Outer Dowsing Offshore Wind

Environmental Statement

Appendix 12.2 Offshore Ornithology Collision Risk Modelling

Volume 3

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Acronyms & Definitions

Abbreviations / Acronyms

Abbreviation / Acronym	Description
CI	Confidence Interval
CRM	Collision Risk Model
DAS	Digital Aerial Survey
EIA	Environmental Impact Assessment
EPP	Evidence Plan Process
ES	Environmental Statement
GT R4 ltd	The Applicant. The special project vehicle created in partnership between Corio Generation (a wholly owned Green Investment Group portfolio company), Gulf Energy Development and TotalEnergies.
HAT	Highest Astronomical Tide
MDS	Maximum Design Scenario
MSL	Mean Sea Level
NAF	Nocturnal Activity Factors
NSIP	Nationally Significant Infrastructure Project
ODOW	Outer Dowsing Offshore Wind (The Project)
OWF	Offshore Wind Farm
PCH	Potential Collision Height
RPM	Revolutions per minute
RSPB	Royal Society for the Protection of Birds
sCRM	Stochastic Collison Risk Model
SD	Standard Deviation

Terminology

Term	Definition
The Applicant	GT R4 Ltd. The Applicant making the application for a DCO. The Applicant is GT R4 Limited (a joint venture between Corio Generation, Total Energies and Gulf Energy Development (GULF)), trading as Outer Dowsing Offshore Wind. The Project is being developed by Corio Generation (a wholly owned Green Investment Group portfolio company), TotalEnergies and GULF
Array area	The area offshore within which the generating station (including wind turbine generators (WTG) and inter array cables), offshore accommodation platforms, offshore transformer substations and associated cabling will be positioned.
Baseline	The status of the environment at the time of assessment without the development in place.
Environmental Impact Assessment (EIA)	A statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the EIA Regulations, including the publication of an Environmental Statement (ES).

Term	Definition
Impact	An impact to the receiving environment is defined as any change to its baseline condition, either adverse or beneficial.
Intertidal	The area between Mean High Water Springs (MHWS) and Mean Low Water Springs (MLWS)
Landfall	The location at the land-sea interface where the offshore export cables and fibre optic cables will come ashore.
Maximum Design Scenario	The project design parameters, or a combination of project design parameters that are likely to result in the greatest potential for change in relation to each impact assessed
Outer Dowsing Offshore Wind (ODOW)	The Project.
Receptor	A distinct part of the environment on which effects could occur and can be the subject of specific assessments. Examples of receptors include species (or groups) of animals or plants, people (often categorised further such as 'residential' or those using areas for amenity or recreation), watercourses etc.
The Project	Outer Dowsing Offshore Wind, an offshore wind generating station together with associated onshore and offshore infrastructure.
Wind turbine generator (WTG)	A structure comprising a tower, rotor with three blades connected at the hub, nacelle and ancillary electrical and other equipment which may include J-tube(s), transition piece, access and rest platforms, access ladders, boat access systems, corrosion protection systems, fenders and maintenance equipment, helicopter landing facilities and other associated equipment, fixed to a foundation

12 Offshore Ornithology Collision Risk Modelling

12.1 Introduction

12.1.1 Overview

12.1.1.1 Project Background

1. GT R4 Limited (trading as Outer Dowsing Offshore Wind) hereafter referred to as the 'Applicant', is proposing to develop The Project. The Project will be located approximately 54km from the Lincolnshire coastline in the southern North Sea. The Project will include both offshore and onshore infrastructure including an offshore generating station (windfarm), export cables to landfall, Offshore Reactive Compensation Platforms (ORCPs), onshore cables, connection to the electricity transmission network, ancillary and associated development and areas for the delivery of up to two Artificial Nesting Structures (ANS) and the creation of a biogenic reef (if these compensation measures are deemed to be required by the Secretary of State) (see Volume 1, Chapter 3: Project Description (document reference 6.1.3) for full details.
2. This technical annex has been produced to provide the methodology and results of the collision risk modelling (CRM) that forms part of the ornithological assessment completed to date, and supports Volume 1, Chapter 12: Offshore and Intertidal Ornithology (document reference 6.1.12). A separate report (Volume 1, Chapter 12.1: Offshore and Intertidal Ornithology Technical Baseline (document reference 6.3.12.1)) provides the findings from offshore and intertidal ornithology data to determine the receptors that characterise the baseline and are of relevance to the assessment of potential impacts from The Project.
3. The consideration of offshore and intertidal ornithology for The Project has been discussed with consultees (Natural England and the Royal Society for the Protection of Birds [RSPB]) through the Project Evidence Plan Process (EPP). The latest Natural England advice has been followed (Parker *et al*., 2022c; Natural England, 2022). Where there is deviation from this guidance, any agreements made with consultees during the EPP regarding the CRM methodology can be found within document 6.1.12, Section 12.3.

12.1.2 Collision Risk Modelling

4. There is a potential risk that birds flying through The Project array area could collide with the operational wind turbine generators (WTGs). The risk of potential collision with WTG blades is increased if they are located in areas of higher bird densities and in areas in which there is a high level of flight activity. High levels of flight activity can be associated with locations where food supplies are concentrated or with areas where there is a high turnover of individuals (possibly commuting daily between nesting and feeding areas or passing through the area on seasonal migrations). The potential collision risk can be estimated using collision risk modelling (CRM). This appendix presents the methodology and results from collision risk modelling for seabirds that regularly use the site. A separate appendix lays out the approach to assessing collision impacts on migratory bird species (Volume 3, Chapter 12.4: Migratory Bird Report (document reference 6.3.12.4)).

5. Investigation of the site-specific survey data identified six seabird species to be considered for collision risk. These species are also highlighted within current guidance and have been agreed with relevant stakeholders through the EPP (Volume 3, Chapter 12: Offshore and Intertidal Ornithology, Section 12.3 (document reference 6.3.12.3)). These species are:
   - Kittiwake, *Rissa tridactyla*;
   - Greater black-backed gull, *Larus marinus*;
   - Herring gull, *Larus argentatus*;
   - Lesser black-backed gull, *Larus fuscus*;
   - Sandwich tern, *Sterna sandvicensis*;
   - Gannet, *Morus bassanus*.
6. Other species were recorded in trivial numbers during the 30 months of digital aerial survey (DAS) data collected within the array area, or they are not considered to be collision risk species because their flight height distribution does not overlap with the area of collision risk (i.e., they fly below the rotor swept area) (Johnston *et al.,* 2014). These species have not been included within the CRM completed to inform the assessments presented in the Environmental Impact Assessment (EIA), since predicted mortality would be expected to be so low as to make no material contribution to increases on baseline mortality. For a detailed account of species inclusion within CRM see the screening table which presents a rationale on a species-by-species basis (document 6.1.12).
7. The results presented in the main body of this appendix are calculated for the Maximum Design Scenario (MDS) (i.e., The project design scenario giving rise to the greatest level of collision risk) and are used to subsequently inform the worst-case assessment within document 6.1.12.
8. A range of WTG's are being considered for The Project (in terms of size and number) at this stage. The collision estimates for two WTG options, representing the worst-case and the best-case, are also presented in the annex to this appendix (Annex A) to provide an indication of the range of collision mortalities that might occur.

12.2 Methodology

12.2.1 Guidance and Models

9. CRM was undertaken using the Marine Science Scotland Stochastic Collision Risk Model Shiny Application ("sCRM App"; Donovan, 2018), as recommended by the latest Natural England guidance (Parker *et al*., 2022c). The sCRM builds on the Band (2012) offshore CRM, together with code written by Masden (2015) to incorporate variation or uncertainty surrounding the input parameters into calculations of collision frequency. The sCRM was accessed via the "Shiny App" interface, which is a user-friendly graphical interface accessible via a standard web-browser or within R statistical software (R Core Team, 2021) that uses an R code to estimate collision risk (Donovan, 2018). For this assessment the modelling was carried out within the app, run within R statistical software. The advantage of the sCRM over the Band (2012) model is that it provides a clear and transparent audit trail for all modelling runs, which enables regulators and stakeholders to easily access and reproduce the results of any modelling scenario. A full report on the sCRM was published by Marine Scotland in 2018 to accompany the User Guide (McGregor *et al*., 2018).
10. The sCRM, as with Band (2012), can generate collision estimates using two different methods (basic and extended models), with both methods having two further options based on flight height data. The basic model assumes the flight height distribution across the rotor swept heights is uniform, whilst the extended model accounts for variation in flight height distributions by using species-specific modelled flight height distributions (Band, 2012; Johnston *et al*., 2014). Since seabird flight height distributions tend to be skewed towards lower rotor swept heights where collision risk is lower, Option 3 gives rise to considerably lower collision estimates than Option 2 (Band, 2012).
11. Both the basic and extended models can also be run using either site-specific flight height data (i.e. collected from the proposed array area), or generic flight height data derived from pre-construction surveys for wind farm developments across 32 sites in the UK and Europe (Johnston *et al*., 2014). This produces four model options: Option 1 (site-specific flight height data) and 2 (generic flight height data) for the basic model, and Option 3 (generic flight height data) and 4 (site-specific flight height data) for the extended model (Band, 2012).
12. Due to the lack of sufficient site-specific flight height data for all species, large uncertainties in the height calculation methodology, and the lack of guidance on using Option 3 within the latest tool, results are only presented for Option 2 at this stage as agreed at ETG (September 2022, document 6.1.12, Section 12.3).

