Offshore Wind Power Limited

West of Orkney Offshore EIA Report

Volume 2, Supporting Study 12: Offshore Ornithology Technical Supporting Study

WO1-WOW-CON-EV-RP-0051: Approved by S.Kerr
Document Control 18/09/2023

ASSIGNMENT	**L100632-S05**
DOCUMENT	**L-100632-S05-A-REPT-008**

XODUS

Aberdeen

Xodus House
50 Huntly Street . Aberdeen
AB10 1RS . UK

T +44 (0)1224 628300
E david.bloxsom@xodusgroup.com

www.xodusgroup.com

West of Orkney Windfarm

Offshore Ornithology Technical Supporting Study 12

Date:	12th May 2023
Tel:	0141 342 5404
Web:	www.macarthurgreen.com
Address:	93 South Woodside Road |Glasgow | G20 6NT

Document Quality Record

Version	Status	Person Responsible	Date
0.1	Draft	Dr. N. Goodship	10/11/2022
0.2	Reviewed	Dr. R. McGregor	08/12/2022
0.3	Updated	Dr. N. Goodship	08/12/2022
1	Internal Approval	Dr. R. McGregor	08/12/2022
1.1	Updated	Dr. N. Goodship	06/01/2023
2	Internal Approval	Dr. R. McGregor	09/05/2023

CONTENTS

LIST OF TABLES

LIST OF FIGURES

1 INTRODUCTION

1. The proposed West of Orkney Windfarm (hereafter referred to as 'the Project') is comprised of the offshore Project which is seaward of mean high-water springs (MHWS); components including wind turbine generators, offshore export cables, substation platforms, foundations and associated infrastructure) and the onshore Project which is landward of MHWS (including onshore underground export cables, onshore substation and all other associated infrastructure) during all Project stages from development to decommissioning.

2. The aim of this Technical Supporting Study is to present details of the ornithology baseline site characterisation data collected for the offshore Project by Digital Aerial Survey (DAS) methods, conducted by HiDef Aerial Surveying Limited (HiDef) as well as to present the full tabulated results of displacement analysis and collision risk modelling. The Offshore EIA Report, chapter 13: Offshore and intertidal ornithology and the Offshore Report to Inform Appropriate Assessment (RIAA) is informed using the aerial survey baseline data.

3. This Technical Supporting Study is supported by the following Annexes.

- Annex 12.1: Mean design based estimates of density and abundance per month;
- Annex 12.2: Design based estimates of density and abundance per survey;
- Annex 12.3: Matrix displacement tables;
- Annex 12.4: All design based estimates of density and abundance of birds in flight and on the sea;
- Annex 12.5: Collision risk input parameters;
- Annex 12.6: Summary of collision risk results;
- Annex 12.7: Survey dates and times;
- Annex 12.8: Highly Pathogenic Avian Influenza Virus epidemic;
- Annex 12.9: Density surface models (DSMs) for key species;
- Annex 12.10: PVA methods, inputs and results;
- Annex 12.11: Digital aerial survey raw count data;
- Annex 12.12: Regional population estimates;
- Annex 12.13: Alternative peak mean displacement matrices and analyses.

4. A summary of the survey methods, data analysis and the results obtained are provided in the following relevant sections of this Technical Supporting Study.

2 SURVEY METHODS

2.1.1 Survey area

5. DAS collected offshore ornithology data within the OAA plus a 2 km and a 4 km buffer around the OAA (Figure 2-1); a total area of 1290 km² and 1321 km² was surveyed from July 2020 to January 2021 and February 2021 to September 2022 respectively.

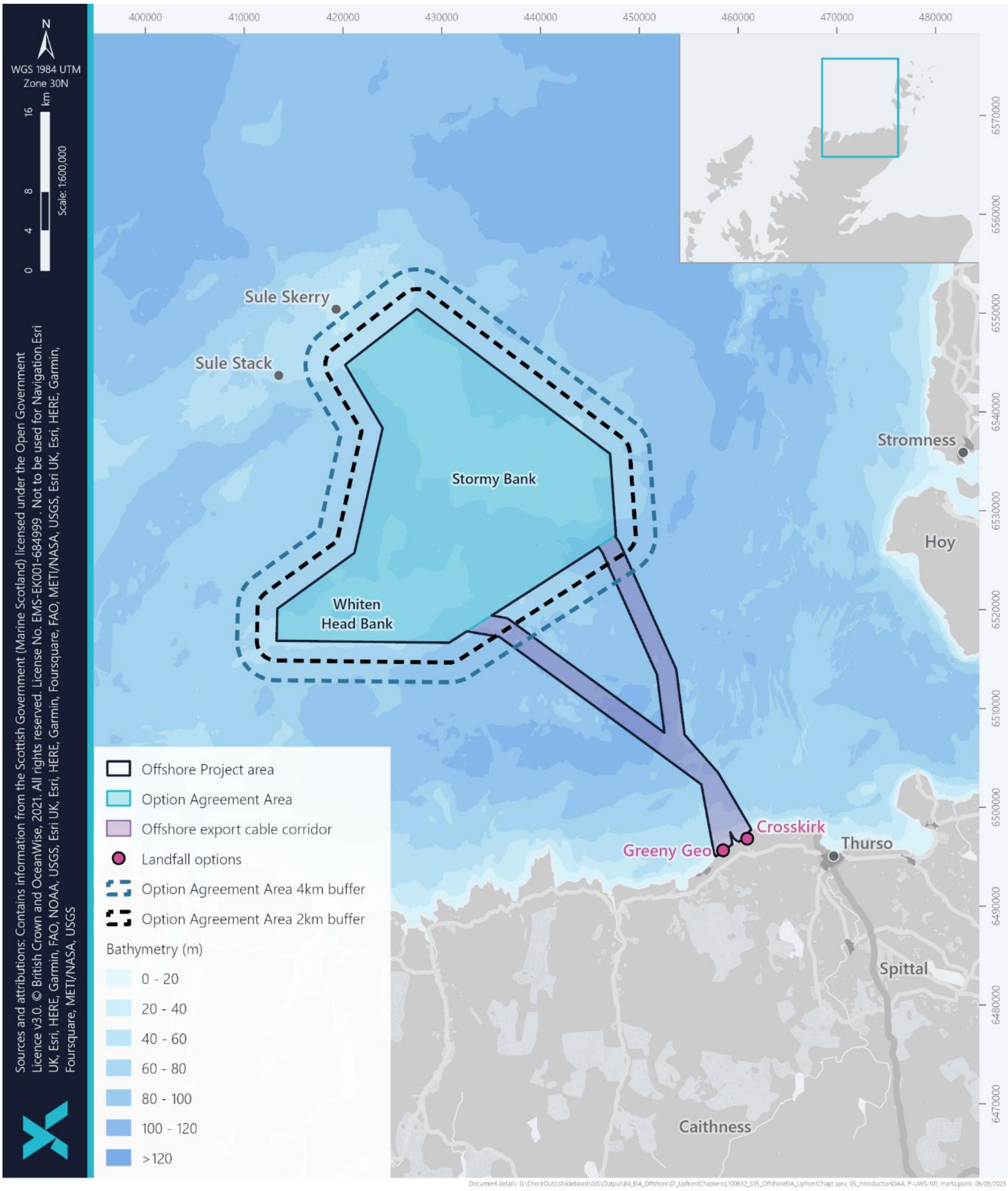


Figure 2-1 Proposed location of the offshore Project plus 2 km and 4 km buffers that the DAS were conducted over.

2.1.2 Survey timing

6. DAS were undertaken each month as illustrated in Table 2-1, further survey timing details (i.e. dates and survey start and end times) are presented in Annex 12.7. Surveys began in July 2020 and were completed in September 2022. Generally, one survey was conducted each calendar month, except in January 2022 when adverse weather conditions prevented the survey taking place; two surveys were conducted in February 2022 to substitute the missing January 2022 survey.

7. The analysis presented in this Supporting Study includes data collected from a total of 27 surveys.

Table 2-1 Months when DAS were conducted (white) at the offshore Project between July 2020 to September 2022.

Month	2020	2021	2022
January	-	X	-
February	-	X	XX
March	-	X	X
April	-	X	X
May	-	X	X
June	-	X	X
July	X	X	X
August	X	X	X
September	X	X	X
October	X	X	-
November	X	X	-
December	X	X	-

X: Survey completed; XX: Two surveys completed; -: No survey undertaken.

2.1.3 DAS methodology

8. Detailed HiDef survey methodology is presented in Supporting Study 8: Digital video aerial survey methodology and marine mammal survey results.

9. In summary, DAS were undertaken using an aircraft equipped with four HiDef Gen II video cameras flown along 21 transects placed 2 km apart across the OAA and a 4 km buffer.

10. The transect orientation was approximately north to south, which was perpendicular to the depth contours along the coast to ensure that each transect sampled a similar range of habitats (primarily relating to water depth) and reduced the variation as much as possible in bird and mammal abundance estimates between transects.

11. Each camera captured images with a 2 cm Ground Sample Distance (GSD) and sampled a strip of 125 m width, separated from the next camera by ~25 m, thus providing a combined sampled width of 500 m within a 575 m overall strip. The surveys were flown at a height of

approximately 550 m above sea level (ASL; ~1800 feet) which eliminated the risk of flushing species that are easily disturbed by aircraft noise (Thaxter *et al.*, 2016[1]).

12. Position data for the aircraft was captured from a Garmin GPSMap 296 receiver with differential GPS enabled to give 1 m accuracy for the positions and recording updates in location at one second intervals for later matching to bird and marine mammal observations.

13. Data from two out of the four cameras was processed to achieve a minimum target of 12.5% coverage of the site; remaining unprocessed data was archived. The survey design and coverage allowed for a robust data analysis to estimate species density and abundance.

14. Aerial survey data were comprised of a list of object observations classified as: object type (bird, mammal, vessel, etc), species (where appropriate, for exceptions of 'unidentified' auks, see section 3.1.3), count (number of individuals), bird behaviour (flying or sitting on the sea), sex (where possible), age (where possible), bird flight direction, position (longitude and latitude coordinates), date and time stamp of video collection.

15. Density and abundance estimates were calculated for all bird species recorded in the aerial survey data (Section 3.1). For birds belonging to the auk family (guillemot, razorbill and puffin) additional data analyses was carried out to apportion unidentified auks (section 3.1.3) and calculate availability bias (section 3.1.4).

3 DATA ANALYSIS

3.1 Bird density and abundance estimates

3.1.1 Estimates per survey

16. Raw data from DAS were supplied as observation logs, containing details of all objects (seabird, marine mammal, vessel, etc.) as well as latitude and longitude coordinates for each object. All non-bird records were removed prior to analysis. Analysis was conducted for each survey separately. Bird locations were assigned to the following sub-zones; OAA, OAA plus 2 km buffer and OAA plus 4 km buffer.

17. Design based density (birds/km^2) and abundance values were estimated for individual species in each of the 27 surveys using the 'R' Project statistical program (R Development Core Team 2012[2]).

18. The population abundance for each species on each survey was calculated as the number of birds recorded multiplied by the total area (e.g. of the OAA) divided by the area surveyed in that area. Thus, at a coverage of 12.5% the observed counts were multiplied by eight to obtain abundance in the entire area. Densities were obtained as the counts divided by the area surveyed. This is a simple extrapolation, that assumes similar densities were present

[1] Thaxter, C.B., Ross-Smith, V.H. and Cook, A.S.C.P. (2016). How high do birds fly? A review of current datasets and an appraisal of current methodologies for collecting flight height data: Literature review. BTO Research Report No. 666.

[2] R Development Core Team 2012. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. http://www.R-project.org/

in the un-surveyed areas. These calculations were conducted for the sub-zones as noted above.

19. To obtain measures of uncertainty around the estimated abundances and densities a boot-strap resampling method used for analysing time-series data was adapted as follows:

    1. All 21 transect lines tracked during each survey were divided into 500 m segments.
    2. The observations for each species on each survey were resampled using a time-series boot strap function (R library 'boot' function 'tsboot') with a blocking structure defined as 10 segments. Thus, resampling was conducted at the level of groups of 10 segments, randomly selected on each of the 1,000 iterations conducted. A block size of 10 was selected as a precautionary length, with the assumption that beyond this number of segments there would be no detectable auto-correlation.
    3. Each bootstrap iteration provided a re-estimated number of observations which were analysed to obtain population and densities as described above. From the bootstrap samples, the standard deviation (SD) and upper and lower 95% confidence intervals (bootstrap CI, 25th and 975th value in the ranked bootstraps) were extracted to provide measures of uncertainty.
    4. Density and abundance estimates calculated for each species in each survey are presented in Annex 12.2.

20. This method to calculate density and abundance for each species in each survey assumes that the surveyed area is representative of the un-surveyed region, thus the design of survey is important (hence 'design based').

3.1.2 Mean estimates per calendar month

21. Pre-application consultation with NatureScot discussing mean density and abundance estimates took place in meeting (dated 8th February 2023) and through letter correspondence (dated 2nd March 2023 and 5th April 2023).

22. The density and abundance estimates calculated for each survey (section 3.1.1) were used to obtain representative density and abundance values for each calendar month. This was done by adding together the density/abundance estimates for each appropriate month and calculating the mean, SD and CI (e.g. three density/abundance estimates were available for the month of July, two were available for the month of October etc, see Table 2-1 for surveyed months). Calendar month density and abundance estimates (including SD and CI) are presented in Annex 12.1.

23. In the raw survey data (refer to Annex 12.11), bird behaviour was classified as either sitting on the sea surface ('sitting') or in flight ('flying'). Data analysis was conducted on each subset separately and also combined across both ('all birds').

24. For displacement analysis (section 3.2), the mean calendar month abundance estimates for all birds (i.e. sitting plus flying birds) presented in Annex 12.1 were used for the assessment.

25. For collision risk analysis (section 3.3), the mean calendar month density estimate calculated only for birds in flight presented in Annex 12.4 were used for the assessment.

3.1.3 Assignment of unidentified auks to species

26. For some auk observations (i.e. birds belonging to the auk family) recorded during aerial surveys, it was not possible to classify the observation as an individual species (i.e. guillemot, razorbill or puffin) and the observation was assigned as either an 'auk species' (i.e. the species was either a guillemot, razorbill or puffin) or a 'large auk' (i.e. the species was either a guillemot or a razorbill).

27. The population and density estimates for unidentified auks were added to the species level estimates in proportion to the presence of the latter. Thus, if the relative percentages of identified guillemot, razorbill and puffin were 65%, 25% and 10%, the unidentified auks were apportioned to each species using these values. This was conducted separately on a survey basis, since the relative proportions of each species varied across seasons.

3.1.4 Availability bias of guillemots, razorbills and puffins

28. Auks spend a proportion of their time foraging beneath the water surface and therefore a proportion of individuals present in an area will be unobserved during the period the survey plane passes over. Density and abundance estimates were adjusted to account for these unobserved individual auks by multiplying the number of birds recorded on the sea (birds in flight are not adjusted) with species-specific correction factors. The adjustment rates used were 1.311 for guillemot and 1.211 for razorbill (i.e. this assumes 24% of guillemots and 17% of razorbills are underwater at any given time; Thaxter *et al.*, 2010[3]) and 1.165 for puffin (14% assumed to be underwater at any time, Spencer 2012[4]).

3.2 Disturbance and Displacement Analysis

29. The presence of wind turbines generators (WTGs) has the potential to directly disturb and displace birds from within and around the offshore Project OAA. This is assessed as an indirect habitat loss, as it has the potential to reduce the area available to birds for feeding, loafing and moulting. Vessel activity and the lighting of WTGs and associated ancillary structures could also attract (or repel) certain species of birds and affect migratory behaviour on a local scale.

30. Displacement matrix table inputs and outputs are provided in Annex 12.3. Displacement and mortality rates for seven species (kittiwake, Arctic tern, guillemot, razorbill, puffin, fulmar and gannet) used in the displacement matrices were advised by consultees during formal scoping consultation (18th May 2022); NatureScot advised in a letter (dated 5th April 2023) on the displacement and mortality rates to be used for Arctic tern.

31. In order to focus the assessment of disturbance and displacement for the operational stage of the Project, a screening exercise was undertaken to identify those species most

[3] Thaxter C.B., Wanless S., Daunt F., Harris M.P., Benvenuti S., Watanuki Y., Grémillet D. and Hamer K.C. (2010). Influence of wing loading on the trade-off between pursuit-diving and flight in common guillemots and razorbills. The Journal of Experimental Biology 213, 1018-1025.

[4] Spencer, S.M. (2012). Diving behaviour and identification of sex of breeding Atlantic puffins (*Fratercula arctica*), and nest-site characteristics of Alcids on Petit Manan Island, Maine. MSc Thesis submitted to University of Massachusetts Amherst in May 2012.

likely to be at risk (Table 3-1), focussing on the species recorded during the baseline surveys (Section 4).

32. Species screened into the displacement assessment include those that meet both of the following classifications:

    1. Species recorded regularly within the OAA + 2 km buffer during DASs undertaken between July 2020 to September 2022 (i.e. a minimum of 15 birds recorded over one or more surveys); and
    2. Species considered susceptible to disturbance (i.e. have medium or high 'Disturbance Sensitivity' and 'Habitat Specialization' scores as assessed by Bradbury *et al.*, 2014[5] (expanded from Furness *et al.*, 2013[6]), summarised in Table 1 by the Statutory Nature Conservation Bodies (SNCB 2022[7])).

33. Any species with a low sensitivity to displacement or recorded infrequently during baseline surveys, were screened out of further assessment.

34. Pre-application consultation with NatureScot (meeting dated 8th February 2023) agreed the seven species (kittiwake, Arctic tern, guillemot, razorbill, puffin, fulmar and gannet) identified as at potential risk to disturbance and displacement effects. These 'at risk' species were assessed within two biological seasons (breeding and non-breeding season, Table 4-2); migration periods were included within the non-breeding seasons and were not assessed separately as it is resident species that are considered to be most at risk from disturbance and displacement effects.

35. NatureScot also advised (letter dated 5th April 2023) that "great skua scores 1 and 2 for Disturbance Susceptibility and Habitat Specialisation respectively in Bradbury et al (2014) and European storm petrel 1 and 1, such that we would not require displacement assessment for these species". For this reason, great skua and European storm-petrel were not included in the displacement assessment.

36. The displacement assessment followed the 'Matrix Approach' as advised by SNCB (2022[7]). For species screened into the assessment, matrix tables presented in Annex 12.3 show percentage increments from 0-100% in 10% increments for displacement levels and 0-100% in smaller increments at lower values (e.g. 0%, 1%, 2%, 5%, 10%, 20% etc) for mortality to represent proportions of birds potentially displaced/dying as a result of the Project.

37. The population estimate used for each species to assess displacement effects was the relevant mean seasonal peak (i.e. the highest mean value for a calendar month (section 3.1.2) within each season). Following SNCB (2022[7]), for all screened in species, the displacement assessment used all data recorded within the 2 km buffer. The mean peak

---

[5] Bradbury, G., Trinder, M., Furness, B., Banks, A.N, Caldow, R.W.G. and Hume, D.,2014. 'Mapping Seabird Sensitivity to Offshore Wind Farms'. PLoS ONE. 9(9): e106366.
[6] Furness R. W., Wade, H. M. and Masden E.A., 2013. Assessing vulnerability of marine bird populations to offshore wind farms . Journal of Environmental Management 119 pp.56-66.
[7] Joint SNCB 2022 Interim Displacement Advice Note - https://hub.jncc.gov.uk/assets/9aecb87c-80c5-4cfb-9102-39f0228dcc9a

estimated abundance inputs used for the displacement analysis are presented in Annex 12.3.

Table 3-1 Disturbance and displacement screening

Month	Total number of birds recorded during aerial surveys (Low, Medium or High)*	Sensitivity to Disturbance and Displacement (Low, Medium or High)**	Screening Result (In or Out)
Kittiwake	High	Low	**Screened IN** for potential effects during breeding and non-breeding seasons due to high number of birds recorded during baseline surveys.
Black-headed gull	Low	Medium	**Screened OUT** due to low number of birds recorded during baseline surveys.
Little gull	Low	Low	**Screened OUT** due to low number of birds recorded during baseline surveys and low sensitivity to disturbance and displacement (low macro avoidance rate).
Common gull	Low	Low	**Screened OUT** due to low number of birds recorded during baseline surveys and low sensitivity to disturbance and displacement.
Great black-backed gull	Medium	Low	**Screened OUT** due to low sensitivity to disturbance and displacement and not known to avoid wind turbines (low macro avoidance rate).
Herring gull	Low	Low	**Screened OUT** due to low number of birds recorded during baseline surveys and low sensitivity to disturbance and displacement.
Lesser black-backed gull	Low	Low	**Screened OUT** due to low number of birds recorded during baseline surveys and low sensitivity to disturbance and displacement.
Common tern	Low	Medium	**Screened OUT** due to low number of birds recorded during baseline surveys.
Arctic tern	Medium	Medium	**Screened IN** for potential effects during breeding season due to medium number of birds recorded during baseline surveys and medium sensitivity to disturbance and displacement.
Great skua	Medium	Low	**Screened OUT** due to low sensitivity to disturbance and displacement.
Arctic skua	Low	Low	**Screened OUT** due to low number of birds recorded during baseline surveys and low sensitivity to disturbance and displacement.
Little auk	Low	Low	**Screened OUT** due to low number of birds recorded during baseline surveys and low

Month	Total number of birds recorded during aerial surveys (Low, Medium or High)*	Sensitivity to Disturbance and Displacement (Low, Medium or High)**	Screening Result (In or Out)
			sensitivity to disturbance and displacement.
Guillemot	High	Medium	**Screened IN** for potential effects during breeding and non-breeding seasons due to high number of birds recorded during baseline surveys and medium sensitivity to disturbance and displacement.
Razorbill	Medium	Medium	**Screened IN** for potential effects during breeding and non-breeding seasons due to medium number of birds recorded during baseline surveys and medium sensitivity to disturbance and displacement.
Black guillemot	Low	High	**Screened OUT** due to low number of birds recorded during baseline surveys. .
Puffin	High	Medium	**Screened IN** for potential effects during breeding and non-breeding seasons due to high number of birds recorded during baseline surveys and medium sensitivity to disturbance and displacement.
Red-throated diver	Low	High	**Screened OUT** due to low number of birds recorded during baseline surveys..
Great northern diver	Low	High	**Screened OUT** due to low number of birds recorded during baseline surveys..
European storm-petrel	Medium	Low	**Screened OUT** due to low sensitivity to disturbance and displacement.
Fulmar	High	Low	**Screened IN** for potential effects during breeding and non-breeding seasons due to high number of birds recorded during baseline surveys.
Cory's shearwater	Low	Low	**Screened OUT** due to low number of birds recorded during baseline surveys and low sensitivity to disturbance and displacement.
Sooty shearwater	Low	Low	**Screened OUT** due to low number of birds recorded during baseline surveys and low sensitivity to disturbance and displacement.
Great shearwater	Low	Low	**Screened OUT** due to low number of birds recorded during baseline surveys and low sensitivity to disturbance and displacement.
Manx shearwater	Low	Low	**Screened OUT** as due to low number of birds recorded during baseline surveys and

Month	Total number of birds recorded during aerial surveys (Low, Medium or High)*	Sensitivity to Disturbance and Displacement (Low, Medium or High)**	Screening Result (In or Out)
			low sensitivity to disturbance and displacement.
Gannet	High	Low	**Screened IN** for potential effects during breeding and non-breeding seasons due to high number of birds recorded during baseline surveys.
Shag	Low	Medium	**Screened OUT** due to low number of birds recorded during baseline surveys.

*Low number of birds ≤15 birds over 27 surveys, medium number of birds = 16 to 250 birds over 27 surveys, High number of birds >251 birds over 27 surveys.

**Low sensitivity = Score 1 to 2; Medium sensitivity = Score 3; High sensitivity = Score 4 to 5 (summarised in Table 1, SNCB 2022[7]).

3.3 Collision Risk Modelling

38. There is a potential risk of collision with the WTG rotors and associated infrastructure resulting in injury or fatality to birds which fly through the OAA whilst foraging for food or commuting between breeding sites and foraging areas.

39. The initial screening exercise to assess which species to include in the collision risk assessment is presented in Table 3-2. A total of 19 species were recorded in flight within the OAA during the baseline DAS, the densities of these species (refer to section 3.1.2 for calculations) recorded in each calendar month within the OAA are presented in Annex 12.4. Based on collision risk (Garthe and Hüppop, 2004[8]; Furness and Wade, 2012[9], Wade *et al.*, 2016[10]) as well as the estimated density of birds in flight within the OAA, five species were screened into the collision risk assessment: kittiwake, great black-backed gull, Arctic tern, great skua and gannet; this list of species considered to be at risk of collision was agreed with NatureScot during pre-application consultation (meeting dated 8th February 2023).

40. For all other species recorded flying within the OAA, the predicted risk of collisions and/or the estimated density was low and these species were therefore screened out of the collision risk assessment.

[8] Garthe, S., & Hüppop, O. (2004). Scaling possible adverse effects of marine wind farms on seabirds: developing and applying a vulnerability index. Journal of Applied Ecology, 41(4), 724–734.
[9] Furness, R.W. & Wade, H.M. (2012). Vulnerability of Scottish seabirds to offshore wind turbines. Report to Marine Scotland.
[10] Wade, H.M., Masden E.M., Jackson, A.C. & Furness, R.W. (2016). Incorporating data uncertainty when estimating potential vulnerability of Scottish seabirds to marine renewable energy developments. Marine Policy, 70, 108-113.

Table 3-2 Collision risk screening

Month	Risk of collisions (Low, Medium, High; Garthe and Hüppop, 2004[8]; Furness and Wade, 2012[9], Wade *et al.*, 2016[10])	Estimated density of birds in flight within OAA	Screening Result (In or Out)
Kittiwake	Medium	High	**IN**
Black-headed gull	Medium	Low	**OUT**
Little gull	Medium	Low	**OUT**
Great black-backed gull	High	Medium	**IN**
Herring gull	High	Low	**OUT**
Arctic tern	Medium	Medium	**IN**
Great skua	Medium	Medium	**IN**
Arctic skua	Medium	Low	**OUT**
Guillemot	Very low	High	**OUT**
Razorbill	Very low	Medium	**OUT**
Black guillemot	Very low	Low	**OUT**
Puffin	Very low	High	**OUT**
Great northern diver	Low	Low	**OUT**
European storm-petrel	Very low	Low to Medium	**OUT**
Fulmar	Very low	High	**OUT**
Cory's shearwater	Very low	Low	**OUT**
Sooty shearwater	Very low	Low	**OUT**
Manx shearwater	Very low	Low	**OUT**
Gannet	Medium	High	**IN**

41. Stochastic Collision Risk Modelling (sCRM; McGregor *et al.*, 2018[11]) was used to assess predicted collisions for five WTG scenarios (rotor diameters of 236 m, 250 m, 265 m, 300 m and 330 m. The aim of this modelling was to determine the worst case scenario (WCS) for each bird species (kittiwake, great black-backed gull, Arctic tern, great skua and gannet) at risk of collision within the OAA.

42. The Marine Scotland[12] stochastic CRM tool (https://dmpstats.shinyapps.io/avian_stochcrm/) was used to assess collision risk.

43. The sCRM incorporates measures of variation or uncertainty in input parameters (such as monthly bird densities) into an overall measure of uncertainty in the predicted collision risk

[11] McGregor, R. M., King, S., Donovan, C. R., Caneco, B., & Webb, A. 2018. A Stochastic Collision Risk Model for Seabirds in Flight. Marine Scotland.
[12] Now referred to as the Marine Directorate

outputs. The previous CRM (Band 2012[13]) was unable to correctly combine input parameter uncertainty or variation into the outputs, despite the help manual providing advice on an approach to use.

44. Input parameters for sCRM followed NatureScot pre-application advice (5th April 2023) and are provided in Annex 12.5. As advised by NatureScot (5th April 2023) deterministic CRM (Band 2012[13]) was also carried out for the five identified collision risk species, input parameters are provided in Annex 12.5. All results for the sCRM and the deterministic collision risk modelling are presented in Annex 12.6.

3.4 Spatial Distributions

45. Density Surface Modelling (DSM) was carried out by DMP Statistical Solutions Ltd (DMP Stats); density surface maps displaying the distribution of key species (kittiwake, guillemot, razorbill, puffin, fulmar and gannet) recorded within the OAA plus 4 km buffer during baseline surveys are provided in Annex 12.9.

3.4.1 DSM Modelling

46. Raw data from DAS were supplied as GIS shapefiles containing GPS aerial flight tracks and locations of animal observations classified to species or species group as well as behaviour. All non-bird records were removed prior to analysis and all bird records were restricted to those recorded on the surface of the sea. Flight GPS tracks were segmented into 1 km blocks, with observations of each species summed within these segments, and observation effort calculated (area surveyed) as a function of the number of operating cameras.

47. DSM was performed in R (R Core Team, 2022) using the MRSea package[14] which uses adaptive regression-spline smoothers to provide estimated mean density surfaces and associated 95% confidence intervals via parametric bootstrapping.

48. The fundamental/initial model was a Generalised Linear Model (GLM), with log-link and quasi-Poisson error structure or Poisson as required. An offset was included for the area of the survey cell and the only covariate considered was spatial location, from which spatial smooths were estimated using the salsa2d algorithm. Separate surfaces were fitted for each of the species-surveys where there were sufficient records (refer to Section 3.4.2), with all surveyed 1 km transect segments underpinning the knot locations. These locations were used to create 500 potential knots, over which salsa2d performed its search. The initial number of knots was generally 10, with a maximum generally of 50, given exploratory analyses that suggested highly complex surfaces are not favoured. Some adjustments to these settings were made for surfaces with convergence difficulties, in particular low levels of knots for very sparse species-surveys.

49. Confidence intervals were generated using the MRSea parametric bootstrapping method, which provide confidence intervals for each 1 km^2 grid cell. Estimates to the various regions

[13] Band, W. 2012. Using a collision risk model to assess bird collision risks for offshore windfarms. SOSS, The Crown Estate, London, UK.

[14] Scott-Hayward L, Oedekoven C, Mackenzie M, Walker C (2014). *MRSea package: Statistical Modelling of bird and cetacean distributions in offshore renewables development areas*. University of St. Andrews: Contract with Marine Scotland: SB9 (CR/2012/05)

were calculated by summation over the 1 km^2 grid contained within these. Upper and lower confidence intervals are given by the 2.5 and 97.5 percentiles of the summed bootstrap surfaces.

3.4.2 Data availability

50. For the majority of bird species recorded during baseline surveys, relatively few individuals were recorded and for species with low counts it was not possible to fit a model (and produce a map).

51. Six species (kittiwake, guillemot, razorbill, puffin, fulmar and gannet) were recorded in sufficient numbers in some surveys to be able to support a model. For each of these six species, maps displaying fitted mean DSMs by species and survey, for which there were sufficient data to support the model, are presented in Annex 12.9.

4 ORNITHOLOGY BASELINE

52. A total of 26 seabird species were recorded during DAS; Table 4-1 lists the bird species recorded within the OAA, OAA plus 2 km buffer and the OAA plus 4 km buffer.

53. The conservation status of all species recorded during baseline surveys as well as their population trends in relation to climate are provided in Table 4-1 (Pearce-Higgins, 2021[15]).

Table 4-1 Bird species recorded during surveys for the OAA, OAA plus 2 km buffer and OAA plus 4 km buffer between July 2020 to September 2022.

Species	Scientific Name	Conservation status	OAA	OAA and 2 km buffer	OAA and 4 km buffer
Kittiwake	*Rissa tridactyla*	Birds of Conservation Concern (BoCC; Stanbury *et al.*, 2021[16]) Red listed, Birds Directive Migratory Species, International Union for Conservation of Nature (IUCN) Red List 'Vulnerable' status.	X	X	X
Black-headed gull	*Chroicocephalus ridibundus*	BoCC Amber listed, Birds Directive Migratory Species	X	X	X
Little gull	*Hydrocoloeus minutus*	BoCC Green listed, Birds Directive Migratory Species, IUCN Red List 'Near Threatened' status.	X	X	X
Common gull	*Larus canus*	BoCC Amber listed, Birds Directive Migratory Species, IUCN Red List 'Least Concern' status.	-	X	X

[15] Pearce-Higgins, J.W. (2021). Climate Change and the UK's Birds. British Trust for Ornithology Report, Thetford, Norfolk.
[16] Stanbury, A.J., Eaton, M.A., Aebischer, N.J., Balmer, D., Brown, A.F., Douse, A., Lindley, P., McCulloch, N., Noble, D.G. and Win, I. (2021) Birds of Conservation Concern 5: the status of all regularly occurring birds in the UK, Channel Islands and the Isle of Man. British Birds 114: 723-747 [Online] Available from - https://www.bto.org/our-science/publications/birds-conservation-concern/status-our-bird-populations-fifth-birds.

Species	Scientific Name	Conservation status	OAA	OAA and 2 km buffer	OAA and 4 km buffer
Great black-backed gull	*Larus marinus*	BoCC Amber listed, Birds Directive Migratory Species, IUCN Red List 'Least Concern' status. 'High risk' breeding population vulnerability to climate change.	X	X	X
Herring gull	*Larus argentatus*	BoCC Red listed, Birds Directive Migratory Species, IUCN Red List 'Near Threatened' status. 'High risk' breeding population vulnerability to climate change.	X	X	X
Lesser black-backed gull	*Larus fuscus*	BoCC Amber listed, Birds Directive Migratory Species, IUCN Red List 'Least Concern' status. 'High benefit' breeding population vulnerability to climate change.	X	X	X
Common tern	*Sterna hirundo*	BoCC Amber listed, Birds Directive Annex I, Migratory Species, IUCN Red List 'Least Concern' status. 'High benefit' breeding population vulnerability to climate change.	-	X	X
Arctic tern	*Sterna paradisaea*	BoCC Amber listed, Birds Directive Annex I, Migratory Species, IUCN Red List 'Least Concern' status. 'High risk' breeding population vulnerability to climate change.	X	X	X
Great skua	*Stercorarius skua*	BoCC Amber listed, Birds Directive Migratory Species, IUCN Red List 'Least Concern' status.	X	X	X
Arctic skua	*Stercorarius parasiticus*	BoCC Red listed, Birds Directive Migratory Species, IUCN Red List 'Least Concern' status. 'High risk' breeding population vulnerability to climate change.	X	X	X
Little auk	*Alle alle*	BoCC Green listed, Birds Directive Migratory Species, IUCN Red List 'Least Concern' status.	X	X	X
Guillemot	*Uria aalge*	BoCC Amber listed, Birds Directive Migratory Species, IUCN Red List 'Least Concern' status. 'Medium risk' breeding population vulnerability to climate change.	X	X	X

Species	Scientific Name	Conservation status	OAA	OAA and 2 km buffer	OAA and 4 km buffer
Razorbill	*Alca torda*	BoCC Amber listed, Birds Directive Migratory Species, IUCN Red List 'Near Threatened' status. 'Medium risk' breeding population vulnerability to climate change.	X	X	X
Black guillemot	*Cepphus grylle*	BoCC Amber listed, Birds Directive Migratory Species, IUCN Red List 'Least Concern' status. 'High risk' breeding population vulnerability to climate change.	X	X	X
Puffin	*Fratercula arctica*	BoCC Red listed, Birds Directive Migratory Species, IUCN Red List 'Vulnerable' status. 'High risk' breeding population vulnerability to climate change.	X	X	X
Red-throated diver	*Gavia stellata*	BoCC Green listed, Birds Directive Migratory Species, Birds Directive Annex I, IUCN Red List 'Least Concern' status. 'High risk' breeding population vulnerability to climate change.	X	X	X
Great northern diver	*Gavia immer*	BoCC Amber listed, Birds Directive Migratory Species, Birds Directive Annex I, IUCN Red List 'Least Concern' status.	X	X	X
European storm-petrel	*Hydrobates pelagicus*	BoCC Amber listed, Birds Directive Migratory Species, Birds Directive Annex I, IUCN Red List 'Least Concern' status. 'High risk' breeding population vulnerability to climate change.	X	X	X
Fulmar	*Fulmarus glacialis*	BoCC Amber listed, Birds Directive Migratory Species, IUCN Red List 'Least Concern' status. 'High risk' breeding population vulnerability to climate change.	X	X	X
Cory's shearwater	*Calonectris borealis*	IUCN Red List 'Least Concern' status.	X	X	X
Sooty shearwater	*Puffinus griseus*	BoCC Green listed, Birds Directive Migratory Species, IUCN Red List 'Near Threatened' status.	X	X	X
Great shearwater	*Puffinus gravis*	BoCC Green listed, Birds Directive Migratory Species, IUCN Red List 'Least Concern' status.	-	-	X

Species	Scientific Name	Conservation status	OAA	OAA and 2 km buffer	OAA and 4 km buffer
Manx shearwater	*Puffinus puffinus*	BoCC Amber listed, Birds Directive Migratory Species, IUCN Red List 'Least Concern' status.	X	X	X
Gannet	*Morus bassanus*	BoCC Amber listed, Birds Directive Migratory Species, IUCN Red List 'Least Concern' status. 'Limited Impact' breeding population vulnerability to climate change.	X	X	X
Shag	*Gulosus aristotelis*	BoCC Red listed, Birds Directive Migratory Species, IUCN Red List 'Least Concern' status. 'Medium risk' breeding population vulnerability to climate change.	X	X	X

X: Species recorded in at least one survey; - Species not recorded.

54. Breeding and non-breeding seasons for each species are defined using NatureScot 2023[17] guidance as presented in Table 4-2.

Table 4-2 Species specific seasonal definitions taken from NatureScot (2023[17]).

Month	Breeding	Non-breeding
Kittiwake	mid-April to August	September to mid-April
Black-headed gull	April to August	September to March
Little gull	N/A	August to mid-April
Common gull	April to August	September to March
Great black-backed gull	April to August	September to March
Herring gull	April to August	September to March
Lesser black-backed gull	mid-March to August	N/A
Common tern	May to mid-September	N/A
Arctic tern	May to August	N/A
Great skua	mid-April to mid-September	mid-September to mid-April
Arctic skua	May to August	N/A
Little auk	-	-
Guillemot	April to mid-August	mid-August to March
Razorbill	April to mid-August	mid-August to March

[17] NatureScot (2023). Advice on marine renewables development. Guidance Note 9: Guidance to support Offshore Wind applications: Marine Ornithology Advice for Seasonal Definitions for Birds in the Scottish Marine Environment. Available at: https://www.nature.scot/professional-advice/planning-and-development/planning-and-development-advice/renewable-energy/marine-renewables/advice-marine-renewables-development

Month	Breeding	Non-breeding
Black guillemot	April to August	September to March
Puffin	April to mid-August	mid-August to March
Red-throated diver	May to mid-September	mid-September to April
Great northern diver	N/A	October to mid-May
European storm-petrel	mid-May to October	November to mid-May
Fulmar	April to mid-September	mid-September to March
Cory's shearwater	Not a breeding species in the UK	Not present in UK waters during the winter
Sooty shearwater	Not a breeding species in the UK	Not present in UK waters during the winter
Great shearwater	Not a breeding species in the UK	Not present in UK waters during the winter
Manx shearwater	April to mid-October	mid-Oct to March
Gannet	mid-March to September	October to mid-March
Shag	March to September	October to February

N/A: Not present in significant numbers in Scottish marine areas; - Species not included in NatureScot 2023

4.1 Overview of bird species

55. A summary of each species recorded in the OAA is provided below. Details of mean density and abundance estimates per calendar month are provided in Annex 12.1 and individual survey estimates are provided in Annex 12.2. Density surface maps for some key species (kittiwake, guillemot, razorbill, puffin, fulmar and gannet) are described in the appropriate summary species accounts below and provided in Annex 12.1.9. Raw counts (individuals) of all species recorded in the survey area are provided in Annex 12.11.

4.2 Summary species accounts

4.2.1 Kittiwake

56. Kittiwakes were regularly recorded in all calendar months within the OAA. Numbers fluctuated, with high numbers recorded in early spring, mid-summer as well as late autumn/early winter months and relatively low numbers recorded at other times of the year. The estimated mean population size in the OAA was generally higher during the kittiwake non-breeding season (September to mid-April) compared with the breeding season (mid-April to August). The estimated peak mean population in the OAA and 2 km buffer during the non-breeding season was 1,216.8 individuals in March and during the breeding season, 690.1 individuals in July.

57. Annex 12.9 provides kittiwake DSM maps for 15 surveys when kittiwake observations recorded in the survey area were high enough to be able to fit a model to the data (refer to section 3.4.2). Kittiwakes displayed a weak spatial pattern across the survey area, highest activity tended to be concentrated on the eastern edge of the OAA and to a lesser extent, on the south-western edge of the OAA. Less kittiwake activity was recorded in the centre or northern part of the OAA in each month/year.

4.2.2 Black-headed gull

58. One black-headed gull was recorded in flight during one survey in April 2022 (during the breeding season) within the OAA.

4.2.3 Little gull

59. One little gull was recorded in flight during one survey in September 2020 (during the non-breeding season) within the OAA.

4.2.4 Common gull

60. One common gull was recorded in flight during one survey in April 2021 (during the breeding season) within the 2 km buffer surrounding the OAA.

4.2.5 Great black-backed gull

61. Great black-backed gulls were recorded in seven calendar months within the OAA. This species was generally recorded during the non-breeding season (September to March) in medium numbers and apart from two birds recorded in flight within the OAA in June 2021, great black-backed gulls were largely absent from the survey area during the breeding season (April to August). The estimated peak mean population in the OAA and 2 km buffer during the non-breeding season was 220.8 individuals in December and during the breeding season, 7.5 individuals in March.

4.2.6 Herring gull

62. Herring gulls were recorded in four calendar months within the OAA. This species was recorded in very low numbers generally during the non-breeding season (September to March) and was largely absent from the survey area during the breeding season (April to August). The estimated peak mean population in the OAA and 2 km buffer during the non-breeding season was 15.5 individuals in November and during the breeding season, 7.8 individuals in May.

4.2.7 Lesser black-backed gull

63. Two lesser black-backed gulls were recorded sitting on the sea during the breeding season within the OAA, one in August 2020 and another in August 2021. A population size of 2.6 individuals within the OAA and 2 km buffer in August was estimated.

4.2.8 Common tern

64. Two common terns were recorded during the breeding season in one survey in August 2020 within the OAA and 4 km buffer. A population size of 2.6 individuals within the OAA and 2 km buffer in August was estimated.

4.2.9 Arctic tern

65. Arctic terns were recorded in four calendar months within the OAA. This species was recorded in low to medium numbers (1 to 23 birds per survey) and only during the breeding season (May to August). Arctic tern was absent within the survey area in all other months of the year. The estimated peak mean population recorded in the OAA and 2 km buffer during the breeding season was 89.1 individuals in June.

4.2.10 Great skua

66. Great skuas were recorded in seven calendar months within the OAA. Numbers recorded during each survey in the breeding season (mid-April to mid-September) fluctuated from very low to medium (1 to 40 individuals), but this species was largely absent from the survey area during the non-breeding season (Mid-September to mid-April). The estimated peak mean population in the OAA and 2 km buffer during the breeding season was 113.8 individuals in August and during the non-breeding season, 3.9 individuals in October and November.

4.2.11 Arctic skua

67. Arctic skuas were recorded in low numbers in two calendar months both during the breeding season (May to August) within the OAA; one bird in June 2022 and four birds were recorded in July 2022 within the OAA and 2 km buffer. This species was absent within the survey area at all other times of the year. The estimated peak mean population in the OAA and 2 km buffer during the breeding season was 10.6 individuals in July.

4.2.12 Little auk

68. Five little auks were recorded in November 2021, two were recorded in February 2022 and one was recorded in February 2021 all within the OAA and 4 km buffer. A peak population size of 11.6 individuals within the OAA and 2 km buffer in November 2021 was estimated.

4.2.13 Guillemot

69. Guillemots were regularly recorded in all calendar months within the OAA. Numbers fluctuated, with relatively high numbers recorded in the early spring, mid-summer and autumn months and relatively low numbers recorded during the winter. The estimated population size in the OAA was generally higher during the guillemot breeding season (April to mid-August) compared with the non-breeding season (mid-August to March). The estimated peak mean population for all guillemots (including apportioned guillemots from unidentified auk groups as well as accounting for availability bias, refer to section 3) in the OAA and 2 km buffer during the breeding season was 4,860.9 individuals in July and during the non-breeding season, 4,275.1 individuals in September.

70. Annex 12.9 provides guillemot DSM maps for 25 surveys when guillemot counts recorded in the survey area were high enough to be able to fit a model to the data (refer to section 3.4.2). Guillemots displayed a weak spatial pattern across the survey area. Overall, guillemot activity was recorded in all regions of the survey area, but within each survey, activity tended to be concentrated to one or two regions and there was considerable inter-annual variability. As a general trend, guillemots tended to be more dispersed across the site during the late summer/autumn and spring months when birds were likely passing to and from breeding colonies, highest activity was generally concentrated on the eastern edge of the OAA and to a lesser extent, on the north-western edge of the OAA. In the middle of the breeding season (May to July), guillemot activity tended to be more concentrated on the eastern and north-western edges of the OAA with less activity in the centre.

4.2.14 Razorbill

71. Razorbills were recorded in all calendar months within the OAA except January. Numbers fluctuated with low to medium numbers recorded in the early spring, summer and early autumn months and very low numbers recorded during the winter. The estimated population size in the OAA was generally higher during the razorbill breeding season (April to mid-August) compared with the non-breeding season (mid-August to March), although the peak mean was recorded just after the breeding season in September. The estimated peak mean population for all razorbills (including apportioned razorbills from unidentified auk groups as well as accounting for availability bias, refer to section 3) in the OAA and 2 km buffer during the breeding season was 69.8 individuals in April and during the non-breeding season, 143.9 individuals in September.

72. Annex 12.9 provides razorbill DSM maps for eight surveys when razorbill counts recorded in the survey area were high enough to be able to fit a model to the data (refer to section 3.4.2). Razorbills displayed a weak spatial pattern across the survey area. Razorbill activity was generally low across the survey area, highest activity tended to be concentrated on the eastern edge of the OAA.

4.2.15 Black guillemot

73. One black guillemot was recorded in one survey in July 2021 and another in October 2021, both were recorded on the sea within the OAA. This species was absent within the survey area at other times of the year. A population size of 3.88 individuals within the OAA and 2 km buffer in October was estimated.

4.2.16 Puffin

74. Puffins were regularly recorded in all calendar months except March and November within the OAA and 4 km buffer. This species was also absent from the OAA itself in January and November. Numbers recorded within the OAA fluctuated with relatively high numbers recorded in the late spring, summer and autumn months and relatively low numbers recorded during the winter. The estimated population size in the OAA was higher during the puffin breeding season (April to mid-August) compared with the non-breeding season (mid-August to March). The estimated peak mean population for all puffins (including apportioned puffins from unidentified auk groups as well as accounting for availability bias, refer to section 3) in the OAA and 2 km buffer during the breeding season was 5,271.9 individuals in June and during the non-breeding season, 2,663.4 individuals in August.

75. Annex 12.9 provides puffin DSM maps for 15 surveys when puffin counts recorded in the survey area were high enough to fit a model to the data (refer to section 3.4.2). Puffins displayed a weak spatial pattern and were patchily distributed across the survey area. Within each survey, activity tended to be concentrated to one or two regions and there was considerable inter-annual variability. As a general trend, puffins tended to be more dispersed across the site during the autumn and spring months when birds were likely passing to and from breeding colonies, highest activity was generally concentrated on the south-western and north-western edge of the OAA. For the majority of the breeding season (May to July), puffins were less dispersed and activity was more concentrated on the western edge of the OAA with less activity in the centre.

4.2.17 Red-throated diver

76. Single red-throated divers were recorded, one per survey, in October 2020, November 2021 and May 2022 within the OAA and 2 km buffer; this species was absent from the OAA itself in all months except October 2020. Red-throated diver was absent within the survey area at all other times of the year. A population size of *c.* 3.88 individuals within the OAA and 4 km buffer was estimated for each month a red-throated diver was recorded.

4.2.18 Great northern diver

77. Single great northern divers were recorded, one per survey, in October 2020, May 2021 and May 2022 within the OAA. Great northern diver was absent within the survey area at all other times of the year. The estimated peak mean population recorded in the OAA and 4 km buffer was 7.8 individuals in May.

4.2.19 European storm-petrel

78. European storm petrels were recorded infrequently in medium numbers (one to 36 individuals per survey) during the breeding season (Mid-May to October) in August and September 2020 and 2021. This species was not recorded in August or September 2022 and was absent within the survey area at all other times of the year. As this species was not recorded between May to July, it is likely that individuals recorded in August and September were dispersing away from breeding colonies. The estimated peak mean population recorded in the OAA and 2 km buffer during the breeding season was 74.9 individuals in August.

4.2.20 Fulmar

79. Fulmars were regularly recorded in all calendar months within the OAA. Numbers fluctuated with generally higher numbers recorded during the fulmar non-breeding season (mid-September to March) compared with the breeding season (April to mid-September). The estimated peak mean population recorded in the OAA and 2 km buffer during the non-breeding season was 2,774.3 individuals in December and during the breeding season, 1,917.8 individuals in September.

80. Annex 12.9 provides fulmar DSM maps for 20 surveys when fulmar counts recorded in the survey area were high enough to be able to fit a model to the data (refer to section 3.4.2). Fulmars displayed a weak spatial pattern across the survey area. Fulmars appeared to be more widely distributed across the survey area during post breeding dispersal in September and October. During the breeding season, fulmar present in the survey area tended to concentrate on the eastern edge of the OAA and during the non-breeding season, the highest numbers were recorded on the eastern, southern and north-western edges of the OAA.

4.2.21 Cory's shearwater

81. One Cory's shearwater was recorded during one survey in August 2021 within the OAA.

4.2.22 Sooty shearwater

82. Two sooty shearwaters were recorded in one survey in August 2021 and another individual was recorded in September 2021 within the OAA and 2 km buffer. The estimated peak mean population size within the OAA and 2 km buffer was 5.2 individuals in August.

4.2.23 Great shearwater

83. One great shearwater was recorded during one survey in September 2022 within the 4 km buffer surrounding the OAA.

4.2.24 Manx shearwater

84. Manx shearwaters were recorded in four calendar months (June to September) within the OAA (a small number of birds were also recorded in the 4 km buffer in October). This species was recorded in very low numbers (one to three birds per survey) and only during the breeding season (April to mid-October). Manx shearwater was absent within the survey area at all other times of the year. The estimated peak mean population in the OAA and 2 km buffer during the breeding season was 7.8 individuals in June.

4.2.25 Gannet

85. Gannets were regularly recorded in all calendar months within the OAA. Numbers were relatively low during the winter months but increased through the spring and summer months to peak in October. The estimated population size in the OAA was higher during the gannet breeding season (Mid-March to September) compared with the non-breeding season (October to mid-March), although the peak mean was recorded just after the breeding season in October. The estimated peak mean population recorded in the OAA and 2 km buffer during the breeding season was 958.1 individuals in August and during the non-breeding season, 1,170.9 individuals in October.

86. Annex 12.9 provides gannet DSM maps for 16 surveys when gannet counts recorded in the survey area were high enough to be able to fit a model to the data (refer to section 3.4.2). Gannets displayed a moderate spatial pattern across the survey area. Gannets tended to be more widely distributed across the survey area during post breeding dispersal between August to October. During the breeding season, gannets present in the survey area tended to concentrate on the southern, northern, and western edges of the OAA, activity in the centre of the OAA was relatively low.

4.2.26 Shag

87. Three shags were recorded during one survey in April 2021 within the OAA and one shag was recorded within the 4 km buffer surrounding the OAA in February 2022. Shag was absent within the survey area at all other times of the year. A peak mean population size of 7.8 individuals within the OAA and 2 km buffer in April was estimated.

West of Orkney Windfarm

Offshore Ornithology Technical Supporting Study 12

Annex 12.1 Mean design based estimates of density and abundance per month

Date:	12th May 2023
Tel:	0141 342 5404
Web:	www.macarthurgreen.com
Address:	93 South Woodside Road |Glasgow | G20 6NT

Document Quality Record

Version	Status	Person Responsible	Date
0.1	Draft	Dr. S. Raveh	04/11/2022
0.2	Reviewed	Dr. N. Goodship	08/11/2022
0.3	Updated	Dr. N. Goodship	08/11/2022
1	Internal Approval	Dr. R. McGregor	06/12/2022
1.1	Comments addressed	Dr. N. Goodship	06/01/2023
2	Internal Approval	Dr. R. McGregor	09/05/2023

CONTENTS

LIST OF TABLES

1 INTRODUCTION

1. This Annex 12.1 provides tables of bird density and abundance recorded in each calendar month by HiDef Aerial Surveying Limited (HiDef) for the West of Orkney Windfarm ('the Project') Offshore Environmental Impact Assessment (EIA) Report and Offshore Report to Inform Appropriate Assessment (RIAA).

2. The tables provide density and abundance estimates for each species recorded per month in flight and on the sea within the OAA plus a 2 km and a 4 km buffer. These estimates have been derived from data collected over 27 surveys between July 2020 to September 2022.

3. For auk species (guillemots, razorbills and puffins), the density and abundance tables have been split into three categories including:

    1. Birds not accounting for unidentified auks and availability bias;
    2. Birds including unidentified auks apportioned using identified auk ratios; and
    3. Birds including unidentified auks apportioned using identified auk ratios and accounting for availability bias.

4. Monthly densities and abundances are summarised as the mean calendar month density/abundance, standard deviation (S.D.) and 95% confidence interval (c.i.) range. For all methodology details on density and abundance calculations, refer to Supporting Study 12 (SS12): Offshore ornithology technical supporting study.

Table 1-1 Key to species density and abundance tables.

Species	Section Number
Kittiwake	2
Black-headed gull	3
Little gull	4
Common gull	5
Great black-backed gull	6
Herring gull	7
Lesser black-backed gull	8
Common tern	9
Arctic tern	10
Great skua	11
Arctic skua	12
Little auk	13
Guillemot	14
Razorbill	15
Black guillemot	16
Puffin	17
Auk species group	18
Large auk species group	19
Red-throated diver	20
Great northern diver	21
European storm-petrel	22
Fulmar	23
Cory's shearwater	24
Sooty shearwater	25
Great shearwater	26
Manx shearwater	27
Gannet	28
Shag	29

2 KITTIWAKE

Table 2-1 Mean density of kittiwakes recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0.07 (0.03)	0.02-0.13	0.10 (0.03)	0.05-0.16	0.10 (0.02)	0.06-0.15
Feb	0.30 (0.07)	0.17-0.44	0.27 (0.05)	0.16-0.38	0.25 (0.05)	0.17-0.35
Mar	1.41 (0.31)	0.84-2.05	1.36 (0.23)	0.94-1.82	1.46 (0.18)	1.11-1.83
Apr	0.30 (0.07)	0.18-0.44	0.36 (0.07)	0.23-0.49	0.36 (0.06)	0.25-0.48
May	0.08 (0.04)	0.02-0.17	0.09 (0.05)	0.03-0.19	0.09 (0.04)	0.04-0.17
Jun	0.16 (0.10)	0.02-0.39	0.12 (0.07)	0.02-0.29	0.11 (0.06)	0.02-0.23
Jul	0.84 (0.37)	0.18-1.62	0.77 (0.29)	0.28-1.40	0.67 (0.22)	0.29-1.13
Aug	0.10 (0.03)	0.05-0.16	0.09 (0.02)	0.05-0.15	0.11 (0.02)	0.07-0.15
Sep	0.09 (0.03)	0.03-0.17	0.07 (0.03)	0.02-0.13	0.06 (0.02)	0.02-0.11
Oct	0.89 (0.19)	0.54-1.29	0.89 (0.16)	0.60-1.22	0.98 (0.15)	0.69-1.28
Nov	0.21 (0.06)	0.11-0.33	0.19 (0.04)	0.11-0.28	0.15 (0.03)	0.09-0.22
Dec	0.08 (0.03)	0.02-0.15	0.08 (0.03)	0.03-0.14	0.08 (0.02)	0.03-0.13

Table 2-2 Mean abundance of kittiwake recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	46.49 (17.39)	15.5-85.23	92.98 (24.78)	46.49-139.47	116.22 (27.09)	69.73-170.46
Feb	193.65 (46.36)	108.44-289.25	237.55 (49.1)	147.18-338.25	294.36 (54.44)	193.66-407.98
Mar	922.31 (202.33)	550.19-1344.89	1216.78 (201.34)	840.8-1627.65	1689.58 (211.53)	1282.67-2119.84
Apr	197.66 (44.68)	120.17-290.65	317.82 (60.12)	205.44-438.05	414.69 (65.42)	294.46-550.32
May	50.43 (29.09)	11.65-112.48	81.46 (41.27)	23.29-170.63	104.74 (43.7)	42.6-201.69
Jun	104.6 (64.99)	11.62-255.7	108.48 (64.05)	19.37-255.8	123.98 (64.79)	27.12-267.33
Jul	552.64 (244.14)	118.69-1060.84	690.15 (254.95)	251.01-1251.17	769.43 (255.44)	335.51-1311.88
Aug	66.24 (18.24)	31.85-103.24	84.77 (20.5)	47.77-129.67	121.71 (25.55)	76.86-174.42
Sep	59.51 (22.95)	18.08-111.32	64.72 (25.49)	18.08-119.12	72.63 (27.37)	23.35-129.72
Oct	585.43 (127.54)	352.81-845.18	798.66 (142.89)	538.81-1089.53	1135.96 (176.05)	802.44-1484.89
Nov	139.51 (37.36)	73.64-217.11	170.51 (38.58)	96.89-251.88	178.25 (39.99)	104.64-259.72
Dec	50.37 (22.02)	15.5-96.96	69.74 (25.17)	27.12-123.99	89.12 (28.49)	38.75-147.24

3 BLACK-HEADED GULL

Table 3-1 Mean density of black-headed gull recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0.01 (0.01)	0-0.02	0.004 (0.004)	0-0.013	0.003 (0.003)	0-0.010
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 3-2 Mean abundance of black-headed gull recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	3.87 (3.64)	0-11.6	3.87 (3.83)	0-11.7	3.87 (3.64)	0-11.6
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

4 LITTLE GULL

Table 4-1 Mean density of little gull recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0.004 (0.004)	0-0.012	0.003 (0.003)	0-0.009	0.002 (0.002)	0-0.007
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 4-2 Mean abundance of little gull recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	2.58 (2.34)	0-7.75	2.58 (2.57)	0-7.75	2.58 (2.55)	0-7.75
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

5 COMMON GULL

Table 5-1 Mean density of common gull recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0.004 (0.004)	0-0.013	0.003 (0.003)	0-0.010
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 5-2 Mean abundance of common gull recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	3.88 (3.51)	0-11.63	3.88 (3.51)	0-11.63
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

6 GREAT BLACK-BACKED GULL

Table 6-1 Mean density of great black-backed gull recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0.09 (0.03)	0.04-0.17	0.07 (0.02)	0.03-0.12	0.07 (0.02)	0.03-0.12
Feb	0.11 (0.04)	0.04-0.18	0.13 (0.06)	0.04-0.26	0.15 (0.06)	0.05-0.28
Mar	0.02 (0.01)	0-0.05	0.03 (0.01)	0-0.05	0.03 (0.01)	0.01-0.05
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0.01 (0.01)	0-0.02	0.01 (0.01)	0-0.02	0.01 (0.01)	0-0.03
Nov	0.18 (0.05)	0.09-0.28	0.18 (0.04)	0.1-0.27	0.16 (0.03)	0.09-0.22
Dec	0.21 (0.05)	0.12-0.31	0.25 (0.05)	0.16-0.36	0.24 (0.04)	0.16-0.32

Table 6-2 Mean abundance of great black-backed gull recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	61.98 (22.32)	23.24-108.47	61.98 (21.41)	30.99-108.47	85.23 (26.06)	38.74-139.47
Feb	72.3 (24.16)	28.4-121.37	116.19 (53.44)	38.73-229.86	170.42 (70.47)	59.39-325.34
Mar	11.62 (8.23)	0-31	23.25 (11.92)	0-46.5	34.88 (13.88)	11.63-62.1
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	7.75 (7.46)	0-23.25	7.75 (7.23)	0-23.25	7.75 (7.36)	0-23.25
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	3.88 (3.45)	0-11.63	7.75 (5.19)	0-19.38	15.51 (10.35)	0-38.77
Nov	116.21 (32.27)	58.1-182.06	162.67 (38.01)	92.85-240.14	182.02 (39.15)	108.42-259.49
Dec	139.49 (32.85)	77.5-205.46	220.86 (43.52)	143.37-317.83	275.11 (48.87)	189.77-372.07

7 HERRING GULL

Table 7-1 Mean density of herring gull recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03
Feb	0.01 (0.01)	0-0.02	0.01 (0.004)	0-0.01	0.01 (0.01)	0-0.02
Mar	0.01 (0.01)	0-0.02	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0.02 (0.01)	0-0.06	0.02 (0.01)	0-0.04	0.02 (0.01)	0-0.04
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 7-2 Mean abundance of herring gull recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	7.75 (7.37)	0-23.24	7.75 (7.48)	0-23.24	15.5 (9.65)	0-38.74
Feb	5.16 (3.32)	0-12.91	5.16 (3.24)	0-12.91	7.75 (5.85)	0-20.66
Mar	3.88 (3.75)	0-11.63	7.75 (7.23)	0-23.25	7.75 (7.2)	0-23.25
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	7.75 (6.81)	0-23.25	7.75 (6.63)	0-23.25
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	15.5 (9.76)	0-38.75	15.5 (9.49)	0-34.88	19.38 (10.56)	3.88-42.63
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

8 LESSER BLACK-BACKED GULL

Table 8-1 Mean density of lesser black-backed gull recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0.004 (0.004)	0-0.012	0.003 (0.003)	0-0.009	0.004 (0.003)	0-0.011
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 8-2 Mean abundance of lesser black-backed gull recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	2.58 (2.49)	0-7.74	2.58 (2.39)	0-7.74	5.16 (3.48)	0-12.91
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

9 COMMON TERN

Table 9-1 Mean density of common tern recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0.003 (0.002)	0-0.009	0.005 (0.002)	0-0.009
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 9-2 Mean abundance of common tern recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	2.65 (2.17)	0-7.96	5.31 (2.79)	0-10.62
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

10 ARCTIC TERN

Table 10-1 Mean density of Arctic tern recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0.006 (0.006)	0-0.018	0.004 (0.004)	0-0.013	0.003 (0.003)	0-0.010
Jun	0.136 (0.086)	0-0.331	0.100 (0.064)	0-0.230	0.077 (0.050)	0-0.188
Jul	0.008 (0.005)	0-0.020	0.018 (0.012)	0-0.044	0.014 (0.009)	0-0.032
Aug	0.036 (0.030)	0-0.103	0.035 (0.028)	0-0.099	0.031 (0.023)	0.002-0.076
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 10-2 Mean abundance of Arctic tern recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	3.88 (3.62)	0-11.65	3.88 (3.6)	0-11.65	3.88 (3.75)	0-11.65
Jun	89.14 (56.67)	0-217.04	89.14 (56.79)	0-205.42	89.14 (57.38)	0-217.04
Jul	5.29 (3.39)	0-13.22	15.86 (10.74)	0-39.66	15.86 (9.98)	0-37.01
Aug	23.41 (19.67)	0-67.63	31.15 (25.21)	0-88.26	36.36 (26.06)	2.6-88.32
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

11 GREAT SKUA

Table 11-1 Mean density of great skua recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0.04 (0.02)	0.01-0.08	0.03 (0.01)	0.01-0.07	0.03 (0.01)	0.01-0.06
May	0.01 (0.01)	0-0.02	0.01 (0.01)	0-0.03	0.02 (0.01)	0-0.03
Jun	0.02 (0.01)	0.01-0.05	0.02 (0.01)	0-0.03	0.02 (0.01)	0.01-0.04
Jul	0.01 (0.01)	0-0.03	0.02 (0.01)	0-0.05	0.02 (0.01)	0-0.04
Aug	0.17 (0.14)	0-0.49	0.13 (0.09)	0-0.36	0.1 (0.07)	0-0.27
Sep	0 (0)	0-0	0 (0)	0-0	0.002 (0.002)	0-0.005
Oct	0.01 (0.01)	0-0.02	0.004 (0.004)	0-0.013	0.003 (0.003)	0-0.010
Nov	0.01 (0.01)	0-0.02	0.004 (0.004)	0-0.013	0.003 (0.003)	0-0.010
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 11-2 Mean abundance of great skua recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	27.14 (12.37)	7.76-50.48	31.01 (13.23)	11.63-58.14	38.77 (13.96)	15.51-65.99
May	3.88 (3.7)	0-11.63	11.63 (8.12)	0-27.15	19.39 (10.81)	0-38.78
Jun	15.49 (7.21)	3.87-30.97	15.49 (7.19)	3.87-30.97	23.23 (8.59)	7.74-42.59
Jul	7.93 (5.68)	0-21.12	21 (10.66)	2.58-42.12	26.29 (12.21)	2.58-49.99
Aug	113.79 (90.4)	2.65-322.86	113.79 (84.83)	2.65-317.55	113.79 (83.99)	2.65-314.9
Sep	0 (0)	0-0	0 (0)	0-0	2.63 (1.98)	0-5.27
Oct	3.88 (3.47)	0-11.63	3.88 (3.58)	0-11.63	3.88 (3.63)	0-11.63
Nov	3.88 (3.49)	0-11.63	3.88 (3.55)	0-11.63	3.88 (3.45)	0-11.63
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

12 ARCTIC SKUA

Table 12-1 Mean density of Arctic skua recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0.006 (0.005)	0-0.018	0.004 (0.004)	0-0.013	0.003 (0.003)	0-0.010
Jul	0.004 (0.004)	0-0.012	0.012 (0.006)	0-0.024	0.009 (0.005)	0-0.018
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 12-2 Mean abundance of Arctic skua recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	3.87 (3.53)	0-11.61	3.87 (3.68)	0-11.61	3.87 (3.61)	0-11.61
Jul	2.64 (2.51)	0-7.93	10.58 (5.44)	0-21.15	10.58 (5.22)	0-21.15
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

13 LITTLE AUK

Table 13-1 Mean density of little auk recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0.004 (0.004)	0-0.012	0.006 (0.005)	0-0.017	0.007 (0.005)	0-0.018
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0.006 (0.005)	0-0.018	0.013 (0.007)	0-0.026	0.017 (0.007)	0.007-0.030
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 13-2 Mean abundance of little auk recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	2.58 (2.49)	0-7.75	5.16 (4.83)	0-15.5	7.75 (5.89)	0-20.66
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	3.87 (3.6)	0-11.61	11.61 (5.85)	0-23.22	19.35 (8.12)	7.64-34.93
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

14 GUILLEMOT

Table 14-1 Mean density of guillemot recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0.93 (0.15)	0.66-1.26	1.16 (0.14)	0.9-1.46	1.19 (0.13)	0.94-1.45
Feb	0.98 (0.24)	0.57-1.51	0.92 (0.19)	0.61-1.32	0.94 (0.15)	0.68-1.24
Mar	1.19 (0.15)	0.89-1.5	1.27 (0.14)	1-1.55	1.44 (0.18)	1.13-1.85
Apr	3.29 (0.42)	2.49-4.16	3.48 (0.33)	2.86-4.14	3.79 (0.29)	3.27-4.4
May	0.96 (0.17)	0.64-1.31	1.02 (0.17)	0.72-1.38	1.38 (0.24)	0.97-1.88
Jun	1.68 (0.43)	0.91-2.63	1.49 (0.33)	0.91-2.18	1.44 (0.27)	0.95-2
Jul	3.54 (0.62)	2.41-4.79	3.99 (0.58)	2.88-5.16	3.71 (0.44)	2.88-4.63
Aug	2.12 (0.36)	1.43-2.85	2.49 (0.35)	1.84-3.18	2.96 (0.33)	2.36-3.64
Sep	3.35 (0.44)	2.52-4.24	3.5 (0.39)	2.78-4.28	3.68 (0.36)	3-4.4
Oct	2.68 (0.38)	1.98-3.46	3.08 (0.36)	2.36-3.78	3.08 (0.28)	2.56-3.67
Nov	0.63 (0.11)	0.42-0.86	0.65 (0.09)	0.49-0.83	0.69 (0.08)	0.54-0.83
Dec	0.77 (0.12)	0.55-1.02	0.98 (0.12)	0.75-1.23	1.07 (0.1)	0.87-1.28

Table 14-2 Mean density of guillemot (including unidentified auks apportioned using identified auk ratios) recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	1.09 (0.18)	0.77-1.47	1.33 (0.16)	1.04-1.67	1.37 (0.15)	1.07-1.66
Feb	1.05 (0.26)	0.61-1.61	0.98 (0.21)	0.65-1.42	1.01 (0.16)	0.73-1.34
Mar	1.29 (0.17)	0.96-1.63	1.37 (0.16)	1.08-1.68	1.54 (0.2)	1.21-1.98
Apr	3.53 (0.45)	2.67-4.45	3.7 (0.35)	3.05-4.4	4.03 (0.3)	3.48-4.67
May	0.99 (0.18)	0.66-1.35	1.04 (0.18)	0.74-1.42	1.43 (0.25)	1.01-1.95
Jun	1.72 (0.44)	0.93-2.69	1.51 (0.34)	0.93-2.22	1.46 (0.27)	0.97-2.03
Jul	3.74 (0.66)	2.55-5.06	4.2 (0.61)	3.04-5.43	3.93 (0.46)	3.05-4.89
Aug	2.21 (0.37)	1.5-2.96	2.58 (0.36)	1.91-3.3	3.05 (0.34)	2.44-3.75
Sep	3.51 (0.47)	2.63-4.44	3.66 (0.4)	2.91-4.48	3.84 (0.38)	3.13-4.59
Oct	2.84 (0.4)	2.11-3.67	3.27 (0.39)	2.51-4.01	3.26 (0.3)	2.71-3.88
Nov	0.75 (0.13)	0.5-1.03	0.78 (0.11)	0.58-1	0.8 (0.09)	0.63-0.97
Dec	0.9 (0.14)	0.65-1.19	1.14 (0.14)	0.87-1.42	1.21 (0.12)	0.98-1.44

Table 14-3 Mean density of guillemot (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	1.38 (0.22)	0.98-1.87	1.72 (0.21)	1.34-2.16	1.77 (0.19)	1.39-2.15
Feb	1.35 (0.33)	0.79-2.07	1.27 (0.26)	0.84-1.83	1.29 (0.2)	0.93-1.71
Mar	1.65 (0.22)	1.23-2.1	1.76 (0.2)	1.38-2.16	1.99 (0.25)	1.55-2.55
Apr	4.6 (0.59)	3.48-5.81	4.82 (0.46)	3.96-5.73	5.24 (0.4)	4.52-6.08
May	1.2 (0.22)	0.8-1.63	1.27 (0.22)	0.9-1.73	1.77 (0.31)	1.24-2.41
Jun	2.22 (0.57)	1.2-3.47	1.94 (0.43)	1.19-2.84	1.87 (0.35)	1.24-2.6
Jul	4.84 (0.85)	3.3-6.55	5.44 (0.79)	3.94-7.03	5.08 (0.6)	3.94-6.32
Aug	2.89 (0.49)	1.96-3.87	3.38 (0.47)	2.5-4.32	4 (0.44)	3.19-4.91
Sep	4.59 (0.61)	3.44-5.8	4.78 (0.53)	3.8-5.85	5.01 (0.49)	4.09-5.99
Oct	3.64 (0.52)	2.7-4.71	4.17 (0.49)	3.2-5.11	4.14 (0.38)	3.43-4.92
Nov	0.96 (0.17)	0.64-1.32	1.01 (0.14)	0.76-1.3	1.03 (0.11)	0.81-1.25
Dec	1.17 (0.18)	0.84-1.54	1.48 (0.18)	1.13-1.85	1.56 (0.15)	1.27-1.87

Table 14-4 Mean abundance of guillemot recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	612.1 (99.11)	433.89-829.24	1038.25 (126.41)	805.8-1301.68	1379.16 (149.78)	1084.73-1673.59
Feb	645.45 (158.85)	376.94-988.9	818.45 (171.44)	542.19-1182.55	1081.82 (171.9)	782.31-1438.18
Mar	778.48 (101.53)	584.8-983.89	1138.7 (127.89)	894.57-1390.5	1669.31 (212.11)	1308.99-2142.13
Apr	2162.72 (277.6)	1635.42-2732.49	3108.52 (297.9)	2558.17-3697.81	4387.66 (332.09)	3786.92-5089.26
May	632.59 (113.55)	423.06-857.74	908.11 (152.95)	648.06-1237.89	1598.84 (275.57)	1125.5-2177.14
Jun	1103.72 (285.32)	596.2-1727.32	1328.36 (298.39)	813.28-1952.07	1661.48 (309)	1099.81-2308.43
Jul	2323.68 (408.08)	1582.37-3142.04	3565.71 (519.84)	2579.42-4612.81	4296.34 (506.12)	3336.25-5351.04
Aug	1391.34 (237.69)	941.02-1867.68	2229.26 (308.72)	1643.46-2846.56	3426 (380.23)	2735.91-4212.52
Sep	2200.09 (291.36)	1651.06-2780.59	3128.6 (344.65)	2485.52-3826.6	4262.39 (419.29)	3474.7-5094.57
Oct	1756.28 (250.08)	1302.57-2271.92	2756.54 (324.46)	2112.87-3376.96	3566.84 (328.95)	2961.83-4245.41
Nov	410.43 (72.33)	274.9-561.44	580.9 (82.5)	433.72-743.67	797.73 (87)	627.32-964.37
Dec	507.59 (78.82)	364.03-670.33	879.56 (109.81)	670.23-1100.42	1236.04 (119.97)	1003.55-1476.37

Table 14-5 Mean abundance of guillemot (including unidentified auks apportioned using identified auk ratios) recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	712.83 (115.42)	505.29-965.7	1193.21 (145.28)	926.07-1495.96	1580.61 (171.66)	1243.18-1918.05
Feb	689.34 (169.14)	402.67-1054.77	880.42 (183.39)	583.94-1268.99	1164.45 (184.71)	841.43-1546.64
Mar	844.34 (112.16)	630.59-1071.91	1227.8 (139.44)	961.9-1503.37	1781.66 (227.44)	1394.61-2288.27
Apr	2313.91 (296.76)	1749.9-2922.41	3310.11 (316.95)	2724.45-3937.01	4659.04 (352.22)	4021.77-5403.32
May	652 (117.19)	435.78-884.37	931.39 (156.87)	664.68-1269.63	1653.17 (284.61)	1164.32-2250.51
Jun	1126.96 (291.29)	608.74-1763.75	1351.59 (303.63)	827.51-1986.25	1692.45 (314.83)	1120.25-2351.8
Jul	2456.53 (431.76)	1672.09-3322.59	3754.28 (546.59)	2717.51-4856.05	4543.17 (534.7)	3528.97-5657.33
Aug	1448.6 (245.84)	982.93-1941	2309.92 (318.26)	1706.64-2946.59	3532.84 (390.73)	2823.15-4340.88
Sep	2304.13 (305.22)	1729.12-2912.43	3271.9 (361.21)	2598.23-4003.66	4436.94 (437.19)	3615.6-5304.79
Oct	1864.84 (265.31)	1383.32-2411.68	2927.13 (344.33)	2244.2-3585.73	3776.19 (348.05)	3136.48-4494.49
Nov	491.76 (86.77)	328.85-672.85	700.96 (99.81)	522.91-897.95	929.42 (101.93)	729.87-1124.67
Dec	592.83 (91.45)	426.13-781.77	1019.05 (126.63)	777.66-1273.56	1394.9 (135.14)	1132.93-1665.51

Table 14-6 Mean abundance of guillemot (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	906.53 (146.78)	642.6-1228.12	1541.87 (187.73)	1196.68-1933.09	2045.5 (222.15)	1608.82-2482.18
Feb	888.14 (217.79)	518.81-1358.62	1136.02 (236.41)	753.57-1636.78	1492.35 (236.62)	1078.14-1981.7
Mar	1084.47 (144.87)	808.46-1378.7	1576.4 (179.68)	1233.87-1931.91	2296.8 (293.42)	1797.33-2950.28
Apr	3019.34 (387.1)	2283.47-3812.74	4306.27 (412.1)	3544.7-5121.31	6062.23 (457.95)	5233.54-7030.07
May	787.82 (142.66)	524.85-1070.79	1133.18 (192.59)	805.95-1548.27	2048.97 (354.89)	1439.24-2793.42
Jun	1456.13 (376.36)	786.54-2278.98	1731.12 (388.9)	1059.89-2544	2168.82 (403.42)	1435.59-3013.62
Jul	3179.61 (558.72)	2164.62-4300.27	4860.91 (707.08)	3519.54-6286.13	5874.16 (691.19)	4562.52-7314.16
Aug	1895.88 (321.81)	1286.32-2540.45	3025.21 (416.81)	2235.07-3858.97	4625.37 (511.49)	3696.31-5683.12
Sep	3010.67 (398.73)	2259.49-3805.31	4275.05 (471.93)	3394.89-5231.14	5799.78 (571.52)	4726.06-6934.32
Oct	2388.23 (340.4)	1770.92-3090.41	3729.67 (439.35)	2857.81-4569.45	4784.21 (441.48)	3971.75-5694.52
Nov	631.15 (111.35)	422.17-863.54	906.21 (129.01)	676.07-1160.83	1192.75 (130.79)	936.69-1443.29
Dec	767.2 (118.08)	551.88-1011.22	1321.28 (163.87)	1008.9-1650.53	1809.5 (175.16)	1469.9-2160.16

15 RAZORBILL

Table 15-1 Mean density of razorbill recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0.05 (0.02)	0-0.1	0.04 (0.02)	0.01-0.08	0.03 (0.01)	0.01-0.06
Mar	0.06 (0.03)	0.01-0.12	0.08 (0.03)	0.03-0.14	0.09 (0.03)	0.04-0.16
Apr	0.04 (0.01)	0.01-0.07	0.06 (0.02)	0.03-0.1	0.07 (0.02)	0.04-0.1
May	0.01 (0)	0-0.02	0 (0)	0-0.01	0.01 (0.01)	0-0.03
Jun	0.03 (0.01)	0.01-0.05	0.02 (0.01)	0-0.04	0.04 (0.02)	0.01-0.07
Jul	0.05 (0.03)	0-0.12	0.05 (0.03)	0.01-0.11	0.06 (0.02)	0.02-0.11
Aug	0.06 (0.03)	0.01-0.13	0.06 (0.03)	0.01-0.12	0.05 (0.02)	0.01-0.1
Sep	0.1 (0.05)	0.02-0.21	0.13 (0.06)	0.03-0.26	0.15 (0.06)	0.05-0.27
Oct	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03	0.02 (0.01)	0-0.04
Nov	0.01 (0.01)	0-0.02	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Dec	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02

Table 15-2 Mean density of razorbill (including unidentified auks apportioned using identified auk ratios) recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0.05 (0.03)	0-0.11	0.05 (0.02)	0.01-0.09	0.04 (0.02)	0.01-0.07
Mar	0.07 (0.03)	0.01-0.14	0.09 (0.03)	0.03-0.17	0.1 (0.04)	0.04-0.18
Apr	0.04 (0.01)	0.01-0.07	0.07 (0.02)	0.03-0.1	0.07 (0.02)	0.04-0.11
May	0.01 (0)	0-0.02	0 (0)	0-0.01	0.01 (0.01)	0-0.03
Jun	0.03 (0.01)	0.01-0.05	0.02 (0.01)	0-0.04	0.04 (0.02)	0.01-0.07
Jul	0.05 (0.03)	0-0.12	0.05 (0.03)	0.01-0.11	0.06 (0.02)	0.02-0.11
Aug	0.06 (0.03)	0.01-0.14	0.06 (0.03)	0.01-0.13	0.05 (0.02)	0.01-0.1
Sep	0.1 (0.05)	0.02-0.21	0.13 (0.06)	0.03-0.27	0.15 (0.06)	0.06-0.28
Oct	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03	0.02 (0.01)	0-0.04
Nov	0.01 (0.01)	0-0.02	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Dec	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02

Table 15-3 Mean density of razorbill (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0.06 (0.03)	0-0.12	0.05 (0.02)	0.01-0.1	0.04 (0.02)	0.01-0.08
Mar	0.08 (0.04)	0.02-0.16	0.11 (0.04)	0.04-0.2	0.12 (0.04)	0.05-0.21
Apr	0.05 (0.02)	0.01-0.08	0.08 (0.02)	0.04-0.12	0.09 (0.02)	0.05-0.12
May	0.01 (0)	0-0.02	0 (0)	0-0.01	0.02 (0.01)	0-0.04
Jun	0.04 (0.01)	0.01-0.06	0.03 (0.01)	0.01-0.05	0.05 (0.02)	0.02-0.08
Jul	0.06 (0.04)	0-0.14	0.06 (0.03)	0.01-0.12	0.07 (0.03)	0.03-0.13
Aug	0.07 (0.04)	0.02-0.17	0.07 (0.04)	0.01-0.15	0.06 (0.03)	0.02-0.12
Sep	0.12 (0.06)	0.02-0.25	0.16 (0.07)	0.04-0.32	0.19 (0.07)	0.07-0.34
Oct	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03	0.02 (0.01)	0-0.04
Nov	0.01 (0.01)	0-0.02	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Dec	0.01 (0.01)	0-0.03	0.02 (0.01)	0-0.03	0.01 (0.01)	0-0.03

Table 15-4 Mean abundance of razorbill recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	30.98 (15.05)	2.58-64.55	38.73 (16.81)	7.75-72.29	38.73 (16.86)	7.75-74.87
Mar	38.77 (18.72)	7.75-77.53	69.78 (26.85)	23.26-127.93	104.65 (36.25)	42.64-182.16
Apr	27.15 (9.29)	7.76-46.54	54.29 (14.53)	27.15-85.32	81.44 (18.76)	46.54-116.44
May	3.88 (3.06)	0-11.65	3.88 (3.11)	0-11.65	15.51 (9.57)	0-34.9
Jun	19.38 (7.73)	7.75-34.88	19.38 (7.78)	3.88-34.88	46.51 (17.39)	15.5-81.39
Jul	31.79 (21.85)	2.64-79.56	45 (22.9)	10.58-95.36	66.15 (25.56)	23.79-121.79
Aug	38.88 (21.65)	7.74-88.26	51.87 (26.33)	7.74-109.13	59.61 (26.76)	15.42-116.87
Sep	65.09 (32.37)	13.07-135.24	115.05 (53.35)	28.83-230.04	172.75 (67.28)	62.87-316.69
Oct	7.75 (4.96)	0-19.39	11.63 (6.23)	0-23.26	19.39 (13.64)	0-50.4
Nov	3.87 (3.6)	0-11.61	7.75 (7.4)	0-23.24	7.75 (7.07)	0-23.24
Dec	7.75 (4.87)	0-19.37	11.62 (6.35)	0-23.25	11.62 (6.09)	0-23.25

