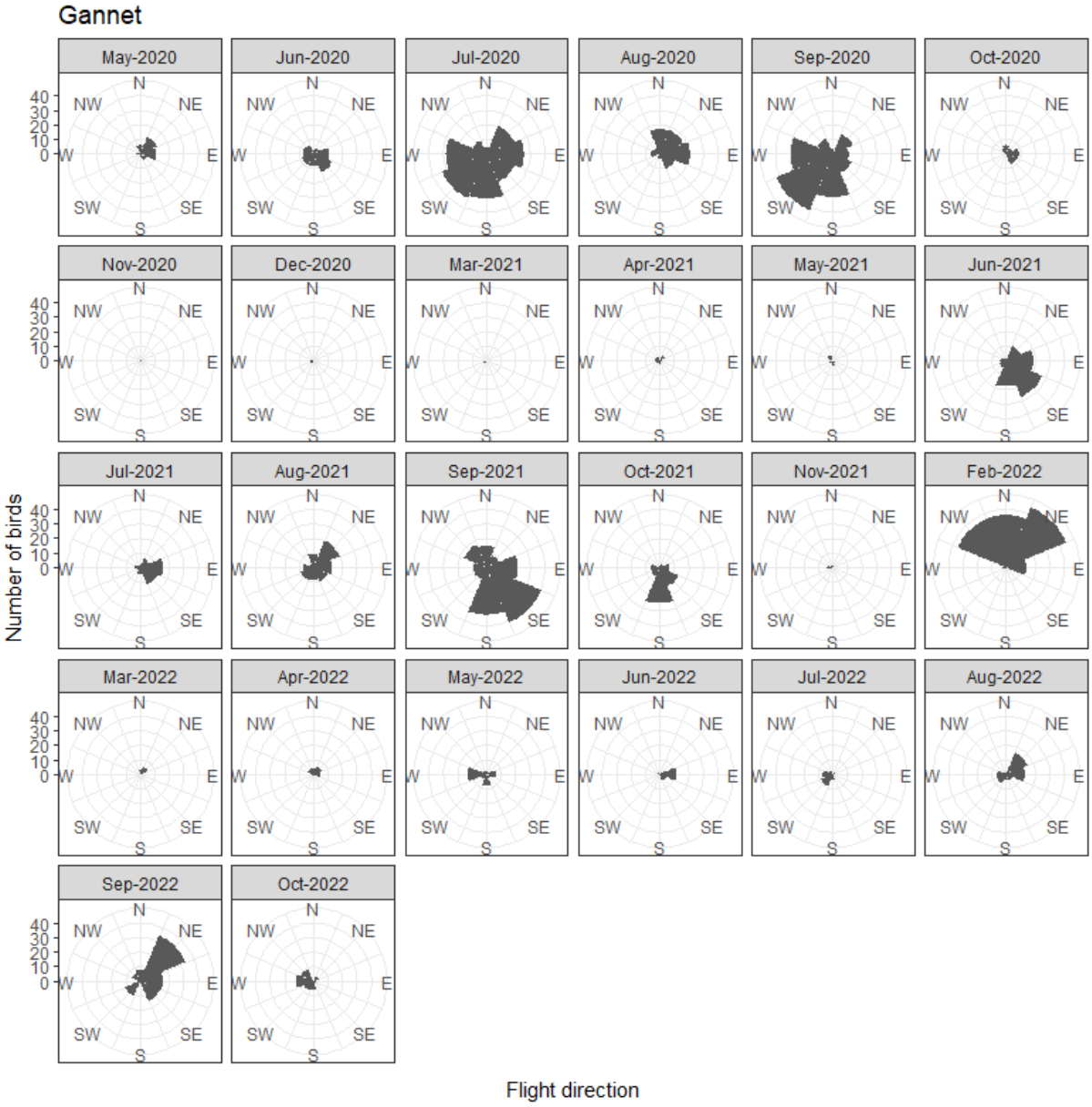


Figure 2.39 Gannet monthly flight directions in the ornithology study area.

Great Cormorant

General overview

2.15.151 The Irish cormorant breeding population was estimated at 4,688 pairs between 2015 and 2018. The general population and breeding distribution seems to have steadily increased in Ireland since 1970 but this may be due to more extensive survey effort (Cummins et al., 2019). Cormorants breed in colonies between April and August (Furness, 2015) and they prey on a wide range of small fish species, from shallow coastal waters, less than 20m deep (Forrester et al., 2007). The species is Amber-listed in Ireland as 50% or more of the Irish breeding population is found at 10 breeding colonies or less (Gilbert et al., 2021).

2.15.152 The closest colonies to the proposed development are Lambay Island (299 pairs in 2015), Ireland's Eye (424 pairs in 2015) and the Skerries Islands (544 pairs in 2010) (Cummins et al., 2019).

Abundance and density

2.15.153 No cormorants were recorded during the 29 months of data collection.

European shag

General overview

2.15.154 The Irish shag breeding population was estimated at 4,688 pairs between 2015 and 2018. The general population and breeding distribution seems to have steadily increased in Ireland since 1970 but this may be due to more extensive survey effort (Cummins et al., 2019). They breed in colonies between February and August (Furness, 2015) and they prey on a wide range of small fish species, from shallow coastal waters, between 20m to 40m deep (Forrester et al., 2007). The species is Amber-listed in Ireland as 50% or more of the Irish breeding population is found at 10 breeding colonies or less (Gilbert et al., 2021).

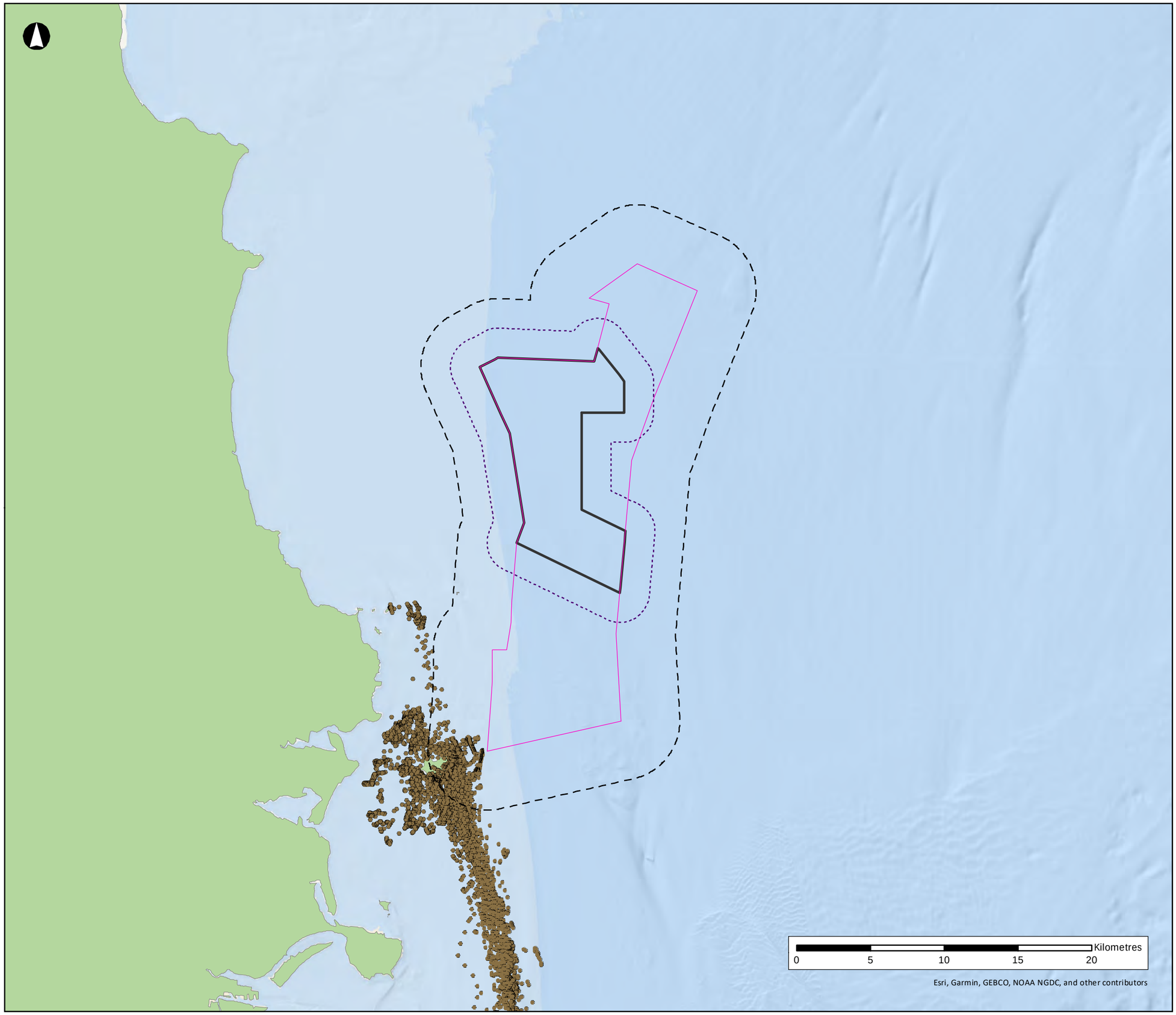
2.15.155 During the breeding season, adults forage close to their colonies, with a mean-maximum foraging range of 13.2 ± 10.5km (Woodward et al., 2019). Six colonies are within the mean-maximum foraging distance ± 1 SD of the proposed development area.

Abundance and density

2.15.156 Across 29 months, only one individual was recorded in March 2021. This equates to an abundance estimate of five individuals and a density of 0.06 birds/km^2 in the array area.

Available tracking data

2.15.157 Tracking data is available for shags from Lambay Island through the FAME dataset (Baer & Newton, 2012). Between 2010 and 2011, 62 individuals were tracked for a total of 62 days. Individuals travelled a maximum distance of 32km from the colony, and a mean distance of 15km. All individuals foraged only in waters <20m, and birds almost exclusively moved south/south-east from the colony resulting in no overlap with the array area. Further data was also available from June 2016, with a further 12 shags tracked from the island. This data similarly showed almost all birds moving southeast, with no overlap with the array area.



Array Area
2km Buffer from Array Area
MAC Boundary (Array Area Only)
4km Buffer from MAC Boundary (Array Area Only)
Shag Tracks from Lambay Island

NISA
North Irish Sea Array

ARUP GoBe

Project
North Irish Sea Array Offshore Wind Farm

Figure Title
Tracking Data sourced from BirdWatch Ireland (BWI) - Shag

Job No: 281240	Datum: WGS84 Projection: UTM30N
Date: May 2024	Figure No: 2.40
Scale: 1:250,000 @A3	
Status: Issue	

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

2.15.159 Arctic skuas *Stecorarius parasiticus* were recorded once across the survey period, with one individual recorded in the 4km buffer in November 2020 only. This corresponded to an abundance estimate of five individuals, and a density of 0.02 birds per km^2 in the array area plus 4km buffer.

2.15.160 Black guillemots were recorded across two months, with two individuals recorded in the array area plus 2km buffer in September 2020, and three individuals in December 2020. This corresponded to an abundance estimate of 10 and 18 individuals respectively, and a density estimate of 0.05 and 0.09 birds per km^2 respectively in the array area plus 4km buffer.

2.15.161 Great northern divers were recorded across two months, with six individuals recorded in February 2021, and one individual in May 2021. Notably, of these seven individuals only one was recorded in the array area. These numbers corresponded to an abundance estimate of 30 and five individuals respectively, and a density estimate of 0.09 and 0.02 birds/km^2 respectively in the array area plus 4km buffer. The mean peak densities per bio-season in the ECC plus a 4km buffer based on the data from the ObSERVE aerial surveys (2016) can be found in Table 2.5.

2.15.162 Common scoter was not recorded in the array or the buffers across the survey period, however it was the most common bird recorded during the landfall surveys with 13,262 individuals observed over the two survey years. As such the density of birds within the Offshore ECC was calculated from the ObSERVE dataset (Jessop *et al.*, 2019). The mean peak densities per bio-season in the ECC plus a 4km buffer based on the data from the ObSERVE aerial surveys (2016) can be found in Table 2.5.

2.15.163 Great skuas *Stercorarius skua* were recorded once across the survey period, with one individual recorded in the 4km buffer in September 2020 only. This corresponded to an abundance estimate of five individuals, and a density of 0.02 birds per km^2 in the array area plus 4km buffer.

2.15.164 Little gulls were recorded once across the survey period, with one individual recorded in the 4km buffer in November 2021 only. This corresponded to an abundance estimate of five individuals, and a density of 0.02 birds per km^2 in the array area plus 4km buffer.

2.15.165 Sandwich terns were recorded once across the survey period, with one individual recorded in the array area in July 2020 only. This corresponded to an abundance estimate of five individuals, and a density of 0.02 birds per km^2 in the array area plus 4km buffer.

2.15.166 Sooty shearwaters *Ardenna grisea* were recorded across two months, with one individual in September 2020 and August 2022. This corresponded to an of five individuals, and a density of 0.02 birds per km^2 in the array area plus 4km buffer in both months respectively.

2.15.167 Whimbrels *Numenius phaeopus* were recorded once across the survey period, with three individual recorded in the 4km buffer in September 2021 only. This corresponded to an abundance estimate of 15 individuals, and a density of 0.05 birds per km^2 in the array area plus 4km buffer.

Vessel surveys

2.15.168 Raw counts of birds recorded across site specific vessel-based surveys are presented in Table 2.59 below, with numbers presented in brackets to differentiate between birds in flight and birds sitting on the water within each month.

Table 2.59: Vessel surveys of ornithological receptors collected between November 2019 and July 2022.