12.2.2 CRM Input Parameters

13. Models were run stochastically for each species. Uncertainty in each relevant parameter was incorporated into the model using distributions set by standard deviations (SD). A total of 1000 simulations were run for each scenario, as per Natural England guidance, to ensure that any outputs were robust. The Offshore Wind Marine Environmental Assessments: Best Practice Advice for Evidence and Data Standards (Parker *et al*., 2022c), was used to determine model input parameters for each species. The mean density of flying birds within The Project array area formed the basis of the modelling. SNCB advocated seabird parameters, including biometrics, nocturnal activity factors (NAF) and avoidance rates, were used throughout based on the latest interim guidance (Natural England, 2022).
14. The stochastic model output provides a mean and an upper and lower 95% Confidence intervals (CI) as a measure of variance in the outputs.

12.2.3 Turbine Parameters

15. The WTG and windfarm parameters used within the CRM are summarised in Table 12.1 and Table 12.2. These values are based on the MDS parameter values, as described in document 6.1.3. The values for revolutions per minute (RPM) and pitch have a standard deviation (SD) associated with them.

Table 12.1. Maximum design scenario offshore wind farm and WTG parameters used for CRM. HAT = Highest Astronomical Tide.

Parameter	Mean (SD)
No. WTGs	100
Wind farm width (km)	32.9
Latitude (deg)	53.56
Rotor radius (m)	118
No. Blades	3
Max Chord (m)	6
Rated RPM	8.11 (0.40)
Average Pitch (^{o})	6.5 (1.75)
Min Tip Clearance HAT (m)	37.67 (40m MSL)
Hub height relative to HAT (m)	148.67
Tidal offset (HAT – MSL) (m)	2.33

Table 12.2: Maximum design scenario operational parameters used within the CRM

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind availability (%)	92.1	91.1	90.7	87.7	86.7	83.1	83.6	84.7	87.7	91.4	92.8	91.7
Mean downtime (%)	2.8	2.7	2.7	2.6	2.6	2.5	2.5	2.5	2.6	2.7	2.8	2.8
SD downtime (%)	0	0	0	0	0	0	0	0	0	0	0	0

12.2.4 Density of Birds in Flight

16. Density of birds in flight within the array area were provided by DAS data collected between February 2021 and August 2023 (document 6.3.12.1).
17. In December 2023 Natural England provided updated advice to developers for entering seabird density and associated standard deviations for use in collision risk modelling. Following this advice, corrected bootstrap density estimates for birds in flight, derived from Project DAS data, were used as an input to the sCRM tool (as opposed to using a monthly mean and SD). This approach ensures that the full distribution of abundance estimates from each monthly survey can be sampled in sCRM simulations. One thousand bootstrapped samples, corrected by apportioning any unidentified species within relevant groups, were produced for each survey. Where more than one survey was conducted per month the densities were combined. A density of zero was used in the model for surveys when densities of birds were too low for bootstrapped estimates to be produced. Given that 30 months of surveys were conducted and there were two monthly surveys during the 2022 breeding season some months had up to 4,000 bootstrapped samples, while some winter months contained 2,000 samples.
18. The results based on the old methodology of using a mean monthly density and associated SD have been provided in Appendix B.

12.2.5 Avoidance Rates

19. Most birds exhibit some avoidance of WTGs, and the inclusion of this behaviour is a key element of CRM. Avoidance behaviour can occur at three scales (Cook *et al.,* 2014); macro-avoidance (avoiding the whole wind farm array and buffer area), meso-avoidance (avoiding WTGs but not the rotor-swept area), and micro-avoidance (last-second changes to avoid collision with WTG blades). Different species exhibit varying degrees of avoidance behaviours towards offshore wind farms and therefore species-specific avoidance rates are used within the CRM (Table 12.3). The most recent interim guidance on avoidance rates, provided by Natural England (Natural England, 2022) based on a review of the latest evidence bases (Cook, 2021), and a re-analysis of avoidance rates (Ozsanlev-Harris *et al*. 2023), were used within the CRM as agreed through the ETGs (document 6.1.12, Section 12.3). However, there is further evidence that the standard CRM avoidance rates used within assessments are precautionary; for example the findings from the recent Vattenfall (2023) study indicated that seabirds were exposed to very low risks of collision and no collisions or narrow escapes were recorded.

Table 12.3: Species-specific mean avoidance rates and associated standard deviation (SD) used for CRM.

Species	Mean	SD
Kittiwake	0.993	0.0003
Greater black-backed gull	0.994	0.0004
Herring gull	0.994	0.0004
Lesser black-backed gull	0.994	0.0004
Sandwich tern	0.991	0.0004

Species	Mean	SD
Gannet	0.993	0.0003

12.2.6 Species Biometrics

20. Physical and behavioural biometric input parameters were determined for each species and used to inform the CRM (Table 12.4). Biometric data (bird length and wingspan) were derived from Snow & Perrins (1987) for each species as displayed in the latest guidance (Natural England, 2022). SDs have been considered within the model as advised by the latest Natural England guidance (Natural England, 2022).

Table 12.4: Species-specific mean biometrics parameters and associated standard deviations (SD) used for CRM of anticipated key species.

Species	Body Length (m)	Wingspan (m)
Gannet	0.94 (0.0325)	1.72 (0.0375)
Kittiwake	0.39 (0.005)	1.08 (0.0625)
Herring gull	0.60 (0.0225)	1.44 (0.03)
Great black-backed gull	0.71 (0.035)	1.58 (0.0375)
Lesser black-backed gull	0.58 (0.03)	1.42 (0.0375)
Sandwich tern	0.38 (0.005)	1.00 (0.04)

12.2.7 Nocturnal Activity

21. Nocturnal Activity factors (NAFs) are applied in the CRM to allow the calculation of collision risk during the night. NAF values are derived from daytime survey data and extrapolated to include activity at night. Nocturnal activity levels are based on a review by Garthe and Hüppop (2004) which ranks species from 1 (low) to 5 (high) to indicate % nocturnal activity levels in relation to daytime activity (1 = 0%, 2 = 25%, 3 = 50%, 4 = 75%, 5 = 100%).
22. Since the publication of these NAF values, Furness *et al*. (2005) have reviewed gannet studies and recommended, using the available evidence-base, considerably lower relative nocturnal activity rate estimates. Similarly, a review of nocturnal activity in large gulls (MacArthur Green, 2015) indicated that the 50% rate was more than double the realistic level for these species.
23. The NAF used within the models followed the latest Natural England guidance (Table 12.5; Natural England, 2022) and were agreed at ETG (document 6.1.12, Section 12.3). For kittiwake and gull species the SDs are designed to incorporate the 0.25 and 0.5 within the 95% confidence intervals.

Table 12.5: Mean nocturnal activity factor and associated standard deviation (SD) used within the CRM assessment.

Species	Mean	SD
Gannet	0.080	0.1000
Kittiwake	0.375	0.0637
Herring gull	0.375	0.0637
Great black-backed gull	0.375	0.0637
Lesser black-backed gull	0.375	0.0637
Sandwich tern	0.000	0.0000

12.2.8 Seabird Flight Speeds

24. Flight speed is an important parameter in CRM because both the flux of birds (derived from predicted density of birds in flight) and probability of collision are sensitive to it. Notably, sensitivity acts in opposite directions i.e. increased speed increases flux and consequently the number of collisions, while increased speed also reduces the probability of collision for birds passing through the rotor swept area. These two contrasting effects of flight speeds do not necessarily balance out (Masden et al. 2021), and, in general, increased flight speeds increase the predicted number of collisions.
25. There is mounting evidence that flight speed is influenced by seabird behaviour. For example, lower flight speeds are recorded during foraging activity in comparison with commuting flight (Cook et al. 2023). However, the current models do not yet incorporate information on different behaviours and therefore only one flight speed can be inputted.
26. Mean flight speeds for species included in the CRM were taken from the latest Natural England (2022) guidance (Table 12.6) and were agreed with Natural England at ETG (document 6.1.12, Section 12.3). The guidance uses flight speeds derived from Pennycuick (1997) for gannet, Fijn and Gyimesi (2018) for sandwich tern and Alerstam et al. (2007) for all other species.