Table 15-5 Mean abundance of razorbill (including unidentified auks apportioned using identified auk ratios) recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	33.56 (16.41)	2.58-70.23	41.31 (18.26)	7.75-77.97	41.31 (18.26)	7.75-80.55
Mar	46.52 (22.08)	9.48-92.18	81.41 (31.05)	27.92-148.86	120.16 (41.15)	49.53-208.01
Apr	27.15 (9.29)	7.76-46.54	58.17 (15.57)	29.09-91.41	85.32 (19.66)	48.75-121.98
May	3.88 (3.06)	0-11.65	3.88 (3.11)	0-11.65	15.51 (9.57)	0-34.9
Jun	19.38 (7.73)	7.75-34.88	19.38 (7.78)	3.88-34.88	46.51 (17.39)	15.5-81.39
Jul	31.79 (21.85)	2.64-79.56	45 (22.9)	10.58-95.36	68.8 (26.47)	24.83-126.39
Aug	41.46 (22.89)	8.39-93.63	54.45 (27.47)	8.34-114.1	62.19 (27.69)	16.39-121.39
Sep	65.09 (32.37)	13.07-135.24	120.32 (55.65)	30.39-240.38	178.02 (69.23)	64.91-326.15
Oct	7.75 (4.96)	0-19.39	11.63 (6.23)	0-23.26	19.39 (13.64)	0-50.4
Nov	3.87 (3.6)	0-11.61	7.75 (7.4)	0-23.24	7.75 (7.07)	0-23.24
Dec	7.75 (4.87)	0-19.37	11.62 (6.35)	0-23.25	11.62 (6.09)	0-23.25

Table 15-6 Mean abundance of razorbill (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	38.73 (18.95)	2.95-81.07	49.05 (21.62)	9.29-92.43	49.05 (21.63)	9.29-95.53
Mar	54.28 (25.44)	11.2-106.83	96.92 (36.66)	34.12-176.78	143.41 (49.21)	59.01-248.49
Apr	31.02 (10.61)	8.86-53.18	69.8 (18.68)	34.9-109.69	100.83 (23.23)	57.62-144.16
May	3.88 (3.06)	0-11.65	3.88 (3.11)	0-11.65	19.38 (11.72)	0-42.65
Jun	23.25 (9.27)	9.3-41.86	23.25 (9.33)	4.65-41.86	54.26 (20.29)	18.09-94.96
Jul	37.07 (25.24)	3.17-92.26	52.94 (26.56)	12.69-111.22	82.02 (31.04)	30-149.38
Aug	49.21 (26.61)	10.32-109.77	64.79 (32.31)	10.13-134.73	72.54 (31.93)	19.28-140.68
Sep	78.1 (38.6)	15.94-161.69	143.87 (66.31)	36.62-286.99	217.28 (84.41)	79.35-397.88
Oct	7.75 (4.96)	0-19.39	11.63 (6.23)	0-23.26	19.39 (13.64)	0-50.4
Nov	3.87 (3.6)	0-11.61	7.75 (7.4)	0-23.24	7.75 (7.07)	0-23.24
Dec	7.75 (4.87)	0-19.37	15.5 (8.46)	0-31	15.5 (8.12)	0-31

16 BLACK GUILLEMOT

Table 16-1 Mean density of black guillemot recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0.004 (0.004)	0-0.012	0.003 (0.003)	0-0.009	0.002 (0.002)	0-0.007
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0.006 (0.005)	0-0.018	0.004 (0.004)	0-0.013	0.003 (0.003)	0-0.010
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 16-2 Mean abundance of black guillemot recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	2.58 (2.41)	0-7.75	2.58 (2.39)	0-7.75	2.58 (2.37)	0-7.75
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	3.88 (3.61)	0-11.63	3.88 (3.48)	0-11.63	3.88 (3.64)	0-11.63
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

17 PUFFIN

Table 17-1 Mean density of puffin recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Feb	0.004 (0.003)	0-0.012	0.003 (0.003)	0-0.09	0.002 (0.002)	0-0.007
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	1.37 (0.2)	0.99-1.76	1.29 (0.15)	0.99-1.59	1.17 (0.12)	0.94-1.39
May	2.02 (0.37)	1.39-2.81	2.36 (0.32)	1.76-3.03	2.73 (0.3)	2.16-3.33
Jun	5.49 (1.03)	3.66-7.69	5.06 (0.79)	3.65-6.67	5.03 (0.66)	3.79-6.35
Jul	2.41 (0.36)	1.72-3.12	2.74 (0.35)	2.08-3.45	3.13 (0.48)	2.33-4.14
Aug	1.85 (0.35)	1.23-2.59	2.5 (0.41)	1.73-3.35	2.84 (0.42)	2.06-3.7
Sep	1.2 (0.18)	0.87-1.59	1.1 (0.15)	0.82-1.39	1.05 (0.11)	0.84-1.28
Oct	0.18 (0.05)	0.09-0.27	0.16 (0.04)	0.1-0.24	0.14 (0.03)	0.09-0.21
Nov	0 (0)	0-0	0 (0)	0-0	0.003 (0.003)	0-0.010
Dec	0.01 (0.01)	0-0.02	0.004 (0.004)	0-0.013	0.01 (0)	0-0.02

Table 17-2 Mean density of puffin (including unidentified auks apportioned using identified auk ratios) recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Feb	0 (0)	0-0.01	0 (0)	0-0.01	0 (0)	0-0.01
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	1.43 (0.21)	1.05-1.86	1.33 (0.16)	1.03-1.67	1.21 (0.13)	0.98-1.46
May	2.05 (0.37)	1.38-2.8	2.4 (0.33)	1.75-3.04	2.78 (0.31)	2.21-3.42
Jun	5.54 (1.03)	3.7-7.62	5.1 (0.76)	3.78-6.68	5.09 (0.67)	3.85-6.5
Jul	2.5 (0.36)	1.8-3.22	2.84 (0.36)	2.19-3.6	3.26 (0.5)	2.4-4.33
Aug	1.9 (0.35)	1.25-2.62	2.56 (0.43)	1.77-3.42	2.91 (0.42)	2.14-3.76
Sep	1.24 (0.2)	0.9-1.67	1.13 (0.16)	0.85-1.47	1.08 (0.12)	0.88-1.32
Oct	0.18 (0.05)	0.09-0.28	0.16 (0.04)	0.09-0.25	0.15 (0.03)	0.09-0.21
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0.01
Dec	0.01 (0.01)	0-0.02	0 (0)	0-0.01	0.01 (0)	0-0.02

Table 17-3 Mean density of puffin (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Feb	0 (0)	0-0.01	0 (0)	0-0.01	0 (0)	0-0.01
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	1.62 (0.24)	1.2-2.12	1.52 (0.18)	1.18-1.91	1.38 (0.14)	1.12-1.67
May	2.35 (0.42)	1.58-3.21	2.75 (0.38)	2-3.49	3.19 (0.36)	2.54-3.92
Jun	6.41 (1.19)	4.28-8.84	5.9 (0.88)	4.37-7.72	5.87 (0.77)	4.44-7.51
Jul	2.9 (0.42)	2.09-3.73	3.29 (0.42)	2.53-4.17	3.77 (0.58)	2.78-5.02
Aug	2.21 (0.41)	1.45-3.04	2.98 (0.5)	2.06-3.98	3.38 (0.49)	2.48-4.36
Sep	1.44 (0.23)	1.05-1.94	1.32 (0.18)	0.99-1.71	1.25 (0.14)	1.02-1.53
Oct	0.21 (0.05)	0.1-0.32	0.19 (0.04)	0.11-0.29	0.17 (0.04)	0.1-0.25
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0.01
Dec	0.01 (0.01)	0-0.02	0 (0)	0-0.01	0.01 (0)	0-0.02

Table 17-4 Mean abundance of puffin recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	7.75 (7.23)	0-23.24	7.75 (7.19)	0-23.24
Feb	2.58 (2.29)	0-7.75	2.58 (2.38)	0-7.75	2.58 (2.35)	0-7.75
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	902.34 (131.7)	666.09-1177.35	1150.22 (139.47)	894.5-1448.65	1351.7 (139.92)	1095.87-1634.45
May	1327.53 (239.86)	892.71-1816.59	2111.59 (290.96)	1537.15-2678.26	3159.54 (352.31)	2515.18-3885.49
Jun	3606.28 (670.15)	2409.35-4966.01	4520.43 (674.68)	3354.28-5918.86	5818.07 (763.61)	4404.1-7433.84
Jul	1582.5 (229.72)	1140.11-2035.81	2448.91 (309.68)	1885.38-3102.79	3623.96 (551.62)	2679.72-4802.14
Aug	1211.58 (225.93)	794.59-1672.87	2233.42 (376.14)	1539.94-2986.92	3289.09 (473.45)	2411.74-4249.89
Sep	790.75 (124.39)	575.38-1065.76	982.33 (135.05)	741-1275.56	1215.77 (131.39)	987.23-1485.67
Oct	116.31 (30.45)	58.16-182.22	143.45 (33.9)	81.32-217.11	166.71 (35.42)	100.8-240.37
Nov	0 (0)	0-0	0 (0)	0-0	3.88 (3.52)	0-11.63
Dec	3.87 (3.89)	0-11.62	3.87 (3.68)	0-11.62	7.75 (4.8)	0-19.37

Table 17-5 Mean abundance of puffin (including unidentified auks apportioned using identified auk ratios) recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	7.75 (7.23)	0-23.24	7.75 (7.19)	0-23.24
Feb	2.58 (2.29)	0-7.75	2.58 (2.38)	0-7.75	2.58 (2.35)	0-7.75
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	937.21 (136.87)	691.73-1223.06	1188.96 (144.23)	924.5-1497.62	1398.2 (144.77)	1133.47-1690.82
May	1343.06 (242.56)	903.33-1837.64	2146.53 (295.59)	1562.91-2722.17	3217.76 (358.83)	2561.49-3957.13
Jun	3633.39 (675.66)	2426.62-5004.1	4559.14 (681.04)	3382.09-5970.84	5883.9 (772.77)	4452.97-7519.14
Jul	1640.84 (238.16)	1182.2-2111.16	2539.01 (321.31)	1954.96-3218.57	3772.63 (581.14)	2780.39-5014.9
Aug	1245.39 (231.56)	817.77-1717.95	2290.78 (383.78)	1583.01-3059.91	3367.53 (483.51)	2470.89-4348.32
Sep	814.15 (128.07)	592.47-1097.29	1010.9 (138.96)	762.54-1312.51	1249.5 (134.96)	1014.79-1526.76
Oct	116.31 (30.45)	58.16-182.22	147.33 (34.74)	83.58-222.77	170.59 (36.19)	103.24-245.83
Nov	0 (0)	0-0	0 (0)	0-0	3.88 (3.52)	0-11.63
Dec	3.87 (3.89)	0-11.62	3.87 (3.68)	0-11.62	7.75 (4.8)	0-19.37

Table 17-6 Mean abundance of puffin (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	7.75 (7.23)	0-23.24	7.75 (7.19)	0-23.24
Feb	2.58 (2.29)	0-7.75	2.58 (2.38)	0-7.75	2.58 (2.35)	0-7.75
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	1065.03 (155.78)	785.78-1390.58	1355.53 (164.63)	1053.67-1707.93	1599.64 (165.7)	1296.59-1934.68
May	1541.02 (278.37)	1036.38-2108.62	2460.94 (338.97)	1791.69-3121.08	3687.41 (411.81)	2934.31-4535.91
Jun	4210.54 (783.53)	2811.13-5799.84	5271.86 (788.04)	3909.96-6905.42	6794.16 (892.72)	5141.13-8683.28
Jul	1901.67 (276.02)	1370.14-2446.87	2942.06 (372.35)	2265.32-3729.66	4363.39 (673.48)	3213.98-5803.23
Aug	1448.62 (269.26)	951.36-1998.08	2663.37 (446.26)	1840.37-3557.68	3909.92 (561.25)	2869.19-5048.54
Sep	946.39 (148.78)	688.86-1275.31	1176.77 (161.71)	887.77-1527.79	1451.68 (156.7)	1179.21-1773.63
Oct	135.7 (35.63)	67.65-212.85	170.59 (40.22)	96.79-257.91	197.73 (42.02)	119.55-285.1
Nov	0 (0)	0-0	0 (0)	0-0	3.88 (3.52)	0-11.63
Dec	3.87 (3.89)	0-11.62	3.87 (3.68)	0-11.62	7.75 (4.8)	0-19.37

18 AUK SPECIES GROUP (GUILLEMOT, RAZORBILL OR PUFFIN)

Table 18-1 Mean density of unidentified auk species (guillemot, razorbill or puffin) recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0.12 (0.04)	0.05-0.2	0.14 (0.04)	0.08-0.21	0.11 (0.03)	0.05-0.17
Feb	0.02 (0.01)	0-0.05	0.01 (0.01)	0-0.04	0.02 (0.01)	0-0.04
Mar	0.02 (0.01)	0-0.05	0.03 (0.02)	0-0.06	0.02 (0.01)	0.01-0.05
Apr	0.2 (0.05)	0.11-0.31	0.19 (0.04)	0.11-0.27	0.2 (0.04)	0.13-0.27
May	0.04 (0.02)	0.01-0.09	0.06 (0.02)	0.02-0.1	0.07 (0.02)	0.03-0.12
Jun	0.06 (0.03)	0.02-0.12	0.06 (0.02)	0.02-0.1	0.07 (0.02)	0.04-0.11
Jul	0.27 (0.07)	0.14-0.42	0.28 (0.06)	0.17-0.4	0.3 (0.06)	0.2-0.43
Aug	0.12 (0.04)	0.05-0.21	0.14 (0.03)	0.08-0.21	0.14 (0.03)	0.08-0.2
Sep	0.13 (0.04)	0.06-0.21	0.13 (0.03)	0.07-0.19	0.12 (0.03)	0.06-0.18
Oct	0.06 (0.03)	0.02-0.12	0.08 (0.03)	0.03-0.13	0.07 (0.02)	0.03-0.12
Nov	0.08 (0.03)	0.03-0.15	0.09 (0.03)	0.04-0.15	0.07 (0.02)	0.03-0.12
Dec	0.05 (0.02)	0.01-0.09	0.05 (0.02)	0.02-0.08	0.04 (0.01)	0.02-0.07

Table 18-2 Mean abundance of unidentified auk species (guillemot, razorbill or puffin) recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	77.48 (26.83)	30.99-131.72	123.97 (31.46)	69.54-185.95	123.97 (31.64)	61.98-193.7
Feb	12.91 (9.19)	0-33.57	12.91 (9.06)	0-33.57	18.07 (10.48)	2.58-41.31
Mar	15.49 (9.19)	0-34.85	23.24 (13.54)	3.87-50.46	27.11 (13.65)	7.75-54.23
Apr	131.77 (35.06)	69.77-205.49	170.54 (36.06)	100.8-244.17	228.71 (41.66)	154.98-317.84
May	27.17 (14.35)	3.88-58.21	50.46 (19.66)	19.41-93.15	85.39 (25.56)	38.82-139.72
Jun	38.72 (17.76)	11.61-77.44	50.33 (19.06)	19.36-92.93	85.18 (23.31)	42.59-131.65
Jul	175.32 (47.22)	93.07-276.11	249.58 (53.69)	154.01-355.54	350.64 (68.36)	231.29-496.61
Aug	80.53 (26.44)	31.05-135.27	122.29 (29.88)	67.57-184.85	159.03 (35.18)	93.76-226.96
Sep	83.38 (25.32)	39.16-135.39	112.1 (30.44)	60.03-172.1	135.45 (34.49)	72.99-208.23
Oct	42.65 (16.79)	11.63-77.54	73.66 (23.88)	27.14-120.28	85.29 (24.49)	38.77-135.69
Nov	54.22 (20.07)	19.36-96.83	77.46 (24.89)	34.85-135.57	81.34 (26.11)	30.98-135.57
Dec	31 (13.71)	7.75-58.12	42.62 (15.46)	19.28-73.62	46.5 (16.07)	19.37-81.37

19 LARGE AUK SPECIES GROUP (GUILLEMOT OR RAZORBILL)

Table 19-1 Mean density of unidentified large auk species (guillemot or razorbill) recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0.04 (0.02)	0-0.08	0.03 (0.02)	0.01-0.07	0.07 (0.02)	0.03-0.11
Feb	0.05 (0.02)	0.01-0.1	0.06 (0.02)	0.02-0.1	0.06 (0.02)	0.02-0.1
Mar	0.09 (0.04)	0.03-0.17	0.09 (0.03)	0.03-0.15	0.09 (0.03)	0.04-0.14
Apr	0.08 (0.03)	0.04-0.14	0.08 (0.02)	0.04-0.13	0.08 (0.02)	0.04-0.12
May	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.02 (0.01)	0-0.05
Jun	0.02 (0.02)	0-0.05	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03
Jul	0.02 (0.01)	0-0.05	0.04 (0.01)	0.01-0.06	0.04 (0.01)	0.02-0.07
Aug	0.02 (0.01)	0-0.05	0.02 (0.01)	0-0.04	0.02 (0.01)	0-0.05
Sep	0.07 (0.04)	0.01-0.16	0.07 (0.04)	0.01-0.16	0.07 (0.03)	0.02-0.13
Oct	0.1 (0.03)	0.04-0.17	0.11 (0.03)	0.05-0.18	0.11 (0.03)	0.06-0.16
Nov	0.04 (0.02)	0.01-0.09	0.05 (0.02)	0.02-0.09	0.04 (0.01)	0.02-0.07
Dec	0.08 (0.03)	0.02-0.15	0.11 (0.04)	0.04-0.18	0.1 (0.03)	0.04-0.16

Table 19-2 Mean abundance of unidentified large auk species (guillemot or razorbill) recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

	Density (birds km^{-2})					
Month	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	23.24 (12.86)	0-54.24	30.99 (14.31)	7.75-61.98	77.48 (25.31)	30.99-131.72
Feb	33.56 (14.5)	7.75-64.55	51.64 (18.4)	20.66-87.85	67.14 (23.33)	25.82-116.2
Mar	58.12 (23.93)	19.37-108.49	77.49 (26.62)	31-135.61	100.75 (32.05)	42.62-166.62
Apr	54.28 (17.55)	23.27-89.16	73.66 (20.87)	34.9-120.17	93.04 (22.63)	50.41-139.54
May	7.76 (7.32)	0-23.29	7.76 (7.39)	0-23.29	27.17 (16.74)	0-58.21
Jun	11.62 (11.07)	0-34.86	11.62 (10.71)	0-34.86	11.62 (10.95)	0-34.86
Jul	15.86 (8.51)	2.64-34.37	31.73 (11.37)	10.58-55.52	50.17 (15.77)	23.79-81.9
Aug	13.12 (8.58)	0-31.48	15.73 (10.96)	0-39.29	28.84 (14.31)	5.25-60.25
Sep	46.64 (26.26)	5.17-106.31	65.04 (35.05)	10.38-143.14	78.11 (35.45)	23.45-156.16
Oct	65.91 (21.23)	27.14-112.43	100.8 (28.41)	46.52-158.96	127.94 (29.91)	69.79-189.97
Nov	27.11 (12.82)	3.87-58.09	42.6 (16.37)	15.49-77.46	50.35 (17.24)	19.26-85.21
Dec	54.25 (21.84)	15.5-100.74	96.87 (31.57)	38.75-162.74	112.37 (34.23)	50.37-182.11

20 RED-THROATED DIVER

Table 20-1 Mean density of red-throated diver recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0.004 (0.004)	0-0.013	0.003 (0.003)	0-0.010
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0.006 (0.006)	0-0.018	0.004 (0.004)	0-0.013	0.003 (0.003)	0-0.010
Nov	0 (0)	0-0	0.004 (0.004)	0-0.013	0.003 (0.003)	0-0.010
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 20-2 Mean abundance of red-throated diver recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	3.88 (3.2)	0-11.65	3.88 (3.34)	0-11.65
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	3.88 (3.66)	0-11.63	3.88 (3.52)	0-11.63	3.88 (3.58)	0-11.63
Nov	0 (0)	0-0	3.87 (3.45)	0-11.61	3.87 (3.38)	0-11.61
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

21 GREAT NORTHERN DIVER

Table 21-1 Mean density of great northern diver recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0.012 (0.011)	0-0.035	0.009 (0.008)	0-0.026	0.007 (0.006)	0-0.020
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0.006 (0.006)	0-0.02	0.004 (0.004)	0-0.013	0.003 (0.003)	0-0.010
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 21-2 Mean abundance of great northern diver recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	7.76 (7.01)	0-23.27	7.76 (7.1)	0-23.27	7.76 (7.32)	0-23.27
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	3.88 (3.64)	0-11.63	3.88 (3.41)	0-11.63	3.88 (3.51)	0-11.63
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

22 EUROPEAN STORM-PETREL

Table 22-1 Mean density of European storm-petrel recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0.1 (0.04)	0.04-0.18	0.08 (0.03)	0.03-0.15	0.08 (0.03)	0.04-0.14
Sep	0.02 (0.01)	0-0.03	0.01 (0.01)	0-0.03	0.04 (0.03)	0-0.09
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 22-2 Mean abundance of European storm-petrel recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	67.11 (24.75)	23.23-118.74	74.85 (25.27)	30.97-131.64	95.58 (30.15)	41.3-157.74
Sep	10.33 (4.46)	2.58-18.08	12.91 (5.32)	2.58-23.24	41.32 (30.96)	5.17-108.53
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

23 FULMAR

Table 23-1 Mean density of fulmar recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	1.91 (0.35)	1.31-2.67	2.15 (0.34)	1.54-2.84	2.42 (0.28)	1.92-3
Feb	0.99 (0.17)	0.67-1.34	1.09 (0.17)	0.79-1.45	1.17 (0.13)	0.93-1.43
Mar	1.81 (0.3)	1.31-2.46	1.88 (0.25)	1.44-2.43	1.82 (0.2)	1.46-2.2
Apr	0.57 (0.19)	0.28-0.99	0.5 (0.15)	0.29-0.82	0.49 (0.12)	0.31-0.74
May	0.13 (0.03)	0.07-0.2	0.26 (0.06)	0.15-0.37	0.23 (0.05)	0.14-0.33
Jun	0.09 (0.02)	0.05-0.14	0.1 (0.02)	0.06-0.13	0.09 (0.02)	0.06-0.12
Jul	0.52 (0.12)	0.32-0.78	0.54 (0.09)	0.37-0.73	0.66 (0.1)	0.48-0.85
Aug	1.42 (0.46)	0.65-2.42	1.24 (0.35)	0.65-1.97	1.17 (0.27)	0.7-1.74
Sep	2.39 (0.78)	1.09-4.03	2.14 (0.61)	1.17-3.47	1.91 (0.48)	1.12-2.93
Oct	1.97 (0.69)	0.82-3.46	1.93 (0.52)	1.03-3.07	2.56 (0.61)	1.51-3.85
Nov	0.96 (0.26)	0.53-1.55	0.91 (0.2)	0.57-1.34	1.7 (0.45)	0.91-2.62
Dec	2.49 (0.54)	1.5-3.56	3.1 (0.74)	1.78-4.58	2.97 (0.63)	1.87-4.28

Table 23-2 Mean abundance of fulmar recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	1255.19 (226.74)	860.04-1751.07	1921.53 (300.39)	1379.16-2541.96	2797.07 (320.96)	2223.51-3471.73
Feb	648.21 (112.41)	441.62-878.1	976.18 (151.6)	702.39-1298.97	1355.81 (155.62)	1074.34-1658.01
Mar	1189.88 (193.89)	856.62-1616.2	1682.13 (226.44)	1290.74-2174.34	2104.59 (227.3)	1693.73-2550.39
Apr	371.72 (125.83)	185.74-646.88	449.16 (133.24)	263.09-735.94	569.21 (138.41)	363.85-856.08
May	85.36 (22.77)	42.69-131.91	228.83 (51.78)	131.88-329.64	267.64 (55.73)	166.82-383.96
Jun	61.94 (14.65)	34.84-92.92	85.17 (17.2)	54.1-120.02	104.53 (17.97)	69.69-139.37
Jul	341.54 (78.41)	209.08-514.03	485.2 (84.21)	331.54-654.84	758.63 (111.63)	554.37-981.61
Aug	930.9 (304.45)	429.01-1586.52	1105.01 (314.62)	577.12-1763.15	1357.49 (312.09)	813.7-2015.34
Sep	1566.3 (512.16)	717.58-2643.05	1917.82 (541.06)	1042.9-3100.78	2204.62 (552.93)	1296.01-3392.07
Oct	1294.92 (453.57)	538.81-2268.14	1721.39 (467.9)	918.85-2749.37	2965.9 (710.89)	1752.01-4458.83
Nov	631.7 (170.75)	348.64-1015.46	813.77 (183.24)	507.56-1201.49	1971.75 (520.66)	1049.65-3025.51
Dec	1635.12 (356.39)	987.76-2336.63	2774.25 (662.37)	1592.39-4099.57	3432.94 (724.53)	2161.86-4955.76

24 CORY'S SHEARWATER

Table 24-1 Mean density of Cory's shearwater recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0.004 (0.004)	0-0.012	0.003 (0.003)	0-0.009	0.002 (0.002)	0-0.007
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 24-2 Mean abundance of Cory's shearwater recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	2.58 (2.48)	0-7.74	2.58 (2.45)	0-7.74	2.58 (2.31)	0-7.74
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

25 SOOTY SHEARWATER

Table 25-1 Mean density of sooty shearwater recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0.004 (0.004)	0-0.012	0.006 (0.004)	0-0.014	0.004 (0.003)	0-0.011
Sep	0 (0)	0-0	0.003 (0.002)	0-0.009	0.002 (0.002)	0-0.007
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 25-2 Mean abundance of sooty shearwater recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	2.58 (2.45)	0-7.74	5.16 (3.29)	0-12.91	5.16 (3.46)	0-12.91
Sep	0 (0)	0-0	2.58 (2.22)	0-7.75	2.58 (2.24)	0-7.75
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

26 GREAT SHEARWATER

Table 26-1 Mean density of great shearwater recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0.002 (0.002)	0-0.007
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 26-2 Mean abundance of great shearwater recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	2.63 (2.28)	0-7.9
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

27 MANX SHEARWATER

Table 27-1 Mean density of Manx shearwater recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0.006 (0.005)	0-0.018	0.009 (0.006)	0-0.022	0.007 (0.005)	0-0.017
Jul	0.004 (0.004)	0-0.012	0.003 (0.003)	0-0.009	0.007 (0.004)	0-0.014
Aug	0.004 (0.003)	0-0.012	0.003 (0.002)	0-0.009	0.007 (0.005)	0-0.016
Sep	0.004 (0.004)	0-0.012	0.003 (0.003)	0-0.009	0.007 (0.005)	0-0.018
Oct	0 (0)	0-0	0 (0)	0-0	0.003 (0.003)	0-0.010
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 27-2 Mean abundance of Manx shearwater recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	3.88 (3.54)	0-11.63	7.75 (5.15)	0-19.38	7.75 (5.28)	0-19.38
Jul	2.64 (2.48)	0-7.93	2.64 (2.43)	0-7.93	7.93 (4.1)	0-15.86
Aug	2.6 (2.14)	0-7.8	2.6 (2.13)	0-7.8	7.78 (5.25)	0-18.15
Sep	2.63 (2.55)	0-7.9	2.63 (2.49)	0-7.9	7.85 (5.87)	0-20.92
Oct	0 (0)	0-0	0 (0)	0-0	3.88 (3.34)	0-11.63
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

28 GANNET

Table 28-1 Mean density of gannet recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0.04 (0.02)	0-0.08	0.03 (0.02)	0.01-0.08	0.03 (0.01)	0.01-0.05
Feb	0.07 (0.03)	0.03-0.14	0.07 (0.02)	0.03-0.11	0.08 (0.02)	0.03-0.13
Mar	0.13 (0.04)	0.06-0.2	0.14 (0.03)	0.08-0.21	0.14 (0.03)	0.09-0.2
Apr	0.68 (0.13)	0.45-0.95	0.68 (0.1)	0.49-0.88	0.64 (0.08)	0.48-0.8
May	0.38 (0.09)	0.22-0.58	0.42 (0.08)	0.27-0.59	0.47 (0.09)	0.32-0.66
Jun	0.4 (0.1)	0.22-0.61	0.38 (0.08)	0.23-0.55	0.35 (0.06)	0.24-0.49
Jul	0.48 (0.15)	0.24-0.81	0.45 (0.12)	0.26-0.71	0.56 (0.17)	0.29-0.93
Aug	1.3 (0.72)	0.35-2.98	1.07 (0.53)	0.36-2.31	1.06 (0.49)	0.39-2.18
Sep	1.03 (0.16)	0.73-1.35	1.01 (0.13)	0.76-1.27	1.11 (0.15)	0.84-1.42
Oct	1.43 (0.21)	1.01-1.86	1.31 (0.16)	1-1.63	1.21 (0.14)	0.96-1.49
Nov	0.02 (0.01)	0-0.05	0.04 (0.02)	0.01-0.08	0.04 (0.02)	0.01-0.07
Dec	0.05 (0.02)	0.01-0.09	0.05 (0.02)	0.01-0.1	0.04 (0.02)	0.01-0.08

Table 28-2 Mean abundance of gannet recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	23.24 (13.62)	0-54.24	30.99 (15.7)	7.75-69.73	30.99 (15.42)	7.75-61.98
Feb	49.06 (19.09)	18.07-92.96	59.39 (20.46)	23.24-100.77	90.38 (28.61)	38.73-152.36
Mar	85.29 (23.26)	42.65-131.8	127.92 (29.52)	73.66-189.94	166.67 (34.32)	104.66-236.43
Apr	445.17 (83.16)	298.03-623.28	603.93 (88.38)	437.35-785.91	739.47 (92.44)	553.6-921.54
May	252.02 (59)	143.46-379.97	376.12 (74.86)	240.4-527.33	546.8 (100.42)	368.39-760.12
Jun	263.36 (65.56)	147.17-398.9	336.96 (73.49)	201.4-488	406.67 (72.2)	278.77-565.46
Jul	314.15 (100.74)	157.85-534.41	400.83 (105.65)	231.56-633.95	653.26 (196.04)	337.23-1070.65
Aug	851.66 (473.86)	229.74-1956.32	958.12 (477.89)	318.11-2070.05	1228.14 (564.46)	451.02-2522.46
Sep	673.71 (105.33)	481.74-888.85	902.28 (116.67)	679.07-1135.98	1284.07 (172.37)	967.58-1639.74
Oct	938.23 (140.2)	662.97-1221.26	1170.85 (146.55)	891.52-1461.73	1399.6 (158.31)	1108.82-1721.58
Nov	11.62 (8.68)	0-30.98	34.85 (16.65)	7.74-69.71	46.47 (18.29)	15.39-85.21
Dec	31 (15.31)	7.75-61.99	42.62 (18.84)	11.62-85.24	46.5 (19.68)	11.62-89.12

29 SHAG

Table 29-1 Mean density of shag recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0.01
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0.01 (0.01)	0-0.02	0.01 (0.01)	0-0.02	0.01 (0.01)	0-0.02
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 29-2 Mean abundance of shag recorded per month in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	2.58 (2.45)	0-7.75
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	3.88 (3.64)	0-11.63	7.76 (5.13)	0-19.39	11.63 (6.4)	0-27.15
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

West of Orkney Windfarm

Offshore Ornithology Technical Supporting Study 12

Annex 12.2
Design based estimates of density and abundance per survey

Date:	12th May 2023
Tel:	0141 342 5404
Web:	www.macarthurgreen.com
Address:	93 South Woodside Road |Glasgow | G20 6NT

Document Quality Record

Version	Status	Person Responsible	Date
0.1	Draft	Dr. S. Raveh	04/11/2022
0.2	Reviewed	Dr. N. Goodship	08/11/2022
0.3	Updated	Dr. N. Goodship	08/11/2022
1	Internal Approval	Dr. Ross McGregor	06/12/2022
1.1	Comments addressed	Dr. N. Goodship	06/01/2023
2	Internal Approval	Dr. Ross McGregor	17/01/2023

CONTENTS

LIST OF TABLES

1 INTRODUCTION

1. This Annex provides tables of bird density and abundance recorded in each survey by HiDef Aerial Surveying Limited (HiDef) for the West of Orkney Windfarm ('the Project') Offshore Environmental Impact Assessment (EIA) Report and Offshore Report to Inform Appropriate Assessment (RIAA).

2. The tables provide density and abundance estimates for each species recorded in flight and on the sea within the OAA plus a 2 km and a 4 km buffer per survey. These estimates have been derived from data collected over 27 surveys between July 2020 to September 2022.

3. For auk species (guillemots, razorbills and puffins), the density and abundance tables have been split into three categories including:

    1. Birds not accounting for unidentified auks and availability bias;
    2. Birds including unidentified auks apportioned using identified auk ratios; and
    3. Birds including unidentified auks apportioned using identified auk ratios and accounting for availability bias.

4. Density/abundance estimates standard deviation (S.D.) and 95% confidence interval (c.i.) range are provided for each of the 27 surveys. For full methodology details on density and abundance calculations, refer to the Supporting Study (SS12): Offshore ornithology technical supporting study.

Table 1-1 Key to species density and abundance tables.

Species	Section Number
Kittiwake	2
Black-headed gull	0
Little gull	4
Common gull	5
Great black-backed gull	6
Herring gull	0
Lesser black-backed gull	8
Common tern	9
Arctic tern	10
Great skua	11
Arctic skua	12
Little auk	13
Guillemot	14
Razorbill	15
Black guillemot	16
Puffin	17
Auk species group	18
Large auk species group	19
Red-throated diver	20
Great northern diver	21
European storm-petrel	22
Fulmar	23
Cory's shearwater	24
Sooty shearwater	25
Great shearwater	0
Manx shearwater	27
Gannet	28
Shag	29

2 KITTIWAKE

Table 2-1 Density of kittiwakes recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km⁻²)					
	OAA		OAA and2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0.28 (0.18)	0.04-0.67	0.27 (0.13)	0.08-0.56	0.26 (0.1)	0.1-0.49
Aug-2020	0.28 (0.07)	0.15-0.41	0.26 (0.05)	0.16-0.37	0.27 (0.04)	0.19-0.36
Sep-2020	0.01 (0.01)	0-0.04	0.02 (0.01)	0-0.04	0.01 (0.01)	0-0.03
Oct-2020	1.02 (0.25)	0.58-1.54	1.12 (0.21)	0.75-1.55	1.25 (0.21)	0.86-1.66
Nov-2020	0.3 (0.07)	0.17-0.45	0.26 (0.05)	0.16-0.37	0.2 (0.04)	0.13-0.29
Dec-2020	0.11 (0.05)	0.04-0.2	0.11 (0.04)	0.04-0.2	0.11 (0.03)	0.05-0.17
Jan-2021	0.07 (0.03)	0.02-0.13	0.1 (0.03)	0.05-0.16	0.1 (0.02)	0.06-0.15
Feb-2021	0.33 (0.08)	0.18-0.5	0.26 (0.06)	0.15-0.39	0.22 (0.05)	0.13-0.32
Mar-2021	1.29 (0.29)	0.77-1.91	1.33 (0.22)	0.91-1.76	1.37 (0.16)	1.06-1.69
Apr-2021	0.46 (0.09)	0.31-0.65	0.56 (0.1)	0.37-0.75	0.54 (0.08)	0.4-0.71
May-2021	0.06 (0.05)	0-0.18	0.08 (0.06)	0-0.23	0.07 (0.05)	0.01-0.17
Jun-2021	0.2 (0.13)	0.02-0.5	0.16 (0.1)	0.03-0.37	0.14 (0.07)	0.03-0.3
Jul-2021	0.12 (0.04)	0.06-0.19	0.11 (0.03)	0.06-0.18	0.11 (0.03)	0.07-0.17
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0.24 (0.08)	0.08-0.41	0.17 (0.06)	0.06-0.3	0.13 (0.05)	0.05-0.23
Oct-2021	0.77 (0.14)	0.5-1.04	0.67 (0.11)	0.46-0.88	0.72 (0.09)	0.53-0.9
Nov-2021	0.13 (0.04)	0.06-0.21	0.12 (0.03)	0.06-0.19	0.11 (0.03)	0.05-0.16
Dec-2021	0.05 (0.02)	0.01-0.09	0.04 (0.02)	0.02-0.08	0.05 (0.02)	0.02-0.08
Feb-2022	0.08 (0.03)	0.02-0.14	0.1 (0.03)	0.05-0.15	0.11 (0.03)	0.06-0.16
Feb-2022	0.47 (0.1)	0.3-0.68	0.44 (0.08)	0.29-0.6	0.44 (0.07)	0.31-0.58
Mar-2022	1.52 (0.33)	0.91-2.19	1.4 (0.23)	0.97-1.88	1.55 (0.2)	1.15-1.97
Apr-2022	0.14 (0.05)	0.06-0.24	0.16 (0.04)	0.09-0.23	0.17 (0.03)	0.11-0.24
May-2022	0.09 (0.04)	0.04-0.17	0.1 (0.03)	0.05-0.16	0.11 (0.03)	0.07-0.17
Jun-2022	0.12 (0.07)	0.01-0.28	0.09 (0.05)	0.02-0.2	0.07 (0.04)	0.01-0.16
Jul-2022	2.13 (0.9)	0.45-3.99	1.93 (0.69)	0.7-3.46	1.62 (0.53)	0.71-2.74
Aug-2022	0.02 (0.02)	0-0.06	0.03 (0.01)	0-0.06	0.05 (0.02)	0.01-0.09
Sep-2022	0.02 (0.02)	0-0.06	0.03 (0.01)	0-0.05	0.04 (0.01)	0.01-0.07

Table 2-2 Abundance of kittiwakes recorded per survey in flight and on the sea, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	184.47 (118.08)	24.06-441.13	240.61 (116.47)	72.18-497.47	296.76 (118.99)	112.29-569.45
Aug-2020	183.12 (44.59)	95.54-270.7	230.89 (48.91)	143.31-334.39	310.51 (51.88)	214.97-414.01
Sep-2020	7.75 (6.83)	0-23.24	15.49 (9.66)	0-38.74	15.49 (9.58)	0-38.74
Oct-2020	666.84 (164.17)	379.94-1008.01	1000.26 (187.97)	666.65-1388.15	1442.24 (243.43)	992.31-1922.98
Nov-2020	193.88 (47.53)	108.57-294.89	232.65 (47.5)	139.59-333.47	232.65 (48.23)	147.35-333.47
Dec-2020	69.74 (30.28)	23.25-131.93	100.74 (36.05)	38.75-178.23	123.99 (39.13)	54.24-201.48
Jan-2021	46.49 (17.39)	15.5-85.23	92.98 (24.78)	46.49-139.47	116.22 (27.09)	69.73-170.46
Feb-2021	216.86 (55.48)	116.18-325.49	232.35 (54.8)	131.67-348.53	255.59 (56.24)	154.9-371.76
Mar-2021	844.24 (187.11)	503.44-1254.93	1185.03 (192.53)	813.25-1572.29	1587.78 (189.23)	1231.5-1959.75
Apr-2021	302.49 (59.11)	201.66-426.58	496.39 (85.33)	333.51-667.02	628.24 (92.02)	457.61-822.14
May-2021	38.75 (35.12)	0-116.26	69.75 (57.25)	0-201.51	77.5 (55.16)	7.56-201.51
Jun-2021	131.78 (84.01)	15.5-325.57	139.53 (85.38)	23.25-333.51	162.78 (83.16)	38.76-348.82
Jul-2021	77.52 (24.03)	38.76-124.03	100.77 (28.11)	54.26-162.79	131.78 (31.13)	77.52-201.55
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	154.96 (51.37)	54.24-271.18	154.96 (54.67)	54.24-271.18	154.96 (55.3)	54.24-271.38
Oct-2021	504.01 (90.9)	325.67-682.36	597.06 (97.82)	410.96-790.91	829.68 (108.67)	612.57-1046.79
Nov-2021	85.14 (27.19)	38.7-139.33	108.37 (29.67)	54.18-170.29	123.85 (31.75)	61.92-185.96
Dec-2021	31 (13.77)	7.75-62	38.75 (14.28)	15.5-69.75	54.25 (17.85)	23.25-93
Feb-2022	54.25 (19.16)	15.5-93	85.25 (22.69)	46.5-131.75	124 (30.34)	69.75-186
Feb-2022	309.85 (64.44)	193.65-449.28	395.05 (69.79)	263.37-534.49	503.5 (76.74)	356.32-666.17
Mar-2022	1000.38 (217.55)	596.93-1434.84	1248.53 (210.14)	868.35-1683	1791.37 (233.82)	1333.84-2279.93
Apr-2022	92.84 (30.26)	38.68-154.73	139.25 (34.9)	77.36-209.07	201.14 (38.83)	131.32-278.51
May-2022	62.11 (23.07)	23.29-108.69	93.17 (25.3)	46.58-139.75	131.99 (32.24)	77.64-201.86
Jun-2022	77.43 (45.97)	7.74-185.83	77.43 (42.73)	15.49-178.09	85.17 (46.41)	15.49-185.83
Jul-2022	1395.93 (590.31)	293.26-2617.37	1729.05 (620.28)	626.58-3093.26	1879.75 (616.2)	816.74-3164.64
Aug-2022	15.61 (10.11)	0-39.02	23.41 (12.59)	0-54.62	54.62 (24.76)	15.61-109.25
Sep-2022	15.81 (10.65)	0-39.52	23.71 (12.15)	0-47.43	47.43 (17.23)	15.81-79.05

3 BLACK-HEADED GULL

Table 3-1 Density of black-headed gulls recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 3-2 Abundance of black-headed gull recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	7.74 (7.53)	0-23.21	7.74 (7.04)	0-23.21	7.74 (7.21)	0-23.21
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

4 LITTLE GULL

Table 4-1 Density of little gull recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

	Density (birds km^{-2})					
Survey	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 4-2 Abundance of little gull recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	7.75 (7.02)	0-23.24	7.75 (7.71)	0-23.24	7.75 (7.65)	0-23.24
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

5 COMMON GULL

Table 5-1 Density of common gull recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 5-2 Abundance of common gull recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	7.76 (7.02)	0-23.27	7.76 (7.01)	0-23.27
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

6 GREAT BLACK-BACKED GULL

Table 6-1 Density of great black-backed gull recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km⁻²)					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0.01 (0.01)	0-0.04	0.02 (0.01)	0-0.04	0.03 (0.02)	0-0.07
Nov-2020	0.17 (0.05)	0.08-0.26	0.14 (0.04)	0.07-0.22	0.11 (0.03)	0.05-0.17
Dec-2020	0.02 (0.01)	0-0.06	0.07 (0.03)	0.03-0.14	0.07 (0.02)	0.03-0.12
Jan-2021	0.09 (0.03)	0.04-0.17	0.07 (0.02)	0.03-0.12	0.07 (0.02)	0.03-0.12
Feb-2021	0.06 (0.02)	0.01-0.11	0.17 (0.12)	0.03-0.42	0.2 (0.12)	0.03-0.48
Mar-2021	0.02 (0.01)	0-0.06	0.03 (0.01)	0-0.05	0.03 (0.01)	0.01-0.05
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0.02 (0.02)	0-0.07	0.02 (0.02)	0-0.05	0.01 (0.01)	0-0.04
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0.19 (0.05)	0.09-0.29	0.23 (0.05)	0.14-0.32	0.21 (0.04)	0.13-0.28
Dec-2021	0.4 (0.09)	0.24-0.57	0.42 (0.07)	0.29-0.57	0.4 (0.06)	0.29-0.52
Feb-2022	0.07 (0.03)	0.01-0.14	0.05 (0.02)	0.01-0.1	0.09 (0.03)	0.04-0.15
Feb-2022	0.2 (0.05)	0.11-0.31	0.16 (0.04)	0.1-0.25	0.15 (0.03)	0.08-0.21
Mar-2022	0.01 (0.01)	0-0.04	0.03 (0.01)	0-0.05	0.03 (0.01)	0.01-0.06
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 6-2 Abundance of great black-backed gull recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	7.75 (6.89)	0-23.26	15.51 (10.39)	0-38.77	31.02 (20.7)	0-77.54
Nov-2020	108.57 (31.72)	54.29-170.61	124.08 (34.59)	61.85-193.88	124.08 (34.93)	62.04-193.88
Dec-2020	15.5 (9.79)	0-38.75	61.99 (26.22)	23.25-123.99	85.24 (27.41)	38.75-139.48
Jan-2021	61.98 (22.32)	23.24-108.47	61.98 (21.41)	30.99-108.47	85.23 (26.06)	38.74-139.47
Feb-2021	38.73 (16.08)	7.75-69.71	154.9 (102.91)	23.24-379.51	232.35 (140.63)	38.73-557.65
Mar-2021	15.49 (9.4)	0-38.73	23.24 (11.8)	0-46.47	30.98 (13.19)	7.75-54.41
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	15.5 (14.93)	0-46.51	15.5 (14.46)	0-46.51	15.5 (14.72)	0-46.51
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	123.85 (32.82)	61.92-193.51	201.25 (41.44)	123.85-286.39	239.95 (43.37)	154.81-325.1
Dec-2021	263.49 (55.91)	154.99-372.18	379.73 (60.82)	263.49-511.67	464.98 (70.34)	340.79-604.66
Feb-2022	46.5 (21.28)	7.75-93	46.5 (20.7)	7.75-85.44	108.5 (31.89)	46.5-178.25
Feb-2022	131.68 (35.13)	69.72-201.4	147.18 (36.71)	85.21-224.64	170.42 (38.89)	92.95-240.13
Mar-2022	7.75 (7.07)	0-23.26	23.26 (12.05)	0-46.53	38.77 (14.57)	15.51-69.79
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

7 HERRING GULL

Table 7-1 Density of herring gull recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km⁻²)					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0.04 (0.02)	0-0.08	0.03 (0.01)	0-0.05	0.03 (0.01)	0.01-0.05
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03
Feb-2021	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.02
Mar-2021	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0.02 (0.02)	0-0.05	0.01 (0.01)	0-0.04
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0.02 (0.02)	0-0.06	0.02 (0.01)	0-0.04	0.01 (0.01)	0-0.03
Mar-2022	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 7-2 Abundance of herring gull recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	23.27 (12.57)	0-46.53	23.27 (12.43)	0-46.53	31.02 (14.36)	7.76-62.04
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	7.75 (7.34)	0-23.24	7.75 (7.18)	0-23.24	15.5 (9.36)	0-30.99
Feb-2021	0 (0)	0-0	0 (0)	0-0	7.75 (7.04)	0-23.24
Mar-2021	0 (0)	0-0	7.75 (7.63)	0-23.24	7.75 (7.19)	0-23.24
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	15.5 (13.41)	0-46.5	15.5 (12.56)	0-46.5
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	7.74 (7.09)	0-23.22	7.74 (6.96)	0-23.22	7.74 (7.25)	0-23.22
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	15.49 (9.95)	0-38.73	15.49 (10.18)	0-38.73	15.49 (10.25)	0-38.73
Mar-2022	7.75 (7.07)	0-23.26	7.75 (7.51)	0-23.26	7.75 (7.38)	0-23.26
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

8 LESSER BLACK-BACKED GULL

Table 8-1 Density of lesser black-backed gull recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 8-2 Abundance of lesser black-backed gull recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	7.74 (7.46)	0-23.23	7.74 (7.18)	0-23.23	15.49 (10.44)	0-38.72
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

9 COMMON TERN

Table 9-1 Density of common tern recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km⁻²)					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 9-2 Abundance of common tern recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	7.96 (6.52)	0-23.89	15.92 (8.37)	0-31.85
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

10 ARCTIC TERN

Table 10-1 Density of Arctic tern recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km-2)					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0.27 (0.17)	0-0.66	0.2 (0.13)	0-0.46	0.15 (0.1)	0-0.38
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0.03 (0.02)	0-0.08	0.02 (0.02)	0-0.04
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0.02 (0.02)	0-0.06	0.05 (0.04)	0-0.13	0.04 (0.03)	0-0.1
Aug-2022	0.11 (0.09)	0-0.31	0.08 (0.06)	0-0.22	0.07 (0.05)	0.01-0.19
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 10-2 Abundance of Arctic tern recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	178.29 (113.34)	0-434.09	178.29 (113.57)	0-410.83	178.29 (114.76)	0-434.09
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	23.23 (18.11)	0-69.69	23.23 (17.78)	0-46.46
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	7.76 (7.24)	0-23.29	7.76 (7.2)	0-23.29	7.76 (7.5)	0-23.29
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	15.86 (10.17)	0-39.66	47.59 (32.22)	0-118.97	47.59 (29.94)	0-111.04
Aug-2022	70.23 (59)	0-202.89	70.23 (57.52)	0-195.08	85.84 (60.4)	7.8-218.49
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

11 GREAT SKUA

Table 11-1 Density of great skua recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km⁻²)					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0.02 (0.02)	0-0.06	0.03 (0.01)	0-0.05	0.02 (0.01)	0-0.04
Aug-2020	0.46 (0.37)	0.01-1.31	0.34 (0.25)	0.01-0.94	0.26 (0.19)	0.01-0.72
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Nov-2020	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0.07 (0.03)	0.02-0.12	0.06 (0.02)	0.03-0.1	0.06 (0.02)	0.03-0.09
May-2021	0.01 (0.01)	0-0.04	0.02 (0.01)	0-0.03	0.02 (0.01)	0-0.04
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0.01 (0.01)	0-0.04	0.03 (0.01)	0.01-0.06	0.03 (0.01)	0.01-0.05
Aug-2021	0.04 (0.03)	0-0.11	0.03 (0.02)	0-0.08	0.02 (0.02)	0-0.06
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
May-2022	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03
Jun-2022	0.05 (0.02)	0.01-0.09	0.03 (0.02)	0.01-0.07	0.04 (0.01)	0.01-0.07
Jul-2022	0 (0)	0-0	0.01 (0.01)	0-0.03	0.02 (0.01)	0-0.04
Aug-2022	0.02 (0.02)	0-0.06	0.02 (0.01)	0-0.04	0.01 (0.01)	0-0.03
Sep-2022	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.01

Table 11-2 Abundance of great skua recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	16.04 (10.08)	0-40.1	24.06 (11.72)	0-48.12	24.06 (11.29)	0-48.12
Aug-2020	302.54 (240.28)	7.96-859.86	302.54 (224.71)	7.96-843.94	302.54 (220.84)	7.96-835.98
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	7.75 (6.95)	0-23.26	7.75 (7.17)	0-23.26	7.75 (7.26)	0-23.26
Nov-2020	7.76 (6.99)	0-23.27	7.76 (7.1)	0-23.27	7.76 (6.91)	0-23.27
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	46.54 (17.44)	15.51-77.75	54.29 (18.84)	23.27-93.07	69.8 (20.72)	31.02-108.78
May-2021	7.75 (7.41)	0-23.25	15.5 (9.57)	0-31	23.25 (12.4)	0-46.5
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	7.75 (6.95)	0-23.26	31.01 (13.26)	7.75-54.46	31.01 (12.92)	7.75-54.26
Aug-2021	23.23 (21.03)	0-69.69	23.23 (20.01)	0-69.69	23.23 (21.09)	0-69.69
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	7.74 (7.3)	0-23.21	7.74 (7.61)	0-23.21	7.74 (7.2)	0-23.21
May-2022	0 (0)	0-0	7.76 (6.66)	0-23.29	15.53 (9.22)	0-31.06
Jun-2022	30.97 (14.43)	7.74-61.94	30.97 (14.39)	7.74-61.94	46.46 (17.18)	15.49-85.17
Jul-2022	0 (0)	0-0	7.93 (7.02)	0-23.79	23.79 (12.43)	0-47.59
Aug-2022	15.61 (9.88)	0-39.02	15.61 (9.76)	0-39.02	15.61 (10.03)	0-39.02
Sep-2022	0 (0)	0-0	0 (0)	0-0	7.9 (5.93)	0-15.81

12 ARCTIC SKUA

Table 12-1 Density of Arctic skua recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Jul-2022	0.01 (0.01)	0-0.04	0.04 (0.02)	0-0.07	0.03 (0.01)	0-0.05
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 12-2 Abundance of Arctic skua recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	7.74 (7.06)	0-23.23	7.74 (7.36)	0-23.23	7.74 (7.22)	0-23.23
Jul-2022	7.93 (7.52)	0-23.79	31.73 (16.31)	0-63.45	31.73 (15.65)	0-63.45
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

13 LITTLE AUK

Table 13-1 Density of little auk recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km⁻²)					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0.01 (0.01)	0-0.04	0.03 (0.01)	0-0.05	0.03 (0.01)	0.01-0.06
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 13-2 Abundance of little auk recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	7.75 (7.48)	0-23.24	7.75 (7.28)	0-23.24	7.75 (7.32)	0-23.24
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	7.74 (7.19)	0-23.22	23.22 (11.7)	0-46.44	38.7 (16.25)	15.29-69.86
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	7.75 (7.22)	0-23.25	15.5 (10.35)	0-38.75
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

14 GUILLEMOT

Table 14-1 Density of guillemot recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km⁻²)					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	3.12 (0.59)	2.03-4.33	3.22 (0.43)	2.42-4.15	3.06 (0.33)	2.46-3.75
Aug-2020	0.9 (0.15)	0.62-1.19	1.08 (0.16)	0.79-1.42	1.16 (0.14)	0.91-1.45
Sep-2020	3.53 (0.45)	2.66-4.4	3.79 (0.38)	3.05-4.54	3.57 (0.3)	3.01-4.15
Oct-2020	2.86 (0.45)	2.08-3.82	3.44 (0.43)	2.58-4.24	3.28 (0.31)	2.67-3.91
Nov-2020	0.31 (0.06)	0.19-0.43	0.43 (0.07)	0.3-0.58	0.43 (0.06)	0.32-0.54
Dec-2020	0.48 (0.09)	0.32-0.67	0.68 (0.1)	0.48-0.89	0.74 (0.08)	0.58-0.9
Jan-2021	0.93 (0.15)	0.66-1.26	1.16 (0.14)	0.9-1.46	1.19 (0.13)	0.94-1.45
Feb-2021	2.42 (0.61)	1.42-3.75	2.12 (0.47)	1.39-3.13	2.1 (0.34)	1.53-2.81
Mar-2021	2.17 (0.25)	1.7-2.66	2.28 (0.23)	1.84-2.71	2.6 (0.32)	2.07-3.32
Apr-2021	5.14 (0.64)	3.9-6.4	5.51 (0.51)	4.56-6.51	6.06 (0.44)	5.26-6.99
May-2021	0.28 (0.09)	0.13-0.46	0.34 (0.11)	0.16-0.57	0.52 (0.15)	0.26-0.81
Jun-2021	0.93 (0.25)	0.51-1.44	0.87 (0.19)	0.53-1.27	0.93 (0.17)	0.62-1.26
Jul-2021	1.02 (0.19)	0.66-1.41	1.27 (0.21)	0.88-1.71	1.45 (0.18)	1.15-1.82
Aug-2021	2.47 (0.3)	1.9-3.06	2.73 (0.27)	2.23-3.26	2.86 (0.22)	2.43-3.3
Sep-2021	3.61 (0.38)	2.88-4.38	3.47 (0.3)	2.91-4.07	3.62 (0.25)	3.14-4.13
Oct-2021	2.49 (0.32)	1.89-3.11	2.72 (0.3)	2.15-3.31	2.89 (0.25)	2.45-3.43
Nov-2021	0.94 (0.16)	0.65-1.29	0.87 (0.11)	0.67-1.08	0.95 (0.09)	0.77-1.12
Dec-2021	1.06 (0.15)	0.79-1.37	1.29 (0.14)	1.02-1.57	1.4 (0.13)	1.15-1.65
Feb-2022	0.11 (0.03)	0.05-0.18	0.16 (0.04)	0.1-0.24	0.25 (0.04)	0.17-0.32
Feb-2022	0.42 (0.08)	0.26-0.59	0.46 (0.07)	0.32-0.6	0.46 (0.07)	0.33-0.6
Mar-2022	0.2 (0.06)	0.08-0.34	0.27 (0.06)	0.16-0.4	0.28 (0.05)	0.19-0.38
Apr-2022	1.45 (0.21)	1.08-1.92	1.44 (0.16)	1.16-1.77	1.52 (0.14)	1.28-1.81
May-2022	1.64 (0.26)	1.16-2.15	1.69 (0.23)	1.29-2.2	2.25 (0.33)	1.68-2.95
Jun-2022	2.43 (0.62)	1.31-3.82	2.1 (0.48)	1.29-3.1	1.94 (0.37)	1.28-2.73
Jul-2022	6.49 (1.08)	4.54-8.63	7.47 (1.1)	5.35-9.61	6.64 (0.81)	5.05-8.3
Aug-2022	3 (0.64)	1.78-4.29	3.67 (0.61)	2.49-4.87	4.86 (0.63)	3.76-6.18
Sep-2022	2.91 (0.5)	2.01-3.93	3.24 (0.48)	2.38-4.23	3.86 (0.54)	2.86-4.93

Table 14-2 Density of guillemot (including unidentified auks apportioned using identified auk ratios) recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	3.41 (0.65)	2.22-4.73	3.52 (0.47)	2.64-4.53	3.33 (0.36)	2.68-4.09
Aug-2020	0.97 (0.16)	0.67-1.29	1.15 (0.17)	0.84-1.51	1.24 (0.15)	0.97-1.55
Sep-2020	3.62 (0.46)	2.73-4.52	3.87 (0.39)	3.12-4.64	3.65 (0.3)	3.08-4.24
Oct-2020	3.01 (0.47)	2.19-4.02	3.62 (0.45)	2.71-4.46	3.42 (0.33)	2.79-4.08
Nov-2020	0.39 (0.07)	0.24-0.54	0.54 (0.09)	0.38-0.72	0.52 (0.07)	0.38-0.66
Dec-2020	0.53 (0.1)	0.35-0.74	0.75 (0.12)	0.53-1	0.81 (0.09)	0.64-0.99
Jan-2021	1.09 (0.18)	0.77-1.47	1.33 (0.16)	1.04-1.67	1.37 (0.15)	1.07-1.66
Feb-2021	2.54 (0.64)	1.49-3.94	2.22 (0.49)	1.46-3.27	2.18 (0.35)	1.59-2.93
Mar-2021	2.32 (0.26)	1.82-2.84	2.43 (0.24)	1.95-2.89	2.74 (0.34)	2.17-3.49
Apr-2021	5.54 (0.69)	4.2-6.91	5.9 (0.54)	4.89-6.97	6.48 (0.47)	5.62-7.47
May-2021	0.3 (0.09)	0.14-0.48	0.35 (0.11)	0.16-0.59	0.53 (0.15)	0.27-0.83
Jun-2021	0.94 (0.25)	0.51-1.46	0.88 (0.19)	0.53-1.28	0.94 (0.17)	0.63-1.27
Jul-2021	1.03 (0.19)	0.67-1.42	1.29 (0.21)	0.9-1.73	1.47 (0.18)	1.17-1.86
Aug-2021	2.63 (0.32)	2.03-3.26	2.9 (0.29)	2.38-3.47	3.01 (0.23)	2.55-3.47
Sep-2021	3.82 (0.41)	3.05-4.64	3.65 (0.31)	3.06-4.29	3.8 (0.26)	3.29-4.33
Oct-2021	2.67 (0.34)	2.02-3.33	2.92 (0.32)	2.31-3.56	3.1 (0.27)	2.63-3.69
Nov-2021	1.11 (0.19)	0.76-1.51	1.03 (0.13)	0.79-1.29	1.08 (0.1)	0.88-1.28
Dec-2021	1.28 (0.18)	0.95-1.64	1.53 (0.17)	1.21-1.85	1.6 (0.14)	1.32-1.88
Feb-2022	0.12 (0.04)	0.05-0.2	0.18 (0.04)	0.11-0.27	0.29 (0.05)	0.2-0.38
Feb-2022	0.5 (0.1)	0.3-0.69	0.55 (0.09)	0.39-0.72	0.54 (0.08)	0.39-0.7
Mar-2022	0.25 (0.08)	0.1-0.42	0.32 (0.07)	0.2-0.48	0.34 (0.06)	0.24-0.46
Apr-2022	1.51 (0.21)	1.13-2	1.51 (0.17)	1.21-1.84	1.58 (0.14)	1.33-1.87
May-2022	1.69 (0.27)	1.19-2.22	1.74 (0.24)	1.33-2.25	2.33 (0.34)	1.74-3.06
Jun-2022	2.49 (0.63)	1.34-3.92	2.15 (0.49)	1.32-3.16	1.99 (0.38)	1.31-2.8
Jul-2022	6.79 (1.14)	4.75-9.03	7.79 (1.14)	5.58-10.03	6.97 (0.85)	5.3-8.72
Aug-2022	3.02 (0.64)	1.8-4.33	3.7 (0.61)	2.5-4.9	4.91 (0.63)	3.79-6.24
Sep-2022	3.08 (0.53)	2.13-4.15	3.46 (0.51)	2.53-4.5	4.06 (0.57)	3-5.19

Table 14-3 Density of guillemot (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	4.45 (0.84)	2.9-6.17	4.59 (0.62)	3.45-5.92	4.35 (0.47)	3.5-5.33
Aug-2020	1.26 (0.21)	0.87-1.67	1.5 (0.22)	1.1-1.97	1.61 (0.19)	1.26-2.01
Sep-2020	4.73 (0.61)	3.56-5.9	5.05 (0.51)	4.07-6.06	4.76 (0.4)	4.02-5.53
Oct-2020	3.92 (0.61)	2.85-5.23	4.71 (0.59)	3.52-5.8	4.45 (0.43)	3.63-5.31
Nov-2020	0.5 (0.09)	0.31-0.69	0.69 (0.12)	0.49-0.93	0.67 (0.09)	0.49-0.85
Dec-2020	0.67 (0.13)	0.44-0.94	0.96 (0.15)	0.68-1.27	1.04 (0.11)	0.82-1.27
Jan-2021	1.38 (0.22)	0.98-1.87	1.72 (0.21)	1.34-2.16	1.77 (0.19)	1.39-2.15
Feb-2021	3.26 (0.82)	1.91-5.05	2.84 (0.62)	1.87-4.19	2.77 (0.45)	2.02-3.72
Mar-2021	2.97 (0.34)	2.33-3.64	3.1 (0.31)	2.5-3.69	3.52 (0.43)	2.8-4.49
Apr-2021	7.26 (0.9)	5.5-9.04	7.7 (0.71)	6.38-9.1	8.46 (0.61)	7.35-9.76
May-2021	0.38 (0.12)	0.17-0.61	0.44 (0.15)	0.2-0.75	0.68 (0.19)	0.35-1.07
Jun-2021	1.22 (0.33)	0.66-1.88	1.12 (0.25)	0.68-1.63	1.21 (0.21)	0.81-1.63
Jul-2021	1.26 (0.24)	0.82-1.75	1.59 (0.26)	1.1-2.13	1.83 (0.22)	1.45-2.3
Aug-2021	3.44 (0.42)	2.65-4.27	3.8 (0.38)	3.11-4.55	3.95 (0.3)	3.35-4.55
Sep-2021	5.01 (0.53)	3.99-6.07	4.77 (0.41)	4.01-5.61	4.97 (0.35)	4.31-5.67
Oct-2021	3.36 (0.42)	2.54-4.18	3.63 (0.4)	2.87-4.42	3.82 (0.34)	3.24-4.54
Nov-2021	1.43 (0.25)	0.98-1.94	1.33 (0.17)	1.03-1.67	1.39 (0.13)	1.13-1.65
Dec-2021	1.66 (0.23)	1.24-2.15	1.99 (0.22)	1.58-2.42	2.09 (0.19)	1.72-2.46
Feb-2022	0.15 (0.05)	0.07-0.26	0.24 (0.05)	0.15-0.36	0.39 (0.06)	0.26-0.5
Feb-2022	0.65 (0.13)	0.4-0.9	0.73 (0.12)	0.51-0.95	0.71 (0.1)	0.51-0.92
Mar-2022	0.33 (0.11)	0.14-0.56	0.42 (0.09)	0.26-0.63	0.45 (0.07)	0.31-0.61
Apr-2022	1.94 (0.28)	1.45-2.58	1.93 (0.21)	1.55-2.36	2.02 (0.18)	1.7-2.39
May-2022	2.02 (0.32)	1.43-2.65	2.09 (0.29)	1.6-2.71	2.86 (0.42)	2.14-3.76
Jun-2022	3.22 (0.82)	1.73-5.07	2.75 (0.62)	1.69-4.06	2.54 (0.48)	1.68-3.58
Jul-2022	8.82 (1.47)	6.18-11.73	10.13 (1.49)	7.25-13.04	9.06 (1.1)	6.89-11.33
Aug-2022	3.96 (0.84)	2.36-5.67	4.85 (0.8)	3.28-6.43	6.43 (0.83)	4.97-8.18
Sep-2022	4.02 (0.69)	2.78-5.42	4.52 (0.66)	3.31-5.88	5.31 (0.74)	3.93-6.78

Table 14-4 Abundance of guillemot recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	2045.22 (387.07)	1331.2-2839.25	2879.35 (388.29)	2165.33-3713.48	3537.03 (384.15)	2846.06-4339.68
Aug-2020	589.16 (97.27)	406.05-780.25	963.36 (142.72)	708.59-1265.91	1337.56 (157.95)	1050.54-1671.95
Sep-2020	2316.43 (296.25)	1742.94-2889.92	3385.55 (341.13)	2726.84-4059.76	4129.29 (344.46)	3486.27-4795.75
Oct-2020	1876.46 (293.31)	1364.5-2504.53	3078.32 (383.04)	2302.73-3791.88	3791.68 (364.13)	3093.63-4520.56
Nov-2020	201.63 (37.85)	124.08-279.18	387.76 (65.46)	271.43-519.59	496.33 (68.65)	364.49-628.16
Dec-2020	317.71 (61.28)	209.03-441.7	604.43 (93.45)	426.2-798.16	852.4 (94.21)	674.17-1046.13
Jan-2021	612.1 (99.11)	433.89-829.24	1038.25 (126.41)	805.8-1301.68	1379.16 (149.78)	1084.73-1673.59
Feb-2021	1587.74 (401.92)	929.41-2463.13	1897.55 (416.14)	1246.96-2796.17	2424.21 (392.43)	1765.88-3253.13
Mar-2021	1425.13 (161.19)	1115.32-1742.88	2037.01 (204.78)	1641.81-2424.27	3012.91 (369.86)	2393.1-3842.24
Apr-2021	3373.87 (420.26)	2559.29-4203.96	4925.08 (453.51)	4079.67-5817.21	7011.45 (505.84)	6088.48-8089.73
May-2021	186.01 (57.51)	85.26-302.27	302.27 (99.26)	139.51-511.53	596.79 (168.43)	302.27-938
Jun-2021	612.37 (163.78)	333.12-945.69	775.16 (170.17)	472.85-1131.92	1077.47 (191.46)	720.7-1457.49
Jul-2021	666.65 (125.26)	433.91-922.66	1139.51 (189.38)	790.68-1527.29	1674.39 (202.67)	1325.55-2108.48
Aug-2021	1618.42 (197.72)	1246.53-2005.6	2439.24 (241.42)	1997.85-2919.34	3314.27 (255.49)	2810.93-3817.6
Sep-2021	2370.91 (251.83)	1890.34-2874.73	3099.23 (266.19)	2603.36-3641.6	4191.71 (291.3)	3633.85-4780.76
Oct-2021	1636.1 (206.85)	1240.65-2039.31	2434.77 (265.89)	1923-2962.04	3341.99 (293.78)	2830.03-3970.26
Nov-2021	619.23 (106.81)	425.72-843.7	774.04 (99.54)	596.01-967.74	1099.13 (105.35)	890.14-1300.57
Dec-2021	697.47 (96.36)	519.03-898.96	1154.69 (126.17)	914.26-1402.68	1619.67 (145.74)	1332.94-1906.6
Feb-2022	69.75 (20.83)	31-116.25	147.25 (31.38)	93-217	286.75 (46.24)	193.75-372

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Feb-2022	278.86 (53.79)	170.42-387.31	410.55 (66.8)	286.61-534.49	534.49 (77.03)	387.31-689.41
Mar-2022	131.83 (41.88)	54.28-224.89	240.4 (50.99)	147.34-356.72	325.7 (54.36)	224.89-442.03
Apr-2022	951.56 (134.93)	711.55-1261.02	1291.96 (142.28)	1036.66-1578.4	1763.87 (158.35)	1485.37-2088.8
May-2022	1079.17 (169.59)	760.86-1413.21	1513.95 (206.63)	1156.62-1964.25	2600.89 (382.71)	1948.72-3416.28
Jun-2022	1595.07 (406.85)	859.29-2508.94	1881.56 (426.61)	1153.72-2772.21	2245.49 (426.53)	1478.92-3159.36
Jul-2022	4259.17 (711.92)	2982.02-5664.23	6678.26 (981.86)	4782.25-8597.66	7677.62 (931.53)	5837.13-9604.95
Aug-2022	1966.43 (418.08)	1170.49-2817.18	3285.19 (542.02)	2223.94-4354.43	5626.18 (727.27)	4346.24-7148.01
Sep-2022	1912.94 (325.99)	1319.89-2577.13	2901.02 (426.62)	2126.36-3778.45	4466.15 (622.11)	3303.97-5707.19

Table 14-5 Abundance of guillemot (including unidentified auks apportioned using identified auk ratios) recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	2237.71 (423.5)	1456.49-3106.47	3144.02 (423.98)	2364.37-4054.83	3857.85 (418.99)	3104.21-4733.3
Aug-2020	636.93 (105.16)	438.97-843.51	1027.06 (152.16)	755.44-1349.6	1433.1 (169.23)	1125.58-1791.38
Sep-2020	2378.41 (304.17)	1789.57-2967.25	3463.03 (348.94)	2789.24-4152.66	4222.26 (352.22)	3564.76-4903.72
Oct-2020	1977.26 (309.07)	1437.8-2639.07	3241.15 (403.3)	2424.54-3992.46	3962.27 (380.51)	3232.82-4723.94
Nov-2020	255.92 (48.04)	157.49-354.35	480.82 (81.16)	336.57-644.3	604.9 (83.67)	444.22-765.58
Dec-2020	348.71 (67.25)	229.43-484.79	674.17 (104.23)	475.38-890.25	937.64 (103.63)	741.59-1150.74
Jan-2021	712.83 (115.42)	505.29-965.7	1193.21 (145.28)	926.07-1495.96	1580.61 (171.66)	1243.18-1918.05
Feb-2021	1665.19 (421.52)	974.75-2583.29	1982.74 (434.82)	1302.95-2921.71	2524.9 (408.73)	1839.22-3388.25
Mar-2021	1525.82 (172.57)	1194.12-1866.02	2168.68 (218.02)	1747.93-2580.97	3167.82 (388.88)	2516.14-4039.78
Apr-2021	3637.58 (453.11)	2759.33-4532.55	5274.1 (485.65)	4368.78-6229.46	7492.32 (540.53)	6506.05-8644.56
May-2021	193.76 (59.9)	88.81-314.86	310.02 (101.8)	143.09-524.65	612.29 (172.81)	310.12-962.36
Jun-2021	620.13 (165.86)	337.34-957.66	782.91 (171.87)	477.57-1143.24	1085.22 (192.84)	725.89-1467.98
Jul-2021	674.41 (126.72)	438.95-933.38	1155.02 (191.96)	801.44-1548.07	1705.39 (206.43)	1350.1-2147.53
Aug-2021	1726.83 (210.96)	1330.03-2139.94	2594.11 (256.75)	2124.7-3104.7	3484.63 (268.62)	2955.42-4013.83
Sep-2021	2510.38 (266.65)	2001.53-3043.83	3261.94 (280.17)	2740.03-3832.78	4393.16 (305.3)	3808.49-5010.52
Oct-2021	1752.41 (221.55)	1328.84-2184.29	2613.11 (285.36)	2063.86-3179.01	3590.12 (315.59)	3040.15-4265.03
Nov-2021	727.59 (125.5)	500.22-991.35	921.1 (118.46)	709.25-1151.61	1253.94 (120.19)	1015.51-1483.75
Dec-2021	836.96 (115.64)	622.84-1078.75	1363.93 (149.04)	1079.93-1656.86	1852.16 (166.66)	1524.27-2180.28
Feb-2022	77.5 (23.14)	34.44-129.17	162.75 (34.69)	102.79-239.84	341 (54.98)	230.4-442.37

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Feb-2022	325.34 (62.76)	198.82-451.86	495.75 (80.66)	346.09-645.42	627.44 (90.42)	454.67-809.31
Mar-2022	162.85 (51.74)	67.06-277.81	286.93 (60.86)	175.86-425.77	395.5 (66.01)	273.08-536.75
Apr-2022	990.25 (140.41)	740.47-1312.28	1346.11 (148.25)	1080.12-1644.56	1825.76 (163.9)	1537.49-2162.09
May-2022	1110.23 (174.47)	782.75-1453.88	1552.77 (211.93)	1186.27-2014.62	2694.05 (396.42)	2018.53-3538.66
Jun-2022	1633.78 (416.73)	880.14-2569.84	1920.28 (435.39)	1177.45-2829.25	2299.69 (436.82)	1514.62-3235.62
Jul-2022	4457.46 (745.06)	3120.84-5927.92	6963.79 (1023.84)	4986.72-8965.26	8066.26 (978.69)	6132.61-10091.16
Aug-2022	1982.04 (421.4)	1179.78-2839.54	3308.6 (545.88)	2239.79-4385.46	5680.8 (734.33)	4388.44-7217.41
Sep-2022	2023.6 (344.85)	1396.24-2726.22	3090.74 (454.52)	2265.42-4025.54	4695.39 (654.04)	3473.55-6000.13

Table 14-6 Abundance of guillemot (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	2919.45 (552.52)	1900.22-4052.89	4106.48 (553.77)	3088.15-5296.1	5028.83 (546.17)	4046.44-6170.02
Aug-2020	828.02 (136.71)	570.66-1096.56	1337.56 (198.16)	983.83-1757.62	1863.03 (220)	1463.26-2328.79
Sep-2020	3106.65 (397.31)	2337.52-3875.78	4516.66 (455.1)	3637.87-5416.11	5508.31 (459.5)	4650.54-6397.33
Oct-2020	2574.31 (402.39)	1871.96-3435.96	4210.4 (523.91)	3149.58-5186.37	5148.63 (494.44)	4200.76-6138.34
Nov-2020	325.72 (61.15)	200.44-450.99	620.41 (104.73)	434.29-831.35	775.51 (107.27)	569.52-981.51
Dec-2020	441.7 (85.19)	290.61-614.07	860.15 (132.98)	606.52-1135.84	1201.11 (132.75)	949.97-1474.09
Jan-2021	906.53 (146.78)	642.6-1228.12	1541.87 (187.73)	1196.68-1933.09	2045.5 (222.15)	1608.82-2482.18
Feb-2021	2137.65 (541.12)	1251.3-3316.22	2540.39 (557.12)	1669.4-3743.45	3206.47 (519.07)	2335.7-4302.86
Mar-2021	1951.81 (220.75)	1527.5-2386.99	2772.81 (278.75)	2234.85-3299.96	4074.02 (500.12)	3235.91-5195.42
Apr-2021	4762.2 (593.2)	3612.43-5933.87	6887.35 (634.2)	5705.11-8134.94	9788.1 (706.16)	8499.63-11293.41
May-2021	248.01 (76.67)	113.67-403.02	395.27 (129.8)	182.43-668.92	790.55 (223.12)	400.41-1242.55
Jun-2021	798.41 (213.54)	434.33-1232.99	999.95 (219.52)	609.97-1460.18	1395.28 (247.94)	933.28-1887.4
Jul-2021	829.44 (155.85)	539.86-1147.96	1418.58 (235.76)	984.32-1901.33	2116.24 (256.16)	1675.35-2664.89
Aug-2021	2261.14 (276.24)	1741.56-2802.08	3399.45 (336.45)	2784.31-4068.54	4568.73 (352.19)	3874.88-5262.58
Sep-2021	3285.19 (348.95)	2619.29-3983.29	4269.19 (366.68)	3586.12-5016.3	5749.08 (399.53)	4983.95-6556.98
Oct-2021	2202.15 (278.41)	1669.87-2744.85	3248.94 (354.8)	2566.04-3952.53	4419.8 (388.52)	3742.73-5250.69
Nov-2021	936.58 (161.54)	643.9-1276.1	1192.02 (153.29)	917.85-1490.32	1610 (154.32)	1303.87-1905.07
Dec-2021	1092.7 (150.97)	813.15-1408.37	1782.41 (194.76)	1411.28-2165.21	2417.88 (217.56)	1989.84-2846.22

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Feb-2022	100.75 (30.09)	44.78-167.91	217 (46.25)	137.05-319.79	449.5 (72.48)	303.71-583.13
Feb-2022	426.04 (82.18)	260.36-591.72	650.68 (105.87)	454.25-847.11	821.09 (118.33)	595-1059.09
Mar-2022	217.14 (68.99)	89.41-370.41	379.99 (80.6)	232.9-563.85	519.58 (86.72)	358.75-705.14
Apr-2022	1276.49 (181)	954.51-1691.61	1725.19 (189.99)	1384.29-2107.68	2336.36 (209.74)	1967.46-2766.74
May-2022	1327.62 (208.64)	936.02-1738.56	1871.09 (255.38)	1429.46-2427.61	3307.4 (486.67)	2478.08-4344.29
Jun-2022	2113.85 (539.18)	1138.76-3324.96	2462.29 (558.28)	1509.8-3627.83	2942.36 (558.9)	1937.9-4139.85
Jul-2022	5789.94 (967.79)	4053.77-7699.97	9057.69 (1331.7)	6486.14-11660.96	10477.41 (1271.24)	7965.75-13107.59
Aug-2022	2598.5 (552.47)	1546.72-3722.71	4338.63 (715.83)	2937.08-5750.75	7444.34 (962.29)	5750.78-9457.98
Sep-2022	2640.17 (449.93)	1821.66-3556.86	4039.3 (594.01)	2960.69-5261	6141.95 (855.54)	4543.68-7848.65

15 RAZORBILL

Table 15-1 Density of razorbill recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0.02 (0.02)	0-0.07	0.02 (0.02)	0-0.05	0.01 (0.01)	0-0.04
Aug-2020	0.02 (0.02)	0-0.07	0.02 (0.01)	0-0.05	0.01 (0.01)	0-0.04
Sep-2020	0.09 (0.04)	0.02-0.19	0.09 (0.03)	0.03-0.16	0.08 (0.03)	0.03-0.14
Oct-2020	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.04
Nov-2020	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0.08 (0.04)	0.01-0.17	0.09 (0.03)	0.03-0.15	0.07 (0.03)	0.02-0.12
Mar-2021	0.01 (0.01)	0-0.04	0.03 (0.01)	0-0.05	0.06 (0.02)	0.02-0.11
Apr-2021	0.08 (0.03)	0.02-0.14	0.12 (0.03)	0.06-0.19	0.14 (0.03)	0.08-0.2
May-2021	0 (0)	0-0	0 (0)	0-0	0.02 (0.01)	0-0.04
Jun-2021	0.06 (0.02)	0.02-0.11	0.04 (0.02)	0.01-0.08	0.08 (0.03)	0.03-0.14
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0.14 (0.07)	0.04-0.29	0.11 (0.05)	0.03-0.22	0.11 (0.04)	0.04-0.19
Sep-2021	0.08 (0.06)	0-0.21	0.06 (0.04)	0-0.15	0.07 (0.03)	0.01-0.14
Oct-2021	0.02 (0.02)	0-0.06	0.03 (0.01)	0-0.05	0.02 (0.01)	0-0.05
Nov-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Dec-2021	0.02 (0.01)	0-0.06	0.03 (0.01)	0-0.05	0.02 (0.01)	0-0.04
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0.06 (0.03)	0-0.13	0.04 (0.02)	0-0.1	0.03 (0.02)	0-0.07
Mar-2022	0.11 (0.05)	0.02-0.2	0.13 (0.05)	0.05-0.23	0.12 (0.04)	0.05-0.2
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0.12 (0.08)	0.01-0.29	0.13 (0.06)	0.04-0.27	0.16 (0.05)	0.06-0.27
Aug-2022	0.01 (0.01)	0-0.04	0.04 (0.02)	0-0.1	0.03 (0.02)	0-0.07
Sep-2022	0.12 (0.05)	0.04-0.22	0.24 (0.1)	0.07-0.47	0.3 (0.11)	0.12-0.54

Table 15-2 Density of razorbill (including unidentified auks apportioned using identified auk ratios) recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0.02 (0.02)	0-0.07	0.02 (0.02)	0-0.05	0.01 (0.01)	0-0.04
Aug-2020	0.02 (0.02)	0-0.07	0.02 (0.01)	0-0.05	0.01 (0.01)	0-0.04
Sep-2020	0.09 (0.04)	0.02-0.19	0.09 (0.03)	0.03-0.16	0.08 (0.03)	0.03-0.14
Oct-2020	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.04
Nov-2020	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0.08 (0.04)	0.01-0.17	0.09 (0.03)	0.03-0.15	0.07 (0.03)	0.02-0.12
Mar-2021	0.01 (0.01)	0-0.04	0.03 (0.01)	0-0.05	0.06 (0.02)	0.02-0.11
Apr-2021	0.08 (0.03)	0.02-0.14	0.13 (0.03)	0.07-0.2	0.15 (0.03)	0.08-0.21
May-2021	0 (0)	0-0	0 (0)	0-0	0.02 (0.01)	0-0.04
Jun-2021	0.06 (0.02)	0.02-0.11	0.04 (0.02)	0.01-0.08	0.08 (0.03)	0.03-0.14
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0.15 (0.07)	0.04-0.32	0.12 (0.05)	0.03-0.23	0.11 (0.04)	0.04-0.2
Sep-2021	0.08 (0.06)	0-0.21	0.06 (0.04)	0-0.15	0.07 (0.03)	0.01-0.14
Oct-2021	0.02 (0.02)	0-0.06	0.03 (0.01)	0-0.05	0.02 (0.01)	0-0.05
Nov-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Dec-2021	0.02 (0.01)	0-0.06	0.03 (0.01)	0-0.05	0.02 (0.01)	0-0.04
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0.07 (0.04)	0-0.16	0.05 (0.03)	0-0.11	0.04 (0.02)	0-0.09
Mar-2022	0.13 (0.06)	0.03-0.25	0.16 (0.06)	0.06-0.28	0.15 (0.05)	0.07-0.25
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0.12 (0.08)	0.01-0.29	0.13 (0.06)	0.04-0.27	0.16 (0.06)	0.06-0.29
Aug-2022	0.01 (0.01)	0-0.04	0.04 (0.02)	0-0.1	0.03 (0.02)	0-0.07
Sep-2022	0.12 (0.05)	0.04-0.22	0.26 (0.11)	0.08-0.5	0.31 (0.12)	0.12-0.56