Species	Number of birds recorded (total (in flight/sitting)						
	Survey 1 Nov 2019	Survey 2 Jan 2020	Survey 3 Mar 2020	Survey 4 Aug 2020	Survey 5 Jun 2021	Survey 6 Jul 2021[8]	Survey 7[9] Jul 2022
Common Scoter	5 (5/0)	13 (13/0)	1 (1/0)	1 (1/0)	-	-	-
Red-throated diver	1 (1/0)	1 (1/0)	2 (2/0)	-	-	-	-
Great northern diver	3 (3/0)		-	-	-	-	-
Fulmar	29 (28/1)	26 (22/4)	28 (9/19)	36 (34/2)	27 (21/6)	3 (1/2)	-
Gannet	7 (7/0)	27 (19/8)	51 (51/0)	358 (288/70)	144 (50/94)	32 (8/24)	189 (178/1)
Kittiwake	232 (210/22)	111 (90/21)	155 (52/103)	272 (202/70)	494 (60/434)	51 (15/36)	93 (43/50)
Black-headed gull	1 (1/0)	-	1 (1/0)	3 (3/0)	-	-	-
Common gull	19 (16/3)	34 (34/0)	8 (3/5)	1 (1/0)	-	-	-
Great black-backed gull	169 (156/13)	247 (121/126)	46 (21/25)	41 (35/6)	-	4 (1/3)	175 (65/110)
Herring gull	332 (307/25)	821 (418/403)	200 (108/92)	107 (102/5)	145 (31/114)	24 (2/22)	916 (265/651)
Lesser black-backed gull	-	1 (0/1)	2 (2/0)	51 (47/4)	38 (16/22)	1 (1/0)	-
Large gull species	10 (0/10)	-	-	-	-	-	-
Great skua	2 (2/0)	-	-	2 (1/1)	-	-	-
Guillemot	657 (309/348)	4,702 (1,194/3,508)	1,485 (1,398/87)	1,522 (4/1,518)	1,385 (457/928)	4,035 (1/4,034)	1,540
Razorbill	111 (49/23)	41 (32/9)	231 (224/7)	195 (0/195)	64 (41/23)	15 (1/14)	29
Guillemot/razorbill	65 (42/23)	12 (12/0)	3,207 (902/2,305)	240 (0/240)	110 (0/110)	140 (0/140)	-

8 Note that in Survey 6 the second survey (23rd July) only focused on flying gulls, terns, and gannets to collect data on flight heights. This data is therefore excluded from counts in this table

9 A breakdown of the number of birds sitting vs in flight is not available for all species for this survey.

Puffin	2 (0/2)	-	-	4 (1/3)	6 (3/3)	1 (0/1)	17
Shag	-	1 (1/0)	30 (27/3)	2 (2/0)	1 (1/0)	-	-
Black guillemot	-	-	2 (2/0)_	-	-	-	-
White wagtail *Moticilla alba*	-	-	2 (2/0)	-	-	-	-
Meadow pipit *Anthus pratensis*	-	-	19 (19/0)	-	-	-	-
Passerine sp.	-	-	1 (1/0)	1 (1/0)	-	-	-
Sandwich tern	-	-	-	1 (1/0)	-	1 (1/0)	-
Roseate tern	-	-	-	19 (19/0)	9 (1/8)	48 (48/0)	36
Common tern	-	-	-	41 (41/0)	14 (3/11)	8 (8/0)	27
Arctic tern	-	-	-	17 (17/0)	-	1 (1/0)	1
Arctic skua	-	-	-	1 (1/0)	-	-	-
Storm petrel *Hydrobates pelagicus*	-	-	-	3 (3/0)	-	-	-
Manx shearwater	-	-	-	1,682 (1,234/448)	1,197 (395/802)	1,020 (157/863)	4,312 (846/3,466)
Cormorant	-	-	-	5 (5/0)	-	-	-
Wigeon *Anus penelope*	-	-	-	-	2 (2/0)	-	-

2.15.169

Flight height data

2.15.170 Flight height data was collected during both DAS surveys (Table 2.60) and vessel surveys (Table 2.61). Based on available literature, it's expected that relatively low numbers of birds should be at collision risk height, ~14% of gannets an ~31% of herring gull flights being at rotor swept heights as an example (Furness and Wade, 2012). Considering the data below, the boat and vessel data is roughly in agreement with this, with ~10% of gannets in the 21-30m band based on DAS data, and 11% based on vessel data. However, there were considerable differences in the flight height distribution between the DAS and vessel data, with a higher proportion of birds estimated to be at higher flight bands compared with the vessel data. As an example, no Manx shearwaters were recorded above 10m based on vessel data, though based on DAS data, the majority of individuals were distributed in higher flight bants up to and above 50m. Similarly, for kittiwake only a small proportion (~11%) of birds were recorded above 20m based on vessel data, but from DAS data, ~77% of individuals were estimated at heights above 20m.

2.15.171 Given these discrepancies of seabird flight heights in data collected over the same time period (though noting that the DAS data covered more months), this data is not considered a reliable indicator of flight height, with DAS data considered to be an overestimate of flight height. This is supported by species which generally have consistently low flight heights (e.g. Manx shearwater and guillemot) having disproportionately high flight heights in this dataset. Given this inconsistency in flight height distribution between the two datasets, site-specific flight height data is not taken forward to use in the collision risk modelling (CRM) assessment. This is a common approach in the UK because flight height data from DASs is not considered robust.

Table 2.60: Flight heights of seabirds recorded on DAS surveys (May 2021 to October 2022).

Species	Sample size	Flight height band				
		0 to 10m	11 to 20m	21 to 30m	31 to 50m	51m+
Kittiwake	1045	127	111	101	196	511
Herring gull	473	57	52	50	83	231
Guillemot	352	64	65	36	68	119
Manx shearwater	117	23	15	11	25	43
Gannet	273	31	35	26	54	127
Great black-backed gull	106	15	13	8	18	52
Common gull	68	9	11	3	11	34
Roseate tern	21	4	1	3	3	1
Common tern	10	3	0	3	3	1

Table 2.61: Flight heights of seabirds recorded on vessel surveys (June and July 2021, and July 2022).

Species	Sample size	Flight height band				
		0 to 10m	11 to 20m	21 to 30m	31 to 50m	51m+
Kittiwake	177	118	40	15	3	1
Herring gull	391	253	72	29	32	5
Roseate tern	155	155	0	0	0	0
Common tern	56	55	1	0	0	0
Gannet	288	174	60	33	18	3
Manx shearwater	846	846	0	0	0	0
Great black-backed gull	65	47	6	4	6	2

Vantage-point surveys

Bird species recorded during VP surveys across the two VP locations are presented in Table 2.62 below. The most abundant species recorded were pale-bellied brent geese, and common scoter.

Table 2.62: Bird species recorded during vantage-point surveys conducted between November 2019 and May 2021.

Species	Number of individuals recorded (n)			
	September to November 2019, plus March 2020	April to May 2020	September to November 2020	March to May 2021
Pale-bellied brent goose *Branta bernicla hrota*	940	101	223	24
Greylag goose *Anser anser*	159	-	-	-
Pink-footed goose *Anser brachyrhynchus*	1	-	-	-
Mute swan *Cygnus olor*	4	-	-	-
Whooper swan *Cygnus cygnus*	22	-	23	-
Shelduck *Tadorna tadorna*	26	23	17	15
Teal *Anas crecca*	4	-	-	-
Eider *Somateria mollissima*	3	-	-	4
Velvet scoter *Melanitta fusca*	13	-	-	1
Common scoter	2,367	105	1,020	582
Unidentified scoter sp.	8	-	-	-
Long-tailed duck *Clangula hyemalis*	2	-	2	1
Red-breasted merganser *Mergus serrator*	17	-	6	19
Red-throated diver	106	7	38	54
Great northern diver	18	3	7	6
Unidentified diver sp.	7	-	1	-
Great crested grebe *Podiceps cristatus*	57	-	22	2
Red-throated diver or great crested grebe	2	-	-	-
Grey heron *Ardea cinerea*	2	-	-	-
Oystercatcher *Haematopus ostralegus*	235	-	-	-
Golden plover *Pluvialis apricaria*	543	-	-	-
Ringed plover *Charadrius hiaticula*	28	-	-	-
Curlew *Numenius arquata*	40	-	-	-
Bar-tailed godwit *Limosa lapponica*	27	-	-	-
Black-tailed godwit *Limosa limosa*	7	-	-	-
Turnstone *Arenaria interpres*	237	-	-	-
Knot *Calidris canutus*	40	-	-	-
Ruff *Calidris pugnax*	2	-	-	-
Curlew sandpiper *Calidris ferruginea*	3	-	-	-
Sanderling *Calidris alba*	79	-	-	-
Dunlin *Calidris alpina*	223	-	-	-
Redshank *Tringa totanus*	58	-	-	-
Greenshank *Tringa nebularia*	11	-	-	-
Skylark *Alauda arvensis*	9	-	-	-
Swallow *Hirundo rustica*	77	-	-	-

House martin *Delichon urbicum*	45	-	-	-
Unidentified hirundine species	32	-	-	-
Meadow pipit	30	-	-	-
Linnet *Linaria cannabina*	58	-	-	-
Mallard *Anas platyrhynchos*	-	-	2	-
Tufted duck *Aythya fuligula*	-	-	2	1

Landfall surveys

2.15.172 Landfall survey results between January 2021 and December 2022 are presented in Table 2.63 below. Raw counts of recorded bird species are presented, with the survey area consisting of the stretch of coast between Balbriggan and the mouth of the river Delvin. A total of 64 bird species were recorded across the 24-month period.

2.15.173 The most commonly recorded species were common scoter and Herring gull, with 13,262 and 9,165 individuals recorded across the survey period respectively.

Table 2.63: Bird species recorded during landfall surveys.

Species	2021												2022											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Waders																								
Bar-tailed godwit	3	117	75	8	0	0	11	98	2	2	0	1	0	0	0	0	2	0	0	1	6	13	11	10
Black-tailed godwit	6	18	11	0	0	0	0	12	6	0	1	6	0	0	0	0	0	0	1	3	10	12	1	0
Curlew	182	38	33	3	0	0	5	34	41	165	16	64	34	28	0	0	0	0	1	3	108	69	6	1
Dunlin	0	122	153	0	0	0	0	41	11	1	10	18	49	30	4	3	20	0	18	12	2	128	2	20
Golden plover	42	141	285	4	0	0	0	0	88	34	44	5	57	1	0	0	0	0	0	0	3	1	2	120
Greenshank	0	2	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	15	13	7	10	7	15
Grey plover *Pluvialis squatarola*	0	2	0	0	0	0	0	0	1	2	5	14	4	15	0	0	0	0	0	0	3	8	4	10
Knot	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	1	2	0	3
Lapwing *Vanellus vanellus*	86	53	130	0	0	0	0	18	0	14	126	0	41	0	0	0	0	0	0	0	0	0	1	20
Oystercatcher	142	58	163	15	4	2	4	123	104	142	43	81	58	73	8	10	0	113	42	260	73	209	68	89
Purple sandpiper *Calidris maritima*	2	11	2	0	0	0	0	0	0	3	0	2	0	4	0	0	0	0	0	0	0	6	2	8
Redshank	74	19	6	4	0	0	0	13	37	72	21	45	31	11	15	0	0	2	26	62	29	112	34	35

Ringed plover	12	0	29	0	2	0	4	13	23	1	1	11	49	8	0	1	20	2	22	89	5	39	1	25
Sanderling	11	29	30	0	0	0	0	44	0	0	0	0	0	0	0	0	0	38	16	5	0	8	0	0
Snipe *Gallinago gallinago*	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	8	5	10
Turnstone	128	92	81	15	11	0	19	69	22	39	0	7	4	71	0	20	1	76	23	52	2	179	15	40
Whimbrel	0	0	1	0	0	0	0	12	0	0	0	0	0	0	0	8	1	0	0	0	0	0	0	0
Swans, geese and non-marine ducks																								
Mallard	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	9
Mute swan	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Brent goose	79	171	144	0	0	0	0	0	1	17	15	41	0	140	142	0	0	0	0	0	9	0	24	92
Shelduck	5	37	8	2	0	0	0	15	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Teal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0
Whooper swan	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wigeon	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Herons																								
Grey heron	4	11	5	3	5	0	2	8	4	4	3	4	3	0	2	1	0	2	5	8	3	9	4	7
Little egret *Egretta garzetta*	0	9	0	6	1	1	1	12	5	1	3	0	1	0	0	1	0	0	17	1	8	0	0	2
Raptors																								

Buzzard *Buteo buteo*	0	0	0	0	0	0	0	0	1	0	2	2	1	0	2	0	0	0	0	0	0	0	0	0
Hen harrier *Circus cyaneus*	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kestrel *Falco tinnunculus*	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Merlin *Falco columbarius*	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0

Seaducks, divers and grebes

Common scoter	2,016	1,383	1,370	50	0	0	0	53	780	575	404	870	500	490	395	0	0	0	0	3	65	638	3,440	230
Eider	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Great-crested grebe	11	11	5	1	0	0	0	3	0	4	1	10	1	0	0	1	0	0	0	3	1	9	63	3
Great northern diver	7	3	5	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	3	0
Little grebe *Tachybaptus ruficollis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Long-tailed duck	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-breasted merganser	3	6	2	0	0	0	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Red-throated diver	9	16	12	2	0	0	0	2	30	28	2	9	17	3	3	0	0	0	0	0	0	40	47	0
Velvet scoter	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Gulls and terns

Arctic tern	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Black-headed gull	61	93	102	0	11	4	47	132	122	652	23	129	100	3	0	0	0	5	108	147	239	160	66	36

Common gull	21	27	60	5	0	0	6	16	72	76	7	97	47	0	1	0	0	0	15	24	23	61	21	17
Common tern	0	0	0	0	1	6	4	0	1	0	0	0	0	0	0	0	6	2	40	4	0	0	0	0
Common or Arctic tern	0	0	0	0	4	11	30	43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Common or Arctic or Roseate tern	0	0	0	0	0	24	30	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fosters tern *Sterna forsteri*	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Great black-backed gull	23	27	44	12	4	3	13	26	58	6	27	25	13	1	88	20	12	3	11	18	22	10	10	3
Herring gull	126	126	187	37	35	19	56	159	1,364	611	354	529	454	234	1,458	315	497	228	446	385	816	253	360	116
Kittiwake	0	1	0	0	2	0	0	7	41	0	0	0	0	0	0	0	0	3	1	191	270	0	0	0
Lesser black-backed gull	0	0	11	2	2	1	14	34	2	2	0	0	0	1	23	4	6	8	9	14	1	0	0	0
Mediterranean gull	0	0	0	0	0	0	0	1	115	8	0	0	0	0	0	0	0	2	9	207	69	2	0	0
Roseate tern	0	0	0	0	0	5	2	5	0	0	0	0	0	0	0	0	0	0	17	0	0	0	0	0
Sandwich tern	0	0	0	0	0	0	4	113	93	0	0	0	0	0	0	2	3	3	27	6	0	0	0	0
Seabirds																								
Arctic skua	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Black guillemot	0	6	2	0	3	2	6	4	0	0	0	6	0	0	0	1	2	9	17	0	0	0	0	0
Cormorant	13	20	13	7	7	6	6	8	70	25	19	40	22	3	19	49	42	57	95	222	46	19	72	0
Gannet	0	1	4	2	3	4	7	8	2	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0

Guillemot	0	2	2	2	7	2	4	19	40	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Razorbill	0	3	0	2	4	0	2	10	400	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shag	9	10	11	7	6	5	4	18	25	19	3	20	2	0	1	3	4	3	11	14	32	4	10	1
Passerines																								
Sand martin *Riparia riparia*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	4	20	10	0	0	0	0	0
Skylark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Yellowhammer *Emberiza citrinella*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Other waterbirds																								
Kingfisher *Alcedo atthis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

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Appendix A: Abundance Estimates and Behaviour information of all bird species from site-specific surveys

Arctic Skua

Table A 1:Arctic Skua abundance estimates and behaviour information from DAS surveys in the array area.

Array Area	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 2: Arctic Skua abundance estimates and behaviour information from DAS surveys in the array area plus 2km buffer.

Array Area + 2km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 3: Arctic Skua abundance estimates and behaviour information from DAS surveys in the array area plus 4km buffer.