Table 12.6: Species-specific mean flight speeds and associated standard deviations (SD) used for CRM.

Species	Mean	SD
Gannet	14.9	0.00
Kittiwake	13.1	0.40
Herring gull	12.8	1.80
Great black-backed gull	13.7	1.20
Lesser black-backed gull	13.1	1.90
Sandwich tern	10.3	3.40

12.2.9 Other Parameters

27. Following the interim Natural England (2022) guidance it was assumed that all birds were flapping while flying and that an even proportion (50%) of flights occurred in the upwind and downwind directions.

12.3 Results

28. This section presents the outputs from the CRM analysis for each of the six seabird species considered. A summary of the monthly breakdown of collisions for each species is presented in Table 12.7. The 95% CIs provide an indication of the level of certainty or uncertainty in the results. The results from the other WTG options and from scenarios with an increased minimum tip height are presented within Annex A.

Table 12.7: Summary of average monthly collisions by species based on the maximum design scenario.

Option 2	Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Kittiwake	Mean	0.88	1.69	5.23	9.69	3.63	2.54	2.01	2.42	0.91	0.34	0.63	0.97	**30.93**
	2.5% CI	0.11	0.66	2.37	3.69	0.48	0.55	0.20	0.27	0.00	0.07	0.15	0.39	**8.94**
	97.5% CI	2.66	3.27	10.53	19.56	12.72	7.08	6.39	8.01	2.77	0.80	1.42	1.84	**77.04**
Gannet	Mean	0.06	0.16	0.38	1.06	0.64	0.35	0.45	0.38	0.22	0.44	0.77	0.00	**4.92**
	2.5% CI	0.00	0.00	0.04	0.09	0.00	0.00	0.00	0.03	0.00	0.05	0.02	0.00	**0.23**
	97.5% CI	0.23	0.68	1.15	3.67	3.86	1.26	1.84	1.37	0.95	1.28	3.01	0.00	**19.30**
Herring gull	Mean	0.25	0.00	0.08	0.17	0.15	0.83	0.30	0.00	0.00	0.00	0.08	0.37	**2.24**
	2.5% CI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
	97.5% CI	0.91	0.00	0.50	1.02	0.91	3.70	1.27	0.00	0.00	0.00	0.50	1.53	**10.34**
Great black-backed gull	Mean	1.18	0.00	0.11	0.00	0.06	0.06	0.00	0.17	0.35	0.11	0.59	0.37	**2.99**
	2.5% CI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
	97.5% CI	5.02	0.00	0.61	0.00	0.56	0.50	0.00	1.04	1.62	0.64	1.46	1.23	**12.68**
Lesser black-backed gull	Mean	0.00	0.00	0.08	0.25	0.07	0.67	0.18	0.37	0.00	0.07	0.06	0.00	**1.75**
	2.5% CI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
	97.5% CI	0.00	0.00	0.61	1.05	0.44	3.23	0.90	2.54	0.00	0.41	0.42	0.00	**9.58**
Sandwich tern	Mean	0.00	0.00	0.00	0.05	0.23	0.07	0.01	0.01	0.01	0.00	0.00	0.00	**0.37**
	2.5% CI	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.02**
	97.5% CI	0.00	0.00	0.00	0.46	0.84	0.48	0.06	0.06	0.06	0.00	0.00	0.00	**1.95**

12.3.1 Kittiwake

29. The kittiwake collision rate for Band Option 2 estimated a mean of 30.93 annual collisions (Table 12.8). The monthly distribution of collision estimates for kittiwake are displayed in Figure 12.1, with the error bars displaying the upper and lower 95% CIs.

Table 12.8: Summary of annual kittiwake collisions following SNCB guidance for Option 2.

Species	Mean estimate	2.5% CI	97.5% CI
Kittiwake	30.93	8.94	77.04

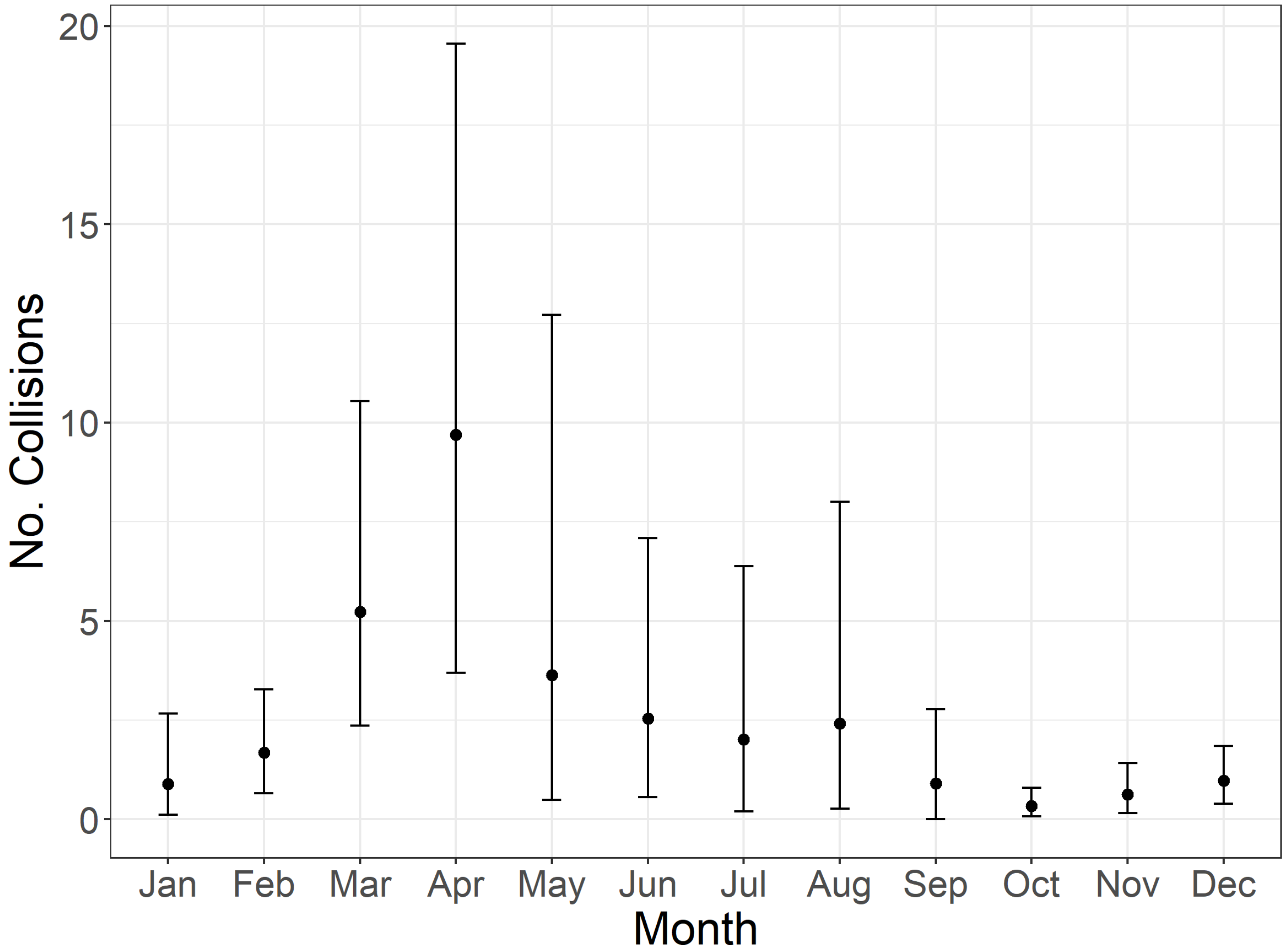

Figure 12.1: Monthly kittiwake collisions following SNCB guidance for Option 2.

12.3.2 Greater black-backed gull

30. The greater black-backed gull collision rate for Band Option 2 estimated a mean of 2.99 annual collisions (Table 12.9). The monthly distribution of collision estimates for greater black-backed gull are displayed in Figure 12.2, with the error bars displaying the upper and lower 95% CIs.

Table 12.9: Summary of annual great black-backed gull collisions following SNCB guidance for Option 2.