Table 15-3 Density of razorbill (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0.02 (0.02)	0-0.07	0.02 (0.02)	0-0.05	0.01 (0.01)	0-0.04
Aug-2020	0.02 (0.02)	0-0.07	0.02 (0.01)	0-0.05	0.01 (0.01)	0-0.04
Sep-2020	0.12 (0.05)	0.03-0.24	0.1 (0.04)	0.03-0.19	0.1 (0.04)	0.04-0.18
Oct-2020	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.04
Nov-2020	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0.09 (0.04)	0.01-0.19	0.1 (0.04)	0.03-0.18	0.08 (0.03)	0.02-0.14
Mar-2021	0.01 (0.01)	0-0.04	0.03 (0.01)	0-0.05	0.07 (0.03)	0.02-0.14
Apr-2021	0.09 (0.03)	0.03-0.16	0.16 (0.04)	0.08-0.25	0.17 (0.04)	0.1-0.25
May-2021	0 (0)	0-0	0 (0)	0-0	0.03 (0.01)	0-0.05
Jun-2021	0.07 (0.03)	0.03-0.13	0.05 (0.02)	0.01-0.09	0.09 (0.04)	0.03-0.16
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0.19 (0.09)	0.05-0.39	0.15 (0.06)	0.03-0.28	0.13 (0.05)	0.05-0.23
Sep-2021	0.09 (0.07)	0-0.24	0.07 (0.05)	0-0.17	0.08 (0.04)	0.02-0.17
Oct-2021	0.02 (0.02)	0-0.06	0.03 (0.01)	0-0.05	0.02 (0.01)	0-0.05
Nov-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Dec-2021	0.02 (0.01)	0-0.06	0.03 (0.02)	0-0.07	0.03 (0.01)	0-0.05
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0.08 (0.04)	0-0.18	0.06 (0.03)	0-0.13	0.05 (0.03)	0-0.1
Mar-2022	0.15 (0.07)	0.03-0.29	0.19 (0.07)	0.08-0.34	0.17 (0.06)	0.08-0.29
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0.15 (0.09)	0.01-0.35	0.16 (0.07)	0.04-0.32	0.2 (0.07)	0.08-0.35
Aug-2022	0.01 (0.01)	0-0.04	0.05 (0.03)	0-0.12	0.04 (0.02)	0-0.09
Sep-2022	0.14 (0.06)	0.04-0.26	0.31 (0.13)	0.09-0.61	0.38 (0.14)	0.15-0.69

Table 15-4 Abundance of razorbill recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	16.04 (14.67)	0-48.12	16.04 (13.73)	0-48.12	16.04 (13.64)	0-48.12
Aug-2020	15.92 (13.58)	0-47.77	15.92 (13.19)	0-47.77	15.92 (14.03)	0-47.77
Sep-2020	61.98 (28.74)	15.49-123.96	77.47 (30.08)	23.24-139.45	92.97 (33.28)	38.74-162.89
Oct-2020	0 (0)	0-0	0 (0)	0-0	15.51 (14.39)	0-46.52
Nov-2020	0 (0)	0-0	7.76 (7.33)	0-23.27	7.76 (7.09)	0-23.27
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	54.22 (24.67)	7.75-108.43	77.45 (28.6)	23.24-131.67	77.45 (29.56)	23.24-139.41
Mar-2021	7.75 (7.24)	0-23.24	23.24 (11.63)	0-46.47	69.71 (28.34)	23.24-131.67
Apr-2021	54.29 (18.57)	15.51-93.07	108.58 (29.06)	54.29-170.63	162.88 (37.52)	93.07-232.87
May-2021	0 (0)	0-0	0 (0)	0-0	23.25 (12.87)	0-46.5
Jun-2021	38.76 (15.46)	15.5-69.76	38.76 (15.55)	7.75-69.76	93.02 (34.78)	31.01-162.78
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	92.92 (44.6)	23.23-193.59	100.67 (44.31)	23.23-193.78	123.9 (44.68)	46.27-217.01
Sep-2021	54.24 (38.04)	0-139.47	54.24 (36.85)	0-131.72	77.48 (40.09)	15.5-162.71
Oct-2021	15.51 (9.92)	0-38.77	23.26 (12.45)	0-46.52	23.26 (12.89)	0-54.28
Nov-2021	7.74 (7.2)	0-23.22	7.74 (7.46)	0-23.22	7.74 (7.04)	0-23.22
Dec-2021	15.5 (9.74)	0-38.75	23.25 (12.69)	0-46.5	23.25 (12.18)	0-46.5
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	38.73 (20.47)	0-85.21	38.73 (21.82)	0-85.21	38.73 (21.01)	0-85.21
Mar-2022	69.79 (30.21)	15.51-131.83	116.32 (42.07)	46.53-209.38	139.59 (44.16)	62.04-232.65
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	7.76 (6.12)	0-23.29	7.76 (6.23)	0-23.29	7.76 (6.28)	0-23.29
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	79.31 (50.87)	7.93-190.55	118.97 (54.96)	31.73-237.94	182.42 (63.02)	71.38-317.26
Aug-2022	7.8 (6.76)	0-23.41	39.02 (21.51)	0-85.84	39.02 (21.59)	0-85.84
Sep-2022	79.05 (30.33)	23.71-142.28	213.43 (93.13)	63.24-418.95	347.81 (128.47)	134.38-624.47

Table 15-5 Abundance of razorbill (including unidentified auks apportioned using identified auk ratios) recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	16.04 (14.67)	0-48.12	16.04 (13.73)	0-48.12	16.04 (13.64)	0-48.12
Aug-2020	15.92 (13.58)	0-47.77	15.92 (13.19)	0-47.77	15.92 (14.03)	0-47.77
Sep-2020	61.98 (28.74)	15.49-123.96	77.47 (30.08)	23.24-139.45	92.97 (33.28)	38.74-162.89
Oct-2020	0 (0)	0-0	0 (0)	0-0	15.51 (14.39)	0-46.52
Nov-2020	0 (0)	0-0	7.76 (7.33)	0-23.27	7.76 (7.09)	0-23.27
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	54.22 (24.67)	7.75-108.43	77.45 (28.6)	23.24-131.67	77.45 (29.56)	23.24-139.41
Mar-2021	7.75 (7.24)	0-23.24	23.24 (11.63)	0-46.47	69.71 (28.34)	23.24-131.67
Apr-2021	54.29 (18.57)	15.51-93.07	116.34 (31.14)	58.17-182.82	170.63 (39.31)	97.5-243.96
May-2021	0 (0)	0-0	0 (0)	0-0	23.25 (12.87)	0-46.5
Jun-2021	38.76 (15.46)	15.5-69.76	38.76 (15.55)	7.75-69.76	93.02 (34.78)	31.01-162.78
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	100.67 (48.32)	25.17-209.72	108.41 (47.72)	25.02-208.69	131.64 (47.47)	49.16-230.58
Sep-2021	54.24 (38.04)	0-139.47	54.24 (36.85)	0-131.72	77.48 (40.09)	15.5-162.71
Oct-2021	15.51 (9.92)	0-38.77	23.26 (12.45)	0-46.52	23.26 (12.89)	0-54.28
Nov-2021	7.74 (7.2)	0-23.22	7.74 (7.46)	0-23.22	7.74 (7.04)	0-23.22
Dec-2021	15.5 (9.74)	0-38.75	23.25 (12.69)	0-46.5	23.25 (12.18)	0-46.5
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	46.48 (24.56)	0-102.25	46.48 (26.19)	0-102.25	46.48 (25.22)	0-102.25
Mar-2022	85.3 (36.92)	18.96-161.13	139.59 (50.48)	55.84-251.26	170.61 (53.97)	75.83-284.35
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	7.76 (6.12)	0-23.29	7.76 (6.23)	0-23.29	7.76 (6.28)	0-23.29
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	79.31 (50.87)	7.93-190.55	118.97 (54.96)	31.73-237.94	190.35 (65.76)	74.49-331.05
Aug-2022	7.8 (6.76)	0-23.41	39.02 (21.51)	0-85.84	39.02 (21.59)	0-85.84
Sep-2022	79.05 (30.33)	23.71-142.28	229.24 (100.02)	67.92-449.98	363.62 (134.31)	140.49-652.86

Table 15-6 Abundance of razorbill (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	16.04 (14.67)	0-48.12	16.04 (13.73)	0-48.12	16.04 (13.64)	0-48.12
Aug-2020	15.92 (13.58)	0-47.77	15.92 (13.19)	0-47.77	15.92 (14.03)	0-47.77
Sep-2020	77.47 (35.93)	19.37-154.95	92.97 (36.1)	27.89-167.34	116.21 (41.6)	48.42-203.61
Oct-2020	0 (0)	0-0	0 (0)	0-0	15.51 (14.39)	0-46.52
Nov-2020	0 (0)	0-0	7.76 (7.33)	0-23.27	7.76 (7.09)	0-23.27
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	61.96 (28.2)	8.85-123.92	92.94 (34.32)	27.88-158	92.94 (35.48)	27.88-167.29
Mar-2021	7.75 (7.24)	0-23.24	23.24 (11.63)	0-46.47	85.2 (34.63)	28.4-160.93
Apr-2021	62.05 (21.22)	17.73-106.37	139.61 (37.36)	69.8-219.38	201.66 (46.46)	115.23-288.32
May-2021	0 (0)	0-0	0 (0)	0-0	31 (17.16)	0-62
Jun-2021	46.51 (18.55)	18.6-83.72	46.51 (18.67)	9.3-83.72	108.52 (40.58)	36.17-189.91
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	123.9 (59.47)	30.97-258.12	131.64 (57.94)	30.38-253.41	154.87 (55.85)	57.84-271.27
Sep-2021	61.98 (43.48)	0-159.39	61.98 (42.12)	0-150.53	92.98 (48.11)	18.6-195.25
Oct-2021	15.51 (9.92)	0-38.77	23.26 (12.45)	0-46.52	23.26 (12.89)	0-54.28
Nov-2021	7.74 (7.2)	0-23.22	7.74 (7.46)	0-23.22	7.74 (7.04)	0-23.22
Dec-2021	15.5 (9.74)	0-38.75	31 (16.92)	0-62	31 (16.24)	0-62
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	54.22 (28.65)	0-119.29	54.22 (30.55)	0-119.29	54.22 (29.42)	0-119.29
Mar-2022	100.81 (43.64)	22.4-190.43	170.61 (61.7)	68.24-307.09	201.63 (63.79)	89.61-336.04
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	7.76 (6.12)	0-23.29	7.76 (6.23)	0-23.29	7.76 (6.28)	0-23.29
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	95.18 (61.04)	9.52-228.66	142.77 (65.95)	38.07-285.53	230.01 (79.46)	90-400.02
Aug-2022	7.8 (6.76)	0-23.41	46.82 (25.81)	0-103	46.82 (25.91)	0-103
Sep-2022	94.86 (36.4)	28.46-170.74	276.66 (120.72)	81.97-543.08	442.66 (163.51)	171.03-794.78

16 BLACK GUILLEMOT

Table 16-1 Density of black guillemot recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km⁻²)					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 16-2 Abundance of black guillemot recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	7.75 (6.93)	0-23.26	7.75 (7.17)	0-23.26	7.75 (7.13)	0-23.26
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	7.75 (7.19)	0-23.26	7.75 (6.84)	0-23.26	7.75 (6.93)	0-23.26
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

17 PUFFIN

Table 17-1 Density of puffin recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km⁻²)					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	1.1 (0.16)	0.79-1.42	1.41 (0.19)	1.09-1.86	2.23 (0.6)	1.3-3.57
Aug-2020	1.13 (0.19)	0.76-1.52	1.43 (0.21)	1.05-1.87	1.95 (0.3)	1.38-2.54
Sep-2020	0.17 (0.05)	0.08-0.27	0.16 (0.04)	0.09-0.24	0.17 (0.03)	0.11-0.23
Oct-2020	0.12 (0.04)	0.05-0.2	0.11 (0.03)	0.06-0.18	0.11 (0.03)	0.06-0.16
Nov-2020	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.02
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Feb-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	1.28 (0.2)	0.92-1.71	1.21 (0.16)	0.93-1.55	1.17 (0.12)	0.94-1.42
May-2021	0.15 (0.05)	0.06-0.26	0.23 (0.06)	0.12-0.34	0.35 (0.08)	0.21-0.51
Jun-2021	5.24 (0.83)	3.76-6.99	4.79 (0.61)	3.71-6.04	4.78 (0.57)	3.72-5.98
Jul-2021	1.8 (0.26)	1.29-2.27	2.1 (0.25)	1.61-2.61	2.33 (0.23)	1.92-2.82
Aug-2021	1.69 (0.26)	1.19-2.19	1.84 (0.2)	1.45-2.24	1.98 (0.19)	1.61-2.37
Sep-2021	2.75 (0.39)	2.07-3.61	2.55 (0.31)	2-3.23	2.39 (0.23)	2.02-2.86
Oct-2021	0.24 (0.06)	0.13-0.35	0.21 (0.05)	0.12-0.3	0.18 (0.04)	0.11-0.25
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	1.47 (0.2)	1.11-1.87	1.36 (0.16)	1.07-1.69	1.17 (0.12)	0.96-1.4
May-2022	3.89 (0.68)	2.66-5.28	4.5 (0.6)	3.32-5.65	5.11 (0.53)	4.14-6.21
Jun-2022	5.75 (1.21)	3.59-8.14	5.33 (0.9)	3.79-7.2	5.28 (0.75)	3.89-6.87
Jul-2022	4.34 (0.63)	3.13-5.62	4.71 (0.6)	3.62-5.94	4.83 (0.6)	3.73-6.06
Aug-2022	2.72 (0.58)	1.68-3.94	4.22 (0.85)	2.66-5.91	4.59 (0.73)	3.27-6.11
Sep-2022	0.7 (0.13)	0.48-0.99	0.59 (0.11)	0.4-0.8	0.59 (0.08)	0.43-0.76

Table 17-2 Density of puffin (including unidentified auks apportioned using identified auk ratios) recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

	Density (birds km^{-2})					
Survey	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	1.2 (0.17)	0.86-1.54	1.54 (0.21)	1.2-2.03	2.43 (0.66)	1.42-3.89
Aug-2020	1.16 (0.2)	0.79-1.57	1.5 (0.22)	1.1-1.95	2.04 (0.32)	1.44-2.66
Sep-2020	0.17 (0.05)	0.08-0.27	0.16 (0.04)	0.09-0.24	0.17 (0.03)	0.11-0.23
Oct-2020	0.12 (0.04)	0.05-0.2	0.11 (0.03)	0.06-0.18	0.11 (0.03)	0.06-0.16
Nov-2020	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.02
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Feb-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	1.34 (0.21)	0.96-1.79	1.27 (0.16)	0.97-1.62	1.22 (0.13)	0.98-1.49
May-2021	0.15 (0.05)	0.06-0.26	0.23 (0.06)	0.12-0.34	0.36 (0.08)	0.21-0.52
Jun-2021	5.26 (0.83)	3.76-7.01	4.79 (0.61)	3.72-6.05	4.79 (0.57)	3.73-5.99
Jul-2021	1.81 (0.26)	1.3-2.28	2.13 (0.26)	1.64-2.65	2.36 (0.23)	1.94-2.85
Aug-2021	1.78 (0.27)	1.26-2.32	1.94 (0.21)	1.54-2.37	2.07 (0.2)	1.68-2.48
Sep-2021	2.82 (0.4)	2.12-3.71	2.62 (0.32)	2.06-3.32	2.46 (0.23)	2.07-2.94
Oct-2021	0.24 (0.06)	0.13-0.35	0.22 (0.05)	0.13-0.32	0.19 (0.04)	0.12-0.26
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	1.52 (0.2)	1.14-1.93	1.39 (0.16)	1.1-1.73	1.2 (0.12)	0.98-1.44
May-2022	3.94 (0.69)	2.69-5.34	4.58 (0.61)	3.37-5.75	5.21 (0.54)	4.22-6.32
Jun-2022	5.82 (1.23)	3.63-8.24	5.4 (0.91)	3.85-7.3	5.38 (0.76)	3.97-7
Jul-2022	4.5 (0.66)	3.24-5.82	4.84 (0.61)	3.72-6.11	4.99 (0.62)	3.85-6.26
Aug-2022	2.75 (0.59)	1.69-3.97	4.25 (0.86)	2.68-5.94	4.61 (0.74)	3.29-6.14
Sep-2022	0.73 (0.14)	0.51-1.04	0.62 (0.11)	0.42-0.84	0.61 (0.09)	0.45-0.78

Table 17-3 Density of puffin (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	1.39 (0.2)	1.01-1.8	1.79 (0.24)	1.39-2.37	2.84 (0.77)	1.66-4.53
Aug-2020	1.36 (0.23)	0.92-1.83	1.73 (0.25)	1.27-2.25	2.35 (0.36)	1.66-3.06
Sep-2020	0.19 (0.06)	0.09-0.31	0.18 (0.05)	0.1-0.28	0.2 (0.04)	0.13-0.27
Oct-2020	0.14 (0.04)	0.06-0.24	0.13 (0.04)	0.07-0.21	0.13 (0.03)	0.07-0.19
Nov-2020	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.02
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Feb-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	1.55 (0.25)	1.12-2.08	1.47 (0.19)	1.13-1.89	1.42 (0.15)	1.14-1.73
May-2021	0.18 (0.06)	0.07-0.3	0.26 (0.06)	0.14-0.39	0.42 (0.1)	0.25-0.61
Jun-2021	6.06 (0.96)	4.34-8.08	5.51 (0.71)	4.27-6.96	5.5 (0.66)	4.28-6.88
Jul-2021	2.08 (0.3)	1.49-2.63	2.46 (0.3)	1.89-3.06	2.71 (0.27)	2.23-3.28
Aug-2021	2.08 (0.32)	1.47-2.7	2.26 (0.24)	1.79-2.76	2.42 (0.23)	1.96-2.89
Sep-2021	3.28 (0.46)	2.46-4.31	3.05 (0.37)	2.4-3.87	2.86 (0.27)	2.41-3.42
Oct-2021	0.27 (0.06)	0.15-0.41	0.25 (0.05)	0.15-0.37	0.21 (0.04)	0.14-0.3
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	1.7 (0.23)	1.28-2.16	1.56 (0.18)	1.23-1.93	1.34 (0.14)	1.1-1.61
May-2022	4.52 (0.79)	3.09-6.13	5.24 (0.69)	3.87-6.59	5.96 (0.62)	4.83-7.23
Jun-2022	6.77 (1.43)	4.23-9.59	6.28 (1.06)	4.47-8.48	6.24 (0.89)	4.61-8.13
Jul-2022	5.22 (0.76)	3.77-6.76	5.61 (0.71)	4.31-7.09	5.77 (0.71)	4.45-7.23
Aug-2022	3.19 (0.68)	1.96-4.61	4.95 (1)	3.12-6.92	5.37 (0.86)	3.82-7.14
Sep-2022	0.86 (0.16)	0.59-1.21	0.72 (0.13)	0.48-0.97	0.7 (0.1)	0.52-0.91

Table 17-4 Abundance of puffin recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	721.84 (103.18)	521.33-930.58	1259.21 (168.22)	978.5-1660.24	2582.59 (699.84)	1507.65-4130.54
Aug-2020	740.44 (125.74)	501.59-995.21	1281.83 (186.85)	939.28-1671.95	2261.12 (349.32)	1592.34-2937.86
Sep-2020	108.46 (31.67)	54.23-178.19	139.45 (34.78)	77.47-216.92	201.43 (36.06)	131.7-271.15
Oct-2020	77.54 (24.55)	31.02-131.82	100.8 (27.23)	54.08-162.83	124.06 (29.44)	69.79-186.09
Nov-2020	0 (0)	0-0	0 (0)	0-0	7.76 (7.03)	0-23.27
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	7.75 (7.23)	0-23.24	7.75 (7.19)	0-23.24
Feb-2021	7.75 (6.87)	0-23.24	7.75 (7.15)	0-23.24	7.75 (7.04)	0-23.24
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	837.65 (133.42)	604.97-1124.62	1085.84 (139.55)	829.89-1388.52	1349.55 (143.11)	1085.65-1644.28
May-2021	100.76 (35.06)	38.75-170.51	201.51 (49.45)	108.51-302.27	403.02 (92.22)	240.26-589.04
Jun-2021	3441.7 (545.19)	2464.81-4589.13	4278.87 (548)	3317.48-5403.04	5526.88 (660.99)	4302.13-6915.38
Jul-2021	1178.27 (170.77)	844.94-1488.54	1875.93 (227.58)	1441.83-2333.29	2697.62 (265.76)	2216.82-3263.69
Aug-2021	1107.34 (169.79)	782.11-1440.31	1641.65 (177.71)	1300.73-2005.6	2292.11 (221.22)	1858.47-2741.43
Sep-2021	1805.3 (255.16)	1355.91-2370.91	2277.94 (276.31)	1789.81-2890.23	2766.07 (261.52)	2331.98-3308.43
Oct-2021	155.08 (36.35)	85.29-232.62	186.1 (40.57)	108.56-271.39	209.36 (41.4)	131.82-294.65
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	7.75 (7.77)	0-23.25	7.75 (7.36)	0-23.25	15.5 (9.6)	0-38.75
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	967.04 (129.97)	727.21-1230.07	1214.6 (139.39)	959.11-1508.77	1353.85 (136.72)	1106.1-1624.62
May-2022	2554.3 (444.65)	1746.67-3462.67	4021.67 (532.47)	2965.79-5054.26	5916.05 (612.41)	4790.1-7181.94

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jun-2022	3770.87 (795.1)	2353.89-5342.9	4761.98 (801.35)	3391.07-6434.67	6109.27 (866.24)	4506.07-7952.31
Jul-2022	2847.38 (415.2)	2054.04-3688.31	4211.59 (533.24)	3235.82-5314.85	5591.65 (689.25)	4314.69-7012.17
Aug-2022	1786.95 (382.26)	1100.07-2583.09	3776.8 (763.86)	2379.81-5283.22	5314.04 (849.8)	3784.4-7070.37
Sep-2022	458.47 (86.35)	315.99-648.19	529.61 (94.06)	355.71-719.53	679.8 (96.59)	498-877.42

Table 17-5 Abundance of puffin (including unidentified auks apportioned using identified auk ratios) recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	786.01 (112.35)	567.67-1013.29	1379.52 (184.29)	1071.98-1818.86	2815.18 (762.87)	1643.43-4502.55
Aug-2020	764.32 (129.79)	517.77-1027.31	1337.56 (194.97)	980.12-1744.65	2364.62 (365.31)	1665.23-3072.34
Sep-2020	108.46 (31.67)	54.23-178.19	139.45 (34.78)	77.47-216.92	201.43 (36.06)	131.7-271.15
Oct-2020	77.54 (24.55)	31.02-131.82	100.8 (27.23)	54.08-162.83	124.06 (29.44)	69.79-186.09
Nov-2020	0 (0)	0-0	0 (0)	0-0	7.76 (7.03)	0-23.27
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	7.75 (7.23)	0-23.24	7.75 (7.19)	0-23.24
Feb-2021	7.75 (6.87)	0-23.24	7.75 (7.15)	0-23.24	7.75 (7.04)	0-23.24
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	876.43 (139.6)	632.98-1176.69	1132.38 (145.53)	865.46-1448.03	1411.6 (149.69)	1135.56-1719.88
May-2021	100.76 (35.06)	38.75-170.51	201.51 (49.45)	108.51-302.27	410.77 (94)	244.88-600.36
Jun-2021	3449.45 (546.42)	2470.36-4599.46	4286.62 (549)	3323.49-5412.83	5542.38 (662.84)	4314.19-6934.78
Jul-2021	1186.02 (171.9)	850.5-1498.33	1906.94 (231.34)	1465.66-2371.85	2728.63 (268.82)	2242.3-3301.21
Aug-2021	1169.29 (179.29)	825.86-1520.89	1734.57 (187.77)	1374.36-2119.12	2400.52 (231.68)	1946.37-2871.1
Sep-2021	1851.79 (261.73)	1390.83-2431.97	2339.92 (283.83)	1838.51-2968.87	2843.55 (268.84)	2397.3-3401.1
Oct-2021	155.08 (36.35)	85.29-232.62	193.85 (42.26)	113.08-282.7	217.11 (42.94)	136.7-305.57
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	7.75 (7.77)	0-23.25	7.75 (7.36)	0-23.25	15.5 (9.6)	0-38.75
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	997.98 (134.13)	750.48-1269.43	1245.54 (142.94)	983.54-1547.21	1384.8 (139.84)	1131.38-1661.76
May-2022	2585.36 (450.06)	1767.91-3504.77	4091.54 (541.72)	3017.32-5142.08	6024.74 (623.66)	4878.1-7313.89

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jun-2022	3817.33 (804.9)	2382.89-5408.73	4831.67 (813.08)	3440.7-6528.84	6225.42 (882.71)	4591.74-8103.49
Jul-2022	2950.49 (430.23)	2128.42-3821.87	4330.56 (548.31)	3327.23-5464.98	5774.08 (711.73)	4455.46-7240.94
Aug-2022	1802.56 (385.6)	1109.68-2605.65	3800.21 (768.59)	2394.56-5315.97	5337.45 (853.54)	3801.07-7101.52
Sep-2022	482.19 (90.81)	332.33-681.71	553.33 (98.27)	371.64-751.74	703.52 (99.96)	515.37-908.03

Table 17-6 Abundance of puffin (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	914.33 (130.7)	660.35-1178.73	1604.09 (214.29)	1246.49-2114.95	3280.37 (888.93)	1914.99-5246.56
Aug-2020	891.71 (151.42)	604.06-1198.53	1544.57 (225.15)	1131.8-2014.65	2722.9 (420.66)	1917.53-3537.85
Sep-2020	123.96 (36.19)	61.98-203.64	162.69 (40.58)	90.38-253.08	232.42 (41.61)	151.97-312.87
Oct-2020	93.05 (29.46)	37.22-158.18	116.31 (31.41)	62.4-187.88	147.33 (34.96)	82.87-220.99
Nov-2020	0 (0)	0-0	0 (0)	0-0	7.76 (7.03)	0-23.27
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	7.75 (7.23)	0-23.24	7.75 (7.19)	0-23.24
Feb-2021	7.75 (6.87)	0-23.24	7.75 (7.15)	0-23.24	7.75 (7.04)	0-23.24
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	1016.04 (161.84)	733.81-1364.13	1318.52 (169.45)	1007.73-1686.06	1644.28 (174.37)	1322.75-2003.37
May-2021	116.26 (40.46)	44.71-196.74	232.51 (57.06)	125.2-348.77	480.53 (109.96)	286.47-702.31
Jun-2021	3976.56 (629.92)	2847.85-5302.3	4930 (631.4)	3822.32-6225.25	6364.05 (761.11)	4953.78-7962.87
Jul-2021	1364.31 (197.74)	978.36-1723.57	2201.51 (267.08)	1692.07-2738.24	3139.47 (309.29)	2579.92-3798.26
Aug-2021	1362.88 (208.98)	962.59-1772.69	2021.08 (218.79)	1601.37-2469.15	2795.44 (269.8)	2266.58-3343.44
Sep-2021	2153.97 (304.44)	1617.79-2828.81	2727.32 (330.82)	2142.9-3460.41	3308.43 (312.8)	2789.23-3957.14
Oct-2021	178.34 (41.8)	98.09-267.51	224.87 (49.03)	131.17-327.93	248.13 (49.07)	156.23-349.22
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	7.75 (7.77)	0-23.25	7.75 (7.36)	0-23.25	15.5 (9.6)	0-38.75
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	1114.03 (149.73)	837.75-1417.04	1392.53 (159.81)	1099.61-1729.8	1554.99 (157.03)	1270.43-1865.99

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
May-2022	2965.79 (516.28)	2028.05-4020.49	4689.36 (620.87)	3458.18-5893.38	6894.29 (713.67)	5582.16-8369.51
Jun-2022	4444.51 (937.15)	2774.4-6297.38	5613.71 (944.68)	3997.6-7585.59	7224.27 (1024.33)	5328.47-9403.68
Jul-2022	3426.38 (499.63)	2471.71-4438.3	5020.59 (635.68)	3857.39-6335.78	6670.33 (822.21)	5147.03-8364.87
Aug-2022	2091.28 (447.36)	1287.42-3023	4424.47 (894.85)	2787.92-6189.23	6211.42 (993.3)	4423.47-8264.34
Sep-2022	561.23 (105.7)	386.82-793.47	640.28 (113.72)	430.04-869.87	814.18 (115.68)	596.44-1050.87

18 AUK SPECIES GROUP (GUILLEMOT, RAZORBILL OR PUFFIN)

Table 18-1 Density of unidentified auk species (guillemot, razorbill or puffin) recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0.39 (0.1)	0.22-0.6	0.43 (0.08)	0.28-0.58	0.49 (0.09)	0.33-0.69
Aug-2020	0.07 (0.03)	0.01-0.13	0.11 (0.03)	0.05-0.17	0.14 (0.03)	0.08-0.21
Sep-2020	0.04 (0.02)	0-0.07	0.03 (0.02)	0.01-0.06	0.03 (0.01)	0.01-0.07
Oct-2020	0.08 (0.03)	0.02-0.14	0.08 (0.02)	0.03-0.12	0.07 (0.02)	0.03-0.11
Nov-2020	0.06 (0.03)	0.01-0.12	0.07 (0.03)	0.03-0.13	0.06 (0.02)	0.02-0.1
Dec-2020	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Jan-2021	0.12 (0.04)	0.05-0.2	0.14 (0.04)	0.08-0.21	0.11 (0.03)	0.05-0.17
Feb-2021	0.02 (0.02)	0-0.06	0.02 (0.01)	0-0.04	0.03 (0.01)	0.01-0.05
Mar-2021	0.05 (0.03)	0-0.11	0.04 (0.02)	0.01-0.09	0.04 (0.02)	0.01-0.07
Apr-2021	0.31 (0.07)	0.18-0.46	0.3 (0.05)	0.2-0.42	0.34 (0.05)	0.24-0.44
May-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03
Jun-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03
Jul-2021	0.02 (0.02)	0-0.06	0.05 (0.02)	0.02-0.1	0.05 (0.02)	0.01-0.08
Aug-2021	0.25 (0.06)	0.13-0.38	0.26 (0.05)	0.16-0.36	0.23 (0.04)	0.15-0.31
Sep-2021	0.18 (0.05)	0.08-0.3	0.16 (0.04)	0.09-0.26	0.17 (0.04)	0.09-0.26
Oct-2021	0.05 (0.02)	0.01-0.09	0.09 (0.03)	0.03-0.15	0.08 (0.02)	0.04-0.13
Nov-2021	0.11 (0.03)	0.05-0.18	0.1 (0.03)	0.05-0.17	0.08 (0.02)	0.03-0.13
Dec-2021	0.08 (0.03)	0.02-0.14	0.09 (0.03)	0.04-0.14	0.07 (0.02)	0.03-0.12
Feb-2022	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Feb-2022	0.02 (0.02)	0-0.06	0.02 (0.01)	0-0.04	0.01 (0.01)	0-0.03
Mar-2022	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Apr-2022	0.09 (0.04)	0.04-0.17	0.08 (0.03)	0.03-0.13	0.06 (0.02)	0.03-0.11
May-2022	0.07 (0.03)	0.01-0.14	0.1 (0.04)	0.04-0.18	0.13 (0.04)	0.07-0.21
Jun-2022	0.11 (0.04)	0.04-0.2	0.1 (0.03)	0.04-0.18	0.13 (0.03)	0.07-0.2
Jul-2022	0.39 (0.1)	0.21-0.6	0.35 (0.08)	0.22-0.51	0.38 (0.07)	0.26-0.52
Aug-2022	0.05 (0.03)	0-0.11	0.04 (0.02)	0.01-0.09	0.04 (0.02)	0.01-0.07
Sep-2022	0.17 (0.04)	0.1-0.25	0.18 (0.04)	0.11-0.26	0.15 (0.03)	0.09-0.21

Table 18-2 Abundance of unidentified auk species (guillemot, razorbill or puffin) recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	256.66 (63.22)	144.37-393	384.98 (70.56)	248.43-521.33	561.43 (107.12)	376.96-794.03
Aug-2020	47.77 (19.88)	7.96-87.58	95.54 (25.57)	47.77-151.27	159.23 (39.45)	87.58-238.85
Sep-2020	23.24 (12.61)	0-46.48	30.99 (13.91)	7.75-54.23	38.74 (15.64)	15.49-77.47
Oct-2020	54.28 (19.11)	15.51-93.05	69.79 (21.52)	23.26-108.75	77.54 (22.36)	31.02-124.06
Nov-2020	38.78 (18.23)	7.76-77.55	62.04 (22.54)	23.27-116.33	69.8 (23.51)	23.27-116.33
Dec-2020	7.75 (7.25)	0-23.25	7.75 (7.46)	0-23.25	7.75 (7.24)	0-23.25
Jan-2021	77.48 (26.83)	30.99-131.72	123.97 (31.46)	69.54-185.95	123.97 (31.64)	61.98-193.7
Feb-2021	15.49 (10.48)	0-38.73	15.49 (9.95)	0-38.73	30.98 (14.01)	7.75-61.96
Mar-2021	30.98 (18.38)	0-69.71	38.73 (19.84)	7.75-77.65	46.47 (20.01)	15.49-85.2
Apr-2021	201.66 (46.71)	116.34-302.68	271.46 (49.12)	178.39-372.29	387.8 (58.94)	279.22-511.9
May-2021	7.75 (7.18)	0-23.25	7.75 (7.81)	0-23.25	15.5 (10.37)	0-38.75
Jun-2021	7.75 (6.88)	0-23.25	7.75 (7.08)	0-23.25	15.5 (9.03)	0-31.01
Jul-2021	15.5 (10.36)	0-38.76	46.51 (18.92)	15.5-85.27	54.26 (20.25)	15.5-93.02
Aug-2021	162.62 (42.4)	85.18-247.99	232.31 (45.07)	147.13-325.23	271.03 (45.99)	178.1-356.21
Sep-2021	116.22 (36.07)	54.24-193.7	147.21 (40.21)	77.48-232.64	193.7 (49.87)	100.73-302.18
Oct-2021	31.02 (14.47)	7.75-62.03	77.54 (26.24)	31.02-131.82	93.05 (26.62)	46.52-147.33
Nov-2021	69.66 (21.92)	30.96-116.11	92.88 (27.25)	46.44-154.81	92.88 (28.72)	38.7-154.81
Dec-2021	54.25 (20.17)	15.5-93	77.5 (23.45)	38.55-123.99	85.25 (24.9)	38.75-139.49
Feb-2022	7.75 (6.86)	0-23.25	7.75 (7.38)	0-23.25	7.75 (7.29)	0-23.25
Feb-2022	15.49 (10.24)	0-38.73	15.49 (9.86)	0-38.73	15.49 (10.13)	0-38.73
Mar-2022	0 (0)	0-0	7.75 (7.23)	0-23.26	7.75 (7.29)	0-23.26
Apr-2022	61.89 (23.41)	23.21-108.31	69.63 (23)	23.21-116.04	69.63 (24.38)	30.75-123.78
May-2022	46.58 (21.53)	7.76-93.17	93.17 (31.51)	38.82-163.04	155.28 (40.75)	77.64-240.68
Jun-2022	69.69 (28.64)	23.23-131.63	92.92 (31.03)	38.72-162.6	154.86 (37.6)	85.17-232.29
Jul-2022	253.81 (68.09)	134.83-396.57	317.26 (71.6)	198.09-460.02	436.23 (77.7)	301.39-602.79
Aug-2022	31.21 (17.04)	0-70.23	39.02 (19)	7.8-78.03	46.82 (20.1)	15.61-85.84
Sep-2022	110.67 (27.26)	63.24-166	158.09 (37.19)	94.86-229.43	173.9 (37.95)	102.76-245.05

19 LARGE AUK SPECIES GROUP (GUILLEMOT OR RAZORBILL)

Table 19-1 Density of unidentified large auk species (guillemot or razorbill) recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0.04 (0.02)	0-0.08	0.03 (0.02)	0-0.06	0.03 (0.02)	0.01-0.07
Sep-2020	0.06 (0.02)	0.01-0.11	0.05 (0.02)	0.02-0.09	0.05 (0.02)	0.02-0.08
Oct-2020	0.07 (0.03)	0.02-0.13	0.1 (0.03)	0.04-0.17	0.08 (0.02)	0.03-0.13
Nov-2020	0.02 (0.01)	0-0.06	0.03 (0.02)	0.01-0.07	0.03 (0.01)	0.01-0.06
Dec-2020	0.04 (0.02)	0-0.08	0.07 (0.02)	0.03-0.12	0.07 (0.02)	0.03-0.11
Jan-2021	0.04 (0.02)	0-0.08	0.03 (0.02)	0.01-0.07	0.07 (0.02)	0.03-0.11
Feb-2021	0.09 (0.04)	0.02-0.18	0.08 (0.03)	0.03-0.13	0.06 (0.02)	0.02-0.11
Mar-2021	0.11 (0.04)	0.04-0.19	0.1 (0.03)	0.04-0.18	0.09 (0.03)	0.05-0.15
Apr-2021	0.15 (0.04)	0.07-0.24	0.15 (0.04)	0.08-0.23	0.14 (0.03)	0.09-0.19
May-2021	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.02
Jun-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Jul-2021	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.01
Aug-2021	0.02 (0.02)	0-0.06	0.02 (0.01)	0-0.04	0.01 (0.01)	0-0.03
Sep-2021	0.12 (0.07)	0.01-0.28	0.09 (0.05)	0.01-0.21	0.07 (0.04)	0.01-0.17
Oct-2021	0.13 (0.04)	0.06-0.21	0.12 (0.03)	0.06-0.18	0.14 (0.03)	0.09-0.19
Nov-2021	0.06 (0.02)	0.01-0.12	0.06 (0.02)	0.03-0.1	0.05 (0.02)	0.03-0.09
Dec-2021	0.13 (0.04)	0.05-0.22	0.15 (0.05)	0.06-0.24	0.13 (0.04)	0.06-0.21
Feb-2022	0 (0)	0-0	0.01 (0.01)	0-0.03	0.04 (0.02)	0.01-0.08
Feb-2022	0.06 (0.03)	0.01-0.12	0.09 (0.03)	0.03-0.14	0.07 (0.02)	0.03-0.11
Mar-2022	0.07 (0.03)	0.02-0.14	0.07 (0.03)	0.03-0.12	0.08 (0.03)	0.03-0.14
Apr-2022	0.01 (0.01)	0-0.04	0.02 (0.01)	0-0.04	0.02 (0.01)	0-0.05
May-2022	0.02 (0.02)	0-0.07	0.02 (0.02)	0-0.05	0.04 (0.02)	0-0.08
Jun-2022	0.02 (0.02)	0-0.07	0.02 (0.02)	0-0.05	0.01 (0.01)	0-0.04
Jul-2022	0.07 (0.04)	0.01-0.16	0.11 (0.04)	0.04-0.19	0.12 (0.04)	0.06-0.2
Aug-2022	0 (0)	0-0	0.01 (0.01)	0-0.03	0.03 (0.01)	0.01-0.05
Sep-2022	0.04 (0.03)	0-0.1	0.08 (0.05)	0.01-0.19	0.08 (0.04)	0.03-0.16

Table 19-2 Abundance of unidentified large auk species (guillemot or razorbill) recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	23.89 (15.24)	0-55.73	23.89 (15.16)	0-55.73	39.81 (18.71)	7.96-79.62
Sep-2020	38.74 (14.97)	7.75-69.73	46.48 (16.53)	15.49-77.47	54.23 (18.16)	23.24-92.97
Oct-2020	46.52 (17.03)	15.51-85.29	93.05 (29.72)	38.77-155.08	93.05 (28.54)	38.77-155.08
Nov-2020	15.51 (9.77)	0-38.78	31.02 (14.53)	7.76-62.04	38.78 (15.24)	7.76-69.8
Dec-2020	23.25 (15.18)	0-54.24	61.99 (21.8)	23.25-108.49	77.49 (24.54)	31-123.99
Jan-2021	23.24 (12.86)	0-54.24	30.99 (14.31)	7.75-61.98	77.48 (25.31)	30.99-131.72
Feb-2021	61.96 (25.63)	15.49-116.18	69.71 (24.3)	30.98-116.18	69.71 (24.91)	23.24-123.92
Mar-2021	69.71 (27.16)	23.24-123.92	92.94 (30.23)	38.73-162.65	108.43 (30.69)	54.22-170.4
Apr-2021	100.83 (27.8)	46.54-155.12	131.85 (31.31)	69.8-201.66	162.88 (32.55)	100.83-224.92
May-2021	0 (0)	0-0	0 (0)	0-0	7.75 (6.96)	0-23.25
Jun-2021	7.75 (7.32)	0-23.25	7.75 (7.18)	0-23.25	7.75 (7.41)	0-23.25
Jul-2021	0 (0)	0-0	0 (0)	0-0	7.75 (5.9)	0-15.5
Aug-2021	15.49 (10.51)	0-38.72	15.49 (10.21)	0-38.72	15.49 (10.15)	0-38.72
Sep-2021	77.48 (47.31)	7.75-185.95	77.48 (47.12)	7.75-185.95	85.23 (46.99)	15.5-193.7
Oct-2021	85.29 (25.42)	38.77-139.57	108.56 (27.1)	54.28-162.83	162.83 (31.27)	100.8-224.87
Nov-2021	38.7 (15.88)	7.74-77.4	54.18 (18.22)	23.22-92.88	61.92 (19.24)	30.77-100.62
Dec-2021	85.25 (28.51)	31-147.24	131.74 (41.34)	54.25-216.99	147.24 (43.92)	69.75-240.24
Feb-2022	0 (0)	0-0	7.75 (6.59)	0-23.25	46.5 (20.42)	15.5-93
Feb-2022	38.73 (17.88)	7.75-77.46	77.46 (24.29)	30.98-124.13	85.21 (24.66)	38.73-131.68
Mar-2022	46.53 (20.71)	15.51-93.06	62.04 (23.02)	23.26-108.57	93.06 (33.41)	31.02-162.85
Apr-2022	7.74 (7.3)	0-23.21	15.47 (10.43)	0-38.68	23.21 (12.7)	0-54.15
May-2022	15.53 (14.63)	0-46.58	15.53 (14.78)	0-46.58	46.58 (26.52)	0-93.17
Jun-2022	15.49 (14.83)	0-46.46	15.49 (14.24)	0-46.46	15.49 (14.49)	0-46.46
Jul-2022	47.59 (25.54)	7.93-103.11	95.18 (34.11)	31.73-166.56	142.77 (41.42)	71.38-230.21
Aug-2022	0 (0)	0-0	7.8 (7.51)	0-23.41	31.21 (14.06)	7.8-62.43
Sep-2022	23.71 (16.52)	0-63.24	71.14 (41.49)	7.9-166	94.86 (41.2)	31.62-181.81

20 RED-THROATED DIVER

Table 20-1 Density of red-throated diver recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 20-2 Abundance of red-throated diver recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	7.75 (7.32)	0-23.26	7.75 (7.04)	0-23.26	7.75 (7.17)	0-23.26
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	7.74 (6.9)	0-23.22	7.74 (6.76)	0-23.22
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	7.76 (6.4)	0-23.29	7.76 (6.67)	0-23.29
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

21 GREAT NORTHERN DIVER

Table 21-1 Density of great northern diver recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 21-2 Abundance of great northern diver recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	7.75 (7.29)	0-23.26	7.75 (6.83)	0-23.26	7.75 (7.03)	0-23.26
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	7.75 (7.27)	0-23.25	7.75 (7.3)	0-23.25	7.75 (7.58)	0-23.25
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	7.76 (6.76)	0-23.29	7.76 (6.91)	0-23.29	7.76 (7.06)	0-23.29
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

22 EUROPEAN STORM-PETREL

Table 22-1 Density of European storm-petrel recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.02
Sep-2020	0 (0)	0-0	0 (0)	0-0	0.07 (0.07)	0-0.22
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0.31 (0.11)	0.11-0.54	0.25 (0.08)	0.1-0.44	0.24 (0.07)	0.11-0.39
Sep-2021	0.05 (0.02)	0.01-0.08	0.04 (0.02)	0.01-0.08	0.03 (0.01)	0.01-0.06
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 22-2 Abundance of European storm-petrel recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	7.96 (7.31)	0-23.89
Sep-2020	0 (0)	0-0	0 (0)	0-0	85.22 (77.04)	0-255.66
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	201.33 (74.25)	69.69-356.21	224.56 (75.82)	92.92-394.92	278.77 (83.15)	123.9-449.32
Sep-2021	30.99 (13.39)	7.75-54.24	38.74 (15.97)	7.75-69.73	38.74 (15.83)	15.5-69.93
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

23 FULMAR

Table 23-1 Density of fulmar recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

	Density (birds km⁻²)					
Survey	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0.72 (0.17)	0.44-1.1	0.89 (0.14)	0.63-1.18	1.2 (0.16)	0.9-1.52
Aug-2020	2.29 (1.15)	0.45-4.83	1.79 (0.86)	0.39-3.61	1.53 (0.65)	0.43-2.9
Sep-2020	4.18 (1.99)	0.93-8.38	3.57 (1.54)	1.17-7.01	2.91 (1.21)	0.99-5.55
Oct-2020	1.77 (0.46)	1.02-2.72	1.96 (0.35)	1.39-2.73	3.12 (0.68)	1.96-4.48
Nov-2020	1.38 (0.43)	0.67-2.36	1.21 (0.33)	0.67-1.93	1.66 (0.38)	0.93-2.45
Dec-2020	2.36 (0.53)	1.35-3.39	3.87 (1.07)	1.99-6.03	3.92 (0.93)	2.3-5.89
Jan-2021	1.91 (0.35)	1.31-2.67	2.15 (0.34)	1.54-2.84	2.42 (0.28)	1.92-3
Feb-2021	0.27 (0.07)	0.14-0.42	0.34 (0.06)	0.23-0.44	0.36 (0.05)	0.27-0.47
Mar-2021	1.22 (0.31)	0.72-1.94	1.23 (0.26)	0.81-1.81	1.2 (0.2)	0.85-1.61
Apr-2021	0.45 (0.28)	0.08-1.08	0.4 (0.22)	0.14-0.88	0.4 (0.17)	0.17-0.76
May-2021	0.07 (0.03)	0.02-0.13	0.27 (0.07)	0.13-0.42	0.21 (0.06)	0.1-0.35
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0.25 (0.05)	0.15-0.34	0.23 (0.04)	0.15-0.3	0.29 (0.04)	0.22-0.37
Aug-2021	1.46 (0.17)	1.14-1.79	1.42 (0.14)	1.15-1.7	1.43 (0.11)	1.22-1.65
Sep-2021	0.9 (0.13)	0.65-1.17	0.85 (0.1)	0.65-1.06	0.9 (0.09)	0.72-1.06
Oct-2021	2.17 (0.93)	0.63-4.19	1.89 (0.7)	0.67-3.42	2.01 (0.55)	1.07-3.23
Nov-2021	0.54 (0.09)	0.39-0.73	0.61 (0.07)	0.47-0.76	1.75 (0.52)	0.88-2.78
Dec-2021	2.62 (0.55)	1.66-3.73	2.33 (0.41)	1.57-3.14	2.02 (0.33)	1.43-2.67
Feb-2022	1.15 (0.14)	0.89-1.43	1.24 (0.13)	1-1.5	1.36 (0.11)	1.15-1.56
Feb-2022	1.55 (0.3)	0.99-2.16	1.7 (0.32)	1.13-2.42	1.79 (0.24)	1.36-2.27
Mar-2022	2.41 (0.28)	1.89-2.99	2.53 (0.25)	2.08-3.05	2.44 (0.19)	2.08-2.8
Apr-2022	0.68 (0.11)	0.48-0.9	0.61 (0.08)	0.45-0.77	0.58 (0.07)	0.46-0.72
May-2022	0.19 (0.04)	0.11-0.27	0.24 (0.04)	0.16-0.32	0.25 (0.03)	0.19-0.32
Jun-2022	0.19 (0.04)	0.11-0.28	0.19 (0.04)	0.12-0.27	0.18 (0.03)	0.12-0.24
Jul-2022	0.59 (0.14)	0.36-0.91	0.51 (0.1)	0.34-0.71	0.47 (0.09)	0.32-0.66
Aug-2022	0.5 (0.07)	0.37-0.63	0.5 (0.06)	0.39-0.61	0.55 (0.05)	0.45-0.67
Sep-2022	2.08 (0.21)	1.7-2.53	2.02 (0.17)	1.68-2.33	1.91 (0.14)	1.65-2.18

Table 23-2 Abundance of fulmar recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	473.21 (113.12)	288.74-722.24	794.03 (129.55)	561.43-1058.7	1387.54 (187.48)	1042.46-1756.68
Aug-2020	1504.76 (757.07)	294.38-3168.95	1600.3 (770.87)	350.31-3225.48	1775.46 (746.56)	501.19-3360.63
Sep-2020	2742.53 (1309.44)	612.03-5501.91	3191.87 (1377.79)	1045.69-6270.25	3362.31 (1397.63)	1146.4-6422.68
Oct-2020	1163.09 (299.23)	666.84-1783.41	1752.39 (310.83)	1240.63-2442.5	3605.59 (780.98)	2271.13-5179.84
Nov-2020	907.35 (284.7)	441.85-1551.02	1085.72 (299.55)	597.14-1721.83	1915.51 (442.06)	1077.77-2838.57
Dec-2020	1549.82 (350.67)	883.21-2224.19	3463.86 (956.6)	1782.3-5393.58	4533.23 (1072.77)	2665.31-6819.42
Jan-2021	1255.19 (226.74)	860.04-1751.07	1921.53 (300.39)	1379.16-2541.96	2797.07 (320.96)	2223.51-3471.73
Feb-2021	178.14 (46.9)	92.94-278.82	302.06 (49.23)	201.37-395	418.23 (61.43)	317.55-542.16
Mar-2021	797.76 (204.38)	472.46-1270.42	1099.83 (229.9)	720.31-1618.96	1386.41 (235.38)	983.46-1859.06
Apr-2021	294.73 (182.69)	54.29-705.8	356.78 (193.2)	123.9-783.36	465.36 (199.4)	193.9-884.38
May-2021	46.5 (17.78)	15.5-85.26	240.26 (66.7)	116.26-372.02	248.01 (71.77)	116.26-403.02
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	162.79 (32.16)	100.77-225	201.55 (35.52)	131.78-271.31	341.08 (45.46)	255.81-426.54
Aug-2021	960.21 (111.36)	750.94-1177.03	1269.95 (122.8)	1029.9-1517.75	1657.13 (126.65)	1417.08-1912.87
Sep-2021	588.85 (88.19)	426.14-767.25	759.31 (91.89)	581.11-945.27	1038.24 (104.6)	836.6-1231.94
Oct-2021	1426.74 (607.91)	410.77-2752.88	1690.38 (624.96)	597.06-3056.25	2326.21 (640.81)	1232.89-3737.83
Nov-2021	356.06 (56.81)	255.43-479.9	541.83 (66.93)	417.98-681.15	2027.98 (599.26)	1021.53-3212.44
Dec-2021	1720.42 (362.1)	1092.31-2449.08	2084.65 (368.14)	1402.49-2805.56	2332.64 (376.3)	1658.42-3092.1
Feb-2022	751.74 (90.67)	581.24-937.74	1108.24 (115.33)	891.24-1340.74	1573.23 (124.17)	1332.99-1805.73
Feb-2022	1014.75 (199.67)	650.68-1417.74	1518.25 (290.23)	1014.55-2161.18	2075.97 (281.26)	1572.47-2626.14
Mar-2022	1581.99 (183.39)	1240.78-1961.98	2264.42 (222.98)	1861.17-2729.71	2822.77 (219.21)	2404.01-3241.73
Apr-2022	448.7 (68.98)	317.19-587.96	541.54 (73.27)	402.29-688.53	673.06 (77.41)	533.8-827.78
May-2022	124.22 (27.76)	69.87-178.57	217.39 (36.86)	147.51-287.26	287.26 (39.68)	217.39-364.9
Jun-2022	123.89 (29.29)	69.69-185.83	170.35 (34.4)	108.21-240.03	209.06 (35.94)	139.37-278.75
Jul-2022	388.64 (89.94)	237.74-594.86	460.02 (87.55)	301.39-634.51	547.27 (101.94)	364.85-761.61
Aug-2022	327.74 (44.91)	241.71-413.57	444.79 (50.18)	351.15-546.23	639.87 (63.07)	522.82-772.53
Sep-2022	1367.51 (138.85)	1114.56-1659.99	1802.27 (153.49)	1501.89-2086.84	2213.32 (156.57)	1905.03-2521.6

24 CORY'S SHEARWATER

Table 24-1 Density of Cory's shearwater recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

	Density (birds km^{-2})					
Survey	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 24-2 Abundance of Cory's shearwater recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	7.74 (7.45)	0-23.23	7.74 (7.34)	0-23.23	7.74 (6.94)	0-23.23
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

25 SOOTY SHEARWATER

Table 25-1 Density of sooty shearwater recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0.01 (0.01)	0-0.04	0.02 (0.01)	0-0.04	0.01 (0.01)	0-0.03
Sep-2021	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 25-2 Abundance of sooty shearwater recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	7.74 (7.35)	0-23.23	15.49 (9.88)	0-38.72	15.49 (10.38)	0-38.72
Sep-2021	0 (0)	0-0	7.75 (6.67)	0-23.24	7.75 (6.71)	0-23.24
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

26 GREAT SHEARWATER

Table 26-1 Density of great shearwater recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km⁻²)					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.02

Table 26-2 Abundance of great shearwater recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	7.9 (6.83)	0-23.71

27 MANX SHEARWATER

Table 27-1 Density of Manx shearwater recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km⁻²)					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.02
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0.01 (0.01)	0-0.04	0.02 (0.01)	0-0.04	0.01 (0.01)	0-0.03
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.02
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.02
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.02 (0.01)	0-0.04
Aug-2022	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03
Sep-2022	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03

Table 27-2 Abundance of Manx shearwater recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	7.75 (7.24)	0-23.24
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	7.75 (7.07)	0-23.25	15.5 (10.3)	0-38.76	15.5 (10.55)	0-38.76
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	7.74 (6.2)	0-23.23
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	7.75 (6.69)	0-23.26
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	7.93 (7.44)	0-23.79	7.93 (7.28)	0-23.79	23.79 (12.3)	0-47.59
Aug-2022	7.8 (6.41)	0-23.41	7.8 (6.39)	0-23.41	15.61 (9.55)	0-31.21
Sep-2022	7.9 (7.65)	0-23.71	7.9 (7.47)	0-23.71	15.81 (10.36)	0-39.52

28 GANNET

Table 28-1 Density of gannet recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0.55 (0.29)	0.15-1.21	0.48 (0.2)	0.2-0.95	0.87 (0.38)	0.28-1.68
Aug-2020	2.94 (1.99)	0.4-7.61	2.21 (1.44)	0.36-5.59	1.82 (1.08)	0.36-4.32
Sep-2020	1.52 (0.24)	1.09-2.02	1.43 (0.17)	1.1-1.78	1.33 (0.15)	1.03-1.62
Oct-2020	1.16 (0.2)	0.74-1.55	0.99 (0.15)	0.71-1.28	0.92 (0.12)	0.68-1.18
Nov-2020	0.01 (0.01)	0-0.04	0.03 (0.02)	0-0.06	0.03 (0.01)	0.01-0.06
Dec-2020	0.08 (0.04)	0.02-0.15	0.08 (0.03)	0.03-0.15	0.06 (0.02)	0.02-0.11
Jan-2021	0.04 (0.02)	0-0.08	0.03 (0.02)	0.01-0.08	0.03 (0.01)	0.01-0.05
Feb-2021	0.09 (0.03)	0.04-0.17	0.09 (0.02)	0.04-0.13	0.08 (0.02)	0.04-0.13
Mar-2021	0.04 (0.02)	0-0.07	0.06 (0.02)	0.03-0.1	0.08 (0.02)	0.04-0.13
Apr-2021	0.4 (0.1)	0.22-0.61	0.44 (0.07)	0.3-0.6	0.44 (0.06)	0.31-0.56
May-2021	0.53 (0.13)	0.31-0.81	0.55 (0.11)	0.36-0.79	0.55 (0.09)	0.39-0.74
Jun-2021	0.26 (0.06)	0.15-0.38	0.27 (0.05)	0.17-0.37	0.25 (0.04)	0.18-0.34
Jul-2021	0.35 (0.07)	0.22-0.51	0.38 (0.07)	0.24-0.55	0.39 (0.07)	0.27-0.53
Aug-2021	0.76 (0.13)	0.53-1.03	0.77 (0.12)	0.55-1.03	1.06 (0.33)	0.6-1.82
Sep-2021	1.04 (0.15)	0.77-1.35	1 (0.12)	0.75-1.23	1.26 (0.19)	0.92-1.66
Oct-2021	1.7 (0.22)	1.28-2.17	1.63 (0.18)	1.28-1.99	1.5 (0.15)	1.23-1.8
Nov-2021	0.02 (0.02)	0-0.06	0.05 (0.02)	0.02-0.1	0.05 (0.02)	0.02-0.09
Dec-2021	0.01 (0.01)	0-0.04	0.02 (0.01)	0-0.04	0.02 (0.01)	0-0.05
Feb-2022	0.02 (0.02)	0-0.07	0.03 (0.02)	0-0.07	0.07 (0.03)	0.02-0.14
Feb-2022	0.11 (0.03)	0.05-0.19	0.09 (0.03)	0.03-0.14	0.08 (0.02)	0.04-0.13
Mar-2022	0.22 (0.05)	0.13-0.33	0.23 (0.05)	0.14-0.32	0.21 (0.04)	0.14-0.28
Apr-2022	0.95 (0.16)	0.68-1.28	0.91 (0.12)	0.67-1.16	0.84 (0.1)	0.65-1.03
May-2022	0.24 (0.05)	0.13-0.34	0.29 (0.05)	0.18-0.39	0.4 (0.08)	0.25-0.58
Jun-2022	0.54 (0.14)	0.29-0.84	0.48 (0.11)	0.28-0.72	0.45 (0.08)	0.3-0.64
Jul-2022	0.53 (0.1)	0.35-0.73	0.48 (0.08)	0.34-0.63	0.44 (0.06)	0.32-0.56
Aug-2022	0.2 (0.05)	0.12-0.31	0.24 (0.04)	0.16-0.32	0.3 (0.05)	0.21-0.4
Sep-2022	0.52 (0.09)	0.35-0.7	0.6 (0.1)	0.42-0.8	0.74 (0.1)	0.56-0.97

Table 28-2 Abundance of gannet recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	360.92 (191.72)	96.25-794.03	433.11 (182.98)	176.25-850.37	1002.56 (438.82)	328.84-1949.17
Aug-2020	1926.73 (1306.74)	262.74-4992.18	1974.5 (1290.62)	318.47-4999.94	2109.85 (1254.97)	421.97-5000.74
Sep-2020	999.4 (160.09)	712.55-1324.78	1278.3 (156.35)	983.9-1588.38	1533.96 (178.73)	1193.08-1875.03
Oct-2020	759.89 (133.99)	488.5-1015.77	883.95 (132.76)	635.63-1147.78	1062.29 (143.28)	790.9-1364.89
Nov-2020	7.76 (7.11)	0-23.27	23.27 (15.85)	0-54.29	31.02 (16.53)	7.56-69.8
Dec-2020	54.24 (23.17)	15.5-100.74	69.74 (27.7)	23.25-131.74	69.74 (26.8)	23.25-123.99
Jan-2021	23.24 (13.62)	0-54.24	30.99 (15.7)	7.75-69.73	30.99 (15.42)	7.75-61.98
Feb-2021	61.96 (20.05)	23.24-108.43	77.45 (21.24)	38.73-116.37	92.94 (24.98)	46.47-147.16
Mar-2021	23.24 (12.37)	0-46.47	54.22 (18.59)	23.24-92.94	92.94 (26.41)	46.47-147.16
Apr-2021	263.7 (63.07)	147.36-403.31	395.56 (66.68)	271.46-535.17	511.9 (74.65)	356.78-651.7
May-2021	348.77 (83.82)	201.51-534.78	496.03 (101.15)	317.77-705.29	635.54 (104.16)	449.53-852.55
Jun-2021	170.53 (38.6)	100.77-248.05	240.3 (45.55)	155.03-333.32	294.56 (46.88)	209.29-395.33
Jul-2021	232.55 (47.3)	147.28-333.33	341.08 (66.91)	217.05-488.36	449.6 (79.29)	310.07-612.39
Aug-2021	495.59 (84.42)	348.46-673.89	689.18 (104.29)	495.4-921.49	1231.23 (385.36)	689.18-2106.26
Sep-2021	681.83 (98.92)	503.43-883.28	891.03 (107.83)	674.08-1100.23	1456.64 (220.83)	1061.49-1921.72
Oct-2021	1116.58 (146.4)	837.44-1426.74	1457.76 (160.33)	1147.4-1775.67	1736.9 (173.33)	1426.74-2078.28
Nov-2021	15.48 (10.26)	0-38.7	46.44 (17.44)	15.48-85.14	61.92 (20.05)	23.22-100.62
Dec-2021	7.75 (7.44)	0-23.25	15.5 (9.99)	0-38.75	23.25 (12.56)	0-54.25
Feb-2022	15.5 (14.27)	0-46.5	23.25 (16.43)	0-62	85.25 (35.7)	23.25-162.75
Feb-2022	69.72 (22.94)	30.98-123.94	77.46 (23.73)	30.98-123.94	92.95 (25.16)	46.48-147.18
Mar-2022	147.34 (34.15)	85.3-217.14	201.63 (40.45)	124.08-286.93	240.4 (42.22)	162.85-325.7
Apr-2022	626.64 (103.25)	448.7-843.26	812.31 (110.08)	603.24-1036.66	967.04 (110.23)	750.42-1191.39
May-2022	155.28 (34.18)	85.4-225.15	256.21 (48.58)	163.04-349.37	458.07 (96.67)	287.26-667.69
Jun-2022	356.18 (92.52)	193.58-549.76	433.61 (101.43)	247.78-642.67	518.78 (97.51)	348.24-735.59
Jul-2022	348.98 (63.22)	230.01-475.89	428.3 (67.08)	301.39-563.13	507.61 (70)	372.78-650.38
Aug-2022	132.66 (30.41)	78.03-202.89	210.69 (38.76)	140.46-288.72	343.35 (53.04)	241.9-460.39
Sep-2022	339.9 (56.99)	229.24-458.47	537.52 (85.84)	379.23-719.33	861.61 (117.55)	648.19-1122.47

29 SHAG

Table 29-1 Density of shag recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

	Density (birds km⁻²)					
Survey	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0.01 (0.01)	0-0.04	0.02 (0.01)	0-0.04	0.02 (0.01)	0-0.05
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.02
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 29-2 Abundance of shag recorded per survey in flight and on the sea, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	7.76 (7.27)	0-23.27	15.51 (10.26)	0-38.78	23.27 (12.79)	0-54.29
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	7.75 (7.34)	0-23.25
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

MacArthur Green

West of Orkney Windfarm

Offshore Ornithology Technical Supporting Study 12

Annex 12.3 Matrix displacement tables

Date:	12th May 2023
Tel:	0141 342 5404
Web:	www.macarthurgreen.com
Address:	93 South Woodside Road |Glasgow | G20 6NT

Document Quality Record

Version	Status	Person Responsible	Date
0.1	Draft	Dr. N. Goodship	11/11/2022
0.2	Reviewed	Dr. R. McGregor	07/12/2022
0.3	Updated	Dr. N. Goodship	07/12/2022
1	Internal Approval	Dr. R. McGregor	07/12/2022
1.1	Updated	Dr. N. Goodship	03/05/2023
2	Internal Approval	Dr. R. McGregor	09/05/2023

CONTENTS

LIST OF TABLES

1 INTRODUCTION

1. This Annex provides displacement analysis results for species potentially at risk from disturbance and displacement from development of the West of Orkney Windfarm ('the Project'). The methods have used the 'Matrix Approach' for the displacement assessment followed Joint Statutory Nature Conservation Bodies[1] (SNCB 2022[2]) advice as summarised in the Supporting Study 12 (SS12): Offshore ornithology technical supporting study.

2. Seven species screened into the displacement assessment are: kittiwake, Arctic tern, guillemot, razorbill, puffin, fulmar and gannet. For full methodology details on the displacement screening procedure, refer to the SS12: Offshore ornithology technical supporting study. Impacts are assessed for two seasons (breeding and non-breeding seasons), except Arctic tern, which is assessed for the breeding season only.

3. The full range of potential displacement and mortality impacts are presented in the form of matrices. During formal scoping consultation (18th May 2022), the most likely displacement and mortality percentages (Table 1-1) for kittiwake, guillemot, razorbill and puffin were advised by NatureScot, and for fulmar, by the Royal Society for the Protection of Birds (RSPB). NatureScot advised in a letter (dated 5th April 2023) on the displacement and mortality rates to be used for Arctic tern which were in turn based on disturbance-sensitivity indices as assessed by Bradbury *et al.* 2014[3]. Displacement and mortality rates advised by consultees are highlighted in green within a range of cells within each matrix (dark green is the central value).

4. NatureScot also advised (letter dated 5th April 2023) that "*great skua scores 1 and 2 for Disturbance Susceptibility and Habitat Specialisation respectively in Bradbury et al. (2014) and European storm petrel 1 and 1, such that we would not require displacement assessment for these species*". For this reason, great skua and European storm-petrel were not included in the displacement assessment.

5. Mean seasonal peak abundance estimates recorded within the OAA plus a 2 km buffer presented in Table 1-2 were used to assess displacement effects for all species screened into the assessment. Methodology details of abundance calculations are summarised in SS12: Offshore ornithology technical supporting study.

6. A summary of displacement impact results is presented in Table 9-1.

---

[1] Statutory Nature Conservation Bodies in this case comprising Natural Resources Wales (NRW), Department of Agriculture, Environment and Rural Affairs / Northern Ireland Environment Agency (DAERA/NIEA), Natural England (NE), Scottish Natural Heritage (SNH) and Joint Nature Conservation Committee (JNCC).

[2] Joint SNCB 2022 Interim Displacement Advice Note - https://hub.jncc.gov.uk/assets/9aecb87c-80c5-4cfb-9102-39f0228dcc9a.

[3] Bradbury, G., Trinder, M., Furness, B., Banks, A.N, Caldow, R.W.G. and Hume, D.,2014. 'Mapping Seabird Sensitivity to Offshore Wind Farms'. PLoS ONE. 9(9): e106366. Corrected in 2017.

Table 1-1 Matrix table displacement and mortality inputs.

Species	Season	Displacement rate	Mortality rate
Kittiwake	Breeding	30%	1 to 3%
	Non-breeding	30%	1 to 3%
Arctic tern	Breeding	30 to 50%	3%
Guillemot	Breeding	60%	3 to 5%
	Non-breeding	60%	1 to 3%
Razorbill	Breeding	60%	3 to 5%
	Non-breeding	60%	1 to 3%
Puffin	Breeding	60%	3 to 5%
	Non-breeding	60%	1 to 3%
Fulmar	Breeding	10 to 30%	1 to 3%
	Non-breeding	10 to 30%	1 to 3%
Gannet	Breeding	70%	1 to 3%
	Non-breeding	70%	1 to 3%

Table 1-2 Peak mean abundance estimates for all birds on the sea and in flight within the OAA and 2 km buffer.

Species	Season	Peak mean abundance (number of individuals within OAA and 2 km buffer)	Month with peak mean abundance
Kittiwake	Breeding	690	July
	Non-breeding	1,217	March
Arctic tern	Breeding	89	June
Guillemot	Breeding	4,861	July
	Non-breeding	4,275	September
Razorbill	Breeding	70	April
	Non-breeding	144	September
Puffin	Breeding	5,272	June
	Non-breeding	2,663	August
Fulmar	Breeding	1,918	September
	Non-breeding	2,774	December
Gannet	Breeding	958	August
	Non-breeding	1,171	October

2 KITTIWAKE

Table 2-1 Displacement matrix for kittiwake in the breeding season.

		DISPLACEMENT										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
MORTALITY	0%	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1%	0	0.7	1.4	2.1	2.8	3.5	4.1	4.8	5.5	6.2	6.9
	2%	0	1.4	2.8	4.1	5.5	6.9	8.3	9.7	11.0	12.4	13.8
	3%	0	2.1	4.1	6.2	8.3	10.4	12.4	14.5	16.6	18.6	20.7
	4%	0	2.8	5.5	8.3	11.0	13.8	16.6	19.3	22.1	24.8	27.6
	5%	0	3.5	6.9	10.4	13.8	17.3	20.7	24.2	27.6	31.1	34.5
	10%	0	6.9	13.8	20.7	27.6	34.5	41.4	48.3	55.2	62.1	69.0
	15%	0	10.4	20.7	31.1	41.4	51.8	62.1	72.5	82.8	93.2	103.5
	20%	0	13.8	27.6	41.4	55.2	69.0	82.8	96.6	110.4	124.2	138.0
	30%	0	20.7	41.4	62.1	82.8	103.5	124.2	144.9	165.6	186.3	207.0
	40%	0	27.6	55.2	82.8	110.4	138.0	165.6	193.2	220.8	248.5	276.1
	50%	0	34.5	69.0	103.5	138.0	172.5	207.0	241.6	276.1	310.6	345.1
	60%	0	41.4	82.8	124.2	165.6	207.0	248.5	289.9	331.3	372.7	414.1
	70%	0	48.3	96.6	144.9	193.2	241.6	289.9	338.2	386.5	434.8	483.1
	80%	0	55.2	110.4	165.6	220.8	276.1	331.3	386.5	441.7	496.9	552.1
	90%	0	62.1	124.2	186.3	248.5	310.6	372.7	434.8	496.9	559.0	621.1
	100%	0	69.0	138.0	207.0	276.1	345.1	414.1	483.1	552.1	621.1	690.1

Table 2-2 Displacement matrix for kittiwake in the non-breeding season.

		DISPLACEMENT										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
MORTALITY	0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1%	0.0	1.2	2.4	3.7	4.9	6.1	7.3	8.5	9.7	11.0	12.2
	2%	0.0	2.4	4.9	7.3	9.7	12.2	14.6	17.0	19.5	21.9	24.3
	3%	0.0	3.7	7.3	11.0	14.6	18.3	21.9	25.6	29.2	32.9	36.5
	4%	0.0	4.9	9.7	14.6	19.5	24.3	29.2	34.1	38.9	43.8	48.7
	5%	0.0	6.1	12.2	18.3	24.3	30.4	36.5	42.6	48.7	54.8	60.8
	10%	0.0	12.2	24.3	36.5	48.7	60.8	73.0	85.2	97.3	109.5	121.7
	15%	0.0	18.3	36.5	54.8	73.0	91.3	109.5	127.8	146.0	164.3	182.5
	20%	0.0	24.3	48.7	73.0	97.3	121.7	146.0	170.3	194.7	219.0	243.4
	30%	0.0	36.5	73.0	109.5	146.0	182.5	219.0	255.5	292.0	328.5	365.0
	40%	0.0	48.7	97.3	146.0	194.7	243.4	292.0	340.7	389.4	438.0	486.7
	50%	0.0	60.8	121.7	182.5	243.4	304.2	365.0	425.9	486.7	547.6	608.4
	60%	0.0	73.0	146.0	219.0	292.0	365.0	438.0	511.0	584.1	657.1	730.1
	70%	0.0	85.2	170.3	255.5	340.7	425.9	511.0	596.2	681.4	766.6	851.7
	80%	0.0	97.3	194.7	292.0	389.4	486.7	584.1	681.4	778.7	876.1	973.4
	90%	0.0	109.5	219.0	328.5	438.0	547.6	657.1	766.6	876.1	985.6	1095.1
	100%	0.0	121.7	243.4	365.0	486.7	608.4	730.1	851.7	973.4	1095.1	1216.8

3 ARCTIC TERN

Table 3-1 Displacement matrix for Arctic tern in the breeding season.

		DISPLACEMENT										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
MORTALITY	0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1%	0.0	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.8	0.9
	2%	0.0	0.2	0.4	0.5	0.7	0.9	1.1	1.2	1.4	1.6	1.8
	3%	0.0	0.3	0.5	0.8	1.1	1.3	1.6	1.9	2.1	2.4	2.7
	4%	0.0	0.4	0.7	1.1	1.4	1.8	2.1	2.5	2.9	3.2	3.6
	5%	0.0	0.4	0.9	1.3	1.8	2.2	2.7	3.1	3.6	4.0	4.5
	10%	0.0	0.9	1.8	2.7	3.6	4.5	5.3	6.2	7.1	8.0	8.9
	15%	0.0	1.3	2.7	4.0	5.3	6.7	8.0	9.4	10.7	12.0	13.4
	20%	0.0	1.8	3.6	5.3	7.1	8.9	10.7	12.5	14.3	16.0	17.8
	30%	0.0	2.7	5.3	8.0	10.7	13.4	16.0	18.7	21.4	24.1	26.7
	40%	0.0	3.6	7.1	10.7	14.3	17.8	21.4	25.0	28.5	32.1	35.7
	50%	0.0	4.5	8.9	13.4	17.8	22.3	26.7	31.2	35.7	40.1	44.6
	60%	0.0	5.3	10.7	16.0	21.4	26.7	32.1	37.4	42.8	48.1	53.5
	70%	0.0	6.2	12.5	18.7	25.0	31.2	37.4	43.7	49.9	56.2	62.4
	80%	0.0	7.1	14.3	21.4	28.5	35.7	42.8	49.9	57.1	64.2	71.3
	90%	0.0	8.0	16.0	24.1	32.1	40.1	48.1	56.2	64.2	72.2	80.2
	100%	0.0	8.9	17.8	26.7	35.7	44.6	53.5	62.4	71.3	80.2	89.1

4 GUILLEMOT

Table 4-1 Displacement matrix for guillemot in the breeding season.

		DISPLACEMENT										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
MORTALITY	0%	0.0	0.0	0.0	0.0	0.0	12.2	14.6	17.0	0.0	0.0	0.0
	1%	0.0	4.9	9.7	14.6	19.4	24.3	29.2	34.0	38.9	43.7	48.6
	2%	0.0	9.7	19.4	29.2	38.9	48.6	58.3	68.1	77.8	87.5	97.2
	3%	0.0	14.6	29.2	43.7	58.3	72.9	87.5	102.1	116.7	131.2	145.8
	4%	0.0	19.4	38.9	58.3	77.8	97.2	116.7	136.1	155.5	175.0	194.4
	5%	0.0	24.3	48.6	72.9	97.2	121.5	145.8	170.1	194.4	218.7	243.0
	10%	0.0	48.6	97.2	145.8	194.4	243.0	291.7	340.3	388.9	437.5	486.1
	15%	0.0	72.9	145.8	218.7	291.7	364.6	437.5	510.4	583.3	656.2	729.1
	20%	0.0	97.2	194.4	291.7	388.9	486.1	583.3	680.5	777.7	875.0	972.2
	30%	0.0	145.8	291.7	437.5	583.3	729.1	875.0	1020.8	1166.6	1312.4	1458.3
	40%	0.0	194.4	388.9	583.3	777.7	972.2	1166.6	1361.1	1555.5	1749.9	1944.4
	50%	0.0	243.0	486.1	729.1	972.2	1215.2	1458.3	1701.3	1944.4	2187.4	2430.5
	60%	0.0	291.7	583.3	875.0	1166.6	1458.3	1749.9	2041.6	2333.2	2624.9	2916.5
	70%	0.0	340.3	680.5	1020.8	1361.1	1701.3	2041.6	2381.8	2722.1	3062.4	3402.6
	80%	0.0	388.9	777.7	1166.6	1555.5	1944.4	2333.2	2722.1	3111.0	3499.9	3888.7
	90%	0.0	437.5	875.0	1312.4	1749.9	2187.4	2624.9	3062.4	3499.9	3937.3	4374.8
	100%	0.0	486.1	972.2	1458.3	1944.4	2430.5	2916.5	3402.6	3888.7	4374.8	4860.9

Table 4-2 Displacement matrix for guillemot in the non-breeding season.

		DISPLACEMENT										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
MORTALITY	0%	0.0	2.1	4.3	6.4	8.6	10.7	12.8	15.0	17.1	19.2	21.4
	1%	0.0	4.3	8.6	12.8	17.1	21.4	25.7	29.9	34.2	38.5	42.8
	2%	0.0	8.6	17.1	25.7	34.2	42.8	51.3	59.9	68.4	77.0	85.5
	3%	0.0	12.8	25.7	38.5	51.3	64.1	77.0	89.8	102.6	115.4	128.3
	4%	0.0	17.1	34.2	51.3	68.4	85.5	102.6	119.7	136.8	153.9	171.0
	5%	0.0	21.4	42.8	64.1	85.5	106.9	128.3	149.6	171.0	192.4	213.8
	10%	0.0	42.8	85.5	128.3	171.0	213.8	256.5	299.3	342.0	384.8	427.5
	15%	0.0	64.1	128.3	192.4	256.5	320.6	384.8	448.9	513.0	577.1	641.3
	20%	0.0	85.5	171.0	256.5	342.0	427.5	513.0	598.5	684.0	769.5	855.0
	30%	0.0	128.3	256.5	384.8	513.0	641.3	769.5	897.8	1026.0	1154.3	1282.5
	40%	0.0	171.0	342.0	513.0	684.0	855.0	1026.0	1197.0	1368.0	1539.0	1710.0
	50%	0.0	213.8	427.5	641.3	855.0	1068.8	1282.5	1496.3	1710.0	1923.8	2137.5
	60%	0.0	256.5	513.0	769.5	1026.0	1282.5	1539.0	1795.5	2052.0	2308.5	2565.0
	70%	0.0	299.3	598.5	897.8	1197.0	1496.3	1795.5	2094.8	2394.0	2693.3	2992.5
	80%	0.0	342.0	684.0	1026.0	1368.0	1710.0	2052.0	2394.0	2736.0	3078.0	3420.0
	90%	0.0	384.8	769.5	1154.3	1539.0	1923.8	2308.5	2693.3	3078.0	3462.8	3847.5
	100%	0.0	427.5	855.0	1282.5	1710.0	2137.5	2565.0	2992.5	3420.0	3847.5	4275.0

5 RAZORBILL

Table 5-1 Displacement matrix for razorbill in the breeding season.

		DISPLACEMENT										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
MORTALITY	0%	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3
	1%	0.0	0.1	0.1	0.2	0.3	0.3	0.4	0.5	0.6	0.6	0.7
	2%	0.0	0.1	0.3	0.4	0.6	0.7	0.8	1.0	1.1	1.3	1.4
	3%	0.0	0.2	0.4	0.6	0.8	1.0	1.3	1.5	1.7	1.9	2.1
	4%	0.0	0.3	0.6	0.8	1.1	1.4	1.7	2.0	2.2	2.5	2.8
	5%	0.0	0.3	0.7	1.0	1.4	1.7	2.1	2.4	2.8	3.1	3.5
	10%	0.0	0.7	1.4	2.1	2.8	3.5	4.2	4.9	5.6	6.3	7.0
	15%	0.0	1.0	2.1	3.1	4.2	5.2	6.3	7.3	8.4	9.4	10.5
	20%	0.0	1.4	2.8	4.2	5.6	7.0	8.4	9.8	11.2	12.6	14.0
	30%	0.0	2.1	4.2	6.3	8.4	10.5	12.6	14.7	16.8	18.8	20.9
	40%	0.0	2.8	5.6	8.4	11.2	14.0	16.8	19.5	22.3	25.1	27.9
	50%	0.0	3.5	7.0	10.5	14.0	17.5	20.9	24.4	27.9	31.4	34.9
	60%	0.0	4.2	8.4	12.6	16.8	20.9	25.1	29.3	33.5	37.7	41.9
	70%	0.0	4.9	9.8	14.7	19.5	24.4	29.3	34.2	39.1	44.0	48.9
	80%	0.0	5.6	11.2	16.8	22.3	27.9	33.5	39.1	44.7	50.3	55.8
	90%	0.0	6.3	12.6	18.8	25.1	31.4	37.7	44.0	50.3	56.5	62.8
	100%	0.0	7.0	14.0	20.9	27.9	34.9	41.9	48.9	55.8	62.8	69.8

Table 5-2 Displacement matrix for razorbill in the non-breeding season.

		DISPLACEMENT										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
MORTALITY	0%	0.0	0.1	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.6	0.7
	1%	0.0	0.1	0.3	0.4	0.6	0.7	0.9	1.0	1.2	1.3	1.4
	2%	0.0	0.3	0.6	0.9	1.2	1.4	1.7	2.0	2.3	2.6	2.9
	3%	0.0	0.4	0.9	1.3	1.7	2.2	2.6	3.0	3.5	3.9	4.3
	4%	0.0	0.6	1.2	1.7	2.3	2.9	3.5	4.0	4.6	5.2	5.8
	5%	0.0	0.7	1.4	2.2	2.9	3.6	4.3	5.0	5.8	6.5	7.2
	10%	0.0	1.4	2.9	4.3	5.8	7.2	8.6	10.1	11.5	12.9	14.4
	15%	0.0	2.2	4.3	6.5	8.6	10.8	12.9	15.1	17.3	19.4	21.6
	20%	0.0	2.9	5.8	8.6	11.5	14.4	17.3	20.1	23.0	25.9	28.8
	30%	0.0	4.3	8.6	12.9	17.3	21.6	25.9	30.2	34.5	38.8	43.2
	40%	0.0	5.8	11.5	17.3	23.0	28.8	34.5	40.3	46.0	51.8	57.5
	50%	0.0	7.2	14.4	21.6	28.8	36.0	43.2	50.4	57.5	64.7	71.9
	60%	0.0	8.6	17.3	25.9	34.5	43.2	51.8	60.4	69.1	77.7	86.3
	70%	0.0	10.1	20.1	30.2	40.3	50.4	60.4	70.5	80.6	90.6	100.7
	80%	0.0	11.5	23.0	34.5	46.0	57.5	69.1	80.6	92.1	103.6	115.1
	90%	0.0	12.9	25.9	38.8	51.8	64.7	77.7	90.6	103.6	116.5	129.5
	100%	0.0	14.4	28.8	43.2	57.5	71.9	86.3	100.7	115.1	129.5	143.9

6 PUFFIN

Table 6-1 Displacement matrix for puffin in the breeding season.