Array Area +	All Behaviours			Flying			Sitting		

4km buffer												
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	1	5	1	14	5.0	0.02	0	0.0	0.00	1	5.0	0.02
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Arctic tern

Table A 4: Arctic tern abundance estimates and behaviour information from DAS surveys in the array area.

Array Area	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	2	10	2	29	10.1	0.11	2	10.1	0.11	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 5: Arctic tern abundance estimates and behaviour information from DAS surveys in the array area plus 2km buffer.

Array Area + 2km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	5	25	5	60	25.0	0.12	0	0.0	0.00	0	0.0	0.00
Jul-21	5	25	5	59	25.1	0.13	2	10.1	0.11	0	0.0	0.00
Aug-21	5	24	5	62	24.0	0.12	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 6: Arctic tern abundance estimates and behaviour information from DAS surveys in the array area plus 4km buffer.

Array Area +	All Behaviours				Flying		Sitting	

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4km buffer												
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	13	65	13	185	65.4	0.19	13	65.4	0.19	0	0.0	0.00
Jul-21	8	40	8	79	40.1	0.12	8	40.1	0.12	0	0.0	0.00
Aug-21	7	34	7	72	34.0	0.10	7	34.0	0.10	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Black guillemot

Table A 7: Black guillemot abundance estimates and behaviour information from DAS surveys in the array area.

Array Area	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	1	5	1	15	5.0	0.06	1	5.0	0.06	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	2	10	2	29	11.6	0.11	0	0.0	0.00	2	11.6	0.11
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	13	65	13	185	65.4	0.19	13	65.4	0.19	0	0.0	0.00
Jul-21	8	40	8	79	40.1	0.12	8	40.1	0.12	0	0.0	0.00
Aug-21	7	34	7	72	34.0	0.10	7	34.0	0.10	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 8: Black guillemot abundance estimates and behaviour information from DAS surveys in the array area plus 2km buffer.

Array Area + 2km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	2	10	2	25	5.0	0.05	1	5.0	0.03	1	5.0	0.05
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	3	15	3	35	17.5	0.07	0	0.0	0.00	3	17.5	0.07
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	13	65	13	185	65.4	0.19	13	65.4	0.19	0	0.0	0.00
Jul-21	8	40	8	79	40.1	0.12	8	40.1	0.12	0	0.0	0.00
Aug-21	7	34	7	72	34.0	0.10	7	34.0	0.10	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 9: Black guillemot abundance estimates and behaviour information from DAS surveys in the array area plus 4km buffer.

Array Area + 4km buffer	All Behaviours			Flying			Sitting		

North Irish Sea Array Windfarm Ltd

Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	2	10	2	25	5.0	0.05	1	5.0	0.03	1	5.0	0.03
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	3	15	3	35	17.5	0.04	0	0.0	0.00	3	17.5	0.04
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	13	65	13	185	65.4	0.19	13	65.4	0.19	0	0.0	0.00
Jul-21	8	40	8	79	40.1	0.12	8	40.1	0.12	0	0.0	0.00
Aug-21	7	34	7	72	34.0	0.10	7	34.0	0.10	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Black-headed gull

Table A 10: Black-headed gull abundance estimates and behaviour information from DAS surveys in the array area.

Array Area	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	1	5	1	14	5.0	0.06	1	5.0	0.06	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	4	20	4	49	20.4	0.23	4	20.4	0.23	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 11: Black-headed gull abundance estimates and behaviour information from DAS surveys in the array area plus 2km buffer.

Array Area + 2km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	1	5	1	15	5.0	0.02	1	5.0	0.02	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	6	30	6	90	30.0	0.15	6	30.0	0.15	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	1	5	1	15	5.0	0.02	1	5.0	0.02	0	0.0	0.00
Nov-21	4	21	4	52	21.2	0.11	4	21.2	0.11	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 12: Black-headed gull abundance estimates and behaviour information from DAS surveys in the array area plus 4km buffer.

Array Area + 4km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	1	5	1	15	5.0	0.01	1	5.0	0.01	0	0.0	0.00

Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	7	35	7	95	35.0	0.10	7	35.0	0.10	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	2	10	2	25	10.0	0.03	2	10.0	0.03	0	0.0	0.00
Nov-21	6	31	6	67	31.1	0.09	6	31.1	0.09	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Commic tern

Table A 13: Commic tern abundance estimates and behaviour information from DAS surveys in the array area.

Array Area	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	4.0	0.05	0	4.0	0.05	0	0.0	0.00
Jun-20	10	47	10	95	47.0	0.53	10	47.0	0.53	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	4	19	4	57	44.3	0.50	4	44.3	0.50	0	0.0	0.00
Jul-21	8	40	8	95	45.0	0.51	8	45.0	0.51	0	0.0	0.00
Aug-21	2	9	2	23	47.0	0.53	2	14.0	0.16	0	0.0	0.00
Sep-21	1	5	1	14	5.0	0.06	1	5.0	0.06	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	3	14	3	43	33.0	0.37	3	33.0	0.37	0	0.0	0.00
Jul-22	6	29	10	49	34.4	0.39	6	34.4	0.39	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 14: Commic tern abundance estimates and behaviour information from DAS surveys in the array area plus 2km buffer.

Array Area + 2km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	8.0	0.04	0	8.0	0.04	0	0.0	0.00
Jun-20	41	204	41	438	219.0	1.09	41	219.0	1.09	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	6	30	6	81	85.0	0.42	6	85.0	0.42	0	0.0	0.00
Jul-21	14	70	14	145	79.4	0.39	14	79.4	0.39	0	0.0	0.00
Aug-21	8	40	8	114	164.0	0.81	8	60.0	0.30	0	104.0	0.52

Sep-21	5	25	5	55	40.0	0.20	5	40.0	0.20	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	13	65	13	144	105.0	0.52	13	105.0	0.52	0	0.0	0.00
Jul-22	15	74	20	133	167.3	0.83	14	162.3	0.81	1	5.0	0.02
Aug-22	1	5	1	14	5.0	0.02	1	5.0	0.02	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 15: Commic tern abundance estimates and behaviour information from DAS surveys in the array area plus 4km buffer.

Array Area + 4km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	8.0	0.02	0	8.0	0.02	0	0.0	0.00
Jun-20	74	366	94	688	379.7	1.13	74	379.7	1.13	0	0.0	0.00
Jul-20	0	0	0	0	15.0	0.04	0	15.0	0.04	0	0.0	0.00

Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	1	5	1	15	5.0	0.01	1	5.0	0.01	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	1	5	1	15	5.0	0.01	1	5.0	0.01	0	0.0	0.00
Jun-21	15	76	15	152	151.8	0.45	15	151.8	0.45	0	0.0	0.00
Jul-21	35	177	40	363	192.1	0.57	35	192.1	0.57	0	0.0	0.00
Aug-21	10	50	10	125	295.5	0.88	10	122.7	0.37	0	104.0	0.52
Sep-21	14	71	15	137	91.0	0.27	14	91.0	0.27	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	1	5	1	15	10.0	0.03	1	10.0	0.03	0	0.0	0.00
Jun-22	20	100	20	250	137.0	0.41	20	137.0	0.41	0	0.0	0.00
Jul-22	28	139	30	267	345.0	1.03	27	340.0	1.01	1	5.0	0.01
Aug-22	1	5	1	14	5.0	0.01	1	5.0	0.01	0	0.0	0.00
Sep-22	1	5	1	15	5.0	0.01	1	5.0	0.01	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Common gull

Table A 16: Common gull abundance estimates and behaviour information from DAS surveys in the array area.

Array Area	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	4.0	0.05	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	47.0	0.53	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	2	10	2	29	10.0	0.11	2	0.0	0.00	0	0.0	0.00
Feb-21	1	5	1	14	5.0	0.06	1	0.0	0.00	0	0.0	0.00
Mar-21	5	24	9	43	24.5	0.28	1	0.0	0.00	0	0.0	0.00
Apr-21	1	5	1	15	5.0	0.06	1	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	10.0	0.11	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	5.0	0.06	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	5.0	0.06	4	19.5	0.22
Nov-21	27	133	27	291	137.3	1.55	23	5.0	0.06	0	0.0	0.00
Dec-21	1	5	1	14	5.0	0.06	1	0.0	0.00	0	0.0	0.00
Jan-22	8	39	8	108	39.0	0.44	7	0.0	0.00	0	0.0	0.00
Feb-22	8	38	10	72	38.0	0.43	8	0.0	0.00	0	0.0	0.00
Mar-22	1	5	1	15	5.0	0.06	1	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	115.4	1.30	4	21.8	0.25

Jul-22	0	0	0	0	0.0	0.00	0	5.0	0.06	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	34.0	0.38	1	5.0	0.06
Sep-22	0	0	0	0	0.0	0.00	0	38.0	0.43	0	0.0	0.00
Oct-22	1	5	1	14	5.0	0.06	1	5.0	0.06	0	0.0	0.00

Table A 17: Common gull abundance estimates and behaviour information from DAS surveys in the array area plus 2km buffer.

Array Area +2km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	2	9	2	28	9.0	0.04	2	9.0	0.04	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	8	40	15	69	40.0	0.20	7	35.0	0.17	1	5.0	0.02
Feb-21	1	5	1	15	5.0	0.02	1	5.0	0.02	0	0.0	0.00
Mar-21	14	70	20	130	70.8	0.35	9	45.0	0.22	5	25.8	0.13
Apr-21	1	5	1	15	5.0	0.02	1	5.0	0.02	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Nov-21	42	218	42	467	225.4	1.12	33	172.8	0.86	9	52.7	0.26
Dec-21	5	26	5	52	26.0	0.13	5	26.0	0.13	0	0.0	0.00
Jan-22	16	80	16	219	80.1	0.40	15	75.1	0.37	1	5.0	0.02
Feb-22	17	86	25	161	86.8	0.43	16	81.8	0.41	1	5.0	0.02
Mar-22	2	10	2	29	10.0	0.05	1	5.0	0.02	1	5.0	0.02
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	1	5	1	15	5.0	0.02	1	5.0	0.02	0	0.0	0.00

Table A 18: Common gull abundance estimates and behaviour information from DAS surveys in the array area plus 4km buffer.

Array Area +4km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Oct-20	2	9	2	28	9.0	0.03	2	9.0	0.03	0	0.0	0.00
Nov-20	1	5	1	14	5.0	0.01	1	5.0	0.01	0	0.0	0.00
Dec-20	21	105	45	180	105.0	0.31	20	100.0	0.30	1	5.0	0.01
Feb-21	2	10	2	30	10.0	0.03	2	10.0	0.03	0	0.0	0.00
Mar-21	21	106	55	171	107.9	0.32	15	75.0	0.22	6	31.9	0.09
Apr-21	1	5	1	15	5.0	0.01	1	5.0	0.01	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	70	362	70	755	367.5	1.09	59	306.3	0.91	11	61.2	0.18
Dec-21	6	31	6	57	31.0	0.09	6	31.0	0.09	0	0.0	0.00
Jan-22	21	105	21	261	105.5	0.31	18	90.4	0.27	3	15.0	0.04
Feb-22	31	157	61	278	157.8	0.47	29	147.8	0.44	2	10.0	0.03
Mar-22	16	79	16	213	79.0	0.24	14	69.0	0.21	2	10.0	0.03
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	1	5	1	15	5.0	0.01	1	5.0	0.01	0	0.0	0.00

Common tern

Table A 19: Common tern abundance estimates and behaviour information from DAS surveys in the array area.

Array Area	All Behaviours				Flying				Sitting			

North Irish Sea Array Windfarm Ltd

Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	3	14	3	43	14.0	0.16	3	14.0	0.16	0	0.0	0.00
Jul-22	8	39	8	97	39.5	0.45	8	39.5	0.45	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 20: Common tern abundance estimates and behaviour information from DAS surveys in the array area plus 2km buffer.

Array Area + 2km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	1	5	1	15	5.3	0.03	1	5.3	0.03	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	6	30	6	65	30.0	0.15	6	30.0	0.15	0	0.0	0.00
Jul-22	36	177	39	363	177.7	0.88	36	177.7	0.88	0	0.0	0.00
Aug-22	1	5	1	14	5.0	0.02	1	5.0	0.02	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 21: Common tern abundance estimates and behaviour information from DAS surveys in the array area plus 4km buffer.

Array Area + 4km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	1	5	1	15	5.0	0.01	1	5.0	0.01	0	0.0	0.00
Jul-21	6	30	6	71	30.6	0.09	6	30.6	0.09	0	0.0	0.00
Aug-21	2	10	2	30	10.0	0.03	2	10.0	0.03	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	2	10	2	30	10.0	0.03	2	10.0	0.03	0	0.0	0.00
Jun-22	9	45	10	80	45.3	0.13	9	45.3	0.13	0	0.0	0.00
Jul-22	71	351	79	722	351.6	1.05	71	351.6	1.05	0	0.0	0.00
Aug-22	2	10	2	24	10.0	0.03	2	10.0	0.03	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Fulmar

Table A 22: Fulmar abundance estimates and behaviour information from DAS surveys in the array area.

Array Area	All Behaviours				Flying				Sitting			

North Irish Sea Array Windfarm Ltd

Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	1	5	1	14	5.0	0.06	0	0.0	0.00	1	5.0	0.06
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	1	5	1	14	5.0	0.06	0	0.0	0.00	1	5.0	0.06
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	1	5	1	14	5.0	0.06	1	5.0	0.06	0	0.0	0.00
Sep-21	2	10	2	24	10.0	0.11	1	5.0	0.06	1	5.0	0.06
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	1	5	1	14	5.0	0.06	0	0.0	0.00	1	5.0	0.06
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 23: Fulmar abundance estimates and behaviour information from DAS surveys in the array area plus 2km buffer.

Array Area + 2km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	1	5	1	15	5.0	0.02	0	0.0	0.00	1	5.0	0.02
Jul-20	1	5	1	15	5.0	0.02	1	5.0	0.02	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	1	5	1	15	5.0	0.02	1	5.0	0.02	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	1	5	1	14	5.0	0.02	0	0.0	0.00	1	5.0	0.02
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	2	10	2	25	10.0	0.05	1	5.0	0.02	1	5.0	0.02
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	6	30	6	69	30.0	0.15	1	5.0	0.02	5	25.0	0.12
Sep-21	11	55	11	106	55.0	0.27	2	10.0	0.05	9	45.0	0.22
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	1	5	1	16	5.0	0.02	0	0.0	0.00	1	5.0	0.02
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	2	10	2	25	10.0	0.05	0	0.0	0.00	2	10.0	0.05
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 24: Fulmar abundance estimates and behaviour information from DAS surveys in the array area plus 4km buffer.