Species	Mean estimate	2.5% CI	97.5% CI
Greater black-backed gull	2.99	0.00	12.68

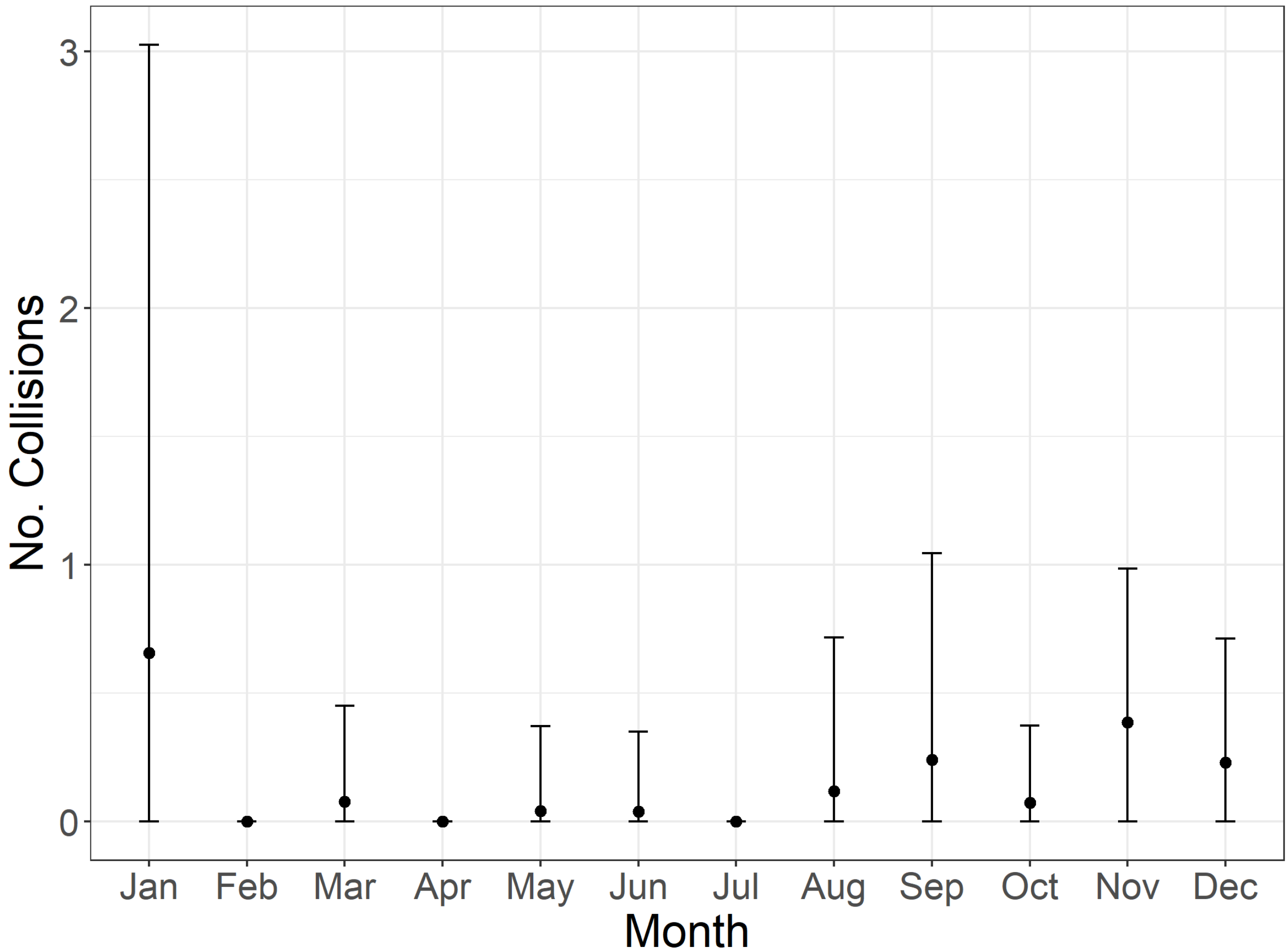

Figure 12.2: Monthly great black-backed gull collisions following SNCB guidance for Option 2.

12.3.3 Herring gull

31. The herring gull collision rate for Band Option 2 estimated a mean of 2.24 annual collisions (Table 12.10). The monthly distribution of collision estimates for herring gull are displayed in Figure 12.3, with the error bars displaying the upper and lower 95% CIs.

Table 12.10: Summary of annual herring gull collisions following SNCB guidance for Option 2.

Species	Mean estimate	2.5% CI	97.5% CI
Herring gull	2.24	0.00	10.34

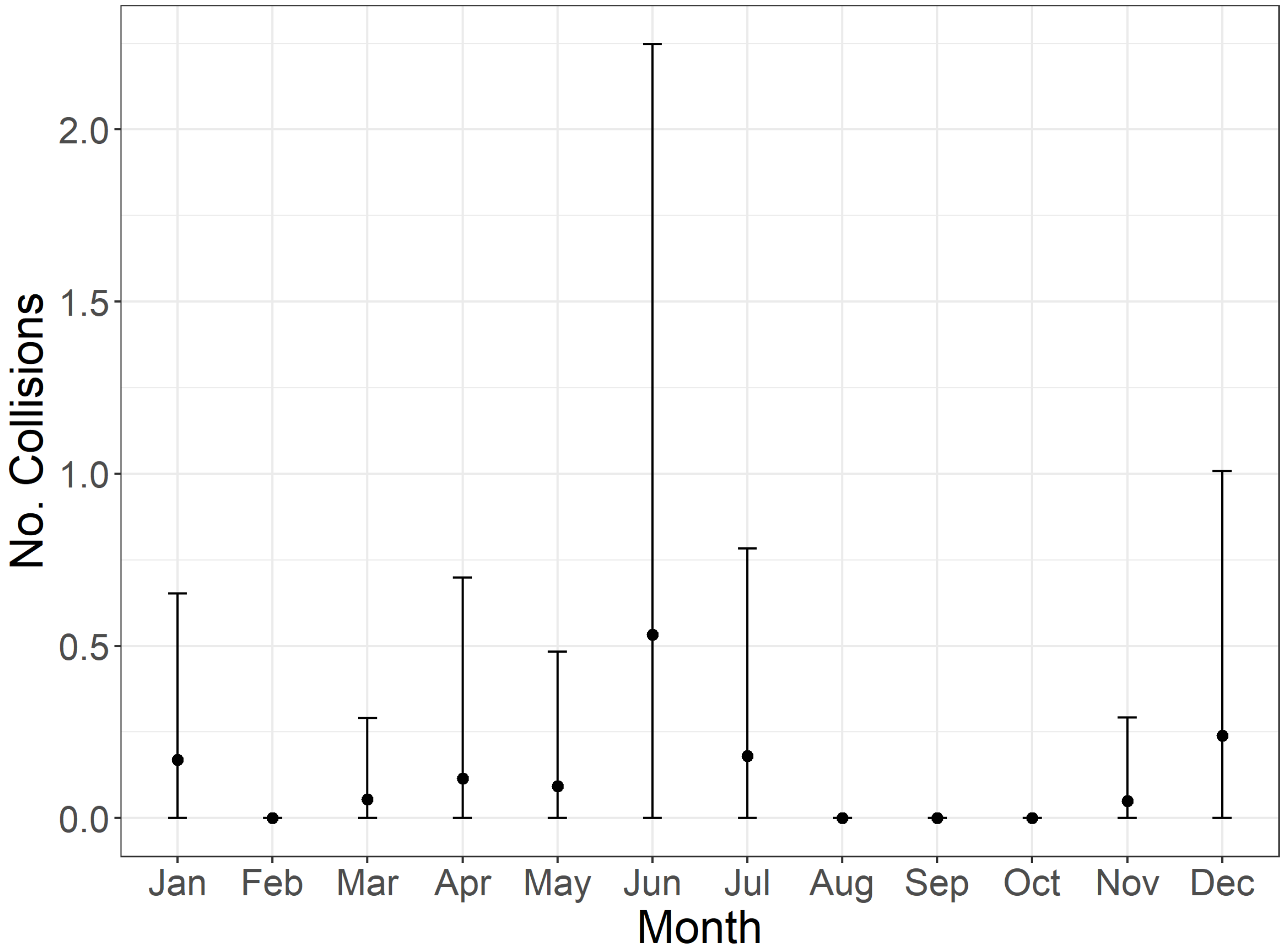

Figure 12.3: Monthly herring gull collisions following SNCB guidance for Option 2.

12.3.4 Lesser black-backed gull

32. The lesser black-backed gull collision rate for Band Option 2 estimated a mean of 1.75 annual collisions (Table 12.11). The average monthly collision rates for the MDS are presented in Figure 12.4 with the error bars displaying the upper and lower 95% CIs.

Table 12.11: Summary of annual lesser black-backed gull collisions following SNCB guidance for Option 2.