		DISPLACEMENT										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
MORTALITY	0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1%	0.0	5.3	10.5	15.8	21.1	26.4	31.6	36.9	42.2	47.4	52.7
	2%	0.0	10.5	21.1	31.6	42.2	52.7	63.3	73.8	84.3	94.9	105.4
	3%	0.0	15.8	31.6	47.4	63.3	79.1	94.9	110.7	126.5	142.3	158.2
	4%	0.0	21.1	42.2	63.3	84.3	105.4	126.5	147.6	168.7	189.8	210.9
	5%	0.0	26.4	52.7	79.1	105.4	131.8	158.2	184.5	210.9	237.2	263.6
	10%	0.0	52.7	105.4	158.2	210.9	263.6	316.3	369.0	421.7	474.5	527.2
	15%	0.0	79.1	158.2	237.2	316.3	395.4	474.5	553.5	632.6	711.7	790.8
	20%	0.0	105.4	210.9	316.3	421.7	527.2	632.6	738.1	843.5	948.9	1054.4
	30%	0.0	158.2	316.3	474.5	632.6	790.8	948.9	1107.1	1265.2	1423.4	1581.6
	40%	0.0	210.9	421.7	632.6	843.5	1054.4	1265.2	1476.1	1687.0	1897.9	2108.7
	50%	0.0	263.6	527.2	790.8	1054.4	1318.0	1581.6	1845.2	2108.7	2372.3	2635.9
	60%	0.0	316.3	632.6	948.9	1265.2	1581.6	1897.9	2214.2	2530.5	2846.8	3163.1
	70%	0.0	369.0	738.1	1107.1	1476.1	1845.2	2214.2	2583.2	2952.2	3321.3	3690.3
	80%	0.0	421.7	843.5	1265.2	1687.0	2108.7	2530.5	2952.2	3374.0	3795.7	4217.5
	90%	0.0	474.5	948.9	1423.4	1897.9	2372.3	2846.8	3321.3	3795.7	4270.2	4744.7
	100%	0.0	527.2	1054.4	1581.6	2108.7	2635.9	3163.1	3690.3	4217.5	4744.7	5271.9

Table 6-2 Displacement matrix for puffin in the non-breeding season.

		DISPLACEMENT										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
MORTALITY	0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1%	0.0	2.7	5.3	8.0	10.7	13.3	16.0	18.6	21.3	24.0	26.6
	2%	0.0	5.3	10.7	16.0	21.3	26.6	32.0	37.3	42.6	47.9	53.3
	3%	0.0	8.0	16.0	24.0	32.0	40.0	47.9	55.9	63.9	71.9	79.9
	4%	0.0	10.7	21.3	32.0	42.6	53.3	63.9	74.6	85.2	95.9	106.5
	5%	0.0	13.3	26.6	40.0	53.3	66.6	79.9	93.2	106.5	119.9	133.2
	10%	0.0	26.6	53.3	79.9	106.5	133.2	159.8	186.4	213.1	239.7	266.3
	15%	0.0	40.0	79.9	119.9	159.8	199.8	239.7	279.7	319.6	359.6	399.5
	20%	0.0	53.3	106.5	159.8	213.1	266.3	319.6	372.9	426.1	479.4	532.7
	30%	0.0	79.9	159.8	239.7	319.6	399.5	479.4	559.3	639.2	719.1	799.0
	40%	0.0	106.5	213.1	319.6	426.1	532.7	639.2	745.7	852.3	958.8	1065.3
	50%	0.0	133.2	266.3	399.5	532.7	665.8	799.0	932.2	1065.3	1198.5	1331.7
	60%	0.0	159.8	319.6	479.4	639.2	799.0	958.8	1118.6	1278.4	1438.2	1598.0
	70%	0.0	186.4	372.9	559.3	745.7	932.2	1118.6	1305.1	1491.5	1677.9	1864.4
	80%	0.0	213.1	426.1	639.2	852.3	1065.3	1278.4	1491.5	1704.6	1917.6	2130.7
	90%	0.0	239.7	479.4	719.1	958.8	1198.5	1438.2	1677.9	1917.6	2157.3	2397.0
	100%	0.0	266.3	532.7	799.0	1065.3	1331.7	1598.0	1864.4	2130.7	2397.0	2663.4

7 FULMAR

Table 7-1 Displacement matrix for fulmar in the breeding season.

		DISPLACEMENT										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
MORTALITY	0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1%	0.0	1.9	3.8	5.8	7.7	9.6	11.5	13.4	15.3	17.3	19.2
	2%	0.0	3.8	7.7	11.5	15.3	19.2	23.0	26.8	30.7	34.5	38.4
	3%	0.0	5.8	11.5	17.3	23.0	28.8	34.5	40.3	46.0	51.8	57.5
	4%	0.0	7.7	15.3	23.0	30.7	38.4	46.0	53.7	61.4	69.0	76.7
	5%	0.0	9.6	19.2	28.8	38.4	47.9	57.5	67.1	76.7	86.3	95.9
	10%	0.0	19.2	38.4	57.5	76.7	95.9	115.1	134.2	153.4	172.6	191.8
	15%	0.0	28.8	57.5	86.3	115.1	143.8	172.6	201.4	230.1	258.9	287.7
	20%	0.0	38.4	76.7	115.1	153.4	191.8	230.1	268.5	306.9	345.2	383.6
	30%	0.0	57.5	115.1	172.6	230.1	287.7	345.2	402.7	460.3	517.8	575.3
	40%	0.0	76.7	153.4	230.1	306.9	383.6	460.3	537.0	613.7	690.4	767.1
	50%	0.0	95.9	191.8	287.7	383.6	479.5	575.3	671.2	767.1	863.0	958.9
	60%	0.0	115.1	230.1	345.2	460.3	575.3	690.4	805.5	920.6	1035.6	1150.7
	70%	0.0	134.2	268.5	402.7	537.0	671.2	805.5	939.7	1074.0	1208.2	1342.5
	80%	0.0	153.4	306.9	460.3	613.7	767.1	920.6	1074.0	1227.4	1380.8	1534.3
	90%	0.0	172.6	345.2	517.8	690.4	863.0	1035.6	1208.2	1380.8	1553.4	1726.0
	100%	0.0	191.8	383.6	575.3	767.1	958.9	1150.7	1342.5	1534.3	1726.0	1917.8

Table 7-2 Displacement matrix for fulmar in the non-breeding season.

		DISPLACEMENT										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
MORTALITY	0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1%	0.0	2.8	5.5	8.3	11.1	13.9	16.6	19.4	22.2	25.0	27.7
	2%	0.0	5.5	11.1	16.6	22.2	27.7	33.3	38.8	44.4	49.9	55.5
	3%	0.0	8.3	16.6	25.0	33.3	41.6	49.9	58.3	66.6	74.9	83.2
	4%	0.0	11.1	22.2	33.3	44.4	55.5	66.6	77.7	88.8	99.9	111.0
	5%	0.0	13.9	27.7	41.6	55.5	69.4	83.2	97.1	111.0	124.8	138.7
	10%	0.0	27.7	55.5	83.2	111.0	138.7	166.5	194.2	221.9	249.7	277.4
	15%	0.0	41.6	83.2	124.8	166.5	208.1	249.7	291.3	332.9	374.5	416.1
	20%	0.0	55.5	111.0	166.5	221.9	277.4	332.9	388.4	443.9	499.4	554.9
	30%	0.0	83.2	166.5	249.7	332.9	416.1	499.4	582.6	665.8	749.0	832.3
	40%	0.0	111.0	221.9	332.9	443.9	554.9	665.8	776.8	887.8	998.7	1109.7
	50%	0.0	138.7	277.4	416.1	554.9	693.6	832.3	971.0	1109.7	1248.4	1387.1
	60%	0.0	166.5	332.9	499.4	665.8	832.3	998.7	1165.2	1331.6	1498.1	1664.6
	70%	0.0	194.2	388.4	582.6	776.8	971.0	1165.2	1359.4	1553.6	1747.8	1942.0
	80%	0.0	221.9	443.9	665.8	887.8	1109.7	1331.6	1553.6	1775.5	1997.5	2219.4
	90%	0.0	249.7	499.4	749.0	998.7	1248.4	1498.1	1747.8	1997.5	2247.1	2496.8
	100%	0.0	277.4	554.9	832.3	1109.7	1387.1	1664.6	1942.0	2219.4	2496.8	2774.3

8 GANNET

Table 8-1 Displacement matrix for gannet in the breeding season.

		DISPLACEMENT										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
MORTALITY	0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1%	0.0	1.0	1.9	2.9	3.8	4.8	5.7	6.7	7.7	8.6	9.6
	2%	0.0	1.9	3.8	5.7	7.7	9.6	11.5	13.4	15.3	17.2	19.2
	3%	0.0	2.9	5.7	8.6	11.5	14.4	17.2	20.1	23.0	25.9	28.7
	4%	0.0	3.8	7.7	11.5	15.3	19.2	23.0	26.8	30.7	34.5	38.3
	5%	0.0	4.8	9.6	14.4	19.2	24.0	28.7	33.5	38.3	43.1	47.9
	10%	0.0	9.6	19.2	28.7	38.3	47.9	57.5	67.1	76.6	86.2	95.8
	15%	0.0	14.4	28.7	43.1	57.5	71.9	86.2	100.6	115.0	129.3	143.7
	20%	0.0	19.2	38.3	57.5	76.6	95.8	115.0	134.1	153.3	172.4	191.6
	30%	0.0	28.7	57.5	86.2	115.0	143.7	172.4	201.2	229.9	258.7	287.4
	40%	0.0	38.3	76.6	115.0	153.3	191.6	229.9	268.2	306.6	344.9	383.2
	50%	0.0	47.9	95.8	143.7	191.6	239.5	287.4	335.3	383.2	431.1	479.0
	60%	0.0	57.5	115.0	172.4	229.9	287.4	344.9	402.4	459.8	517.3	574.8
	70%	0.0	67.1	134.1	201.2	268.2	335.3	402.4	469.4	536.5	603.5	670.6
	80%	0.0	76.6	153.3	229.9	306.6	383.2	459.8	536.5	613.1	689.8	766.4
	90%	0.0	86.2	172.4	258.7	344.9	431.1	517.3	603.5	689.8	776.0	862.2
	100%	0.0	95.8	191.6	287.4	383.2	479.0	574.8	670.6	766.4	862.2	958.0

Table 8-2 Displacement matrix for gannet in the non-breeding season.

		DISPLACEMENT										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
MORTALITY	0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1%	0.0	1.2	2.3	3.5	4.7	5.9	7.0	8.2	9.4	10.5	11.7
	2%	0.0	2.3	4.7	7.0	9.4	11.7	14.1	16.4	18.7	21.1	23.4
	3%	0.0	3.5	7.0	10.5	14.1	17.6	21.1	24.6	28.1	31.6	35.1
	4%	0.0	4.7	9.4	14.1	18.7	23.4	28.1	32.8	37.5	42.2	46.8
	5%	0.0	5.9	11.7	17.6	23.4	29.3	35.1	41.0	46.8	52.7	58.6
	10%	0.0	11.7	23.4	35.1	46.8	58.6	70.3	82.0	93.7	105.4	117.1
	15%	0.0	17.6	35.1	52.7	70.3	87.8	105.4	123.0	140.5	158.1	175.7
	20%	0.0	23.4	46.8	70.3	93.7	117.1	140.5	163.9	187.4	210.8	234.2
	30%	0.0	35.1	70.3	105.4	140.5	175.7	210.8	245.9	281.0	316.2	351.3
	40%	0.0	46.8	93.7	140.5	187.4	234.2	281.0	327.9	374.7	421.6	468.4
	50%	0.0	58.6	117.1	175.7	234.2	292.8	351.3	409.9	468.4	527.0	585.5
	60%	0.0	70.3	140.5	210.8	281.0	351.3	421.6	491.8	562.1	632.3	702.6
	70%	0.0	82.0	163.9	245.9	327.9	409.9	491.8	573.8	655.8	737.7	819.7
	80%	0.0	93.7	187.4	281.0	374.7	468.4	562.1	655.8	749.4	843.1	936.8
	90%	0.0	105.4	210.8	316.2	421.6	527.0	632.3	737.7	843.1	948.5	1053.9
	100%	0.0	117.1	234.2	351.3	468.4	585.5	702.6	819.7	936.8	1053.9	1171.0

9 SUMMARY

Table 9-1 Summary of predicted seasonal displacement impacts.

Species	Season	Displacement Impact (central value)	Minimum Displacement	Maximum Displacement
Kittiwake	Breeding	4.1 (30% displacement & 2% mortality)	2.1 (30% displacement & 1% mortality)	6.2 (30% displacement & 3% mortality)
	Non-breeding	7.3 (30% displacement & 2% mortality)	3.7 (30% displacement & 1% mortality)	11.0 (30% displacement & 3% mortality)
Arctic tern	Breeding	1.1 (40% displacement & 3% mortality)	0.7 (30% displacement & 3% mortality)	1.4 (50% displacement & 3% mortality)
Guillemot	Breeding	116.7 (60% displacement & 4% mortality)	87.5 (60% displacement & 3% mortality)	145.8 (60% displacement & 5% mortality)
	Non-breeding	51.3 (60% displacement & 2% mortality)	25.7 (60% displacement & 1% mortality)	77.0 (60% displacement & 3% mortality)
Razorbill	Breeding	1.7 (60% displacement & 4% mortality)	1.3 (60% displacement & 3% mortality)	2.1 (60% displacement & 5% mortality)
	Non-breeding	1.7 (60% displacement & 2% mortality)	0.9 (60% displacement & 1% mortality)	2.6 (60% displacement & 3% mortality)
Puffin	Breeding	126.5 (60% displacement & 4% mortality)	94.9 (60% displacement & 3% mortality)	158.2 (60% displacement & 5% mortality)
	Non-breeding	32.0 (60% displacement & 2% mortality)	16.0 (60% displacement & 1% mortality)	47.9 (60% displacement & 3% mortality)
Fulmar	Breeding	7.7 (20% displacement & 2% mortality)	3.8 (10% displacement & 1% mortality)	11.5 (30% displacement & 3% mortality)
	Non-breeding	11.1 (20% displacement & 2% mortality)	5.5 (10% displacement & 1% mortality)	16.6 (30% displacement & 3% mortality)
Gannet	Breeding	13.4 (70% displacement & 2% mortality)	6.7 (70% displacement & 1% mortality)	20.1 (70% displacement & 3% mortality)
	Non-breeding	16.4 (70% displacement & 2% mortality)	8.2 (70% displacement & 1% mortality)	24.6 (70% displacement & 3% mortality)

West of Orkney Windfarm

Offshore Ornithology Technical Supporting Study 12

Annex 12.4
All design based estimates of density and abundance of birds in flight and on the sea.

Date:	12th May 2023
Tel:	0141 342 5404
Web:	www.macarthurgreen.com
Address:	93 South Woodside Road |Glasgow | G20 6NT

Document Quality Record

Version	Status	Person Responsible	Date
0.1	Draft	Dr. N. Goodship	08/11/2022
0.2	Reviewed	Dr. R. McGregor	07/12/2022
0.3	Updated	Dr. N. Goodship	08/12/2022
1	Internal Approval	Dr. R. McGregor	08/12/2022
1.1	Updated	Dr. N. Goodship	03/05/2023
2	Internal Approval	Dr. R. McGregor	09/05/2023

CONTENTS

LIST OF TABLES

1 INTRODUCTION

1. This Annex provides tables of bird density and abundance recorded in each calendar month by HiDef Aerial Surveying Limited (HiDef) for the West of Orkney Windfarm ('the Project') Offshore Environmental Impact Assessment (EIA) Report and Report to Inform Appropriate Assessment (RIAA).

2. Separate density and abundance estimates for each species recorded in flight or on the sea, within the OAA plus a 2 km and a 4 km buffer were calculated. These estimates have been derived from data collected over 27 surveys between July 2020 to September 2022.

3. For auk species (guillemots, razorbills and puffins), the density and abundance tables have been split into three categories including:

    1. Birds not accounting for unidentified auks and availability bias;
    2. Birds including unidentified auks apportioned using identified auk ratios; and
    3. Birds including unidentified auks apportioned using identified auk ratios and accounting for availability bias.

4. Monthly densities and abundances are summarised either as the mean calendar month density/abundance estimate or as the density/abundance estimate per survey. Standard deviation (S.D.) and 95% confidence interval (c.i.) ranges are provided. For all methodology details on density and abundance calculations, refer to Supporting Study 12 (SS12): Offshore ornithology technical supporting study.

Table 1-1 Key to species density and abundance tables. 'Fly' refers to birds recorded in flight and 'Sit' refers to birds recorded on the sea.

Species	Mean Density Fly	Mean Abundance Fly	Mean Density Sit	Mean Abundance Sit	All Density Fly	All Abundance Fly	All Density Sit	All Abundance Sit
Kittiwake	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8
Black-headed gull	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8
Little gull	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8
Common gull	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8
Great black-backed gull	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8
Herring gull	7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8
Lesser black-backed gull	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8
Common tern	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8
Arctic tern	10.1	10.2	10.3	10.4	10.5	10.6	10.7	10.8
Great skua	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8
Arctic skua	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8
Little auk	13.1	13.2	13.3	13.4	13.5	13.6	13.7	13.8
Guillemot	14.1-14.3	14.4-14.6	14.7-14.9	14.10-14.12	14.13-14.15	14.16-14.18	14.19-14.21	14.22-14.24
Razorbill	15.1-15.3	15.4-15.6	15.7-15.9	15.10-15.12	15.13-15.15	15.16-15.18	15.19-15.21	15.22-15.24
Black guillemot	16.1	16.2	16.3	16.4	16.5	16.6	16.7	16.8
Puffin	17.1-17.3	17.4-17.6	17.7-17.9	17.10-17.12	17.13-17.15	17.16-17.18	17.19-17.21	17.22-17.24
Auk species group	18.1	18.2	18.3	18.4	18.5	18.6	18.7	18.8
Large auk species group	19.1	19.2	19.3	19.4	19.5	19.6	19.7	19.8
Red-throated diver	20.1	20.2	20.3	20.4	20.5	20.6	20.7	20.8
Great northern diver	21.1	21.2	21.3	21.4	21.5	21.6	21.7	21.8
European storm-petrel	22.1	22.2	22.3	22.4	22.5	22.6	22.7	22.8
Fulmar	23.1	23.2	23.3	23.4	23.5	23.6	23.7	23.8
Cory's shearwater	24.1	24.2	24.3	24.4	24.5	24.6	24.7	24.8

Sooty shearwater	25.1	25.2	25.3	25.4	25.5	25.6	25.7	25.8
Great shearwater	26.1	26.2	26.3	26.4	26.5	26.6	26.7	26.8
Manx shearwater	27.1	27.2	27.3	27.4	27.5	27.6	27.7	27.8
Gannet	28.1	28.2	28.3	28.4	28.5	28.6	28.7	28.8
Shag	29.1	29.2	29.3	29.4	29.5	29.6	29.7	29.8

2 KITTIWAKE

Table 2-1 Mean density of kittiwake recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0.07 (0.03)	0.02-0.13	0.1 (0.03)	0.05-0.14	0.08 (0.02)	0.05-0.12
Feb	0.23 (0.06)	0.13-0.35	0.21 (0.04)	0.13-0.3	0.21 (0.04)	0.14-0.29
Mar	0.87 (0.19)	0.52-1.26	0.85 (0.14)	0.59-1.14	0.88 (0.11)	0.67-1.11
Apr	0.28 (0.06)	0.17-0.42	0.34 (0.06)	0.22-0.47	0.35 (0.06)	0.25-0.46
May	0.08 (0.04)	0.02-0.17	0.09 (0.04)	0.02-0.18	0.09 (0.04)	0.03-0.17
Jun	0.04 (0.03)	0-0.1	0.03 (0.02)	0.01-0.07	0.03 (0.02)	0.01-0.07
Jul	0.52 (0.23)	0.12-1	0.51 (0.19)	0.19-0.93	0.44 (0.15)	0.2-0.75
Aug	0.07 (0.02)	0.04-0.11	0.07 (0.02)	0.04-0.11	0.07 (0.01)	0.05-0.1
Sep	0.09 (0.03)	0.03-0.16	0.07 (0.03)	0.02-0.12	0.06 (0.02)	0.02-0.1
Oct	0.63 (0.13)	0.39-0.9	0.65 (0.11)	0.44-0.88	0.72 (0.11)	0.52-0.94
Nov	0.21 (0.06)	0.11-0.33	0.19 (0.04)	0.11-0.28	0.15 (0.03)	0.09-0.22
Dec	0.05 (0.02)	0.01-0.09	0.06 (0.02)	0.02-0.1	0.06 (0.02)	0.02-0.09

Table 2-2 Mean abundance of kittiwake recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	46.49 (17.39)	15.5-85.23	85.23 (22.72)	42.61-127.84	92.98 (21.67)	55.79-136.37
Feb	152.34 (36.28)	85.39-227.78	191.08 (39.05)	119.29-270.82	240.14 (43.91)	158.7-331.83
Mar	569.71 (124.8)	339.87-828.46	763.45 (126.6)	527.98-1022.23	1019.28 (128.61)	771.08-1282.22
Apr	186.03 (42.41)	112.41-274.25	306.19 (58.12)	197.62-422.41	403.06 (63.72)	285.99-535.1
May	50.43 (29.09)	11.65-112.48	77.58 (40.22)	21.35-164.81	100.86 (42.76)	40.31-195.75
Jun	27.12 (16.78)	2.99-66.18	27.12 (15.9)	4.91-63.77	34.87 (18.34)	7.43-75.31
Jul	343.54 (151.07)	76.47-657.74	459.84 (168.98)	169.22-831.71	512.62 (168.91)	225.73-871.98
Aug	47.72 (12.67)	23.54-73.2	66.24 (15.73)	37.89-100.54	84.77 (16.4)	55.51-118.22
Sep	56.87 (21.18)	18.08-104.73	59.51 (22.53)	18.08-107.39	67.41 (24.82)	22.47-118.87
Oct	414.84 (85.79)	255.32-587.93	581.55 (102.19)	394.02-788.47	837.43 (125.95)	596.65-1087.41
Nov	139.51 (37.36)	73.64-217.11	170.51 (38.58)	96.89-251.88	178.25 (39.99)	104.64-259.72
Dec	31 (13.61)	9.04-60.32	50.37 (18.23)	19.67-89.71	65.87 (21.15)	28.58-109.46

Table 2-3 Mean density of kittiwake recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0.01 (0)	0-0.01	0.02 (0)	0.01-0.03
Feb	0.06 (0.02)	0.04-0.09	0.05 (0.01)	0.03-0.08	0.05 (0.01)	0.03-0.07
Mar	0.54 (0.12)	0.32-0.79	0.51 (0.08)	0.35-0.68	0.58 (0.07)	0.44-0.72
Apr	0.02 (0)	0.01-0.02	0.01 (0)	0.01-0.02	0.01 (0)	0.01-0.01
May	0 (0)	0-0	0 (0)	0-0.01	0 (0)	0-0.01
Jun	0.12 (0.07)	0.01-0.29	0.09 (0.05)	0.02-0.21	0.08 (0.04)	0.02-0.17
Jul	0.32 (0.14)	0.06-0.61	0.26 (0.1)	0.09-0.47	0.22 (0.07)	0.09-0.38
Aug	0.03 (0.01)	0.01-0.05	0.02 (0.01)	0.01-0.03	0.03 (0.01)	0.02-0.05
Sep	0 (0)	0-0.01	0.01 (0)	0-0.01	0 (0)	0-0.01
Oct	0.26 (0.06)	0.15-0.39	0.24 (0.05)	0.16-0.34	0.26 (0.04)	0.18-0.34
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0.03 (0.01)	0.01-0.06	0.02 (0.01)	0.01-0.04	0.02 (0.01)	0.01-0.03

Table 2-4 Mean abundance of kittiwake recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	7.75 (2.07)	3.87-11.62	23.24 (5.42)	13.95-34.09
Feb	41.31 (10.07)	23.05-61.47	46.47 (10.04)	27.88-67.43	54.22 (10.53)	34.96-76.15
Mar	352.59 (77.53)	210.32-516.43	453.33 (74.74)	312.82-605.42	670.3 (82.92)	511.59-837.62
Apr	11.63 (2.27)	7.76-16.41	11.63 (2)	7.82-15.63	11.63 (1.7)	8.47-15.22
May	0 (0)	0-0	3.88 (1.05)	1.94-5.82	3.88 (0.95)	2.28-5.94
Jun	77.49 (48.21)	8.64-189.52	81.36 (48.16)	14.46-192.03	89.11 (46.45)	19.69-192.01
Jul	209.1 (93.07)	42.22-403.1	230.31 (85.97)	81.79-419.47	256.81 (86.53)	109.78-439.89
Aug	18.52 (5.56)	8.31-30.04	18.52 (4.77)	9.88-29.13	36.94 (9.15)	21.35-56.19
Sep	2.63 (1.77)	0-6.59	5.22 (2.96)	0-11.73	5.22 (2.55)	0.88-10.85
Oct	170.59 (41.74)	97.49-257.25	217.11 (40.71)	144.78-301.06	298.53 (50.09)	205.79-397.48
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	19.37 (8.41)	6.46-36.65	19.37 (6.93)	7.45-34.27	23.25 (7.34)	10.17-37.78

Table 2-5 Density of kittiwake recorded on each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km⁻²)					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0.18 (0.12)	0.02-0.44	0.18 (0.09)	0.05-0.37	0.17 (0.07)	0.07-0.33
Aug-2020	0.21 (0.05)	0.11-0.3	0.2 (0.04)	0.13-0.3	0.2 (0.03)	0.14-0.27
Sep-2020	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.02	0.01 (0)	0-0.02
Oct-2020	0.51 (0.13)	0.29-0.77	0.64 (0.12)	0.43-0.89	0.74 (0.13)	0.51-0.99
Nov-2020	0.3 (0.07)	0.17-0.45	0.26 (0.05)	0.16-0.37	0.2 (0.04)	0.13-0.29
Dec-2020	0.05 (0.02)	0.02-0.09	0.07 (0.02)	0.03-0.12	0.07 (0.02)	0.03-0.11
Jan-2021	0.07 (0.03)	0.02-0.13	0.1 (0.03)	0.05-0.14	0.08 (0.02)	0.05-0.12
Feb-2021	0.19 (0.05)	0.1-0.28	0.16 (0.04)	0.09-0.23	0.13 (0.03)	0.08-0.19
Mar-2021	0.66 (0.15)	0.39-0.98	0.73 (0.12)	0.5-0.97	0.68 (0.08)	0.52-0.83
Apr-2021	0.43 (0.08)	0.28-0.6	0.53 (0.09)	0.36-0.71	0.52 (0.08)	0.38-0.68
May-2021	0.06 (0.05)	0-0.18	0.08 (0.06)	0-0.23	0.07 (0.05)	0.01-0.17
Jun-2021	0.05 (0.03)	0.01-0.12	0.03 (0.02)	0.01-0.08	0.03 (0.02)	0.01-0.07
Jul-2021	0.12 (0.04)	0.06-0.19	0.11 (0.03)	0.06-0.18	0.11 (0.03)	0.07-0.17
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0.24 (0.08)	0.08-0.41	0.17 (0.06)	0.06-0.3	0.13 (0.05)	0.05-0.23
Oct-2021	0.76 (0.14)	0.49-1.02	0.66 (0.11)	0.45-0.87	0.7 (0.09)	0.52-0.89
Nov-2021	0.13 (0.04)	0.06-0.21	0.12 (0.03)	0.06-0.19	0.11 (0.03)	0.05-0.16
Dec-2021	0.05 (0.02)	0.01-0.09	0.04 (0.02)	0.02-0.08	0.05 (0.02)	0.02-0.08
Feb-2022	0.08 (0.03)	0.02-0.14	0.1 (0.03)	0.05-0.15	0.11 (0.03)	0.06-0.16
Feb-2022	0.42 (0.09)	0.27-0.62	0.39 (0.07)	0.26-0.53	0.38 (0.06)	0.27-0.5
Mar-2022	1.08 (0.23)	0.64-1.54	0.98 (0.16)	0.68-1.32	1.09 (0.14)	0.81-1.38
Apr-2022	0.14 (0.05)	0.06-0.24	0.16 (0.04)	0.09-0.23	0.17 (0.03)	0.11-0.24
May-2022	0.09 (0.04)	0.04-0.17	0.1 (0.03)	0.05-0.14	0.11 (0.03)	0.06-0.16
Jun-2022	0.04 (0.02)	0-0.08	0.03 (0.01)	0.01-0.06	0.03 (0.01)	0-0.06
Jul-2022	1.27 (0.54)	0.27-2.38	1.25 (0.45)	0.45-2.24	1.04 (0.34)	0.45-1.75
Aug-2022	0.01 (0.01)	0-0.03	0.02 (0.01)	0-0.04	0.02 (0.01)	0.01-0.04
Sep-2022	0.01 (0.01)	0-0.03	0.02 (0.01)	0-0.04	0.03 (0.01)	0.01-0.06

Table 2-6 Abundance of kittiwake recorded on each survey in flight per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	120.31 (77.01)	15.69-287.69	160.41 (77.64)	48.12-331.65	200.51 (80.4)	75.87-384.77
Aug-2020	135.35 (32.96)	70.62-200.08	183.12 (38.79)	113.66-265.21	230.89 (38.58)	159.85-307.85
Sep-2020	7.75 (6.83)	0-23.24	7.75 (4.83)	0-19.37	7.75 (4.79)	0-19.37
Oct-2020	333.42 (82.08)	189.97-504.01	573.79 (107.83)	382.42-796.3	860.69 (145.27)	592.19-1147.59
Nov-2020	193.88 (47.53)	108.57-294.89	232.65 (47.5)	139.59-333.47	232.65 (48.23)	147.35-333.47
Dec-2020	31 (13.46)	10.33-58.63	61.99 (22.19)	23.84-109.68	77.49 (24.45)	33.9-125.92
Jan-2021	46.49 (17.39)	15.5-85.23	85.23 (22.72)	42.61-127.84	92.98 (21.67)	55.79-136.37
Feb-2021	123.92 (31.7)	66.39-185.99	139.41 (32.88)	79-209.12	154.9 (34.09)	93.88-225.31
Mar-2021	433.74 (96.13)	258.65-644.73	650.6 (105.7)	446.49-863.22	782.27 (93.23)	606.74-965.54
Apr-2021	279.22 (54.56)	186.14-393.77	473.12 (81.33)	317.88-635.75	604.97 (88.61)	440.66-791.69
May-2021	38.75 (35.12)	0-116.26	69.75 (57.25)	0-201.51	77.5 (55.16)	7.56-201.51
Jun-2021	31.01 (19.77)	3.65-76.6	31.01 (18.97)	5.17-74.11	38.76 (19.8)	9.23-83.05
Jul-2021	77.52 (24.03)	38.76-124.03	100.77 (28.11)	54.26-162.79	131.78 (31.13)	77.52-201.55
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	154.96 (51.37)	54.24-271.18	154.96 (54.67)	54.24-271.18	154.96 (55.3)	54.24-271.38
Oct-2021	496.26 (89.5)	320.66-671.86	589.31 (96.55)	405.63-780.64	814.17 (106.64)	601.12-1027.23
Nov-2021	85.14 (27.19)	38.7-139.33	108.37 (29.67)	54.18-170.29	123.85 (31.75)	61.92-185.96
Dec-2021	31 (13.77)	7.75-62	38.75 (14.28)	15.5-69.75	54.25 (17.85)	23.25-93
Feb-2022	54.25 (19.16)	15.5-93	85.25 (22.69)	46.5-131.75	124 (30.34)	69.75-186
Feb-2022	278.86 (57.99)	174.29-404.35	348.58 (61.58)	232.38-471.6	441.53 (67.29)	312.47-584.18
Mar-2022	705.69 (153.47)	421.09-1012.18	876.3 (147.49)	609.46-1181.24	1256.29 (163.98)	935.42-1598.91
Apr-2022	92.84 (30.26)	38.68-154.73	139.25 (34.9)	77.36-209.07	201.14 (38.83)	131.32-278.51
May-2022	62.11 (23.07)	23.29-108.69	85.4 (23.19)	42.7-128.1	124.22 (30.35)	73.07-189.99
Jun-2022	23.23 (13.79)	2.32-55.75	23.23 (12.82)	4.65-53.43	30.97 (16.88)	5.63-67.58
Jul-2022	832.8 (352.18)	174.96-1561.5	1118.33 (401.19)	405.27-2000.68	1205.58 (395.2)	523.82-2029.64
Aug-2022	7.8 (5.06)	0-19.51	15.61 (8.39)	0-36.42	23.41 (10.61)	6.69-46.82
Sep-2022	7.9 (5.32)	0-19.76	15.81 (8.1)	0-31.62	39.52 (14.36)	13.17-65.87

Table 2-7 Density of kittiwake recorded on each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km⁻²)					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0.1 (0.06)	0.01-0.23	0.09 (0.04)	0.03-0.19	0.08 (0.03)	0.03-0.16
Aug-2020	0.07 (0.02)	0.04-0.11	0.05 (0.01)	0.03-0.08	0.07 (0.01)	0.05-0.09
Sep-2020	0 (0)	0-0	0.01 (0.01)	0-0.02	0.01 (0)	0-0.02
Oct-2020	0.51 (0.13)	0.29-0.77	0.48 (0.09)	0.32-0.66	0.5 (0.08)	0.35-0.67
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0.06 (0.03)	0.02-0.11	0.04 (0.02)	0.02-0.08	0.04 (0.01)	0.02-0.07
Jan-2021	0 (0)	0-0	0.01 (0)	0-0.01	0.02 (0)	0.01-0.03
Feb-2021	0.14 (0.04)	0.08-0.21	0.1 (0.02)	0.06-0.16	0.09 (0.02)	0.05-0.13
Mar-2021	0.63 (0.14)	0.37-0.93	0.6 (0.1)	0.41-0.79	0.7 (0.08)	0.54-0.86
Apr-2021	0.04 (0.01)	0.02-0.05	0.03 (0)	0.02-0.03	0.02 (0)	0.01-0.03
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0.15 (0.1)	0.02-0.38	0.12 (0.07)	0.02-0.29	0.11 (0.05)	0.03-0.23
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0.01 (0)	0.01-0.02	0.01 (0)	0.01-0.01	0.01 (0)	0.01-0.02
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0.05 (0.01)	0.03-0.07	0.05 (0.01)	0.03-0.07	0.05 (0.01)	0.04-0.07
Mar-2022	0.45 (0.1)	0.27-0.64	0.42 (0.07)	0.29-0.56	0.46 (0.06)	0.34-0.59
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0.01 (0)	0-0.01	0.01 (0)	0-0.01
Jun-2022	0.08 (0.05)	0.01-0.2	0.06 (0.03)	0.01-0.14	0.05 (0.03)	0.01-0.1
Jul-2022	0.86 (0.36)	0.18-1.61	0.68 (0.25)	0.25-1.22	0.58 (0.19)	0.25-0.98
Aug-2022	0.01 (0.01)	0-0.03	0.01 (0)	0-0.02	0.03 (0.01)	0.01-0.05
Sep-2022	0.01 (0.01)	0-0.03	0.01 (0)	0-0.02	0.01 (0)	0-0.01

Table 2-8 Abundance of kittiwake recorded on each survey on the sea per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	64.16 (41.07)	8.37-153.44	80.2 (38.82)	24.06-165.82	96.25 (38.59)	36.42-184.69
Aug-2020	47.77 (11.63)	24.92-70.62	47.77 (10.12)	29.65-69.18	79.62 (13.3)	55.12-106.16
Sep-2020	0 (0)	0-0	7.75 (4.83)	0-19.37	7.75 (4.79)	0-19.37
Oct-2020	333.42 (82.08)	189.97-504.01	426.47 (80.14)	284.23-591.85	581.55 (98.16)	400.13-775.4
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	38.75 (16.82)	12.92-73.29	38.75 (13.87)	14.9-68.55	46.49 (14.67)	20.34-75.55
Jan-2021	0 (0)	0-0	7.75 (2.07)	3.87-11.62	23.24 (5.42)	13.95-34.09
Feb-2021	92.94 (23.78)	49.79-139.49	92.94 (21.92)	52.67-139.41	100.69 (22.16)	61.02-146.45
Mar-2021	410.5 (90.98)	244.79-610.19	534.42 (86.83)	366.76-709.07	805.51 (96)	624.76-994.21
Apr-2021	23.27 (4.55)	15.51-32.81	23.27 (4)	15.63-31.27	23.27 (3.41)	16.95-30.45
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	100.77 (64.24)	11.86-248.96	108.52 (66.41)	18.09-259.4	124.03 (63.36)	29.53-265.77
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	7.75 (1.4)	5.01-10.5	7.75 (1.27)	5.34-10.27	15.51 (2.03)	11.45-19.57
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	30.98 (6.44)	19.37-44.93	46.48 (8.21)	30.98-62.88	61.97 (9.44)	43.86-81.99
Mar-2022	294.69 (64.09)	175.84-422.67	372.23 (62.65)	258.89-501.76	535.09 (69.84)	398.42-681.02
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	7.76 (2.11)	3.88-11.65	7.76 (1.9)	4.57-11.87
Jun-2022	54.2 (32.18)	5.42-130.08	54.2 (29.91)	10.84-124.66	54.2 (29.54)	9.85-118.26
Jul-2022	563.13 (238.14)	118.31-1055.87	610.72 (219.09)	221.32-1092.57	674.17 (221)	292.92-1135
Aug-2022	7.8 (5.06)	0-19.51	7.8 (4.2)	0-18.21	31.21 (14.15)	8.92-62.43
Sep-2022	7.9 (5.32)	0-19.76	7.9 (4.05)	0-15.81	7.9 (2.87)	2.63-13.17

3 BLACK-HEADED GULL

Table 3-1 Mean density of black-headed gull recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0.01 (0.01)	0-0.02	0 (0)	0-0.01	0 (0)	0-0.01
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 3-2 Mean abundance of black-headed gull recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 3-3 Mean density of black-headed gull recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 3-4 Mean abundance of black-headed gull recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 3-5 Density of black-headed gull recorded on each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 3-6 Abundance of black-headed gull recorded on each survey in flight per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	7.74 (7.27)	0-23.21	7.74 (7.65)	0-23.4	7.74 (7.28)	0-23.21
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 3-7 Density of black-headed gull recorded on each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 3-8 Abundance of black-headed gull recorded on each survey on the sea per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

4 LITTLE GULL

Table 4-1 Mean density of little gull recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0.01	0 (0)	0-0.01	0 (0)	0-0.01
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 4-2 Mean abundance of little gull recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	2.58 (2.34)	0-7.75	2.58 (2.57)	0-7.75	2.58 (2.55)	0-7.75
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 4-3 Mean density of little gull recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 4-4 Mean abundance of little gull recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 4-5 Density of little gull recorded on each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 4-6 Abundance of little gull recorded on each survey in flight per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	7.75 (7.02)	0-23.24	7.75 (7.71)	0-23.24	7.75 (7.65)	0-23.24
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 4-7 Density of little gull recorded on each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 4-8 Abundance of little gull recorded on each survey on the sea per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

5 COMMON GULL

Table 5-1 Mean density of common gull recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0.01	0 (0)	0-0.01
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 5-2 Mean abundance of common gull recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	3.88 (3.51)	0-11.63	3.88 (3.51)	0-11.63
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 5-3 Mean density of common gull recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 5-4 Mean abundance of common gull recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 5-5 Density of common gull recorded on each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 5-6 Abundance of common gull recorded on each survey in flight per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	7.76 (7.02)	0-23.27	7.76 (7.01)	0-23.27
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 5-7 Density of common gull recorded on each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 5-8 Abundance of common gull recorded on each survey on the sea per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

6 GREAT BLACK-BACKED GULL

Table 6-1 Mean density of great black-backed gull recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0.04 (0.01)	0.01-0.06	0.03 (0.01)	0.01-0.05	0.02 (0.01)	0.01-0.03
Feb	0.04 (0.01)	0.01-0.06	0.03 (0.01)	0.01-0.05	0.05 (0.02)	0.02-0.09
Mar	0.01 (0.01)	0-0.02	0.01 (0)	0-0.02	0.01 (0.01)	0-0.02
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0.01 (0.01)	0-0.02	0 (0)	0-0.01	0.01 (0.01)	0-0.03
Nov	0.06 (0.02)	0.03-0.1	0.08 (0.02)	0.04-0.12	0.07 (0.02)	0.04-0.1
Dec	0.09 (0.02)	0.05-0.13	0.1 (0.02)	0.06-0.13	0.1 (0.02)	0.07-0.13

Table 6-2 Mean abundance of great black-backed gull recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	23.24 (8.37)	8.72-40.68	23.24 (8.03)	11.62-40.68	23.24 (7.11)	10.57-38.04
Feb	23.24 (7.46)	9.67-38.15	28.4 (9.73)	13.16-48.93	59.39 (23.16)	22.08-109.73
Mar	3.88 (3.54)	0-11.63	7.75 (4.02)	0-15.51	15.5 (6.02)	5.62-27.74
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	7.75 (7.46)	0-23.25	7.75 (7.23)	0-23.25	7.75 (7.36)	0-23.25
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	3.88 (3.45)	0-11.63	3.88 (2.6)	0-9.69	11.63 (7.76)	0-29.08
Nov	42.64 (12.25)	21.32-66.93	69.74 (17.47)	37.93-105.2	77.48 (18.3)	43.8-113.84
Dec	58.12 (13.96)	31.91-86.31	85.25 (15.69)	56.68-119.92	112.37 (20.3)	76.96-152.63

Table 6-3 Mean density of great black-backed gull recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0.06 (0.02)	0.02-0.1	0.04 (0.01)	0.02-0.08	0.05 (0.02)	0.02-0.09
Feb	0.07 (0.03)	0.03-0.13	0.1 (0.05)	0.03-0.2	0.1 (0.04)	0.03-0.19
Mar	0.01 (0.01)	0-0.03	0.02 (0.01)	0-0.03	0.02 (0.01)	0.01-0.03
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0.01	0 (0)	0-0.01
Nov	0.11 (0.03)	0.06-0.18	0.1 (0.02)	0.06-0.15	0.09 (0.02)	0.06-0.13
Dec	0.12 (0.03)	0.07-0.18	0.15 (0.03)	0.1-0.22	0.14 (0.02)	0.1-0.19

Table 6-4 Mean abundance of great black-backed gull recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	38.74 (13.95)	14.53-67.8	38.74 (13.38)	19.37-67.8	61.98 (18.95)	28.17-101.43
Feb	49.06 (16.7)	18.74-83.21	87.79 (43.71)	25.57-180.94	111.03 (47.31)	37.31-215.61
Mar	7.75 (4.7)	0-19.36	15.5 (7.91)	0-30.99	19.37 (7.86)	6.01-34.36
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	3.88 (2.6)	0-9.69	3.88 (2.59)	0-9.69
Nov	73.57 (20.02)	36.79-115.13	92.92 (20.54)	54.91-134.94	104.53 (20.85)	64.63-145.65
Dec	81.37 (18.89)	45.59-119.15	135.62 (27.83)	86.69-197.91	162.74 (28.58)	112.8-219.44

Table 6-5 Density of great black-backed gull recorded on each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.02	0.02 (0.01)	0-0.05
Nov-2020	0.11 (0.03)	0.05-0.17	0.1 (0.03)	0.05-0.15	0.07 (0.02)	0.04-0.12
Dec-2020	0.01 (0.01)	0-0.03	0.02 (0.01)	0.01-0.03	0.03 (0.01)	0.02-0.05
Jan-2021	0.04 (0.01)	0.01-0.06	0.03 (0.01)	0.01-0.05	0.02 (0.01)	0.01-0.03
Feb-2021	0.02 (0.01)	0-0.04	0.02 (0.01)	0-0.04	0.06 (0.04)	0.01-0.14
Mar-2021	0 (0)	0-0	0 (0)	0-0	0.01 (0)	0-0.01
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0.02 (0.02)	0-0.07	0.02 (0.02)	0-0.05	0.01 (0.01)	0-0.04
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0.02 (0.01)	0.01-0.04	0.06 (0.01)	0.04-0.09	0.06 (0.01)	0.04-0.08
Dec-2021	0.17 (0.04)	0.1-0.23	0.17 (0.03)	0.12-0.23	0.16 (0.02)	0.12-0.21
Feb-2022	0.01 (0.01)	0-0.02	0.01 (0)	0-0.02	0.03 (0.01)	0.01-0.06
Feb-2022	0.07 (0.02)	0.04-0.11	0.07 (0.02)	0.04-0.11	0.06 (0.01)	0.03-0.08
Mar-2022	0.01 (0.01)	0-0.04	0.02 (0.01)	0-0.03	0.02 (0.01)	0.01-0.04
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 6-6 Abundance of great black-backed gull recorded on each survey in flight per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	7.75 (6.89)	0-23.26	7.75 (5.19)	0-19.38	23.26 (15.53)	0-58.15
Nov-2020	69.8 (20.39)	34.9-109.68	85.31 (23.78)	42.52-133.29	85.31 (24.02)	42.65-133.29
Dec-2020	7.75 (4.89)	0-19.37	15.5 (6.55)	5.81-31	38.75 (12.46)	17.61-63.4
Jan-2021	23.24 (8.37)	8.72-40.68	23.24 (8.03)	11.62-40.68	23.24 (7.11)	10.57-38.04
Feb-2021	15.49 (6.43)	3.1-27.88	15.49 (10.29)	2.32-37.95	69.71 (42.19)	11.62-167.29
Mar-2021	0 (0)	0-0	0 (0)	0-0	7.75 (3.3)	1.94-13.6
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	15.5 (14.93)	0-46.51	15.5 (14.46)	0-46.51	15.5 (14.72)	0-46.51
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	15.48 (4.1)	7.74-24.19	54.18 (11.16)	33.34-77.11	69.66 (12.59)	44.94-94.38
Dec-2021	108.49 (23.02)	63.82-153.25	154.99 (24.82)	107.55-208.84	185.99 (28.14)	136.32-241.87
Feb-2022	7.75 (3.55)	1.29-15.5	7.75 (3.45)	1.29-14.24	38.75 (11.39)	16.61-63.66
Feb-2022	46.48 (12.4)	24.61-71.08	61.97 (15.46)	35.88-94.58	69.72 (15.91)	38.03-98.24
Mar-2022	7.75 (7.07)	0-23.26	15.51 (8.03)	0-31.02	23.26 (8.74)	9.31-41.88
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 6-7 Density of great black-backed gull recorded on each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km⁻²)					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0.01 (0.01)	0-0.02	0.01 (0)	0-0.02
Nov-2020	0.06 (0.02)	0.03-0.09	0.04 (0.01)	0.02-0.07	0.03 (0.01)	0.02-0.05
Dec-2020	0.01 (0.01)	0-0.03	0.05 (0.02)	0.02-0.1	0.04 (0.01)	0.02-0.07
Jan-2021	0.06 (0.02)	0.02-0.1	0.04 (0.01)	0.02-0.08	0.05 (0.02)	0.02-0.09
Feb-2021	0.04 (0.01)	0.01-0.06	0.16 (0.1)	0.02-0.38	0.14 (0.09)	0.02-0.34
Mar-2021	0.02 (0.01)	0-0.06	0.03 (0.01)	0-0.05	0.02 (0.01)	0.01-0.04
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0.17 (0.04)	0.08-0.26	0.16 (0.03)	0.1-0.23	0.15 (0.03)	0.09-0.2
Dec-2021	0.24 (0.05)	0.14-0.33	0.25 (0.04)	0.17-0.34	0.24 (0.04)	0.18-0.31
Feb-2022	0.06 (0.03)	0.01-0.12	0.04 (0.02)	0.01-0.08	0.06 (0.02)	0.03-0.1
Feb-2022	0.13 (0.03)	0.07-0.2	0.1 (0.02)	0.06-0.15	0.09 (0.02)	0.05-0.12
Mar-2022	0 (0)	0-0	0.01 (0)	0-0.02	0.01 (0.01)	0.01-0.02
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 6-8 Abundance of great black-backed gull recorded on each survey on the sea per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	7.75 (5.19)	0-19.38	7.75 (5.18)	0-19.38
Nov-2020	38.78 (11.33)	19.39-60.93	38.78 (10.81)	19.33-60.59	38.78 (10.92)	19.39-60.59
Dec-2020	7.75 (4.89)	0-19.37	46.49 (19.66)	17.44-92.99	46.49 (14.95)	21.13-76.08
Jan-2021	38.74 (13.95)	14.53-67.8	38.74 (13.38)	19.37-67.8	61.98 (18.95)	28.17-101.43
Feb-2021	23.24 (9.65)	4.65-41.82	139.41 (92.62)	20.91-341.56	162.65 (98.44)	27.11-390.35
Mar-2021	15.49 (9.4)	0-38.73	23.24 (11.8)	0-46.47	23.24 (9.89)	5.81-40.81
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	108.37 (28.71)	54.18-169.32	147.07 (30.28)	90.5-209.29	170.29 (30.78)	109.86-230.71
Dec-2021	154.99 (32.89)	91.17-218.93	224.74 (36)	155.94-302.82	278.99 (42.2)	204.47-362.8
Feb-2022	38.75 (17.73)	6.46-77.5	38.75 (17.25)	6.46-71.2	69.75 (20.5)	29.89-114.59
Feb-2022	85.21 (22.73)	45.11-130.32	85.21 (21.25)	49.33-130.05	100.7 (22.98)	54.93-141.9
Mar-2022	0 (0)	0-0	7.75 (4.02)	0-15.51	15.51 (5.83)	6.2-27.92
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

7 HERRING GULL

Table 7-1 Mean density of herring gull recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03
Feb	0.01 (0.01)	0-0.02	0.01 (0)	0-0.01	0.01 (0.01)	0-0.02
Mar	0 (0)	0-0	0 (0)	0-0.01	0 (0)	0-0.01
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0.01 (0.01)	0-0.03	0.01 (0)	0-0.02	0.01 (0)	0-0.02
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 7-2 Mean abundance of herring gull recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	7.75 (7.37)	0-23.24	7.75 (7.48)	0-23.24	15.5 (9.65)	0-38.74
Feb	5.16 (3.32)	0-12.91	5.16 (3.24)	0-12.91	7.75 (5.85)	0-20.66
Mar	0 (0)	0-0	3.87 (3.52)	0-11.62	3.87 (3.71)	0-11.62
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	7.76 (4.18)	0-18.1	7.76 (4.05)	0-15.51	11.63 (5.23)	2.91-23.27
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 7-3 Mean density of herring gull recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0.01 (0.01)	0-0.02	0 (0)	0-0.01	0 (0)	0-0.01
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02	0.01 (0)	0-0.02
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 7-4 Mean abundance of herring gull recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	3.88 (3.75)	0-11.63	3.88 (3.71)	0-11.63	3.88 (3.48)	0-11.63
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	7.75 (6.81)	0-23.25	7.75 (6.63)	0-23.25
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	7.75 (5.58)	0-20.66	7.75 (5.44)	0-19.37	7.75 (5.34)	0.97-19.37
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 7-5 Density of herring gull recorded on each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0.02 (0.01)	0-0.06	0.02 (0.01)	0-0.03	0.02 (0.01)	0.01-0.04
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03
Feb-2021	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.02
Mar-2021	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0.02 (0.02)	0-0.06	0.02 (0.01)	0-0.04	0.01 (0.01)	0-0.03
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 7-6 Abundance of herring gull recorded on each survey in flight per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	15.51 (8.37)	0-36.19	15.51 (8.1)	0-31.02	23.27 (10.45)	5.82-46.53
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	7.75 (7.37)	0-23.24	7.75 (7.48)	0-23.24	15.5 (9.65)	0-38.74
Feb-2021	0 (0)	0-0	0 (0)	0-0	7.75 (7.32)	0-23.24
Mar-2021	0 (0)	0-0	7.75 (7.05)	0-23.24	7.75 (7.42)	0-23.24
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	15.49 (9.96)	0-38.73	15.49 (9.71)	0-38.73	15.49 (10.21)	0-38.73
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 7-7 Density of herring gull recorded on each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0.01 (0.01)	0-0.03	0.01 (0)	0-0.02	0.01 (0)	0-0.01
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0.02 (0.02)	0-0.05	0.01 (0.01)	0-0.04
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 7-8 Abundance of herring gull recorded on each survey on the sea per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	7.76 (4.18)	0-18.1	7.76 (4.05)	0-15.51	7.76 (3.48)	1.94-15.51
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	15.5 (13.62)	0-46.5	15.5 (13.27)	0-46.5
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	7.74 (6.97)	0-23.22	7.74 (6.84)	0-23.22	7.74 (7.19)	0-23.22
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	7.75 (7.51)	0-23.26	7.75 (7.41)	0-23.26	7.75 (6.97)	0-23.26
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

8 LESSER BLACK-BACKED GULL

Table 8-1 Mean density of lesser black-backed gull recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 8-2 Mean abundance of lesser black-backed gull recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 8-3 Mean density of lesser black-backed gull recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0.01	0 (0)	0-0.01	0 (0)	0-0.01
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 8-4 Mean abundance of lesser black-backed gull recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	2.58 (2.49)	0-7.74	2.58 (2.39)	0-7.74	5.16 (3.48)	0-12.91
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 8-5 Density of lesser black-backed gull recorded on each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 8-6 Abundance of lesser black-backed gull recorded on each survey in flight per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 8-7 Density of lesser black-backed gull recorded on each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km⁻²)					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 8-8 Abundance of lesser black-backed gull recorded on each survey on the sea per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	7.74 (7.46)	0-23.23	7.74 (7.18)	0-23.23	15.49 (10.44)	0-38.72
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

9 COMMON TERN

Table 9-1 Mean density of common tern recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0.01	0 (0)	0-0.01
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 9-2 Mean abundance of common tern recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	2.65 (2.17)	0-7.96	5.31 (2.79)	0-10.62
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 9-3 Mean density of common tern recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 9-4 Mean abundance of common tern recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 9-5 Density of common tern recorded on each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 9-6 Abundance of common tern recorded on each survey in flight per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	7.96 (6.52)	0-23.89	15.92 (8.37)	0-31.85
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 9-7 Density of common tern recorded on each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 9-8 Abundance of common tern recorded on each survey on the sea per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

10 ARCTIC TERN

Table 10-1 Mean density of arctic tern recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0.01 (0.01)	0-0.02	0 (0)	0-0.01	0 (0)	0-0.01
Jun	0.08 (0.05)	0-0.19	0.06 (0.04)	0-0.13	0.04 (0.03)	0-0.11
Jul	0.01 (0.01)	0-0.02	0.02 (0.01)	0-0.04	0.01 (0.01)	0-0.03
Aug	0 (0)	0-0.01	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 10-2 Mean abundance of arctic tern recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	3.88 (3.62)	0-11.65	3.88 (3.6)	0-11.65	3.88 (3.75)	0-11.65
Jun	50.39 (32.03)	0-122.68	50.39 (32.1)	0-116.11	50.39 (32.43)	0-122.68
Jul	5.29 (3.39)	0-13.22	15.86 (10.74)	0-39.66	15.86 (9.98)	0-37.01
Aug	2.6 (2.19)	0-7.51	10.34 (8.17)	0-30.46	12.95 (9.59)	0.47-28.73
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 10-3 Mean density of arctic tern recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0.06 (0.04)	0-0.14	0.04 (0.03)	0-0.1	0.03 (0.02)	0-0.08
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0.03 (0.03)	0-0.09	0.02 (0.02)	0-0.06	0.02 (0.01)	0-0.05
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 10-4 Mean abundance of arctic tern recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	38.76 (24.64)	0-94.37	38.76 (24.69)	0-89.31	38.76 (24.95)	0-94.37
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	20.81 (17.48)	0-60.11	20.81 (17.04)	0-57.8	23.41 (16.47)	2.13-59.59
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 10-5 Density of arctic tern recorded on each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0.15 (0.1)	0-0.37	0.11 (0.07)	0-0.26	0.09 (0.06)	0-0.21
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0.03 (0.02)	0-0.08	0.02 (0.02)	0-0.04
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0.02 (0.02)	0-0.06	0.05 (0.04)	0-0.13	0.04 (0.03)	0-0.1
Aug-2022	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02	0.01 (0.01)	0-0.03
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 10-6 Abundance of arctic tern recorded on each survey in flight per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	100.77 (64.06)	0-245.35	100.77 (64.19)	0-232.21	100.77 (64.87)	0-245.35
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	23.23 (18.11)	0-69.69	23.23 (17.78)	0-46.46
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	7.76 (7.24)	0-23.29	7.76 (7.2)	0-23.29	7.76 (7.5)	0-23.29
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	15.86 (10.17)	0-39.66	47.59 (32.22)	0-118.97	47.59 (29.94)	0-111.04
Aug-2022	7.8 (6.56)	0-22.54	7.8 (6.39)	0-21.68	15.61 (10.98)	1.42-39.73
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 10-7 Density of arctic tern recorded on each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km⁻²)					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0.12 (0.08)	0-0.29	0.09 (0.06)	0-0.2	0.07 (0.04)	0-0.16
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0.1 (0.08)	0-0.27	0.07 (0.06)	0-0.19	0.06 (0.04)	0.01-0.15
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 10-8 Abundance of arctic tern recorded on each survey on the sea per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	77.52 (49.28)	0-188.73	77.52 (49.38)	0-178.62	77.52 (49.9)	0-188.73
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	62.43 (52.45)	0-180.34	62.43 (51.13)	0-173.41	70.23 (49.42)	6.38-178.77
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

11 GREAT SKUA

Table 11-1 Mean density of great skua recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0.04 (0.01)	0.01-0.06	0.03 (0.01)	0.01-0.04	0.02 (0.01)	0.01-0.03
May	0 (0)	0-0	0 (0)	0-0.01	0 (0)	0-0.01
Jun	0.01 (0)	0-0.01	0 (0)	0-0.01	0.01 (0)	0-0.01
Jul	0.01 (0.01)	0-0.02	0.02 (0.01)	0-0.04	0.02 (0.01)	0-0.03
Aug	0.04 (0.03)	0-0.1	0.03 (0.02)	0-0.07	0.02 (0.01)	0-0.06
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 11-2 Mean abundance of great skua recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	23.27 (8.72)	7.76-38.88	23.27 (8.07)	9.97-39.89	23.27 (6.91)	10.34-36.26
May	0 (0)	0-0	3.88 (2.39)	0-7.75	3.88 (2.07)	0-7.75
Jun	3.87 (1.8)	0.97-7.74	3.87 (1.8)	0.97-7.74	7.74 (2.86)	2.58-14.2
Jul	5.26 (4)	0-14.44	18.33 (9.36)	2.58-36.78	20.97 (9.58)	2.58-39.36
Aug	23.83 (18.51)	0.56-66.84	23.83 (17.4)	0.56-65.73	23.83 (17.17)	0.56-65.17
Sep	0 (0)	0-0	0 (0)	0-0	2.63 (1.98)	0-5.27
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 11-3 Mean density of great skua recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0.01 (0.01)	0-0.02	0.01 (0.01)	0-0.02	0.01 (0.01)	0-0.03
May	0.01 (0.01)	0-0.02	0.01 (0.01)	0-0.02	0.01 (0.01)	0-0.03
Jun	0.02 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0)	0-0.02
Jul	0 (0)	0-0.01	0 (0)	0-0.01	0 (0)	0-0.01
Aug	0.14 (0.11)	0-0.39	0.1 (0.08)	0-0.28	0.08 (0.06)	0-0.22
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0.01 (0.01)	0-0.02	0 (0)	0-0.01	0 (0)	0-0.01
Nov	0.01 (0.01)	0-0.02	0 (0)	0-0.01	0 (0)	0-0.01
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 11-4 Mean abundance of great skua recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	3.87 (3.65)	0-11.6	7.75 (5.15)	1.66-18.25	15.5 (7.05)	5.17-29.73
May	3.88 (3.7)	0-11.63	7.76 (5.72)	0-19.4	15.51 (8.74)	0-31.03
Jun	11.61 (5.41)	2.9-23.23	11.61 (5.39)	2.9-23.23	15.49 (5.73)	5.16-28.39
Jul	2.67 (1.68)	0-6.68	2.67 (1.3)	0-5.35	5.32 (2.64)	0-10.63
Aug	89.96 (71.89)	2.1-256.01	89.96 (67.43)	2.1-251.82	89.96 (66.82)	2.1-249.73
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	3.88 (3.47)	0-11.63	3.88 (3.58)	0-11.63	3.88 (3.63)	0-11.63
Nov	3.88 (3.49)	0-11.63	3.88 (3.55)	0-11.63	3.88 (3.45)	0-11.63
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 11-5 Density of great skua recorded on each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0.01 (0.01)	0-0.03	0.02 (0.01)	0-0.04	0.01 (0.01)	0-0.03
Aug-2020	0.1 (0.08)	0-0.28	0.07 (0.05)	0-0.2	0.06 (0.04)	0-0.15
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0.07 (0.03)	0.02-0.12	0.05 (0.02)	0.02-0.09	0.04 (0.01)	0.02-0.06
May-2021	0 (0)	0-0	0.01 (0.01)	0-0.02	0.01 (0)	0-0.01
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0.01 (0.01)	0-0.04	0.03 (0.01)	0.01-0.06	0.03 (0.01)	0.01-0.05
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0.01 (0.01)	0-0.02	0.01 (0)	0-0.02	0.01 (0)	0-0.02
Jul-2022	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03
Aug-2022	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02	0.01 (0)	0-0.02
Sep-2022	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.01

Table 11-6 Abundance of great skua recorded on each survey in flight per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	8.02 (5.04)	0-20.05	16.04 (7.81)	0-32.08	16.04 (7.53)	0-32.08
Aug-2020	63.69 (50.58)	1.68-181.02	63.69 (47.31)	1.68-177.67	63.69 (46.49)	1.68-176
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	46.54 (17.44)	15.51-77.75	46.54 (16.15)	19.94-79.78	46.54 (13.81)	20.68-72.52
May-2021	0 (0)	0-0	7.75 (4.78)	0-15.5	7.75 (4.13)	0-15.5
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	7.75 (6.95)	0-23.26	31.01 (13.26)	7.75-54.46	31.01 (12.92)	7.75-54.26
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	7.74 (3.61)	1.94-15.49	7.74 (3.6)	1.94-15.49	15.49 (5.73)	5.16-28.39
Jul-2022	0 (0)	0-0	7.93 (7.02)	0-23.79	15.86 (8.28)	0-31.73
Aug-2022	7.8 (4.94)	0-19.51	7.8 (4.88)	0-19.51	7.8 (5.01)	0-19.51
Sep-2022	0 (0)	0-0	0 (0)	0-0	7.9 (5.93)	0-15.81

Table 11-7 Density of great skua recorded on each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0.01 (0.01)	0-0.03	0.01 (0)	0-0.02	0.01 (0)	0-0.01
Aug-2020	0.36 (0.29)	0.01-1.03	0.27 (0.2)	0.01-0.75	0.21 (0.15)	0.01-0.57
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Nov-2020	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0.01 (0)	0-0.01	0.02 (0.01)	0.01-0.03
May-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.02	0.01 (0.01)	0-0.03
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0.04 (0.03)	0-0.11	0.03 (0.02)	0-0.08	0.02 (0.02)	0-0.06
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
May-2022	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03
Jun-2022	0.04 (0.02)	0.01-0.07	0.03 (0.01)	0.01-0.05	0.03 (0.01)	0.01-0.05
Jul-2022	0 (0)	0-0	0 (0)	0-0	0.01 (0)	0-0.01
Aug-2022	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02	0.01 (0)	0-0.02
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 11-8 Abundance of great skua recorded on each survey on the sea per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	8.02 (5.04)	0-20.05	8.02 (3.91)	0-16.04	8.02 (3.76)	0-16.04
Aug-2020	238.85 (189.69)	6.29-678.84	238.85 (177.41)	6.29-666.27	238.85 (174.35)	6.29-659.98
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	7.75 (6.95)	0-23.26	7.75 (7.17)	0-23.26	7.75 (7.26)	0-23.26
Nov-2020	7.76 (6.99)	0-23.27	7.76 (7.1)	0-23.27	7.76 (6.91)	0-23.27
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	7.76 (2.69)	3.32-13.3	23.27 (6.91)	10.34-36.26
May-2021	7.75 (7.41)	0-23.25	7.75 (4.78)	0-15.5	15.5 (8.27)	0-31
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	23.23 (21.03)	0-69.69	23.23 (20.01)	0-69.69	23.23 (21.09)	0-69.69
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	7.74 (7.3)	0-23.21	7.74 (7.61)	0-23.21	7.74 (7.2)	0-23.21
May-2022	0 (0)	0-0	7.76 (6.66)	0-23.29	15.53 (9.22)	0-31.06
Jun-2022	23.23 (10.82)	5.81-46.46	23.23 (10.79)	5.81-46.46	30.97 (11.45)	10.32-56.78
Jul-2022	0 (0)	0-0	0 (0)	0-0	7.93 (4.14)	0-15.86
Aug-2022	7.8 (4.94)	0-19.51	7.8 (4.88)	0-19.51	7.8 (5.01)	0-19.51
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

12 ARCTIC SKUA

Table 12-1 Mean density of arctic skua recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0.01 (0.01)	0-0.02	0 (0)	0-0.01	0 (0)	0-0.01
Jul	0 (0)	0-0	0 (0)	0-0.01	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 12-2 Mean abundance of arctic skua recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	3.87 (3.53)	0-11.61	3.87 (3.68)	0-11.61	3.87 (3.61)	0-11.61
Jul	0 (0)	0-0	2.64 (1.36)	0-5.29	2.64 (1.3)	0-5.29
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 12-3 Mean density of arctic skua recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0.01	0.01 (0)	0-0.02	0.01 (0)	0-0.01
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 12-4 Mean abundance of arctic skua recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	2.64 (2.51)	0-7.93	7.93 (4.08)	0-15.86	7.93 (3.91)	0-15.86
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 12-5 Density of arctic skua recorded on each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Jul-2022	0 (0)	0-0	0.01 (0)	0-0.02	0.01 (0)	0-0.01
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 12-6 Abundance of arctic skua recorded on each survey in flight per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	7.74 (7.06)	0-23.23	7.74 (7.36)	0-23.23	7.74 (7.22)	0-23.23
Jul-2022	0 (0)	0-0	7.93 (4.08)	0-15.86	7.93 (3.91)	0-15.86
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 12-7 Density of arctic skua recorded on each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0.01 (0.01)	0-0.04	0.03 (0.01)	0-0.05	0.02 (0.01)	0-0.04
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 12-8 Abundance of arctic skua recorded on each survey on the sea per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	7.93 (7.52)	0-23.79	23.79 (12.24)	0-47.59	23.79 (11.74)	0-47.59
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

13 LITTLE AUK

Table 13-1 Mean density of little auk recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0.01
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 13-2 Mean abundance of little auk recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	2.58 (1.72)	0-6.46
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 13-3 Mean density of little auk recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0.01	0.01 (0.01)	0-0.02	0 (0)	0-0.01
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0.01 (0.01)	0-0.02	0.01 (0.01)	0-0.03	0.02 (0.01)	0.01-0.03
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 13-4 Mean abundance of little auk recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	2.58 (2.49)	0-7.75	5.16 (4.83)	0-15.5	5.17 (4.16)	0-14.2
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	3.87 (3.6)	0-11.61	11.61 (5.85)	0-23.22	19.35 (8.12)	7.64-34.93
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 13-5 Density of little auk recorded on each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0.01 (0)	0-0.02
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 13-6 Abundance of little auk recorded on each survey in flight per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	7.75 (5.17)	0-19.37
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 13-7 Density of little auk recorded on each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km⁻²)					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0.01 (0.01)	0-0.04	0.03 (0.01)	0-0.05	0.03 (0.01)	0.01-0.06
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0)	0-0.02
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 13-8 Abundance of little auk recorded on each survey on the sea per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	7.75 (7.48)	0-23.24	7.75 (7.28)	0-23.24	7.75 (7.32)	0-23.24
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	7.74 (7.19)	0-23.22	23.22 (11.7)	0-46.44	38.7 (16.25)	15.29-69.86
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	7.75 (7.22)	0-23.25	7.75 (5.17)	0-19.37
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

14 GUILLEMOT

Table 14-1 Mean density of guillemot recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0.11 (0.02)	0.08-0.14	0.08 (0.01)	0.06-0.1	0.07 (0.01)	0.06-0.09
Feb	0.07 (0.02)	0.04-0.12	0.07 (0.02)	0.05-0.1	0.09 (0.02)	0.07-0.13
Mar	0.12 (0.01)	0.09-0.14	0.11 (0.01)	0.09-0.13	0.1 (0.01)	0.08-0.13
Apr	0.07 (0.01)	0.05-0.09	0.11 (0.01)	0.09-0.13	0.12 (0.01)	0.1-0.14
May	0.32 (0.05)	0.22-0.42	0.3 (0.04)	0.23-0.4	0.31 (0.05)	0.23-0.41
Jun	0.11 (0.03)	0.06-0.17	0.13 (0.03)	0.08-0.2	0.14 (0.03)	0.09-0.19
Jul	0.2 (0.04)	0.14-0.28	0.21 (0.03)	0.15-0.28	0.22 (0.03)	0.17-0.27
Aug	0.01 (0)	0.01-0.01	0.01 (0)	0.01-0.01	0.01 (0)	0.01-0.01
Sep	0.04 (0.01)	0.03-0.06	0.05 (0.01)	0.04-0.06	0.04 (0)	0.04-0.05
Oct	0.25 (0.03)	0.19-0.31	0.36 (0.04)	0.28-0.43	0.43 (0.04)	0.36-0.51
Nov	0.05 (0.01)	0.03-0.06	0.04 (0.01)	0.03-0.06	0.06 (0.01)	0.04-0.07
Dec	0.04 (0.01)	0.03-0.06	0.05 (0.01)	0.04-0.07	0.05 (0)	0.04-0.06

Table 14-2 Mean density of guillemot (including unidentified auks apportioned using identified auk ratios) recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0.12 (0.02)	0.09-0.17	0.09 (0.01)	0.07-0.11	0.08 (0.01)	0.07-0.1
Feb	0.08 (0.02)	0.05-0.12	0.07 (0.02)	0.05-0.11	0.1 (0.02)	0.07-0.13
Mar	0.13 (0.01)	0.1-0.15	0.12 (0.01)	0.1-0.14	0.11 (0.01)	0.08-0.13
Apr	0.07 (0.01)	0.06-0.1	0.11 (0.01)	0.09-0.14	0.12 (0.01)	0.1-0.14
May	0.33 (0.05)	0.23-0.44	0.31 (0.05)	0.23-0.41	0.32 (0.05)	0.24-0.43
Jun	0.11 (0.03)	0.06-0.17	0.14 (0.03)	0.08-0.2	0.14 (0.03)	0.09-0.19
Jul	0.21 (0.04)	0.14-0.29	0.22 (0.03)	0.16-0.29	0.23 (0.03)	0.18-0.29
Aug	0.01 (0)	0.01-0.01	0.01 (0)	0.01-0.01	0.01 (0)	0.01-0.02
Sep	0.05 (0.01)	0.03-0.06	0.05 (0.01)	0.04-0.06	0.04 (0)	0.04-0.05
Oct	0.27 (0.03)	0.2-0.33	0.38 (0.04)	0.3-0.46	0.46 (0.04)	0.39-0.55
Nov	0.06 (0.01)	0.04-0.08	0.05 (0.01)	0.04-0.07	0.07 (0.01)	0.05-0.08
Dec	0.05 (0.01)	0.03-0.06	0.06 (0.01)	0.04-0.08	0.05 (0.01)	0.04-0.06

Table 14-3 Mean density of guillemot (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0.16 (0.03)	0.11-0.21	0.12 (0.01)	0.09-0.15	0.11 (0.01)	0.09-0.13
Feb	0.1 (0.03)	0.06-0.16	0.09 (0.02)	0.06-0.14	0.12 (0.02)	0.09-0.17
Mar	0.16 (0.02)	0.13-0.2	0.15 (0.02)	0.12-0.18	0.14 (0.02)	0.11-0.17
Apr	0.1 (0.01)	0.07-0.13	0.15 (0.02)	0.12-0.18	0.16 (0.01)	0.13-0.19
May	0.39 (0.07)	0.27-0.52	0.38 (0.05)	0.28-0.5	0.4 (0.06)	0.29-0.53
Jun	0.14 (0.04)	0.08-0.22	0.17 (0.04)	0.11-0.26	0.18 (0.03)	0.12-0.25
Jul	0.27 (0.05)	0.18-0.36	0.28 (0.04)	0.2-0.37	0.29 (0.03)	0.23-0.36
Aug	0.01 (0)	0.01-0.02	0.01 (0)	0.01-0.02	0.02 (0)	0.01-0.02
Sep	0.06 (0.01)	0.04-0.08	0.07 (0.01)	0.05-0.08	0.06 (0.01)	0.05-0.07
Oct	0.33 (0.04)	0.25-0.42	0.48 (0.05)	0.37-0.58	0.57 (0.05)	0.48-0.68
Nov	0.07 (0.01)	0.05-0.1	0.07 (0.01)	0.05-0.09	0.08 (0.01)	0.07-0.1
Dec	0.06 (0.01)	0.04-0.08	0.08 (0.01)	0.05-0.1	0.07 (0.01)	0.05-0.08

Table 14-4 Mean abundance of guillemot recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	69.73 (11.29)	49.43-94.47	69.73 (8.49)	54.12-87.43	85.23 (9.26)	67.03-103.42
Feb	49.05 (12.26)	28.78-75.68	61.96 (13.44)	40.82-90.86	108.43 (17.51)	78.98-145.37
Mar	77.45 (8.76)	60.62-94.72	100.69 (10.12)	81.15-119.83	116.18 (14.26)	92.28-148.16
Apr	46.46 (6.32)	34.91-60.34	96.79 (10.03)	78.57-116.84	135.5 (11.34)	115.33-159.05
May	209.6 (34.71)	144.91-278.15	271.71 (39.32)	204.07-357.12	360.99 (55.21)	266.71-478.17
Jun	69.71 (18.07)	37.68-108.99	120.06 (26.94)	73.49-176.38	158.78 (29.64)	105.01-221.09
Jul	133.55 (23.9)	89.79-181.74	190.9 (29.75)	135.1-251	253.84 (30.39)	198.27-317.9
Aug	5.31 (0.88)	3.66-7.03	7.96 (1.18)	5.86-10.46	13.27 (1.57)	10.42-16.59
Sep	28.62 (3.94)	21.22-36.48	44.11 (4.78)	35.12-53.74	49.28 (4.56)	40.74-58.24
Oct	162.83 (21.28)	122.75-205.02	317.91 (35.54)	248.83-387.59	500.13 (44.5)	421.48-594.44
Nov	30.98 (5.52)	20.46-42.47	38.73 (5.6)	28.74-49.82	65.83 (7.13)	51.85-79.49
Dec	27.12 (5.02)	18.18-37.31	46.5 (6.84)	33.46-60.58	54.24 (5.76)	43.28-65.99

Table 14-5 Mean abundance of guillemot (including unidentified auks apportioned using identified auk ratios) recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	81.21 (13.15)	57.57-110.02	80.14 (9.76)	62.2-100.48	97.68 (10.61)	76.83-118.53
Feb	51.75 (12.92)	30.37-79.79	65.16 (14.11)	42.95-95.49	113.28 (18.28)	82.5-151.85
Mar	82.93 (9.38)	64.9-101.41	107.2 (10.78)	86.4-127.58	122.15 (15)	97.02-155.78
Apr	48.93 (6.65)	36.77-63.51	101.86 (10.54)	82.7-122.93	141.82 (11.85)	120.73-166.43
May	215.79 (35.75)	149.15-286.4	278.68 (40.32)	209.3-366.28	373.77 (57.15)	276.19-495.06
Jun	71.14 (18.44)	38.45-111.22	122.12 (27.41)	74.76-179.41	161.89 (30.22)	107.06-225.45
Jul	138.23 (24.73)	92.97-188.08	196.99 (30.66)	139.48-258.91	263.81 (31.56)	206.04-330.32
Aug	5.74 (0.95)	3.95-7.6	8.49 (1.26)	6.24-11.15	14.22 (1.68)	11.17-17.77
Sep	29.96 (4.13)	22.21-38.2	45.88 (4.98)	36.51-55.91	50.95 (4.72)	42.11-60.24
Oct	174.01 (22.73)	131.19-219.05	340.1 (38.01)	266.23-414.62	535.34 (47.62)	451.2-636.27
Nov	37.5 (6.69)	24.72-51.42	46.87 (6.8)	34.74-60.32	76.61 (8.35)	60.26-92.6
Dec	30.17 (5.56)	20.25-41.47	52.37 (7.68)	37.72-68.19	60.18 (6.38)	48.02-73.19

Table 14-6 Mean abundance of guillemot (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	103.28 (16.72)	73.21-139.91	103.56 (12.61)	80.37-129.83	126.41 (13.73)	99.42-153.39
Feb	66.51 (16.6)	39.03-102.54	83.59 (18.1)	55.1-122.47	143.97 (23.24)	104.86-192.99
Mar	106.08 (12)	83.02-129.73	137.06 (13.78)	110.47-163.12	157.1 (19.28)	124.78-200.34
Apr	63.41 (8.61)	47.65-82.29	131.45 (13.6)	106.74-158.62	182.81 (15.27)	155.65-214.51
May	259.06 (43.07)	178.82-344.13	336.65 (48.86)	252.59-442.78	459.87 (70.44)	339.58-609.35
Jun	91.89 (23.81)	49.66-143.67	156.39 (35.1)	95.74-229.77	207.4 (38.72)	137.16-288.81
Jul	175.31 (31.33)	118-238.43	249.1 (38.69)	176.49-327.21	335.33 (40.11)	261.82-419.82
Aug	7.46 (1.23)	5.14-9.88	11.05 (1.64)	8.13-14.53	18.48 (2.18)	14.52-23.1
Sep	39.14 (5.39)	29.02-49.9	59.91 (6.5)	47.68-73.02	66.56 (6.16)	55-78.69
Oct	219.77 (28.74)	165.66-276.75	426.03 (47.66)	333.39-519.43	663.76 (59.08)	559.31-788.92
Nov	48.06 (8.58)	31.69-65.9	60.58 (8.79)	44.91-77.96	98.32 (10.71)	77.34-118.84
Dec	38.39 (7.07)	25.78-52.76	67.1 (9.83)	48.35-87.34	77.41 (8.2)	61.78-94.13

Table 14-7 Mean density of guillemot recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0.83 (0.13)	0.59-1.12	1.08 (0.13)	0.84-1.36	1.12 (0.12)	0.88-1.36
Feb	0.91 (0.22)	0.53-1.39	0.85 (0.18)	0.56-1.22	0.84 (0.13)	0.61-1.12
Mar	1.07 (0.14)	0.8-1.35	1.16 (0.13)	0.91-1.42	1.34 (0.17)	1.05-1.72
Apr	3.22 (0.41)	2.44-4.07	3.37 (0.32)	2.77-4	3.68 (0.28)	3.17-4.26
May	0.64 (0.12)	0.42-0.88	0.71 (0.13)	0.5-0.98	1.07 (0.19)	0.74-1.47
Jun	1.58 (0.41)	0.85-2.47	1.35 (0.3)	0.83-1.99	1.3 (0.24)	0.86-1.8
Jul	3.34 (0.59)	2.27-4.51	3.77 (0.55)	2.73-4.88	3.49 (0.41)	2.71-4.35
Aug	2.11 (0.36)	1.43-2.83	2.48 (0.34)	1.83-3.17	2.95 (0.33)	2.36-3.63
Sep	3.31 (0.44)	2.48-4.18	3.45 (0.38)	2.74-4.22	3.64 (0.36)	2.97-4.35
Oct	2.43 (0.35)	1.8-3.15	2.73 (0.32)	2.08-3.34	2.65 (0.25)	2.2-3.16
Nov	0.58 (0.1)	0.39-0.79	0.61 (0.09)	0.45-0.78	0.63 (0.07)	0.5-0.76
Dec	0.73 (0.11)	0.53-0.96	0.93 (0.12)	0.71-1.16	1.02 (0.1)	0.83-1.22

Table 14-8 Mean density of guillemot (including unidentified auks apportioned using identified auk ratios) recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0.96 (0.16)	0.68-1.3	1.24 (0.15)	0.97-1.56	1.28 (0.14)	1.01-1.56
Feb	0.97 (0.24)	0.57-1.49	0.91 (0.19)	0.6-1.31	0.91 (0.14)	0.66-1.21
Mar	1.16 (0.16)	0.86-1.48	1.25 (0.14)	0.98-1.54	1.43 (0.18)	1.12-1.84
Apr	3.45 (0.44)	2.61-4.36	3.59 (0.34)	2.95-4.27	3.9 (0.29)	3.37-4.53
May	0.66 (0.12)	0.44-0.91	0.73 (0.13)	0.51-1.01	1.11 (0.2)	0.77-1.52
Jun	1.61 (0.42)	0.87-2.52	1.37 (0.31)	0.84-2.02	1.32 (0.25)	0.88-1.84
Jul	3.53 (0.62)	2.41-4.78	3.98 (0.58)	2.88-5.14	3.7 (0.43)	2.87-4.6
Aug	2.2 (0.37)	1.49-2.95	2.57 (0.35)	1.9-3.28	3.04 (0.34)	2.43-3.74
Sep	3.46 (0.46)	2.6-4.38	3.61 (0.4)	2.86-4.41	3.79 (0.37)	3.09-4.53
Oct	2.58 (0.37)	1.91-3.34	2.89 (0.34)	2.21-3.55	2.8 (0.26)	2.32-3.33
Nov	0.69 (0.12)	0.46-0.95	0.73 (0.1)	0.55-0.94	0.74 (0.08)	0.58-0.89
Dec	0.86 (0.13)	0.62-1.13	1.08 (0.13)	0.83-1.35	1.15 (0.11)	0.94-1.38

Table 14-9 Mean density of guillemot (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	1.22 (0.2)	0.87-1.66	1.61 (0.2)	1.25-2.02	1.66 (0.18)	1.3-2.01
Feb	1.25 (0.31)	0.73-1.91	1.18 (0.24)	0.78-1.69	1.17 (0.18)	0.84-1.55
Mar	1.49 (0.2)	1.11-1.9	1.61 (0.19)	1.26-1.98	1.85 (0.24)	1.45-2.38
Apr	4.5 (0.58)	3.41-5.68	4.67 (0.45)	3.84-5.55	5.08 (0.38)	4.39-5.89
May	0.81 (0.15)	0.53-1.11	0.89 (0.16)	0.62-1.24	1.37 (0.25)	0.95-1.89
Jun	2.08 (0.54)	1.12-3.25	1.76 (0.4)	1.08-2.59	1.7 (0.32)	1.12-2.36
Jul	4.58 (0.8)	3.12-6.19	5.16 (0.75)	3.74-6.66	4.79 (0.56)	3.72-5.96
Aug	2.88 (0.49)	1.95-3.86	3.37 (0.46)	2.49-4.3	3.98 (0.44)	3.18-4.89
Sep	4.53 (0.6)	3.4-5.72	4.71 (0.52)	3.74-5.77	4.96 (0.49)	4.04-5.93
Oct	3.3 (0.47)	2.45-4.29	3.69 (0.44)	2.82-4.53	3.56 (0.33)	2.95-4.24
Nov	0.89 (0.16)	0.59-1.22	0.95 (0.13)	0.71-1.21	0.95 (0.1)	0.74-1.14
Dec	1.11 (0.17)	0.8-1.46	1.4 (0.17)	1.07-1.75	1.5 (0.14)	1.22-1.79