Array Area + 4km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	1	5	1	15	5.0	0.01	0	0.0	0.00	1	5.0	0.01
Jul-20	1	5	1	15	5.0	0.01	1	5.0	0.01	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	1	5	1	15	5.0	0.01	1	5.0	0.01	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	1	5	1	14	5.0	0.01	0	0.0	0.00	1	5.0	0.01
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	3	15	3	40	15.0	0.04	1	5.0	0.01	2	10.0	0.03
Mar-21	1	5	1	15	5.0	0.01	1	5.0	0.01	0	0.0	0.00
Apr-21	2	10	2	30	10.0	0.03	2	10.0	0.03	0	0.0	0.00

May-21	1	5	1	15	5.0	0.01	1	5.0	0.01	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	8	40	10	85	40.0	0.12	2	10.0	0.03	6	30.0	0.09
Sep-21	16	81	30	137	81.0	0.24	4	20.0	0.06	12	61.0	0.18
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	1	5	1	16	5.0	0.01	0	0.0	0.00	1	5.0	0.01
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	1	5	1	14	5.0	0.01	1	5.0	0.01	0	0.0	0.00
Sep-22	5	25	5	50	25.0	0.07	0	0.0	0.00	5	25.0	0.07
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Gannet

Table A 25: Gannet abundance estimates and behaviour information from DAS surveys in the array area.

Array Area	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	3	12	3	27	12.0	0.14	2	8.0	0.09	1	4.0	0.05
Jun-20	2	9	2	28	9.0	0.10	2	9.0	0.10	0	0.0	0.00
Jul-20	18	86	43	143	86.0	0.97	4	19.0	0.21	14	67.0	0.76
Aug-20	2	10	2	24	10.0	0.11	1	5.0	0.06	1	5.0	0.06
Sep-20	42	200	129	267	200.0	2.26	18	86.0	0.97	24	115.0	1.30

Oct-20	17	79	19	135	79.0	0.89	3	14.0	0.16	14	65.0	0.73
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	3	14	3	33	14.0	0.16	1	5.0	0.06	2	10.0	0.11
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	1	5	1	15	5.0	0.06	0	0.0	0.00	1	5.0	0.06
Jun-21	2	10	2	29	10.0	0.11	1	5.0	0.06	1	5.0	0.06
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	10	47	10	98	47.0	0.53	2	9.0	0.10	8	37.0	0.42
Sep-21	37	178	96	250	178.0	2.01	28	135.0	1.53	9	43.0	0.49
Oct-21	21	100	21	215	100.1	1.13	16	77.0	0.87	5	24.1	0.27
Nov-21	2	10	2	20	10.0	0.11	1	5.0	0.06	1	5.0	0.06
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	1	5	1	15	5.0	0.06	0	0.0	0.00	1	5.0	0.06
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	2	10	2	24	10.0	0.11	2	10.0	0.11	0	0.0	0.00
Apr-22	5	24	5	57	24.0	0.27	2	9.0	0.10	0	0.0	0.00
May-22	3	14	5	28	14.0	0.16	3	14.0	0.16	0	0.0	0.00
Jun-22	4	19	5	28	19.0	0.21	3	14.0	0.16	1	5.0	0.06
Jul-22	3	15	3	34	15.1	0.17	1	5.1	0.06	2	10.0	0.11
Aug-22	7	33	9	65	33.0	0.37	5	23.0	0.26	2	9.0	0.10
Sep-22	11	52	24	80	52.0	0.59	7	33.0	0.37	3	14.0	0.16
Oct-22	30	141	47	287	141.0	1.59	3	14.0	0.16	27	127.0	1.44

Table A 26: Gannet abundance estimates and behaviour information from DAS surveys in the array area plus 2km buffer.

Array Area + 2km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	7	28	8	56	28.0	0.14	5	20.0	0.10	2	8.0	0.04
Jun-20	6	30	10	55	30.0	0.15	4	20.0	0.10	2	10.0	0.05
Jul-20	63	215	90	700	215.0	1.07	10	50.0	0.25	53	265.0	1.32

Aug-20	7	36	7	71	36.0	0.18	4	20.0	0.10	3	15.0	0.07
Sep-20	95	475	315	654	475.0	2.36	52	260.0	1.29	43	215.0	1.07
Oct-20	39	183	89	295	183.0	0.91	9	42.0	0.21	30	141.0	0.70
Nov-20	2	9	2	23	9.0	0.04	2	9.0	0.04	0	0.0	0.00
Dec-20	2	10	2	25	10.0	0.05	1	5.0	0.02	1	5.0	0.02
Feb-21	4	20	5	45	20.0	0.10	2	10.0	0.05	2	20.0	0.10
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	3	15	3	35	15.0	0.07	2	10.0	0.05	1	5.0	0.02
May-21	5	25	5	45	25.0	0.12	4	20.0	0.10	1	5.0	0.02
Jun-21	6	30	10	55	30.0	0.15	2	10.0	0.05	4	20.0	0.10
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	24	119	69	168	119.0	0.59	6	30.0	0.15	18	89.0	0.44
Sep-21	65	327	201	462	327.0	1.62	41	206.0	1.02	24	121.0	0.60
Oct-21	51	257	101	453	257.2	1.28	38	191.0	0.95	13	65.2	0.32
Nov-21	4	21	4	41	21.0	0.10	1	5.0	0.02	3	16.0	0.08
Dec-21	1	5	1	16	5.0	0.02	0	0.0	0.00	1	5.0	0.02
Jan-22	1	5	1	15	5.0	0.02	0	0.0	0.00	1	5.0	0.02
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	3	15	5	29	15.0	0.07	3	15.0	0.07	0	0.0	0.00
Apr-22	6	30	6	60	30.0	0.15	2	10.0	0.05	1	5.0	0.02
May-22	7	35	15	55	35.0	0.17	7	35.0	0.17	0	0.0	0.00
Jun-22	14	70	15	159	70.0	0.35	6	30.0	0.15	8	40.0	0.20
Jul-22	8	39	10	79	39.1	0.19	3	15.1	0.07	5	25.0	0.12
Aug-22	17	81	29	138	81.0	0.40	11	52.0	0.26	6	29.0	0.14
Sep-22	22	110	50	194	110.0	0.55	15	75.0	0.37	6	30.0	0.15
Oct-22	71	350	172	541	355.1	1.76	13	64.0	0.32	58	286.1	1.42

Table A 27: Gannet abundance estimates and behaviour information from DAS surveys in the array area plus 4km buffer.

Array Area +	All Behaviours				Flying				Sitting			

North Irish Sea Array Windfarm Ltd

km buffer												
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	14	56	24	96	56.0	0.17	11	44.0	0.13	3	12.0	0.04
Jun-20	16	79	45	114	79.0	0.24	12	59.0	0.18	4	20.0	0.06
Jul-20	151	756	165	1628	756.0	2.25	80	401.0	1.19	71	356.0	1.06
Aug-20	8	41	8	87	41.0	0.12	4	20.0	0.06	4	20.0	0.06
Sep-20	162	807	533	1091	807.0	2.40	82	408.0	1.22	78	388.0	1.16
Oct-20	50	236	132	368	236.0	0.70	12	57.0	0.17	38	179.0	0.53
Nov-20	2	9	2	23	9.0	0.03	2	9.0	0.03	0	0.0	0.00
Dec-20	8	40	8	90	40.0	0.12	1	5.0	0.01	7	35.0	0.10
Feb-21	9	45	10	85	45.0	0.13	6	30.0	0.09	3	15.0	0.04
Mar-21	1	5	1	15	5.0	0.01	0	0.0	0.00	1	5.0	0.01
Apr-21	5	25	5	50	25.0	0.07	4	20.0	0.06	1	5.0	0.01
May-21	6	31	6	61	31.0	0.09	5	25.0	0.07	1	5.0	0.01
Jun-21	21	106	25	203	106.0	0.32	12	61.0	0.18	9	46.0	0.14
Jul-21	1	5	1	15	5.0	0.01	1	5.0	0.01	0	0.0	0.00
Aug-21	40	200	130	284	200.0	0.60	10	50.0	0.15	30	150.0	0.45
Sep-21	115	584	411	752	584.0	1.74	63	320.0	0.95	52	264.0	0.79
Oct-21	65	329	157	551	329.1	0.98	50	253.0	0.75	15	76.1	0.23
Nov-21	12	62	16	129	62.0	0.18	4	21.0	0.06	8	41.0	0.12
Dec-21	2	10	2	26	10.0	0.03	0	0.0	0.00	2	10.0	0.03
Jan-22	1	5	1	15	5.0	0.01	0	0.0	0.00	1	5.0	0.01
Feb-22	1	5	1	15	5.0	0.01	1	5.0	0.01	0	0.0	0.00
Mar-22	5	25	10	40	25.0	0.07	4	20.0	0.06	1	5.0	0.01
Apr-22	7	35	7	70	35.0	0.10	3	15.0	0.04	1	5.0	0.01
May-22	9	45	20	75	45.0	0.13	9	45.0	0.13	0	0.0	0.00
Jun-22	16	80	20	185	80.5	0.24	8	40.2	0.12	8	40.3	0.12
Jul-22	14	69	30	124	69.1	0.21	8	40.1	0.12	6	30.0	0.09

Aug-22	44	211	120	307	211.0	0.63	17	82.0	0.24	27	130.0	0.39
Sep-22	37	185	115	265	185.0	0.55	25	125.0	0.37	9	45.0	0.13
Oct-22	90	451	260	676	456.2	1.36	19	95.0	0.28	71	356.2	1.06

Great black-backed gull

Table A 28: Great black-backed gull abundance estimates and behaviour information from DAS surveys in the array area.

Array Area	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	1	5	1	14	5.0	0.06	1	5.0	0.06	0	0.0	0.00
Jul-20	27	62	27	386	129.0	1.46	13	62.0	0.70	14	67.0	0.76
Aug-20	1	5	1	14	5.0	0.06	1	5.0	0.06	0	0.0	0.00
Sep-20	2	10	2	29	10.0	0.11	2	10.0	0.11	0	0.0	0.00
Oct-20	6	9	14	42	28.0	0.32	2	9.0	0.10	4	19.0	0.21
Nov-20	3	9	3	32	14.0	0.16	2	9.0	0.10	1	5.0	0.06
Dec-20	45	83	45	578	227.6	2.57	17	83.0	0.94	27	138.6	1.57
Feb-21	8	14	8	86	40.6	0.46	3	14.0	0.16	5	26.6	0.30
Mar-21	8	9	9	85	38.0	0.43	2	9.0	0.10	6	28.0	0.32
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	6	5	9	56	55.9	0.63	1	6.7	0.08	5	49.3	0.56
Sep-21	3	10	5	29	14.0	0.16	2	10.0	0.11	1	5.0	0.06

Oct-21	1	5	1	14	5.0	0.06	1	5.0	0.06	0	0.0	0.00
Nov-21	19	20	44	153	112.6	1.27	4	20.0	0.23	15	92.6	1.05
Dec-21	9	38	14	77	46.0	0.52	8	39.4	0.44	1	6.7	0.08
Jan-22	11	15	11	133	54.5	0.62	3	15.5	0.17	8	39.1	0.44
Feb-22	16	48	19	138	76.0	0.86	10	48.0	0.54	6	29.0	0.33
Mar-22	10	24	10	97	24.0	0.27	5	24.0	0.27	5	24.0	0.27
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	1	5	1	14	5.0	0.06	1	5.0	0.06	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	2	9	2	19	9.0	0.10	2	9.0	0.10	0	0.8	0.01
Oct-22	1	5	1	14	5.0	0.06	1	5.0	0.06	0	0.0	0.00

Table A 29: Great black-backed gull abundance estimates and behaviour information from DAS surveys in the array area plus 2km buffer.

Array Area + 2km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	3	15	3	30	15.0	0.07	3	15.0	0.07	0	0.0	0.00
Jul-20	51	255	51	675	263.3	1.31	29	153.3	0.76	22	110.0	0.55
Aug-20	3	15	3	36	15.0	0.07	3	15.0	0.07	0	0.0	0.00
Sep-20	3	15	3	45	15.0	0.07	3	15.0	0.07	0	0.0	0.00
Oct-20	13	61	28	98	66.0	0.33	4	19.0	0.09	9	47.0	0.23
Nov-20	4	18	4	37	18.0	0.09	3	14.0	0.07	1	5.0	0.02
Dec-20	132	653	132	1731	660.3	3.28	32	159.3	0.79	99	496.0	2.46

Feb-21	15	75	30	140	78.0	0.39	9	45.0	0.22	6	33.0	0.16
Mar-21	14	70	25	140	70.0	0.35	4	20.0	0.10	10	50.0	0.25
Apr-21	3	15	3	40	15.0	0.07	3	15.0	0.07	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	4	20	4	40	20.0	0.10	4	20.0	0.10	0	0.0	0.00
Jul-21	1	5	1	15	5.0	0.02	1	5.0	0.02	0	0.0	0.00
Aug-21	9	44	20	69	72.4	0.36	3	16.7	0.08	6	56.7	0.28
Sep-21	24	121	24	236	131.6	0.65	11	55.0	0.27	13	75.6	0.38
Oct-21	3	15	3	35	15.0	0.07	3	15.0	0.07	0	0.0	0.00
Nov-21	32	166	78	280	229.4	1.14	7	36.0	0.18	25	193.4	0.96
Dec-21	46	241	46	540	267.5	1.33	20	105.7	0.53	26	161.8	0.80
Jan-22	17	85	17	179	86.1	0.43	6	31.0	0.15	11	55.1	0.27
Feb-22	40	201	81	352	204.5	1.02	19	96.9	0.48	21	108.6	0.54
Mar-22	15	74	25	138	74.0	0.37	10	49.0	0.24	5	25.0	0.12
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	1	5	1	15	5.0	0.02	1	5.0	0.02	0	0.0	0.00
Jun-22	2	10	2	25	10.0	0.05	2	10.0	0.05	0	0.0	0.00
Jul-22	9	44	10	93	44.8	0.22	3	15.8	0.08	6	29.0	0.14
Aug-22	5	24	5	48	25.4	0.13	2	10.0	0.05	3	15.4	0.08
Sep-22	5	25	5	50	61.0	0.30	3	15.0	0.07	2	46.0	0.23
Oct-22	4	20	4	44	20.0	0.10	1	5.0	0.02	3	15.0	0.07

Table A 30: Great black-backed gull abundance estimates and behaviour information from DAS surveys in the array area plus 4km buffer.