Species	Mean estimate	2.5% CI	97.5% CI
Lesser black-backed gull	1.75	0.00	9.58

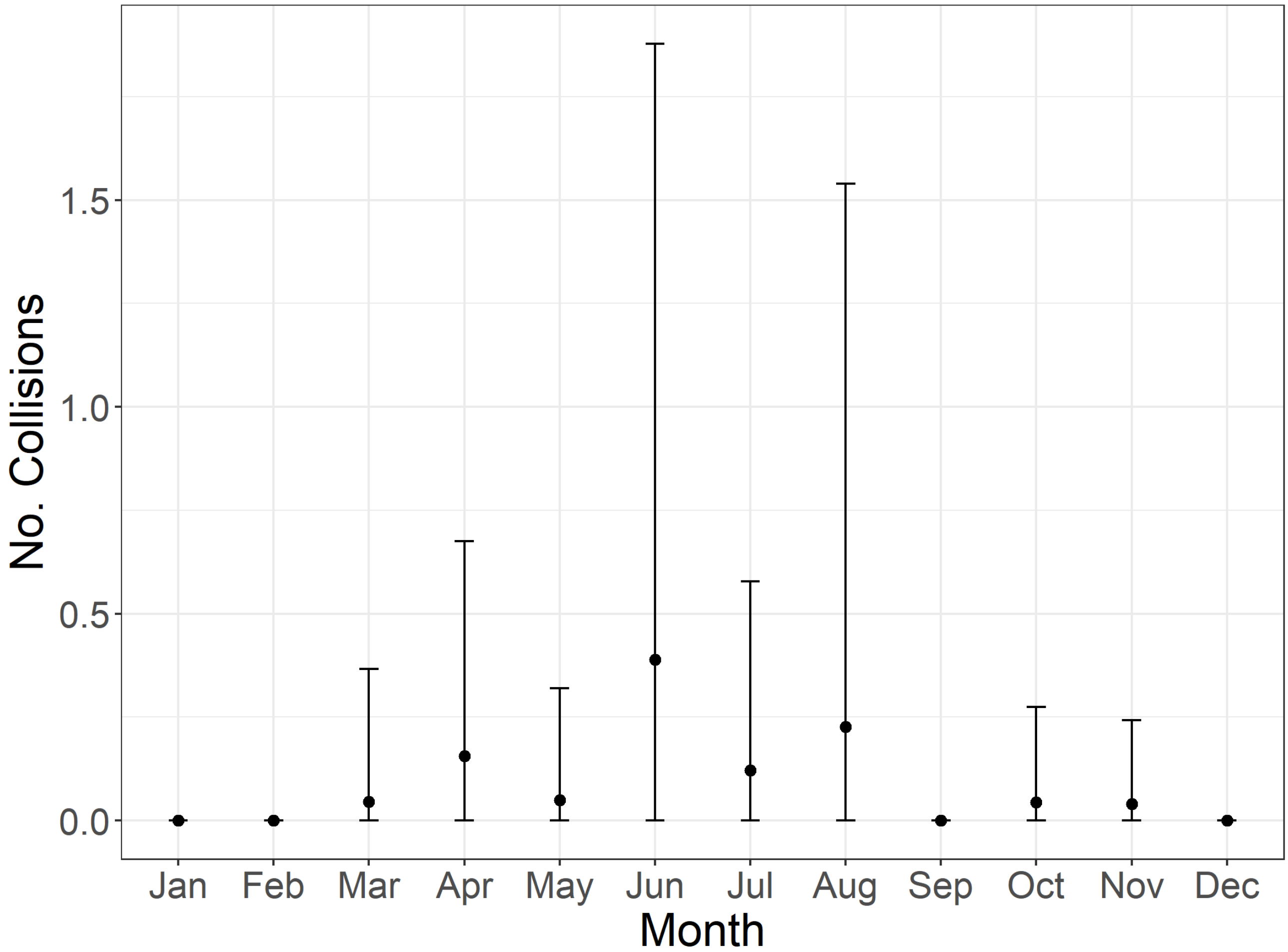

Figure 12.4: Monthly lesser black-backed gull collisions follow SNCB guidance for Option 2.

12.3.5 Sandwich tern

33. The Sandwich tern collision rate for Band Option 2 estimated a mean of 0.37 annual collisions (Table 12.12). The monthly distribution of collision estimates for Sandwich tern are displayed in Figure 12.5, with the error bars displaying the upper and lower 95% CIs.

Table 12.12: Summary of Sandwich tern annual collisions following SNCB guidance for Option 2.

Species	Mean estimate	2.5% CI	97.5% CI
Sandwich tern	0.37	0.02	1.95

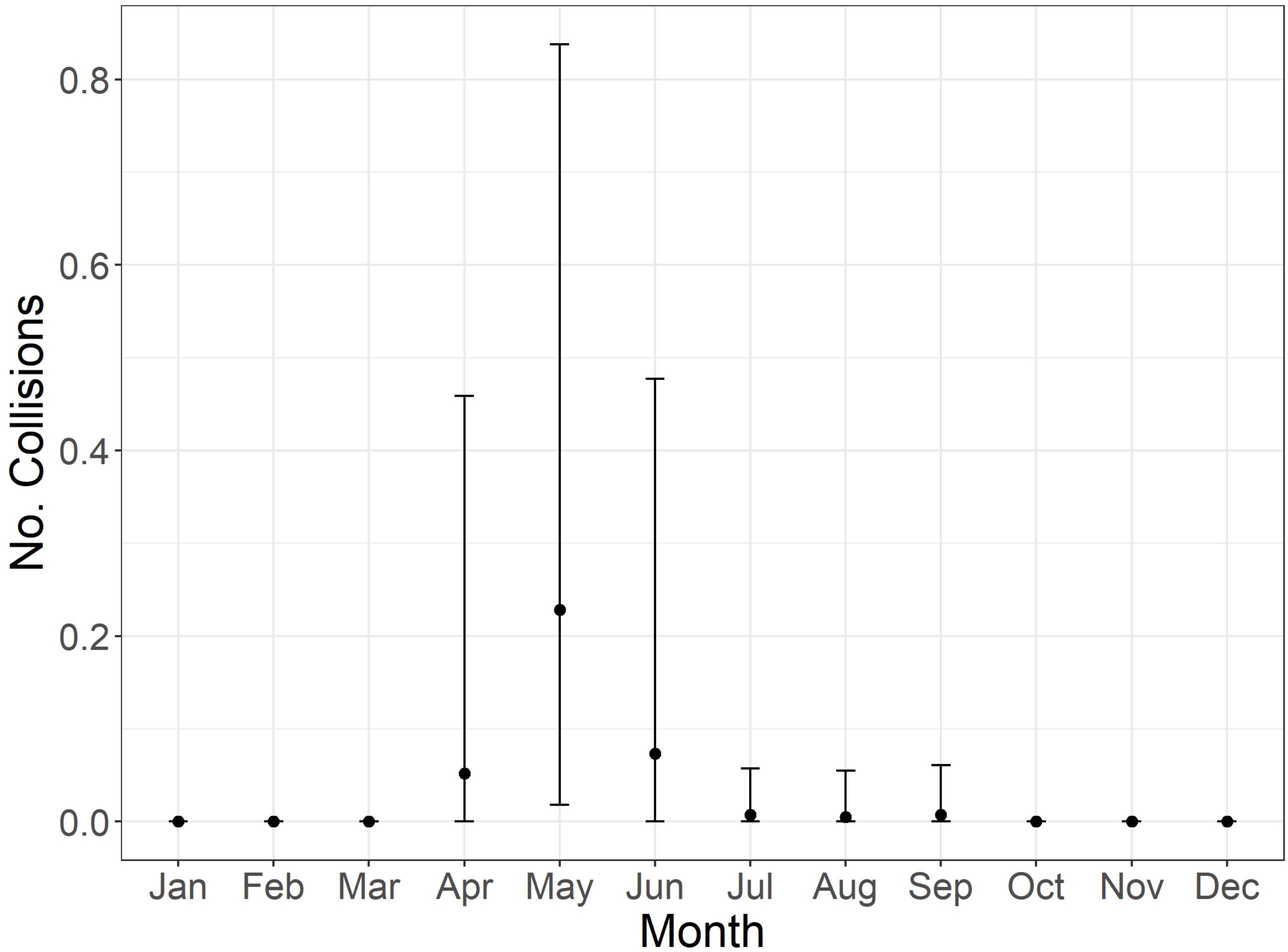

Figure 12.5: Monthly Sandwich tern collisions follow SNCB guidance for Option 2

12.3.6 Gannet

34. The gannet collision rate for Band Option 2 estimated a mean of 1.48 annual collisions (Table 12.13). The monthly distribution of collision estimates for gannet are displayed in Figure 12.6, with the error bars displaying the upper and lower 95% CIs. Collisions include 70% macro-avoidance.

Table 12.13: Summary of annual gannet collisions following SNCB guidance for Option 2.