Table 14-10 Mean abundance of guillemot recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	542.37 (87.82)	384.46-734.77	968.51 (117.92)	751.68-1214.26	1293.93 (140.53)	1017.7-1570.17
Feb	596.4 (146.58)	348.16-913.22	756.49 (158)	501.37-1091.69	973.38 (154.39)	703.34-1292.81
Mar	701.03 (92.77)	524.19-889.16	1038.02 (117.76)	813.42-1270.67	1553.13 (197.85)	1216.72-1993.98
Apr	2116.26 (271.27)	1600.51-2672.15	3011.73 (287.87)	2479.59-3580.97	4252.16 (320.75)	3671.59-4930.21
May	422.99 (78.84)	278.15-579.59	636.39 (113.63)	444-880.77	1237.84 (220.36)	858.78-1698.97
Jun	1034.01 (267.25)	558.53-1618.33	1208.3 (271.45)	739.79-1775.68	1502.7 (279.36)	994.8-2087.34
Jul	2190.14 (384.18)	1492.59-2960.31	3374.81 (490.09)	2444.32-4361.81	4042.5 (475.73)	3137.98-5033.14
Aug	1386.03 (236.82)	937.36-1860.65	2221.3 (307.54)	1637.6-2836.1	3412.73 (378.67)	2725.48-4195.94
Sep	2171.48 (287.42)	1629.83-2744.11	3084.49 (339.87)	2450.4-3772.87	4213.11 (414.74)	3433.96-5036.33
Oct	1593.44 (228.8)	1179.82-2066.9	2438.63 (288.92)	1864.04-2989.37	3066.7 (284.45)	2540.35-3650.97
Nov	379.45 (66.81)	254.44-518.97	542.16 (76.89)	404.98-693.85	731.9 (79.87)	575.47-884.88
Dec	480.47 (73.8)	345.85-633.01	833.07 (102.97)	636.78-1039.84	1181.79 (114.22)	960.28-1410.38

Table 14-11 Mean abundance of guillemot (including unidentified auks apportioned using identified auk ratios) recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	631.62 (102.27)	447.73-855.68	1113.07 (135.52)	863.87-1395.49	1482.94 (161.05)	1166.35-1799.52
Feb	637.59 (156.22)	372.3-974.98	815.25 (169.28)	540.99-1173.5	1051.17 (166.43)	758.93-1394.79
Mar	761.41 (102.78)	565.69-970.5	1120.61 (128.66)	875.5-1375.79	1659.51 (212.45)	1297.59-2132.49
Apr	2264.98 (290.11)	1713.13-2858.9	3208.25 (306.41)	2641.75-3814.08	4517.23 (340.36)	3901.04-5236.89
May	436.21 (81.44)	286.63-597.97	652.71 (116.54)	455.38-903.35	1279.4 (227.47)	888.14-1755.45
Jun	1055.82 (272.86)	570.3-1652.53	1229.47 (276.22)	752.76-1806.83	1530.56 (284.61)	1013.19-2126.35
Jul	2318.29 (407.03)	1579.12-3134.51	3557.29 (515.94)	2578.03-4597.14	4279.36 (503.14)	3322.94-5327.01
Aug	1442.86 (244.89)	978.97-1933.4	2301.43 (317)	1700.4-2935.43	3518.63 (389.05)	2811.98-4323.1
Sep	2274.17 (301.1)	1706.9-2874.23	3226.03 (356.23)	2561.72-3947.75	4385.98 (432.47)	3573.49-5244.55
Oct	1690.83 (242.58)	1252.14-2192.62	2587.03 (306.32)	1977.97-3171.11	3240.86 (300.43)	2685.28-3858.21
Nov	454.25 (80.08)	304.14-621.43	654.09 (93.01)	488.17-837.63	852.81 (93.58)	669.61-1032.07
Dec	562.67 (85.88)	405.88-740.3	966.68 (118.95)	739.94-1205.37	1334.73 (128.77)	1084.91-1592.33

Table 14-12 Mean abundance of guillemot (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	803.25 (130.06)	569.39-1088.2	1438.31 (175.12)	1116.3-1803.26	1919.09 (208.42)	1509.4-2328.79
Feb	821.63 (201.2)	479.78-1256.08	1052.43 (218.31)	698.47-1514.31	1348.38 (213.39)	973.28-1788.7
Mar	978.4 (132.87)	725.44-1248.97	1439.34 (165.9)	1123.41-1768.79	2139.7 (274.14)	1672.56-2749.94
Apr	2955.94 (378.49)	2235.82-3730.44	4174.82 (398.5)	3437.96-4962.69	5879.42 (442.69)	5077.89-6815.57
May	528.76 (99.59)	346.03-726.66	796.53 (143.72)	553.36-1105.49	1589.1 (284.45)	1099.67-2184.07
Jun	1364.25 (352.55)	736.88-2135.31	1574.73 (353.8)	964.15-2314.24	1961.42 (364.7)	1298.43-2724.81
Jul	3004.3 (527.39)	2046.62-4061.84	4611.81 (668.39)	3343.05-5958.92	5538.83 (651.08)	4300.7-6894.35
Aug	1888.42 (320.57)	1281.17-2530.57	3014.16 (415.17)	2226.94-3844.45	4606.89 (509.31)	3681.79-5660.02
Sep	2971.53 (393.34)	2230.47-3755.41	4215.14 (465.43)	3347.21-5158.12	5733.22 (565.36)	4671.06-6855.63
Oct	2168.46 (311.66)	1605.26-2813.66	3303.63 (391.7)	2524.42-4050.02	4120.45 (382.41)	3412.43-4905.59
Nov	583.09 (102.77)	390.49-797.65	845.64 (120.22)	631.16-1082.87	1094.43 (120.08)	859.35-1324.45
Dec	728.81 (111.01)	526.1-958.46	1254.18 (154.04)	960.55-1563.19	1732.09 (166.96)	1408.12-2066.02

Table 14-13 Density of guillemot recorded in each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0.06 (0.01)	0.04-0.08	0.05 (0.01)	0.04-0.07	0.08 (0.01)	0.06-0.09
Aug-2020	0.02 (0)	0.02-0.03	0.03 (0)	0.02-0.04	0.03 (0)	0.03-0.04
Sep-2020	0.05 (0.01)	0.04-0.06	0.08 (0.01)	0.06-0.09	0.07 (0.01)	0.06-0.09
Oct-2020	0.07 (0.01)	0.05-0.09	0.12 (0.02)	0.09-0.15	0.11 (0.01)	0.09-0.14
Nov-2020	0.04 (0.01)	0.02-0.05	0.03 (0.01)	0.02-0.05	0.03 (0)	0.02-0.04
Dec-2020	0.07 (0.01)	0.05-0.1	0.09 (0.01)	0.06-0.11	0.07 (0.01)	0.06-0.09
Jan-2021	0.11 (0.02)	0.08-0.14	0.08 (0.01)	0.06-0.1	0.07 (0.01)	0.06-0.09
Feb-2021	0.21 (0.05)	0.12-0.33	0.2 (0.04)	0.13-0.29	0.27 (0.04)	0.2-0.37
Mar-2021	0.24 (0.03)	0.18-0.29	0.23 (0.02)	0.18-0.27	0.2 (0.02)	0.16-0.26
Apr-2021	0.05 (0.01)	0.04-0.06	0.08 (0.01)	0.06-0.09	0.08 (0.01)	0.07-0.09
May-2021	0.04 (0.01)	0.02-0.06	0.03 (0.01)	0.01-0.04	0.03 (0.01)	0.01-0.04
Jun-2021	0.07 (0.02)	0.04-0.11	0.09 (0.02)	0.05-0.13	0.07 (0.01)	0.05-0.1
Jul-2021	0.28 (0.05)	0.18-0.39	0.33 (0.05)	0.23-0.44	0.33 (0.04)	0.26-0.41
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0.04 (0)	0.03-0.04	0.03 (0)	0.03-0.04	0.03 (0)	0.02-0.03
Oct-2021	0.43 (0.05)	0.32-0.53	0.59 (0.06)	0.47-0.72	0.75 (0.07)	0.64-0.89
Nov-2021	0.06 (0.01)	0.04-0.08	0.05 (0.01)	0.04-0.06	0.08 (0.01)	0.07-0.1
Dec-2021	0.01 (0)	0.01-0.02	0.02 (0)	0.01-0.02	0.02 (0)	0.02-0.02
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0.01 (0)	0.01-0.02	0.01 (0)	0.01-0.01	0.01 (0)	0-0.01
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0.09 (0.01)	0.07-0.12	0.14 (0.02)	0.11-0.17	0.15 (0.01)	0.13-0.18
May-2022	0.6 (0.09)	0.43-0.79	0.58 (0.08)	0.44-0.75	0.6 (0.09)	0.45-0.78
Jun-2022	0.14 (0.04)	0.08-0.22	0.18 (0.04)	0.11-0.27	0.2 (0.04)	0.13-0.28
Jul-2022	0.27 (0.04)	0.19-0.35	0.26 (0.04)	0.18-0.33	0.25 (0.03)	0.19-0.32
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0.05 (0.01)	0.03-0.06	0.04 (0.01)	0.03-0.05	0.03 (0)	0.02-0.03

Table 14-14 Density of guillemot (including unidentified auks apportioned using identified auk ratios) recorded in each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0.07 (0.01)	0.04-0.09	0.06 (0.01)	0.04-0.08	0.08 (0.01)	0.07-0.1
Aug-2020	0.03 (0)	0.02-0.03	0.03 (0)	0.02-0.04	0.04 (0)	0.03-0.05
Sep-2020	0.05 (0.01)	0.04-0.06	0.08 (0.01)	0.06-0.1	0.08 (0.01)	0.06-0.09
Oct-2020	0.07 (0.01)	0.05-0.1	0.13 (0.02)	0.1-0.16	0.12 (0.01)	0.1-0.14
Nov-2020	0.04 (0.01)	0.03-0.06	0.04 (0.01)	0.03-0.06	0.04 (0.01)	0.03-0.05
Dec-2020	0.08 (0.01)	0.05-0.11	0.1 (0.01)	0.07-0.13	0.08 (0.01)	0.06-0.1
Jan-2021	0.12 (0.02)	0.09-0.17	0.09 (0.01)	0.07-0.11	0.08 (0.01)	0.07-0.1
Feb-2021	0.22 (0.06)	0.13-0.35	0.21 (0.05)	0.14-0.31	0.29 (0.05)	0.21-0.38
Mar-2021	0.25 (0.03)	0.2-0.31	0.24 (0.02)	0.19-0.29	0.21 (0.03)	0.17-0.27
Apr-2021	0.05 (0.01)	0.04-0.06	0.08 (0.01)	0.07-0.1	0.09 (0.01)	0.07-0.1
May-2021	0.04 (0.01)	0.02-0.06	0.03 (0.01)	0.01-0.05	0.03 (0.01)	0.01-0.04
Jun-2021	0.07 (0.02)	0.04-0.11	0.09 (0.02)	0.05-0.13	0.07 (0.01)	0.05-0.1
Jul-2021	0.29 (0.05)	0.19-0.4	0.33 (0.06)	0.23-0.45	0.33 (0.04)	0.26-0.42
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0.04 (0)	0.03-0.05	0.04 (0)	0.03-0.04	0.03 (0)	0.02-0.03
Oct-2021	0.46 (0.06)	0.35-0.57	0.63 (0.07)	0.5-0.77	0.81 (0.07)	0.68-0.96
Nov-2021	0.07 (0.01)	0.05-0.09	0.06 (0.01)	0.05-0.08	0.09 (0.01)	0.07-0.11
Dec-2021	0.01 (0)	0.01-0.02	0.02 (0)	0.02-0.02	0.02 (0)	0.02-0.03
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0.01 (0)	0.01-0.02	0.01 (0)	0.01-0.01	0.01 (0)	0.01-0.01
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0.1 (0.01)	0.07-0.13	0.14 (0.02)	0.12-0.18	0.16 (0.01)	0.13-0.19
May-2022	0.62 (0.1)	0.44-0.81	0.6 (0.08)	0.46-0.77	0.62 (0.09)	0.46-0.81
Jun-2022	0.14 (0.04)	0.08-0.23	0.19 (0.04)	0.11-0.27	0.21 (0.04)	0.14-0.29
Jul-2022	0.28 (0.05)	0.19-0.37	0.27 (0.04)	0.19-0.35	0.27 (0.03)	0.2-0.33
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0.05 (0.01)	0.04-0.07	0.04 (0.01)	0.03-0.05	0.03 (0)	0.02-0.04

Table 14-15 Density of guillemot (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded in each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0.09 (0.02)	0.06-0.12	0.08 (0.01)	0.06-0.1	0.11 (0.01)	0.09-0.13
Aug-2020	0.03 (0.01)	0.02-0.05	0.04 (0.01)	0.03-0.05	0.05 (0.01)	0.04-0.06
Sep-2020	0.06 (0.01)	0.05-0.08	0.1 (0.01)	0.08-0.12	0.1 (0.01)	0.08-0.11
Oct-2020	0.1 (0.02)	0.07-0.13	0.17 (0.02)	0.12-0.2	0.15 (0.01)	0.13-0.18
Nov-2020	0.06 (0.01)	0.04-0.08	0.06 (0.01)	0.04-0.07	0.05 (0.01)	0.04-0.07
Dec-2020	0.1 (0.02)	0.06-0.14	0.12 (0.02)	0.09-0.16	0.1 (0.01)	0.08-0.13
Jan-2021	0.16 (0.03)	0.11-0.21	0.12 (0.01)	0.09-0.15	0.11 (0.01)	0.09-0.13
Feb-2021	0.29 (0.07)	0.17-0.44	0.27 (0.06)	0.18-0.39	0.36 (0.06)	0.26-0.49
Mar-2021	0.32 (0.04)	0.25-0.4	0.31 (0.03)	0.25-0.36	0.27 (0.03)	0.22-0.35
Apr-2021	0.07 (0.01)	0.05-0.08	0.11 (0.01)	0.09-0.13	0.11 (0.01)	0.1-0.13
May-2021	0.05 (0.01)	0.02-0.08	0.03 (0.01)	0.02-0.06	0.04 (0.01)	0.02-0.06
Jun-2021	0.09 (0.02)	0.05-0.14	0.11 (0.02)	0.07-0.16	0.1 (0.02)	0.06-0.13
Jul-2021	0.35 (0.07)	0.23-0.49	0.41 (0.07)	0.28-0.55	0.41 (0.05)	0.33-0.52
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0.05 (0.01)	0.04-0.06	0.05 (0)	0.04-0.06	0.04 (0)	0.03-0.04
Oct-2021	0.57 (0.07)	0.43-0.71	0.79 (0.09)	0.62-0.96	0.99 (0.09)	0.84-1.18
Nov-2021	0.09 (0.02)	0.06-0.12	0.08 (0.01)	0.06-0.1	0.12 (0.01)	0.1-0.14
Dec-2021	0.02 (0)	0.01-0.02	0.03 (0)	0.02-0.03	0.03 (0)	0.02-0.04
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0.02 (0)	0.01-0.03	0.01 (0)	0.01-0.02	0.01 (0)	0.01-0.01
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0.13 (0.02)	0.09-0.17	0.18 (0.02)	0.15-0.23	0.2 (0.02)	0.17-0.24
May-2022	0.74 (0.12)	0.52-0.97	0.72 (0.1)	0.55-0.93	0.76 (0.11)	0.57-1
Jun-2022	0.19 (0.05)	0.1-0.3	0.24 (0.05)	0.15-0.35	0.26 (0.05)	0.17-0.37
Jul-2022	0.36 (0.06)	0.25-0.48	0.35 (0.05)	0.25-0.45	0.35 (0.04)	0.26-0.43
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0.07 (0.01)	0.05-0.09	0.05 (0.01)	0.04-0.06	0.04 (0.01)	0.03-0.05

Table 14-16 Abundance of guillemot recorded in each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	40.1 (7.59)	26.1-55.67	48.12 (6.49)	36.19-62.06	88.23 (9.58)	70.99-108.25
Aug-2020	15.92 (2.63)	10.97-21.09	23.89 (3.54)	17.57-31.39	39.81 (4.7)	31.27-49.76
Sep-2020	30.99 (3.96)	23.32-38.66	69.73 (7.03)	56.16-83.61	85.22 (7.11)	71.95-98.97
Oct-2020	46.52 (7.27)	33.83-62.1	108.56 (13.51)	81.2-133.72	131.82 (12.66)	107.55-157.16
Nov-2020	23.27 (4.37)	14.32-32.21	31.02 (5.24)	21.71-41.57	38.78 (5.36)	28.48-49.08
Dec-2020	46.49 (8.97)	30.59-64.64	77.49 (11.98)	54.64-102.33	85.24 (9.42)	67.42-104.61
Jan-2021	69.73 (11.29)	49.43-94.47	69.73 (8.49)	54.12-87.43	85.23 (9.26)	67.03-103.42
Feb-2021	139.41 (35.29)	81.61-216.28	178.14 (39.07)	117.06-262.5	317.55 (51.41)	231.31-426.13
Mar-2021	154.91 (17.52)	121.23-189.44	201.38 (20.24)	162.31-239.66	232.36 (28.52)	184.56-296.32
Apr-2021	31.02 (3.86)	23.53-38.66	69.8 (6.43)	57.82-82.45	93.07 (6.71)	80.82-107.39
May-2021	23.25 (7.19)	10.66-37.78	23.25 (7.64)	10.73-39.35	31 (8.75)	15.7-48.73
Jun-2021	46.51 (12.44)	25.3-71.82	77.52 (17.02)	47.28-113.19	85.27 (15.15)	57.03-115.34
Jul-2021	186.04 (34.96)	121.09-257.49	294.57 (48.96)	204.39-394.81	379.84 (45.98)	300.7-478.31
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	23.24 (2.47)	18.53-28.18	30.99 (2.66)	26.03-36.42	30.99 (2.15)	26.87-35.35
Oct-2021	279.15 (35.29)	211.67-347.94	527.27 (57.58)	416.45-641.46	868.45 (76.34)	735.41-1031.71
Nov-2021	38.7 (6.68)	26.61-52.73	46.44 (5.97)	35.76-58.06	92.88 (8.9)	75.22-109.91
Dec-2021	7.75 (1.07)	5.77-9.99	15.5 (1.69)	12.27-18.83	23.25 (2.09)	19.13-27.37
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	7.75 (1.49)	4.73-10.76	7.75 (1.26)	5.41-10.08	7.75 (1.12)	5.61-9.99
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	61.89 (8.78)	46.28-82.02	123.78 (13.63)	99.32-151.22	177.93 (15.97)	149.84-210.71
May-2022	395.96 (62.22)	279.16-518.52	520.18 (71)	397.4-674.9	690.98 (101.68)	517.72-907.61
Jun-2022	92.92 (23.7)	50.06-146.15	162.6 (36.87)	99.7-239.57	232.29 (44.12)	152.99-326.83
Jul-2022	174.49 (29.17)	122.17-232.05	230.01 (33.82)	164.71-296.12	293.46 (35.61)	223.11-367.13
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	31.62 (5.39)	21.82-42.6	31.62 (4.65)	23.18-41.18	31.62 (4.4)	23.39-40.4

Table 14-17 Abundance of guillemot (including unidentified auks apportioned using identified auk ratios) recorded in each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	43.88 (8.3)	28.56-60.91	52.55 (7.09)	39.52-67.77	96.23 (10.45)	77.43-118.06
Aug-2020	17.21 (2.84)	11.86-22.8	25.46 (3.77)	18.73-33.46	42.65 (5.04)	33.5-53.31
Sep-2020	31.82 (4.07)	23.94-39.7	71.32 (7.19)	57.44-85.52	87.14 (7.27)	73.57-101.2
Oct-2020	49.02 (7.66)	35.65-65.43	114.3 (14.22)	85.5-140.79	137.75 (13.23)	112.39-164.23
Nov-2020	29.53 (5.54)	18.17-40.89	38.47 (6.49)	26.93-51.54	47.26 (6.54)	34.7-59.81
Dec-2020	51.03 (9.84)	33.57-70.95	86.43 (13.36)	60.95-114.14	93.76 (10.36)	74.16-115.07
Jan-2021	81.21 (13.15)	57.57-110.02	80.14 (9.76)	62.2-100.48	97.68 (10.61)	76.83-118.53
Feb-2021	146.21 (37.01)	85.59-226.83	186.14 (40.82)	122.32-274.28	330.74 (53.54)	240.92-443.83
Mar-2021	165.85 (18.76)	129.8-202.83	214.39 (21.55)	172.8-255.15	244.3 (29.99)	194.05-311.55
Apr-2021	33.45 (4.17)	25.37-41.68	74.75 (6.88)	61.92-88.29	99.46 (7.18)	86.36-114.75
May-2021	24.22 (7.49)	11.1-39.36	23.85 (7.83)	11.01-40.36	31.81 (8.98)	16.11-49.99
Jun-2021	47.1 (12.6)	25.62-72.73	78.29 (17.19)	47.76-114.32	85.88 (15.26)	57.44-116.17
Jul-2021	188.21 (35.36)	122.5-260.48	298.58 (49.62)	207.17-400.18	386.87 (46.83)	306.27-487.17
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	24.61 (2.61)	19.62-29.84	32.62 (2.8)	27.4-38.33	32.48 (2.26)	28.16-37.05
Oct-2021	298.99 (37.8)	226.72-372.67	565.9 (61.8)	446.95-688.45	932.93 (82.01)	790.01-1108.32
Nov-2021	45.47 (7.84)	31.26-61.96	55.27 (7.11)	42.55-69.1	105.97 (10.16)	85.82-125.39
Dec-2021	9.3 (1.28)	6.92-11.99	18.31 (2)	14.5-22.24	26.59 (2.39)	21.88-31.3
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	9.04 (1.74)	5.52-12.55	9.35 (1.52)	6.53-12.18	9.09 (1.31)	6.59-11.73
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	64.41 (9.13)	48.16-85.35	128.97 (14.2)	103.48-157.56	184.18 (16.53)	155.1-218.11
May-2022	407.35 (64.02)	287.2-533.44	533.52 (72.82)	407.59-692.2	715.73 (105.32)	536.27-940.12
Jun-2022	95.17 (24.28)	51.27-149.7	165.95 (37.63)	101.76-244.5	237.9 (45.19)	156.68-334.72
Jul-2022	182.61 (30.52)	127.86-242.86	239.85 (35.26)	171.75-308.78	308.32 (37.41)	234.41-385.72
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	33.45 (5.7)	23.08-45.06	33.69 (4.95)	24.69-43.88	33.24 (4.63)	24.59-42.48

Table 14-18 Abundance of guillemot (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded in each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	57.24 (10.83)	37.26-79.47	68.63 (9.26)	51.61-88.51	125.44 (13.62)	100.93-153.9
Aug-2020	22.38 (3.69)	15.42-29.64	33.16 (4.91)	24.39-43.58	55.45 (6.55)	43.55-69.31
Sep-2020	41.56 (5.32)	31.27-51.85	93.02 (9.37)	74.92-111.54	113.68 (9.48)	95.98-132.03
Oct-2020	63.83 (9.98)	46.41-85.19	148.48 (18.48)	111.07-182.89	178.99 (17.19)	146.04-213.4
Nov-2020	37.58 (7.06)	23.13-52.04	49.63 (8.38)	34.74-66.51	60.59 (8.38)	44.49-76.68
Dec-2020	64.64 (12.47)	42.53-89.86	110.28 (17.05)	77.76-145.62	120.11 (13.27)	95-147.41
Jan-2021	103.28 (16.72)	73.21-139.91	103.56 (12.61)	80.37-129.83	126.41 (13.73)	99.42-153.39
Feb-2021	187.7 (47.51)	109.87-291.18	238.49 (52.3)	156.72-351.43	420.02 (67.99)	305.95-563.63
Mar-2021	212.15 (23.99)	166.03-259.46	274.12 (27.56)	220.94-326.23	314.19 (38.57)	249.56-400.68
Apr-2021	43.79 (5.45)	33.22-54.56	97.62 (8.99)	80.86-115.3	129.93 (9.37)	112.83-149.91
May-2021	31 (9.58)	14.21-50.38	30.41 (9.98)	14.03-51.46	41.07 (11.59)	20.8-64.55
Jun-2021	60.64 (16.22)	32.99-93.64	100 (21.95)	61-146.02	110.42 (19.62)	73.86-149.36
Jul-2021	231.47 (43.49)	150.66-320.36	366.71 (60.95)	254.45-491.5	480.07 (58.11)	380.06-604.54
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	32.21 (3.42)	25.68-39.05	42.69 (3.67)	35.86-50.16	42.51 (2.95)	36.85-48.48
Oct-2021	375.72 (47.5)	284.91-468.32	703.59 (76.84)	555.7-855.96	1148.53 (100.96)	972.59-1364.45
Nov-2021	58.54 (10.1)	40.24-79.76	71.52 (9.2)	55.07-89.42	136.06 (13.04)	110.19-160.99
Dec-2021	12.14 (1.68)	9.03-15.65	23.93 (2.61)	18.94-29.06	34.71 (3.12)	28.56-40.85
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	11.83 (2.28)	7.23-16.44	12.28 (2)	8.57-15.98	11.9 (1.71)	8.62-15.35
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	83.02 (11.77)	62.08-110.02	165.29 (18.2)	132.63-201.93	235.69 (21.16)	198.47-279.1
May-2022	487.11 (76.55)	343.43-637.89	642.89 (87.74)	491.15-834.1	878.68 (129.29)	658.36-1154.15
Jun-2022	123.14 (31.41)	66.34-193.69	212.79 (48.25)	130.48-313.52	304.38 (57.82)	200.47-428.26
Jul-2022	237.2 (39.65)	166.08-315.46	311.96 (45.87)	223.39-401.62	400.48 (48.59)	304.48-501.01
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	43.64 (7.44)	30.11-58.79	44.03 (6.47)	32.27-57.34	43.48 (6.06)	32.17-55.57

Table 14-19 Density of guillemot recorded in each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km⁻²)					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	3.05 (0.58)	1.99-4.24	3.17 (0.43)	2.38-4.08	2.98 (0.32)	2.4-3.66
Aug-2020	0.87 (0.14)	0.6-1.16	1.05 (0.16)	0.77-1.38	1.12 (0.13)	0.88-1.4
Sep-2020	3.48 (0.45)	2.62-4.34	3.71 (0.37)	2.99-4.45	3.5 (0.29)	2.95-4.06
Oct-2020	2.79 (0.44)	2.03-3.72	3.32 (0.41)	2.48-4.09	3.16 (0.3)	2.58-3.77
Nov-2020	0.27 (0.05)	0.17-0.38	0.4 (0.07)	0.28-0.53	0.4 (0.05)	0.29-0.5
Dec-2020	0.41 (0.08)	0.27-0.57	0.59 (0.09)	0.42-0.78	0.66 (0.07)	0.52-0.81
Jan-2021	0.83 (0.13)	0.59-1.12	1.08 (0.13)	0.84-1.36	1.12 (0.12)	0.88-1.36
Feb-2021	2.21 (0.56)	1.29-3.42	1.92 (0.42)	1.26-2.83	1.82 (0.29)	1.33-2.44
Mar-2021	1.94 (0.22)	1.51-2.37	2.05 (0.21)	1.65-2.44	2.4 (0.3)	1.91-3.06
Apr-2021	5.09 (0.63)	3.86-6.35	5.43 (0.5)	4.5-6.41	5.98 (0.43)	5.19-6.9
May-2021	0.25 (0.08)	0.11-0.4	0.31 (0.1)	0.14-0.53	0.49 (0.14)	0.25-0.77
Jun-2021	0.86 (0.23)	0.47-1.33	0.78 (0.17)	0.48-1.14	0.86 (0.15)	0.57-1.16
Jul-2021	0.73 (0.14)	0.48-1.01	0.94 (0.16)	0.66-1.27	1.12 (0.14)	0.89-1.41
Aug-2021	2.47 (0.3)	1.9-3.06	2.73 (0.27)	2.23-3.26	2.86 (0.22)	2.43-3.3
Sep-2021	3.58 (0.38)	2.85-4.34	3.43 (0.29)	2.88-4.03	3.6 (0.25)	3.12-4.1
Oct-2021	2.07 (0.26)	1.57-2.58	2.13 (0.23)	1.68-2.6	2.14 (0.19)	1.81-2.54
Nov-2021	0.88 (0.15)	0.61-1.21	0.81 (0.1)	0.63-1.02	0.87 (0.08)	0.7-1.03
Dec-2021	1.05 (0.15)	0.78-1.35	1.27 (0.14)	1.01-1.55	1.38 (0.12)	1.14-1.62
Feb-2022	0.11 (0.03)	0.05-0.18	0.16 (0.04)	0.1-0.24	0.25 (0.04)	0.17-0.32
Feb-2022	0.41 (0.08)	0.25-0.57	0.45 (0.07)	0.31-0.59	0.46 (0.07)	0.33-0.59
Mar-2022	0.2 (0.06)	0.08-0.34	0.27 (0.06)	0.16-0.4	0.28 (0.05)	0.19-0.38
Apr-2022	1.36 (0.19)	1.01-1.8	1.31 (0.14)	1.05-1.6	1.37 (0.12)	1.15-1.62
May-2022	1.04 (0.16)	0.73-1.36	1.11 (0.15)	0.85-1.44	1.65 (0.24)	1.24-2.17
Jun-2022	2.29 (0.58)	1.23-3.6	1.92 (0.44)	1.18-2.83	1.74 (0.33)	1.15-2.45
Jul-2022	6.22 (1.04)	4.36-8.28	7.21 (1.06)	5.16-9.28	6.38 (0.77)	4.85-7.98
Aug-2022	3 (0.64)	1.78-4.29	3.67 (0.61)	2.49-4.87	4.86 (0.63)	3.76-6.18
Sep-2022	2.87 (0.49)	1.98-3.86	3.21 (0.47)	2.35-4.18	3.83 (0.53)	2.84-4.9

Table 14-20 Density of guillemot (including unidentified auks apportioned using identified auk ratios) recorded in each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	3.34 (0.63)	2.18-4.64	3.46 (0.47)	2.6-4.46	3.25 (0.35)	2.62-3.99
Aug-2020	0.94 (0.16)	0.65-1.25	1.12 (0.17)	0.82-1.47	1.2 (0.14)	0.94-1.5
Sep-2020	3.58 (0.46)	2.69-4.46	3.79 (0.38)	3.05-4.55	3.57 (0.3)	3.02-4.15
Oct-2020	2.94 (0.46)	2.14-3.92	3.5 (0.44)	2.62-4.31	3.31 (0.32)	2.7-3.94
Nov-2020	0.34 (0.06)	0.21-0.48	0.49 (0.08)	0.35-0.66	0.48 (0.07)	0.35-0.61
Dec-2020	0.45 (0.09)	0.3-0.63	0.66 (0.1)	0.46-0.87	0.73 (0.08)	0.58-0.9
Jan-2021	0.96 (0.16)	0.68-1.3	1.24 (0.15)	0.97-1.56	1.28 (0.14)	1.01-1.56
Feb-2021	2.31 (0.59)	1.35-3.59	2.01 (0.44)	1.32-2.96	1.9 (0.31)	1.38-2.55
Mar-2021	2.07 (0.23)	1.62-2.53	2.19 (0.22)	1.76-2.6	2.53 (0.31)	2.01-3.22
Apr-2021	5.49 (0.68)	4.17-6.84	5.81 (0.54)	4.82-6.87	6.39 (0.46)	5.55-7.37
May-2021	0.26 (0.08)	0.12-0.42	0.32 (0.11)	0.15-0.54	0.5 (0.14)	0.25-0.79
Jun-2021	0.87 (0.23)	0.47-1.35	0.79 (0.17)	0.48-1.15	0.86 (0.15)	0.58-1.17
Jul-2021	0.74 (0.14)	0.48-1.03	0.96 (0.16)	0.66-1.28	1.14 (0.14)	0.9-1.44
Aug-2021	2.63 (0.32)	2.03-3.26	2.9 (0.29)	2.38-3.47	3.01 (0.23)	2.55-3.47
Sep-2021	3.79 (0.4)	3.02-4.59	3.61 (0.31)	3.03-4.24	3.77 (0.26)	3.27-4.3
Oct-2021	2.21 (0.28)	1.68-2.76	2.29 (0.25)	1.81-2.79	2.3 (0.2)	1.94-2.73
Nov-2021	1.04 (0.18)	0.71-1.42	0.97 (0.12)	0.75-1.21	0.99 (0.1)	0.8-1.17
Dec-2021	1.26 (0.17)	0.94-1.63	1.5 (0.16)	1.19-1.83	1.58 (0.14)	1.3-1.86
Feb-2022	0.12 (0.04)	0.05-0.2	0.18 (0.04)	0.11-0.27	0.29 (0.05)	0.2-0.38
Feb-2022	0.48 (0.09)	0.29-0.67	0.54 (0.09)	0.38-0.71	0.53 (0.08)	0.39-0.69
Mar-2022	0.25 (0.08)	0.1-0.42	0.32 (0.07)	0.2-0.48	0.34 (0.06)	0.24-0.46
Apr-2022	1.41 (0.2)	1.05-1.87	1.36 (0.15)	1.09-1.66	1.42 (0.13)	1.19-1.68
May-2022	1.07 (0.17)	0.75-1.4	1.14 (0.16)	0.87-1.48	1.71 (0.25)	1.28-2.25
Jun-2022	2.34 (0.6)	1.26-3.69	1.96 (0.44)	1.2-2.89	1.78 (0.34)	1.17-2.51
Jul-2022	6.51 (1.09)	4.56-8.66	7.52 (1.11)	5.38-9.68	6.71 (0.81)	5.1-8.39
Aug-2022	3.02 (0.64)	1.8-4.33	3.7 (0.61)	2.5-4.9	4.91 (0.63)	3.79-6.24
Sep-2022	3.03 (0.52)	2.09-4.08	3.42 (0.5)	2.51-4.45	4.03 (0.56)	2.98-5.15

Table 14-21 Density of guillemot (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded in each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	4.36 (0.83)	2.84-6.05	4.52 (0.61)	3.4-5.82	4.24 (0.46)	3.41-5.2
Aug-2020	1.23 (0.2)	0.85-1.63	1.46 (0.22)	1.07-1.92	1.56 (0.18)	1.23-1.95
Sep-2020	4.67 (0.6)	3.51-5.83	4.95 (0.5)	3.98-5.93	4.66 (0.39)	3.94-5.42
Oct-2020	3.82 (0.6)	2.78-5.11	4.54 (0.57)	3.4-5.6	4.3 (0.41)	3.5-5.12
Nov-2020	0.44 (0.08)	0.27-0.61	0.64 (0.11)	0.45-0.86	0.62 (0.09)	0.45-0.78
Dec-2020	0.57 (0.11)	0.38-0.8	0.84 (0.13)	0.59-1.11	0.93 (0.1)	0.74-1.15
Jan-2021	1.22 (0.2)	0.87-1.66	1.61 (0.2)	1.25-2.02	1.66 (0.18)	1.3-2.01
Feb-2021	2.97 (0.75)	1.74-4.61	2.57 (0.56)	1.69-3.79	2.41 (0.39)	1.75-3.23
Mar-2021	2.65 (0.3)	2.07-3.24	2.79 (0.28)	2.25-3.33	3.25 (0.4)	2.58-4.14
Apr-2021	7.19 (0.9)	5.45-8.96	7.59 (0.7)	6.29-8.97	8.35 (0.6)	7.25-9.63
May-2021	0.33 (0.1)	0.15-0.54	0.41 (0.13)	0.19-0.69	0.65 (0.18)	0.33-1.02
Jun-2021	1.12 (0.3)	0.61-1.74	1.01 (0.22)	0.61-1.47	1.11 (0.2)	0.74-1.5
Jul-2021	0.91 (0.17)	0.59-1.26	1.18 (0.2)	0.82-1.58	1.41 (0.17)	1.12-1.78
Aug-2021	3.44 (0.42)	2.65-4.27	3.8 (0.38)	3.11-4.55	3.95 (0.3)	3.35-4.55
Sep-2021	4.96 (0.53)	3.95-6.01	4.73 (0.41)	3.97-5.55	4.93 (0.34)	4.28-5.63
Oct-2021	2.78 (0.35)	2.11-3.47	2.85 (0.31)	2.25-3.46	2.83 (0.25)	2.39-3.36
Nov-2021	1.34 (0.23)	0.92-1.82	1.25 (0.16)	0.96-1.57	1.27 (0.12)	1.03-1.51
Dec-2021	1.65 (0.23)	1.23-2.12	1.97 (0.21)	1.56-2.39	2.06 (0.19)	1.7-2.42
Feb-2022	0.15 (0.05)	0.07-0.26	0.24 (0.05)	0.15-0.36	0.39 (0.06)	0.26-0.5
Feb-2022	0.63 (0.12)	0.39-0.88	0.71 (0.12)	0.5-0.93	0.7 (0.1)	0.51-0.9
Mar-2022	0.33 (0.11)	0.14-0.56	0.42 (0.09)	0.26-0.63	0.45 (0.07)	0.31-0.61
Apr-2022	1.82 (0.26)	1.36-2.41	1.74 (0.19)	1.4-2.13	1.82 (0.16)	1.53-2.15
May-2022	1.28 (0.2)	0.9-1.68	1.37 (0.19)	1.05-1.78	2.1 (0.31)	1.57-2.76
Jun-2022	3.03 (0.77)	1.63-4.77	2.52 (0.57)	1.54-3.71	2.28 (0.43)	1.5-3.21
Jul-2022	8.46 (1.41)	5.92-11.25	9.78 (1.44)	7-12.59	8.71 (1.06)	6.62-10.9
Aug-2022	3.96 (0.84)	2.36-5.67	4.85 (0.8)	3.28-6.43	6.43 (0.83)	4.97-8.18
Sep-2022	3.96 (0.67)	2.73-5.33	4.47 (0.66)	3.27-5.82	5.27 (0.73)	3.9-6.74

Table 14-22 Abundance of guillemot recorded in each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	7.75 (6.93)	0-23.26	7.75 (7.17)	0-23.26	7.75 (7.13)	0-23.26
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 14-23 Abundance of guillemot (including unidentified auks apportioned using identified auk ratios) recorded in each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	2193.83 (415.19)	1427.93-3045.56	3091.48 (416.89)	2324.85-3987.06	3761.62 (408.54)	3026.78-4615.23
Aug-2020	619.72 (102.32)	427.1-820.71	1001.59 (148.38)	736.71-1316.14	1390.45 (164.19)	1092.08-1738.06
Sep-2020	2346.59 (300.1)	1765.63-2927.55	3391.71 (341.75)	2731.8-4067.14	4135.12 (344.95)	3491.19-4802.52
Oct-2020	1928.24 (301.41)	1402.15-2573.64	3126.86 (389.08)	2339.04-3851.66	3824.52 (367.28)	3120.43-4559.71
Nov-2020	226.39 (42.5)	139.32-313.46	442.35 (74.67)	309.65-592.75	557.64 (77.13)	409.52-705.77
Dec-2020	297.68 (57.41)	195.85-413.85	587.74 (90.87)	414.43-776.12	843.88 (93.27)	667.43-1035.67
Jan-2021	631.62 (102.27)	447.73-855.68	1113.07 (135.52)	863.87-1395.49	1482.94 (161.05)	1166.35-1799.52
Feb-2021	1518.98 (384.51)	889.16-2356.46	1796.61 (394)	1180.63-2647.43	2194.16 (355.19)	1598.3-2944.42
Mar-2021	1359.97 (153.82)	1064.32-1663.19	1954.28 (196.47)	1575.13-2325.82	2923.51 (358.89)	2322.09-3728.23
Apr-2021	3604.13 (448.94)	2733.96-4490.87	5199.35 (478.77)	4306.86-6141.17	7392.87 (533.36)	6419.69-8529.8
May-2021	169.54 (52.41)	77.71-275.5	286.17 (93.97)	132.08-484.29	580.48 (163.83)	294.01-912.37
Jun-2021	573.03 (153.26)	311.72-884.93	704.62 (154.69)	429.82-1028.92	999.34 (177.58)	668.44-1351.81
Jul-2021	486.2 (91.36)	316.45-672.91	856.44 (142.34)	594.26-1147.89	1318.52 (159.6)	1043.83-1660.36
Aug-2021	1726.83 (210.96)	1330.03-2139.94	2594.11 (256.75)	2124.7-3104.7	3484.63 (268.62)	2955.42-4013.83
Sep-2021	2485.77 (264.03)	1981.91-3013.99	3229.32 (277.37)	2712.63-3794.45	4360.68 (303.04)	3780.33-4973.47
Oct-2021	1453.42 (183.75)	1102.12-1811.61	2047.21 (223.56)	1616.91-2490.56	2657.19 (233.58)	2250.13-3156.72
Nov-2021	682.12 (117.65)	468.96-929.39	865.84 (111.35)	666.69-1082.51	1147.97 (110.04)	929.7-1358.37
Dec-2021	827.66 (114.35)	615.92-1066.76	1345.63 (147.04)	1065.44-1634.62	1825.57 (164.27)	1502.39-2148.98
Feb-2022	77.5 (23.14)	34.44-129.17	162.75 (34.69)	102.79-239.84	341 (54.98)	230.4-442.37
Feb-2022	316.3 (61.01)	193.3-439.31	486.4 (79.14)	339.56-633.24	618.35 (89.11)	448.08-797.58
Mar-2022	162.85 (51.74)	67.06-277.81	286.93 (60.86)	175.86-425.77	395.5 (66.01)	273.08-536.75

Apr-2022	925.84 (131.28)	692.31-1226.93	1217.15 (134.04)	976.63-1486.99	1641.59 (147.37)	1382.39-1943.98
May-2022	702.88 (110.46)	495.55-920.44	1019.25 (139.11)	778.68-1322.42	1978.32 (291.1)	1482.26-2598.54
Jun-2022	1538.61 (392.45)	828.87-2420.14	1754.33 (397.76)	1075.7-2584.75	2061.79 (391.63)	1357.94-2900.9
Jul-2022	4274.85 (714.54)	2992.99-5685.07	6723.94 (988.58)	4814.97-8656.48	7757.94 (941.28)	5898.2-9705.44
Aug-2022	1982.04 (421.4)	1179.78-2839.54	3308.6 (545.88)	2239.79-4385.46	5680.8 (734.33)	4388.44-7217.41
Sep-2022	1990.15 (339.15)	1373.17-2681.16	3057.05 (449.56)	2240.73-3981.66	4662.15 (649.41)	3448.96-5957.65

Table 14-24 Abundance of guillemot (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded in each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	2862.21 (541.68)	1862.96-3973.42	4037.85 (544.51)	3036.54-5207.59	4903.4 (532.55)	3945.51-6016.11
Aug-2020	805.64 (133.01)	555.24-1066.92	1304.4 (193.24)	959.44-1714.05	1807.59 (213.45)	1419.71-2259.48
Sep-2020	3065.09 (391.99)	2306.25-3823.93	4423.64 (445.73)	3562.95-5304.57	5394.63 (450.02)	4554.56-6265.31
Oct-2020	2510.49 (392.42)	1825.55-3350.77	4061.92 (505.43)	3038.51-5003.48	4969.64 (477.25)	4054.72-5924.94
Nov-2020	288.13 (54.09)	177.31-398.95	570.78 (96.35)	399.54-764.84	714.93 (98.89)	525.02-904.83
Dec-2020	377.06 (72.72)	248.08-524.21	749.88 (115.93)	528.76-990.22	1081 (119.47)	854.97-1326.68
Jan-2021	803.25 (130.06)	569.39-1088.2	1438.31 (175.12)	1116.3-1803.26	1919.09 (208.42)	1509.4-2328.79
Feb-2021	1949.95 (493.6)	1141.43-3025.04	2301.9 (504.82)	1512.68-3392.02	2786.45 (451.07)	2029.75-3739.23
Mar-2021	1739.66 (196.76)	1361.47-2127.53	2498.69 (251.2)	2013.92-2973.73	3759.83 (461.55)	2986.36-4794.74
Apr-2021	4718.41 (587.74)	3579.21-5879.3	6789.74 (625.21)	5624.25-8019.64	9658.17 (696.79)	8386.8-11143.49
May-2021	217.01 (67.09)	99.46-352.65	364.87 (119.82)	168.4-617.47	749.48 (211.53)	379.61-1178
Jun-2021	737.77 (197.32)	401.34-1139.35	899.96 (197.57)	548.97-1314.16	1284.87 (228.32)	859.43-1738.04
Jul-2021	597.97 (112.36)	389.2-827.6	1051.87 (174.82)	729.87-1409.83	1636.16 (198.05)	1295.3-2060.36
Aug-2021	2261.14 (276.24)	1741.56-2802.08	3399.45 (336.45)	2784.31-4068.54	4568.73 (352.19)	3874.88-5262.58
Sep-2021	3252.98 (345.53)	2593.61-3944.24	4226.5 (363.02)	3550.26-4966.14	5706.57 (396.57)	4947.1-6508.5
Oct-2021	1826.42 (230.91)	1384.97-2276.54	2545.35 (277.96)	2010.34-3096.57	3271.27 (287.56)	2770.14-3886.24
Nov-2021	878.05 (151.45)	603.66-1196.34	1120.5 (144.1)	862.78-1400.9	1473.94 (141.28)	1193.68-1744.08
Dec-2021	1080.56 (149.29)	804.11-1392.72	1758.49 (192.15)	1392.33-2136.15	2383.18 (214.44)	1961.27-2805.36
Feb-2022	100.75 (30.09)	44.78-167.91	217 (46.25)	137.05-319.79	449.5 (72.48)	303.71-583.13
Feb-2022	414.2 (79.9)	253.13-575.28	638.4 (103.87)	445.68-831.13	809.19 (116.61)	586.37-1043.74
Mar-2022	217.14 (68.99)	89.41-370.41	379.99 (80.6)	232.9-563.85	519.58 (86.72)	358.75-705.14

Apr-2022	1193.46 (169.23)	892.43-1581.58	1559.91 (171.79)	1251.66-1905.75	2100.67 (188.58)	1768.99-2487.64
May-2022	840.51 (132.09)	592.59-1100.67	1228.2 (167.63)	938.31-1593.51	2428.71 (357.38)	1819.72-3190.13
Jun-2022	1990.72 (507.77)	1072.43-3131.27	2249.5 (510.03)	1379.32-3314.31	2637.98 (501.08)	1737.43-3711.59
Jul-2022	5552.74 (928.14)	3887.69-7384.52	8745.72 (1285.83)	6262.75-11259.34	10076.93 (1222.65)	7661.28-12606.57
Aug-2022	2598.5 (552.47)	1546.72-3722.71	4338.63 (715.83)	2937.08-5750.75	7444.34 (962.29)	5750.78-9457.98
Sep-2022	2596.53 (442.49)	1791.55-3498.07	3995.28 (587.53)	2928.42-5203.66	6098.47 (849.48)	4511.52-7793.09

15 RAZORBILL

Table 15-1 Mean density of razorbill recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0.01	0.01 (0)	0-0.01
Apr	0.01 (0)	0-0.01	0 (0)	0-0.01	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0.01 (0)	0-0.01	0 (0)	0-0.01	0 (0)	0-0.01
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0.01	0 (0)	0-0.01	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0.01	0 (0)	0-0.01
Nov	0.01 (0.01)	0-0.02	0 (0)	0-0.01	0 (0)	0-0.01
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 15-2 Mean density of razorbill (including unidentified auks apportioned using identified auk ratios) recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0.01	0.01 (0)	0-0.01
Apr	0.01 (0)	0-0.01	0 (0)	0-0.01	0 (0)	0-0.01
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0.01 (0)	0-0.01	0 (0)	0-0.01	0 (0)	0-0.01
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0.01	0 (0)	0-0.01	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0.01	0 (0)	0-0.01
Nov	0.01 (0.01)	0-0.02	0 (0)	0-0.01	0 (0)	0-0.01
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 15-3 Mean density of razorbill (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0.01	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0.01	0.01 (0)	0-0.02
Apr	0.01 (0)	0-0.01	0.01 (0)	0-0.01	0 (0)	0-0.01
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0.01 (0)	0-0.01	0.01 (0)	0-0.01	0 (0)	0-0.01
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0.01 (0)	0-0.01	0 (0)	0-0.01	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0.01	0 (0)	0-0.01
Nov	0.01 (0.01)	0-0.02	0 (0)	0-0.01	0 (0)	0-0.01
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 15-4 Mean abundance of razorbill recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	2.58 (0.95)	0.77-4.39	2.58 (0.99)	0.77-4.65
Mar	0 (0)	0-0	3.87 (1.94)	0-7.75	7.75 (2.8)	3.01-13.78
Apr	3.88 (1.33)	1.11-6.65	3.88 (1.04)	1.94-6.09	3.88 (0.89)	2.22-5.54
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	3.88 (1.55)	1.55-6.98	3.88 (1.56)	0.78-6.98	3.88 (1.45)	1.29-6.78
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	2.58 (1.24)	0.65-5.38	2.58 (1.14)	0.6-4.97	2.58 (0.93)	0.96-4.52
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	3.88 (2.08)	0-7.75	3.88 (2.15)	0-9.05
Nov	3.87 (3.6)	0-11.61	3.87 (3.73)	0-11.61	3.87 (3.52)	0-11.61
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 15-5 Mean abundance of razorbill (including unidentified auks apportioned using identified auk ratios) recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	2.58 (0.95)	0.77-4.39	2.58 (0.99)	0.77-4.65
Mar	0 (0)	0-0	3.87 (1.94)	0-7.75	8.61 (3.07)	3.4-15.21
Apr	3.88 (1.33)	1.11-6.65	4.16 (1.11)	2.08-6.53	4.06 (0.94)	2.32-5.81
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	3.88 (1.55)	1.55-6.98	3.88 (1.56)	0.78-6.98	3.88 (1.45)	1.29-6.78
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	2.8 (1.34)	0.7-5.83	2.78 (1.22)	0.64-5.35	2.74 (0.99)	1.02-4.8
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	3.88 (2.08)	0-7.75	3.88 (2.15)	0-9.05
Nov	3.87 (3.6)	0-11.61	3.87 (3.73)	0-11.61	3.87 (3.52)	0-11.61
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 15-6 Mean abundance of razorbill (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	3.1 (1.14)	0.93-5.27	3.1 (1.18)	0.93-5.58
Mar	0 (0)	0-0	3.87 (1.94)	0-7.75	10.33 (3.7)	4.07-18.28
Apr	4.43 (1.52)	1.27-7.6	4.99 (1.33)	2.49-7.84	4.8 (1.11)	2.74-6.86
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	4.65 (1.85)	1.86-8.37	4.65 (1.87)	0.93-8.37	4.52 (1.69)	1.51-7.91
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	3.44 (1.65)	0.86-7.17	3.38 (1.49)	0.78-6.5	3.23 (1.16)	1.2-5.65
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	3.88 (2.08)	0-7.75	3.88 (2.15)	0-9.05
Nov	3.87 (3.6)	0-11.61	3.87 (3.73)	0-11.61	3.87 (3.52)	0-11.61
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 15-7 Mean density of razorbill recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0.05 (0.02)	0-0.1	0.04 (0.02)	0.01-0.08	0.03 (0.01)	0.01-0.06
Mar	0.06 (0.03)	0.01-0.12	0.07 (0.03)	0.03-0.13	0.08 (0.03)	0.03-0.15
Apr	0.04 (0.01)	0.01-0.06	0.06 (0.02)	0.03-0.09	0.07 (0.02)	0.04-0.1
May	0.01 (0)	0-0.02	0 (0)	0-0.01	0.01 (0.01)	0-0.03
Jun	0.02 (0.01)	0.01-0.04	0.02 (0.01)	0-0.03	0.04 (0.01)	0.01-0.06
Jul	0.05 (0.03)	0-0.12	0.05 (0.03)	0.01-0.11	0.06 (0.02)	0.02-0.11
Aug	0.06 (0.03)	0.01-0.13	0.06 (0.03)	0.01-0.12	0.05 (0.02)	0.01-0.1
Sep	0.1 (0.05)	0.02-0.21	0.13 (0.06)	0.03-0.26	0.15 (0.06)	0.05-0.27
Oct	0.01 (0.01)	0-0.03	0.01 (0)	0-0.02	0.01 (0.01)	0-0.04
Nov	0 (0)	0-0	0 (0)	0-0.01	0 (0)	0-0.01
Dec	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02

Table 15-8 Mean density of razorbill (including unidentified auks apportioned using identified auk ratios) recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0.05 (0.03)	0-0.11	0.04 (0.02)	0.01-0.08	0.03 (0.01)	0.01-0.07
Mar	0.07 (0.03)	0.01-0.14	0.09 (0.03)	0.03-0.16	0.1 (0.03)	0.04-0.17
Apr	0.04 (0.01)	0.01-0.06	0.06 (0.02)	0.03-0.09	0.07 (0.02)	0.04-0.1
May	0.01 (0)	0-0.02	0 (0)	0-0.01	0.01 (0.01)	0-0.03
Jun	0.02 (0.01)	0.01-0.04	0.02 (0.01)	0-0.03	0.04 (0.01)	0.01-0.06
Jul	0.05 (0.03)	0-0.12	0.05 (0.03)	0.01-0.11	0.06 (0.02)	0.02-0.11
Aug	0.06 (0.03)	0.01-0.13	0.06 (0.03)	0.01-0.12	0.05 (0.02)	0.01-0.1
Sep	0.1 (0.05)	0.02-0.21	0.13 (0.06)	0.03-0.27	0.15 (0.06)	0.06-0.28
Oct	0.01 (0.01)	0-0.03	0.01 (0)	0-0.02	0.01 (0.01)	0-0.04
Nov	0 (0)	0-0	0 (0)	0-0.01	0 (0)	0-0.01
Dec	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02

Table 15-9 Mean density of razorbill (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0.06 (0.03)	0-0.12	0.05 (0.02)	0.01-0.1	0.04 (0.02)	0.01-0.08
Mar	0.08 (0.04)	0.02-0.16	0.1 (0.04)	0.04-0.19	0.12 (0.04)	0.05-0.2
Apr	0.04 (0.01)	0.01-0.07	0.07 (0.02)	0.04-0.11	0.08 (0.02)	0.05-0.12
May	0.01 (0)	0-0.02	0 (0)	0-0.01	0.02 (0.01)	0-0.04
Jun	0.03 (0.01)	0.01-0.05	0.02 (0.01)	0-0.04	0.04 (0.02)	0.01-0.08
Jul	0.06 (0.04)	0-0.14	0.06 (0.03)	0.01-0.12	0.07 (0.03)	0.03-0.13
Aug	0.07 (0.04)	0.01-0.16	0.07 (0.03)	0.01-0.14	0.06 (0.03)	0.02-0.12
Sep	0.12 (0.06)	0.02-0.25	0.16 (0.07)	0.04-0.32	0.19 (0.07)	0.07-0.34
Oct	0.01 (0.01)	0-0.03	0.01 (0)	0-0.02	0.01 (0.01)	0-0.04
Nov	0 (0)	0-0	0 (0)	0-0.01	0 (0)	0-0.01
Dec	0.01 (0.01)	0-0.03	0.02 (0.01)	0-0.03	0.01 (0.01)	0-0.03

Table 15-10 Mean abundance of razorbill recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	30.98 (15.05)	2.58-64.55	36.15 (15.85)	6.97-67.9	36.15 (15.87)	6.97-70.23
Mar	38.77 (18.72)	7.75-77.53	65.91 (24.91)	23.26-120.18	96.9 (33.45)	39.62-168.38
Apr	23.27 (7.96)	6.65-39.89	50.41 (13.49)	25.21-79.22	77.56 (17.87)	44.32-110.89
May	3.88 (3.06)	0-11.65	3.88 (3.11)	0-11.65	15.51 (9.57)	0-34.9
Jun	15.5 (6.18)	6.2-27.91	15.5 (6.22)	3.1-27.91	42.63 (15.94)	14.21-74.61
Jul	31.79 (21.85)	2.64-79.56	45 (22.9)	10.58-95.36	66.15 (25.56)	23.79-121.79
Aug	36.3 (20.41)	7.1-82.88	49.29 (25.2)	7.15-104.16	57.03 (25.83)	14.46-112.35
Sep	65.09 (32.37)	13.07-135.24	115.05 (53.35)	28.83-230.04	172.75 (67.28)	62.87-316.69
Oct	7.75 (4.96)	0-19.39	7.75 (4.15)	0-15.51	15.51 (11.49)	0-41.35
Nov	0 (0)	0-0	3.88 (3.67)	0-11.63	3.88 (3.55)	0-11.63
Dec	7.75 (4.87)	0-19.37	11.62 (6.35)	0-23.25	11.62 (6.09)	0-23.25

Table 15-11 Mean abundance of razorbill (including unidentified auks apportioned using identified auk ratios) recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	33.56 (16.41)	2.58-70.23	38.73 (17.31)	6.97-73.58	38.73 (17.27)	6.97-75.91
Mar	46.52 (22.08)	9.48-92.18	77.54 (29.12)	27.92-141.12	111.55 (38.08)	46.13-192.79
Apr	23.27 (7.96)	6.65-39.89	54.02 (14.46)	27.01-84.88	81.25 (18.72)	46.43-116.17
May	3.88 (3.06)	0-11.65	3.88 (3.11)	0-11.65	15.51 (9.57)	0-34.9
Jun	15.5 (6.18)	6.2-27.91	15.5 (6.22)	3.1-27.91	42.63 (15.94)	14.21-74.61
Jul	31.79 (21.85)	2.64-79.56	45 (22.9)	10.58-95.36	68.8 (26.47)	24.83-126.39
Aug	38.67 (21.55)	7.69-87.81	51.67 (26.25)	7.7-108.75	59.45 (26.71)	15.36-116.59
Sep	65.09 (32.37)	13.07-135.24	120.32 (55.65)	30.39-240.38	178.02 (69.23)	64.91-326.15
Oct	7.75 (4.96)	0-19.39	7.75 (4.15)	0-15.51	15.51 (11.49)	0-41.35
Nov	0 (0)	0-0	3.88 (3.67)	0-11.63	3.88 (3.55)	0-11.63
Dec	7.75 (4.87)	0-19.37	11.62 (6.35)	0-23.25	11.62 (6.09)	0-23.25

Table 15-12 Mean abundance of razorbill (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	38.73 (18.95)	2.95-81.07	45.96 (20.48)	8.36-87.16	45.96 (20.45)	8.36-89.95
Mar	54.28 (25.44)	11.2-106.83	93.05 (34.73)	34.12-169.04	133.08 (45.51)	54.94-230.21
Apr	26.59 (9.1)	7.6-45.59	64.82 (17.35)	32.41-101.86	96.03 (22.12)	54.87-137.3
May	3.88 (3.06)	0-11.65	3.88 (3.11)	0-11.65	19.38 (11.72)	0-42.65
Jun	18.6 (7.42)	7.44-33.49	18.6 (7.47)	3.72-33.49	49.74 (18.6)	16.58-87.04
Jul	37.07 (25.24)	3.17-92.26	52.94 (26.56)	12.69-111.22	82.02 (31.04)	30-149.38
Aug	45.77 (24.95)	9.46-102.6	61.42 (30.83)	9.35-128.23	69.31 (30.76)	18.07-135.03
Sep	78.1 (38.6)	15.94-161.69	143.87 (66.31)	36.62-286.99	217.28 (84.41)	79.35-397.88
Oct	7.75 (4.96)	0-19.39	7.75 (4.15)	0-15.51	15.51 (11.49)	0-41.35
Nov	0 (0)	0-0	3.88 (3.67)	0-11.63	3.88 (3.55)	0-11.63
Dec	7.75 (4.87)	0-19.37	15.5 (8.46)	0-31	15.5 (8.12)	0-31

Table 15-13 Density of razorbill recorded in each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km⁻²)					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0.01 (0)	0-0.01	0.01 (0)	0-0.01
Mar-2021	0 (0)	0-0	0.01 (0)	0-0.02	0.01 (0)	0-0.01
Apr-2021	0.01 (0)	0-0.02	0.01 (0)	0-0.01	0.01 (0)	0-0.01
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0.01 (0)	0-0.02	0.01 (0)	0-0.02	0.01 (0)	0-0.01
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0.01 (0.01)	0-0.02	0.01 (0)	0-0.02	0.01 (0)	0-0.01
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0.01 (0)	0-0.02	0.01 (0)	0-0.02
Nov-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0.01 (0)	0-0.01
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 15-14 Density of razorbill (including unidentified auks apportioned using identified auk ratios) recorded in each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0.01 (0)	0-0.01	0.01 (0)	0-0.01
Mar-2021	0 (0)	0-0	0.01 (0)	0-0.02	0.01 (0)	0-0.01
Apr-2021	0.01 (0)	0-0.02	0.01 (0)	0-0.01	0.01 (0)	0-0.01
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0.01 (0)	0-0.02	0.01 (0)	0-0.02	0.01 (0)	0-0.01
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0.01 (0.01)	0-0.03	0.01 (0)	0-0.02	0.01 (0)	0-0.01
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0.01 (0)	0-0.02	0.01 (0)	0-0.02
Nov-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0.01 (0)	0-0.01
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 15-15 Density of razorbill (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded in each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0.01 (0)	0-0.02	0.01 (0)	0-0.01
Mar-2021	0 (0)	0-0	0.01 (0)	0-0.02	0.01 (0)	0-0.02
Apr-2021	0.01 (0)	0-0.02	0.01 (0)	0.01-0.02	0.01 (0)	0-0.01
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0.01 (0.01)	0.01-0.03	0.01 (0)	0-0.02	0.01 (0)	0-0.01
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0.02 (0.01)	0-0.03	0.01 (0)	0-0.02	0.01 (0)	0-0.01
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0.01 (0)	0-0.02	0.01 (0)	0-0.02
Nov-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0.01 (0)	0-0.02
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 15-16 Abundance of razorbill recorded in each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	7.75 (2.86)	2.32-13.17	7.75 (2.96)	2.32-13.94
Mar-2021	0 (0)	0-0	7.75 (3.88)	0-15.49	7.75 (3.15)	2.58-14.63
Apr-2021	7.76 (2.65)	2.22-13.3	7.76 (2.08)	3.88-12.19	7.76 (1.79)	4.43-11.09
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	7.75 (3.09)	3.1-13.95	7.75 (3.11)	1.55-13.95	7.75 (2.9)	2.58-13.57
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	7.74 (3.72)	1.94-16.13	7.74 (3.41)	1.79-14.91	7.74 (2.79)	2.89-13.56
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	7.75 (4.15)	0-15.51	7.75 (4.3)	0-18.09
Nov-2021	7.74 (7.2)	0-23.22	7.74 (7.46)	0-23.22	7.74 (7.04)	0-23.22
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	7.75 (2.45)	3.45-12.92
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 15-17 Abundance of razorbill (including unidentified auks apportioned using identified auk ratios) recorded in each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	7.75 (2.86)	2.32-13.17	7.75 (2.96)	2.32-13.94
Mar-2021	0 (0)	0-0	7.75 (3.88)	0-15.49	7.75 (3.15)	2.58-14.63
Apr-2021	7.76 (2.65)	2.22-13.3	8.31 (2.22)	4.16-13.06	8.13 (1.87)	4.64-11.62
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	7.75 (3.09)	3.1-13.95	7.75 (3.11)	1.55-13.95	7.75 (2.9)	2.58-13.57
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	8.39 (4.03)	2.1-17.48	8.34 (3.67)	1.92-16.05	8.23 (2.97)	3.07-14.41
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	7.75 (4.15)	0-15.51	7.75 (4.3)	0-18.09
Nov-2021	7.74 (7.2)	0-23.22	7.74 (7.46)	0-23.22	7.74 (7.04)	0-23.22
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	9.48 (3)	4.21-15.8
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 15-18 Abundance of razorbill (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded in each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	9.29 (3.43)	2.79-15.8	9.29 (3.55)	2.79-16.73
Mar-2021	0 (0)	0-0	7.75 (3.88)	0-15.49	9.47 (3.85)	3.16-17.88
Apr-2021	8.86 (3.03)	2.53-15.2	9.97 (2.67)	4.99-15.67	9.6 (2.21)	5.49-13.73
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	9.3 (3.71)	3.72-16.74	9.3 (3.73)	1.86-16.74	9.04 (3.38)	3.01-15.83
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	10.32 (4.96)	2.58-21.51	10.13 (4.46)	2.34-19.49	9.68 (3.49)	3.61-16.95
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	7.75 (4.15)	0-15.51	7.75 (4.3)	0-18.09
Nov-2021	7.74 (7.2)	0-23.22	7.74 (7.46)	0-23.22	7.74 (7.04)	0-23.22
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	11.2 (3.54)	4.98-18.67
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 15-19 Density of razorbill recorded in each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0.02 (0.02)	0-0.07	0.02 (0.02)	0-0.05	0.01 (0.01)	0-0.04
Aug-2020	0.02 (0.02)	0-0.07	0.02 (0.01)	0-0.05	0.01 (0.01)	0-0.04
Sep-2020	0.09 (0.04)	0.02-0.19	0.09 (0.03)	0.03-0.16	0.08 (0.03)	0.03-0.14
Oct-2020	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.04
Nov-2020	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0.08 (0.04)	0.01-0.17	0.08 (0.03)	0.02-0.13	0.06 (0.02)	0.02-0.11
Mar-2021	0.01 (0.01)	0-0.04	0.02 (0.01)	0-0.03	0.05 (0.02)	0.02-0.1
Apr-2021	0.07 (0.02)	0.02-0.12	0.11 (0.03)	0.06-0.18	0.13 (0.03)	0.08-0.19
May-2021	0 (0)	0-0	0 (0)	0-0	0.02 (0.01)	0-0.04
Jun-2021	0.05 (0.02)	0.02-0.09	0.03 (0.01)	0.01-0.06	0.07 (0.03)	0.02-0.13
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0.13 (0.06)	0.03-0.27	0.1 (0.05)	0.02-0.2	0.1 (0.04)	0.04-0.18
Sep-2021	0.08 (0.06)	0-0.21	0.06 (0.04)	0-0.15	0.07 (0.03)	0.01-0.14
Oct-2021	0.02 (0.02)	0-0.06	0.02 (0.01)	0-0.03	0.01 (0.01)	0-0.03
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0.02 (0.01)	0-0.06	0.03 (0.01)	0-0.05	0.02 (0.01)	0-0.04
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0.06 (0.03)	0-0.13	0.04 (0.02)	0-0.1	0.03 (0.02)	0-0.07
Mar-2022	0.11 (0.05)	0.02-0.2	0.13 (0.05)	0.05-0.23	0.11 (0.04)	0.05-0.19
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0.12 (0.08)	0.01-0.29	0.13 (0.06)	0.04-0.27	0.16 (0.05)	0.06-0.27
Aug-2022	0.01 (0.01)	0-0.04	0.04 (0.02)	0-0.1	0.03 (0.02)	0-0.07
Sep-2022	0.12 (0.05)	0.04-0.22	0.24 (0.1)	0.07-0.47	0.3 (0.11)	0.12-0.54

Table 15-20 Density of razorbill (including unidentified auks apportioned using identified auk ratios) recorded in each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0.02 (0.02)	0-0.07	0.02 (0.02)	0-0.05	0.01 (0.01)	0-0.04
Aug-2020	0.02 (0.02)	0-0.07	0.02 (0.01)	0-0.05	0.01 (0.01)	0-0.04
Sep-2020	0.09 (0.04)	0.02-0.19	0.09 (0.03)	0.03-0.16	0.08 (0.03)	0.03-0.14
Oct-2020	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.04
Nov-2020	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0.08 (0.04)	0.01-0.17	0.08 (0.03)	0.02-0.13	0.06 (0.02)	0.02-0.11
Mar-2021	0.01 (0.01)	0-0.04	0.02 (0.01)	0-0.03	0.05 (0.02)	0.02-0.1
Apr-2021	0.07 (0.02)	0.02-0.12	0.12 (0.03)	0.06-0.19	0.14 (0.03)	0.08-0.2
May-2021	0 (0)	0-0	0 (0)	0-0	0.02 (0.01)	0-0.04
Jun-2021	0.05 (0.02)	0.02-0.09	0.03 (0.01)	0.01-0.06	0.07 (0.03)	0.02-0.13
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0.14 (0.07)	0.04-0.29	0.11 (0.05)	0.03-0.22	0.11 (0.04)	0.04-0.19
Sep-2021	0.08 (0.06)	0-0.21	0.06 (0.04)	0-0.15	0.07 (0.03)	0.01-0.14
Oct-2021	0.02 (0.02)	0-0.06	0.02 (0.01)	0-0.03	0.01 (0.01)	0-0.03
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0.02 (0.01)	0-0.06	0.03 (0.01)	0-0.05	0.02 (0.01)	0-0.04
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0.07 (0.04)	0-0.16	0.05 (0.03)	0-0.11	0.04 (0.02)	0-0.09
Mar-2022	0.13 (0.06)	0.03-0.25	0.16 (0.06)	0.06-0.28	0.14 (0.04)	0.06-0.23
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0.12 (0.08)	0.01-0.29	0.13 (0.06)	0.04-0.27	0.16 (0.06)	0.06-0.29
Aug-2022	0.01 (0.01)	0-0.04	0.04 (0.02)	0-0.1	0.03 (0.02)	0-0.07
Sep-2022	0.12 (0.05)	0.04-0.22	0.26 (0.11)	0.08-0.5	0.31 (0.12)	0.12-0.56

Table 15-21 Density of razorbill (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded in each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0.02 (0.02)	0-0.07	0.02 (0.02)	0-0.05	0.01 (0.01)	0-0.04
Aug-2020	0.02 (0.02)	0-0.07	0.02 (0.01)	0-0.05	0.01 (0.01)	0-0.04
Sep-2020	0.12 (0.05)	0.03-0.24	0.1 (0.04)	0.03-0.19	0.1 (0.04)	0.04-0.18
Oct-2020	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.04
Nov-2020	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0.09 (0.04)	0.01-0.19	0.09 (0.03)	0.03-0.16	0.07 (0.03)	0.02-0.13
Mar-2021	0.01 (0.01)	0-0.04	0.02 (0.01)	0-0.03	0.07 (0.03)	0.02-0.12
Apr-2021	0.08 (0.03)	0.02-0.14	0.14 (0.04)	0.07-0.23	0.17 (0.04)	0.09-0.24
May-2021	0 (0)	0-0	0 (0)	0-0	0.03 (0.01)	0-0.05
Jun-2021	0.06 (0.02)	0.02-0.1	0.04 (0.02)	0.01-0.07	0.09 (0.03)	0.03-0.15
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0.17 (0.08)	0.04-0.36	0.14 (0.06)	0.03-0.26	0.13 (0.05)	0.05-0.22
Sep-2021	0.09 (0.07)	0-0.24	0.07 (0.05)	0-0.17	0.08 (0.04)	0.02-0.17
Oct-2021	0.02 (0.02)	0-0.06	0.02 (0.01)	0-0.03	0.01 (0.01)	0-0.03
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0.02 (0.01)	0-0.06	0.03 (0.02)	0-0.07	0.03 (0.01)	0-0.05
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0.08 (0.04)	0-0.18	0.06 (0.03)	0-0.13	0.05 (0.03)	0-0.1
Mar-2022	0.15 (0.07)	0.03-0.29	0.19 (0.07)	0.08-0.34	0.16 (0.05)	0.07-0.27
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0.15 (0.09)	0.01-0.35	0.16 (0.07)	0.04-0.32	0.2 (0.07)	0.08-0.35
Aug-2022	0.01 (0.01)	0-0.04	0.05 (0.03)	0-0.12	0.04 (0.02)	0-0.09
Sep-2022	0.14 (0.06)	0.04-0.26	0.31 (0.13)	0.09-0.61	0.38 (0.14)	0.15-0.69

Table 15-22 Abundance of razorbill recorded in each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	16.04 (14.67)	0-48.12	16.04 (13.73)	0-48.12	16.04 (13.64)	0-48.12
Aug-2020	15.92 (13.58)	0-47.77	15.92 (13.19)	0-47.77	15.92 (14.03)	0-47.77
Sep-2020	61.98 (28.74)	15.49-123.96	77.47 (30.08)	23.24-139.45	92.97 (33.28)	38.74-162.89
Oct-2020	0 (0)	0-0	0 (0)	0-0	15.51 (14.39)	0-46.52
Nov-2020	0 (0)	0-0	7.76 (7.33)	0-23.27	7.76 (7.09)	0-23.27
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	54.22 (24.67)	7.75-108.43	69.71 (25.74)	20.91-118.5	69.71 (26.61)	20.91-125.47
Mar-2021	7.75 (7.24)	0-23.24	15.49 (7.75)	0-30.98	61.96 (25.19)	20.65-117.04
Apr-2021	46.54 (15.92)	13.3-79.78	100.83 (26.98)	50.41-158.44	155.12 (35.74)	88.64-221.79
May-2021	0 (0)	0-0	0 (0)	0-0	23.25 (12.87)	0-46.5
Jun-2021	31.01 (12.37)	12.4-55.81	31.01 (12.44)	6.2-55.81	85.27 (31.88)	28.42-149.22
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	85.18 (40.89)	21.29-177.46	92.92 (40.9)	21.44-178.88	116.15 (41.88)	43.38-203.45
Sep-2021	54.24 (38.04)	0-139.47	54.24 (36.85)	0-131.72	77.48 (40.09)	15.5-162.71
Oct-2021	15.51 (9.92)	0-38.77	15.51 (8.3)	0-31.02	15.51 (8.6)	0-36.19
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	15.5 (9.74)	0-38.75	23.25 (12.69)	0-46.5	23.25 (12.18)	0-46.5
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	38.73 (20.47)	0-85.21	38.73 (21.82)	0-85.21	38.73 (21.01)	0-85.21
Mar-2022	69.79 (30.21)	15.51-131.83	116.32 (42.07)	46.53-209.38	131.83 (41.71)	58.59-219.72
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	7.76 (6.12)	0-23.29	7.76 (6.23)	0-23.29	7.76 (6.28)	0-23.29
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	79.31 (50.87)	7.93-190.55	118.97 (54.96)	31.73-237.94	182.42 (63.02)	71.38-317.26
Aug-2022	7.8 (6.76)	0-23.41	39.02 (21.51)	0-85.84	39.02 (21.59)	0-85.84
Sep-2022	79.05 (30.33)	23.71-142.28	213.43 (93.13)	63.24-418.95	347.81 (128.47)	134.38-624.47

Table 15-23 Abundance of razorbill (including unidentified auks apportioned using identified auk ratios) recorded in each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	16.04 (14.67)	0-48.12	16.04 (13.73)	0-48.12	16.04 (13.64)	0-48.12
Aug-2020	15.92 (13.58)	0-47.77	15.92 (13.19)	0-47.77	15.92 (14.03)	0-47.77
Sep-2020	77.47 (35.93)	19.37-154.95	92.97 (36.1)	27.89-167.34	116.21 (41.6)	48.42-203.61
Oct-2020	0 (0)	0-0	0 (0)	0-0	15.51 (14.39)	0-46.52
Nov-2020	0 (0)	0-0	7.76 (7.33)	0-23.27	7.76 (7.09)	0-23.27
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	61.96 (28.2)	8.85-123.92	83.65 (30.89)	25.09-142.2	83.65 (31.93)	25.09-150.56
Mar-2021	7.75 (7.24)	0-23.24	15.49 (7.75)	0-30.98	75.73 (30.78)	25.24-143.05
Apr-2021	53.18 (18.19)	15.2-91.17	129.64 (34.69)	64.82-203.71	192.05 (44.25)	109.75-274.59
May-2021	0 (0)	0-0	0 (0)	0-0	31 (17.16)	0-62
Jun-2021	37.21 (14.84)	14.88-66.97	37.21 (14.93)	7.44-66.97	99.48 (37.2)	33.16-174.09
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	113.57 (54.52)	28.39-236.61	121.52 (53.49)	28.04-233.92	145.19 (52.36)	54.22-254.31
Sep-2021	61.98 (43.48)	0-159.39	61.98 (42.12)	0-150.53	92.98 (48.11)	18.6-195.25
Oct-2021	15.51 (9.92)	0-38.77	15.51 (8.3)	0-31.02	15.51 (8.6)	0-36.19
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	15.5 (9.74)	0-38.75	31 (16.92)	0-62	31 (16.24)	0-62
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	54.22 (28.65)	0-119.29	54.22 (30.55)	0-119.29	54.22 (29.42)	0-119.29
Mar-2022	100.81 (43.64)	22.4-190.43	170.61 (61.7)	68.24-307.09	190.43 (60.24)	84.63-317.38
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	7.76 (6.12)	0-23.29	7.76 (6.23)	0-23.29	7.76 (6.28)	0-23.29
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	95.18 (61.04)	9.52-228.66	142.77 (65.95)	38.07-285.53	230.01 (79.46)	90-400.02
Aug-2022	7.8 (6.76)	0-23.41	46.82 (25.81)	0-103	46.82 (25.91)	0-103
Sep-2022	94.86 (36.4)	28.46-170.74	276.66 (120.72)	81.97-543.08	442.66 (163.51)	171.03-794.78

Table 15-24 Abundance of razorbill (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded in each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	16.04 (14.67)	0-48.12	16.04 (13.73)	0-48.12	16.04 (13.64)	0-48.12
Aug-2020	15.92 (13.58)	0-47.77	15.92 (13.19)	0-47.77	15.92 (14.03)	0-47.77
Sep-2020	77.47 (35.93)	19.37-154.95	92.97 (36.1)	27.89-167.34	116.21 (41.6)	48.42-203.61
Oct-2020	0 (0)	0-0	0 (0)	0-0	15.51 (14.39)	0-46.52
Nov-2020	0 (0)	0-0	7.76 (7.33)	0-23.27	7.76 (7.09)	0-23.27
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	61.96 (28.2)	8.85-123.92	83.65 (30.89)	25.09-142.2	83.65 (31.93)	25.09-150.56
Mar-2021	7.75 (7.24)	0-23.24	15.49 (7.75)	0-30.98	75.73 (30.78)	25.24-143.05
Apr-2021	53.18 (18.19)	15.2-91.17	129.64 (34.69)	64.82-203.71	192.05 (44.25)	109.75-274.59
May-2021	0 (0)	0-0	0 (0)	0-0	31 (17.16)	0-62
Jun-2021	37.21 (14.84)	14.88-66.97	37.21 (14.93)	7.44-66.97	99.48 (37.2)	33.16-174.09
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	113.57 (54.52)	28.39-236.61	121.52 (53.49)	28.04-233.92	145.19 (52.36)	54.22-254.31
Sep-2021	61.98 (43.48)	0-159.39	61.98 (42.12)	0-150.53	92.98 (48.11)	18.6-195.25
Oct-2021	15.51 (9.92)	0-38.77	15.51 (8.3)	0-31.02	15.51 (8.6)	0-36.19
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	15.5 (9.74)	0-38.75	31 (16.92)	0-62	31 (16.24)	0-62
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	54.22 (28.65)	0-119.29	54.22 (30.55)	0-119.29	54.22 (29.42)	0-119.29
Mar-2022	100.81 (43.64)	22.4-190.43	170.61 (61.7)	68.24-307.09	190.43 (60.24)	84.63-317.38
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	7.76 (6.12)	0-23.29	7.76 (6.23)	0-23.29	7.76 (6.28)	0-23.29
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	95.18 (61.04)	9.52-228.66	142.77 (65.95)	38.07-285.53	230.01 (79.46)	90-400.02
Aug-2022	7.8 (6.76)	0-23.41	46.82 (25.81)	0-103	46.82 (25.91)	0-103
Sep-2022	94.86 (36.4)	28.46-170.74	276.66 (120.72)	81.97-543.08	442.66 (163.51)	171.03-794.78

16 BLACK GUILLEMOT

Table 16-1 Mean density of black guillemot recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0.01 (0.01)	0-0.02	0 (0)	0-0.01	0 (0)	0-0.01
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 16-2 Mean abundance of black guillemot recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	3.88 (3.59)	0-11.63	3.88 (3.42)	0-11.63	3.88 (3.46)	0-11.63
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 16-3 Mean density of black guillemot recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0.01	0 (0)	0-0.01	0 (0)	0-0.01
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 16-4 Mean abundance of black guillemot recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	2.58 (2.31)	0-7.75	2.58 (2.39)	0-7.75	2.58 (2.38)	0-7.75
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 16-5 Density of black guillemot recorded on each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 16-6 Abundance of black guillemot recorded on each survey in flight per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	7.75 (7.19)	0-23.26	7.75 (6.84)	0-23.26	7.75 (6.93)	0-23.26
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 16-7 Density of black guillemot recorded on each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 16-8 Abundance of black guillemot recorded on each survey on the sea per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	7.75 (6.93)	0-23.26	7.75 (7.17)	0-23.26	7.75 (7.13)	0-23.26
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