Array Area + 4km buffer	All Behaviours			Flying			Sitting		

North Irish Sea Array Windfarm Ltd

Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	8	40	8	84	40.9	0.12	6	30.9	0.09	2	10.0	0.03
Jul-20	58	291	58	746	299.3	0.89	34	178.3	0.53	24	120.0	0.36
Aug-20	8	41	8	82	41.0	0.12	8	41.0	0.12	0	0.0	0.00
Sep-20	34	169	34	488	169.0	0.50	21	105.0	0.31	13	65.0	0.19
Oct-20	19	90	57	118	95.0	0.28	7	33.0	0.10	12	62.0	0.18
Nov-20	14	64	14	142	67.6	0.20	6	28.0	0.08	8	40.6	0.12
Dec-20	182	908	182	1930	940.5	2.80	48	244.0	0.73	133	690.5	2.06
Feb-21	26	130	60	206	137.5	0.41	13	67.7	0.20	13	69.8	0.21
Mar-21	21	106	45	191	106.6	0.32	5	25.6	0.08	16	80.0	0.24
Apr-21	3	15	3	40	15.0	0.04	3	15.0	0.04	0	0.0	0.00
May-21	1	5	1	15	5.0	0.01	1	5.0	0.01	0	0.0	0.00
Jun-21	8	41	10	71	41.0	0.12	8	41.0	0.12	0	0.0	0.00
Jul-21	24	121	24	323	121.0	0.36	24	121.0	0.36	0	0.0	0.00
Aug-21	11	55	20	85	91.5	0.27	5	28.1	0.08	6	63.3	0.19
Sep-21	29	147	36	290	164.5	0.49	12	61.0	0.18	17	103.5	0.31
Oct-21	6	30	6	56	40.2	0.12	5	31.8	0.09	1	8.3	0.02
Nov-21	52	269	155	382	348.2	1.04	10	52.6	0.16	42	295.6	0.88
Dec-21	65	339	115	663	381.1	1.14	31	163.5	0.49	34	217.7	0.65
Jan-22	19	95	25	195	95.9	0.29	7	35.7	0.11	12	60.2	0.18
Feb-22	53	268	101	476	273.4	0.81	30	154.8	0.46	23	118.6	0.35
Mar-22	43	213	55	451	219.9	0.65	20	105.9	0.32	23	114.0	0.34
Apr-22	3	15	3	30	15.1	0.04	0	0.0	0.00	3	15.1	0.04
May-22	1	5	1	15	5.5	0.02	1	5.5	0.02	0	0.0	0.00
Jun-22	10	50	10	130	50.3	0.15	10	50.3	0.15	0	0.0	0.00
Jul-22	19	94	40	163	94.9	0.28	9	45.9	0.14	10	49.0	0.15
Aug-22	22	106	34	201	110.8	0.33	10	48.0	0.14	12	62.8	0.19
Sep-22	8	40	10	75	68.5	0.20	5	25.0	0.07	3	43.5	0.13
Oct-22	15	75	55	95	87.5	0.26	6	30.0	0.09	9	57.5	0.17

Great northern diver

Table A 31: Great northern diver abundance estimates and behaviour information from DAS surveys in the array area.

Array Area	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	1	5	1	14	5.0	0.06	0	0.0	0.00	1	5.0	0.06
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	5.0	0.06
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 32: Great northern diver abundance estimates and behaviour information from DAS surveys in the array area plus 2km buffer.

Array Area + 2km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	1	5	1	15	5.0	0.02	0	0.0	0.00	1	5.0	0.02
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

May-21	1	5	1	15	5.0	0.02	0	0.0	0.00	1	5.0	0.02
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 33: Great northern diver abundance estimates and behaviour information from DAS surveys in the array area plus 4km buffer.

Array Area + 4km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	6	30	10	55	30.0	0.09	0	0.0	0.00	6	30.0	0.09
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	1	5	1	15	5.0	0.01	0	0.0	0.00	1	5.0	0.01
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Great skua

Table A 34: Great skua abundance estimates and behaviour information from DAS surveys in the array area.

Array Area	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 35: Great skua abundance estimates and behaviour information from DAS surveys in the array area plus 2km buffer.

Array Area + 2km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 36: Great skua abundance estimates and behaviour information from DAS surveys in the array area plus 4km buffer.

Array Area + 4km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Sep-20	1	5	1	15	5.0	0.01	1	5.0	0.01	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Guillemot

North Irish Sea Array Windfarm Ltd

Table A 37: Guillemot abundance estimates and behaviour information from DAS surveys in the array area.

Array Area	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	66	257	129	428	378.4	4.28	14	59.0	0.67	52	319.4	3.61
Jun-20	78	369	213	577	544.7	6.15	26	123.0	1.39	52	421.7	4.76
Jul-20	766	3,649	1,686	5,597	5,137.4	58.05	4	19.0	0.21	762	5,118.4	57.84
Aug-20	605	2,917	1147	5,197	3,980.0	44.97	1	5.0	0.06	604	3,975.0	44.91
Sep-20	1,266	6,040	4,065	7,853	9,341.4	105.55	0	0.0	0.00	1,266	9,341.4	105.55
Oct-20	83	385	116	835	4,083.6	46.14	3	16.6	0.19	80	4,067.0	45.96
Nov-20	0	0	0	0	444.6	5.02	0	38.7	0.44	0	405.9	4.59
Dec-20	15	74	29	118	770.8	8.71	1	44.0	0.50	14	726.8	8.21
Feb-21	0	0	0	0	294.2	3.32	0	0.0	0.00	0	294.2	3.32
Mar-21	491	2,331	1,477	3,219	3,499.8	39.55	2	9.0	0.10	489	3,490.8	39.44
Apr-21	70	342	220	450	622.8	7.04	1	5.0	0.06	69	617.8	6.98
May-21	136	671	489	908	913.4	10.32	8	52.3	0.59	128	861.0	9.73
Jun-21	87	416	129	765	610.2	6.89	3	14.0	0.16	84	596.2	6.74
Jul-21	143	712	169	1,663	927.9	10.48	12	60.0	0.68	131	867.9	9.81
Aug-21	1,816	8,510	5,253	11,824	11,857.7	133.99	0	0.0	0.00	1,814	11,839.7	133.78
Sep-21	2,702	12,986	7767	18,898	18,368.0	207.55	1	5.0	0.06	2,701	18,363.0	207.49
Oct-21	265	1,268	612	1,995	2,205.2	24.92	1	5.7	0.06	264	2,199.5	24.85
Nov-21	305	1,503	724	2,306	3,074.4	34.74	18	96.6	1.09	287	2,977.8	33.65
Dec-21	132	633	264	1,170	1,344.9	15.20	7	42.8	0.48	125	1,302.1	14.71
Jan-22	310	1,526	748	2,447	2,386.9	26.97	24	123.0	1.39	286	2,263.9	25.58
Feb-22	326	1,554	953	2,326	2,664.1	30.10	61	407.9	4.61	265	2,256.2	25.49
Mar-22	66	321	92	706	524.9	5.93	9	44.0	0.50	57	480.9	5.43
Apr-22	180	855	456	1,306	1,208.1	13.65	3	14.0	0.16	177	1,194.1	13.49
May-22	96	456	290	665	596.5	6.74	19	99.0	1.12	77	497.5	5.62
Jun-22	68	321	146	567	408.4	4.61	13	61.0	0.69	55	347.4	3.93

Jul-22	1,177	5,722	2,883	8,882	7,550.2	85.31	12	58.8	0.66	1,165	7,491.5	84.65
Aug-22	1,823	8,475	6,109	10,697	11,142.5	125.90	0	0.0	0.00	1,823	11,142.5	125.90
Sep-22	2,454	11,619	7,306	15,658	15,831.5	178.89	0	0.0	0.00	2,454	15,831.5	178.89
Oct-22	829	3,907	2,488	5,476	7,426.8	83.92	1	5.0	0.06	828	7,421.8	83.86

Table A 38: Guillemot abundance estimates and behaviour information from DAS surveys in the array area plus 2km buffer.

Array Area + 2km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	140	560	368	768	806.6	4.01	24	100.0	0.50	116	706.6	3.51
Jun-20	188	935	706	1,154	1,422.9	7.07	55	274.0	1.36	133	1,148.9	5.71
Jul-20	1,761	8,800	5,977	11,928	12,827.6	63.74	15	80.0	0.40	1,746	12,747.6	63.34
Aug-20	1,410	7,182	4,381	10,478	9,618.3	47.79	2	10.0	0.05	1,408	9,608.3	47.74
Sep-20	3,180	15,888	10,392	20,444	24,075.5	119.62	0	0.0	0.00	3,180	24,075.5	119.62
Oct-20	189	885	304	1,522	7,356.7	36.55	5	25.8	0.13	184	7,330.9	36.43
Nov-20	0	0	0	0	941.7	4.68	0	118.7	0.59	0	823.0	4.09
Dec-20	30	148	84	208	1,487.4	7.39	2	41.6	0.21	28	1,443.0	7.17
Feb-21	0	0	0	0	674.4	3.35	0	27.2	0.13	0	647.2	3.22
Mar-21	1,327	6,638	4,752	8,409	9,770.0	48.54	3	15.0	0.07	1,324	9,755.0	48.47
Apr-21	185	915	643	1,153	1,627.2	8.09	3	15.0	0.07	182	1,612.2	8.01
May-21	273	1,360	1,016	1,719	1,880.5	9.34	18	113.7	0.56	255	1,766.9	8.78
Jun-21	173	872	373	1,437	1,241.2	6.17	12	78.5	0.39	161	1,162.7	5.78
Jul-21	272	1,363	506	2,697	1,782.7	8.86	18	90.0	0.45	254	1,692.7	8.41
Aug-21	4,220	20,847	14,504	27,446	29,116.5	144.67	0	0.0	0.00	4,216	29,081.5	144.50
Sep-21	4,748	23,856	17,490	31,237	33,694.1	167.42	1	5.0	0.02	4,747	33,689.1	167.39

Oct-21	671	3,377	1,928	5,158	5,612.9	27.89	1	5.6	0.03	670	5,607.2	27.86
Nov-21	577	2,992	1,742	4,272	6,582.5	32.71	27	157.7	0.78	550	6,424.9	31.92
Dec-21	219	1,149	630	1,826	2,373.5	11.79	22	160.6	0.80	197	2,212.9	11.00
Jan-22	579	2,878	1,631	4,464	4,572.9	22.72	50	252.9	1.26	529	4,319.9	21.46
Feb-22	625	3,145	2,411	4,016	5,299.3	26.33	134	806.2	4.01	491	4,493.1	22.32
Mar-22	199	978	535	1,479	1,598.5	7.94	35	192.0	0.95	164	1,406.5	6.99
Apr-22	292	1,460	885	2,065	2,135.7	10.61	5	25.0	0.12	287	2,110.7	10.49
May-22	241	1,204	924	1,484	1,575.5	7.83	44	229.4	1.14	197	1,346.2	6.69
Jun-22	177	881	532	1,334	1,121.8	5.57	30	149.0	0.74	147	972.8	4.83
Jul-22	2,852	14,008	8,409	19,278	18,512.4	91.98	67	330.3	1.64	2,785	18,182.1	90.34
Aug-22	4,672	22,253	16,623	27,721	29,261.4	145.39	1	5.0	0.02	4,671	29,256.4	145.37
Sep-22	4,671	23,267	16,846	29,459	31,525.4	156.64	0	0.0	0.00	4,671	31,525.4	156.64
Oct-22	1,760	8,664	6,419	10,786	15,277.1	75.91	3	15.0	0.07	1,757	15,262.1	75.83

Table A 39: Guillemot abundance estimates and behaviour information from DAS surveys in the array area plus 4km buffer.

Array Area + 4km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	253	1,008	749	1,252	1,498.7	4.46	35	143.3	0.43	218	1,355.3	4.04
Jun-20	339	1,677	1,212	2,107	2,619.6	7.80	70	350.7	1.04	269	2,268.9	6.76
Jul-20	2,548	12,763	9,622	15,973	18,803.3	56.00	30	160.0	0.48	2,518	18,643.3	55.53
Aug-20	2,342	11,955	7,810	16,549	31,213.5	92.97	2	20.0	0.06	2,340	31,193.5	92.91
Sep-20	5,032	25,060	17,993	32,565	38,193.9	113.76	0	0.0	0.00	5,032	38,193.9	113.76
Oct-20	260	1,227	585	2,019	10,548.8	31.42	6	31.4	0.09	254	10,517.4	31.33
Nov-20	0	0	0	0	1,565.9	4.66	0	145.9	0.43	0	1,420.0	4.23
Dec-20	44	219	105	334	2,314.6	6.89	3	51.8	0.15	41	2,260.0	6.73

Feb-21	0	0	0	0	1,011.3	3.01	0	41.6	0.12	0	969.8	2.89
Mar-21	2,286	11,485	8,149	14,696	16,941.4	50.46	3	22.5	0.07	2,283	16,918.9	50.39
Apr-21	440	2,914	1,541	2,767	3,871.4	11.53	5	35.0	0.10	435	3,836.4	11.43
May-21	451	2,295	1,593	2,901	3,171.1	9.44	45	253.5	0.75	406	2,917.6	8.69
Jun-21	318	1,612	679	2,585	2,204.4	6.57	29	165.1	0.49	289	2,039.4	6.07
Jul-21	526	2,656	1,328	4,418	3,422.5	10.19	54	273.0	0.81	472	3,149.5	9.38
Aug-21	6,952	34,681	22,504	46,479	48,313.8	143.90	0	0.0	0.00	6,945	48,263.8	143.75
Sep-21	6,668	33,873	22,758	43,881	48,177.9	143.49	2	10.0	0.03	6,666	48,167.9	143.46
Oct-21	1,012	5,118	2,999	7,384	8,783.6	26.16	2	12.9	0.04	1,010	8,770.6	26.12
Nov-21	984	5,086	3,029	7,128	11,373.3	33.87	32	188.0	0.56	952	11,185.3	33.31
Dec-21	326	1,701	1,038	2,400	3,389.0	10.09	29	210.5	0.63	297	3,178.5	9.47
Jan-22	856	4,288	2,710	5,972	6,945.8	20.69	74	374.8	1.12	782	6,570.9	19.57
Feb-22	1,026	5,190	3,708	6,551	8,501.2	25.32	230	1,308.0	3.90	796	7,193.2	21.42
Mar-22	364	1,806	1,086	2,698	2,895.6	8.62	83	457.0	1.36	281	2,438.6	7.26
Apr-22	492	2,463	1,527	3,545	3,669.3	10.93	7	35.0	0.10	485	3,634.3	10.82
May-22	421	2,112	1,580	2,628	2,746.3	8.18	80	410.5	1.22	341	2,335.7	6.96
Jun-22	311	1,556	885	2,231	1,985.0	5.91	51	256.5	0.76	260	1,728.5	5.15
Jul-22	4,262	21,087	15,101	27,307	27,753.2	82.66	135	669.2	1.99	4,127	27,084.1	80.67
Aug-22	7,033	33,736	26,445	40,413	44,351.9	132.10	1	5.0	0.01	7,032	44,346.9	132.08
Sep-22	6,768	33,851	24,488	42,514	45,769.3	136.32	0	0.0	0.00	6,768	45,769.3	136.32
Oct-22	2,356	11,800	8,705	14,830	20,328.1	60.55	7	37.2	0.11	2,349	20,290.9	60.43

Herring gull

Table A 40: Herring gull abundance estimates and behaviour information from DAS surveys in the array area.