Species	Mean estimate	2.5% CI	97.5% CI
Gannet	1.48	0.07	5.79

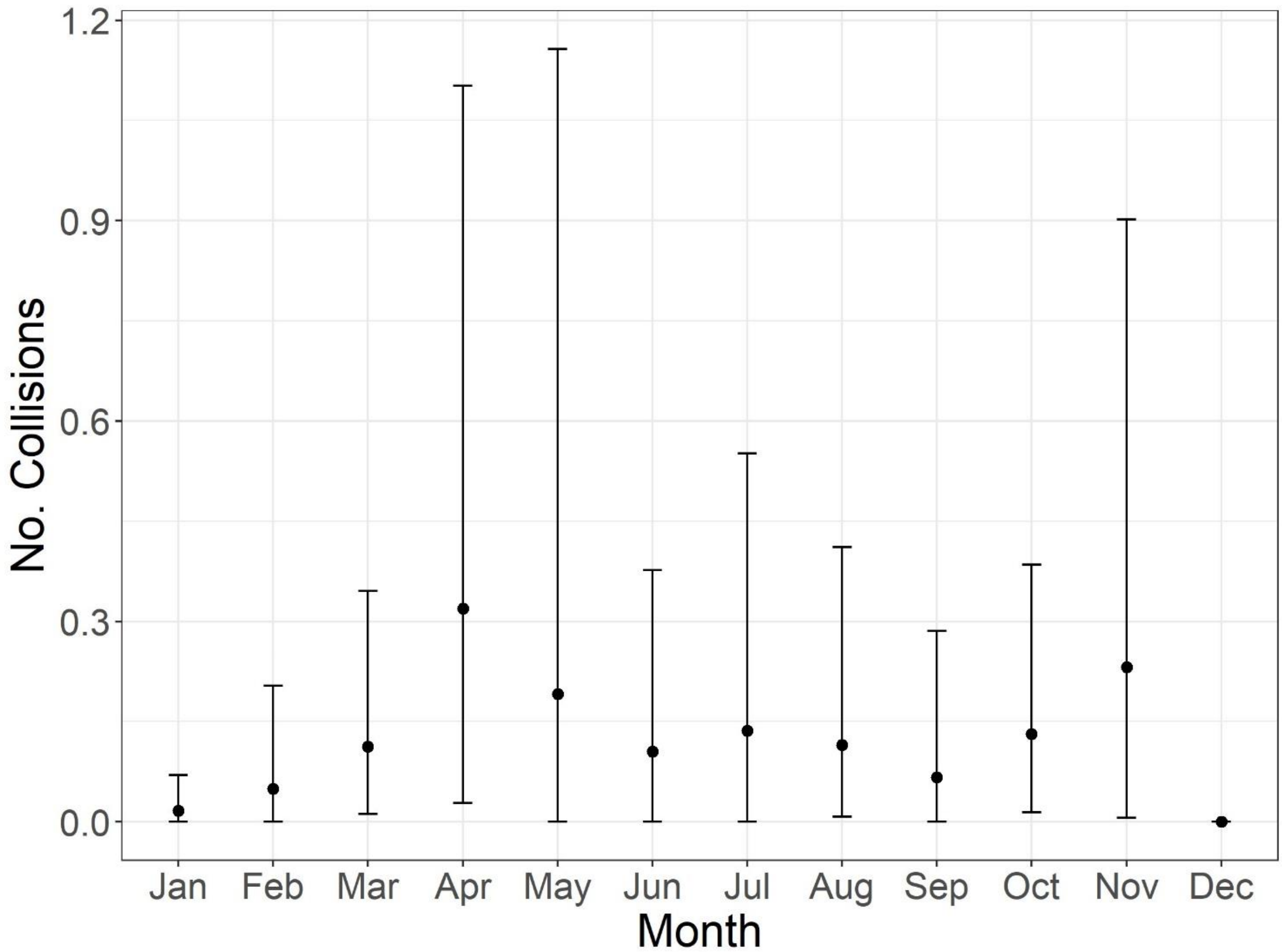

Figure 12.6: Monthly gannet collisions following SNCB guidance for Option 2.

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Appendix A. Results from a range of WTG options

Introduction

35. This Annex provides the results of CRM for two different WTG options that form the worst-case and best-case scenarios (considering expected swept area) (Table A 1) currently being considered by The Project. This presents the full range of impacts on collision risk species that The project may contribute. The same species parameters are used within the scenarios within this appendix as presented within the main Appendix.

Results

36. The monthly collision estimates using Natural England advocated parameters in Band Option 2 are presented for both scenarios in Table A 2 and Table A 3.

Table A 1: WTG parameters for the two wind farm options currently being considered.

Parameter	High	Low
No. WTGs	100	50
Rotor diameter (m)	236	340
Rated RPM	8.11	5.63
Rated RPM SD	0.40	0.28
No. Blades	3	3
Latitude (deg)	53.6	53.6
Wind farm width (km)	32.9	32.9
Max blade width (m)	6.0	9.0
Average Pitch (°)	6.5	6.5
Average Pitch SD	1.75	1.75
Min Tip Clearance HAT (m)	37.67	37.67
Tidal offset (HAT-MSL) (m)	2.33	2.33

Table A 2: Summary of average monthly collisions by species based on High scenario (40m minimum tip height [MSL]).

Species	Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Kittiwake	Mean	0.88	1.69	5.23	9.69	3.63	2.54	2.01	2.42	0.91	0.34	0.63	0.97	30.93
	SD	0.78	0.70	2.11	4.62	3.66	1.90	1.79	2.06	0.87	0.21	0.37	0.40	19.47
	CV	0.88	0.41	0.40	0.48	1.01	0.75	0.89	0.85	0.96	0.63	0.60	0.41	8.27
	Median	0.54	1.55	4.81	8.45	2.04	1.79	1.42	1.85	0.60	0.28	0.55	0.89	24.76
	2.5% CI	0.11	0.66	2.37	3.69	0.48	0.55	0.20	0.27	0.00	0.07	0.15	0.39	8.94
	25.0%	0.24	1.16	3.81	5.90	1.04	1.07	0.66	0.83	0.16	0.16	0.30	0.67	16.01
	75.0%	2.66	3.27	10.53	19.56	12.72	7.08	6.39	8.01	2.77	0.80	1.42	1.84	77.04
	97.5% CI	2.66	3.27	10.53	19.56	12.72	7.08	6.39	8.01	2.77	0.80	1.42	1.84	77.04
Gannet	Mean	0.02	0.05	0.11	0.32	0.19	0.11	0.14	0.12	0.07	0.13	0.23	0.00	1.48
	SD	0.02	0.06	0.09	0.29	0.31	0.10	0.15	0.11	0.08	0.10	0.27	0.00	1.58
	CV	1.13	1.22	0.82	0.90	1.63	0.94	1.12	0.95	1.18	0.80	1.17	-	11.86
	Median	0.01	0.02	0.09	0.23	0.07	0.07	0.08	0.08	0.04	0.10	0.10	0.00	0.88
	2.5% CI	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.00	0.07
	25.0%	0.00	0.01	0.04	0.11	0.00	0.03	0.03	0.04	0.02	0.05	0.03	0.00	0.35
	75.0%	0.02	0.07	0.16	0.42	0.21	0.15	0.19	0.16	0.09	0.19	0.37	0.00	2.03
	97.5% CI	0.07	0.20	0.35	1.10	1.16	0.38	0.55	0.41	0.29	0.38	0.90	0.00	5.79
Herring gull	Mean	0.25	0.00	0.08	0.17	0.15	0.83	0.30	0.00	0.00	0.00	0.08	0.37	2.24
	SD	0.25	0.00	0.15	0.30	0.26	1.03	0.37	0.00	0.00	0.00	0.15	0.49	3
	CV	1.03	-	1.78	1.71	1.69	1.24	1.26	-	-	-	1.79	1.32	11.82
	Median	0.18	0.00	0.00	0.00	0.00	0.47	0.19	0.00	0.00	0.00	0.00	0.00	0.83
	2.5% CI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	25.0%	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
	75.0%	0.36	0.00	0.15	0.25	0.23	1.29	0.44	0.00	0.00	0.00	0.14	0.67	3.52
	97.5% CI	0.91	0.00	0.50	1.02	0.91	3.70	1.27	0.00	0.00	0.00	0.50	1.53	10.34
Great black-backed gull	Mean	1.18	0.00	0.11	0.00	0.06	0.06	0.00	0.17	0.35	0.11	0.59	0.37	2.99
	SD	1.42	0.00	0.19	0.00	0.16	0.15	0.00	0.31	0.50	0.19	0.39	0.35	3.66