17 PUFFIN

Table 17-1 Mean density of puffin recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0.24 (0.03)	0.18-0.31	0.2 (0.02)	0.16-0.25	0.16 (0.02)	0.13-0.19
May	0.22 (0.04)	0.15-0.3	0.26 (0.03)	0.19-0.32	0.33 (0.03)	0.26-0.4
Jun	0.2 (0.03)	0.14-0.27	0.26 (0.04)	0.2-0.34	0.3 (0.04)	0.23-0.38
Jul	0.09 (0.01)	0.07-0.12	0.1 (0.01)	0.08-0.13	0.17 (0.02)	0.13-0.21
Aug	0.02 (0)	0.01-0.03	0.04 (0.01)	0.02-0.05	0.06 (0.01)	0.04-0.08
Sep	0.01 (0)	0.01-0.01	0.01 (0)	0-0.01	0.01 (0)	0.01-0.01
Oct	0.01 (0)	0-0.01	0 (0)	0-0.01	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 17-2 Mean density of puffin (including unidentified auks apportioned using identified auk ratios) recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0.25 (0.03)	0.19-0.32	0.2 (0.02)	0.16-0.25	0.16 (0.02)	0.13-0.19
May	0.22 (0.04)	0.15-0.3	0.26 (0.03)	0.19-0.33	0.33 (0.03)	0.27-0.4
Jun	0.2 (0.03)	0.14-0.27	0.27 (0.04)	0.2-0.34	0.3 (0.04)	0.23-0.38
Jul	0.09 (0.01)	0.07-0.12	0.1 (0.01)	0.08-0.13	0.17 (0.02)	0.13-0.21
Aug	0.02 (0)	0.01-0.03	0.04 (0.01)	0.03-0.05	0.06 (0.01)	0.05-0.08
Sep	0.01 (0)	0.01-0.01	0.01 (0)	0-0.01	0.01 (0)	0.01-0.01
Oct	0.01 (0)	0-0.01	0 (0)	0-0.01	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 17-3 Mean density of puffin (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0.28 (0.04)	0.21-0.36	0.23 (0.03)	0.18-0.29	0.18 (0.02)	0.15-0.22
May	0.25 (0.04)	0.17-0.34	0.3 (0.04)	0.22-0.38	0.38 (0.04)	0.31-0.46
Jun	0.23 (0.04)	0.16-0.31	0.31 (0.04)	0.23-0.39	0.35 (0.04)	0.27-0.44
Jul	0.11 (0.02)	0.08-0.14	0.12 (0.01)	0.09-0.15	0.2 (0.02)	0.15-0.24
Aug	0.02 (0)	0.01-0.03	0.04 (0.01)	0.03-0.06	0.07 (0.01)	0.05-0.1
Sep	0.01 (0)	0.01-0.01	0.01 (0)	0.01-0.01	0.01 (0)	0.01-0.01
Oct	0.01 (0)	0-0.01	0.01 (0)	0-0.01	0 (0)	0-0.01
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 17-4 Mean abundance of puffin recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	158.62 (21.61)	118.94-202.59	177.96 (20.58)	140.23-221.49	181.83 (18.42)	148.41-218.41
May	143.63 (25)	98.22-194.71	229.03 (30.32)	168.9-287.84	376.55 (38.98)	304.88-457.12
Jun	131.76 (21.48)	93.3-176.66	236.38 (31.83)	180.82-301.91	348.74 (43.34)	268.46-440.06
Jul	60.03 (8.72)	43.16-76.68	89.11 (11.13)	68.52-112.1	191.14 (22.3)	150.63-237.89
Aug	13.06 (2.68)	8.2-18.61	31.64 (5.2)	22.11-42.25	71.44 (11.09)	50.4-93.15
Sep	5.22 (0.86)	3.76-7.12	5.22 (0.78)	3.8-6.86	7.85 (0.99)	6.04-9.89
Oct	3.88 (0.91)	2.13-5.82	3.88 (0.85)	2.26-5.65	3.88 (0.77)	2.44-5.46
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 17-5 Mean abundance of puffin (including unidentified auks apportioned using identified auk ratios) recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	163.87 (22.33)	122.86-209.3	182.7 (21.13)	143.96-227.39	186.26 (18.87)	152.02-223.73
May	145.38 (25.31)	99.41-197.08	233.01 (30.85)	171.84-292.84	383.46 (39.69)	310.48-465.52
Jun	132.18 (21.55)	93.58-177.23	237.31 (31.97)	181.5-303.13	350.91 (43.63)	270.09-442.85
Jul	61.21 (8.9)	44.01-78.2	91.56 (11.44)	70.41-115.21	195.94 (22.94)	154.29-244.03
Aug	13.23 (2.71)	8.32-18.85	32.62 (5.35)	22.83-43.54	74.28 (11.53)	52.4-96.84
Sep	5.42 (0.9)	3.9-7.4	5.41 (0.81)	3.93-7.11	8.11 (1.03)	6.23-10.21
Oct	3.88 (0.91)	2.13-5.82	4.04 (0.88)	2.36-5.89	4.02 (0.8)	2.53-5.66
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 17-6 Mean abundance of puffin (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	183.44 (25.01)	137.53-234.34	204.82 (23.7)	161.38-254.95	209.66 (21.24)	171.11-251.85
May	166.77 (29.03)	114.04-226.08	267.06 (35.36)	196.94-335.63	438.81 (45.42)	355.29-532.7
Jun	152.51 (24.88)	107.96-204.5	273.38 (36.85)	209.08-349.25	403.85 (50.23)	310.8-509.69
Jul	70.71 (10.28)	50.84-90.35	105.99 (13.24)	81.51-133.37	226.02 (26.48)	177.95-281.53
Aug	15.37 (3.15)	9.66-21.9	37.77 (6.19)	26.43-50.42	85.67 (13.3)	60.43-111.69
Sep	6.31 (1.04)	4.54-8.61	6.28 (0.94)	4.57-8.25	9.4 (1.19)	7.23-11.84
Oct	4.46 (1.05)	2.45-6.69	4.68 (1.02)	2.73-6.83	4.59 (0.91)	2.89-6.47
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 17-7 Mean density of puffin recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Feb	0 (0)	0-0.01	0 (0)	0-0.01	0 (0)	0-0.01
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	1.13 (0.17)	0.83-1.49	1.09 (0.13)	0.84-1.37	1.01 (0.11)	0.82-1.22
May	1.8 (0.33)	1.21-2.47	2.11 (0.29)	1.53-2.67	2.41 (0.27)	1.91-2.96
Jun	5.29 (0.99)	3.53-7.3	4.79 (0.72)	3.55-6.28	4.73 (0.62)	3.57-6.05
Jul	2.32 (0.34)	1.67-2.98	2.64 (0.33)	2.03-3.34	2.97 (0.46)	2.19-3.95
Aug	1.83 (0.34)	1.2-2.52	2.46 (0.41)	1.7-3.29	2.78 (0.4)	2.04-3.59
Sep	1.2 (0.19)	0.87-1.61	1.09 (0.15)	0.82-1.42	1.04 (0.11)	0.85-1.28
Oct	0.17 (0.05)	0.09-0.27	0.16 (0.04)	0.09-0.24	0.14 (0.03)	0.09-0.2
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0.01
Dec	0.01 (0.01)	0-0.02	0 (0)	0-0.01	0.01 (0)	0-0.02

Table 17-8 Mean density of puffin (including unidentified auks apportioned using identified auk ratios) recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Feb	0 (0)	0-0.01	0 (0)	0-0.01	0 (0)	0-0.01
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	1.18 (0.17)	0.87-1.54	1.13 (0.14)	0.87-1.42	1.05 (0.11)	0.85-1.27
May	1.82 (0.33)	1.22-2.5	2.14 (0.3)	1.56-2.72	2.45 (0.28)	1.95-3.02
Jun	5.33 (1)	3.55-7.35	4.83 (0.73)	3.58-6.34	4.78 (0.63)	3.62-6.12
Jul	2.41 (0.35)	1.73-3.1	2.74 (0.35)	2.11-3.47	3.09 (0.48)	2.27-4.12
Aug	1.88 (0.35)	1.23-2.59	2.53 (0.42)	1.74-3.37	2.85 (0.41)	2.09-3.67
Sep	1.23 (0.19)	0.9-1.66	1.12 (0.15)	0.85-1.46	1.07 (0.12)	0.87-1.31
Oct	0.17 (0.05)	0.09-0.27	0.16 (0.04)	0.09-0.24	0.14 (0.03)	0.09-0.21
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0.01
Dec	0.01 (0.01)	0-0.02	0 (0)	0-0.01	0.01 (0)	0-0.02

Table 17-9 Mean density of puffin (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Feb	0 (0)	0-0.01	0 (0)	0-0.01	0 (0)	0-0.01
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	1.34 (0.2)	0.99-1.76	1.29 (0.16)	1-1.62	1.2 (0.12)	0.97-1.45
May	2.09 (0.38)	1.41-2.87	2.45 (0.34)	1.78-3.11	2.81 (0.32)	2.23-3.46
Jun	6.18 (1.16)	4.12-8.52	5.59 (0.84)	4.14-7.33	5.52 (0.73)	4.18-7.06
Jul	2.79 (0.4)	2.01-3.59	3.17 (0.4)	2.44-4.02	3.58 (0.56)	2.62-4.77
Aug	2.18 (0.41)	1.43-3.01	2.94 (0.49)	2.03-3.92	3.31 (0.47)	2.43-4.27
Sep	1.43 (0.23)	1.04-1.93	1.31 (0.18)	0.99-1.7	1.25 (0.13)	1.01-1.52
Oct	0.2 (0.05)	0.1-0.31	0.19 (0.04)	0.11-0.28	0.17 (0.04)	0.1-0.24
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0.01
Dec	0.01 (0.01)	0-0.02	0 (0)	0-0.01	0.01 (0)	0-0.02

Table 17-10 Mean abundance of puffin recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	7.75 (7.23)	0-23.24	7.75 (7.19)	0-23.24
Feb	2.58 (2.29)	0-7.75	2.58 (2.38)	0-7.75	2.58 (2.35)	0-7.75
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	743.72 (110.09)	547.15-974.76	972.26 (118.89)	754.27-1227.15	1169.87 (121.49)	947.46-1416.04
May	1183.9 (214.85)	794.49-1621.88	1882.56 (260.64)	1368.25-2390.42	2782.99 (313.34)	2210.3-3428.37
Jun	3474.52 (648.67)	2316.05-4789.35	4284.04 (642.85)	3173.45-5616.95	5469.33 (720.27)	4135.64-6993.78
Jul	1522.47 (220.99)	1096.94-1959.12	2359.8 (298.55)	1816.86-2990.69	3432.81 (529.31)	2529.09-4564.25
Aug	1198.52 (223.25)	786.38-1654.26	2201.79 (370.94)	1517.83-2944.68	3217.65 (462.35)	2361.34-4156.74
Sep	785.53 (123.53)	571.62-1058.64	977.12 (134.27)	737.2-1268.7	1207.91 (130.4)	981.19-1475.78
Oct	112.43 (29.54)	56.02-176.4	139.57 (33.05)	79.06-211.46	162.83 (34.66)	98.36-234.92
Nov	0 (0)	0-0	0 (0)	0-0	3.88 (3.52)	0-11.63
Dec	3.87 (3.89)	0-11.62	3.87 (3.68)	0-11.62	7.75 (4.8)	0-19.37

Table 17-11 Mean abundance of puffin (including unidentified auks apportioned using identified auk ratios) recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	7.75 (7.23)	0-23.24	7.75 (7.19)	0-23.24
Feb	2.58 (2.29)	0-7.75	2.58 (2.38)	0-7.75	2.58 (2.35)	0-7.75
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	773.34 (114.54)	568.87-1013.76	1006.26 (123.1)	780.54-1270.23	1211.94 (125.9)	981.45-1467.08
May	1197.68 (217.25)	803.92-1640.56	1913.52 (264.74)	1391.08-2429.33	2834.29 (319.13)	2251.01-3491.61
Jun	3501.21 (654.1)	2333.04-4826.87	4321.84 (649.07)	3200.59-5667.71	5532.99 (729.14)	4182.88-7076.28
Jul	1579.63 (229.27)	1138.19-2032.96	2447.44 (309.87)	1884.55-3103.35	3576.69 (558.2)	2626.11-4770.87
Aug	1232.15 (228.85)	809.45-1699.1	2258.16 (378.43)	1560.18-3016.37	3293.25 (471.98)	2418.49-4251.48
Sep	808.73 (127.17)	588.57-1089.89	1005.49 (138.15)	758.61-1305.41	1241.39 (133.93)	1008.56-1516.55
Oct	112.43 (29.54)	56.02-176.4	143.29 (33.86)	81.23-216.88	166.57 (35.39)	100.71-240.17
Nov	0 (0)	0-0	0 (0)	0-0	3.88 (3.52)	0-11.63
Dec	3.87 (3.89)	0-11.62	3.87 (3.68)	0-11.62	7.75 (4.8)	0-19.37

Table 17-12 Mean abundance of puffin (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	7.75 (7.23)	0-23.24	7.75 (7.19)	0-23.24
Feb	2.58 (2.29)	0-7.75	2.58 (2.38)	0-7.75	2.58 (2.35)	0-7.75
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	881.59 (130.78)	648.25-1156.25	1150.7 (140.93)	892.29-1452.98	1389.98 (144.45)	1125.47-1682.83
May	1374.25 (249.34)	922.34-1882.54	2193.88 (303.61)	1594.75-2785.45	3248.6 (366.39)	2579.02-4003.2
Jun	4058.03 (758.65)	2703.16-5595.34	4998.47 (751.19)	3700.88-6556.17	6390.31 (842.49)	4830.32-8173.58
Jul	1830.97 (265.74)	1319.3-2356.52	2836.07 (359.11)	2183.81-3596.28	4137.37 (647)	3036.03-5521.7
Aug	1433.25 (266.11)	941.7-1976.18	2625.6 (440.07)	1813.94-3507.26	3824.25 (547.95)	2808.77-4936.86
Sep	940.08 (147.74)	684.32-1266.7	1170.49 (160.77)	883.2-1519.54	1442.28 (155.51)	1171.98-1761.79
Oct	131.24 (34.59)	65.2-206.16	165.9 (39.2)	94.06-251.08	193.13 (41.11)	116.66-278.64
Nov	0 (0)	0-0	0 (0)	0-0	3.88 (3.52)	0-11.63
Dec	3.87 (3.89)	0-11.62	3.87 (3.68)	0-11.62	7.75 (4.8)	0-19.37

Table 17-13 Density of puffin recorded in each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km⁻²)					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0.02 (0)	0.01-0.02	0.01 (0)	0.01-0.02
Aug-2020	0.01 (0)	0.01-0.02	0.07 (0.01)	0.05-0.09	0.16 (0.02)	0.11-0.21
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0.04 (0.01)	0.03-0.05	0.03 (0)	0.02-0.03	0.02 (0)	0.02-0.02
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0.37 (0.06)	0.26-0.49	0.44 (0.06)	0.34-0.56	0.48 (0.06)	0.37-0.6
Jul-2021	0.15 (0.02)	0.11-0.19	0.12 (0.01)	0.09-0.15	0.21 (0.02)	0.18-0.26
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0.01 (0)	0.01-0.02	0.01 (0)	0.01-0.01	0.01 (0)	0.01-0.01
Oct-2021	0.01 (0)	0.01-0.02	0.01 (0)	0.01-0.01	0.01 (0)	0-0.01
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0.45 (0.06)	0.34-0.57	0.37 (0.04)	0.29-0.46	0.29 (0.03)	0.24-0.35
May-2022	0.44 (0.08)	0.3-0.59	0.51 (0.07)	0.38-0.64	0.65 (0.07)	0.53-0.79
Jun-2022	0.04 (0.01)	0.02-0.05	0.09 (0.01)	0.06-0.12	0.13 (0.02)	0.09-0.17
Jul-2022	0.12 (0.02)	0.09-0.16	0.16 (0.02)	0.12-0.2	0.27 (0.03)	0.21-0.34
Aug-2022	0.05 (0.01)	0.03-0.07	0.03 (0.01)	0.02-0.05	0.03 (0)	0.02-0.04
Sep-2022	0.01 (0)	0.01-0.02	0.01 (0)	0.01-0.01	0.01 (0)	0.01-0.02

Table 17-14 Density of puffin (including unidentified auks apportioned using identified auk ratios) recorded in each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0.02 (0)	0.02-0.03	0.02 (0)	0.01-0.02
Aug-2020	0.01 (0)	0.01-0.02	0.07 (0.01)	0.05-0.1	0.17 (0.03)	0.12-0.22
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0.04 (0.01)	0.03-0.05	0.03 (0)	0.02-0.03	0.02 (0)	0.02-0.03
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0.37 (0.06)	0.26-0.49	0.44 (0.06)	0.34-0.56	0.48 (0.06)	0.37-0.6
Jul-2021	0.15 (0.02)	0.11-0.2	0.12 (0.01)	0.09-0.15	0.22 (0.02)	0.18-0.26
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0.01 (0)	0.01-0.02	0.01 (0)	0.01-0.01	0.01 (0)	0.01-0.01
Oct-2021	0.01 (0)	0.01-0.02	0.01 (0)	0.01-0.01	0.01 (0)	0-0.01
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0.46 (0.06)	0.35-0.59	0.38 (0.04)	0.3-0.47	0.3 (0.03)	0.25-0.36
May-2022	0.44 (0.08)	0.3-0.6	0.52 (0.07)	0.38-0.65	0.66 (0.07)	0.54-0.8
Jun-2022	0.04 (0.01)	0.02-0.05	0.09 (0.01)	0.06-0.12	0.13 (0.02)	0.1-0.17
Jul-2022	0.13 (0.02)	0.09-0.16	0.16 (0.02)	0.13-0.21	0.28 (0.03)	0.21-0.35
Aug-2022	0.05 (0.01)	0.03-0.07	0.04 (0.01)	0.02-0.05	0.03 (0)	0.02-0.04
Sep-2022	0.01 (0)	0.01-0.02	0.01 (0)	0.01-0.01	0.01 (0)	0.01-0.02

Table 17-15 Density of puffin (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded in each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0.02 (0)	0.02-0.03	0.02 (0)	0.01-0.03
Aug-2020	0.01 (0)	0.01-0.02	0.09 (0.01)	0.06-0.11	0.19 (0.03)	0.13-0.25
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0.04 (0.01)	0.03-0.06	0.03 (0)	0.02-0.04	0.02 (0)	0.02-0.03
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0.42 (0.07)	0.3-0.56	0.51 (0.07)	0.39-0.64	0.55 (0.07)	0.43-0.69
Jul-2021	0.18 (0.03)	0.13-0.22	0.14 (0.02)	0.11-0.18	0.25 (0.02)	0.21-0.3
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0.01 (0)	0.01-0.02	0.01 (0)	0.01-0.01	0.01 (0)	0.01-0.01
Oct-2021	0.01 (0)	0.01-0.02	0.01 (0)	0.01-0.02	0.01 (0)	0.01-0.01
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0.52 (0.07)	0.39-0.66	0.43 (0.05)	0.34-0.53	0.34 (0.03)	0.28-0.41
May-2022	0.51 (0.09)	0.35-0.69	0.6 (0.08)	0.44-0.75	0.76 (0.08)	0.61-0.92
Jun-2022	0.04 (0.01)	0.03-0.06	0.1 (0.02)	0.07-0.14	0.15 (0.02)	0.11-0.2
Jul-2022	0.15 (0.02)	0.1-0.19	0.19 (0.02)	0.15-0.24	0.32 (0.04)	0.25-0.4
Aug-2022	0.06 (0.01)	0.03-0.08	0.04 (0.01)	0.03-0.06	0.03 (0.01)	0.02-0.04
Sep-2022	0.01 (0)	0.01-0.02	0.01 (0)	0.01-0.01	0.02 (0)	0.01-0.02

Table 17-16 Abundance of puffin recorded in each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	16.04 (2.14)	12.46-21.15	16.04 (4.35)	9.36-25.66
Aug-2020	7.96 (1.35)	5.39-10.7	63.69 (9.28)	46.67-83.08	183.12 (28.29)	128.96-237.93
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	23.27 (3.71)	16.8-31.24	23.27 (2.99)	17.78-29.75	23.27 (2.47)	18.72-28.35
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	240.3 (38.07)	172.09-320.41	395.33 (50.63)	306.51-499.19	550.36 (65.82)	428.4-688.63
Jul-2021	100.77 (14.61)	72.26-127.31	108.52 (13.17)	83.41-134.98	248.06 (24.44)	203.85-300.11
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	7.75 (1.1)	5.82-10.18	7.75 (0.94)	6.09-9.83	7.75 (0.73)	6.53-9.27
Oct-2021	7.75 (1.82)	4.26-11.63	7.75 (1.69)	4.52-11.31	7.75 (1.53)	4.88-10.91
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	293.98 (39.51)	221.07-373.94	332.66 (38.18)	262.69-413.23	340.4 (34.38)	278.1-408.48
May-2022	287.26 (50.01)	196.43-389.42	458.07 (60.65)	337.8-575.68	753.09 (77.96)	609.76-914.24
Jun-2022	23.23 (4.9)	14.5-32.91	77.43 (13.03)	55.14-104.63	147.12 (20.86)	108.51-191.5
Jul-2022	79.31 (11.57)	57.22-102.74	142.77 (18.08)	109.69-180.16	309.33 (38.13)	238.69-387.91
Aug-2022	31.21 (6.68)	19.22-45.12	31.21 (6.31)	19.67-43.66	31.21 (4.99)	22.23-41.53
Sep-2022	7.9 (1.49)	5.45-11.18	7.9 (1.4)	5.31-10.74	15.81 (2.25)	11.58-20.41

Table 17-17 Abundance of puffin (including unidentified auks apportioned using identified auk ratios) recorded in each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	17.57 (2.35)	13.66-23.17	17.49 (4.74)	10.21-27.97
Aug-2020	8.22 (1.4)	5.57-11.05	66.46 (9.69)	48.7-86.69	191.5 (29.59)	134.86-248.82
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	24.35 (3.88)	17.58-32.69	24.27 (3.12)	18.55-31.03	24.34 (2.58)	19.58-29.65
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	240.84 (38.15)	172.48-321.13	396.05 (50.72)	307.06-500.1	551.91 (66.01)	429.6-690.56
Jul-2021	101.44 (14.7)	72.74-128.15	110.32 (13.38)	84.79-137.21	250.91 (24.72)	206.19-303.56
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	7.95 (1.12)	5.97-10.44	7.96 (0.97)	6.25-10.1	7.97 (0.75)	6.72-9.53
Oct-2021	7.75 (1.82)	4.26-11.63	8.08 (1.76)	4.71-11.78	8.04 (1.59)	5.06-11.32
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	303.39 (40.78)	228.15-385.91	341.14 (39.15)	269.38-423.76	348.18 (35.16)	284.46-417.81
May-2022	290.75 (50.61)	198.82-394.15	466.03 (61.7)	343.67-585.68	766.93 (79.39)	620.97-931.03
Jun-2022	23.52 (4.96)	14.68-33.32	78.56 (13.22)	55.95-106.16	149.91 (21.26)	110.57-195.14
Jul-2022	82.19 (11.98)	59.29-106.46	146.8 (18.59)	112.79-185.25	319.42 (39.37)	246.47-400.56
Aug-2022	31.49 (6.74)	19.38-45.51	31.41 (6.35)	19.79-43.93	31.35 (5.01)	22.33-41.71
Sep-2022	8.31 (1.57)	5.73-11.75	8.26 (1.47)	5.55-11.22	16.36 (2.32)	11.99-21.12

Table 17-18 Abundance of puffin (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded in each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	20.43 (2.73)	15.88-26.94	20.37 (5.52)	11.89-32.59
Aug-2020	9.59 (1.63)	6.5-12.89	76.75 (11.19)	56.24-100.11	220.52 (34.07)	155.29-286.52
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	28.22 (4.5)	20.38-37.89	28.25 (3.63)	21.59-36.13	28.35 (3.01)	22.81-34.54
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	277.64 (43.98)	198.84-370.21	455.49 (58.34)	353.15-575.16	633.73 (75.79)	493.29-792.94
Jul-2021	116.68 (16.91)	83.68-147.41	127.36 (15.45)	97.89-158.41	288.69 (28.44)	237.23-349.27
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	9.24 (1.31)	6.94-12.14	9.28 (1.13)	7.29-11.77	9.27 (0.88)	7.81-11.08
Oct-2021	8.92 (2.09)	4.9-13.38	9.37 (2.04)	5.47-13.66	9.19 (1.82)	5.79-12.93
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	338.66 (45.52)	254.68-430.78	381.39 (43.77)	301.17-473.77	390.97 (39.48)	319.42-469.16
May-2022	333.54 (58.06)	228.08-452.15	534.12 (70.72)	393.88-671.25	877.62 (90.85)	710.59-1065.41
Jun-2022	27.38 (5.77)	17.09-38.79	91.28 (15.36)	65-123.34	173.97 (24.67)	128.32-226.45
Jul-2022	95.44 (13.92)	68.85-123.63	170.19 (21.55)	130.76-214.77	369 (45.48)	284.73-462.74
Aug-2022	36.53 (7.81)	22.49-52.8	36.57 (7.4)	23.04-51.15	36.48 (5.83)	25.98-48.54
Sep-2022	9.68 (1.82)	6.67-13.68	9.56 (1.7)	6.42-12.98	18.93 (2.69)	13.87-24.44

Table 17-19 Density of puffin recorded in each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	1.1 (0.16)	0.79-1.42	1.39 (0.19)	1.08-1.83	2.22 (0.6)	1.3-3.55
Aug-2020	1.12 (0.19)	0.76-1.5	1.36 (0.2)	1-1.78	1.8 (0.28)	1.26-2.33
Sep-2020	0.17 (0.05)	0.08-0.27	0.16 (0.04)	0.09-0.24	0.17 (0.03)	0.11-0.23
Oct-2020	0.12 (0.04)	0.05-0.2	0.11 (0.03)	0.06-0.18	0.11 (0.03)	0.06-0.16
Nov-2020	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.02
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Feb-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	1.24 (0.2)	0.9-1.67	1.19 (0.15)	0.91-1.52	1.15 (0.12)	0.92-1.4
May-2021	0.15 (0.05)	0.06-0.26	0.23 (0.06)	0.12-0.34	0.35 (0.08)	0.21-0.51
Jun-2021	4.88 (0.77)	3.49-6.5	4.34 (0.56)	3.37-5.48	4.3 (0.51)	3.35-5.38
Jul-2021	1.64 (0.24)	1.18-2.07	1.98 (0.24)	1.52-2.46	2.12 (0.21)	1.74-2.56
Aug-2021	1.69 (0.26)	1.19-2.19	1.84 (0.2)	1.45-2.24	1.98 (0.19)	1.61-2.37
Sep-2021	2.74 (0.39)	2.06-3.6	2.54 (0.31)	1.99-3.22	2.38 (0.23)	2.01-2.85
Oct-2021	0.22 (0.05)	0.12-0.34	0.2 (0.04)	0.12-0.29	0.17 (0.03)	0.11-0.25
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	1.03 (0.14)	0.77-1.3	0.99 (0.11)	0.78-1.23	0.88 (0.09)	0.72-1.05
May-2022	3.45 (0.6)	2.36-4.68	3.99 (0.53)	2.94-5.01	4.46 (0.46)	3.61-5.42
Jun-2022	5.71 (1.2)	3.56-8.09	5.24 (0.88)	3.73-7.08	5.15 (0.73)	3.8-6.71
Jul-2022	4.22 (0.61)	3.04-5.46	4.55 (0.58)	3.5-5.74	4.57 (0.56)	3.52-5.73
Aug-2022	2.67 (0.57)	1.65-3.87	4.19 (0.85)	2.64-5.86	4.57 (0.73)	3.25-6.08
Sep-2022	0.69 (0.13)	0.47-0.97	0.58 (0.1)	0.39-0.79	0.57 (0.08)	0.42-0.74

Table 17-20 Density of puffin (including unidentified auks apportioned using identified auk ratios) recorded in each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	1.2 (0.17)	0.86-1.54	1.52 (0.2)	1.18-2.01	2.42 (0.66)	1.41-3.87
Aug-2020	1.15 (0.2)	0.78-1.55	1.42 (0.21)	1.04-1.85	1.88 (0.29)	1.32-2.44
Sep-2020	0.17 (0.05)	0.08-0.27	0.16 (0.04)	0.09-0.24	0.17 (0.03)	0.11-0.23
Oct-2020	0.12 (0.04)	0.05-0.2	0.11 (0.03)	0.06-0.18	0.11 (0.03)	0.06-0.16
Nov-2020	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.02
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Feb-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	1.3 (0.21)	0.94-1.74	1.24 (0.16)	0.95-1.58	1.2 (0.13)	0.96-1.46
May-2021	0.15 (0.05)	0.06-0.26	0.23 (0.06)	0.12-0.34	0.36 (0.08)	0.21-0.52
Jun-2021	4.89 (0.77)	3.5-6.52	4.35 (0.56)	3.37-5.49	4.31 (0.52)	3.36-5.4
Jul-2021	1.65 (0.24)	1.18-2.09	2.01 (0.24)	1.54-2.5	2.14 (0.21)	1.76-2.59
Aug-2021	1.78 (0.27)	1.26-2.32	1.94 (0.21)	1.54-2.37	2.07 (0.2)	1.68-2.48
Sep-2021	2.81 (0.4)	2.11-3.69	2.61 (0.32)	2.05-3.31	2.45 (0.23)	2.07-2.93
Oct-2021	0.22 (0.05)	0.12-0.34	0.21 (0.05)	0.12-0.3	0.18 (0.04)	0.11-0.25
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	1.06 (0.14)	0.8-1.35	1.01 (0.12)	0.8-1.26	0.9 (0.09)	0.73-1.08
May-2022	3.5 (0.61)	2.39-4.74	4.05 (0.54)	2.99-5.1	4.54 (0.47)	3.68-5.52
Jun-2022	5.78 (1.22)	3.61-8.19	5.32 (0.89)	3.79-7.18	5.25 (0.74)	3.87-6.84
Jul-2022	4.37 (0.64)	3.15-5.66	4.68 (0.59)	3.59-5.9	4.71 (0.58)	3.64-5.91
Aug-2022	2.7 (0.58)	1.66-3.9	4.21 (0.85)	2.66-5.9	4.59 (0.73)	3.27-6.1
Sep-2022	0.72 (0.14)	0.5-1.02	0.61 (0.11)	0.41-0.83	0.59 (0.08)	0.44-0.77

Table 17-21 Density of puffin (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded in each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	1.39 (0.2)	1.01-1.8	1.77 (0.24)	1.38-2.34	2.82 (0.76)	1.64-4.51
Aug-2020	1.34 (0.23)	0.91-1.81	1.64 (0.24)	1.2-2.14	2.16 (0.33)	1.52-2.81
Sep-2020	0.19 (0.06)	0.09-0.31	0.18 (0.05)	0.1-0.28	0.2 (0.04)	0.13-0.27
Oct-2020	0.14 (0.04)	0.06-0.24	0.13 (0.04)	0.07-0.21	0.13 (0.03)	0.07-0.19
Nov-2020	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.02
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Feb-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	1.5 (0.24)	1.09-2.02	1.44 (0.19)	1.1-1.85	1.4 (0.15)	1.12-1.7
May-2021	0.18 (0.06)	0.07-0.3	0.26 (0.06)	0.14-0.39	0.42 (0.1)	0.25-0.61
Jun-2021	5.64 (0.89)	4.04-7.51	5 (0.64)	3.88-6.32	4.95 (0.59)	3.86-6.2
Jul-2021	1.9 (0.28)	1.36-2.4	2.32 (0.28)	1.78-2.89	2.46 (0.24)	2.02-2.98
Aug-2021	2.08 (0.32)	1.47-2.7	2.26 (0.24)	1.79-2.76	2.42 (0.23)	1.96-2.89
Sep-2021	3.27 (0.46)	2.45-4.29	3.04 (0.37)	2.39-3.86	2.85 (0.27)	2.4-3.41
Oct-2021	0.26 (0.06)	0.14-0.39	0.24 (0.05)	0.14-0.35	0.21 (0.04)	0.13-0.29
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	1.18 (0.16)	0.89-1.5	1.13 (0.13)	0.89-1.4	1.01 (0.1)	0.82-1.21
May-2022	4.01 (0.7)	2.74-5.44	4.65 (0.62)	3.43-5.84	5.2 (0.54)	4.21-6.31
Jun-2022	6.73 (1.42)	4.2-9.54	6.18 (1.04)	4.4-8.35	6.09 (0.86)	4.49-7.93
Jul-2022	5.07 (0.74)	3.66-6.57	5.42 (0.69)	4.17-6.85	5.45 (0.67)	4.2-6.83
Aug-2022	3.13 (0.67)	1.93-4.53	4.91 (0.99)	3.09-6.86	5.34 (0.85)	3.8-7.1
Sep-2022	0.84 (0.16)	0.58-1.19	0.71 (0.13)	0.47-0.96	0.69 (0.1)	0.5-0.89

Table 17-22 Abundance of puffin recorded in each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	721.84 (103.18)	521.33-930.58	1243.17 (166.07)	966.03-1639.09	2566.55 (695.5)	1498.28-4104.89
Aug-2020	732.48 (124.38)	496.19-984.51	1218.14 (177.56)	892.61-1588.88	2078 (321.03)	1463.38-2699.94
Sep-2020	108.46 (31.67)	54.23-178.19	139.45 (34.78)	77.47-216.92	201.43 (36.06)	131.7-271.15
Oct-2020	77.54 (24.55)	31.02-131.82	100.8 (27.23)	54.08-162.83	124.06 (29.44)	69.79-186.09
Nov-2020	0 (0)	0-0	0 (0)	0-0	7.76 (7.03)	0-23.27
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	7.75 (7.23)	0-23.24	7.75 (7.19)	0-23.24
Feb-2021	7.75 (6.87)	0-23.24	7.75 (7.15)	0-23.24	7.75 (7.04)	0-23.24
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	814.38 (129.72)	588.17-1093.38	1062.58 (136.56)	812.11-1358.77	1326.28 (140.64)	1066.93-1615.93
May-2021	100.76 (35.06)	38.75-170.51	201.51 (49.45)	108.51-302.27	403.02 (92.22)	240.26-589.04
Jun-2021	3201.4 (507.12)	2292.72-4268.72	3883.54 (497.37)	3010.98-4903.85	4976.51 (595.17)	3873.72-6226.75
Jul-2021	1077.5 (156.17)	772.68-1361.23	1767.41 (214.42)	1358.42-2198.3	2449.56 (241.33)	2012.97-2963.58
Aug-2021	1107.34 (169.79)	782.11-1440.31	1641.65 (177.71)	1300.73-2005.6	2292.11 (221.22)	1858.47-2741.43
Sep-2021	1797.55 (254.07)	1350.09-2360.74	2270.19 (275.37)	1783.72-2880.4	2758.32 (260.79)	2325.45-3299.16
Oct-2021	147.33 (34.53)	81.03-220.99	178.34 (38.88)	104.03-260.08	201.6 (39.87)	126.94-283.74
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	7.75 (7.77)	0-23.25	7.75 (7.36)	0-23.25	15.5 (9.6)	0-38.75
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	673.06 (90.46)	506.14-856.13	881.94 (101.21)	696.42-1095.54	1013.45 (102.34)	827.99-1216.15
May-2022	2267.04 (394.64)	1550.24-3073.25	3563.6 (471.82)	2627.98-4478.58	5162.95 (534.45)	4180.33-6267.7
Jun-2022	3747.64 (790.21)	2339.39-5309.99	4684.55 (788.32)	3335.93-6330.04	5962.15 (845.38)	4397.56-7760.81

Jul-2022	2768.07 (403.63)	1996.82-3585.57	4068.82 (515.17)	3126.13-5134.68	5282.33 (651.12)	4076.01-6624.26
Aug-2022	1755.74 (375.59)	1080.85-2537.97	3745.58 (757.55)	2360.14-5239.56	5282.83 (844.81)	3762.18-7028.84
Sep-2022	450.57 (84.86)	310.54-637.01	521.71 (92.66)	350.4-708.79	663.99 (94.34)	486.41-857.02

Table 17-23 Abundance of puffin (including unidentified auks apportioned using identified auk ratios) recorded in each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	786.01 (112.35)	567.67-1013.29	1361.95 (181.94)	1058.33-1795.69	2797.7 (758.13)	1633.22-4474.58
Aug-2020	756.1 (128.4)	512.2-1016.27	1271.1 (185.28)	931.42-1657.96	2173.12 (335.73)	1530.37-2823.53
Sep-2020	108.46 (31.67)	54.23-178.19	139.45 (34.78)	77.47-216.92	201.43 (36.06)	131.7-271.15
Oct-2020	77.54 (24.55)	31.02-131.82	100.8 (27.23)	54.08-162.83	124.06 (29.44)	69.79-186.09
Nov-2020	0 (0)	0-0	0 (0)	0-0	7.76 (7.03)	0-23.27
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	7.75 (7.23)	0-23.24	7.75 (7.19)	0-23.24
Feb-2021	7.75 (6.87)	0-23.24	7.75 (7.15)	0-23.24	7.75 (7.04)	0-23.24
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	852.09 (135.72)	615.4-1144	1108.11 (142.41)	846.92-1417	1387.26 (147.11)	1115.99-1690.22
May-2021	100.76 (35.06)	38.75-170.51	201.51 (49.45)	108.51-302.27	410.77 (94)	244.88-600.36
Jun-2021	3208.61 (508.27)	2297.88-4278.33	3890.58 (498.27)	3016.43-4912.73	4990.47 (596.84)	3884.59-6244.22
Jul-2021	1084.59 (157.2)	777.76-1370.18	1796.62 (217.96)	1380.87-2234.64	2477.72 (244.1)	2036.11-2997.65
Aug-2021	1169.29 (179.29)	825.86-1520.89	1734.57 (187.77)	1374.36-2119.12	2400.52 (231.68)	1946.37-2871.1
Sep-2021	1843.84 (260.61)	1384.86-2421.53	2331.96 (282.86)	1832.26-2958.78	2835.58 (268.09)	2390.59-3391.58
Oct-2021	147.33 (34.53)	81.03-220.99	185.77 (40.5)	108.37-270.92	209.07 (41.35)	131.64-294.25
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	7.75 (7.77)	0-23.25	7.75 (7.36)	0-23.25	15.5 (9.6)	0-38.75
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	694.6 (93.36)	522.34-883.53	904.41 (103.79)	714.16-1123.45	1036.62 (104.68)	846.92-1243.94
May-2022	2294.6 (399.44)	1569.08-3110.62	3625.52 (480.02)	2673.64-4556.39	5257.81 (544.27)	4257.14-6382.86
Jun-2022	3793.81 (799.94)	2368.21-5375.41	4753.1 (799.86)	3384.75-6422.68	6075.5 (861.45)	4481.16-7908.35

Jul-2022	2868.3 (418.25)	2069.13-3715.41	4183.76 (529.72)	3214.44-5279.73	5454.66 (672.36)	4208.99-6840.38
Aug-2022	1771.08 (378.87)	1090.29-2560.13	3768.8 (762.24)	2374.77-5272.04	5306.1 (848.53)	3778.75-7059.81
Sep-2022	473.87 (89.25)	326.6-669.96	545.07 (96.81)	366.09-740.52	687.16 (97.64)	503.38-886.91

Table 17-24 Abundance of puffin (including unidentified auks apportioned using identified auk ratios and accounting for availability bias) recorded in each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	914.33 (130.7)	660.35-1178.73	1583.66 (211.56)	1230.61-2088.01	3260 (883.41)	1903.1-5213.97
Aug-2020	882.12 (149.8)	597.57-1185.65	1467.82 (213.96)	1075.56-1914.55	2502.38 (386.59)	1762.24-3251.33
Sep-2020	123.96 (36.19)	61.98-203.64	162.69 (40.58)	90.38-253.08	232.42 (41.61)	151.97-312.87
Oct-2020	93.05 (29.46)	37.22-158.18	116.31 (31.41)	62.4-187.88	147.33 (34.96)	82.87-220.99
Nov-2020	0 (0)	0-0	0 (0)	0-0	7.76 (7.03)	0-23.27
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	7.75 (7.23)	0-23.24	7.75 (7.19)	0-23.24
Feb-2021	7.75 (6.87)	0-23.24	7.75 (7.15)	0-23.24	7.75 (7.04)	0-23.24
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	987.82 (157.34)	713.42-1326.23	1290.27 (165.82)	986.14-1649.93	1615.93 (171.36)	1299.94-1968.83
May-2021	116.26 (40.46)	44.71-196.74	232.51 (57.06)	125.2-348.77	480.53 (109.96)	286.47-702.31
Jun-2021	3698.92 (585.93)	2649.02-4932.1	4474.51 (573.06)	3469.17-5650.09	5730.32 (685.32)	4460.49-7169.93
Jul-2021	1247.63 (180.83)	894.68-1576.16	2074.15 (251.63)	1594.18-2579.83	2850.78 (280.85)	2342.68-3449
Aug-2021	1362.88 (208.98)	962.59-1772.69	2021.08 (218.79)	1601.37-2469.15	2795.44 (269.8)	2266.58-3343.44
Sep-2021	2144.72 (303.13)	1610.84-2816.67	2718.05 (329.69)	2135.61-3448.64	3299.16 (311.92)	2781.42-3946.06
Oct-2021	169.43 (39.71)	93.18-254.14	215.5 (46.98)	125.71-314.27	238.94 (47.25)	150.44-336.28
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	7.75 (7.77)	0-23.25	7.75 (7.36)	0-23.25	15.5 (9.6)	0-38.75
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	775.36 (104.21)	583.07-986.26	1011.14 (116.04)	798.44-1256.03	1164.02 (117.55)	951.01-1396.83
May-2022	2632.25 (458.22)	1799.97-3568.34	4155.24 (550.15)	3064.29-5222.13	6016.67 (622.82)	4871.57-7304.1

Jun-2022	4417.13 (931.37)	2757.31-6258.59	5522.43 (929.32)	3932.6-7462.25	7050.3 (999.67)	5200.16-9177.23
Jul-2022	3330.93 (485.71)	2402.86-4314.67	4850.4 (614.13)	3726.63-6121.01	6301.33 (776.72)	4862.3-7902.14
Aug-2022	2054.75 (439.55)	1264.93-2970.2	4387.9 (887.46)	2764.88-6138.08	6174.94 (987.47)	4397.49-8215.8
Sep-2022	551.56 (103.88)	380.15-779.79	630.72 (112.02)	423.62-856.89	795.25 (112.99)	582.57-1026.43

18 AUK SPECIES GROUP (GUILLEMOT, RAZORBILL OR PUFFIN)

Table 18-1 Mean density of auk species group (guillemot, razorbill or puffin) recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0.02 (0.01)	0.01-0.04	0.02 (0.01)	0.01-0.03	0.02 (0.01)	0.01-0.03
May	0 (0)	0-0	0 (0)	0-0.01	0.01 (0)	0-0.01
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0.01
Jul	0.02 (0.01)	0.01-0.03	0.02 (0)	0.01-0.03	0.02 (0)	0.01-0.03
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0.01	0 (0)	0-0	0 (0)	0-0
Oct	0.01 (0)	0-0.01	0 (0)	0-0.01	0 (0)	0-0.01
Nov	0.01 (0)	0-0.01	0.01 (0)	0-0.01	0.01 (0)	0-0.01
Dec	0.01 (0.01)	0-0.02	0 (0)	0-0.01	0 (0)	0-0.01

Table 18-2 Mean abundance of auk species group (guillemot, razorbill or puffin) recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	15.47 (5.85)	5.8-27.08	19.35 (5.81)	7.71-31.11	19.35 (6.01)	9.63-32.63
May	0 (0)	0-0	3.88 (1.31)	1.62-6.79	7.76 (2.04)	3.88-12.03
Jun	0 (0)	0-0	0 (0)	0-0	3.87 (0.94)	2.13-5.81
Jul	13.25 (3.5)	7.12-20.62	15.89 (3.47)	9.98-22.79	23.82 (4.28)	16.41-33.01
Aug	0 (0)	0-0	0 (0)	0-0	2.58 (0.44)	1.7-3.39
Sep	2.58 (0.8)	1.21-4.3	2.58 (0.71)	1.36-4.08	2.58 (0.66)	1.34-4.03
Oct	3.88 (1.81)	0.97-7.75	3.88 (1.31)	1.55-6.59	3.88 (1.11)	1.94-6.14
Nov	3.87 (1.22)	1.72-6.45	7.74 (2.27)	3.87-12.9	7.74 (2.39)	3.23-12.9
Dec	3.87 (3.62)	0-11.62	3.87 (3.73)	0-11.62	3.87 (3.62)	0-11.62

Table 18-3 Mean density of auk species group (guillemot, razorbill or puffin) recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0.12 (0.04)	0.05-0.2	0.14 (0.04)	0.08-0.21	0.11 (0.03)	0.05-0.17
Feb	0.02 (0.01)	0-0.05	0.01 (0.01)	0-0.04	0.02 (0.01)	0-0.04
Mar	0.02 (0.01)	0-0.05	0.03 (0.02)	0-0.06	0.02 (0.01)	0.01-0.05
Apr	0.18 (0.04)	0.1-0.27	0.17 (0.03)	0.1-0.24	0.18 (0.03)	0.13-0.25
May	0.04 (0.02)	0.01-0.09	0.05 (0.02)	0.02-0.1	0.07 (0.02)	0.03-0.11
Jun	0.06 (0.03)	0.02-0.12	0.06 (0.02)	0.02-0.1	0.07 (0.02)	0.03-0.11
Jul	0.25 (0.07)	0.13-0.39	0.26 (0.06)	0.16-0.37	0.28 (0.06)	0.19-0.4
Aug	0.12 (0.04)	0.05-0.21	0.14 (0.03)	0.08-0.21	0.14 (0.03)	0.08-0.19
Sep	0.12 (0.04)	0.06-0.2	0.12 (0.03)	0.07-0.19	0.11 (0.03)	0.06-0.18
Oct	0.06 (0.02)	0.02-0.11	0.08 (0.03)	0.03-0.13	0.07 (0.02)	0.03-0.11
Nov	0.08 (0.03)	0.03-0.14	0.08 (0.03)	0.03-0.14	0.06 (0.02)	0.02-0.11
Dec	0.04 (0.02)	0.01-0.07	0.04 (0.01)	0.02-0.07	0.04 (0.01)	0.02-0.06

Table 18-4 Mean abundance of auk species group (guillemot, razorbill or puffin) recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	77.48 (26.83)	30.99-131.72	123.97 (31.46)	69.54-185.95	123.97 (31.64)	61.98-193.7
Feb	12.91 (9.19)	0-33.57	12.91 (9.06)	0-33.57	18.07 (10.48)	2.58-41.31
Mar	15.49 (9.19)	0-34.85	23.24 (13.54)	3.87-50.46	27.11 (13.65)	7.75-54.23
Apr	116.3 (29.21)	63.97-178.42	151.19 (30.25)	93.09-213.06	209.36 (35.65)	145.36-285.21
May	27.17 (14.35)	3.88-58.21	46.58 (18.35)	17.79-86.35	77.63 (23.52)	34.94-127.68
Jun	38.72 (17.76)	11.61-77.44	50.33 (19.06)	19.36-92.93	81.31 (22.37)	40.46-125.84
Jul	162.07 (43.73)	85.95-255.49	233.69 (50.22)	144.03-332.75	326.82 (64.08)	214.88-463.6
Aug	80.53 (26.44)	31.05-135.27	122.29 (29.88)	67.57-184.85	156.45 (34.74)	92.07-223.57
Sep	80.79 (24.51)	37.95-131.09	109.52 (29.73)	58.67-168.02	132.86 (33.82)	71.65-204.2
Oct	38.77 (14.98)	10.66-69.79	69.79 (22.57)	25.59-113.69	81.42 (23.38)	36.83-129.56
Nov	50.35 (18.86)	17.64-90.38	69.72 (22.62)	30.98-122.67	73.6 (23.72)	27.76-122.67
Dec	27.12 (10.09)	7.75-46.5	38.75 (11.73)	19.28-62	42.62 (12.45)	19.37-69.75

Table 18-5 Density of auk species group (guillemot, razorbill or puffin) recorded on each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km⁻²)					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0.01 (0)	0.01-0.02	0.01 (0)	0.01-0.01	0.01 (0)	0-0.01
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0.01 (0)	0.01-0.01	0.01 (0)	0-0.01
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0.01 (0)	0-0.01
Sep-2021	0.01 (0)	0.01-0.02	0.01 (0)	0-0.01	0.01 (0)	0-0.01
Oct-2021	0.01 (0.01)	0-0.02	0.01 (0)	0-0.01	0.01 (0)	0-0.01
Nov-2021	0.01 (0)	0.01-0.02	0.02 (0.01)	0.01-0.03	0.01 (0)	0.01-0.02
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0.05 (0.02)	0.02-0.08	0.03 (0.01)	0.01-0.06	0.03 (0.01)	0.01-0.05
May-2022	0 (0)	0-0	0.01 (0)	0-0.02	0.01 (0)	0.01-0.02
Jun-2022	0 (0)	0-0	0 (0)	0-0	0.01 (0)	0-0.01
Jul-2022	0.05 (0.01)	0.03-0.08	0.04 (0.01)	0.03-0.06	0.05 (0.01)	0.04-0.08
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 18-6 Abundance of auk species group (guillemot, razorbill or puffin) recorded on each survey in flight per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	8.02 (1.98)	4.51-12.28	8.02 (1.47)	5.18-10.86	8.02 (1.53)	5.39-11.34
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	7.75 (7.25)	0-23.25	7.75 (7.46)	0-23.25	7.75 (7.24)	0-23.25
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	7.76 (1.4)	5.1-10.64	7.76 (1.18)	5.58-10.24
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	7.74 (1.31)	5.09-10.18
Sep-2021	7.75 (2.4)	3.62-12.91	7.75 (2.12)	4.08-12.24	7.75 (1.99)	4.03-12.09
Oct-2021	7.75 (3.62)	1.94-15.51	7.75 (2.62)	3.1-13.18	7.75 (2.22)	3.88-12.28
Nov-2021	7.74 (2.44)	3.44-12.9	15.48 (4.54)	7.74-25.8	15.48 (4.79)	6.45-25.8
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	30.95 (11.71)	11.6-54.15	30.95 (10.22)	10.32-51.58	30.95 (10.84)	13.67-55.01
May-2022	0 (0)	0-0	7.76 (2.63)	3.23-13.59	15.53 (4.07)	7.76-24.07
Jun-2022	0 (0)	0-0	0 (0)	0-0	7.74 (1.88)	4.26-11.61
Jul-2022	31.73 (8.51)	16.85-49.57	39.66 (8.95)	24.76-57.5	63.45 (11.3)	43.84-87.68
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 18-7 Density of auk species group (guillemot, razorbill or puffin) recorded on each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0.38 (0.09)	0.21-0.58	0.42 (0.08)	0.27-0.57	0.48 (0.09)	0.32-0.68
Aug-2020	0.07 (0.03)	0.01-0.13	0.11 (0.03)	0.05-0.17	0.14 (0.03)	0.08-0.21
Sep-2020	0.04 (0.02)	0-0.07	0.03 (0.02)	0.01-0.06	0.03 (0.01)	0.01-0.07
Oct-2020	0.08 (0.03)	0.02-0.14	0.08 (0.02)	0.03-0.12	0.07 (0.02)	0.03-0.11
Nov-2020	0.06 (0.03)	0.01-0.12	0.07 (0.03)	0.03-0.13	0.06 (0.02)	0.02-0.1
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0.12 (0.04)	0.05-0.2	0.14 (0.04)	0.08-0.21	0.11 (0.03)	0.05-0.17
Feb-2021	0.02 (0.02)	0-0.06	0.02 (0.01)	0-0.04	0.03 (0.01)	0.01-0.05
Mar-2021	0.05 (0.03)	0-0.11	0.04 (0.02)	0.01-0.09	0.04 (0.02)	0.01-0.07
Apr-2021	0.31 (0.07)	0.18-0.46	0.29 (0.05)	0.19-0.4	0.33 (0.05)	0.24-0.43
May-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03
Jun-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03
Jul-2021	0.02 (0.02)	0-0.06	0.05 (0.02)	0.02-0.1	0.05 (0.02)	0.01-0.08
Aug-2021	0.25 (0.06)	0.13-0.38	0.26 (0.05)	0.16-0.36	0.23 (0.04)	0.15-0.3
Sep-2021	0.17 (0.05)	0.08-0.28	0.16 (0.04)	0.08-0.25	0.16 (0.04)	0.08-0.25
Oct-2021	0.04 (0.02)	0.01-0.07	0.08 (0.03)	0.03-0.13	0.07 (0.02)	0.04-0.12
Nov-2021	0.09 (0.03)	0.04-0.16	0.09 (0.03)	0.04-0.14	0.07 (0.02)	0.03-0.11
Dec-2021	0.08 (0.03)	0.02-0.14	0.09 (0.03)	0.04-0.14	0.07 (0.02)	0.03-0.12
Feb-2022	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Feb-2022	0.02 (0.02)	0-0.06	0.02 (0.01)	0-0.04	0.01 (0.01)	0-0.03
Mar-2022	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Apr-2022	0.05 (0.02)	0.02-0.08	0.04 (0.01)	0.01-0.07	0.03 (0.01)	0.01-0.06
May-2022	0.07 (0.03)	0.01-0.14	0.1 (0.03)	0.04-0.17	0.12 (0.03)	0.06-0.19
Jun-2022	0.11 (0.04)	0.04-0.2	0.1 (0.03)	0.04-0.18	0.13 (0.03)	0.07-0.19
Jul-2022	0.34 (0.09)	0.18-0.53	0.31 (0.07)	0.19-0.45	0.32 (0.06)	0.22-0.45
Aug-2022	0.05 (0.03)	0-0.11	0.04 (0.02)	0.01-0.09	0.04 (0.02)	0.01-0.07
Sep-2022	0.17 (0.04)	0.1-0.25	0.18 (0.04)	0.11-0.26	0.15 (0.03)	0.09-0.21

Table 18-8 Abundance of auk species group (guillemot, razorbill or puffin) recorded on each survey on the sea per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	248.63 (61.24)	139.86-380.72	376.96 (69.09)	243.26-510.47	553.41 (105.59)	371.58-782.68
Aug-2020	47.77 (19.88)	7.96-87.58	95.54 (25.57)	47.77-151.27	159.23 (39.45)	87.58-238.85
Sep-2020	23.24 (12.61)	0-46.48	30.99 (13.91)	7.75-54.23	38.74 (15.64)	15.49-77.47
Oct-2020	54.28 (19.11)	15.51-93.05	69.79 (21.52)	23.26-108.75	77.54 (22.36)	31.02-124.06
Nov-2020	38.78 (18.23)	7.76-77.55	62.04 (22.54)	23.27-116.33	69.8 (23.51)	23.27-116.33
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	77.48 (26.83)	30.99-131.72	123.97 (31.46)	69.54-185.95	123.97 (31.64)	61.98-193.7
Feb-2021	15.49 (10.48)	0-38.73	15.49 (9.95)	0-38.73	30.98 (14.01)	7.75-61.96
Mar-2021	30.98 (18.38)	0-69.71	38.73 (19.84)	7.75-77.65	46.47 (20.01)	15.49-85.2
Apr-2021	201.66 (46.71)	116.34-302.68	263.7 (47.71)	173.29-361.65	380.05 (57.76)	273.63-501.66
May-2021	7.75 (7.18)	0-23.25	7.75 (7.81)	0-23.25	15.5 (10.37)	0-38.75
Jun-2021	7.75 (6.88)	0-23.25	7.75 (7.08)	0-23.25	15.5 (9.03)	0-31.01
Jul-2021	15.5 (10.36)	0-38.76	46.51 (18.92)	15.5-85.27	54.26 (20.25)	15.5-93.02
Aug-2021	162.62 (42.4)	85.18-247.99	232.31 (45.07)	147.13-325.23	263.28 (44.68)	173.01-346.03
Sep-2021	108.47 (33.67)	50.62-180.79	139.47 (38.09)	73.4-220.39	185.95 (47.87)	96.7-290.09
Oct-2021	23.26 (10.85)	5.82-46.52	69.79 (23.61)	27.91-118.64	85.29 (24.4)	42.65-135.05
Nov-2021	61.92 (19.48)	27.52-103.2	77.4 (22.71)	38.7-129.01	77.4 (23.94)	32.25-129.01
Dec-2021	54.25 (20.17)	15.5-93	77.5 (23.45)	38.55-123.99	85.25 (24.9)	38.75-139.49
Feb-2022	7.75 (6.86)	0-23.25	7.75 (7.38)	0-23.25	7.75 (7.29)	0-23.25
Feb-2022	15.49 (10.24)	0-38.73	15.49 (9.86)	0-38.73	15.49 (10.13)	0-38.73
Mar-2022	0 (0)	0-0	7.75 (7.23)	0-23.26	7.75 (7.29)	0-23.26
Apr-2022	30.95 (11.71)	11.6-54.15	38.68 (12.78)	12.89-64.47	38.68 (13.55)	17.08-68.77
May-2022	46.58 (21.53)	7.76-93.17	85.4 (28.88)	35.58-149.45	139.75 (36.67)	69.87-216.61
Jun-2022	69.69 (28.64)	23.23-131.63	92.92 (31.03)	38.72-162.6	147.12 (35.72)	80.91-220.68
Jul-2022	222.08 (59.58)	117.98-347	277.6 (62.65)	173.33-402.52	372.78 (66.4)	257.55-515.11
Aug-2022	31.21 (17.04)	0-70.23	39.02 (19)	7.8-78.03	46.82 (20.1)	15.61-85.84
Sep-2022	110.67 (27.26)	63.24-166	158.09 (37.19)	94.86-229.43	173.9 (37.95)	102.76-245.05

19 LARGE AUK SPECIES GROUP (GUILLEMOT OR RAZORBILL)

Table 19-1 Mean density of large auk species group (guillemot or razorbill) recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0.01 (0.01)	0-0.03	0.01 (0)	0-0.02	0.02 (0.01)	0.01-0.03
Feb	0.02 (0.01)	0-0.03	0.01 (0)	0.01-0.02	0.01 (0)	0-0.02
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0.01 (0)	0.01-0.02	0.01 (0)	0.01-0.02	0.01 (0)	0.01-0.01
May	0.01 (0.01)	0-0.02	0 (0)	0-0.01	0 (0)	0-0.01
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0.01 (0.01)	0-0.02	0.01 (0)	0-0.01	0.01 (0)	0-0.01
Oct	0.02 (0.01)	0.01-0.03	0.01 (0)	0.01-0.02	0.01 (0)	0.01-0.02
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0.01 (0)	0-0.02	0.01 (0)	0-0.01	0.01 (0)	0-0.01

Table 19-2 Mean abundance of large auk species group (guillemot or razorbill) recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	7.75 (4.29)	0-18.08	7.75 (3.58)	1.94-15.5	23.24 (7.59)	9.3-39.52
Feb	10.33 (4.27)	2.58-19.36	10.33 (3.6)	4.59-17.21	10.33 (3.69)	3.44-18.36
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	7.76 (2.14)	3.58-11.93	11.63 (2.76)	6.16-17.79	11.63 (2.32)	7.2-16.07
May	3.88 (3.66)	0-11.65	3.88 (3.69)	0-11.65	3.88 (2.21)	0-7.76
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	5.22 (3.41)	0.26-13.22	5.22 (3.11)	0.55-12.35	7.85 (3.71)	2.23-15.97
Oct	11.63 (3.73)	4.82-19.8	11.63 (3.17)	5.49-18.09	15.51 (3.42)	8.82-22.52
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	7.75 (2.59)	2.82-13.39	7.75 (2.43)	3.19-12.76	7.75 (2.31)	3.67-12.64

Table 19-3 Mean density of large auk species group (guillemot or razorbill) recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0.02 (0.01)	0-0.06	0.03 (0.01)	0.01-0.05	0.05 (0.02)	0.02-0.08
Feb	0.04 (0.02)	0.01-0.07	0.05 (0.02)	0.02-0.08	0.05 (0.02)	0.02-0.08
Mar	0.09 (0.04)	0.03-0.17	0.09 (0.03)	0.03-0.15	0.09 (0.03)	0.04-0.14
Apr	0.07 (0.02)	0.03-0.12	0.07 (0.02)	0.03-0.11	0.07 (0.02)	0.04-0.11
May	0.01 (0.01)	0-0.02	0 (0)	0-0.01	0.02 (0.01)	0-0.04
Jun	0.02 (0.02)	0-0.05	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03
Jul	0.02 (0.01)	0-0.05	0.04 (0.01)	0.01-0.06	0.04 (0.01)	0.02-0.07
Aug	0.02 (0.01)	0-0.05	0.02 (0.01)	0-0.04	0.02 (0.01)	0-0.05
Sep	0.06 (0.03)	0.01-0.14	0.07 (0.04)	0.01-0.15	0.06 (0.03)	0.02-0.12
Oct	0.08 (0.03)	0.03-0.14	0.1 (0.03)	0.05-0.16	0.1 (0.02)	0.05-0.14
Nov	0.04 (0.02)	0.01-0.09	0.05 (0.02)	0.02-0.09	0.04 (0.01)	0.02-0.07
Dec	0.07 (0.03)	0.02-0.13	0.1 (0.03)	0.04-0.17	0.09 (0.03)	0.04-0.15

Table 19-4 Mean abundance of large auk species group (guillemot or razorbill) recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	15.5 (8.58)	0-36.16	23.24 (10.73)	5.81-46.49	54.24 (17.72)	21.69-92.2
Feb	23.24 (10.23)	5.16-45.18	41.31 (14.8)	16.07-70.64	56.81 (19.64)	22.38-97.84
Mar	58.12 (23.93)	19.37-108.49	77.49 (26.62)	31-135.61	100.75 (32.05)	42.62-166.62
Apr	46.53 (15.41)	19.69-77.23	62.03 (18.11)	28.74-102.38	81.41 (20.3)	43.21-123.47
May	3.88 (3.66)	0-11.65	3.88 (3.69)	0-11.65	23.28 (14.53)	0-50.44
Jun	11.62 (11.07)	0-34.86	11.62 (10.71)	0-34.86	11.62 (10.95)	0-34.86
Jul	15.86 (8.51)	2.64-34.37	31.73 (11.37)	10.58-55.52	50.17 (15.77)	23.79-81.9
Aug	13.12 (8.58)	0-31.48	15.73 (10.96)	0-39.29	28.84 (14.31)	5.25-60.25
Sep	41.43 (22.85)	4.91-93.08	59.82 (31.94)	9.83-130.8	70.25 (31.74)	21.23-140.19
Oct	54.28 (17.5)	22.32-92.64	89.17 (25.24)	41.03-140.86	112.43 (26.48)	60.97-167.45
Nov	27.11 (12.82)	3.87-58.09	42.6 (16.37)	15.49-77.46	50.35 (17.24)	19.26-85.21
Dec	46.5 (19.25)	12.68-87.36	89.12 (29.14)	35.56-149.97	104.62 (31.92)	46.7-169.47

Table 19-5 Density of large auk species group (guillemot or razorbill) recorded on each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0.01 (0)	0-0.02	0.01 (0)	0-0.01	0.01 (0)	0-0.01
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0.01 (0.01)	0-0.03	0.01 (0)	0-0.02	0.02 (0.01)	0.01-0.03
Feb-2021	0.05 (0.02)	0.01-0.09	0.03 (0.01)	0.02-0.06	0.03 (0.01)	0.01-0.05
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0.02 (0.01)	0.01-0.04	0.03 (0.01)	0.01-0.04	0.02 (0)	0.01-0.03
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02	0.01 (0)	0-0.02
Oct-2021	0.02 (0.01)	0.01-0.04	0.02 (0)	0.01-0.03	0.02 (0)	0.01-0.03
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0.02 (0.01)	0.01-0.04	0.02 (0.01)	0.01-0.03	0.01 (0)	0.01-0.02
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0)	0-0.01
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02	0.01 (0.01)	0-0.03

Table 19-6 Abundance of large auk species group (guillemot or razorbill) recorded on each survey in flight per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	7.75 (2.84)	2.58-14.22	7.75 (2.48)	3.23-12.92	7.75 (2.38)	3.23-12.92
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	7.75 (4.29)	0-18.08	7.75 (3.58)	1.94-15.5	23.24 (7.59)	9.3-39.52
Feb-2021	30.98 (12.81)	7.75-58.09	30.98 (10.8)	13.77-51.63	30.98 (11.07)	10.33-55.08
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	15.51 (4.28)	7.16-23.86	23.27 (5.52)	12.32-35.59	23.27 (4.65)	14.4-32.13
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	7.75 (4.73)	0.77-18.6	7.75 (4.71)	0.77-18.6	7.75 (4.27)	1.41-17.61
Oct-2021	15.51 (4.62)	7.05-25.38	15.51 (3.87)	7.75-23.26	23.26 (4.47)	14.4-32.12
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	15.5 (5.18)	5.64-26.77	15.5 (4.86)	6.38-25.53	15.5 (4.62)	7.34-25.29
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	7.76 (7.32)	0-23.29	7.76 (7.39)	0-23.29	7.76 (4.42)	0-15.53
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	7.9 (5.51)	0-21.08	7.9 (4.61)	0.88-18.44	15.81 (6.87)	5.27-30.3

Table 19-7 Density of large auk species group (guillemot or razorbill) recorded on each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0.04 (0.02)	0-0.08	0.03 (0.02)	0-0.06	0.03 (0.02)	0.01-0.07
Sep-2020	0.06 (0.02)	0.01-0.11	0.05 (0.02)	0.02-0.09	0.05 (0.02)	0.02-0.08
Oct-2020	0.06 (0.02)	0.02-0.11	0.1 (0.03)	0.04-0.16	0.07 (0.02)	0.03-0.12
Nov-2020	0.02 (0.01)	0-0.06	0.03 (0.02)	0.01-0.07	0.03 (0.01)	0.01-0.06
Dec-2020	0.04 (0.02)	0-0.08	0.07 (0.02)	0.03-0.12	0.07 (0.02)	0.03-0.11
Jan-2021	0.02 (0.01)	0-0.06	0.03 (0.01)	0.01-0.05	0.05 (0.02)	0.02-0.08
Feb-2021	0.05 (0.02)	0.01-0.09	0.04 (0.02)	0.02-0.07	0.03 (0.01)	0.01-0.06
Mar-2021	0.11 (0.04)	0.04-0.19	0.1 (0.03)	0.04-0.18	0.09 (0.03)	0.05-0.15
Apr-2021	0.13 (0.04)	0.06-0.2	0.12 (0.03)	0.06-0.19	0.12 (0.02)	0.07-0.17
May-2021	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.02
Jun-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Jul-2021	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.01
Aug-2021	0.02 (0.02)	0-0.06	0.02 (0.01)	0-0.04	0.01 (0.01)	0-0.03
Sep-2021	0.11 (0.06)	0.01-0.25	0.08 (0.05)	0.01-0.19	0.07 (0.04)	0.01-0.15
Oct-2021	0.11 (0.03)	0.05-0.17	0.1 (0.03)	0.05-0.16	0.12 (0.02)	0.07-0.17
Nov-2021	0.06 (0.02)	0.01-0.12	0.06 (0.02)	0.03-0.1	0.05 (0.02)	0.03-0.09
Dec-2021	0.11 (0.04)	0.04-0.18	0.13 (0.04)	0.05-0.21	0.11 (0.03)	0.05-0.19
Feb-2022	0 (0)	0-0	0.01 (0.01)	0-0.03	0.04 (0.02)	0.01-0.08
Feb-2022	0.06 (0.03)	0.01-0.12	0.09 (0.03)	0.03-0.14	0.07 (0.02)	0.03-0.11
Mar-2022	0.07 (0.03)	0.02-0.14	0.07 (0.03)	0.03-0.12	0.08 (0.03)	0.03-0.14
Apr-2022	0.01 (0.01)	0-0.04	0.02 (0.01)	0-0.04	0.02 (0.01)	0-0.05
May-2022	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.03 (0.02)	0-0.07
Jun-2022	0.02 (0.02)	0-0.07	0.02 (0.02)	0-0.05	0.01 (0.01)	0-0.04
Jul-2022	0.07 (0.04)	0.01-0.16	0.11 (0.04)	0.04-0.19	0.12 (0.04)	0.06-0.2
Aug-2022	0 (0)	0-0	0.01 (0.01)	0-0.03	0.03 (0.01)	0.01-0.05
Sep-2022	0.02 (0.02)	0-0.06	0.07 (0.04)	0.01-0.17	0.07 (0.03)	0.02-0.13

Table 19-8 Abundance of large auk species group (guillemot or razorbill) recorded on each survey on the sea per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	23.89 (15.24)	0-55.73	23.89 (15.16)	0-55.73	39.81 (18.71)	7.96-79.62
Sep-2020	38.74 (14.97)	7.75-69.73	46.48 (16.53)	15.49-77.47	54.23 (18.16)	23.24-92.97
Oct-2020	38.77 (14.19)	12.92-71.08	85.29 (27.25)	35.54-142.16	85.29 (26.17)	35.54-142.16
Nov-2020	15.51 (9.77)	0-38.78	31.02 (14.53)	7.76-62.04	38.78 (15.24)	7.76-69.8
Dec-2020	23.25 (15.18)	0-54.24	61.99 (21.8)	23.25-108.49	77.49 (24.54)	31-123.99
Jan-2021	15.5 (8.58)	0-36.16	23.24 (10.73)	5.81-46.49	54.24 (17.72)	21.69-92.2
Feb-2021	30.98 (12.81)	7.75-58.09	38.73 (13.5)	17.21-64.54	38.73 (13.84)	12.91-68.85
Mar-2021	69.71 (27.16)	23.24-123.92	92.94 (30.23)	38.73-162.65	108.43 (30.69)	54.22-170.4
Apr-2021	85.32 (23.52)	39.38-131.26	108.58 (25.78)	57.49-166.07	139.61 (27.9)	86.42-192.79
May-2021	0 (0)	0-0	0 (0)	0-0	7.75 (6.96)	0-23.25
Jun-2021	7.75 (7.32)	0-23.25	7.75 (7.18)	0-23.25	7.75 (7.41)	0-23.25
Jul-2021	0 (0)	0-0	0 (0)	0-0	7.75 (5.9)	0-15.5
Aug-2021	15.49 (10.51)	0-38.72	15.49 (10.21)	0-38.72	15.49 (10.15)	0-38.72
Sep-2021	69.73 (42.58)	6.97-167.36	69.73 (42.41)	6.97-167.36	77.48 (42.72)	14.09-176.09
Oct-2021	69.79 (20.8)	31.72-114.2	93.05 (23.22)	46.52-139.57	139.57 (26.8)	86.4-192.74
Nov-2021	38.7 (15.88)	7.74-77.4	54.18 (18.22)	23.22-92.88	61.92 (19.24)	30.77-100.62
Dec-2021	69.75 (23.33)	25.36-120.47	116.24 (36.48)	47.87-191.46	131.74 (39.29)	62.4-214.95
Feb-2022	0 (0)	0-0	7.75 (6.59)	0-23.25	46.5 (20.42)	15.5-93
Feb-2022	38.73 (17.88)	7.75-77.46	77.46 (24.29)	30.98-124.13	85.21 (24.66)	38.73-131.68
Mar-2022	46.53 (20.71)	15.51-93.06	62.04 (23.02)	23.26-108.57	93.06 (33.41)	31.02-162.85
Apr-2022	7.74 (7.3)	0-23.21	15.47 (10.43)	0-38.68	23.21 (12.7)	0-54.15
May-2022	7.76 (7.32)	0-23.29	7.76 (7.39)	0-23.29	38.82 (22.1)	0-77.64
Jun-2022	15.49 (14.83)	0-46.46	15.49 (14.24)	0-46.46	15.49 (14.49)	0-46.46
Jul-2022	47.59 (25.54)	7.93-103.11	95.18 (34.11)	31.73-166.56	142.77 (41.42)	71.38-230.21
Aug-2022	0 (0)	0-0	7.8 (7.51)	0-23.41	31.21 (14.06)	7.8-62.43
Sep-2022	15.81 (11.01)	0-42.16	63.24 (36.88)	7.03-147.55	79.05 (34.33)	26.35-151.51

20 RED-THROATED DIVER

Table 20-1 Mean density of red-throated diver recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 20-2 Mean abundance of red-throated diver recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 20-3 Mean density of red-throated diver recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0.01	0 (0)	0-0.01
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0.01 (0.01)	0-0.02	0 (0)	0-0.01	0 (0)	0-0.01
Nov	0 (0)	0-0	0 (0)	0-0.01	0 (0)	0-0.01
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 20-4 Mean abundance of red-throated diver recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	3.88 (3.2)	0-11.65	3.88 (3.34)	0-11.65
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	3.88 (3.66)	0-11.63	3.88 (3.52)	0-11.63	3.88 (3.58)	0-11.63
Nov	0 (0)	0-0	3.87 (3.45)	0-11.61	3.87 (3.38)	0-11.61
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 20-5 Density of red-throated diver recorded on each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km⁻²)					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 20-6 Abundance of red-throated diver recorded on each survey in flight per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 20-7 Density of red-throated diver recorded on each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km⁻²)					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 20-8 Abundance of red-throated diver recorded on each survey on the sea per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	7.75 (7.32)	0-23.26	7.75 (7.04)	0-23.26	7.75 (7.17)	0-23.26
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	7.74 (6.9)	0-23.22	7.74 (6.76)	0-23.22
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	7.76 (6.4)	0-23.29	7.76 (6.67)	0-23.29
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

21 GREAT NORTHERN DIVER

Table 21-1 Mean density of great northern diver recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0.01 (0.01)	0-0.02	0 (0)	0-0.01	0 (0)	0-0.01
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 21-2 Mean abundance of great northern diver recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

	Abundance					
Month	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	3.88 (3.64)	0-11.63	3.88 (3.41)	0-11.63	3.88 (3.51)	0-11.63
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 21-3 Mean density of great northern diver recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 21-4 Mean abundance of great northern diver recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	7.76 (7.01)	0-23.27	7.76 (7.1)	0-23.27	7.76 (7.32)	0-23.27
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 21-5 Density of great northern diver recorded on each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 21-6 Abundance of great northern diver recorded on each survey in flight per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	7.75 (7.29)	0-23.26	7.75 (6.83)	0-23.26	7.75 (7.03)	0-23.26
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 21-7 Density of great northern diver recorded on each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 21-8 Abundance of great northern diver recorded on each survey on the sea per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	7.75 (7.27)	0-23.25	7.75 (7.3)	0-23.25	7.75 (7.58)	0-23.25
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	7.76 (6.76)	0-23.29	7.76 (6.91)	0-23.29	7.76 (7.06)	0-23.29
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

22 EUROPEAN STORM-PETREL

Table 22-1 Mean density of European storm-petrel recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0.1 (0.04)	0.04-0.18	0.08 (0.03)	0.03-0.15	0.08 (0.03)	0.04-0.14
Sep	0.02 (0.01)	0-0.03	0.01 (0.01)	0-0.03	0.04 (0.03)	0-0.09
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 22-2 Mean abundance of European storm-petrel recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	67.11 (24.75)	23.23-118.74	74.85 (25.27)	30.97-131.64	95.58 (30.15)	41.3-157.74
Sep	10.33 (4.46)	2.58-18.08	12.91 (5.32)	2.58-23.24	41.32 (30.96)	5.17-108.53
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 22-3 Mean density of European storm-petrel recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 22-4 Mean abundance of European storm-petrel recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 22-5 Density of European storm-petrel recorded on each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.02
Sep-2020	0 (0)	0-0	0 (0)	0-0	0.07 (0.07)	0-0.22
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0.31 (0.11)	0.11-0.54	0.25 (0.08)	0.1-0.44	0.24 (0.07)	0.11-0.39
Sep-2021	0.05 (0.02)	0.01-0.08	0.04 (0.02)	0.01-0.08	0.03 (0.01)	0.01-0.06
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 22-6 Abundance of European storm-petrel recorded on each survey in flight per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	7.96 (7.31)	0-23.89
Sep-2020	0 (0)	0-0	0 (0)	0-0	85.22 (77.04)	0-255.66
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	201.33 (74.25)	69.69-356.21	224.56 (75.82)	92.92-394.92	278.77 (83.15)	123.9-449.32
Sep-2021	30.99 (13.39)	7.75-54.24	38.74 (15.97)	7.75-69.73	38.74 (15.83)	15.5-69.93
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 22-7 Density of European storm-petrel recorded on each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 22-8 Abundance of European storm-petrel recorded on each survey on the sea per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

23 FULMAR

Table 23-1 Mean density of fulmar recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	1.04 (0.19)	0.71-1.45	1.19 (0.19)	0.85-1.57	1.31 (0.15)	1.04-1.63
Feb	0.83 (0.14)	0.57-1.11	0.92 (0.14)	0.67-1.22	1.01 (0.11)	0.8-1.23
Mar	1.54 (0.25)	1.1-2.09	1.51 (0.2)	1.16-1.95	1.47 (0.16)	1.18-1.78
Apr	0.39 (0.09)	0.24-0.59	0.36 (0.08)	0.24-0.53	0.37 (0.07)	0.26-0.52
May	0.11 (0.03)	0.06-0.18	0.21 (0.05)	0.12-0.31	0.19 (0.04)	0.12-0.27
Jun	0.08 (0.02)	0.04-0.12	0.08 (0.02)	0.05-0.11	0.07 (0.01)	0.04-0.09
Jul	0.26 (0.06)	0.16-0.39	0.26 (0.05)	0.17-0.35	0.28 (0.04)	0.2-0.36
Aug	0.49 (0.14)	0.26-0.78	0.45 (0.11)	0.26-0.68	0.44 (0.09)	0.29-0.63
Sep	0.51 (0.14)	0.27-0.81	0.56 (0.15)	0.32-0.88	0.54 (0.13)	0.33-0.81
Oct	0.8 (0.29)	0.32-1.43	0.78 (0.22)	0.4-1.27	0.98 (0.25)	0.56-1.5
Nov	0.77 (0.2)	0.43-1.23	0.75 (0.17)	0.47-1.1	1.37 (0.37)	0.73-2.11
Dec	1.87 (0.41)	1.13-2.67	2.28 (0.55)	1.31-3.38	2.21 (0.47)	1.38-3.2

Table 23-2 Mean abundance of fulmar recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	681.83 (123.17)	467.18-951.2	1061.49 (165.94)	761.88-1404.23	1518.63 (174.26)	1207.23-1884.93
Feb	542.34 (91.24)	374.43-728.56	823.83 (126.94)	595.37-1094.86	1164.73 (131.69)	925.57-1419.98
Mar	1007.71 (164.62)	724.9-1369.81	1348.8 (181.63)	1034.88-1743.62	1701.5 (183.51)	1369.73-2061.39
Apr	255.42 (60.96)	156.23-385.15	325.1 (72.34)	213.89-477.86	429.66 (85.89)	296.97-606.44
May	73.72 (20.17)	36.14-115.17	190.04 (43.11)	109.34-273.99	221.09 (46.37)	137.18-317.96
Jun	50.33 (11.9)	28.31-75.49	69.69 (14.07)	44.27-98.2	77.43 (13.31)	51.62-103.24
Jul	171.27 (38.41)	105.04-255.05	232.29 (41.27)	156.28-314.91	321.87 (49.01)	232.31-420.1
Aug	321.83 (89.8)	170.91-512.61	402.57 (98.24)	235.69-607.34	512.05 (103.26)	330.9-729.66
Sep	335.4 (93)	179.4-530.42	501.46 (131.42)	286.79-787.5	620.94 (148.03)	376.18-937.24
Oct	527.27 (189.98)	210.45-935.96	701.74 (199.04)	359.27-1138.68	1128.21 (284.09)	643.26-1735.63
Nov	503.79 (134.2)	281-805.2	670.36 (148.39)	421.83-984.24	1588.09 (424.61)	840.63-2445.11
Dec	1224.4 (266.88)	739.59-1749.72	2041.94 (489.45)	1168.99-3021.51	2553.39 (544.12)	1599.45-3698.43

Table 23-3 Mean density of fulmar recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0.87 (0.16)	0.6-1.22	0.96 (0.15)	0.69-1.27	1.11 (0.13)	0.88-1.37
Feb	0.16 (0.03)	0.1-0.23	0.17 (0.03)	0.12-0.23	0.17 (0.02)	0.13-0.21
Mar	0.28 (0.04)	0.2-0.38	0.37 (0.05)	0.29-0.48	0.35 (0.04)	0.28-0.42
Apr	0.18 (0.1)	0.04-0.4	0.14 (0.07)	0.06-0.29	0.12 (0.05)	0.06-0.22
May	0.02 (0)	0.01-0.03	0.04 (0.01)	0.03-0.06	0.04 (0.01)	0.03-0.06
Jun	0.02 (0)	0.01-0.03	0.02 (0)	0.01-0.02	0.02 (0)	0.02-0.03
Jul	0.26 (0.06)	0.16-0.39	0.28 (0.05)	0.2-0.38	0.38 (0.05)	0.28-0.49
Aug	0.93 (0.33)	0.39-1.64	0.79 (0.24)	0.38-1.29	0.73 (0.18)	0.42-1.11
Sep	1.88 (0.64)	0.82-3.22	1.58 (0.46)	0.85-2.59	1.37 (0.35)	0.8-2.12
Oct	1.17 (0.4)	0.5-2.03	1.14 (0.3)	0.63-1.8	1.59 (0.37)	0.96-2.35
Nov	0.19 (0.06)	0.1-0.32	0.16 (0.04)	0.1-0.24	0.33 (0.08)	0.18-0.5
Dec	0.63 (0.14)	0.38-0.89	0.82 (0.19)	0.47-1.21	0.76 (0.16)	0.49-1.09

Table 23-4 Mean abundance of fulmar recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	573.36 (103.57)	392.86-799.87	860.04 (134.45)	617.29-1137.73	1278.44 (146.7)	1016.29-1586.8
Feb	105.87 (21.17)	67.19-149.55	152.35 (24.66)	107.02-204.11	191.09 (23.94)	148.77-238.03
Mar	182.17 (29.27)	131.72-246.39	333.33 (44.81)	255.86-430.72	403.09 (43.79)	324-489
Apr	116.3 (64.88)	29.51-261.73	124.06 (60.89)	49.2-258.09	139.55 (52.52)	66.88-249.64
May	11.65 (2.6)	6.55-16.74	38.79 (8.67)	22.55-55.65	46.55 (9.36)	29.65-66
Jun	11.61 (2.75)	6.53-17.42	15.49 (3.13)	9.84-21.82	27.1 (4.66)	18.07-36.13
Jul	170.27 (40)	104.04-258.98	252.91 (42.94)	175.26-339.93	436.76 (62.62)	322.06-561.52
Aug	609.08 (214.64)	258.1-1073.91	702.44 (216.37)	341.43-1155.82	845.44 (208.84)	482.8-1285.68
Sep	1230.9 (419.16)	538.19-2112.63	1416.36 (409.64)	756.11-2313.29	1583.68 (404.9)	919.83-2454.84
Oct	767.65 (263.6)	328.35-1332.18	1019.65 (268.86)	559.58-1610.7	1837.69 (426.81)	1108.75-2723.21
Nov	127.92 (36.55)	67.64-210.26	143.41 (34.85)	85.73-217.26	383.66 (96.05)	209.02-580.4
Dec	410.72 (89.5)	248.17-586.92	732.31 (172.92)	423.4-1078.06	879.55 (180.41)	562.41-1257.33