Array Area	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density

May-20	1	4	1	12	4.0	0.05	35	143.3	0.43	218	1,355.3	4.04
Jun-20	5	24	5	43	24.0	0.27	70	350.7	1.04	269	2,268.9	6.76
Jul-20	60	286	60	791	286.0	3.23	30	160.0	0.48	2,518	18,643.3	55.53
Aug-20	0	0	0	0	0.0	0.00	2	20.0	0.06	2,340	31,193.5	92.91
Sep-20	2	10	2	19	10.0	0.11	0	0.0	0.00	5,032	38,193.9	113.76
Oct-20	0	0	0	0	0.0	0.00	6	31.4	0.09	254	10,517.4	31.33
Nov-20	4	18	4	45	18.0	0.20	0	145.9	0.43	0	1,420.0	4.23
Dec-20	82	402	82	1024	410.4	4.64	3	51.8	0.15	41	2,260.0	6.73
Feb-21	18	86	18	214	93.4	1.06	0	41.6	0.12	0	969.8	2.89
Mar-21	27	128	57	209	128.0	1.45	3	22.5	0.07	2,283	16,918.9	50.39
Apr-21	1	5	1	15	5.0	0.06	5	35.0	0.10	435	3,836.4	11.43
May-21	0	0	0	0	0.0	0.00	45	253.5	0.75	406	2,917.6	8.69
Jun-21	0	0	0	0	0.0	0.00	29	165.1	0.49	289	2,039.4	6.07
Jul-21	1	5	1	15	5.0	0.06	54	273.0	0.81	472	3,149.5	9.38
Aug-21	3	14	3	28	22.6	0.26	0	0.0	0.00	6,945	48,263.8	143.75
Sep-21	0	0	0	0	0.0	0.00	2	10.0	0.03	6,666	48,167.9	143.46
Oct-21	1	5	1	14	5.0	0.06	2	12.9	0.04	1,010	8,770.6	26.12
Nov-21	84	414	118	754	498.4	5.63	32	188.0	0.56	952	11,185.3	33.31
Dec-21	26	125	62	201	137.0	1.55	29	210.5	0.63	297	3,178.5	9.47
Jan-22	90	443	90	1201	448.1	5.06	74	374.8	1.12	782	6,570.9	19.57
Feb-22	18	86	19	181	86.0	0.97	230	1,308.0	3.90	796	7,193.2	21.42
Mar-22	1	5	1	15	5.0	0.06	83	457.0	1.36	281	2,438.6	7.26
Apr-22	2	9	2	19	9.0	0.10	7	35.0	0.10	485	3,634.3	10.82
May-22	1	5	1	14	5.0	0.06	80	410.5	1.22	341	2,335.7	6.96
Jun-22	2	9	2	28	9.0	0.10	51	256.5	0.76	260	1,728.5	5.15
Jul-22	8	39	15	68	39.4	0.44	135	669.2	1.99	4,127	27,084.1	80.67
Aug-22	1	5	1	14	5.0	0.06	1	5.0	0.01	7,032	44,346.9	132.08
Sep-22	20	95	20	256	103.2	1.17	0	0.0	0.00	6,768	45,769.3	136.32
Oct-22	2	9	2	28	9.0	0.10	7	37.2	0.11	2,349	20,290.9	60.43

Table A 41: Herring gull abundance estimates and behaviour information from DAS surveys in the array area plus 2km buffer.

Array Area + 2km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	1	4	1	12	4.0	0.02	0	0.0	0.00	1	4.0	0.02
Jun-20	10	50	25	75	50.0	0.25	10	50.0	0.25	0	0.0	0.00
Jul-20	139	695	139	1934	695.0	3.45	77	385.0	1.91	62	310.0	1.54
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	3	15	3	35	15.0	0.07	2	10.0	0.05	1	5.0	0.02
Oct-20	31	145	31	436	145.0	0.72	31	145.0	0.72	0	0.0	0.00
Nov-20	4	18	4	45	18.0	0.09	2	9.0	0.04	2	9.0	0.04
Dec-20	238	1177	238	2399	1189.6	5.91	91	453.7	2.25	146	730.9	3.63
Feb-21	22	110	25	245	117.0	0.58	8	40.0	0.20	14	77.0	0.38
Mar-21	39	195	80	330	195.0	0.97	32	160.0	0.79	7	35.0	0.17
Apr-21	1	5	1	15	5.0	0.02	1	5.0	0.02	0	0.0	0.00
May-21	19	95	19	284	95.0	0.47	19	95.0	0.47	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	6	30	6	60	30.0	0.15	3	15.0	0.07	3	15.0	0.07
Aug-21	7	35	15	54	50.6	0.25	4	22.2	0.11	3	28.4	0.14
Sep-21	38	191	38	512	220.5	1.10	2	10.0	0.05	36	210.5	1.05
Oct-21	5	25	5	55	35.0	0.17	4	20.0	0.10	1	15.0	0.07
Nov-21	108	560	244	928	716.0	3.56	35	181.0	0.90	73	534.0	2.65
Dec-21	224	1175	224	3001	1284.4	6.38	118	623.2	3.10	106	661.2	3.29
Jan-22	104	517	104	1317	524.2	2.60	42	215.5	1.07	62	308.8	1.53
Feb-22	85	428	166	840	436.6	2.17	24	122.2	0.61	61	314.4	1.56
Mar-22	1	5	1	15	5.0	0.02	1	5.0	0.02	0	0.0	0.00
Apr-22	3	15	3	30	15.0	0.07	3	15.0	0.07	0	0.0	0.00

May-22	1	5	1	15	5.0	0.02	1	5.0	0.02	0	0.0	0.00
Jun-22	3	15	3	35	15.0	0.07	3	15.0	0.07	0	0.0	0.00
Jul-22	25	123	54	211	126.5	0.63	13	67.5	0.34	12	59.0	0.29
Aug-22	12	57	29	90	59.3	0.29	7	33.0	0.16	5	26.3	0.13
Sep-22	33	164	33	463	218.0	1.08	30	149.0	0.74	3	69.0	0.34
Oct-22	33	162	33	458	162.0	0.80	31	153.0	0.76	2	10.0	0.05

Table A 42: Herring gull abundance estimates and behaviour information from DAS surveys in the array area plus 4km buffer.

Array Area	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	2	8	2	20	8.0	0.02	0	0.0	0.00	2	8.0	0.02
Jun-20	19	94	64	124	97.0	0.29	19	97.0	0.29	0	0.0	0.00
Jul-20	162	811	162	2,154	811.0	2.42	93	466.0	1.39	69	346.0	1.03
Aug-20	2	10	2	31	10.0	0.03	2	10.0	0.03	0	0.0	0.00
Sep-20	68	339	68	971	339.0	1.01	15	75.0	0.22	53	264.0	0.79
Oct-20	31	146	31	439	146.0	0.43	31	146.0	0.43	0	0.0	0.00
Nov-20	7	32	7	78	32.9	0.10	5	23.0	0.07	2	9.9	0.03
Dec-20	453	2259	853	3,905	2326.1	6.93	143	728.0	2.17	308	1588.1	4.73
Feb-21	25	125	35	261	132.5	0.39	11	57.3	0.17	14	75.2	0.22
Mar-21	57	286	141	472	290.4	0.86	38	195.4	0.58	19	95.0	0.28
Apr-21	1	5	1	15	5.0	0.01	1	5.0	0.01	0	0.0	0.00
May-21	19	97	19	290	97.0	0.29	19	97.0	0.29	0	0.0	0.00
Jun-21	2	10	2	20	10.0	0.03	1	5.0	0.01	1	5.0	0.01
Jul-21	7	35	10	66	35.0	0.10	4	20.0	0.06	3	15.0	0.04
Aug-21	14	70	30	115	105.0	0.31	8	45.0	0.13	6	60.0	0.18
Sep-21	44	224	44	508	265.3	0.79	4	20.0	0.06	40	244.3	0.73
Oct-21	8	40	10	76	54.9	0.16	6	38.2	0.11	2	16.7	0.05

Nov-21	158	817	439	1,225	971.5	2.89	66	345.3	1.03	92	626.2	1.86
Dec-21	378	1972	438	3,886	2218.4	6.61	179	942.5	2.81	199	1275.9	3.80
Jan-22	122	611	160	1,403	617.6	1.84	54	276.7	0.82	68	341.9	1.02
Feb-22	112	567	268	1,022	578.8	1.72	47	242.4	0.72	65	336.4	1.00
Mar-22	22	109	22	322	112.1	0.33	9	48.1	0.14	13	64.0	0.19
Apr-22	8	40	10	80	40.0	0.12	6	30.0	0.09	2	10.0	0.03
May-22	1	5	1	15	5.5	0.02	1	5.5	0.02	0	0.0	0.00
Jun-22	6	30	6	70	30.2	0.09	6	30.2	0.09	0	0.0	0.00
Jul-22	51	252	114	430	255.8	0.76	36	181.8	0.54	15	74.0	0.22
Aug-22	67	321	67	648	341.3	1.02	16	77.0	0.23	51	265.3	0.79
Sep-22	38	190	38	500	256.5	0.76	31	155.0	0.46	7	101.5	0.30
Oct-22	35	175	35	466	177.8	0.53	33	165.0	0.49	2	12.8	0.04

Kittiwake

Table A 43: Kittiwake abundance estimates and behaviour information from DAS surveys in the array area.

Array Area	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	2	8	2	16	8.0	0.09	2	8.0	0.09	0	0.0	0.00
Jun-20	1	5	1	14	5.0	0.06	1	5.0	0.06	0	0.0	0.00
Jul-20	1	5	1	14	5.0	0.06	1	5.0	0.06	0	0.0	0.00
Aug-20	10	48	14	87	48.0	0.54	8	39.0	0.44	2	10.0	0.11
Sep-20	5	24	10	43	24.0	0.27	4	19.0	0.21	1	5.0	0.06
Oct-20	23	107	37	195	107.0	1.21	18	84.0	0.95	5	23.0	0.26
Nov-20	5	23	5	45	23.0	0.26	4	18.0	0.20	1	5.0	0.06
Dec-20	15	74	29	118	74.0	0.84	14	69.0	0.78	1	5.0	0.06
Feb-21	4	19	4	52	19.0	0.21	4	19.0	0.21	0	0.0	0.00

Mar-21	55	261	133	394	265.5	3.00	19	90.0	1.02	36	175.5	1.98
Apr-21	6	29	6	64	29.0	0.33	3	15.0	0.17	3	15.0	0.17
May-21	8	39	10	79	39.0	0.44	7	35.0	0.40	1	5.0	0.06
Jun-21	3	14	5	29	14.0	0.16	3	14.0	0.16	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	13	61	33	89	61.0	0.69	10	47.0	0.53	3	14.0	0.16
Sep-21	42	202	101	332	202.0	2.28	31	149.0	1.68	11	53.0	0.60
Oct-21	19	91	19	187	91.2	1.03	7	33.0	0.37	12	57.2	0.65
Nov-21	38	187	79	301	197.3	2.23	20	101.1	1.14	18	97.2	1.10
Dec-21	42	201	101	326	201.0	2.27	38	182.0	2.06	4	19.0	0.21
Jan-22	224	1103	224	3234	1104.5	12.48	64	315.0	3.56	160	789.5	8.92
Feb-22	30	143	57	243	143.0	1.62	18	86.0	0.97	12	57.0	0.64
Mar-22	2	10	2	19	10.0	0.11	2	10.0	0.11	0	0.0	0.00
Apr-22	6	28	9	47	28.0	0.32	4	19.0	0.21	2	9.0	0.10
May-22	3	14	5	24	14.0	0.16	3	14.0	0.16	0	0.0	0.00
Jun-22	2	9	2	28	9.0	0.10	2	9.0	0.10	0	0.0	0.00
Jul-22	74	360	180	637	361.8	4.09	28	137.8	1.56	46	224.0	2.53
Aug-22	4	19	5	37	19.0	0.21	3	14.0	0.16	1	5.0	0.06
Sep-22	5	24	5	62	24.0	0.27	0	0.0	0.00	5	24.0	0.27
Oct-22	16	75	24	132	75.0	0.85	7	33.0	0.37	9	42.0	0.47

Table A 44: Kittiwake abundance estimates and behaviour information from DAS surveys in the array area plus 2km buffer.

Array Area + 2km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	6	24	6	52	24.0	0.12	5	20.0	0.10	1	4.0	0.02

Jun-20	2	10	2	25	10.0	0.05	2	10.0	0.05	0	0.0	0.00
Jul-20	5	25	5	60	25.0	0.12	5	2.0	0.01	0	0.0	0.00
Aug-20	19	97	56	138	102.0	0.51	17	87.0	0.43	2	15.0	0.07
Sep-20	13	65	30	100	65.0	0.32	8	40.0	0.20	5	25.0	0.12
Oct-20	38	178	94	272	183.0	0.91	33	155.0	0.77	5	28.0	0.14
Nov-20	27	123	59	215	123.0	0.61	24	110.0	0.55	3	14.0	0.07
Dec-20	54	267	173	356	267.0	1.33	44	218.0	1.08	10	49.0	0.24
Feb-21	11	55	20	100	55.0	0.27	10	50.0	0.25	1	5.0	0.02
Mar-21	102	510	325	700	519.2	2.58	41	205.0	1.02	61	314.2	1.56
Apr-21	19	94	49	143	94.0	0.47	14	69.0	0.34	5	25.0	0.12
May-21	9	45	10	90	45.0	0.22	8	40.0	0.20	1	5.0	0.02
Jun-21	5	25	5	45	25.0	0.12	5	25.0	0.12	0	0.0	0.00
Jul-21	1	5	1	15	5.0	0.02	0	0.0	0.00	1	5.0	0.02
Aug-21	39	193	123	272	193.0	0.96	27	133.0	0.66	12	59.0	0.29
Sep-21	75	377	246	507	377.0	1.87	55	276.0	1.37	20	100.0	0.50
Oct-21	47	237	47	488	237.3	1.18	21	106.0	0.53	26	131.3	0.65
Nov-21	101	524	223	871	554.9	2.76	57	299.0	1.49	44	255.8	1.27
Dec-21	159	834	446	1,369	834.0	4.14	138	724.0	3.60	21	110.0	0.55
Jan-22	297	1,476	297	4,191	1480.8	7.36	110	549.4	2.73	187	932.3	4.63
Feb-22	74	372	191	574	374.1	1.86	44	223.1	1.11	30	151.0	0.75
Mar-22	23	113	49	187	113.0	0.56	13	64.0	0.32	10	49.0	0.24
Apr-22	21	105	60	165	105.2	0.52	6	30.0	0.15	15	75.2	0.37
May-22	4	20	5	35	20.0	0.10	4	20.0	0.10	0	0.0	0.00
Jun-22	3	15	3	35	15.0	0.07	2	10.0	0.05	1	5.0	0.02
Jul-22	205	1,007	648	1,390	1008.7	5.01	89	438.7	2.18	116	570.0	2.83
Aug-22	11	52	29	81	52.0	0.26	9	43.0	0.21	2	10.0	0.05
Sep-22	9	45	10	100	45.0	0.22	3	15.0	0.07	6	30.0	0.15
Oct-22	191	940	191	2,240	940.3	4.67	24	118.0	0.59	167	822.3	4.09

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Table A 45: Kittiwake abundance estimates and behaviour information from DAS surveys in the array area plus 4km buffer.