Species	Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
	CV	1.21	-	1.67	-	2.73	2.81	-	1.88	1.43	1.65	0.66	0.94	14.98
	Median	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.54	0.28	1.44
	2.5% CI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	25.0%	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.14	0.62
	75.0%	1.90	0.00	0.20	0.00	0.00	0.00	0.00	0.24	0.54	0.20	0.79	0.56	4.42
	97.5% CI	5.02	0.00	0.61	0.00	0.56	0.50	0.00	1.04	1.62	0.64	1.46	1.23	12.68
Lesser black-backed gull	Mean	0.00	0.00	0.08	0.25	0.07	0.67	0.18	0.37	0.00	0.07	0.06	0.00	1.75
	SD	0.00	0.00	0.19	0.32	0.13	1.02	0.26	0.78	0.00	0.12	0.12	0.00	2.94
	CV	-	-	2.48	1.28	1.93	1.51	1.39	2.12	-	1.87	1.90	-	14.48
	Median	0.00	0.00	0.00	0.15	0.00	0.17	0.11	0.00	0.00	0.00	0.00	0.00	0.42
	2.5% CI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	25.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	75.0%	0.00	0.00	0.00	0.38	0.11	1.11	0.28	0.37	0.00	0.11	0.09	0.00	2.45
	97.5% CI	0.00	0.00	0.61	1.05	0.44	3.23	0.90	2.54	0.00	0.41	0.42	0.00	9.58
Sandwich tern	Mean	0.00	0.00	0.00	0.05	0.23	0.07	0.01	0.01	0.01	0.00	0.00	0.00	0.37
	SD	0.00	0.00	0.00	0.13	0.23	0.12	0.02	0.02	0.02	0.00	0.00	0.00	0.54
	CV	-	-	-	2.44	0.99	1.70	2.14	3.54	2.38	-	-	-	13.19
	Median	0.00	0.00	0.00	0.00	0.15	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.18
	2.5% CI	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
	25.0%	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08
	75.0%	0.00	0.00	0.00	0.05	0.26	0.09	0.01	0.00	0.01	0.00	0.00	0.00	0.42
	97.5% CI	0.00	0.00	0.00	0.46	0.84	0.48	0.06	0.06	0.06	0.00	0.00	0.00	1.95

Table A 3: Summary of average monthly collisions by species based on Low scenario (40m minimum tip height [MSL]). Gannet collisions have been adjusted for 70% macro-avoidance.

Species	Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Kittiwake	Mean	0.58	1.18	3.66	6.80	2.65	1.85	1.40	1.69	0.67	0.24	0.43	0.68	21.82
	SD	0.52	0.48	1.43	3.19	2.61	1.34	1.26	1.35	0.63	0.14	0.24	0.28	13.47
	CV	0.90	0.41	0.39	0.47	0.98	0.72	0.90	0.80	0.94	0.60	0.57	0.41	8.09
	Median	0.29	1.09	3.39	5.84	1.50	1.36	0.98	1.32	0.45	0.20	0.39	0.64	17.46
	2.5% CI	0.08	0.44	1.69	2.64	0.33	0.42	0.13	0.22	0.00	0.05	0.11	0.27	6.36
	25.0%	0.16	0.83	2.72	4.10	0.78	0.79	0.37	0.73	0.11	0.12	0.22	0.45	11.37
	75.0%	0.94	1.50	4.34	9.33	4.31	2.58	1.95	2.22	1.18	0.35	0.62	0.87	30.17
	97.5% CI	1.79	2.30	7.48	13.29	8.89	5.01	4.38	5.27	2.03	0.54	0.93	1.28	53.17
Gannet	Mean	0.01	0.03	0.07	0.21	0.12	0.07	0.09	0.08	0.05	0.08	0.14	0.00	0.94
	SD	0.01	0.04	0.06	0.19	0.20	0.06	0.11	0.07	0.05	0.07	0.16	0.00	1.02
	CV	1.18	1.18	0.82	0.90	1.60	0.90	1.13	0.92	1.14	0.82	1.20	-	11.79
	Median	0.01	0.02	0.06	0.14	0.04	0.05	0.05	0.05	0.03	0.06	0.05	0.00	0.57
	2.5% CI	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.05
	25.0%	0.00	0.00	0.03	0.07	0.00	0.02	0.02	0.02	0.01	0.03	0.02	0.00	0.23
	75.0%	0.01	0.05	0.10	0.28	0.13	0.10	0.13	0.10	0.06	0.11	0.21	0.00	1.29
	97.5% CI	0.04	0.13	0.23	0.68	0.73	0.23	0.38	0.27	0.18	0.26	0.54	0.00	3.68
Herring gull	Mean	0.17	0.00	0.06	0.12	0.09	0.53	0.18	0.00	0.00	0.00	0.05	0.24	1.43
	SD	0.19	0.00	0.09	0.20	0.14	0.66	0.22	0.00	0.00	0.00	0.09	0.31	1.9
	CV	1.09	-	1.67	1.70	1.55	1.23	1.21	-	-	-	1.77	1.28	11.5
	Median	0.12	0.00	0.00	0.00	0.00	0.30	0.12	0.00	0.00	0.00	0.00	0.03	0.56
	2.5% CI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	25.0%	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
	75.0%	0.25	0.00	0.10	0.17	0.16	0.84	0.28	0.00	0.00	0.00	0.09	0.43	2.32
	97.5% CI	0.65	0.00	0.29	0.70	0.48	2.25	0.78	0.00	0.00	0.00	0.29	1.01	6.45
	Mean	0.66	0.00	0.08	0.00	0.04	0.04	0.00	0.12	0.24	0.07	0.39	0.23	1.86

Species	Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Great black-backed gull	SD	0.87	0.00	0.14	0.00	0.11	0.10	0.00	0.21	0.32	0.12	0.25	0.20	2.32
	CV	1.33	-	1.75	-	2.50	2.68	-	1.76	1.32	1.60	0.65	0.88	14.47
	Median	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.35	0.19	0.90
	2.5% CI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	25.0%	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.09	0.40
	75.0%	1.08	0.00	0.14	0.00	0.00	0.00	0.00	0.21	0.40	0.13	0.52	0.35	2.82
	97.5% CI	3.03	0.00	0.45	0.00	0.37	0.35	0.00	0.72	1.05	0.37	0.99	0.71	8.04
Lesser black-backed gull	Mean	0.00	0.00	0.05	0.16	0.05	0.39	0.12	0.23	0.00	0.04	0.04	0.00	1.07
	SD	0.00	0.00	0.10	0.19	0.09	0.57	0.16	0.44	0.00	0.08	0.08	0.00	1.72
	CV	-	-	2.22	1.25	1.84	1.47	1.31	1.96	-	1.90	1.93	-	13.88
	Median	0.00	0.00	0.00	0.10	0.00	0.10	0.07	0.00	0.00	0.00	0.00	0.00	0.27
	2.5% CI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	25.0%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	75.0%	0.00	0.00	0.00	0.24	0.08	0.64	0.19	0.24	0.00	0.07	0.06	0.00	1.51
	97.5% CI	0.00	0.00	0.37	0.68	0.32	1.88	0.58	1.54	0.00	0.27	0.24	0.00	5.88
Sandwich tern	Mean	0.00	0.00	0.00	0.03	0.15	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.24
	SD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
	CV	-	-	-	2.51	1.03	1.86	2.15	2.93	-	-	-	-	10.48
	Median	0.00	0.00	0.00	0.00	0.11	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.13
	2.5% CI	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	25.0%	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
	75.0%	0.00	0.00	0.00	0.02	0.19	0.06	0.01	0.00	0.00	0.00	0.00	0.00	0.28
	97.5% CI	0.00	0.00	0.00	0.25	0.58	0.31	0.03	0.04	0.00	0.00	0.00	0.00	1.22

Appendix B.

Introduction

37. This Annex provides the results of CRM for the worst case scenario (High) using mean monthly densities and standard deviations as input parameters into the stochastic CRM tool, rather than the bootstrapped density estimates. All other parameters and methodology remained the same as in Section 2.

Methodology

38. Density estimates of birds in flight (birds per km^2) and the associated SD were determined using average monthly densities within the array area based on the full 30 months of data collected during the DAS campaign. For months when two surveys were conducted (i.e. March – August 2022), both mean densities were included in the calculation for the monthly mean. Therefore, the mean was derived from four monthly estimates rather than two (October-February) or three (September).

39. The SD of density was calculated using a “rule of thumb” that one SD is approximately one quarter of the range, where the range is estimated as the highest upper 95% confidence limit minus the smallest lower 2.5% confidence limit. Density estimates for each species used for CRM are presented in Table B.1. A mean density estimate is provided for each species, and associated SD.

Table B.1. Monthly mean density and associated standard deviation for each species. Gannet densities presented here have not been adjusted for macro-avoidance.