Table 23-5 Density of fulmar recorded on each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0.21 (0.05)	0.13-0.32	0.27 (0.04)	0.19-0.36	0.32 (0.04)	0.24-0.4
Aug-2020	0.59 (0.3)	0.12-1.25	0.5 (0.24)	0.11-1	0.45 (0.19)	0.13-0.86
Sep-2020	0.67 (0.32)	0.15-1.35	0.82 (0.36)	0.27-1.62	0.75 (0.31)	0.26-1.43
Oct-2020	0.63 (0.16)	0.36-0.96	0.7 (0.12)	0.5-0.98	0.78 (0.17)	0.49-1.13
Nov-2020	1.06 (0.33)	0.52-1.82	0.96 (0.27)	0.53-1.53	1.19 (0.28)	0.67-1.77
Dec-2020	1.77 (0.4)	1.01-2.54	2.89 (0.8)	1.49-4.51	3.03 (0.72)	1.78-4.56
Jan-2021	1.04 (0.19)	0.71-1.45	1.19 (0.19)	0.85-1.57	1.31 (0.15)	1.04-1.63
Feb-2021	0.15 (0.04)	0.08-0.24	0.21 (0.03)	0.14-0.27	0.24 (0.04)	0.18-0.31
Mar-2021	1.04 (0.27)	0.61-1.65	0.99 (0.21)	0.65-1.45	0.96 (0.16)	0.68-1.29
Apr-2021	0.14 (0.09)	0.03-0.34	0.16 (0.08)	0.05-0.34	0.2 (0.09)	0.08-0.38
May-2021	0.07 (0.03)	0.02-0.13	0.23 (0.06)	0.11-0.35	0.18 (0.05)	0.08-0.29
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0.21 (0.04)	0.13-0.29	0.18 (0.03)	0.12-0.25	0.23 (0.03)	0.17-0.28
Aug-2021	0.41 (0.05)	0.32-0.51	0.42 (0.04)	0.34-0.5	0.42 (0.03)	0.36-0.49
Sep-2021	0.34 (0.05)	0.25-0.45	0.35 (0.04)	0.27-0.43	0.38 (0.04)	0.3-0.45
Oct-2021	0.98 (0.42)	0.28-1.89	0.87 (0.32)	0.31-1.57	1.17 (0.32)	0.62-1.87
Nov-2021	0.47 (0.08)	0.34-0.64	0.54 (0.07)	0.41-0.67	1.55 (0.46)	0.78-2.46
Dec-2021	1.96 (0.41)	1.24-2.79	1.67 (0.3)	1.13-2.25	1.38 (0.22)	0.98-1.83
Feb-2022	1.06 (0.13)	0.82-1.33	1.11 (0.12)	0.89-1.34	1.25 (0.1)	1.06-1.43
Feb-2022	1.26 (0.25)	0.81-1.76	1.45 (0.28)	0.97-2.06	1.53 (0.21)	1.16-1.94
Mar-2022	2.03 (0.24)	1.59-2.52	2.03 (0.2)	1.67-2.45	1.98 (0.15)	1.68-2.27
Apr-2022	0.64 (0.1)	0.45-0.83	0.57 (0.08)	0.42-0.73	0.54 (0.06)	0.43-0.67
May-2022	0.15 (0.03)	0.09-0.22	0.2 (0.03)	0.14-0.26	0.2 (0.03)	0.15-0.26
Jun-2022	0.15 (0.04)	0.09-0.23	0.16 (0.03)	0.1-0.22	0.13 (0.02)	0.09-0.18
Jul-2022	0.36 (0.08)	0.22-0.55	0.33 (0.06)	0.22-0.45	0.29 (0.05)	0.19-0.4
Aug-2022	0.46 (0.06)	0.34-0.59	0.44 (0.05)	0.34-0.54	0.45 (0.04)	0.37-0.55
Sep-2022	0.52 (0.05)	0.42-0.63	0.51 (0.04)	0.43-0.59	0.49 (0.03)	0.42-0.55

Table 23-6 Abundance of fulmar recorded on each survey in flight per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	136.35 (32.59)	83.2-208.1	240.61 (39.26)	170.13-320.82	368.94 (49.85)	277.19-467.1
Aug-2020	390.12 (196.28)	76.32-821.58	445.85 (214.77)	97.6-898.64	525.47 (220.95)	148.33-994.63
Sep-2020	441.59 (210.84)	98.55-885.9	735.99 (317.7)	241.12-1445.81	867.69 (360.68)	295.85-1657.46
Oct-2020	410.96 (105.73)	235.62-630.14	628.07 (111.4)	444.65-875.41	907.21 (196.5)	571.45-1303.31
Nov-2020	697.96 (219)	339.88-1193.1	860.82 (237.5)	473.45-1365.17	1380.41 (318.57)	776.69-2045.61
Dec-2020	1162.37 (263)	662.4-1668.14	2588.21 (714.78)	1331.74-4030.1	3510.35 (830.71)	2063.91-5280.68
Jan-2021	681.83 (123.17)	467.18-951.2	1061.49 (165.94)	761.88-1404.23	1518.63 (174.26)	1207.23-1884.93
Feb-2021	100.69 (26.51)	52.53-157.6	185.88 (30.3)	123.92-243.08	278.82 (40.95)	211.7-361.44
Mar-2021	681.58 (174.62)	403.66-1085.41	882.96 (184.57)	578.28-1299.73	1115.32 (189.36)	791.16-1495.56
Apr-2021	93.07 (57.69)	17.14-222.88	139.61 (75.6)	48.48-306.53	232.68 (99.7)	96.95-442.19
May-2021	46.5 (17.78)	15.5-85.26	201.51 (55.94)	97.51-312.02	209.26 (60.56)	98.09-340.05
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	139.53 (27.56)	86.38-192.85	162.79 (28.69)	106.44-219.14	263.56 (35.13)	197.67-329.6
Aug-2021	271.03 (31.43)	211.96-332.23	371.69 (35.94)	301.43-444.22	487.85 (37.28)	417.18-563.13
Sep-2021	224.69 (33.65)	162.61-292.77	309.92 (37.51)	237.19-385.82	433.89 (43.71)	349.62-514.84
Oct-2021	643.58 (274.22)	185.29-1241.79	775.4 (286.68)	273.88-1401.95	1349.2 (371.67)	715.08-2167.94
Nov-2021	309.61 (49.4)	222.11-417.31	479.9 (59.28)	370.21-603.31	1795.76 (530.64)	904.57-2844.61
Dec-2021	1286.44 (270.76)	816.77-1831.29	1495.68 (264.13)	1006.25-2012.91	1596.42 (257.54)	1135-2116.19
Feb-2022	697.49 (84.12)	539.3-870.07	991.99 (103.24)	797.75-1200.1	1441.48 (113.77)	1221.36-1654.51
Feb-2022	828.84 (163.09)	531.47-1158	1293.61 (247.29)	864.44-1841.41	1773.87 (240.33)	1343.64-2243.98
Mar-2022	1333.84 (154.62)	1046.15-1654.22	1814.64 (178.69)	1491.48-2187.51	2287.69 (177.66)	1948.3-2627.23
Apr-2022	417.76 (64.22)	295.31-547.41	510.6 (69.09)	379.3-649.19	626.64 (72.08)	496.99-770.69
May-2022	100.93 (22.55)	56.77-145.09	178.57 (30.28)	121.17-235.97	232.92 (32.18)	176.26-295.87
Jun-2022	100.66 (23.8)	56.62-150.99	139.37 (28.15)	88.53-196.39	154.86 (26.62)	103.24-206.48
Jul-2022	237.94 (55.07)	145.56-364.2	293.46 (55.85)	192.27-404.78	333.12 (62.05)	222.08-463.59

Aug-2022	304.33 (41.7)	224.44-384.03	390.16 (44.01)	308.02-479.15	522.82 (51.53)	427.18-631.21
Sep-2022	339.9 (34.51)	277.03-412.6	458.47 (39.05)	382.06-530.86	561.23 (39.7)	483.06-639.41

Table 23-7 Density of fulmar recorded on each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km⁻²)					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0.51 (0.12)	0.31-0.78	0.62 (0.1)	0.44-0.83	0.88 (0.12)	0.66-1.11
Aug-2020	1.7 (0.85)	0.33-3.58	1.29 (0.62)	0.28-2.6	1.08 (0.45)	0.3-2.05
Sep-2020	3.51 (1.67)	0.78-7.03	2.75 (1.19)	0.9-5.4	2.16 (0.9)	0.74-4.12
Oct-2020	1.15 (0.29)	0.66-1.76	1.26 (0.22)	0.89-1.75	2.33 (0.51)	1.47-3.35
Nov-2020	0.32 (0.1)	0.16-0.55	0.25 (0.07)	0.14-0.4	0.46 (0.11)	0.26-0.69
Dec-2020	0.59 (0.13)	0.34-0.85	0.98 (0.27)	0.5-1.52	0.88 (0.21)	0.52-1.33
Jan-2021	0.87 (0.16)	0.6-1.22	0.96 (0.15)	0.69-1.27	1.11 (0.13)	0.88-1.37
Feb-2021	0.12 (0.03)	0.06-0.18	0.13 (0.02)	0.09-0.17	0.12 (0.02)	0.09-0.16
Mar-2021	0.18 (0.05)	0.1-0.28	0.24 (0.05)	0.16-0.36	0.23 (0.04)	0.17-0.31
Apr-2021	0.31 (0.19)	0.06-0.74	0.24 (0.13)	0.08-0.53	0.2 (0.09)	0.08-0.38
May-2021	0 (0)	0-0	0.04 (0.01)	0.02-0.07	0.03 (0.01)	0.02-0.05
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0.04 (0.01)	0.02-0.05	0.04 (0.01)	0.03-0.06	0.07 (0.01)	0.05-0.08
Aug-2021	1.05 (0.12)	0.82-1.29	1 (0.1)	0.81-1.2	1.01 (0.08)	0.86-1.17
Sep-2021	0.55 (0.08)	0.4-0.72	0.5 (0.06)	0.38-0.63	0.52 (0.05)	0.42-0.62
Oct-2021	1.19 (0.51)	0.34-2.3	1.02 (0.38)	0.36-1.85	0.84 (0.23)	0.45-1.36
Nov-2021	0.07 (0.01)	0.05-0.1	0.07 (0.01)	0.05-0.09	0.2 (0.06)	0.1-0.32
Dec-2021	0.66 (0.14)	0.42-0.94	0.66 (0.12)	0.44-0.89	0.64 (0.1)	0.45-0.84
Feb-2022	0.08 (0.01)	0.06-0.1	0.13 (0.01)	0.1-0.16	0.11 (0.01)	0.1-0.13
Feb-2022	0.28 (0.06)	0.18-0.4	0.25 (0.05)	0.17-0.36	0.26 (0.04)	0.2-0.33
Mar-2022	0.38 (0.04)	0.3-0.47	0.5 (0.05)	0.41-0.61	0.46 (0.04)	0.39-0.53
Apr-2022	0.05 (0.01)	0.03-0.06	0.03 (0)	0.03-0.04	0.04 (0)	0.03-0.05
May-2022	0.04 (0.01)	0.02-0.05	0.04 (0.01)	0.03-0.06	0.05 (0.01)	0.04-0.06
Jun-2022	0.04 (0.01)	0.02-0.05	0.03 (0.01)	0.02-0.05	0.05 (0.01)	0.03-0.06
Jul-2022	0.23 (0.05)	0.14-0.35	0.19 (0.04)	0.12-0.26	0.19 (0.03)	0.12-0.26
Aug-2022	0.04 (0)	0.03-0.05	0.06 (0.01)	0.05-0.08	0.1 (0.01)	0.08-0.12
Sep-2022	1.57 (0.16)	1.28-1.9	1.5 (0.13)	1.25-1.74	1.43 (0.1)	1.23-1.63

Table 23-8 Abundance of fulmar recorded on each survey on the sea per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	336.86 (80.52)	205.54-514.14	553.41 (90.29)	391.3-737.88	1018.6 (137.63)	765.27-1289.59
Aug-2020	1114.64 (560.79)	218.06-2347.37	1154.44 (556.1)	252.71-2326.84	1249.98 (525.61)	352.85-2366
Sep-2020	2300.94 (1098.59)	513.49-4616.01	2455.88 (1060.1)	804.57-4824.44	2494.62 (1036.95)	850.56-4765.21
Oct-2020	752.13 (193.5)	431.22-1153.27	1124.32 (199.43)	795.98-1567.09	2698.38 (584.47)	1699.69-3876.52
Nov-2020	209.39 (65.7)	101.96-357.93	224.9 (62.05)	123.69-356.66	535.1 (123.49)	301.08-792.96
Dec-2020	387.46 (87.67)	220.8-556.05	875.65 (241.83)	450.56-1363.48	1022.88 (242.06)	601.4-1538.74
Jan-2021	573.36 (103.57)	392.86-799.87	860.04 (134.45)	617.29-1137.73	1278.44 (146.7)	1016.29-1586.8
Feb-2021	77.45 (20.39)	40.41-121.23	116.18 (18.93)	77.45-151.92	139.41 (20.48)	105.85-180.72
Mar-2021	116.18 (29.76)	68.81-185.01	216.87 (45.33)	142.03-319.23	271.08 (46.02)	192.3-363.5
Apr-2021	201.66 (125)	37.15-482.91	217.17 (117.6)	75.42-476.83	232.68 (99.7)	96.95-442.19
May-2021	0 (0)	0-0	38.75 (10.76)	18.75-60	38.75 (11.21)	18.17-62.97
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	23.26 (4.59)	14.4-32.14	38.76 (6.83)	25.34-52.18	77.52 (10.33)	58.14-96.94
Aug-2021	689.18 (79.93)	538.98-844.8	898.26 (86.86)	728.47-1073.53	1169.29 (89.36)	999.9-1349.73
Sep-2021	364.16 (54.54)	263.54-474.49	449.39 (54.38)	343.92-559.44	604.35 (60.89)	486.98-717.1
Oct-2021	783.16 (333.69)	225.48-1511.09	914.98 (338.28)	323.18-1654.3	977.01 (269.14)	517.81-1569.89
Nov-2021	46.44 (7.41)	33.32-62.6	61.92 (7.65)	47.77-77.85	232.21 (68.62)	116.97-367.84
Dec-2021	433.98 (91.34)	275.54-617.78	588.97 (104.01)	396.24-792.65	736.21 (118.77)	523.42-975.91
Feb-2022	54.25 (6.54)	41.95-67.67	116.25 (12.1)	93.49-140.64	131.75 (10.4)	111.63-151.22
Feb-2022	185.91 (36.58)	119.21-259.74	224.64 (42.94)	150.11-319.77	302.1 (40.93)	228.83-382.16
Mar-2022	248.16 (28.77)	194.63-307.76	449.78 (44.29)	369.68-542.2	535.09 (41.55)	455.71-614.5
Apr-2022	30.95 (4.76)	21.88-40.55	30.95 (4.19)	22.99-39.34	46.42 (5.34)	36.81-57.09
May-2022	23.29 (5.2)	13.1-33.48	38.82 (6.58)	26.34-51.3	54.35 (7.51)	41.13-69.04
Jun-2022	23.23 (5.49)	13.07-34.84	30.97 (6.26)	19.67-43.64	54.2 (9.32)	36.13-72.27
Jul-2022	150.7 (34.88)	92.19-230.66	166.56 (31.7)	109.13-229.74	214.15 (39.89)	142.77-298.02
Aug-2022	23.41 (3.21)	17.26-29.54	54.62 (6.16)	43.12-67.08	117.05 (11.54)	95.64-141.32

Sep-2022	1027.61 (104.34)	837.53-1247.39	1343.8 (114.45)	1119.83-1555.98	1652.08 (116.87)	1421.97-1882.19

24 CORY'S SHEARWATER

Table 24-1 Mean density of cory's shearwater recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0.01	0 (0)	0-0.01	0 (0)	0-0.01
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 24-2 Mean abundance of cory's shearwater recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	2.58 (2.48)	0-7.74	2.58 (2.45)	0-7.74	2.58 (2.31)	0-7.74
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 24-3 Mean density of cory's shearwater recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 24-4 Mean abundance of cory's shearwater recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 24-5 Density of cory's shearwater recorded on each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 24-6 Abundance of cory's shearwater recorded on each survey in flight per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	7.74 (7.45)	0-23.23	7.74 (7.34)	0-23.23	7.74 (6.94)	0-23.23
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 24-7 Density of cory's shearwater recorded on each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km⁻²)					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 24-8 Abundance of cory's shearwater recorded on each survey on the sea per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

25 SOOTY SHEARWATER

Table 25-1 Mean density of sooty shearwater recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0.01	0.01 (0)	0-0.01	0 (0)	0-0.01
Sep	0 (0)	0-0	0 (0)	0-0.01	0 (0)	0-0.01
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 25-2 Mean abundance of sooty shearwater recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	2.58 (2.45)	0-7.74	5.16 (3.29)	0-12.91	5.16 (3.46)	0-12.91
Sep	0 (0)	0-0	2.58 (2.22)	0-7.75	2.58 (2.24)	0-7.75
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 25-3 Mean density of sooty shearwater recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 25-4 Mean abundance of sooty shearwater recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 25-5 Density of sooty shearwater recorded on each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0.01 (0.01)	0-0.04	0.02 (0.01)	0-0.04	0.01 (0.01)	0-0.03
Sep-2021	0 (0)	0-0	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.02
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 25-6 Abundance of sooty shearwater recorded on each survey in flight per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	7.74 (7.35)	0-23.23	15.49 (9.88)	0-38.72	15.49 (10.38)	0-38.72
Sep-2021	0 (0)	0-0	7.75 (6.67)	0-23.24	7.75 (6.71)	0-23.24
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 25-7 Density of sooty shearwater recorded on each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 25-8 Abundance of sooty shearwater recorded on each survey on the sea per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

26 GREAT SHEARWATER

Table 26-1 Mean density of great shearwater recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0.01
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 26-2 Mean abundance of great shearwater recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	2.63 (2.28)	0-7.9
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 26-3 Mean density of great shearwater recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 26-4 Mean abundance of great shearwater recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 26-5 Density of great shearwater recorded on each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.02

Table 26-6 Abundance of great shearwater recorded on each survey in flight per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	7.9 (6.83)	0-23.71

Table 26-7 Density of great shearwater recorded on each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 26-8 Abundance of great shearwater recorded on each survey on the sea per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

27 MANX SHEARWATER

Table 27-1 Mean density of Manx shearwater recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0.01 (0.01)	0-0.02	0.01 (0.01)	0-0.02	0.01 (0)	0-0.02
Jul	0 (0)	0-0.01	0 (0)	0-0.01	0.01 (0)	0-0.01
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0.01
Sep	0 (0)	0-0.01	0 (0)	0-0.01	0.01 (0.01)	0-0.02
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0.01
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 27-2 Mean abundance of Manx shearwater recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	3.88 (3.54)	0-11.63	7.75 (5.15)	0-19.38	7.75 (5.28)	0-19.38
Jul	2.64 (2.48)	0-7.93	2.64 (2.43)	0-7.93	7.93 (4.1)	0-15.86
Aug	0 (0)	0-0	0 (0)	0-0	2.58 (2.07)	0-7.74
Sep	2.63 (2.55)	0-7.9	2.63 (2.49)	0-7.9	7.85 (5.87)	0-20.92
Oct	0 (0)	0-0	0 (0)	0-0	3.88 (3.34)	0-11.63
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 27-3 Mean density of Manx shearwater recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0.01	0 (0)	0-0.01	0 (0)	0-0.01
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 27-4 Mean abundance of Manx shearwater recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	2.6 (2.14)	0-7.8	2.6 (2.13)	0-7.8	5.2 (3.18)	0-10.4
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 27-5 Density of Manx shearwater recorded on each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km⁻²)					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.02
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0.01 (0.01)	0-0.04	0.02 (0.01)	0-0.04	0.01 (0.01)	0-0.03
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.02
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.02
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.02 (0.01)	0-0.04
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03

Table 27-6 Abundance of Manx shearwater recorded on each survey in flight per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	7.75 (7.24)	0-23.24
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	7.75 (7.07)	0-23.25	15.5 (10.3)	0-38.76	15.5 (10.55)	0-38.76
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	7.74 (6.2)	0-23.23
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	7.75 (6.69)	0-23.26
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	7.93 (7.44)	0-23.79	7.93 (7.28)	0-23.79	23.79 (12.3)	0-47.59
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	7.9 (7.65)	0-23.71	7.9 (7.47)	0-23.71	15.81 (10.36)	0-39.52

Table 27-7 Density of Manx shearwater recorded on each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km⁻²)					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.03	0.01 (0.01)	0-0.03
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 27-8 Abundance of Manx shearwater recorded on each survey on the sea per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	7.8 (6.41)	0-23.41	7.8 (6.39)	0-23.41	15.61 (9.55)	0-31.21
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

28 GANNET

Table 28-1 Mean density of gannet recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0.01 (0.01)	0-0.03	0.01 (0)	0-0.02	0.01 (0)	0-0.01
Feb	0.07 (0.03)	0.02-0.13	0.06 (0.02)	0.02-0.1	0.07 (0.02)	0.03-0.12
Mar	0.13 (0.04)	0.06-0.2	0.14 (0.03)	0.08-0.21	0.14 (0.03)	0.09-0.19
Apr	0.31 (0.06)	0.2-0.44	0.31 (0.05)	0.22-0.41	0.29 (0.04)	0.22-0.37
May	0.24 (0.06)	0.14-0.37	0.23 (0.05)	0.14-0.32	0.28 (0.05)	0.19-0.38
Jun	0.22 (0.05)	0.12-0.33	0.19 (0.04)	0.12-0.27	0.17 (0.03)	0.12-0.23
Jul	0.31 (0.1)	0.16-0.52	0.3 (0.08)	0.17-0.47	0.34 (0.1)	0.18-0.55
Aug	0.36 (0.13)	0.17-0.65	0.36 (0.11)	0.19-0.61	0.49 (0.17)	0.24-0.89
Sep	0.66 (0.1)	0.47-0.88	0.67 (0.09)	0.5-0.85	0.71 (0.1)	0.53-0.9
Oct	0.59 (0.09)	0.41-0.77	0.52 (0.07)	0.39-0.65	0.47 (0.05)	0.37-0.58
Nov	0.01 (0.01)	0-0.03	0.03 (0.01)	0-0.05	0.03 (0.01)	0.01-0.05
Dec	0.03 (0.02)	0.01-0.06	0.03 (0.01)	0.01-0.05	0.02 (0.01)	0-0.05

Table 28-2 Mean abundance of gannet recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	7.75 (4.54)	0-18.08	7.75 (3.92)	1.94-17.43	7.75 (3.86)	1.94-15.5
Feb	43.89 (17.4)	15.96-83.85	54.22 (18.97)	20.91-92.76	80.05 (25.44)	34.15-135.16
Mar	85.29 (23.26)	42.65-131.8	127.92 (29.52)	73.66-189.94	158.93 (32.12)	100.79-224.17
Apr	201.39 (40.4)	128.96-288.82	278.85 (42.28)	199.43-366.29	340.82 (44.16)	251.3-426.75
May	158.94 (37.49)	90.86-240.8	201.61 (40.33)	128.92-283.49	321.84 (58.24)	218.31-445.27
Jun	143.34 (34.51)	81.76-214	170.47 (35.06)	105.41-242.34	193.72 (32.73)	135.06-264.98
Jul	202.91 (62.47)	104.86-339.15	266.06 (69.21)	154.51-418.75	393.46 (112.03)	211.42-631.43
Aug	234.77 (84.2)	114.85-426.89	320.46 (99.01)	173.71-547.05	566.84 (202.11)	281.43-1027.56
Sep	435.75 (68.29)	310.76-575.4	602.08 (78.89)	451.26-760.66	818.11 (110.09)	616.21-1046.7
Oct	387.7 (59.07)	271.25-506.14	465.24 (59.12)	352.74-582.6	538.9 (61.94)	424.78-665.36
Nov	7.75 (6.12)	0-21.31	23.24 (12.29)	3.87-48.43	30.99 (13.27)	9.59-60.05
Dec	19.37 (10.34)	4.43-40.41	23.25 (11.15)	5.17-48.65	27.12 (12.24)	5.17-54.68

Table 28-3 Mean density of gannet recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0.02 (0.01)	0-0.06	0.03 (0.01)	0.01-0.06	0.02 (0.01)	0.01-0.04
Feb	0.01 (0)	0-0.01	0.01 (0)	0-0.01	0.01 (0)	0-0.01
Mar	0 (0)	0-0	0 (0)	0-0	0.01 (0)	0-0.01
Apr	0.37 (0.07)	0.26-0.51	0.36 (0.05)	0.27-0.47	0.34 (0.04)	0.26-0.43
May	0.14 (0.03)	0.08-0.21	0.2 (0.04)	0.12-0.27	0.19 (0.04)	0.13-0.27
Jun	0.18 (0.05)	0.1-0.28	0.19 (0.04)	0.11-0.27	0.18 (0.03)	0.12-0.26
Jul	0.17 (0.06)	0.08-0.3	0.15 (0.04)	0.09-0.24	0.22 (0.07)	0.11-0.38
Aug	0.94 (0.59)	0.18-2.33	0.71 (0.42)	0.16-1.7	0.57 (0.31)	0.15-1.29
Sep	0.36 (0.06)	0.26-0.48	0.34 (0.04)	0.25-0.42	0.4 (0.05)	0.3-0.51
Oct	0.84 (0.12)	0.6-1.09	0.79 (0.1)	0.6-0.98	0.74 (0.08)	0.59-0.91
Nov	0.01 (0)	0-0.01	0.01 (0)	0-0.02	0.01 (0)	0.01-0.02
Dec	0.02 (0.01)	0.01-0.03	0.02 (0.01)	0.01-0.04	0.02 (0.01)	0.01-0.03

Table 28-4 Mean abundance of gannet recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	15.5 (9.08)	0-36.16	23.24 (11.77)	5.81-52.3	23.24 (11.57)	5.81-46.49
Feb	5.16 (1.69)	2.12-9.11	5.16 (1.5)	2.32-8.01	10.33 (3.17)	4.58-17.2
Mar	0 (0)	0-0	0 (0)	0-0	7.75 (2.2)	3.87-12.26
Apr	243.78 (42.76)	169.07-334.46	325.08 (46.11)	237.92-419.63	398.65 (48.28)	302.3-494.8
May	93.08 (21.51)	52.59-139.16	174.51 (34.53)	111.48-243.84	224.96 (42.18)	150.09-314.85
Jun	120.02 (31.05)	65.41-184.91	166.49 (38.43)	95.99-245.65	212.96 (39.47)	143.71-300.48
Jul	111.24 (38.28)	52.99-195.26	134.77 (36.45)	77.06-215.2	259.8 (84)	125.81-439.21
Aug	616.88 (389.66)	114.89-1529.43	637.67 (378.88)	144.4-1523	661.3 (362.35)	169.59-1494.91
Sep	237.96 (37.05)	170.98-313.45	300.2 (37.78)	227.81-375.32	465.96 (62.28)	351.37-593.04
Oct	550.53 (81.13)	391.72-715.12	705.61 (87.43)	538.78-879.13	860.69 (96.37)	684.04-1056.22
Nov	3.87 (2.56)	0-9.68	11.61 (4.36)	3.87-21.29	15.48 (5.01)	5.81-25.16
Dec	11.62 (4.97)	3.32-21.59	19.37 (7.69)	6.46-36.59	19.37 (7.45)	6.46-34.44

Table 28-5 Density of gannet recorded on each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0.32 (0.17)	0.08-0.7	0.3 (0.13)	0.12-0.6	0.46 (0.2)	0.15-0.9
Aug-2020	0.39 (0.26)	0.05-1.01	0.33 (0.22)	0.05-0.83	0.34 (0.2)	0.07-0.8
Sep-2020	0.89 (0.14)	0.63-1.17	0.84 (0.1)	0.65-1.04	0.77 (0.09)	0.6-0.94
Oct-2020	0.56 (0.1)	0.36-0.74	0.44 (0.07)	0.32-0.57	0.4 (0.05)	0.3-0.52
Nov-2020	0.01 (0.01)	0-0.04	0.03 (0.02)	0-0.06	0.03 (0.01)	0.01-0.06
Dec-2020	0.05 (0.02)	0.01-0.09	0.03 (0.01)	0.01-0.07	0.03 (0.01)	0.01-0.05
Jan-2021	0.01 (0.01)	0-0.03	0.01 (0)	0-0.02	0.01 (0)	0-0.01
Feb-2021	0.08 (0.03)	0.03-0.14	0.08 (0.02)	0.04-0.12	0.07 (0.02)	0.04-0.12
Mar-2021	0.04 (0.02)	0-0.07	0.06 (0.02)	0.03-0.1	0.07 (0.02)	0.03-0.11
Apr-2021	0.3 (0.07)	0.17-0.45	0.3 (0.05)	0.21-0.41	0.29 (0.04)	0.2-0.37
May-2021	0.38 (0.09)	0.22-0.58	0.33 (0.07)	0.21-0.47	0.36 (0.06)	0.25-0.48
Jun-2021	0.25 (0.06)	0.15-0.36	0.24 (0.05)	0.16-0.34	0.22 (0.04)	0.16-0.3
Jul-2021	0.28 (0.06)	0.18-0.41	0.29 (0.06)	0.18-0.41	0.27 (0.05)	0.19-0.37
Aug-2021	0.6 (0.1)	0.42-0.82	0.62 (0.09)	0.45-0.83	0.94 (0.29)	0.52-1.6
Sep-2021	0.67 (0.1)	0.5-0.87	0.68 (0.08)	0.52-0.85	0.75 (0.11)	0.55-0.99
Oct-2021	0.63 (0.08)	0.47-0.8	0.6 (0.07)	0.47-0.73	0.53 (0.05)	0.43-0.63
Nov-2021	0.01 (0.01)	0-0.03	0.03 (0.01)	0.01-0.05	0.03 (0.01)	0.01-0.04
Dec-2021	0.01 (0.01)	0-0.04	0.02 (0.01)	0-0.04	0.02 (0.01)	0-0.05
Feb-2022	0.02 (0.02)	0-0.07	0.03 (0.02)	0-0.07	0.07 (0.03)	0.02-0.13
Feb-2022	0.09 (0.03)	0.04-0.17	0.08 (0.02)	0.03-0.12	0.07 (0.02)	0.03-0.11
Mar-2022	0.22 (0.05)	0.13-0.33	0.23 (0.05)	0.14-0.32	0.21 (0.04)	0.14-0.28
Apr-2022	0.32 (0.05)	0.23-0.43	0.32 (0.04)	0.24-0.41	0.3 (0.03)	0.23-0.37
May-2022	0.11 (0.02)	0.06-0.15	0.12 (0.02)	0.08-0.17	0.2 (0.04)	0.13-0.29
Jun-2022	0.19 (0.05)	0.1-0.29	0.14 (0.03)	0.08-0.21	0.11 (0.02)	0.08-0.16
Jul-2022	0.33 (0.06)	0.22-0.44	0.3 (0.05)	0.21-0.4	0.28 (0.04)	0.21-0.36
Aug-2022	0.08 (0.02)	0.05-0.13	0.12 (0.02)	0.08-0.17	0.2 (0.03)	0.14-0.26
Sep-2022	0.43 (0.07)	0.29-0.58	0.5 (0.08)	0.35-0.66	0.6 (0.08)	0.45-0.78

Table 28-6 Abundance of gannet recorded on each survey in flight per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	208.53 (110.77)	55.61-458.77	272.7 (115.21)	110.97-535.42	537.37 (235.21)	176.26-1044.76
Aug-2020	254.77 (172.79)	34.74-660.12	294.58 (192.55)	47.51-745.96	390.12 (232.05)	78.02-924.66
Sep-2020	581.04 (93.07)	414.28-770.22	751.48 (91.92)	578.42-933.78	890.94 (103.81)	692.95-1089.03
Oct-2020	364.44 (64.26)	234.28-487.15	395.45 (59.39)	284.36-513.48	465.24 (62.75)	346.38-597.76
Nov-2020	7.76 (7.11)	0-23.27	23.27 (15.85)	0-54.29	31.02 (16.53)	7.56-69.8
Dec-2020	31 (13.24)	8.86-57.56	31 (12.31)	10.33-58.55	31 (11.91)	10.33-55.1
Jan-2021	7.75 (4.54)	0-18.08	7.75 (3.92)	1.94-17.43	7.75 (3.86)	1.94-15.5
Feb-2021	54.22 (17.55)	20.33-94.88	69.71 (19.12)	34.85-104.73	85.2 (22.9)	42.6-134.89
Mar-2021	23.24 (12.37)	0-46.47	54.22 (18.59)	23.24-92.94	77.45 (22.01)	38.73-122.63
Apr-2021	193.9 (46.37)	108.36-296.55	271.46 (45.76)	186.3-367.27	333.51 (48.64)	232.45-424.59
May-2021	248.01 (59.6)	143.3-380.29	294.52 (60.06)	188.68-418.77	410.77 (67.32)	290.55-551.04
Jun-2021	162.78 (36.84)	96.19-236.78	217.04 (41.14)	140.03-301.06	255.8 (40.71)	181.75-343.31
Jul-2021	186.04 (37.84)	117.83-266.66	255.81 (50.18)	162.79-366.27	317.82 (56.05)	219.19-432.9
Aug-2021	394.92 (67.27)	277.68-537	557.54 (84.37)	400.77-745.48	1084.11 (339.31)	606.83-1854.57
Sep-2021	441.64 (64.07)	326.09-572.13	612.1 (74.07)	463.07-755.81	867.79 (131.56)	632.38-1144.85
Oct-2021	410.96 (53.88)	308.22-525.12	535.03 (58.84)	421.12-651.71	612.57 (61.13)	503.18-732.96
Nov-2021	7.74 (5.13)	0-19.35	23.22 (8.72)	7.74-42.57	30.96 (10.02)	11.61-50.31
Dec-2021	7.75 (7.44)	0-23.25	15.5 (9.99)	0-38.75	23.25 (12.56)	0-54.25
Feb-2022	15.5 (14.27)	0-46.5	23.25 (16.43)	0-62	77.5 (32.45)	21.14-147.95
Feb-2022	61.97 (20.39)	27.54-110.17	69.72 (21.35)	27.89-111.54	77.46 (20.96)	38.73-122.65
Mar-2022	147.34 (34.15)	85.3-217.14	201.63 (40.45)	124.08-286.93	240.4 (42.22)	162.85-325.7
Apr-2022	208.88 (34.42)	149.57-281.09	286.24 (38.79)	212.57-365.3	348.13 (39.68)	270.15-428.9
May-2022	69.87 (15.38)	38.43-101.32	108.69 (20.61)	69.17-148.22	232.92 (49.16)	146.07-339.5
Jun-2022	123.89 (32.18)	67.33-191.22	123.89 (28.98)	70.79-183.62	131.63 (24.74)	88.36-186.64
Jul-2022	214.15 (38.79)	141.14-292.02	269.67 (42.23)	189.77-354.56	325.19 (44.84)	238.81-416.65
Aug-2022	54.62 (12.52)	32.13-83.54	109.25 (20.1)	72.83-149.71	226.3 (34.96)	159.44-303.44
Sep-2022	284.57 (47.72)	191.92-383.84	442.66 (70.69)	312.31-592.39	695.61 (94.9)	523.31-906.21

Table 28-7 Density of gannet recorded on each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km⁻²)					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0.23 (0.12)	0.06-0.51	0.18 (0.08)	0.07-0.35	0.4 (0.18)	0.13-0.78
Aug-2020	2.55 (1.73)	0.35-6.6	1.88 (1.23)	0.3-4.76	1.49 (0.88)	0.3-3.52
Sep-2020	0.64 (0.1)	0.45-0.84	0.59 (0.07)	0.45-0.73	0.56 (0.06)	0.43-0.68
Oct-2020	0.6 (0.11)	0.39-0.81	0.55 (0.08)	0.39-0.71	0.52 (0.07)	0.38-0.66
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0.04 (0.02)	0.01-0.07	0.04 (0.02)	0.01-0.08	0.03 (0.01)	0.01-0.06
Jan-2021	0.02 (0.01)	0-0.06	0.03 (0.01)	0.01-0.06	0.02 (0.01)	0.01-0.04
Feb-2021	0.01 (0)	0-0.02	0.01 (0)	0-0.01	0.01 (0)	0-0.01
Mar-2021	0 (0)	0-0	0 (0)	0-0	0.01 (0)	0.01-0.02
Apr-2021	0.11 (0.03)	0.06-0.16	0.14 (0.02)	0.1-0.19	0.15 (0.02)	0.11-0.2
May-2021	0.15 (0.04)	0.09-0.24	0.23 (0.05)	0.14-0.32	0.19 (0.03)	0.14-0.26
Jun-2021	0.01 (0)	0.01-0.02	0.03 (0)	0.02-0.04	0.03 (0.01)	0.02-0.04
Jul-2021	0.07 (0.01)	0.04-0.1	0.1 (0.02)	0.06-0.14	0.11 (0.02)	0.08-0.16
Aug-2021	0.15 (0.03)	0.11-0.21	0.15 (0.02)	0.11-0.2	0.13 (0.04)	0.07-0.22
Sep-2021	0.37 (0.05)	0.27-0.47	0.31 (0.04)	0.24-0.39	0.51 (0.08)	0.37-0.67
Oct-2021	1.08 (0.14)	0.81-1.37	1.03 (0.11)	0.81-1.26	0.97 (0.1)	0.8-1.16
Nov-2021	0.01 (0.01)	0-0.03	0.03 (0.01)	0.01-0.05	0.03 (0.01)	0.01-0.04
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0.01 (0)	0-0.01
Feb-2022	0.01 (0)	0.01-0.02	0.01 (0)	0-0.01	0.01 (0)	0.01-0.02
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0.64 (0.1)	0.46-0.86	0.59 (0.08)	0.44-0.75	0.53 (0.06)	0.42-0.66
May-2022	0.13 (0.03)	0.07-0.19	0.16 (0.03)	0.1-0.22	0.19 (0.04)	0.12-0.28
Jun-2022	0.35 (0.09)	0.19-0.55	0.35 (0.08)	0.2-0.51	0.33 (0.06)	0.22-0.47
Jul-2022	0.21 (0.04)	0.14-0.28	0.18 (0.03)	0.12-0.23	0.16 (0.02)	0.12-0.2
Aug-2022	0.12 (0.03)	0.07-0.18	0.11 (0.02)	0.08-0.16	0.1 (0.02)	0.07-0.14
Sep-2022	0.08 (0.01)	0.06-0.11	0.11 (0.02)	0.07-0.14	0.14 (0.02)	0.11-0.19

Table 28-8 Abundance of gannet recorded on each survey on the sea per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	152.39 (80.95)	40.64-335.26	160.41 (67.77)	65.28-314.95	465.19 (203.61)	152.58-904.42
Aug-2020	1671.95 (1133.95)	227.99-4332.05	1679.92 (1098.07)	270.95-4253.98	1719.72 (1022.92)	343.94-4076.07
Sep-2020	418.35 (67.01)	298.28-554.56	526.81 (64.44)	405.49-654.61	643.02 (74.92)	500.13-786
Oct-2020	395.45 (69.73)	254.22-528.61	488.5 (73.37)	351.27-634.3	597.05 (80.53)	444.52-767.13
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	23.25 (9.93)	6.64-43.17	38.75 (15.39)	12.92-73.19	38.75 (14.89)	12.92-68.88
Jan-2021	15.5 (9.08)	0-36.16	23.24 (11.77)	5.81-52.3	23.24 (11.57)	5.81-46.49
Feb-2021	7.75 (2.51)	2.9-13.55	7.75 (2.12)	3.87-11.64	7.75 (2.08)	3.87-12.26
Mar-2021	0 (0)	0-0	0 (0)	0-0	15.49 (4.4)	7.75-24.53
Apr-2021	69.8 (16.69)	39.01-106.76	124.1 (20.92)	85.16-167.9	178.39 (26.01)	124.33-227.11
May-2021	100.76 (24.21)	58.21-154.49	201.51 (41.09)	129.09-286.52	224.76 (36.84)	158.98-301.51
Jun-2021	7.75 (1.75)	4.58-11.28	23.25 (4.41)	15-32.26	38.76 (6.17)	27.54-52.02
Jul-2021	46.51 (9.46)	29.46-66.67	85.27 (16.73)	54.26-122.09	131.78 (23.24)	90.88-179.49
Aug-2021	100.67 (17.15)	70.78-136.88	131.64 (19.92)	94.63-176.01	147.13 (46.05)	82.36-251.69
Sep-2021	240.19 (34.85)	177.35-311.16	278.93 (33.76)	211.02-344.42	588.85 (89.27)	429.11-776.86
Oct-2021	705.62 (92.52)	529.21-901.62	922.73 (101.49)	726.28-1123.96	1124.33 (112.2)	923.56-1345.31
Nov-2021	7.74 (5.13)	0-19.35	23.22 (8.72)	7.74-42.57	30.96 (10.02)	11.61-50.31
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	7.75 (3.25)	2.11-14.8
Feb-2022	7.75 (2.55)	3.44-13.77	7.75 (2.37)	3.1-12.39	15.49 (4.19)	7.75-24.53
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	417.76 (68.83)	299.14-562.17	526.07 (71.29)	390.67-671.36	618.9 (70.55)	480.27-762.49
May-2022	85.4 (18.8)	46.97-123.83	147.51 (27.97)	93.87-201.15	225.15 (47.52)	141.2-328.19
Jun-2022	232.29 (60.34)	126.25-358.54	309.72 (72.45)	176.98-459.05	387.15 (72.77)	259.88-548.95
Jul-2022	134.83 (24.42)	88.87-183.86	158.63 (24.84)	111.63-208.57	182.42 (25.16)	133.97-233.73
Aug-2022	78.03 (17.89)	45.9-119.34	101.44 (18.66)	67.63-139.01	117.05 (18.08)	82.47-156.95
Sep-2022	55.33 (9.28)	37.32-74.64	94.86 (15.15)	66.92-126.94	166 (22.65)	124.88-216.26

29 SHAG

Table 29-1 Mean density of shag recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	0 (0)	0-0.01	0.01 (0)	0-0.02
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 29-2 Mean abundance of shag recorded in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0 (0)	0-0	3.88 (2.56)	0-9.7	7.76 (4.26)	0-18.1
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 29-3 Mean density of shag recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0.01
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	0.01 (0.01)	0-0.02	0 (0)	0-0.01	0 (0)	0-0.01
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 29-4 Mean abundance of shag recorded on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Month	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jan	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb	0 (0)	0-0	0 (0)	0-0	2.58 (2.45)	0-7.75
Mar	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr	3.88 (3.64)	0-11.63	3.88 (2.56)	0-9.7	3.88 (2.13)	0-9.05
May	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 29-5 Density of shag recorded on each survey in flight per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km⁻²)					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	0.01 (0.01)	0-0.02	0.01 (0.01)	0-0.03
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 29-6 Abundance of shag recorded on each survey in flight per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0 (0)	0-0	7.76 (5.13)	0-19.39	15.51 (8.53)	0-36.19
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 29-7 Density of shag recorded on each survey on the sea per month, S.D. and 95% c.i., in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Density (birds km^{-2})					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	0.01 (0.01)	0-0.04	0.01 (0.01)	0-0.02	0.01 (0)	0-0.02
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	0.01 (0.01)	0-0.02
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

Table 29-8 Abundance of shag recorded on each survey on the sea per month, S.D. and 95% c.i, in the OAA, OAA and 2 km buffer and OAA and 4 km buffer.

Survey	Abundance					
	OAA		OAA and 2 km buffer		OAA and 4 km buffer	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
Jul-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2020	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jan-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2021	7.76 (7.27)	0-23.27	7.76 (5.13)	0-19.39	7.76 (4.26)	0-18.1
May-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Oct-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Nov-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Dec-2021	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Feb-2022	0 (0)	0-0	0 (0)	0-0	7.75 (7.34)	0-23.25
Feb-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Mar-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Apr-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
May-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jun-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Jul-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Aug-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0
Sep-2022	0 (0)	0-0	0 (0)	0-0	0 (0)	0-0

West of Orkney Windfarm

Offshore Ornithology Technical Supporting Study 12

Annex 12.5 Collision risk input parameters

Date:	12th May 2023
Tel:	0141 342 5404
Web:	www.macarthurgreen.com
Address:	93 South Woodside Road |Glasgow | G20 6NT

Document Quality Record

Version	Status	Person Responsible	Date
0.1	Draft	Dr. N. Goodship	14/11/2022
0.2	Reviewed	Dr. Ross McGregor	07/12/2022
0.3	Updated	Dr. N. Goodship	08/12/2022
1	Internal Approval	Dr. Ross McGregor	08/12/2022
1.1	Comments addressed	Dr. N. Goodship	01/04/2023
2	Internal Approval	Dr. Ross McGregor	09/05/2023

CONTENTS

LIST OF TABLES

1 INTRODUCTION

1. This Annex provides input parameters for stochastic Collision Risk Modelling (sCRM; McGregor et al., 2018)[1] and deterministic collision risk modelling (Band 2012[2]) undertaken for the West of Orkney Windfarm ('the Project') Offshore Environmental Impact Assessment (EIA) Report and Offshore Report to Inform Appropriate Assessment (RIAA).

2. Mean aerial bird densities (birds/km^2) recorded for each calendar month for kittiwake, great black-backed gull, Arctic tern, great skua and gannet within the OAA are presented in Table 1-1. Refer to the Supporting Study 12 (SS12): Offshore ornithology technical supporting study for methodology details on density calculations.

3. Input parameters for sCRM followed NatureScot pre-application advice (5th April 2023) and are presented in Table 1-2. Avoidance rates used in sCRM were those presented in Table 2 in the recently published NatureScot (2023)[3] guidance. Additionally, sCRM was carried out for kittiwake, great black-backed gull, Arctic tern and great skua using avoidance rates presented by the Joint Nature Conservation Committee (JNCC, Ozsanlav-Harris et al., 2022[4]); Ozsanlav-Harris et al. (2022[4]) did not present avoidance rates for gannet.

4. Input parameters for deterministic CRM followed NatureScot pre-application advice (5th April 2023) and are presented in Table 1-3. Avoidance rates used in deterministic CRM were those presented in Table 1 in the NatureScot (2023)[3] guidance. Additionally, as requested by NatureScot, deterministic CRM was carried out using avoidance rates presented in the Statutory Nature Conservation Body (SNCB[5], 2014)[6] guidance.

5. For both stochastic and deterministic CRM, flight height proportions for Option 2 and Option 3 modelling were taken from Johnston et al. (2014a[7],b[8]) and flight speeds for Arctic tern and

[1] McGregor, R. M., King, S., Donovan, C. R., Caneco, B., & Webb, A. 2018. A Stochastic Collision Risk Model for Seabirds in Flight. Marine Scotland.
[2] Band, B., 2012. Using a collision risk model to assess bird collision risks for offshore windfarms. SOSS report, Crown Estate.
[3] NatureScot 2023. Advice on marine renewables development. Guidance Note 7: Guidance to support Offshore Wind Applications: Marine Ornithology - Advice for assessing collision risk of marine birds. Available at: https://www.nature.scot/professional-advice/planning-and-development/planning-and-development-advice/renewable-energy/marine-renewables/advice-marine-renewables-development.
[4] Ozsanlav-Harris, L., Inger, R. and Sherley, R. 2022. Review of data used to calculate avoidance rates for collision risk modelling of seabirds. JNCC Report 732 (Research & review report), JNCC, Peterborough, ISSN 0963-8091. https://hub.jncc.gov.uk/assets/de5903fe-81c5-4a37-a5bc-387cf704924d
[5] In this case the SNCBs comprise the Joint Nature Conservation Committee (JNCC), Natural England (NE), Natural Resource Wales (NRW), Northern Ireland Environment Agency (NIEA), Scottish Natural Heritage (SNH).
[6] SNCB, 2014. Joint Response from the Statutory Nature Conservation Bodies to the Marine Scotland Science Avoidance Rate Review
[7] Johnston, A., Cook, A.S.C.P., Wright, L.J., Humphreys, E.M. and Burton, E.H.K. 2014a. Modelling flight heights of marine birds to more accurately assess collision risk with offshore wind turbines. Journal of Applied Ecology 51: 31-41.
[8] Johnston, A., Cook, A.S.C.P., Wright, L.J., Humphreys, E.M. and Burton, N.H.K. 2014b. corrigendum. Journal of Applied Ecology, 51, doi: 10.1111/1365-2664.12260.

great skua were those published in Alerstam et al. (2007)[9] and Pennycuick, C.J. (1997)[10]. Body length and wingspan measurements for Arctic tern and great skua taken from Snow and Perrins, 1998[11] with Standard Deviation (S.D.) for sCRM based on McGregor et al. (2018)[1].

6. For sCRM, two nocturnal activity factors (NAF) were used for gannet (breeding season = 0.08, non-breeding season = 0.10) based NatureScot (2023)[3] guidance, NAF for all other species were based on Garthe & Hüppop, 2004[12]. For deterministic CRM, NAF were those presented in Table 1 in the NatureScot (2023)[3] guidance, except for Arctic tern and great skua which were based on Garthe & Hüppop, 2004[12].

7. Wind farm and turbine metrics relating to five turbine scenarios are summarised in Table 1-4.

[9]Alerstam, T., Rosén, M., Bäckman, J., Ericson, P. G. P., & Hellgren, O. 2007. Flight Speeds among Bird Species: Allometric and Phylogenetic Effects. PLoS Biology, 5(8), e197. https://doi.org/10.1371/journal.pbio.0050197.

[10] Pennycuick, C. 1997. Actual and 'optimum' flight speeds: field data reassessed. Journal of Experimental Biology. 200(17): 2355-2361

[11] Snow, D.W. and Perrins, C.M. (eds) 1998. The Birds of the Western Palearctic, Concise edition. London Oxford University Press.

[12] Garthe, S. and Hüppop, O. (2004). Scaling possible adverse effects of marine wind farms on seabirds: developing and applying a vulnerability index. Journal of Applied Ecology, 41(4), 724–734.

Table 1-1 Mean aerial density estimates of birds recorded in flight per month within the OAA used in collision risk modelling.

	Mean density (birds/km2)* of flying birds within the OAA ± S.D.											
Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Kittiwake	0.07 (0.03)	0.23 (0.06)	0.87 (0.19)	0.28 (0.06)	0.08 (0.04)	0.04 (0.03)	0.52 (0.23)	0.07 (0.02)	0.09 (0.03)	0.63 (0.13)	0.21 (0.06)	0.05 (0.02)
Great black-backed gull	0.04 (0.01)	0.04 (0.01)	0.01 (0.01)	0 (0)	0 (0)	0.01 (0.01)	0 (0)	0 (0)	0 (0)	0.01 (0.01)	0.06 (0.02)	0.09 (0.02)
Arctic tern	0 (0)	0 (0)	0 (0)	0 (0)	0.01 (0.01)	0.08 (0.05)	0.01 (0.01)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Great skua	0 (0)	0 (0)	0 (0)	0.04 (0.01)	0 (0)	0.01 (0)	0.01 (0.01)	0.04 (0.03)	0 (0)	0 (0)	0 (0)	0 (0)
Gannet	0.01 (0.01)	0.07 (0.03)	0.13 (0.04)	0.31 (0.067)	0.24 (0.06)	0.22 (0.05)	0.31 (0.1)	0.36 (0.13)	0.66 (0.1)	0.59 (0.09)	0.01 (0.01)	0.03 (0.02)

*Design-based density estimates (refer to the Supporting Study 12 for methodology details)

Table 1-2 Species biometrics used in the stochastic collision risk modelling.

	Basic Stochastic Avoidance Rate – Option 2		Extended Stochastic Avoidance Rate – Option 3								
Species	NatureScot (2023)[a]	Ozsanlav-Harris *et al.* (2022)[d]	NatureScot (2023)[a]	Ozsanlav-Harris *et al.* (2022)[d]	Proportion flying at CRH	Flight speed (m/s) ± S.D.	Nocturnal Activity Factor ± S.D.	Body length (m) ± S.D.	Wingspan (m) ± S.D.	Flight type: Flapping or Gliding	% of flights upwind
Kittiwake	0.993 (± 0.0003)[a]	0.9979 (± 0.0013)[d]	0.993 (± 0.0003)[a]	0.9947 (± 0.1295)[d]	0.102[g]	13.1 (0.40)[a]	0.5[j]	0.39 (± 0.005)[a]	1.08 (± 0.0625)[a]	Flapping[a]	50[a]
Great black-backed gull	0.994 (± 0.0004)[a]	0.9991 (± 0.0002)[d]	0.994 (± 0.0004)[a]	0.997 (± 0.0008)[d]	0.260[g]	13.7 (± 1.20)[a]	0.5[j]	0.71 (± 0.035)[a]	1.58 (± 0.0375)[a]	Flapping[a]	50[a]
Arctic tern	0.991 (± 0.0004)[b]	0.9714 (± 0.0005)[e]	0.991 (± 0.0004)[b]	0.9401 (± 0.0033)[e]	0.021[g]	10.3 (± 3.4)[h]	0.125[j]	0.34 (± 0.005)[k]	0.8 (± 0.025)[k]	Flapping[a]	50[a]
Great skua	0.993 (± 0.0003)[c]	0.9928 (± 0.0003)[f]	0.993 (± 0.0003)[c]	0.9533 (± 0.0047)[f]	0.033[g]	14.9 (± 1.825)[i]	0[j]	0.585 (± 0.0375)[k]	1.5 (± 0.025)[k]	Flapping[a]	50[a]
Gannet	0.993 (± 0.0003)[a]	N/A	0.993 (± 0.0003)[a]	N/A	0.083[g]	14.9 (0)[a]	Breeding season = 0.08[a] Non-breeding season = 0.10[a]	0.94 (± 0.0325)[a]	1.72 (± 0.0375)[a]	Gliding[a]	50[a]

a Input parameters (including Avoidance Rates) are those presented in NatureScot (2023[3]) Guidance Note 7, Table 2.
b Avoidance rate for Arctic tern is the 'all gulls and terns' avoidance rate presented in NatureScot (2023[3]) Guidance Note 7, Table 2.
c Avoidance rate for great skua is the 'all gulls' avoidance rate presented in NatureScot (2023[3]) Guidance Note 7, Table 2.
d Avoidance Rates are those presented in Ozsanlav-Harris *et al.* (2022[4]), Table 4 (Basic) and Table 5 (Extended).
e Avoidance rate for Arctic tern is the 'tern' avoidance rate presented in Ozsanlav-Harris *et al.* (2022[4]), Table 4 (Basic) and Table 5 (Extended).
f Avoidance rate for great skua is the 'gull' avoidance rate presented in Ozsanlav-Harris *et al.* (2022[4]), Table 4.
g Proportion flying at CRH (Collision Risk Height) are birds flying >=24 m for use in Option 2 and Option 3 modelling, proportions are taken from Johnston *et al.* (2014a[7],b[8]).
h Alerstam *et al.*, 2007[9].
i Pennycuick, C.J. 1997[10].
j Based on Garthe & Hüppop, 2004[12].
k Snow and Perrins, 1998[11].

Table 1-3 Species biometrics used in the deterministic collision risk modelling.

Species	Avoidance Rate for the Basic Band Model – Option 2		Avoidance Rate for the Extended Band Model – Option 3	Percentage flying at CRH	Flight speed (m/s) ± S.D.	Nocturnal Activity Factor ± S.D.	Body length (m) ± S.D.	Wingspan (m) ± S.D.	Flight type: Flapping or Gliding	% of flights upwind
	NatureScot (2023)	SNCB, (2014)	SNCB, (2014)							
Kittiwake	99.2[a]	98.9[d]	N/A	10.2[f]	13.1[a]	3	0.39[a]	1.08[a]	Flapping[a]	50[a]
Great black-backed gull	99.4[a]	99.5[d]	98.9[d]	26.0[f]	13.7[a]	3	0.71[a]	1.58[a]	Flapping[a]	50[a]
Arctic tern	99.0[b]	N/A	N/A	2.1[f]	10.3[g]	1[i]	0.34[j]	0.8[j]	Flapping[a]	50[a]
Great skua	99.2[c]	98.9[e]	N/A	3.3[f]	14.9[h]	1[i]	0.585[j]	1.5[j]	Flapping[a]	50[a]
Gannet	99.2[a]	98.9[d]	N/A	8.3[f]	14.9[a]	1.32[a]	0.94[a]	1.72[a]	Gliding[a]	50[a]

a Input parameters (including Avoidance Rates) are those presented in NatureScot (2023[3]) Guidance Note 7, Table 1
b Avoidance rate for Arctic tern is the 'all gulls and terns' avoidance rate presented in NatureScot (2023[3]) Guidance Note 7, Table 1.
c Avoidance rate for great skua is the 'all gulls' avoidance rate presented in NatureScot (2023[3]) Guidance Note 7, Table 1.
d Avoidance Rates are those presented in SNCB guidance (2014), Table 1 (Basic) and Table 2 (Extended).
e Avoidance rate for great skua is the 'all gull' avoidance rate presented in SNCB guidance (2014), Table 1.
f Proportion flying at CRH (Collision Risk Height) are birds flying >=24 m for use in Band Option 2 and Option 3 modelling, proportions are taken from Johnston *et al.* (2014a[7],b[8]).
g Alerstam *et al.*, 2007[9].
h Pennycuick, C.J. 1997[10].
i Based on Garthe & Hüppop, 2004[12].
j Snow and Perrins, 1998[11]

Table 1-4 Wind farm and turbine specifications used in the collision risk modelling.

Scenario	Number of turbines	No. of rotor blades	Maximum chord (m)	Rotor diameter	Rotor radius (m)	Mean RPM ± SD	Mean blade pitch (°) ± SD	Hub height above HAT* (m)	Lower blade tip height (i.e. air gap) above HAT* (m)	Wind availability per month (%)	Mean downtime per month (%)	Latitude (°)	Wind Farm Width (km)	Tidal offset (m)
1	125	3	8	236	118	8.11 ± 0.40	6.5 ± 1.75	142.70	24.7	90.5	3.61	58.9	26.12	2.35
2	125	3	8.5	250	125	7.66 ± 0.38	6.5 ± 1.75	149.70	24.7	90.5	3.61	58.9	26.12	2.35
3	125	3	8.5	265	133	7.23 ±0.36	6.5 ± 1.75	157.20	24.7	90.5	3.61	58.9	26.12	2.35
4	125	3	8.5	300	150	6.38 ± 0.32	6.5 ± 1.75	174.70	24.7	90.5	3.61	58.9	26.12	2.35
5	125	3	9	330	165	5.80 ± 0.29	6.5 ± 1.75	189.70	24.7	90.5	3.61	58.9	26.12	2.35

* HAT = Highest Astronomical Tide

West of Orkney Windfarm

Offshore Ornithology Technical Appendix 12

Annex 12.6 Summary of collision risk results

Date:	12th May 2023
Tel:	0141 342 5404
Web:	www.macarthurgreen.com
Address:	93 South Woodside Road |Glasgow | G20 6NT

Document Quality Record

Version	Status	Person Responsible	Date
0.1	Draft	Dr. N. Goodship	30/11/2022
0.2	Reviewed	Dr. R. McGregor	08/12/2022
0.3	Updated	Dr. N. Goodship	08/12/2022
1	Internal Approval	Dr. R. McGregor	08/12/2022
1.1	Updated	Dr. N. Goodship	18/04/2023
2	Internal Approval	Dr. R. McGregor	09/05/2023

CONTENTS

LIST OF TABLES

1 INTRODUCTION

1. This Annex provides the results of the stochastic Collision Risk Modelling (sCRM; McGregor et al. 2018[1]) and deterministic CRM (Band 2012[2]) undertaken for the West of Orkney Windfarm ('the Project') Offshore Environmental Impact Assessment (EIA) Report and Offshore Report to Inform Appropriate Assessment (RIAA) following NatureScot pre-application advice (5th April 2023).

2. sCRM and deterministic CRM results are provided for five species (kittiwake, great black-backed gull, Arctic tern, great skua and gannet) at risk of collision within the OAA for five wind turbine generator (WTG) scenarios (rotor diameters of 236 m, 250 m, 265 m, 300 m and 330 m). The aim of this modelling was to determine the worst case scenario (WCS) for each bird species.

3. Input parameters for sCRM and deterministic CRM (presented in Annex 12.5) followed NatureScot pre-application advice (5th April 2023). Avoidance rates used for sCRM were those provided by NatureScot (2023)[3] guidance as well as rates presented by the Joint Nature Conservation Committee (JNCC, Ozsanlav-Harris *et al.*, 2022[4]). Ozsanlav-Harris *et al.* (2022)[4] did not provide avoidance rates for gannet, sCRM for gannet was performed using NatureScot (2023)[5] avoidance rate only.

4. Avoidance rates used for deterministic CRM were those provided by NatureScot (2023)[3] guidance as well as those presented in the Statutory Nature Conservation Body (SNCB[6], 2014)[7] guidance.

---

[1] McGregor, R. M., King, S., Donovan, C. R., Caneco, B., & Webb, A. 2018. A Stochastic Collision Risk Model for Seabirds in Flight. Marine Scotland.

[2] Band, B., 2012. Using a collision risk model to assess bird collision risks for offshore windfarms. SOSS report, Crown Estate.

[3] NatureScot 2023. Advice on marine renewables development. Guidance Note 7: Guidance to support Offshore Wind Applications: Marine Ornithology - Advice for assessing collision risk of marine birds. Available at: https://www.nature.scot/professional-advice/planning-and-development/planning-and-development-advice/renewable-energy/marine-renewables/advice-marine-renewables-development.

[4] Ozsanlav-Harris, L., Inger, R. and Sherley, R. 2022. Review of data used to calculate avoidance rates for collision risk modelling of seabirds. JNCC Report 732 (Research & review report), JNCC, Peterborough, ISSN 0963-8091. https://hub.jncc.gov.uk/assets/de5903fe-81c5-4a37-a5bc-387cf704924d

[5] NatureScot 2023. Advice on marine renewables development. Guidance Note 7: Guidance to support Offshore Wind Applications: Marine Ornithology - Advice for assessing collision risk of marine birds. Available at: https://www.nature.scot/professional-advice/planning-and-development/planning-and-development-advice/renewable-energy/marine-renewables/advice-marine-renewables-development.

[6] In this case the SNCBs comprise the Joint Nature Conservation Committee (JNCC), Natural England (NE), Natural Resource Wales (NRW), Northern Ireland Environment Agency (NIEA), Scottish Natural Heritage (SNH).

[7] SNCB, 2014. Joint Response from the Statutory Nature Conservation Bodies to the Marine Scotland Science Avoidance Rate Review

5. Flight height proportions for Option 2 and Option 3 modelling were taken from Johnston *et al.* (2014a[8], b[9]).

6. A summary of collision risk results is presented in Table 7-1.

2 KITTIWAKE

7. Predicted mean and S.D. collision mortality estimates for kittiwake determined from sCRM with Option 2 and Option 3 for each scenario using avoidance rates presented in NatureScot (2023)[3] and Ozsanlav-Harris *et al.* (2022)[4] are shown in Table 2-1 and Table 2-2 respectively.

8. For each avoidance rate, collision risk modelling results from sCRM were similar between the five scenarios within Option 2 and Option 3.

9. Predicted collision risk estimates for kittiwake using Ozsanlav-Harris *et al.* (2022)[4] basic avoidance rate (Option 2 = 0.9979) were approximately 70% lower for each scenario than those predicted using the NatureScot (2023)[3] basic avoidance rate (Option 2 = 0.993).

10. The WCS for kittiwake annually and for all calendar months was Option 2 for Scenario 5 using the NatureScot (2023)[3] avoidance rate.

11. Predicted collision mortality estimates for kittiwake determined from deterministic CRM with Option 2 using avoidance rates presented in NatureScot (2023)[3] and SNCB (2014)[7] guidance for each scenario are shown in Table 2-3.

[8] Johnston, A., Cook, A.S.C.P., Wright, L.J., Humphreys, E.M. and Burton, E.H.K. 2014a. Modelling flight heights of marine birds to more accurately assess collision risk with offshore wind turbines. Journal of Applied Ecology 51: 31-41.
[9] Johnston, A., Cook, A.S.C.P., Wright, L.J., Humphreys, E.M. and Burton, N.H.K. 2014b. corrigendum. Journal of Applied Ecology, 51, doi: 10.1111/1365-2664.12260.

Table 2-1 Kittiwake predicted collision mortality calculated using stochastic CRM with Option 2 and Option 3 at 0.993 avoidance rate (NatureScot, 2023) for scenario 1, 2, 3, 4 and 5. Monthly values are the mean and standard deviation (S.D.) predicted collisions. Annual totals are calculated as the summed totals of the monthly means. Worst case scenario is highlighted in grey.

	Mean monthly collision risk ± S.D.												
Scenario	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Option 2													
1 (Rotor diameter 236 m)	0.914 ± 0.405	2.936 ± 0.842	12.964 ± 3.512	4.329 ± 1.137	1.353 ± 0.686	0.789 ± 0.48	9.376 ± 4.299	1.154 ± 0.386	1.346 ± 0.474	9.021 ± 2.281	2.753 ± 0.913	0.642 ± 0.27	47.577 ± 15.685
2 (Rotor diameter 250 m)	0.998 ± 0.438	3.057 ± 0.925	13.674 ± 3.644	4.579 ± 1.224	1.498 ± 0.726	0.823 ± 0.478	9.767 ± 4.384	1.221 ± 0.386	1.394 ± 0.49	9.487 ± 2.439	2.791 ± 0.923	0.659 ± 0.286	49.948 ± 16.343
3 (Rotor diameter 265 m)	0.98 ± 0.426	3.098 ± 0.893	13.936 ± 3.548	4.647 ± 1.202	1.483 ± 0.718	0.805 ± 0.487	9.81 ± 4.353	1.225 ± 0.395	1.429 ± 0.528	9.596 ± 2.478	2.838 ± 0.882	0.683 ± 0.294	50.53 ± 16.204
4 (Rotor diameter 300 m)	0.991 ± 0.433	3.058 ± 0.911	14.039 ± 3.637	4.675 ± 1.187	1.483 ± 0.714	0.842 ± 0.482	9.869 ± 4.392	1.237 ± 0.405	1.431 ± 0.525	9.678 ± 2.368	2.909 ± 0.95	0.691 ± 0.284	50.903 ± 16.288
5 (Rotor diameter 330 m)	1.026 ± 0.459	3.204 ± 0.983	14.383 ± 3.813	4.878 ± 1.3	1.581 ± 0.76	0.895 ± 0.517	10.376 ± 4.588	1.298 ± 0.443	1.515 ± 0.545	10.07 ± 2.599	3.045 ± 0.972	0.708 ± 0.292	52.979 ± 17.271
Option 3													
1 (Rotor diameter 236 m)	0.149 ± 0.07	0.477 ± 0.148	2.11 ± 0.634	0.705 ± 0.206	0.22 ± 0.115	0.128 ± 0.081	1.529 ± 0.743	0.188 ± 0.069	0.219 ± 0.082	1.468 ± 0.413	0.448 ± 0.158	0.104 ± 0.045	7.745 ± 2.764
2 (Rotor diameter 250 m)	0.151 ± 0.069	0.463 ± 0.154	2.071 ± 0.627	0.692 ± 0.203	0.227 ± 0.115	0.124 ± 0.074	1.478 ± 0.7	0.184 ± 0.063	0.211 ± 0.079	1.434 ± 0.412	0.422 ± 0.15	0.1 ± 0.046	7.557 ± 2.692
3 (Rotor diameter 265 m)	0.14 ± 0.064	0.444 ± 0.142	1.997 ± 0.568	0.667 ± 0.195	0.213 ± 0.107	0.115 ± 0.072	1.407 ± 0.651	0.175 ± 0.059	0.205 ± 0.081	1.376 ± 0.403	0.407 ± 0.138	0.098 ± 0.045	7.244 ± 2.525
4 (Rotor diameter 300 m)	0.126 ± 0.058	0.387 ± 0.126	1.78 ± 0.525	0.592 ± 0.169	0.188 ± 0.095	0.107 ± 0.063	1.253 ± 0.589	0.157 ± 0.056	0.182 ± 0.072	1.227 ± 0.348	0.369 ± 0.129	0.088 ± 0.038	6.456 ± 2.268
5 (Rotor diameter 330 m)	0.116 ± 0.055	0.364 ± 0.124	1.633 ± 0.493	0.554 ± 0.168	0.179 ± 0.09	0.102 ± 0.061	1.177 ± 0.546	0.147 ± 0.054	0.172 ± 0.068	1.143 ± 0.338	0.345 ± 0.122	0.08 ± 0.035	6.012 ± 2.154

Table 2-2 Kittiwake predicted collision mortality calculated using stochastic CRM with Option 2 at 0.9979 avoidance rate and with Option 3 at 0.9947 (Ozsanlav-Harris *et al.*, 2022) for scenario 1, 2, 3, 4 and 5. Monthly values are the mean and standard deviation (S.D.) predicted collisions. Annual totals are calculated as the summed totals of the monthly means.

	Mean monthly collision risk ± S.D.												
Scenario	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Option 2													
1 (Rotor diameter 236 m)	0.276 ± 0.224	0.858 ± 0.607	3.921 ± 2.645	1.307 ± 0.875	0.428 ± 0.345	0.226 ± 0.202	2.712 ± 2.096	0.35 ± 0.251	0.405 ± 0.281	2.665 ± 1.75	0.818 ± 0.598	0.19 ± 0.145	14.156 ± 10.019
2 (Rotor diameter 250 m)	0.283 ± 0.223	0.903 ± 0.63	4.051 ± 2.772	1.353 ± 0.93	0.453 ± 0.394	0.239 ± 0.213	2.89 ± 2.273	0.363 ± 0.259	0.421 ± 0.315	2.839 ± 1.964	0.84 ± 0.603	0.202 ± 0.16	14.837 ± 10.736
3 (Rotor diameter 265 m)	0.285 ± 0.235	0.901 ± 0.674	4.057 ± 2.775	1.353 ± 0.909	0.441 ± 0.382	0.248 ± 0.223	2.899 ± 2.395	0.364 ± 0.277	0.428 ± 0.32	2.855 ± 2.042	0.845 ± 0.614	0.201 ± 0.16	14.877 ± 11.006
4 (Rotor diameter 300 m)	0.283 ± 0.222	0.912 ± 0.629	4.123 ± 2.754	1.37 ± 0.886	0.454 ± 0.364	0.259 ± 0.233	2.934 ± 2.308	0.366 ± 0.251	0.421 ± 0.31	2.879 ± 1.895	0.843 ± 0.566	0.204 ± 0.152	15.048 ± 10.57
5 (Rotor diameter 330 m)	0.317 ± 0.258	1.019 ± 0.725	4.575 ± 3.198	1.527 ± 1.077	0.494 ± 0.445	0.277 ± 0.262	3.209 ± 2.606	0.411 ± 0.293	0.479 ± 0.364	3.215 ± 2.232	0.962 ± 0.686	0.225 ± 0.184	16.71 ± 12.33
Option 3													
1 (Rotor diameter 236 m)	0.112 ± 0.051	0.348 ± 0.113	1.6 ± 0.464	0.533 ± 0.159	0.175 ± 0.088	0.093 ± 0.056	1.117 ± 0.519	0.142 ± 0.048	0.167 ± 0.064	1.095 ± 0.302	0.33 ± 0.119	0.079 ± 0.036	5.791 ± 2.019
2 (Rotor diameter 250 m)	0.11 ± 0.051	0.347 ± 0.118	1.546 ± 0.453	0.517 ± 0.152	0.17 ± 0.085	0.092 ± 0.055	1.106 ± 0.518	0.139 ± 0.049	0.163 ± 0.065	1.085 ± 0.312	0.321 ± 0.11	0.077 ± 0.033	5.673 ± 2.001
3 (Rotor diameter 265 m)	0.104 ± 0.046	0.329 ± 0.109	1.49 ± 0.449	0.497 ± 0.143	0.161 ± 0.082	0.09 ± 0.054	1.049 ± 0.492	0.131 ± 0.046	0.156 ± 0.062	1.038 ± 0.298	0.31 ± 0.108	0.073 ± 0.033	5.428 ± 1.922
4 (Rotor diameter 300 m)	0.092 ± 0.043	0.294 ± 0.099	1.321 ± 0.383	0.442 ± 0.127	0.148 ± 0.074	0.083 ± 0.048	0.945 ± 0.451	0.118 ± 0.041	0.136 ± 0.055	0.921 ± 0.266	0.273 ± 0.093	0.066 ± 0.028	4.839 ± 1.708
5 (Rotor diameter 330 m)	0.088 ± 0.04	0.28 ± 0.09	1.259 ± 0.378	0.42 ± 0.12	0.134 ± 0.071	0.076 ± 0.046	0.884 ± 0.427	0.114 ± 0.038	0.131 ± 0.052	0.884 ± 0.249	0.265 ± 0.088	0.061 ± 0.027	4.596 ± 1.626

Table 2-3 Kittiwake predicted collision mortality calculated using deterministic CRM with Option 2 at 99.2% (NatureScot, 2023) and 98.9% (SNCB, 2014) for scenario 1, 2, 3, 4 and 5. Monthly values are the predicted collisions. Annual totals are calculated as the summed totals of the monthly means.

Scenario		Mean monthly collision risk ± S.D.												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Option 2	Avoidance Rate (%)													
1 (Rotor diameter 236 m)	99.2	1.094	3.471	15.649	5.235	1.644	0.824	10.903	1.390	1.617	10.868	3.255	0.764	56.713
	98.9	1.504	4.772	21.516	7.198	2.261	1.133	14.990	1.912	2.224	14.943	4.475	1.050	77.976
2 (Rotor diameter 250 m)	99.2	1.149	3.647	16.444	5.501	1.728	0.866	11.457	1.461	1.699	11.420	3.420	0.802	59.594
	98.9	1.580	5.015	22.609	7.563	2.375	1.191	15.752	2.009	2.337	15.702	4.702	1.103	81.937
3 (Rotor diameter 265 m)	99.2	1.211	3.844	17.330	5.797	1.821	0.913	12.074	1.540	1.791	12.036	3.604	0.846	62.806
	98.9	1.665	5.285	23.827	7.971	2.503	1.255	16.601	2.117	2.462	16.548	4.956	1.163	86.353
4 (Rotor diameter 300 m)	99.2	1.163	3.692	16.646	5.568	1.749	0.877	11.597	1.479	1.720	11.561	3.462	0.812	60.327
	98.9	1.600	5.076	22.887	7.656	2.405	1.205	15.945	2.034	2.365	15.895	4.760	1.117	82.944
5 (Rotor diameter 330 m)	99.2	1.226	3.891	17.544	5.869	1.843	0.924	12.223	1.559	1.813	12.184	3.649	0.856	63.580
	98.9	1.686	5.350	24.121	8.069	2.534	1.270	16.805	2.143	2.493	16.752	5.017	1.177	87.417

3 GREAT BLACK-BACKED GULL

12. Predicted mean and S.D. collision mortality estimates for great black-backed gull determined from sCRM with Option 2 and Option 3 for each scenario using avoidance rates presented in NatureScot (2023) and Ozsanlav-Harris *et al.* (2022) are shown in Table 3-1 and Table 3-2 respectively.

13. For each avoidance rate, collision risk modelling results from sCRM were similar between the five scenarios within Option 2 and Option 3.

14. Predicted collision risk estimates for great black-backed gull using Ozsanlav-Harris *et al.* (2022)[4] basic avoidance rate (Option 2 = 0.9991) were approximately 85% lower for each scenario than those predicted using the NatureScot (2023)[3] basic avoidance rate (Option 2 = 0.994).

15. The WCS for great black-backed gull annually and for all calendar months was Option 2 for Scenario 5 using the NatureScot (2023)[3] avoidance rate.

16. Predicted collision mortality estimates for great black-backed gull determined from deterministic CRM with Option 2 and Option 3 using avoidance rates presented in NatureScot (2023)[3] and SNCB (2014)[7] guidance for each scenario are shown in Table 3-3.

Table 3-1 Great black-backed gull predicted collision mortality calculated using stochastic CRM with Option 2 and Option 3 at 0.994 avoidance rate (NatureScot, 2023) for scenario 1, 2, 3, 4 and 5. Monthly values are the mean and standard deviation (S.D.) predicted collisions. Annual totals are calculated as the summed totals of the monthly means. Worst case scenario is highlighted in grey.

	Mean monthly collision risk ± S.D.												
Scenario	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Option 2													
1 (Rotor diameter 236 m)	1.739 ± 0.546	1.682 ± 0.531	0.633 ± 0.426	0 ± 0	0 ± 0	0.725 ± 0.482	0 ± 0	0 ± 0	0 ± 0	0.618 ± 0.398	2.617 ± 1.008	3.876 ± 1.13	11.89 ± 4.521
2 (Rotor diameter 250 m)	1.85 ± 0.602	1.783 ± 0.533	0.702 ± 0.449	0 ± 0	0 ± 0	0.766 ± 0.482	0 ± 0	0 ± 0	0 ± 0	0.65 ± 0.433	2.749 ± 1.04	4.072 ± 1.162	12.572 ± 4.701
3 (Rotor diameter 265 m)	1.866 ± 0.577	1.781 ± 0.575	0.702 ± 0.436	0 ± 0	0 ± 0	0.807 ± 0.527	0 ± 0	0 ± 0	0 ± 0	0.666 ± 0.431	2.75 ± 1.04	4.057 ± 1.169	12.629 ± 4.755
4 (Rotor diameter 300 m)	1.829 ± 0.553	1.766 ± 0.546	0.681 ± 0.445	0 ± 0	0 ± 0	0.796 ± 0.515	0 ± 0	0 ± 0	0 ± 0	0.643 ± 0.431	2.767 ± 1.027	4.053 ± 1.118	12.535 ± 4.635
5 (Rotor diameter 330 m)	1.93 ± 0.593	1.859 ± 0.579	0.712 ± 0.461	0 ± 0	0 ± 0	0.82 ± 0.53	0 ± 0	0 ± 0	0 ± 0	0.677 ± 0.431	2.859 ± 1.112	4.32 ± 1.197	13.177 ± 4.903
Option 3													
1 (Rotor diameter 236 m)	0.568 ± 0.219	0.55 ± 0.217	0.206 ± 0.149	0 ± 0	0 ± 0	0.237 ± 0.169	0 ± 0	0 ± 0	0 ± 0	0.202 ± 0.143	0.855 ± 0.388	1.266 ± 0.471	3.884 ± 1.756
2 (Rotor diameter 250 m)	0.57 ± 0.228	0.547 ± 0.199	0.217 ± 0.151	0 ± 0	0 ± 0	0.236 ± 0.157	0 ± 0	0 ± 0	0 ± 0	0.199 ± 0.139	0.847 ± 0.378	1.25 ± 0.436	3.866 ± 1.688
3 (Rotor diameter 265 m)	0.546 ± 0.206	0.52 ± 0.197	0.205 ± 0.134	0 ± 0	0 ± 0	0.236 ± 0.161	0 ± 0	0 ± 0	0 ± 0	0.194 ± 0.132	0.804 ± 0.348	1.186 ± 0.425	0.546 ± 0.206
4 (Rotor diameter 300 m)	0.481 ± 0.18	0.464 ± 0.176	0.178 ± 0.121	0 ± 0	0 ± 0	0.21 ± 0.148	0 ± 0	0 ± 0	0 ± 0	0.168 ± 0.119	0.727 ± 0.309	1.065 ± 0.37	3.293 ± 1.423
5 (Rotor diameter 330 m)	0.464 ± 0.171	0.448 ± 0.172	0.172 ± 0.12	0 ± 0	0 ± 0	0.197 ± 0.135	0 ± 0	0 ± 0	0 ± 0	0.163 ± 0.112	0.691 ± 0.312	1.039 ± 0.359	3.174 ± 1.381

Table 3-2 Great black-backed gull predicted collision mortality calculated using stochastic CRM with Option 2 at 0.9991 avoidance rate and with Option 3 at 0.997 (Ozsanlav-Harris *et al.*, 2022) for scenario 1, 2, 3, 4 and 5. Monthly values are the mean and standard deviation (S.D.) predicted collisions. Annual totals are calculated as the summed totals of the monthly means.

	Mean monthly collision risk ± S.D.												
Scenario	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Option 2													
1 (Rotor diameter 236 m)	0.271 ± 0.105	0.257 ± 0.097	0.096 ± 0.068	0 ± 0	0 ± 0	0.114 ± 0.076	0 ± 0	0 ± 0	0 ± 0	0.092 ± 0.067	0.396 ± 0.181	0.591 ± 0.214	1.817 ± 0.808
2 (Rotor diameter 250 m)	0.278 ± 0.102	0.27 ± 0.101	0.103 ± 0.072	0 ± 0	0 ± 0	0.115 ± 0.079	0 ± 0	0 ± 0	0 ± 0	0.095 ± 0.069	0.41 ± 0.19	0.607 ± 0.216	1.878 ± 0.829
3 (Rotor diameter 265 m)	0.281 ± 0.108	0.272 ± 0.102	0.104 ± 0.073	0 ± 0	0 ± 0	0.117 ± 0.082	0 ± 0	0 ± 0	0 ± 0	0.099 ± 0.068	0.416 ± 0.188	0.619 ± 0.229	1.908 ± 0.85
4 (Rotor diameter 300 m)	0.28 ± 0.104	0.27 ± 0.104	0.097 ± 0.069	0 ± 0	0 ± 0	0.124 ± 0.083	0 ± 0	0 ± 0	0 ± 0	0.101 ± 0.068	0.416 ± 0.184	0.622 ± 0.217	1.91 ± 0.829
5 (Rotor diameter 330 m)	0.287 ± 0.11	0.28 ± 0.107	0.108 ± 0.075	0 ± 0	0 ± 0	0.124 ± 0.086	0 ± 0	0 ± 0	0 ± 0	0.103 ± 0.072	0.435 ± 0.191	0.651 ± 0.233	1.988 ± 0.874
Option 3													
1 (Rotor diameter 236 m)	0.292 ± 0.128	0.279 ± 0.126	0.104 ± 0.079	0 ± 0	0 ± 0	0.124 ± 0.09	0 ± 0	0 ± 0	0 ± 0	0.1 ± 0.078	0.431 ± 0.224	0.641 ± 0.275	1.971 ± 1
2 (Rotor diameter 250 m)	0.281 ± 0.13	0.274 ± 0.126	0.104 ± 0.082	0 ± 0	0 ± 0	0.116 ± 0.087	0 ± 0	0 ± 0	0 ± 0	0.096 ± 0.076	0.414 ± 0.222	0.616 ± 0.279	1.901 ± 1.002
3 (Rotor diameter 265 m)	0.27 ± 0.126	0.262 ± 0.12	0.102 ± 0.082	0 ± 0	0 ± 0	0.113 ± 0.086	0 ± 0	0 ± 0	0 ± 0	0.096 ± 0.073	0.402 ± 0.215	0.597 ± 0.276	1.842 ± 0.978
4 (Rotor diameter 300 m)	0.244 ± 0.112	0.235 ± 0.111	0.085 ± 0.066	0 ± 0	0 ± 0	0.108 ± 0.08	0 ± 0	0 ± 0	0 ± 0	0.088 ± 0.066	0.365 ± 0.195	0.542 ± 0.243	1.667 ± 0.873
5 (Rotor diameter 330 m)	0.225 ± 0.1	0.22 ± 0.096	0.084 ± 0.062	0 ± 0	0 ± 0	0.097 ± 0.071	0 ± 0	0 ± 0	0 ± 0	0.081 ± 0.06	0.343 ± 0.171	0.513 ± 0.218	1.563 ± 0.778

Table 3-3 Great black-backed gull predicted collision mortality calculated using deterministic CRM with Option 2 at 99.4% (NatureScot, 2023) and 99.5% (SNCB, 2014) and with Option 3 at 98.9% (SNCB, 2014) for scenario 1, 2, 3, 4 and 5. Monthly values are predicted collisions. Annual totals are calculated as the summed totals of the monthly means.