Array Area	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	8	32	8	64	32.0	0.10	7	28.0	0.08	1	4.0	0.01
Jun-20	4	20	4	45	20.6	0.06	4	20.6	0.06	0	0.0	0.00
Jul-20	8	40	8	80	40.0	0.12	8	40.0	0.12	0	0.0	0.00
Aug-20	35	179	97	276	184.0	0.55	28	143.0	0.43	7	41.0	0.12
Sep-20	18	90	40	139	100.0	0.30	12	60.0	0.18	6	40.0	0.12
Oct-20	52	245	127	396	250.0	0.74	41	193.0	0.57	11	57.0	0.17
Nov-20	60	276	119	459	276.0	0.82	50	230.0	0.69	10	46.0	0.14
Dec-20	84	419	229	658	419.2	1.25	63	314.0	0.94	21	105.2	0.31
Feb-21	16	80	35	136	80.0	0.24	13	65.0	0.19	3	15.0	0.04
Mar-21	155	779	523	1,050	807.1	2.40	64	322.0	0.96	91	485.1	1.44
Apr-21	28	140	80	199	140.0	0.42	23	115.0	0.34	5	25.0	0.07
May-21	11	56	15	97	56.0	0.17	10	51.0	0.15	1	5.0	0.01
Jun-21	10	51	10	106	51.0	0.15	10	51.0	0.15	0	0.0	0.00
Jul-21	5	25	5	66	25.0	0.07	2	10.0	0.03	3	15.0	0.04
Aug-21	115	574	309	858	574.0	1.71	52	259.0	0.77	63	314.0	0.94
Sep-21	104	528	361	721	528.0	1.57	78	132.0	0.39	26	132.0	0.39
Oct-21	68	344	116	663	344.3	1.03	27	137.0	0.41	41	207.3	0.62
Nov-21	247	1,277	465	2,429	1315.6	3.92	154	799.5	2.38	93	516.1	1.54
Dec-21	320	1,669	793	2,817	1682.4	5.01	227	1184.0	3.53	93	498.4	1.48
Jan-22	342	1,713	342	4,509	1719.0	5.12	130	654.1	1.95	212	1064.9	3.17
Feb-22	148	749	364	1,189	750.9	2.24	65	330.9	0.99	83	420.0	1.25
Mar-22	84	417	164	818	417.0	1.24	39	193.0	0.57	45	223.0	0.66
Apr-22	68	340	170	581	340.7	1.01	24	120.0	0.36	44	120.7	0.36
May-22	9	45	15	90	49.1	0.15	9	49.1	0.15	0	0.0	0.00
Jun-22	4	20	4	50	20.1	0.06	3	15.1	0.04	1	5.0	0.01

Jul-22	376	1,860	1,034	2,825	1861.7	5.54	198	981.7	2.92	178	881.0	2.62
Aug-22	24	115	58	182	115.0	0.34	22	106.0	0.32	2	10.0	0.03
Sep-22	15	75	25	130	75.0	0.22	6	30.0	0.09	9	45.0	0.13
Oct-22	236	1,182	236	2,454	1187.3	3.54	33	165.0	0.49	203	1022.3	3.04

Lesser black-backed gull

Table A 46: Lesser black-backed gull abundance estimates and behaviour information from DAS surveys in the array area.

Array Area	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	12	57	12	171	57.0	0.64	4	19.0	0.21	8	38.0	0.43
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	1	5	1	14	5.0	0.06	1	5.0	0.06	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	2	9	2	19	19.5	0.22	0	0.0	0.00	2	19.5	0.22
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	1	5	1	15	5.0	0.06	1	5.0	0.06	0	0.0	0.00

Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	1	5	1	15	5.1	0.06	1	5.1	0.06	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 47: Lesser black-backed gull abundance estimates and behaviour information from DAS surveys in the array area plus 2km buffer.

Array Area + 2km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	2	10	2	25	10.0	0.05	2	10.0	0.05	0	0.0	0.00
Jul-20	14	70	14	210	71.7	0.36	6	31.7	0.16	8	40.0	0.20
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	1	5	1	14	5.0	0.02	1	5.0	0.02	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	1	5	1	15	5.1	0.03	0	0.0	0.00	1	5.1	0.03
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	4	20	4	40	30.0	0.15	2	11.1	0.06	2	18.9	0.09
Sep-21	7	35	7	95	39.9	0.20	1	5.0	0.02	6	34.9	0.17
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	1	5	1	16	5.0	0.02	1	5.0	0.02	0	0.0	0.00
Dec-21	1	5	1	16	5.0	0.03	1	5.0	0.03	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	4	20	4	39	21.1	0.10	4	21.1	0.10	0	0.0	0.00
Aug-22	3	14	3	38	15.4	0.08	0	0.0	0.00	3	15.4	0.08
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 48: Lesser black-backed gull abundance estimates and behaviour information from DAS surveys in the array area plus 4km buffer.

Array Area + 4km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	3	15	3	30	15.5	0.05	3	15.5	0.05	0	0.0	0.00

Jul-20	16	80	16	235	81.7	0.24	7	36.7	0.11	9	45.0	0.13
Aug-20	2	10	2	31	10.0	0.03	2	10.0	0.03	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	1	5	1	14	5.0	0.01	1	5.0	0.01	0	0.0	0.00
Nov-20	1	5	1	14	5.5	0.02	0	0.0	0.00	1	5.5	0.02
Dec-20	1	5	1	15	5.2	0.02	0	0.0	0.00	1	5.2	0.02
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	1	5	1	15	5.0	0.01	1	5.0	0.01	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	6	30	10	50	48.5	0.14	3	16.9	0.05	3	31.7	0.09
Sep-21	9	46	9	97	53.2	0.16	2	10.0	0.03	7	43.2	0.13
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	1	5	1	16	5.1	0.02	1	5.1	0.02	0	0.0	0.00
Dec-21	1	5	1	16	5.0	0.02	1	5.0	0.02	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	7	35	15	54	35.7	0.11	7	35.7	0.11	0	0.0	0.00
Aug-22	13	62	13	125	66.0	0.20	3	14.0	0.04	10	52.0	0.15
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Little gull

Table A 49: Little gull abundance estimates and behaviour information from DAS surveys in the array area.

Array Area	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 50: Little gull abundance estimates and behaviour information from DAS surveys in the array area plus 2km buffer.

Array Area + 2km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 51: Little gull abundance estimates and behaviour information from DAS surveys in the array area plus 4km buffer.

Array Area + 4km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	1	5	1	16	5.0	0.01	1	5.0	0.01	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Manx shearwater

Table A 52: Manx shearwater abundance estimates and behaviour information from DAS surveys in the array area.

Array Area	All Behaviours				Flying				Sitting			

North Irish Sea Array Windfarm Ltd

Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	1	4	1	12	4.0	0.05	1	4.0	0.05	0	0.0	0.00
Jun-20	1	5	1	14	5.0	0.06	1	5.0	0.06	0	0.0	0.00
Jul-20	44	210	44	514	210.0	2.37	4	19.0	0.21	40	191.0	2.16
Aug-20	239	1152	239	2541	1152.0	13.02	45	217.0	2.45	194	935.0	10.56
Sep-20	56	267	86	472	267.0	3.02	41	196.0	2.21	15	72.0	0.81
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	33	163	33	395	163.1	1.84	32	158.0	1.79	1	5.1	0.06
Jun-21	2	10	2	19	10.0	0.11	2	10.0	0.11	0	0.0	0.00
Jul-21	120	598	120	1703	598.0	6.76	5	25.0	0.28	115	573.0	6.47
Aug-21	234	1097	234	2348	1496.2	16.91	6	56.0	0.63	228	1439.2	16.26
Sep-21	36	173	43	351	192.0	2.17	2	24.0	0.27	34	168.0	1.90
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	3	14	3	33	14.0	0.16	3	14.0	0.16	0	0.0	0.00
Jun-22	18	85	18	217	123.0	1.39	18	123.0	1.39	0	0.0	0.00
Jul-22	142	690	142	1522	721.7	8.16	14	97.9	1.11	128	623.9	7.05
Aug-22	427	1985	976	3143	2216.7	25.05	75	493.0	5.57	352	1723.7	19.48
Sep-22	81	384	81	838	630.0	7.12	3	85.0	0.96	78	544.0	6.15
Oct-22	3	14	3	33	14.1	0.16	0	0.0	0.00	3	14.1	0.16

Table A 53: Manx shearwater abundance estimates and behaviour information from DAS surveys in the array area plus 2km buffer.

Array Area + 2km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	2	8	1	12	8.0	0.040	2	8.0	0.04	0	0.0	0.00
Jun-20	1	5	1	14	5.0	0.025	1	5.0	0.02	0	0.0	0.00
Jul-20	383	1,914	44	514	1,914.0	9.510	71	355.0	1.76	312	1559.0	7.75
Aug-20	415	2,114	239	2,541	2,114.0	10.504	99	504.0	2.50	316	1610.0	8.00
Sep-20	158	789	86	472	789.0	3.920	57	285.0	1.42	101	505.0	2.51
Oct-20	0	0	0	0	0.0	0.000	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.000	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.000	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.000	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.000	0	0.0	0.00	0	0.0	0.00
Apr-21	1	5	0	0	5.0	0.025	1	5.0	0.02	0	0.0	0.00
May-21	73	364	33	395	364.5	1.811	71	354.0	1.76	2	10.5	0.05
Jun-21	4	20	2	19	22.5	0.112	4	22.5	0.11	0	0.0	0.00
Jul-21	186	932	120	1,703	933.7	4.639	52	261.0	1.30	134	673.7	3.35
Aug-21	458	2,262	234	2,348	2,934.7	14.582	16	148.0	0.74	442	2786.7	13.85
Sep-21	119	598	43	351	718.1	3.568	4	55.0	0.27	115	663.1	3.29
Oct-21	0	0	0	0	5.0	0.025	0	5.0	0.02	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.000	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.000	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.000	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.000	0	0.0	0.00	0	0.0	0.00

Mar-22	0	0	0	0	0.0	0.000	0	0.0	0.00	0	0.0	0.00
Apr-22	2	10	0	0	10.1	0.050	1	5.0	0.02	1	5.1	0.03
May-22	4	20	3	33	20.0	0.099	4	20.0	0.10	0	0.0	0.00
Jun-22	71	353	18	217	433.0	2.151	33	224.0	1.11	38	209.0	1.04
Jul-22	252	1,238	142	1,522	1,315.4	6.536	25	187.5	0.93	227	1127.9	5.60
Aug-22	1,058	5,029	976	3,143	5,526.9	27.462	176	1,165.1	5.79	882	4371.8	21.72
Sep-22	215	1,071	81	838	1,549.6	7.700	14	219.0	1.09	201	1330.6	6.61
Oct-22	7	34	3	33	34.1	0.170	4	20.0	0.10	3	15.1	0.08

Table A 54: Manx shearwater abundance estimates and behaviour information from DAS surveys in the array area plus 4km buffer.

Array Area + 4km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	5	20	2	20	20.0	0.06	5	20.0	0.06	0	0.0	0.00
Jun-20	5	25	1	15	25.0	0.07	1	5.0	0.01	4	20.0	0.06
Jul-20	443	2,219	490	3,863	2,219.0	6.61	109	546.0	1.63	334	1,673.0	4.98
Aug-20	650	3,318	784	3,652	3,318.0	9.88	150	766.0	2.28	500	2,552.0	7.60
Sep-20	213	1,061	185	1,784	1,061.0	3.16	71	354.0	1.05	142	707.0	2.11
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	2	10	0	0	10.0	0.03	1	5.0	0.01	1	5.0	0.01
Apr-21	1	5	1	15	5.0	0.01	1	5.0	0.01	0	0.0	0.00

May-21	86	438	73	737	438.5	1.31	84	428.0	1.27	2	10.5	0.03
Jun-21	7	35	4	50	36.9	0.11	7	36.9	0.11	0	0.0	0.00
Jul-21	1,402	7,078	186	2,145	7,088.6	21.11	268	1,353.0	4.03	1,134	5,735.6	17.08
Aug-21	813	4,056	766	3,873	5,052.4	15.05	22	210.0	0.63	791	4,842.4	14.42
Sep-21	196	996	119	1,311	1,159.4	3.45	8	97.0	0.29	188	1,062.4	3.16
Oct-21	1	5	0	0	10.0	0.03	1	10.0	0.03	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	2	10	2	30	10.2	0.03	1	5.0	0.01	1	5.2	0.02
May-22	9	45	4	50	45.0	0.13	9	45.0	0.13	0	0.0	0.00
Jun-22	82	410	71	826	507.6	1.51	44	296.3	0.88	38	211.2	0.63
Jul-22	427	2,113	383	2,245	2,231.1	6.65	54	371.5	1.11	373	1,859.7	5.54
Aug-22	1,494	7,166	3,429	6,897	7,893.1	23.51	247	1,691.0	5.04	1,247	6,203.1	18.48
Sep-22	224	1,120	443	1,798	1,660.7	4.95	19	305.0	0.91	205	1,355.7	4.04
Oct-22	10	50	7	79	50.1	0.15	6	30.0	0.09	4	20.1	0.06

Puffin

Table A 55: Puffin abundance estimates and behaviour information from DAS surveys in the array area.

Array Area	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	1	5	1	14	5.8	0.07	0	0.0	0.00	1	5.8	0.07

Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	1	5	1	15	6.0	0.07	0	0.0	0.00	1	6.0	0.07
Jun-21	1	5	1	14	6.1	0.07	0	0.0	0.00	1	6.1	0.07
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	1	5	1	14	5.8	0.07	0	0.0	0.00	1	5.8	0.07
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	1	5	1	15	5.9	0.07	0	0.0	0.00	1	5.9	0.07
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	1	5	1	14	5.8	0.07	0	0.0	0.00	1	5.8	0.07
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	2	9	2	28	10.6	0.12	0	0.0	0.00	2	10.6	0.12

Table A 56: Puffin abundance estimates and behaviour information from DAS surveys in the array area plus 2km buffer.

Array Area + 2km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	1	5	1	15	5.8	0.03	0	0.0	0.00	1	5.8	0.03
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	1	5	1	15	5.9	0.03	0	0.0	0.00	1	5.9	0.03
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	4	20	5	35	24.4	0.12	0	0.0	0.00	4	24.4	0.12
Jun-21	1	5	1	15	6.0	0.03	0	0.0	0.00	1	6.0	0.03
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	2	10	2	25	11.7	0.06	0	0.0	0.00	2	11.7	0.06
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	1	5	1	16	6.0	0.03	0	0.0	0.00	1	6.0	0.03
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	1	5	1	15	5.9	0.03	0	0.0	0.00	1	5.9	0.03
Aug-22	1	5	1	14	5.8	0.03	0	0.0	0.00	1	5.8	0.03
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	2	10	2	30	11.8	0.06	0	0.0	0.00	2	11.8	0.06

Table A 57: Puffin abundance estimates and behaviour information from DAS surveys in the array area plus 4km buffer.