Month	Kittiwake		Gannet		LBBG		GBBG		Herring gull		Sandwich tern	
	Density	SD	Density	SD	Density	SD	Density	SD	Density	SD	Density	SD
January	0.73	0.07	0.03	0.00	0.00	0.00	0.13	0.00	0.06	0.00	0.00	0.00
February	2.05	0.82	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
March	5.55	2.86	0.44	0.05	0.04	0.00	0.04	0.00	0.03	0.00	0.00	0.00
April	9.16	4.84	1.24	0.21	0.03	0.00	0.06	0.00	0.04	0.00	0.19	0.07
May	3.01	0.46	0.44	0.00	0.01	0.00	0.01	0.00	0.02	0.00	0.23	0.00
June	2.35	0.29	0.50	0.01	0.14	0.00	0.02	0.00	0.19	0.00	0.10	0.00
July	1.04	0.16	0.30	0.00	0.03	0.00	0.00	0.00	0.03	0.00	0.01	0.00
August	1.44	0.24	0.23	0.03	0.05	0.00	0.03	0.00	0.00	0.00	0.03	0.00
September	1.05	0.00	0.17	0.06	0.04	0.01	0.11	0.00	0.00	0.00	0.03	0.00
October	0.20	0.04	0.27	0.12	0.01	0.00	0.09	0.00	0.01	0.00	0.00	0.00
November	0.47	0.15	0.80	0.07	0.01	0.00	0.08	0.00	0.03	0.00	0.00	0.00
December	0.50	0.20	0.00	0.00	0.00	0.00	0.07	0.01	0.10	0.04	0.00	0.00

Results

40. The monthly collision estimates using Natural England advocated parameters in Band Option 2 are presented for the High scenario in Table B.2.

Table B.2. Summary of average monthly collisions by species based on the model run on mean monthly densities for the High scenario (40m minimum tip height [MSL]). Gannet collisions have been adjusted for 70% macro-avoidance.

Species	Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Kittiwake	Mean	0.98	1.71	5.41	9.89	4.19	2.85	2.29	2.92	1.03	0.36	0.64	0.96	33.22
	SD	0.61	0.71	2.54	4.39	2.64	1.66	1.43	1.81	0.61	0.18	0.31	0.37	17.26
	CV	0.62	0.42	0.47	0.44	0.63	0.58	0.63	0.62	0.59	0.50	0.48	0.39	6.37
	Median	0.90	1.64	5.14	9.55	3.83	2.64	2.06	2.69	0.95	0.34	0.62	0.93	31.30
	2.5% CI	0.08	0.57	1.16	3.04	0.26	0.36	0.18	0.27	0.13	0.05	0.12	0.33	6.53
	25.0%	0.51	1.20	3.61	6.50	2.16	1.65	1.21	1.54	0.57	0.23	0.42	0.69	20.30
	75.0%	1.35	2.15	7.01	12.53	5.91	3.80	3.16	4.03	1.40	0.48	0.83	1.17	43.81
	97.5% CI	2.37	3.22	10.88	19.26	10.13	6.72	5.54	6.96	2.43	0.77	1.33	1.83	71.44
Gannet	Mean	0.02	0.05	0.12	0.33	0.29	0.11	0.16	0.12	0.08	0.13	0.24	0.00	1.67
	SD	0.02	0.04	0.10	0.30	0.28	0.10	0.14	0.11	0.08	0.10	0.21	0.00	1.48
	CV	0.95	0.87	0.84	0.89	0.94	0.86	0.89	0.86	0.96	0.79	0.90	NaN	9.75
	Median	0.01	0.04	0.09	0.24	0.21	0.08	0.12	0.09	0.05	0.10	0.17	0.00	1.21
	2.5% CI	0.00	0.00	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.02	0.01	0.00	0.10
	25.0%	0.01	0.02	0.05	0.11	0.09	0.04	0.05	0.04	0.02	0.05	0.08	0.00	0.56
	75.0%	0.03	0.07	0.17	0.47	0.41	0.16	0.22	0.18	0.11	0.19	0.33	0.00	2.36
	97.5% CI	0.07	0.16	0.40	1.10	1.04	0.37	0.53	0.39	0.29	0.37	0.81	0.00	5.53
Herring gull	Mean	0.27	0.00	0.16	0.49	0.34	1.27	0.51	0.00	0.00	0.00	0.14	0.76	3.93
	SD	0.18	0.00	0.12	0.33	0.25	0.88	0.35	0.00	0.00	0.00	0.10	0.43	2.64
	CV	0.67	NaN	0.74	0.68	0.75	0.69	0.69	NaN	NaN	NaN	0.74	0.56	5.52
	Median	0.24	0.00	0.14	0.42	0.29	1.11	0.45	0.00	0.00	0.00	0.12	0.66	3.41
	2.5% CI	0.02	0.00	0.01	0.04	0.02	0.08	0.04	0.00	0.00	0.00	0.01	0.17	0.37
	25.0%	0.13	0.00	0.07	0.24	0.15	0.61	0.25	0.00	0.00	0.00	0.06	0.46	1.97
	75.0%	0.35	0.00	0.22	0.67	0.47	1.74	0.71	0.00	0.00	0.00	0.19	0.98	5.33
	97.5% CI	0.71	0.00	0.45	1.26	0.89	3.41	1.34	0.00	0.00	0.00	0.38	1.79	10.22

Species	Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Great black-backed gull	Mean	1.50	0.00	0.21	0.00	0.23	0.22	0.00	0.42	0.69	0.20	0.59	0.45	4.51
	SD	1.01	0.00	0.14	0.00	0.15	0.15	0.00	0.30	0.46	0.14	0.32	0.28	2.95
	CV	0.67	NaN	0.68	NaN	0.66	0.69	NaN	0.70	0.66	0.68	0.55	0.62	5.91
	Median	1.36	0.00	0.19	0.00	0.21	0.20	0.00	0.38	0.63	0.18	0.54	0.41	4.08
	2.5% CI	0.09	0.00	0.01	0.00	0.01	0.02	0.00	0.02	0.06	0.01	0.10	0.03	0.35
	25.0%	0.73	0.00	0.11	0.00	0.11	0.11	0.00	0.20	0.34	0.10	0.36	0.26	2.32
	75.0%	2.08	0.00	0.29	0.00	0.32	0.30	0.00	0.57	0.94	0.28	0.77	0.60	6.15
	97.5% CI	3.76	0.00	0.55	0.00	0.56	0.58	0.00	1.13	1.66	0.53	1.34	1.09	11.19
Lesser black-backed gull	Mean	0.00	0.00	0.34	0.40	0.14	1.06	0.29	0.94	0.00	0.12	0.11	0.00	3.40
	SD	0.00	0.00	0.25	0.33	0.12	0.82	0.23	0.73	0.00	0.10	0.09	0.00	2.67
	CV	NaN	NaN	0.73	0.81	0.80	0.77	0.81	0.78	NaN	0.81	0.83	NaN	6.34
	Median	0.00	0.00	0.28	0.33	0.12	0.87	0.23	0.77	0.00	0.10	0.09	0.00	2.78
	2.5% CI	0.00	0.00	0.03	0.02	0.01	0.08	0.01	0.07	0.00	0.01	0.01	0.00	0.24
	25.0%	0.00	0.00	0.17	0.16	0.06	0.48	0.13	0.41	0.00	0.05	0.05	0.00	1.51
	75.0%	0.00	0.00	0.45	0.55	0.19	1.40	0.37	1.28	0.00	0.17	0.15	0.00	4.57
	97.5% CI	0.00	0.00	0.95	1.21	0.43	3.23	0.92	2.72	0.00	0.39	0.35	0.00	10.19
Sandwich tern	Mean	0.00	0.00	0.00	0.16	0.23	0.12	0.01	0.03	0.03	0.00	0.00	0.00	0.58
	SD	0.00	0.00	0.00	0.16	0.23	0.14	0.01	0.03	0.03	0.00	0.00	0.00	0.6
	CV	NaN	NaN	NaN	1.01	1.02	1.08	1.09	1.02	1.05	NaN	NaN	NaN	6.27
	Median	0.00	0.00	0.00	0.10	0.15	0.08	0.01	0.02	0.02	0.00	0.00	0.00	0.38
	2.5% CI	0.00	0.00	0.00	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.04
	25.0%	0.00	0.00	0.00	0.07	0.09	0.04	0.00	0.01	0.01	0.00	0.00	0.00	0.23
	75.0%	0.00	0.00	0.00	0.18	0.26	0.15	0.01	0.03	0.03	0.00	0.00	0.00	0.66
	97.5% CI	0.00	0.00	0.00	0.62	0.89	0.53	0.05	0.11	0.10	0.00	0.00	0.00	2.30