Array Area + 4km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	1	4	1	12	4.7	0.01	0	0.0	0.00	1	4.7	0.01
Jun-20	1	5	1	15	5.8	0.02	0	0.0	0.00	1	5.8	0.02
Jul-20	2	10	2	25	11.7	0.03	0	0.0	0.00	2	11.7	0.03
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	1	5	1	15	5.8	0.02	0	0.0	0.00	1	5.8	0.02
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	4	20	5	36	24.5	0.07	0	0.0	0.00	4	24.5	0.07
Jun-21	1	5	1	15	5.9	0.02	0	0.0	0.00	1	5.9	0.02

Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	2	10	2	25	11.7	0.03	0	0.0	0.00	2	11.7	0.03
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	1	5	1	16	5.9	0.02	0	0.0	0.00	1	5.9	0.02
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	6	30	15	45	35.1	0.10	0	0.0	0.00	6	35.1	0.10
Aug-22	2	10	2	29	11.7	0.03	0	0.0	0.00	2	11.7	0.03
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	3	15	3	40	17.7	0.05	0	0.0	0.00	3	17.7	0.05

Razorbill

Table A 58: Razorbill abundance estimates and behaviour information from DAS surveys in the array area.

Array Area	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	3	12	3	27	17.4	0.20	0	0.0	0.00	3	17.4	0.20
Jun-20	4	19	4	47	27.2	0.31	1	5.0	0.06	3	22.2	0.25
Jul-20	5	24	5	52	31.2	0.35	0	0.0	0.00	5	31.2	0.35

Aug-20	5	24	5	63	30.3	0.34	0	0.0	0.00	5	30.3	0.34
Sep-20	108	515	108	997	735.8	8.31	0	0.0	0.00	108	735.8	8.31
Oct-20	47	218	47	483	1,668.4	18.85	13	71.4	0.81	34	1,597.0	18.05
Nov-20	0	0	0	0	243.7	2.75	0	88.3	1.00	0	155.5	1.76
Dec-20	9	44	9	98	431.1	4.87	0	0.0	0.00	9	431.1	4.87
Feb-21	0	0	0	0	22.6	0.25	0	0.0	0.00	0	22.6	0.25
Mar-21	23	109	66	147	149.5	1.69	1	5.0	0.06	22	144.5	1.63
Apr-21	4	20	5	39	33.6	0.38	0	0.0	0.00	4	33.6	0.38
May-21	1	5	1	15	6.7	0.08	1	6.7	0.08	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	78	366	150	619	470.8	5.32	0	0.0	0.00	78	470.8	5.32
Sep-21	32	154	32	293	201.2	2.27	0	0.0	0.00	32	201.2	2.27
Oct-21	34	163	72	258	248.8	2.81	6	33.3	0.38	28	215.5	2.44
Nov-21	160	788	222	1,532	1,359.5	15.36	41	219.4	2.48	119	1,140.2	12.88
Dec-21	123	590-	341	815	1,179.4	13.33	1	6.3	0.07	122	1,173.2	13.26
Jan-22	8	39	10	74	58.0	0.66	0	0.0	0.00	8	58.0	0.66
Feb-22	33	157	48	310	246.3	2.78	11	73.1	0.83	22	173.2	1.96
Mar-22	2	10	2	24	15.9	0.18	0	0.0	0.00	2	15.9	0.18
Apr-22	3	14	3	33	18.4	0.21	0	0.0	0.00	3	18.4	0.21
May-22	3	14	5	28	17.6	0.20	0	0.0	0.00	3	17.6	0.20
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	20	97	49	180	117.5	1.33	1	5.1	0.06	19	112.4	1.27
Aug-22	1	5	1	14	6.1	0.07	0	0.0	0.00	1	6.1	0.07
Sep-22	38	180	71	294	226.5	2.56	0	0.0	0.00	38	226.5	2.56
Oct-22	337	1588	683	2823	2,779.4	31.41	3	14.0	0.16	334	2,765.4	31.25

Table A 59: Razorbill abundance estimates and behaviour information from DAS surveys in the array area plus 2km buffer.

Array Area + 2km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	14	56	28	96	78.8	0.39	0	0.0	0.00	14	78.8	0.39
Jun-20	9	45	20	70	63.0	0.31	3	15.0	0.07	6	48.0	0.24
Jul-20	27	135	50	215	182.2	0.91	0	0.0	0.00	27	182.2	0.91
Aug-20	9	46	9	107	56.9	0.28	0	0.0	0.00	9	56.9	0.28
Sep-20	228	1,139	415	2,038	1,592.3	7.91	1	5.0	0.02	227	1,587.3	7.89
Oct-20	133	623	267	1,002	2,717.8	13.50	69	362.2	1.80	64	2,355.6	11.70
Nov-20	0	0	0	0	520.1	2.58	0	224.3	1.11	0	295.8	1.47
Dec-20	26	129	49	213	1,158.1	5.75	3	62.4	0.31	23	1,095.7	5.44
Feb-21	0	0	0	0	78.3	0.39	0	2.8	0.01	0	75.5	0.38
Mar-21	53	265	165	360	358.8	1.78	1	5.0	0.02	52	353.8	1.76
Apr-21	4	20	4	40	33.0	0.16	0	0.0	0.00	4	33.0	0.16
May-21	4	20	4	40	25.6	0.13	1	6.3	0.03	3	19.3	0.10
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	2	10	2	30	12.3	0.06	0	0.0	0.00	2	12.3	0.06
Aug-21	176	869	400	1,309	1,120.9	5.57	0	0.0	0.00	176	1,120.9	5.57
Sep-21	71	357	131	628	465.8	2.31	0	0.0	0.00	71	465.8	2.31
Oct-21	108	544	201	1,067	819.8	4.07	7	39.4	0.20	101	780.4	3.88
Nov-21	265	1,374	446	2,400	1,397.1	6.94	51	297.3	1.48	214	1,099.8	5.46
Dec-21	291	1,527	1,028	2,010	2,999.5	14.90	6	43.4	0.22	285	2,956.1	14.69
Jan-22	14	70	25	119	107.2	0.53	0	1.1	0.01	14	106.1	0.53
Feb-22	76	382	156	694	607.9	3.02	14	83.8	0.42	62	524.1	2.60
Mar-22	5	25	5	49	40.1	0.20	0	0.0	0.00	5	40.1	0.20
Apr-22	24	120	65	180	163.0	0.81	0	0.0	0.00	24	163.0	0.81

May-22	13	65	35	100	78.8	0.39	3	15.6	0.08	10	63.2	0.31
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	48	236	142	354	288.6	1.43	1	5.0	0.02	47	283.6	1.41
Aug-22	5	24	5	48	29.2	0.14	0	0.0	0.00	5	29.2	0.14
Sep-22	99	493	120	1,026	617.0	3.07	0	0.0	0.00	99	617.0	3.07
Oct-22	790	3,889	1,718	6,257	6,274.0	31.17	21	103.0	0.51	769	6,171.0	30.66

Table A 60: Razorbill abundance estimates and behaviour information from DAS surveys in the array area plus 4km buffer.

Array Area + 4km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	31	124	64	187	166.9	0.50	7	28.7	0.09	24	138.2	0.41
Jun-20	15	74	45	104	105.5	0.31	4	20.3	0.06	11	85.2	0.25
Jul-20	38	190	105	265	259.5	0.77	0	0.0	0.00	38	259.5	0.77
Aug-20	21	107	26	204	258.3	0.77	0	0.0	0.00	21	258.3	0.77
Sep-20	297	1,479	598	2,535	2,080.2	6.20	1	5.0	0.01	296	2,075.2	6.18
Oct-20	190	896	524	1,302	4,101.6	12.22	96	506.6	1.51	94	3,594.9	10.71
Nov-20	0	0	0	0	960.7	2.86	0	342.1	1.02	0	618.6	1.84
Dec-20	42	209	100	334	1,870.4	5.57	8	138.2	0.41	34	1,732.2	5.16
Feb-21	0	0	0	0	110.3	0.33	0	3.4	0.01	0	106.9	0.32
Mar-21	107	538	372	693	733.7	2.19	1	7.5	0.02	106	726.2	2.16
Apr-21	9	45	15	80	73.5	0.22	0	0.0	0.00	9	73.5	0.22
May-21	6	31	6	61	38.2	0.11	1	5.5	0.02	5	32.7	0.10
Jun-21	1	5	1	15	6.4	0.02	0	0.0	0.00	1	6.4	0.02
Jul-21	2	10	2	30	12.2	0.04	0	0.0	0.00	2	12.2	0.04
Aug-21	298	1,487	843	2,175	1,913.4	5.70	0	0.0	0.00	298	1,913.4	5.70

Sep-21	145	737	411	1,082	966.7	2.88	1	5.0	0.01	144	961.7	2.86
Oct-21	173	875	440	1,457	1,365.4	4.07	15	98.1	0.29	158	1,267.3	3.77
Nov-21	524	2,708	1,003	4,497	5,315.1	15.83	75	442.0	1.32	449	4,873.1	14.51
Dec-21	611	3,187	2,181	4,340	6,017.0	17.92	9	65.5	0.20	602	5,951.5	17.73
Jan-22	17	85	35	140	132.9	0.40	0	1.2	0.00	17	131.7	0.39
Feb-22	114	577	293	981	901.5	2.68	19	108.0	0.32	95	793.5	2.36
Mar-22	15	74	15	149	119.7	0.36	0	0.0	0.00	15	119.7	0.36
Apr-22	60	300	150	476	407.2	1.21	4	20.0	0.06	56	387.2	1.15
May-22	20	100	55	145	121.4	0.36	4	20.5	0.06	16	101.0	0.30
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	72	356	203	534	435.1	1.30	1	5.0	0.01	71	430.1	1.28
Aug-22	5	24	5	48	29.1	0.09	0	0.0	0.00	5	29.1	0.09
Sep-22	151	755	270	1,320	941.7	2.80	1	5.0	0.01	150	936.7	2.79
Oct-22	898	4,498	2,109	7,167	7,055.6	21.01	41	217.8	0.65	857	6,837.8	20.37

Red-throated diver

Table A 61: Red-throated diver abundance estimates and behaviour information from DAS surveys in the array area.

Array Area	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 62: Red-throated diver abundance estimates and behaviour information from DAS surveys in the array area plus 2km buffer.

Array Area + 2km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density

May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 63: Red-throated diver abundance estimates and behaviour information from DAS surveys in the array area plus 4km buffer.

Array Area + 4km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	1	5	1	15	5.0	0.01	0	0.0	0.00	1	5.0	0.01
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	1	5	1	15	5.0	0.01	0	0.0	0.00	1	5.0	0.01
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Roseate tern

Table A 64: Roseate tern abundance estimates and behaviour information from DAS surveys in the array area.

Array Area	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	2	9	2	28	9.0	0.10	2	9.0	0.10	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	2	10	2	29	22.7	0.26	2	22.7	0.26	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 65: Roseate tern abundance estimates and behaviour information from DAS surveys in the array area plus 2km buffer.

Array Area + 2km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	6	30	6	70	30.0	0.15	6	30.0	0.15	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	3	15	3	35	15.0	0.07	3	15.0	0.07	0	0.0	0.00
Jul-21	1	5	1	15	5.3	0.03	1	5.3	0.03	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	1	5	1	15	5.0	0.02	1	5.0	0.02	0	0.0	0.00
Jul-22	5	25	5	54	25.1	0.12	5	25.1	0.12	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 66: Roseate tern abundance estimates and behaviour information from DAS surveys in the array area plus 4km buffer.

Array Area +	All Behaviours				Flying				Sitting			

4km buffer												
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	7	35	7	74	36.3	0.11	7	36.3	0.11	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	4	20	4	51	40.2	0.12	4	40.2	0.12	0	0.0	0.00
Jul-21	10	50	10	141	54.3	0.16	10	54.3	0.16	0	0.0	0.00
Aug-21	1	5	1	15	29.5	0.09	1	12.3	0.04	0	17.3	0.05
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	2	10	2	25	13.7	0.04	2	13.7	0.04	0	0.0	0.00
Jul-22	23	114	23	312	289.5	0.86	23	289.5	0.86	0	0.0	0.00

Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Sandwich tern

Table A 67: Sandwich tern abundance estimates and behaviour information from DAS surveys in the array area.

Array Area	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	1	5	1	14	5.0	0.06	1	5.0	0.06	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 68: Sandwich tern abundance estimates and behaviour information from DAS surveys in the array area plus 2km buffer.

Array Area +2km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	1	5	1	15	5.0	0.02	1	5.0	0.02	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 69: Sandwich tern abundance estimates and behaviour information from DAS surveys in the array area plus 4km buffer.

Array Area + 4km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density

May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	1	5	1	15	5.0	0.01	1	5.0	0.01	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Shag

Table A 70: Shag abundance estimates and behaviour information from DAS surveys in the array area.

Array Area	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	1	5	1	14	5.0	0.06	0	0.0	0.00	1	5.0	0.06
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 71: Shag abundance estimates and behaviour information from DAS surveys in the array area plus 2km buffer.

Array Area + 2km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	1	5	1	15	5.0	0.02	0	0.0	0.00	1	5.0	0.02
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 72: Shag abundance estimates and behaviour information from DAS surveys in the array area plus 4km buffer.

Array Area + 4km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	1	5	1	15	5.0	0.01	0	0.0	0.00	1	5.0	0.01
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Sooty shearwater

Table A 73: Sooty shearwater abundance estimates and behaviour information from DAS surveys in the array area.

Array Area	All Behaviours				Flying				Sitting			

North Irish Sea Array Windfarm Ltd

Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	1	5	1	14	5.0	0.06	1	5.0	0.06	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 74: Sooty shearwater abundance estimates and behaviour information from DAS surveys in the array area plus 2km buffer.

Array Area + 2km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	1	5	1	15	5.0	0.02	1	5.0	0.02	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	1	5	1	14	6.9	0.03	1	6.9	0.03	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 75: Sooty shearwater abundance estimates and behaviour information from DAS surveys in the array area plus 4km buffer.

Array Area + 4km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	1	5	1	15	5.0	0.01	1	5.0	0.01	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	1	5	1	14	7.0	0.02	1	7.0	0.02	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Whimbrel

Table A 76: Whimbrel abundance estimates and behaviour information from DAS surveys in the array area.

Array Area	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

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Table A 77: Whimbrel abundance estimates and behaviour information from DAS surveys in the array area plus 2km buffer.

Array Area + 2km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Table A 78: Whimbrel abundance estimates and behaviour information from DAS surveys in the array area plus 4km buffer.

Array Area + 4km buffer	All Behaviours						Flying			Sitting		
Survey	Raw Count	Abundance Estimate	Lower Confidence Interval	Higher Confidence Interval	Apportioned Abundance	Density	Raw Count	Abundance Estimate (apportioned)	Density	Raw Count	Abundance Estimate (apportioned)	Density
May-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-20	3	15	3	46	15.0	0.04	3	15.0	0.04	0	0.0	0.00
Oct-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-20	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

Sep-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Nov-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Dec-21	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jan-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Feb-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Mar-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Apr-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
May-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jun-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Jul-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Aug-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Sep-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00
Oct-22	0	0	0	0	0.0	0.00	0	0.0	0.00	0	0.0	0.00

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