Scenario		Mean monthly collision risk ± S.D.												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Option 2	Avoidance Rate (%)													
1 (Rotor diameter 236 m)	99.4	1.651	1.594	0.475	0	0	0.544	0	0	0	0.456	2.456	3.631	10.807
	99.5	1.376	1.329	0.396	0	0	0.453	0	0	0	0.380	2.047	3.026	9.006
2 (Rotor diameter 250 m)	99.4	1.720	1.661	0.495	0	0	0.567	0	0	0	0.475	2.559	3.782	11.258
	99.5	1.433	1.384	0.412	0	0	0.472	0	0	0	0.396	2.132	3.152	9.382
3 (Rotor diameter 265 m)	99.4	1.773	1.712	0.510	0	0	0.584	0	0	0	0.489	2.638	3.899	11.607
	99.5	1.477	1.427	0.425	0	0	0.487	0	0	0	0.408	2.198	3.250	9.673
4 (Rotor diameter 300 m)	99.4	1.727	1.668	0.497	0	0	0.569	0	0	0	0.477	2.570	3.798	11.306
	99.5	1.439	1.390	0.414	0	0	0.474	0	0	0	0.397	2.141	3.165	9.422
5 (Rotor diameter 330 m)	99.4	1.800	1.738	0.518	0	0	0.593	0	0	0	0.497	2.678	3.958	11.781
	99.5	1.500	1.448	0.432	0	0	0.494	0	0	0	0.414	2.231	3.298	9.818
Option 3	Avoidance Rate (%)													
1 (Rotor diameter 236 m)	98.9	0.919	0.887	0.264	0	0	0.303	0	0	0	0.254	1.367	2.021	6.015
2 (Rotor diameter 250 m)	98.9	0.973	0.940	0.280	0	0	0.321	0	0	0	0.269	1.448	2.141	6.372
3 (Rotor diameter 265 m)	98.9	1.036	1.000	0.298	0	0	0.341	0	0	0	0.286	1.541	2.278	1.036

MacArthur Green

Scenario		Mean monthly collision risk ± S.D.												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
4 (Rotor diameter 300 m)	98.9	1.168	1.128	0.336	0	0	0.385	0	0	0	0.322	1.738	2.569	7.646
5 (Rotor diameter 330 m)	98.9	1.285	1.241	0.370	0	0	0.423	0	0	0	0.355	1.912	2.826	8.411

4 ARCTIC TERN

17. Predicted mean and S.D. collision mortality estimates for Arctic tern determined from sCRM with Option 2 and Option 3 for each scenario using avoidance rates presented in NatureScot (2023)[3] and Ozsanlav-Harris *et al.* (2022)[4] are shown in Table 4-1 and Table 4-2 respectively.

18. Collision risk modelling results were very low for the calendar months when Arctic tern was recorded flying in the OAA (May, June and July) and also very similar between the five scenarios.

19. Predicted collision risk estimates for Arctic tern using Ozsanlav-Harris *et al.* (2022)[4] basic avoidance rate (Option 2 = 0.9714) were approximately three times higher for each scenario than those predicted using the NatureScot (2023)[3] basic avoidance rate (Option 2 = 0.991).

20. The WCS was Scenario 5 annually and for May and June and Scenario 4 for July.

21. Predicted collision mortality estimates for Arctic tern determined from deterministic CRM with Option 2 using avoidance rates presented in NatureScot (2023)[3] for each scenario are shown in Table 4-3.

Table 4-1 Arctic tern predicted collision mortality calculated using stochastic CRM with Option 2 and Option 3 at 0.991 avoidance rate (NatureScot, 2023) for scenario 1, 2, 3, 4 and 5. Monthly values are the mean and standard deviation (S.D.) predicted collisions. Annual totals are calculated as the summed totals of the monthly means. Worst case scenario is highlighted in grey.

	Mean monthly collision risk ± S.D.												
Scenario	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Option 2													
1 (Rotor diameter 236 m)	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.048 ± 0.068	0.325 ± 0.423	0.046 ± 0.061	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.419 ± 0.552
2 (Rotor diameter 250 m)	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.049 ± 0.062	0.316 ± 0.377	0.051 ± 0.071	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.416 ± 0.51
3 (Rotor diameter 265 m)	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.047 ± 0.061	0.314 ± 0.369	0.046 ± 0.056	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.407 ± 0.486
4 (Rotor diameter 300 m)	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.048 ± 0.061	0.324 ± 0.387	0.055 ± 0.07	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.427 ± 0.518
5 (Rotor diameter 330 m)	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.053 ± 0.075	0.363 ± 0.459	0.052 ± 0.062	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.468 ± 0.596
Option 3													
1 (Rotor diameter 236 m)	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.006 ± 0.01	0.039 ± 0.063	0.005 ± 0.009	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.05 ± 0.082
2 (Rotor diameter 250 m)	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.005 ± 0.009	0.035 ± 0.055	0.006 ± 0.01	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.046 ± 0.074
3 (Rotor diameter 265 m)	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.005 ± 0.008	0.031 ± 0.048	0.005 ± 0.007	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.041 ± 0.063
4 (Rotor diameter 300 m)	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.004 ± 0.007	0.029 ± 0.047	0.005 ± 0.008	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.038 ± 0.062
5 (Rotor diameter 330 m)	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.004 ± 0.008	0.029 ± 0.048	0.004 ± 0.006	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.037 ± 0.062

Table 4-2 Arctic tern predicted collision mortality calculated using stochastic CRM with Option 2 at 0.9714 avoidance rate and with Option 3 at 0.9401 (Ozsanlav-Harris *et al.*, 2022) for scenario 1, 2, 3, 4 and 5. Monthly values are the mean and standard deviation (S.D.) predicted collisions. Annual totals are calculated as the summed totals of the monthly means.

	Mean monthly collision risk ± S.D.												
Scenario	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Option 2													
1 (Rotor diameter 236 m)	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.144 ± 0.188	0.971 ± 1.205	0.151 ± 0.209	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	1.266 ± 1.602
2 (Rotor diameter 250 m)	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.147 ± 0.179	1.05 ± 1.297	0.161 ± 0.2	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	1.358 ± 1.676
3 (Rotor diameter 265 m)	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.144 ± 0.192	0.984 ± 1.146	0.148 ± 0.191	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	1.276 ± 1.529
4 (Rotor diameter 300 m)	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.147 ± 0.189	1.043 ± 1.199	0.163 ± 0.209	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	1.353 ± 1.597
5 (Rotor diameter 330 m)	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.175 ± 0.246	1.194 ± 1.451	0.175 ± 0.23	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	1.544 ± 1.927
Option 3													
1 (Rotor diameter 236 m)	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.036 ± 0.06	0.24 ± 0.388	0.038 ± 0.066	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.314 ± 0.514
2 (Rotor diameter 250 m)	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.033 ± 0.05	0.238 ± 0.374	0.037 ± 0.058	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.308 ± 0.482
3 (Rotor diameter 265 m)	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.03 ± 0.05	0.203 ± 0.302	0.031 ± 0.051	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.264 ± 0.403
4 (Rotor diameter 300 m)	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.027 ± 0.045	0.193 ± 0.292	0.03 ± 0.051	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.25 ± 0.388
5 (Rotor diameter 330 m)	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.029 ± 0.055	0.197 ± 0.322	0.029 ± 0.051	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.255 ± 0.428

Table 4-3 Arctic tern predicted collision mortality calculated using deterministic CRM with Option 2 at 99.0% (NatureScot, 2023) for scenario 1, 2, 3, 4 and 5. Monthly values are the predicted collisions. Annual totals are calculated as the summed totals of the monthly means.

Scenario		Mean monthly collision risk ± S.D.												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Option 2	Avoidance Rate (%)													
1 (Rotor diameter 236 m)	99.0	0	0	0	0	0.028	0.238	0.030	0	0	0	0	0	0.296
2 (Rotor diameter 250 m)	99.0	0	0	0	0	0.030	0.252	0.031	0	0	0	0	0	0.313
3 (Rotor diameter 265 m)	99.0	0	0	0	0	0.033	0.277	0.035	0	0	0	0	0	0.345
4 (Rotor diameter 300 m)	99.0	0	0	0	0	0.031	0.261	0.032	0	0	0	0	0	0.324
5 (Rotor diameter 330 m)	99.0	0	0	0	0	0.033	0.278	0.035	0	0	0	0	0	0.346

5 GREAT SKUA

22. Predicted mean and SD collision mortality for great skua determined from sCRM with Option 2 and Option 3 for each scenario using avoidance rates presented in NatureScot (2023)[3] and Ozsanlav-Harris *et al.* (2022)[4] are shown in Table 5-1 and Table 5-2 respectively.

23. Collision risk modelling results were very low for the calendar months when great skua was recorded flying in the OAA (April, June, July and August) and also very similar between the five scenarios.

24. Predicted collision risk estimates for great skua using Ozsanlav-Harris *et al.* (2022)[4] basic avoidance rate (Option 2 = 0.9928) were similar to those predicted using the NatureScot (2023)[3] basic avoidance rate (Option 2 = 0.993) for each scenario.

25. The WCS for great skua annually and for calendar months was Option 2 for Scenario 5 using the NatureScot (2023)[3] avoidance rate.

26. Predicted collision mortality estimates for great skua determined from deterministic CRM with Option 2 using avoidance rates presented in NatureScot (2023)[3] and SNCB (2014)[7] guidance for each scenario are shown in Table 5-3.

Table 5-1 Great skua predicted collision mortality calculated using stochastic CRM with Option 2 and Option 3 at 0.993 avoidance rate (NatureScot, 2023) for scenario 1, 2, 3, 4 and 5. Monthly values are the mean and standard deviation (S.D.) predicted collisions. Annual totals are calculated as the summed totals of the monthly means. Worst case scenario is highlighted in grey.

	Mean monthly collision risk ± S.D.												
Scenario	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Option 2													
1 (Rotor diameter 236 m)	0 ± 0	0 ± 0	0 ± 0	0.074 ± 0.067	0 ± 0	0.023 ± 0.019	0.03 ± 0.035	0.094 ± 0.104	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.221 ± 0.225
2 (Rotor diameter 250 m)	0 ± 0	0 ± 0	0 ± 0	0.084 ± 0.085	0 ± 0	0.027 ± 0.025	0.036 ± 0.049	0.104 ± 0.125	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.251 ± 0.284
3 (Rotor diameter 265 m)	0 ± 0	0 ± 0	0 ± 0	0.079 ± 0.074	0 ± 0	0.025 ± 0.023	0.032 ± 0.037	0.096 ± 0.112	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.232 ± 0.246
4 (Rotor diameter 300 m)	0 ± 0	0 ± 0	0 ± 0	0.089 ± 0.091	0 ± 0	0.028 ± 0.025	0.037 ± 0.045	0.113 ± 0.125	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.267 ± 0.286
5 (Rotor diameter 330 m)	0 ± 0	0 ± 0	0 ± 0	0.093 ± 0.093	0 ± 0	0.03 ± 0.027	0.037 ± 0.047	0.12 ± 0.146	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.28 ± 0.313
Option 3													
1 (Rotor diameter 236 m)	0 ± 0	0 ± 0	0 ± 0	0.008 ± 0.01	0 ± 0	0.003 ± 0.003	0.003 ± 0.005	0.01 ± 0.014	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.024 ± 0.032
2 (Rotor diameter 250 m)	0 ± 0	0 ± 0	0 ± 0	0.009 ± 0.013	0 ± 0	0.003 ± 0.004	0.004 ± 0.007	0.011 ± 0.018	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.027 ± 0.042
3 (Rotor diameter 265 m)	0 ± 0	0 ± 0	0 ± 0	0.007 ± 0.01	0 ± 0	0.002 ± 0.003	0.003 ± 0.005	0.009 ± 0.014	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.021 ± 0.032
4 (Rotor diameter 300 m)	0 ± 0	0 ± 0	0 ± 0	0.007 ± 0.011	0 ± 0	0.002 ± 0.003	0.003 ± 0.005	0.009 ± 0.014	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.021 ± 0.033
5 (Rotor diameter 330 m)	0 ± 0	0 ± 0	0 ± 0	0.007 ± 0.01	0 ± 0	0.002 ± 0.003	0.003 ± 0.005	0.009 ± 0.015	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.021 ± 0.033

Table 5-2 Great skua predicted collision mortality calculated using stochastic CRM with Option 2 at 0.9928 avoidance rate and with Option 3 at 0.9533 (Ozsanlav-Harris *et al.* 2022) for scenario 1, 2, 3, 4 and 5. Monthly values are the mean and standard deviation (S.D.) predicted collisions. Annual totals are calculated as the summed totals of the monthly means.

	Mean monthly collision risk ± S.D.												
Scenario	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Option 2													
1 (Rotor diameter 236 m)	0 ± 0	0 ± 0	0 ± 0	0.083 ± 0.084	0 ± 0	0.026 ± 0.025	0.035 ± 0.044	0.105 ± 0.134	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.249 ± 0.287
2 (Rotor diameter 250 m)	0 ± 0	0 ± 0	0 ± 0	0.086 ± 0.082	0 ± 0	0.027 ± 0.025	0.035 ± 0.041	0.108 ± 0.139	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.256 ± 0.287
3 (Rotor diameter 265 m)	0 ± 0	0 ± 0	0 ± 0	0.082 ± 0.075	0 ± 0	0.026 ± 0.022	0.034 ± 0.041	0.101 ± 0.105	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.243 ± 0.243
4 (Rotor diameter 300 m)	0 ± 0	0 ± 0	0 ± 0	0.085 ± 0.078	0 ± 0	0.027 ± 0.024	0.033 ± 0.038	0.105 ± 0.114	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.25 ± 0.254
5 (Rotor diameter 330 m)	0 ± 0	0 ± 0	0 ± 0	0.096 ± 0.098	0 ± 0	0.03 ± 0.029	0.038 ± 0.047	0.12 ± 0.14	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.284 ± 0.314
Option 3													
1 (Rotor diameter 236 m)	0 ± 0	0 ± 0	0 ± 0	0.061 ± 0.088	0 ± 0	0.019 ± 0.026	0.026 ± 0.045	0.078 ± 0.138	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.184 ± 0.297
2 (Rotor diameter 250 m)	0 ± 0	0 ± 0	0 ± 0	0.057 ± 0.077	0 ± 0	0.018 ± 0.023	0.023 ± 0.036	0.072 ± 0.126	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.17 ± 0.262
3 (Rotor diameter 265 m)	0 ± 0	0 ± 0	0 ± 0	0.049 ± 0.065	0 ± 0	0.016 ± 0.02	0.02 ± 0.033	0.06 ± 0.085	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.145 ± 0.203
4 (Rotor diameter 300 m)	0 ± 0	0 ± 0	0 ± 0	0.045 ± 0.063	0 ± 0	0.015 ± 0.02	0.017 ± 0.027	0.056 ± 0.086	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.133 ± 0.196
5 (Rotor diameter 330 m)	0 ± 0	0 ± 0	0 ± 0	0.046 ± 0.071	0 ± 0	0.014 ± 0.022	0.018 ± 0.032	0.057 ± 0.096	0 ± 0	0 ± 0	0 ± 0	0 ± 0	0.135 ± 0.221

Table 5-3 Great skua predicted collision mortality calculated using deterministic CRM with Option 2 at 99.2% (NatureScot, 2023) and 98.9% (SNCB, 2014) for scenario 1, 2, 3, 4 and 5. Monthly values are the predicted collisions. Annual totals are calculated as the summed totals of the monthly means.

Scenario		Mean monthly collision risk ± S.D.												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Option 2	Avoidance Rate (%)													
1 (Rotor diameter 236 m)	99.2	0	0	0	0.196	0	0.062	0.062	0.218	0	0	0	0	0.538
	98.9	0	0	0	0.269	0	0.086	0.085	0.299	0	0	0	0	0.739
2 (Rotor diameter 250 m)	99.2	0	0	0	0.206	0	0.065	0.065	0.229	0	0	0	0	0.565
	98.9	0	0	0	0.283	0	0.090	0.090	0.314	0	0	0	0	0.777
3 (Rotor diameter 265 m)	99.2	0	0	0	0.223	0	0.071	0.071	0.248	0	0	0	0	0.613
	98.9	0	0	0	0.307	0	0.098	0.097	0.341	0	0	0	0	0.842
4 (Rotor diameter 300 m)	99.2	0	0	0	0.211	0	0.067	0.067	0.235	0	0	0	0	0.580
	98.9	0	0	0	0.290	0	0.092	0.092	0.323	0	0	0	0	0.797
5 (Rotor diameter 330 m)	99.2	0	0	0	0.224	0	0.071	0.071	0.249	0	0	0	0	0.615
	98.9	0	0	0	0.308	0	0.098	0.098	0.342	0	0	0	0	0.845

6 GANNET

27. Predicted mean and S.D. collision mortality estimates for gannet determined from sCRM with Option 2 and Option 3 for each scenario using avoidance rates presented in NatureScot (2023)[3] are shown in Table 6-1 for the breeding season (nocturnal activity = 0.08%) and Table 6-2 for the non-breeding season (nocturnal activity = 0.10).

28. Collision risk modelling results were similar between the five Scenarios.

29. The WCS for gannet was Option 2 Scenario 5 annually and for all calendar months for both the breeding and non-breeding seasons.

30. Predicted collision mortality estimates for gannet determined from deterministic CRM with Option 2 using avoidance rates presented in NatureScot (2023)[3] and SNCB (2014)[7] guidance for each scenario are shown in Table 6-3.

Table 6-1 Gannet predicted collision mortality during the breeding season (nocturnal activity = 0.08%) calculated using stochastic CRM with Option 2 and Option 3 at 0.993 avoidance rate (NatureScot, 2023) for scenario 1, 2, 3, 4 and 5. Monthly values are the mean and standard deviation (S.D.) predicted collisions. Annual totals are calculated as the summed totals of the monthly means. Worst case scenario is highlighted in grey.

	Mean monthly collision risk ± S.D.												
Scenario	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Option 2													
1 (Rotor diameter 236 m)	0.11 ± 0.093	0.676 ± 0.426	1.689 ± 0.916	4.607 ± 2.235	4.318 ± 2.193	4.095 ± 2.11	5.792 ± 3.304	6.014 ± 3.53	9.01 ± 4.154	6.866 ± 3.174	0.121 ± 0.101	0.253 ± 0.181	43.551 ± 22.417
2 (Rotor diameter 250 m)	0.114 ± 0.09	0.703 ± 0.449	1.742 ± 0.972	4.815 ± 2.486	4.427 ± 2.264	4.241 ± 2.206	6.045 ± 3.452	6.22 ± 3.669	9.227 ± 4.403	7.092 ± 3.359	0.122 ± 0.098	0.276 ± 0.206	45.024 ± 23.654
3 (Rotor diameter 265 m)	0.117 ± 0.095	0.705 ± 0.443	1.751 ± 0.97	4.814 ± 2.459	4.37 ± 2.263	4.218 ± 2.168	5.824 ± 3.262	6.097 ± 3.7	9.424 ± 4.523	7.131 ± 3.381	0.118 ± 0.096	0.27 ± 0.197	44.839 ± 23.557
4 (Rotor diameter 300 m)	0.119 ± 0.095	0.725 ± 0.442	1.804 ± 1.03	4.864 ± 2.435	4.578 ± 2.36	4.315 ± 2.17	6.084 ± 3.38	6.505 ± 3.795	9.621 ± 4.474	7.354 ± 3.425	0.124 ± 0.102	0.279 ± 0.204	46.372 ± 23.912
5 (Rotor diameter 330 m)	0.12 ± 0.092	0.723 ± 0.441	1.845 ± 1.004	5.105 ± 2.556	4.683 ± 2.467	4.443 ± 2.197	6.276 ± 3.516	6.516 ± 3.719	9.833 ± 4.574	7.52 ± 3.498	0.127 ± 0.101	0.281 ± 0.202	47.472 ± 24.367
Option 3													
1 (Rotor diameter 236 m)	0.023 ± 0.022	0.144 ± 0.104	0.36 ± 0.234	0.98 ± 0.576	0.919 ± 0.562	0.874 ± 0.543	1.234 ± 0.829	1.285 ± 0.88	1.918 ± 1.086	1.462 ± 0.829	0.026 ± 0.024	0.054 ± 0.044	9.279 ± 5.733
2 (Rotor diameter 250 m)	0.023 ± 0.02	0.14 ± 0.103	0.346 ± 0.229	0.956 ± 0.599	0.876 ± 0.544	0.841 ± 0.531	1.202 ± 0.812	1.232 ± 0.851	1.829 ± 1.08	1.406 ± 0.824	0.024 ± 0.021	0.055 ± 0.047	8.93 ± 5.661

	Mean monthly collision risk ± S.D.												
Scenario	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
3 (Rotor diameter 265 m)	0.022 ± 0.02	0.133 ± 0.096	0.331 ± 0.219	0.909 ± 0.563	0.825 ± 0.518	0.797 ± 0.5	1.096 ± 0.729	1.151 ± 0.821	1.78 ± 1.065	1.345 ± 0.798	0.022 ± 0.02	0.051 ± 0.042	8.462 ± 5.391
4 (Rotor diameter 300 m)	0.021 ± 0.018	0.124 ± 0.088	0.309 ± 0.211	0.832 ± 0.51	0.784 ± 0.49	0.739 ± 0.458	1.038 ± 0.687	1.113 ± 0.771	1.647 ± 0.958	1.258 ± 0.736	0.021 ± 0.02	0.048 ± 0.04	7.934 ± 4.987
5 (Rotor diameter 330 m)	0.018 ± 0.016	0.11 ± 0.08	0.282 ± 0.185	0.78 ± 0.485	0.717 ± 0.462	0.678 ± 0.416	0.959 ± 0.647	0.997 ± 0.683	1.503 ± 0.882	1.149 ± 0.672	0.019 ± 0.017	0.043 ± 0.035	7.255 ± 4.58

Table 6-2 Gannet predicted collision mortality during the non-breeding season (nocturnal activity = 0.10) calculated using stochastic CRM with Option 2 at 98.9% avoidance rate for scenario 1, 2, 3, 4 and 5. Monthly values are the mean and standard deviation (S.D.) predicted collisions. Annual totals are calculated as the summed totals of the monthly means. Worst case scenario is highlighted in grey.

	Mean monthly collision risk ± S.D.												
Scenario	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Option 2													
1 (Rotor diameter 236 m)	0.112 ± 0.092	0.696 ± 0.442	1.714 ± 0.948	4.726 ± 2.388	4.35 ± 2.353	4.086 ± 2.111	5.845 ± 3.329	6.018 ± 3.537	9.179 ± 4.367	7.048 ± 3.402	0.116 ± 0.091	0.275 ± 0.202	44.165 ± 23.262
2 (Rotor diameter 250 m)	0.118 ± 0.093	0.736 ± 0.46	1.832 ± 0.983	5.018 ± 2.45	4.563 ± 2.292	4.361 ± 2.15	6.07 ± 3.253	6.365 ± 3.664	9.714 ± 4.467	7.451 ± 3.399	0.127 ± 0.099	0.284 ± 0.206	46.639 ± 23.516
3 (Rotor diameter 265 m)	0.122 ± 0.096	0.71 ± 0.442	1.787 ± 0.989	4.845 ± 2.423	4.467 ± 2.332	4.273 ± 2.08	6.096 ± 3.472	6.22 ± 3.736	9.417 ± 4.4	7.263 ± 3.434	0.128 ± 0.099	0.279 ± 0.202	45.607 ± 23.705
4 (Rotor diameter 300 m)	0.119 ± 0.091	0.74 ± 0.454	1.827 ± 0.993	4.979 ± 2.432	4.561 ± 2.236	4.358 ± 2.2	6.266 ± 3.6	6.409 ± 3.808	9.645 ± 4.457	7.371 ± 3.308	0.128 ± 0.102	0.281 ± 0.203	46.684 ± 23.884
5 (Rotor diameter 330 m)	0.131 ± 0.106	0.765 ± 0.489	1.921 ± 1.099	5.285 ± 2.676	4.787 ± 2.54	4.582 ± 2.336	6.562 ± 3.76	6.78 ± 4.005	10.045 ± 4.734	7.881 ± 3.796	0.134 ± 0.111	0.297 ± 0.232	49.17 ± 25.884
Option 3													
1 (Rotor diameter 236 m)	0.024 ± 0.022	0.149 ± 0.11	0.366 ± 0.239	1.013 ± 0.625	0.932 ± 0.602	0.875 ± 0.544	1.253 ± 0.841	1.289 ± 0.889	1.962 ± 1.145	1.508 ± 0.894	0.025 ± 0.022	0.059 ± 0.049	9.455 ± 5.982
2 (Rotor diameter 250 m)	0.024 ± 0.02	0.147 ± 0.107	0.366 ± 0.235	1.004 ± 0.599	0.912 ± 0.554	0.872 ± 0.524	1.213 ± 0.773	1.272 ± 0.86	1.942 ± 1.097	1.489 ± 0.841	0.025 ± 0.022	0.057 ± 0.047	9.323 ± 5.679

	Mean monthly collision risk ± S.D.												
Scenario	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
3 (Rotor diameter 265 m)	0.023 ± 0.02	0.134 ± 0.098	0.337 ± 0.224	0.914 ± 0.559	0.845 ± 0.533	0.807 ± 0.484	1.154 ± 0.789	1.179 ± 0.841	1.778 ± 1.035	1.373 ± 0.813	0.024 ± 0.021	0.053 ± 0.044	8.621 ± 5.461
4 (Rotor diameter 300 m)	0.02 ± 0.017	0.126 ± 0.091	0.312 ± 0.204	0.85 ± 0.507	0.777 ± 0.465	0.746 ± 0.462	1.074 ± 0.739	1.096 ± 0.766	1.645 ± 0.95	1.257 ± 0.706	0.022 ± 0.02	0.048 ± 0.039	7.973 ± 4.966
5 (Rotor diameter 330 m)	0.02 ± 0.018	0.117 ± 0.088	0.294 ± 0.204	0.806 ± 0.502	0.731 ± 0.474	0.698 ± 0.44	1.001 ± 0.687	1.034 ± 0.724	1.53 ± 0.908	1.202 ± 0.723	0.02 ± 0.019	0.045 ± 0.041	7.498 ± 4.828

Table 6-3 Gannet predicted collision mortality calculated using deterministic CRM with Option 2 at 99.2% (NatureScot, 2023) and 98.9% (SNCB, 2014) for scenario 1, 2, 3, 4 and 5. Monthly values are the predicted collisions. Annual totals are calculated as the summed totals of the monthly means.

Scenario		Mean monthly collision risk ± S.D.												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Option 2	Avoidance Rate (%)													
1 (Rotor diameter 236 m)	99.2	0.093	0.730	1.839	5.056	4.646	4.439	6.262	6.465	9.790	7.465	0.098	0.259	47.144
	98.9	0.129	1.004	2.529	6.952	6.387	6.104	8.610	8.889	13.461	10.264	0.135	0.356	64.818
2 (Rotor diameter 250 m)	99.2	0.097	0.762	1.918	5.272	4.844	4.629	6.530	6.742	10.210	7.785	0.102	0.270	49.161
	98.9	0.134	1.047	2.637	7.249	6.660	6.365	8.978	9.269	14.037	10.703	0.141	0.371	67.592
3 (Rotor diameter 265 m)	99.2	0.103	0.807	2.033	5.589	5.135	4.907	6.921	7.146	10.822	8.251	0.108	0.286	52.109
	98.9	0.142	1.110	2.795	7.684	7.060	6.746	9.516	9.825	14.879	11.345	0.149	0.394	71.644
4 (Rotor diameter 300 m)	99.2	0.099	0.773	1.946	5.349	4.914	4.696	6.624	6.839	10.357	7.897	0.104	0.274	49.872
	98.9	0.136	1.062	2.675	7.354	6.757	6.457	9.108	9.403	14.240	10.858	0.143	0.377	68.568
5 (Rotor diameter 330 m)	99.2	0.104	0.809	2.038	5.602	5.147	4.919	6.938	7.163	10.848	8.271	0.109	0.287	52.235
	98.9	0.142	1.112	2.802	7.702	7.077	6.763	9.539	9.849	14.915	11.372	0.150	0.395	71.817

7 SUMMARY AND WORST-CASE SCENARIO CONCLUSION

31. sCRM with Option 2 using avoidance rates presented in NatureScot (2023)[3] predicted that Scenario 5 gave consistently the largest predicted annual collision risk for kittiwake, great black-backed gull, Arctic tern, great skua and gannet. This is as expected as there is the largest overlap between the rotor swept area and the proportion of birds at rotor height.

32. Among the five different scenarios, the difference in predicted collisions was very small for all five species. These differences are so small that re-running of the stochastic model could result in different scenarios being the "worst" case.

33. Scenario 1, 2, 3 and 4 were consistently lower than the other scenarios and can be excluded as the worst case scenario. Since Scenario 5 was the WCS for all five species, this was selected as the overall WCS for the assessment.

Table 7-1 Worst case scenario assessment results for scenarios 1, 2, 3, 4 and 5. Values are based on Option 2 using avoidance rates presented in NatureScot (2023)[3]. Cells highlighted in grey are the largest estimates.

	Annual collision risk ± S.D.					
Scenario	Kittiwake	Great black-backed gull	Arctic tern	Great skua	Gannet	
					Breeding	Non-breeding
1 (Rotor diameter 236 m)	47.577 ± 15.685	11.89 ± 4.521	0.419 ± 0.552	0.221 ± 0.225	43.551 ± 22.417	44.165 ± 23.262
2 (Rotor diameter 250 m)	49.948 ± 16.343	12.572 ± 4.701	0.416 ± 0.51	0.251 ± 0.284	45.024 ± 23.654	46.639 ± 23.516
3 (Rotor diameter 265 m)	50.53 ± 16.204	12.629 ± 4.755	0.407 ± 0.486	0.232 ± 0.246	44.839 ± 23.557	45.607 ± 23.705
4 (Rotor diameter 300 m)	50.903 ± 16.288	12.535 ± 4.635	0.427 ± 0.518	0.267 ± 0.286	46.372 ± 23.912	46.684 ± 23.884
5 (Rotor diameter 330 m)	52.979 ± 17.271	13.177 ± 4.903	0.468 ± 0.596	0.28 ± 0.313	47.472 ± 24.367	49.17 ± 25.884

MacArthur Green

West of Orkney Windfarm

Offshore Ornithology
Technical Appendix 12

Annex 12.7
Survey dates and times

Date:	12th May 2023
Tel:	0141 342 5404
Web:	www.macarthurgreen.com
Address:	93 South Woodside Road |Glasgow | G20 6NT

Document Quality Record

Version	Status	Person Responsible	Date
0.1	Draft	Dr. S. Raveh	04/11/2022
0.2	Reviewed	Dr. N. Goodship	07/11/2022
0.3	Updated	Dr. N. Goodship	07/11/2022
1	Internal Approval	Dr. R. McGregor	08/12/2022
1.1	Comments addressed	Dr. N. Goodship	06/01/2023
2	Internal Approval	Dr. R. McGregor	09/05/2023

CONTENTS

LIST OF TABLES

1 INTRODUCTION

1. This Annex provides a list of survey dates and times of monthly digital aerial surveys undertaken for the West of Orkney Windfarm (the Project). Offshore EIA Report, chapter 13: Offshore and intertidal ornithology is informed using baseline site characterisation data collected by digital aerial survey methods, conducted by HiDef Aerial Surveying Ltd (see Supporting Study 8: Digital video aerial survey methodology and marine mammal survey results).
2. The date and time of each monthly aerial survey carried out by HiDef is provided in Table 1-1 total of 27 surveys were conducted for the Project between July 2020 and September 2022.

Table 1-1 Survey dates and times for West of Orkney Windfarm

Survey ID	Date	Start time	End time
1	22/07/2020	09:18:30.	14:31:32
2	06/08/2020	10:58:12	14:52:53
3	24/09/2020	09:01:48	12:45:57
4	22/10/2020	10:12:56	13:46:45
5	28/11/2020	11:06:12	14:42:58
6	15/12/2020	11:08:54	14:50:01
7	04/01/2021	10:30:52	14:35:26
8	27/02/2021	10:38:27	14:10:13
9	15/03/2021	11:12:21	14:53:14
10	21/04/2021	10:55:21	14:36:38
11	20/05/2021	10:17:29	13:51:27
12	11/06/2021	10:47:25	14:50:32
13	02/07/2021	10:24:41	14:29:39
14	30/08/2021	10:23:00	14:05:06
15	08/09/2021	10:36:16	14:05:12
16	12/10/2021	09:34:37	13:07:49
17	15/11/2021	10:25:39	14:04:33
18	28/12/2021	10:30:58	14:14:46
19	18/02/2022	09:39:59	14:12:16
20	26/02/2022	10:34:16	14:12:16
21	11/03/2022	08:55:17	12:48:16
22	14/04/2022	09:59:26	13:33:58
23	15/05/2022	10:17:59	13:46:57
24	05/06/2022	10:08:35	13:45:45
25	22/07/2022	09:09:24	12:29:05
26	17/08/2022	10:13:53	13:54:17
27	02/09/2022	11:13:32	15:15:12

West of Orkney Wind Farm

Offshore Ornithology Technical Supporting Study 12

Annex 12.8 Seabirds and highly pathogenic avian influenza

Date:	12th May 2023
Tel:	0141 342 5404
Web:	www.macarthurgreen.com
Address:	93 South Woodside Road |Glasgow | G20 6NT

Document Quality Record

Version	Status	Person Responsible	Date
0.1	Draft	Prof. Robert W. Furness	10/10/2022
0.2	Reviewed	Dr Ross McGregor	13/10/2022
0.3	Updated	Prof. Robert W. Furness	23/11/2022
1	Internal Approval	Dr Ross McGregor	25/11/2022
1.2	Updated	Dr Nicola Goodship	02/05/2023
2	Internal Approval	Dr Ross McGregor	09/05/2023

CONTENTS

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

Birds (wild and domestic) have long been exposed to low pathogenicity avian influenza (LPAI) which causes little or no illness in affected birds. However, highly pathogenic avian influenza virus (HPAIV) is a mutated strain of avian influenza that evolved in domestic poultry in Asia and kills a high proportion of infected birds. Originally confined to domestic birds in high-density poultry farming, this infection eventually escaped into wild birds and has spread around the world.

HPAIV hit great skuas at several colonies in summer 2021 and then hit great skuas again, even harder in 2022 when it also hit gannets, terns and guillemots, and to a smaller extent several other seabird species at colonies around the UK and throughout the North Atlantic. These HPAIV outbreaks were unprecedented in North Atlantic seabirds. It is very difficult to assess how many birds died, but it is likely that about 50% of adult great skuas died and perhaps 25% of adult gannets. Impact may have been large on common guillemot and on some tern colonies (especially Sandwich terns in The Netherlands and east England) but it is even more difficult to quantify in those species. However, there is a high risk that further outbreaks will occur in seabirds in the 2023 breeding season and in subsequent years. Some surviving seabirds are likely to develop resistance to HPAIV but depletion of populations may be considerable.

Ecological theory and empirical evidence suggest that seabird populations are likely to recover from depletion by HPAIV as a consequence of compensatory density-dependence. Although theory predicts the possibility of ecological or genetic Allee effects/depensatory density-dependence affecting seabird populations that are reduced to very small numbers, empirical evidence for Allee effects (depensatory density-dependence) is very limited and in many cases appears to be overwhelmed by influences of average nest site quality increasing as colony size declines (a compensatory density-dependent relationship). There is little or no evidence that genetic Allee effects occur in seabird populations reduced to very small size, and there is no clear evidence for any strong Allee effects in most seabird species (desertion of colonies by terns subject to predation impacts may represent a significant depensatory effect in those species but may also be seen as birds moving to higher quality nest sites where breeding success can be higher).

Recovery of seabird populations depleted by HPAIV may take many years and possibly several decades. Populations might never recover to previous numbers if carrying capacity has reduced as a consequence of ecological change (climate change in particular, but also change in fisheries management affecting availability of food to scavenging seabirds). It is likely that many seabird breeding features of Special Protection Areas (SPAs) in Scotland will be considered to have moved from favourable conservation status to unfavourable conservation status as a consequence of depletion of breeding numbers by HPAIV. It seems unlikely that this anthropogenic strain of avian influenza could be considered a normal environmental pressure for seabirds since it is as anthropogenic as seabird bycatch or plastic pollution.

It will be important to take account of the effects of the HPAIV epidemic on seabirds in the West Orkney Windfarm (the Project) impact assessments. Key to any impact assessment is matching the time scales of the site-based data collection used to inform the impact assessment with the colony based counts used in the assessment. The majority of the digital aerial survey data collected for the proposed development were obtained prior to the severe population level effects on seabirds. Adjusting the analyses of data on a species by species basis could be used to prevent incorrect comparisons of impact levels with mismatched population size estimates. Population size

estimates could be adjusted based on current, precautionary, knowledge of the impacts of HPAIV infection on adult populations, but these should only be used with predicted impacts on demographic rates, not absolute predicted impacts from the proposed development. Guidance from stakeholders will need to be taken into account as it emerges.

1 INTRODUCTION

1. Highly Pathogenic Avian Influenza virus (HPAIV) hit seabirds around the North Atlantic in 2022, causing mass mortality of breeding adult great skuas *Stercorarius skua*, Sandwich terns *Thalasseus sandvicensis* and gannets *Morus bassanus*, and killing smaller numbers of gulls, Arctic terns *Sterna paradisaea* and common terns *S. hirundo*, auks, and fulmars *Fulmarus glacialis*. This outbreak was unexpected and largely caught seabird ecologists by surprise, although there had been a much smaller outbreak in great skuas in 2021. The impact of HPAIV on seabirds will only become clear in a few years from now, which causes problems for the assessment of impacts of offshore wind farms on seabirds. Not only may baseline conditions be altered by mortality caused by HPAIV, but behaviour of seabirds may alter as a consequence of HPAIV, and the population dynamics of seabirds may change as a consequence of changes in density-dependence resulting from acute mortality reducing seabird population size. This report considers these issues based on the limited information available about HPAIV in seabirds and the more extensive literature on density-dependence in seabirds and case studies on seabirds subject to severe and acute depletion of population size.
2. Virus testing in dead wild birds is carried out by the Animal and Plant Health Agency (APHA) which is an executive agency of Defra and also works on behalf of the Scottish Government and Welsh Government. Defra has a hotline for communication of mass mortality of wild birds. However, existing policy is only to test one or two individuals of each affected species from each region every few weeks, and so the vast majority of seabirds that died from HPAIV were not tested for the virus. Numbers testing positive for HPAIV listed by Defra provide very little indication of the scale or location of HPAIV outbreaks. For example, 1,500 dead adult great skuas at Foula in summer 2022 were initially considered not to need testing because several great skuas elsewhere in Shetland had already tested positive for HPAIV. Eventually Defra/APHA agreed to test a maximum of three birds from Foula, all of which tested positive for the virus. In contrast, several gannets washed up on beaches were tested in many counties around the UK but provide little or no indication of where most of that mortality occurred; more gannets from beaches in Cornwall were tested than from beaches in Shetland, despite very much higher numbers of gannets being affected by HPAIV in Shetland than in SW England.
3. SNCBs communicate closely with APHA about virus testing, but the huge numbers of seabirds found dead in 2022 all around the UK presented a major challenge to resource available for virus testing. NatureScot provided fortnightly summaries of HPAIV in Scottish seabirds through 2022, but that list, although very helpful and informative, was indicative rather than comprehensive. There is no comprehensive database of HPAIV impacts on wild birds.
4. Although risk to humans from HPAIV is very small, globally there have been hundreds of human deaths caused by contracting Avian Influenza, almost all associated with poultry farming, with a very high death rate for those who contract the infection from infected birds (WHO 2022). Therefore, UK and Scottish Government guidance is for people to avoid contact with dead birds that might carry HPAIV. This is a sensible precaution but has inhibited research into the outbreaks in 2021 and 2022 in UK seabird populations.
5. Four forms of HPAIV transmission from infected birds to healthy birds should be considered: (1) as a result of the consumption of infected prey or carrion by predators or scavengers, (2) by transfer of virus in secretions or in the air, most likely between adjacent birds in colonies but potentially in flocks elsewhere, (3) through faeces excreted by infected birds, and (4) from

virus shed into freshwater from infected birds or leaching from carcasses of dead birds (Camphuysen et al. 2022). Although close physical contact between individual birds at colonies is most likely to promote infection, influenza viruses deposited into the environment by wild birds may also lead to further infections and mortality events (Ramey et al. 2022). Water-borne HPAIV transmissions were the main determinants of disease dynamics and observed prevalence levels in the Camargue (France), which highlights the importance of the persistence of viral particles in water to infect wild birds (Roche et al. 2009). Fresh-water bodies, or wetlands, may represent an important medium in which infectious influenza viruses reside outside of a biotic reservoir. There is little information regarding the persistence of infectious influenza viruses in the field at ambient temperatures, but in a study in one of the mildest climate zones in Alaska, some influenza A viruses remained viable for more than one year (Ramey et al. 2022). However, the relative importance of these different means of transmission remains unknown, and almost certainly varies considerably according to the ecology of each seabird species. It might be reasonable to guess that scavengers such as great skuas and large gulls would be likely to pick up infections from feeding on seabirds that have died from HPAIV, while transmission between birds at colonies might be most important where birds nest in close physical contact (as with terns, common guillemots *Uria aalge*, kittiwakes *Rissa tridactyla*) but be less likely with seabirds that nest far apart (as with skuas) or in burrows (as with puffins *Fratercula arctica*, shearwaters, storm-petrels).

6. Natural England produced guidance in September 2022 on HPAIV in seabirds and offshore wind farm impact assessments in English waters (NE 2022). They state "We are currently unclear what the short, medium and long-term effects of the 2022 HPAI outbreak will be on seabird colony abundance and vital rates (productivity and survival). We expect HPAI to remain a threat to UK breeding seabirds for the foreseeable future. It will take several years for data to be gathered on abundance, mortality and productivity, so we will need to work with imperfect knowledge in the interim. We must work collectively to ensure that seabird populations are made more resilient to the type of catastrophic event caused by HPAI. This includes delivering the actions relating to feeding, breeding and survival as outlined in Natural England's recommendations to Defra in the England Seabird Conservation and Recovery Plan". While these points relate specifically to England, the guidance will be broadly relevant to considerations in Scotland. Similar guidance is likely to be produced by NatureScot and Marine Scotland.

7. We may learn more about HPAIV in seabirds over the next few months. It is likely that some scientific papers will be published and there are plans for various Workshops. For example, NatureScot plans a workshop on 27 October. BTO plans a workshop on 2 November and two more later in November. This report must therefore be seen as interim in a situation where new information may well appear soon.

2 HPAIV IN SEABIRDS IN NW EUROPE IN 2021 AND 2022

2.1 A need for caution in interpreting "facts"

8. Published scientific papers mostly avoid erroneous facts and unsubstantiated claims as a result of the rigorous peer-review process. However, with the HPAIV epidemic arising suddenly and before most scientists could engage in the study of impacts on seabirds, there are very few peer-reviewed published accounts. Where much of the evidence is available only from web pages, tweets, blogs, and newspaper articles, it is necessary to be very cautious about facts being presented. Even apparently reputable organisations may appear to provide highly misleading information.

9. For example, according to BirdLife International's statement on HPAIV in seabirds in 2022 (posted 8 August 2022) "*more than 80% of the UK's great skua population have been affected a country home to roughly 90% of its global breeding population*", "*The Netherlands lost up to 80% of its breeding population of Sandwich terns in a couple of weeks*", and "*over 20,000 dead northern gannets being washed ashore in Canada*" (BirdLife 2022). No references are cited to support any of these facts.

10. The first 'fact' is simply wrong. RSPB estimate that 56% of the global population of great skuas breeds in the UK (RSPB 2022). The global breeding population of the great skua was estimated at 16,000 pairs by Mitchell et al. (2004) with 60% of these in the UK, far below the 90% stated by BirdLife. According to BirdLife, the global population of the great skua is 16,300 to 17,200 pairs (BirdLife datazone[1]), similar to the estimate by Mitchell *et al.* (2004). Breeding numbers in the UK have increased in some smaller colonies since 2000 but have decreased considerably at some of the largest colonies (Furness 2022; JNCC 2022). Numbers in some regions overseas such as Norway and Russia have increased considerably, so the estimate that 90% of the global population is in the UK is incorrect now, as it was in the recent past. The BirdLife estimate that 80% of the UK's great skua population has been affected by HPAI in 2022 also appears to be a guess and probably an exaggeration. The most detailed study at any great skua colony in 2022 was by Camphuysen and Gear (2022) at Foula. They reported a 57% decline in breeding numbers at Foula in 2022 compared to the previous census in 2015, with the reduction by the end of the 2022 breeding season estimated at between 60 and 70%. Not only is their estimate well below the BirdLife 80%, but this colony was already declining in numbers (Furness 2022), so HPAIV is unlikely to be the only cause of decline since 2015. Most great skua colonies in the UK were not investigated at all in 2022, so the scale of the loss in most colonies is simply unknown yet. It seems unlikely that more than 80% of the UK great skua population died in 2022, but no accurate figure can be given yet.

11. The second 'fact' is not entirely consistent with reported detailed studies on Sandwich terns in The Netherlands in 2022. That research found 8,001 dead adults at ten colonies (22% of breeding adults) plus another 1,600 dead adults away from colonies (Rijks et al. 2022, Mardik Leopold pers. comm.) from a population estimated at 30,000 to 40,000 breeding adults (Rijks et al. 2022). However, the researchers concluded that most of the remaining adults were likely to have become immune to HPAIV, that at an eleventh colony there was no mass mortality and a 'normal' fledging success, and that about 600 pairs that had abandoned an infected colony

[1] http://datazone.birdlife.org/home

bred at a new nearby site with very little sign of any HPAIV mortality (Rijks et al. 2022, Mardik Leopold pers. comm.).

12. The third 'fact', that over 20,000 gannets were washed ashore in Canada seems not to be supported by any authoritative published evidence. Professor Bill Montevecchi, the leading expert on gannets in Canada has suggested that many thousands of gannets died, but that the impact of HPAIV on seabirds in Canada in 2022 was more severe for guillemots than for gannets, and that it is unlikely that 20,000 gannets were counted on Canadian coastlines. When I emailed BirdLife to ask where the estimate of over 20,000 gannets being washed ashore in Canada came from, they said they could not find any such source but that 20,000 was 10% of the population estimate, and they simply changed the online post to '*over 8,000 dead northern gannets being washed ashore in Canada*'. The '*over 8,000*' "fact" appears to be based on suggestions by Radio Canada that about 8,000 seabirds, mostly gannets, were washed up on Canadian beaches (Radio Canada 2022). However, Professor Montevecchi suggested that guillemots died in larger numbers than gannets, so even the 8,000 total may not be taken as an accurate estimate of gannet mortality. Radio Canada noted that whereas large numbers of gannets died in the Magdalen Islands and Acadian Peninsula, very few were affected by HPAIV at Bonaventure Island. In relation to Bonaventure Island, they quote seabird ecologists as saying "*we are talking about a few hundred dead gannets in a colony of more than 100,000 individuals. There is almost no difference visually*". Indeed, breeding numbers at Bonaventure Island were considered to be higher in 2022 than in 2020 (Radio Canada 2022). Clearly HPAIV did have a big impact on gannets in Canada, but the scale of the mortality seems rather uncertain, and apparently highly variable among colonies.

13. A National Geographic article titled "The UK's largest avian flu outbreak has left millions of birds dead – and scientists extremely concerned" (National Geographic 2022) quotes an RSPB spokesperson "*We haven't seen a species go globally extinct in Europe since the last two great auks were hunted down off the coast of Iceland in 1844. Seabird populations are already extremely poor in heart, so for some like the great skua, bird flu could be the straw that breaks the camel's back: we cannot let the species go extinct on our watch*". No source for the estimate of "millions of birds dead" is provided, but "millions" apparently refers to numbers of chickens culled at chicken farms to prevent further spread of the disease in intensive poultry farming, so does not relate to impacts on wild birds, despite the expressed concern about great skua extinction risk. The great skua might be at risk of extinction from HPAIV, but the evidence available so far does not give strong grounds to expect that outcome.

14. These examples simply serve to indicate that extreme care needs to be taken when evaluating evidence about HPAIV impacts on seabirds presented online, in social media or newspaper articles. We have tried to be careful in this report to avoid presenting any misleading or unsupported data by:

    1. Carefully evaluating the original reports that present estimated impacts;
    2. Not repeating any reported impacts that are themselves unsupported by a cited data source;
    3. Presenting citation details of the original reports so that these can be followed up for further detail;

4. Where reports lack details of the methods used or the original source, we have tried to contact the authors to obtain these details, or we have contacted local seabird ecologists with good knowledge of the populations/colonies to get their expert opinion;
5. We have cited named expert opinion as in litt or pers comm to indicate exact sources of evidence.

15. Nevertheless, we emphasise that all estimates of impacts of HPAIV on seabirds in 2021 and 2022 outlined in this report must be treated with great caution, because of the difficulty of obtaining accurate measures under the extremely challenging circumstances of an unprecedented epidemic.

2.2 The origin of the HPAIV epidemic in seabirds

16. Avian influenza has been affecting wild and domestic birds for many decades. Many wild birds have resistance to the low pathogenicity strains of avian influenza (LPAIV) and show only mild symptoms if any, when infected. The evolution of a "new" strain of avian influenza, H5N1, or so-called HPAIV, has changed the situation dramatically. The H5N1 lineage of the avian influenza virus arose in the early 1990s and became endemic in poultry (originally in domestic geese) in southeast Asia (Chen *et al.* 2005). It has circulated in chicken farms since the early 1990s, resulting in mass culls of chickens when outbreaks occur. A H5N1 outbreak affecting wild geese was reported in 2005, and this was the first reported instance of a highly pathogenic strain of avian influenza causing mass mortality in wild birds. In Europe, further outbreaks have occurred annually in wild birds, especially waterfowl, since 2006 (Globig *et al.* 2009, Cui *et al.* 2022), while Asian-origin HPAIV infections in wild and domestic birds in the New World were detected for the first time in winter 2014/15 (Jhung and Nelson 2015). In virtually all earlier outbreaks, migratory Anseriformes (mostly wild geese and ducks) and Charadriiformes (waders and some gulls) were involved, and mortality issues were most prominent in winter. Breeding seabirds were seemingly unaffected, or mass mortality events could not be attributed to HPAIV outbreaks, even though certain seabird species, notably auks, also acted as hosts of low pathogenic influenza virus variants (Huang *et al.* 2014, Wille *et al.* 2014, Lang *et al.* 2016). Over three decades, the ecology of HPAIV H5N1 has significantly changed from sporadic outbreaks in domestic poultry to persistent circulation in wild birds (Sonnberg *et al.* 2013). Migratory birds have played a role in moving the virus around the world, and this can be traced from phylogenetic analysis of virus genome. For example, a clade found in poultry in South Korea in January 2014 was rapidly carried by migratory waterfowl around much of the northern hemisphere (Lycett *et al*. 2016). Over the years, infections have been detected in an increasingly wide range of bird species including wildfowl, waders, gulls, terns, cranes, grebes, herons, pelicans, gamebirds, corvids, raptors, but also more recently in mammals, including humans (Kaplan and Webby 2013, Huang *et al.* 2014, Wille *et al.* 2014, Lang *et al.* 2016, Convention on Migratory Species 2022, WHO 2022).

17. In 2018, HPAIV was detected in swift terns *Thalasseus bergii* and several other seabird species on the west coast of South Africa. In 2021, more than 24,000 Cape cormorants *Phalacrocorax capensis* and Cape gannets *Morus capensis* died on the west coast of South Africa and in 2022 the virus was detected in the endangered African penguin *Spheniscus demersus* near Cape Town (Daily Maverick 2022).

18. Some 2,500 pelicans died of HPAI in late January 2021 in Senegal/Mauritania (BirdLife 2022). However, the first major outbreak of HPAIV in breeding seabirds in Europe was not detected until late summer 2021.

2.3 The HPAIV outbreak in North Atlantic seabirds in 2021

19. Exceptional mortality of breeding adult great skuas was reported in July 2021 on several Scottish islands, prompting a disease investigation which subsequently detected HPAIV H5N1 clade 2.3.4.4b as the cause of the mortalities (Banyard *et al.* 2022). The first dead great skuas were reported just before the end of June, HPAIV infections were confirmed on 20 July, and the last casualties were found in autumn 2021. Affected areas were Hirta (St Kilda), the Flannan Isles, Orkney, and seven locations in Shetland (Fair Isle, Mainland, Papa Stour, Noss, Yell, Fetlar, Unst). H5N1 infections were detected in samples taken at St Kilda, the Flannans and Fair Isle. At St. Kilda (with a population of at least 211 Apparently Occupied Territories (AOTs) in 2019; JNCC 2022) and Fair Isle (430 AOTs in 2020; JNCC 2022), more than 10% of the breeding birds were found dead, with the very likely possibility that more birds had died but were not found (Banyard *et al.* 2022). Breeding productivity at the colonies was very low in 2021, possibly as a consequence of the HPAIV outbreak. One great black-backed gull *Larus marinus* that died at the Flannan Islands also tested positive for HPAIV but only in bulk viscera and not in swab material (Banyard *et al.* 2022). The HPAIV outbreak in 2021 in great skuas has apparently been overlooked by some ornithologists who suggest that the 2022 outbreak was the first to occur in UK breeding seabirds (e.g. Pearce-Higgins and Toms 2022).

20. At Foula, Shetland, in 2021 unusually high mortality of adult great skuas was noticed with at least four times as many dead adults as normal early in the breeding season and several sick adults seen later in the season (Gear 2022). Breeding success in 2021 was zero in the monitoring area, the first time complete breeding failure by great skuas had ever been recorded at Foula (Gear 2022), but no dead birds from Foula were tested for HPAIV. Given the similarity of events at Foula in 2021 to the cases at other great skua colonies nearby, it seems reasonable to assume that HPAIV affected the birds at Foula too.

21. No unusual mortality of any other seabirds was noticed at colonies in Scotland in 2021, suggesting that the epidemic of HPAIV was limited to great skuas. However, Camphuysen and Gear (2022) note that in April 2021, seven times the normal background densities of dead gannets were recorded on beaches in The Netherlands, the highest number in the 45 years of data (Figure 1). When great skuas travelled towards their breeding grounds in April 2021, they must have encountered unusual numbers of dead gannets floating within the southern North Sea. If those gannets had already been infected with HPAIV (causing the unusual mortality rates in April 2021), this could explain how great skuas (as scavengers) have picked up the virus on their way to their own colonies in spring 2021. In spring 2022, great skuas were seen scavenging on dead gannets at sea, and the even higher peak in numbers of dead gannets in the southern North Sea in spring 2022 (Figure 1) suggests that this same pattern most likely occurred in both these years. Apparently almost all these dead gannets were in full adult plumage and were in very good body condition with plenty of subcutaneous fat (Kees Camphuysen, pers. comm.), indicating that they had not starved as is often the case with beached birds. This strongly hints at HPAIV killing gannets in spring in the southern North Sea in 2021, but unfortunately none of those dead birds were tested for the virus.

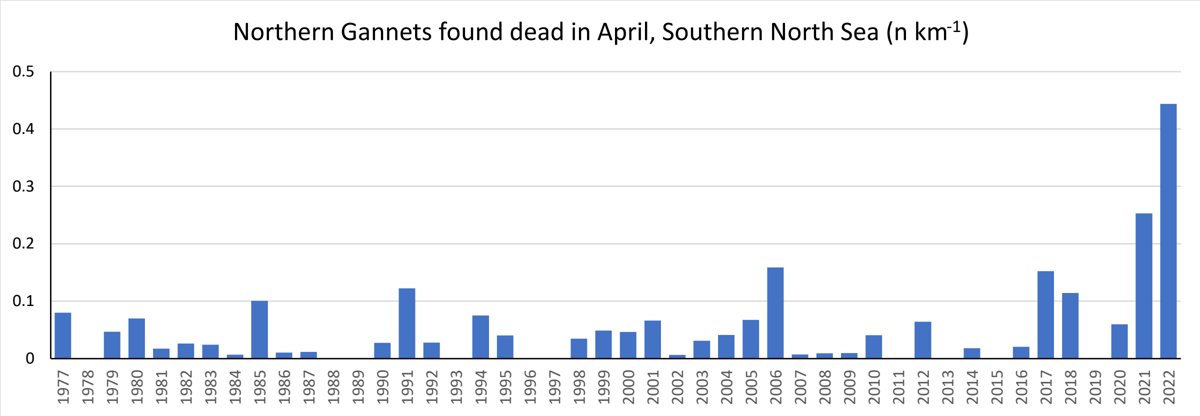


Figure 1. Long-term beached-birds survey data of northern gannets in April in the southern North Sea, based on systematic surveys in The Netherlands (Camphuysen and Gear 2022, calculated from data published in Camphuysen 2022).

2.4 The HPAIV outbreak in North Atlantic seabirds in 2022

22. HPAIV was confirmed in eider ducks *Somateria mollissima* at Shetland and a great black-backed gull at Fair Isle in April 2022 (Philip and Tyler 2022). The first clear indication of the resumption of the epidemic of HPAIV in North Atlantic seabirds in 2022 was detected in mid-April 2022, when unprecedented numbers of dead adult great skuas were found at Foula, Hermaness, Fetlar, Noss, and Fair Isle. At about the same time, dead great skuas were again being found at St Kilda. Very soon it became clear that northern gannets were also being affected, with dead gannets at the colonies at Hermaness and Noss and in the sea around Shetland. At Shetland in May or June a small number of other seabird species tested positive for HPAIV, including herring gull *Larus argentatus*, great black-backed gull and Arctic tern, but up until the end of June almost all mortality attributed to HPAIV was in great skuas and gannets. Shetland great skua colonies were thought to have declined in breeding numbers attending colonies by more than 50% by late June, but it is impossible to know how much of the decline was due to birds leaving the area because of the situation rather than dying of HPAIV. It is likely that some partners of birds that died may have abandoned the area and some pairs may have chosen to do so. Reduced numbers at colonies cannot be assumed to indicate the scale of mortality, just as it would be inaccurate to assume that numbers of dead birds found at colonies indicate the total numbers that died from HPAIV. It appeared that immature/nonbreeding birds abandoned colonies exceptionally early, presumably in response to the sudden mortality event occurring. Miles *et al*. (2022) report that over 1,000 gannet corpses were seen at Hermaness and over 1,000 gannet corpses were seen at Noss, the vast majority being full adults. Gannet AONs at Noss in 2022 at 11,472 AONs were 17% lower than the count in 2019, but it is uncertain whether the "missing" birds had died or abandoned the colony because of the situation in 2022. Only 103 great skua AOTs were found on Noss in 2022, down by 78% from the 476 AOTs in 2018. On Mousa, great skua AOTs in 2022 (36) were 40% down from the most recent count (60 AOTs in 2017). By the end of the summer positive HPAIV tests had been obtained from dead birds sampled in Shetland of eider, great skua, gannet, Arctic tern, herring gull, great black-backed gull, and long-tailed skua *Stercorarius longicaudus*. A few dead seabirds were seen (as normal or slightly more than normal) for Arctic tern, kittiwake and large gulls. However, only great skua, gannet and eider were observed in exceptional numbers of dead birds at Shetland. There

was no sign of HPAIV affecting any auks or petrels in Shetland. Despite HPAIV in great skuas and gannets, Arctic tern and kittiwake had an unusually good breeding season in Shetland in 2022 with increased numbers and increased breeding success compared with recent years, while guillemot and razorbill did at least as well as in recent previous years (Miles *et al*. 2022).

23. HPAIV was not noticed in seabird colonies in Orkney until mid-May, when it was confirmed in great skuas in Orkney. In June, very small numbers (mostly fewer than 5 individuals) of great black-backed gulls, kittiwakes, common guillemots, common gulls *Larus canus* and fulmars were affected at Orkney.

24. In the Western Isles, great skuas were found dead in large numbers at colonies at St Kilda, Lewis, Barra and Mingulay and in small numbers on beaches throughout the Western Isles. Gannets were affected at St Kilda and were also washed up on beaches throughout the Western Isles. Almost all individuals on beaches were in full adult plumage despite there being immature birds flying past the area (Bob Furness, pers. obs.). There were no signs of HPAIV affecting seabirds at Canna, Colonsay, Staffa or Mull in May-June 2022, although that changed later in the season.

25. In east Scotland, there were higher than normal numbers of dead gannets on beaches from May onwards. Sandwich terns at St John's Pool, Caithness were affected, but Sandwich terns at Sands of Forvie were not (Philip and Tyler 2022). Small numbers of great black-backed gulls and herring gulls were affected, but the main mortality was in gannets at Troup Head and Bass Rock (Philip and Tyler 2022). Although a few adult great black-backed gulls were dead on the shore at East Caithness Cliffs SPA in May and June, breeding numbers at the main colonies in the SPA were slightly higher in 2022 than they had been in 2021 or 2015 (Bob Furness, pers. obs.) suggesting that HPAIV had not significantly affected overall breeding numbers of that species in East Caithness Cliffs SPA. Large numbers of common guillemots, razorbills *Alca torda* and puffins were affected at St Abb's Head, and HPAIV was detected in seabirds at the Isle of May, but the impact there was apparently smaller than at St Abbs Head (Philip and Tyler 2022).

26. Relatively late in the seabird breeding season, over 150 adult common terns were found dead on the Avoch tern raft (Moray Firth) and HPAIV is thought to have killed half the population there (Philip and Tyler 2022). Over 50 kittiwakes were very freshly dead in mid-July at a colony of about 150 pairs at Berriedale, East Caithness Cliffs SPA (Bob Furness, pers. obs.) where at the same time large numbers of chicks were just fledging. Large numbers of dead guillemots were found on beaches in east and west Scotland in August-September 2022, suggesting that significant mortality of auks probably occurred late in the breeding season. Over 1,000 dead guillemots were reported from the west coast of Scotland (Philip and Tyler 2022). Quantifying that impact is unlikely to be possible at present since birds were dispersing away from colonies at the time so the evidence for the impact will probably not be available until birds return to colonies in spring 2023. However, Highland Ringing Group received over 100 recoveries of dead ringed adult guillemots from the Canna colony in late summer-early autumn, most of those being found on the coast of Skye (Bob Swann, pers. comm.), which is an unprecedented number of recoveries of ringed adult auks from that colony within a single autumn.

27. Presence of HPAIV was tested in samples of dead seabirds by APHA on behalf of Defra. Only small numbers were tested, and only from sites that were convenient for sampling (for example only three great skuas from Foula were tested from the 1,500 dead adults found there, but all three tested positive for HPAIV). Seabirds testing positive in Scotland in summer 2022

included great skua (Shetland, Orkney, Handa, St Kilda, Lewis), gannet (Shetland, Orkney, Western Isles, east and west coasts of mainland Scotland), common guillemot (east and west coasts of mainland Scotland), razorbill (Golspie and Islay), puffin (Isle of May, St Kilda, Islay), Arctic tern (Shetland, Isle of May), Sandwich tern (Caithness), great black-backed gull (Shetland, Handa), lesser black-backed gull *Larus fuscus* (Handa), herring gull (Caithness, east coast of mainland Scotland), common gull (east coast of mainland Scotland), black-headed gull *Chroicocephalus ridibundus* (Aberdeenshire), kittiwake (Caithness, Isle of May), Manx shearwater *Puffinus* (Rum). In addition, great northern diver *Gavia immer* (Embo) and eider (Shetland and Isle of May) tested positive. The overall picture is that great skua and gannet were very severely affected at most of their colonies in Scotland, while many other species of seabirds in Scotland were affected in small numbers at some colonies but the impacts on the other species were of very uncertain magnitude and highly variable among locations. In late September a fulmar sampled from north Scotland tested positive for HPAIV, confirming the virus in this species which had appeared to be unaffected throughout spring and early summer. The extent to which fulmars became infected is uncertain as only relatively few were reported dead in late summer, but this indicates that the infection may well have spread into some other seabird species without being evident. There is uncertainty as to whether any storm-petrels have been infected, and the infection of Manx shearwaters (which was confirmed at Rum) appears to have been minimal but has not been assessed in detail (Philip and Tyler 2022).

28. In east England, HPAIV infection arrived at the Farne Islands SPA, where over 4,000 dead seabirds were collected for disposal (National Trust web pages and Gwen Potter, pers. com.). These included guillemots, kittiwakes, razorbills and terns. At Coquet Island SPA, the 2022 seabird breeding season appeared at first to be very promising with increased numbers of Sandwich terns (2,214 pairs) and roseate terns (154 pairs) in particular. Small numbers of dead adults were found from 19 May to 16 June, with one or two each day (Alfarwi 2022). However, large numbers of birds, predominantly terns, died between 17 June and 31 July, with 2,122 dead birds (this total including chicks as well as adults) collected and buried (in an attempt to reduce spread of the virus). According to Natural England about 50% of adult roseate terns at Coquet Island SPA died of HPAIV in 2022 (NE 2022). According to Alfarwi (2022) about 54% of roseate tern nests were "lost" with deaths of 60% of the chicks, while 100% of the Sandwich tern chicks died. At Coquet Island a great skua that was present through the summer and scavenged on dead terns and gulls also died. It was suggested that the mobility of tern chicks was highly likely to have caused the rapid increase in deaths of terns in late June (Alfarwi 2022) but it is unclear whether human disturbance at the colony (including walking through the tern colonies collecting dead birds each day) may have increased the movement of infected chicks and so contributed to the spread of the infection.

29. There was mortality of seabirds at Flamborough and Filey Coast SPA and of Sandwich terns, in particular at North Norfolk Coast SPA. According to Natural England about 10% of Sandwich tern adults at North Norfolk Coast SPA died of HPAIV in 2022 (NE 2022). Gannets at Grassholm, at colonies in Ireland and at colonies in the Channel Islands were also affected, but relatively late in the summer compared with colonies in the north.

30. Elsewhere in the North Atlantic HPAIV was confirmed in seabirds from The Netherlands to Spitsbergen, Iceland and Canada. Great skuas and gannets were particularly severely affected at most or almost all of their North Atlantic colonies, including in the Faeroes, Iceland, Canada and Bear Island. Hundreds of adult gannets died at Helgoland, Germany, and as at some UK

gannet colonies, breeding success there was exceptionally low at around 0.1 chicks per nest (Volker Dierschke, in litt.). Sandwich terns were severely affected in The Netherlands (Rijks et al. 2022), but HPAIV also occurred in gulls and other terns there (Kees Camphuysen pers. comm.).

31. Virus sequence phylogenetic analysis showed that HPAIV was transported by migratory birds, probably geese, from Europe to Newfoundland (Caliendo et al. 2022a). In Canada, some tens of thousands of seabirds died, with the outbreak starting in May 2022 in gannets south-west of Newfoundland, then spreading east to colonies off the south and east coasts of Newfoundland in July, and then northwards into Labrador in August (Bill Montevecchi, in litt.). In Canada, the highest mortality was thought to occur in guillemots, with somewhat lower mortality in gannets and razorbills and less still in puffins, kittiwakes and gulls and some apparently very limited mortality of fulmars and shearwaters (Bill Montevecchi, in litt.).

32. The outbreak in great skuas and gannets at Foula was monitored in great detail by Kees Camphuysen and Sheila Gear who carried out daily searches over different parts of the entire island to build up a map of the locations of dead great skuas and to investigate the ecology of the disease in this colony. They found 1,500 dead adult great skuas at the colony. Their report represents the most detailed study carried out on HPAIV in a seabird colony (Camphuysen and Gear 2022). Based on the condition of corpses, the deaths began in mid-late April, but most died during late May. Early in the epidemic the deaths mostly occurred at or close to freshwater bathing sites, but with relatively more of the late deaths occurring within nesting territories. Birds died very suddenly, in good body condition, and usually with spasms that resulted in freshly dead birds being in characteristic posture (shown in numerous photos in that report). Camphuysen and Gear (2022) noted a 57% decline in breeding numbers (AOTs) of Great Skuas at Foula in comparison with census results obtained in 2015. They concluded that, given ongoing mortality throughout the summer, this must be seen as a conservative estimate and that a 60-70% decline in occupied territories is likely.

33. It is likely that a clearer picture of the impact of HPAIV on Scottish seabird populations will emerge in 2023 or later years, when changes in the numbers in breeding colonies will become apparent. However, it is highly likely that at least half of the breeding adult great skuas in Scotland died from HPAIV in the outbreaks in 2021 and 2022. Numbers of dead gannets at St Kilda, Hermaness, Troup Head and Bass Rock were in the low thousands at each of these sites, but whereas great skuas seem mostly to have died at colonies, many gannets died at sea and some washed up on coastlines throughout Europe. That makes estimating numbers that died almost impossible at the present time. It is likely that at least 10% and possibly more than 30% of breeding adult gannets from Scottish colonies may have died from HPAIV in 2021 and 2022 (mostly in 2022). Impacts on breeding numbers of guillemots may have been substantial at some colonies in 2022. Impacts on other seabird species appear to have been smaller and more localised. However, it seems highly likely that there will be further outbreaks in the 2023 breeding season (and possibly on the wintering grounds of some seabirds), so the medium-term impacts of HPAIV on seabirds may be considerably worse than what occurred in 2022 alone. Furthermore, with major impacts on the same seabird species in other countries too, there will be little scope for recolonisation by immature birds from overseas coming to Scottish colonies to fill gaps created by HPAIV.

3 RESPONSES OF SEABIRDS TO ACUTE IMPACTS TO POPULATIONS

3.1 Theoretical predictions

34. Ecological theory predicts that as colonies of seabirds increase in breeding numbers there will start to be increased competition for limiting resources leading to density-dependent reductions in mean fitness of individuals, resulting in reduced population growth. This is known as compensatory density-dependence, or negative density-dependence, and is widespread throughout nature. For colonial seabirds, limiting resources might be food around the colony or high quality nest sites, but the outcome is the same. As population size grows density-dependence will reduce breeding success, increase age of first breeding, reduce survival, or increase net emigration or a combination of these. Where seabird populations are close to environmental carrying capacity, an acute impact that reduces numbers moderately will reduce density-dependent competition, leading to improved demography that will tend to restore numbers towards carrying capacity. The population will naturally "bounce back" from the acute impact to restore numbers.

35. However, if numbers are reduced to very low levels then theory predicts the possibility of positive density-dependence, more often called an Allee effect, named after an American ecologist who developed the theory in this regard. Positive density-dependence reduces individual fitness as population size or population density decreases. Allee effects can be categorized as "strong" or "weak". Weak Allee effects reduce growth rate when population size is very small but growth rate remains positive so that population increases, though more slowly at first until numbers build up somewhat. Strong Allee effects occur if the growth rate falls negative when population size falls below a critical threshold abundance. If strong Allee effects occur, a population that is reduced below critical threshold numbers will decline at an increasingly rapid rate to local extinction.

36. Allee effects can be ecological or genetic. Ecological effects can occur if, for example, predation rates increase as bird numbers decline. This is likely in colonial species if adult birds communally defend eggs and chicks such that defence is less successful when numbers are smaller. Similarly, if foraging is communal/social then reduced numbers may reduce average foraging success. Ecological Allee effects can also include problems for individuals to locate a mate when population density is much reduced, but this is unlikely to be an issue for colonial seabirds as most immature birds can spend several years looking for a suitable colony to recruit into, and most start this process by returning to the colony where they were born. In some animals there is a need to modify the habitat, and that may be difficult when population size is very small, but this also is unlikely to apply to colonial seabirds.

37. Genetic effects can arise as a consequence of small population size leading to inbreeding, loss of genetic diversity (the genetic bottleneck effect) or genetic drift. Inbreeding increases when a population has become very small, so that fitness is reduced by inbreeding depression caused by increased phenotypic expression of deleterious recessive genes. A genetic bottleneck effect and genetic drift are also processes that become prominent specifically when population size is extremely small.

3.2 Empirical evidence relating to negative density-dependence (compensation) in seabird demography

3.2.1 Observational/correlational evidence

38. Horswill *et al.* (2016) reviewed published evidence for compensatory density-dependence in seabirds. Compensatory density-dependence was found across all of the demographic processes and seabird taxonomic groups that they reviewed with a variety of causal mechanisms. Across 89 studies of 27 species, significant evidence of compensatory density-dependence was found in 67 of the studies. These authors concluded that there is widespread evidence of the importance of compensatory density-dependence in seabird populations. Mechanisms of compensatory density-dependence included a relationship between recruitment into individual colonies and the availability of high quality nest sites, density-dependent relationships between availability of limiting resources and age of first breeding, rate of recruitment from the pool of nonbreeders, or in the incidence of nonbreeding. Numerous studies reported compensatory density-dependence in relation to population growth rate, adult survival, juvenile survival, breeding success and dispersal and the balance between immigration and emigration. In many cases the most obvious density-dependent compensation related to numbers of available nest sites (which is relatively easily quantified) but relationships were also evident with food supply around the colony (which is often more difficult to quantify). However, mechanisms of compensatory density-dependence also included examples of increased disease transmission at higher population density (Pöysä and Pöysä 2002), decrease in clutch size at higher population density (Coulson 1999), increased conspecific disturbance at higher population density (Grear *et al.* 2009) and increased cannibalism of chicks at higher population density (Coulson *et al.* 1982).

39. Horswill *et al.* (2016) fitted a relationship between seabird population size and population growth rate to illustrate the form of density-dependence. They used data for six types of seabird, including a diver, a scoter, a gannet, and three species of gull (kittiwake, herring gull and Audouin's gull *Ichthyaetus audouinii*). This showed a significant relationship, with population growth rate highest for the smallest population size and declining with increase in population size. However, that plot assumes that one individual of any of the included species is equivalent to one individual of any of the other species (despite a gannet weighing about six times as much as a kittiwake) and assumes that the carrying capacity baseline remains constant through the data time series. Because seabirds are long-lived but their prey is short-lived and subject to fluctuations driven by the environment, carrying capacity may fluctuate considerably. That may in part explain why the plot showed very high variance of population growth rate, especially close to the intercept (Horswill *et al.* 2016). The plot can be taken as further evidence for the importance of compensatory density-dependence, but with limited value in identifying the specific form of that relationship. Since the review by Horswill *et al.* (2016) several further studies have reported further examples that indicate clear evidence of compensatory density-dependence.

40. Modal age of first breeding by great skuas at Foula, Shetland, was seven years old in the 1970s when numbers were increasing and breeding success was high. However, age of first breeding increased at this colony in the 2010s when population size was declining due to reduced carrying capacity. By comparison, age of first breeding was younger at smaller colonies (Handa,

Fair Isle) indicating compensatory density-dependence in this demographic parameter (Furness 2015).

41. Juvenile survival of Audouin's gull decreased strongly with population size, indicating strong compensatory density-dependence (Payo-Payo *et al.* 2016).

42. Time-series analysis of herring gull and lesser black-backed gull population sizes in the British Isles showed compensatory density-dependence in the herring gull, and lesser black-backed gull showed faster population growth at lower herring gull densities (Nager and O'Hanlon 2016).

43. A positive association between availability of fishery discards and open-air refuse disposal on the egg volume of yellow-legged gulls at 20 colonies in the western Mediterranean was mediated by compensatory density-dependent mechanisms which was interpreted as relating to a density-dependent increase in competition for food for breeding birds (Real *et al.* 2017).

44. Analysis of tracking data for four species of breeding seabirds (kittiwake, common guillemot, razorbill and shag *Gulosus aristotelis*) in British and Irish waters showed that distribution at sea is dependent on compensatory density-dependent competition among sympatric conspecifics and in the case of kittiwake and common guillemot also on competition with conspecifics from neighbouring colonies (Wakefield *et al.* 2017), as originally inferred by Furness and Birkhead (1984) from the spatial distribution of different sizes of colonies.

45. Lamb *et al.* (2017) found evidence for compensatory density-dependent effects on foraging by breeding brown pelicans *Pelecanus occidentalis* with foraging range from the colony increasing with colony size. Individuals from larger colonies were more likely to migrate and travelled longer distances than individuals from smaller colonies. These authors concluded that "*density-dependent competition may be an important driver of both the extent of foraging ranges and the degree of migration exhibited by brown pelicans*".

46. A 49-year study of a wandering albatross *Diomedea exulans* population found that population size explained 60% of the variation in juvenile survival as a consequence of compensatory density-dependence, but that climate change had a stronger effect on overall population dynamics (Fay *et al.* 2017).

47. Analysing time series data for five seabird species in Alaska showed that all five populations exhibited compensatory density-dependent effects on population growth, but that the carrying capacity of the environment had changed considerably, increasing for common guillemots and Brunnich's guillemots *Uria lomvia*, decreasing for black-legged kittiwakes and tufted puffins *Fratercula cirrhata*, but remaining relatively stable for red-legged kittiwake *Rissa brevirostris* (Goyert *et al.* 2017). Subsequent analysis identified climate change as responsible for these changes in carrying capacity (Goyert *et al.* 2018).

48. Analysis of Humbolt penguin *Spheniscus humboldti* chick body condition at different sized colonies showed compensatory density-dependence, with evidence for local prey depletion around colonies (Cortes-Hinojosa *et al.* 2017).

49. Despite potentially confounding effects of industrial fisheries depleting forage fish off Peru, state-space models demonstrated strong evidence of compensatory density-dependence in the abundance of the three key seabird species of the Peruvian upwelling ecosystem (Barbraud *et al.* 2018).

50. An integrated population model of Audouin's gull based on a 28-year data set found that productivity and immature survival were the main drivers of population change, being high when the population was small but showing strong compensatory density-dependence (Genovart *et al*. 2018).

51. South polar skuas *Stercorarius maccormicki* showed reduced population growth as the population size increased, as predicted with compensatory density-dependence. This study inferred that competition for food and nesting space both are likely to be causal mechanisms for this pattern (Pacoureau *et al*. 2019).

52. Population modelling of kittiwakes validated against empirical time series data showed that models lacking compensatory density-dependence fail to provide realistic results, as do models that assume populations are closed to immigration/emigration. Realistic population models for seabirds require incorporation of density-dependence and meta-population structure (Miller *et al*. 2019).

53. Analysis of demographic parameters of kittiwakes over a 20-year period of change in colony size indicated that apparent survival of immature birds was strongly influenced by colony size during a cohort's second year, indicating compensatory density-dependence of immature survival, or colony-fidelity, in this population (McKnight *et al*. 2019).

54. Analysis of foraging trips by breeding Adelie penguins *Pygoscelis adeliae* showed that intra-specific competition for food around the colony was a major compensatory density-dependent influence on this species (Kokubun *et al*. 2021). Studying the same species, Southwell *et al*. (2021) provide evidence from analysis of population growth rates at colonies of Adelie penguin over 70 years that compensatory density-dependent effects have reduced the growth rate of the meta-population and individual colonies in East Antarctica, probably through a combination of limiting nesting habitat and limiting prey availability close to colony sites. The same authors previously concluded that suitable breeding habitat may be more limiting than food in this population, but that conclusions about food-limitation were hampered by lack of data on food availability (Southwell and Emmerson 2020).

55. In great cormorant *Phalacrocorax carbo*, chick body condition was negatively correlated with estimated foraging density of cormorants around the colony, especially within a range of 20 km. It was concluded that the size of the colony itself and of the nearest neighbouring colonies and the associated variation in density of foraging cormorants were major drivers of variation in chick condition between colonies and between years (Bregnballe and Frederiksen 2021).

56. The food-constraint mechanism for compensatory density-dependence at seabird colonies (often referred to as Ashmole's halo based on his theoretical prediction of the effect) was demonstrated empirically at a large seabird colony by Weber *et al*. (2021) by quantifying seabird foraging density and prey fish abundance around a major seabird colony. Prey fish abundance increased with distance from the colony up to a distance of >150 km.

57. Common guillemots at the Isle of May disproportionately used higher quality nest sites when sub-colony size was smaller, resulting in higher breeding success at lower population size (compensatory density-dependence), but new sites were established under all situations and those new sites could be of lower quality, which could act to slow population recovery after periods of reduced colony size (Bennett *et al*. 2022).

58. Tracking data were used to show that chick-rearing season foraging ranges of guillemots increase with colony size scaled to power 0.33, consistent with the theoretical expectation resulting from compensatory density-dependent depletion of prey resources around colonies (Patterson *et al*. 2022).

59. Changes in the numbers of great skuas in colonies in Scotland from 2000 to 2020 showed that small colonies grew considerably whereas the largest colonies either declined or increased only very slightly in numbers (Figure 2). Numbers of great black-backed gulls in colonies in Scotland all decreased from 2000 to 2020, but decreases were much larger at larger colonies (Figure 3). For both species, these changes were interpreted as being the result of compensatory density-dependence with a decrease in carrying capacity in recent years in terms of food availability (Furness 2022).

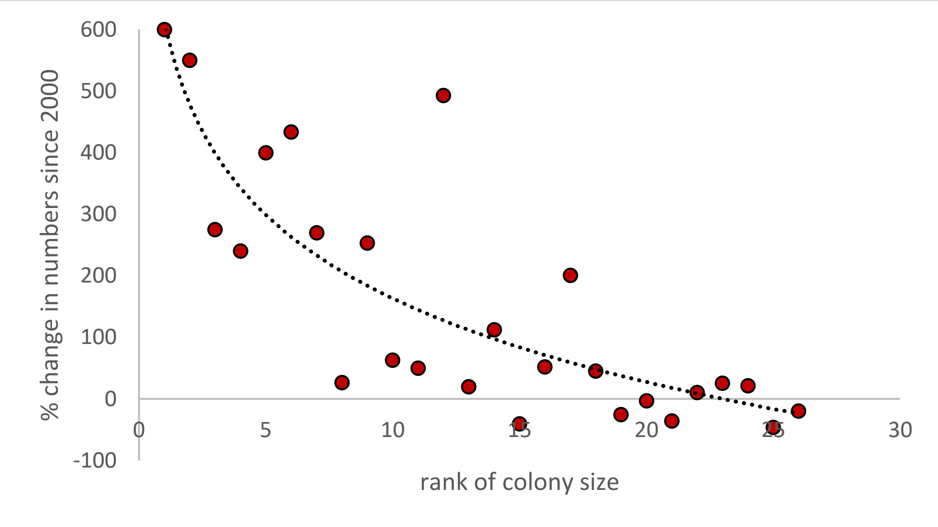


Figure 2. Change in breeding numbers of Great Skuas at colonies in Scotland since Seabird 2000 (up to 2020) in relation to rank of colony size (from smallest rank 1 to largest rank 26). The dotted line shows the best fit logarithmic regression (r=-0.825, p<0.001). From Furness (2022).

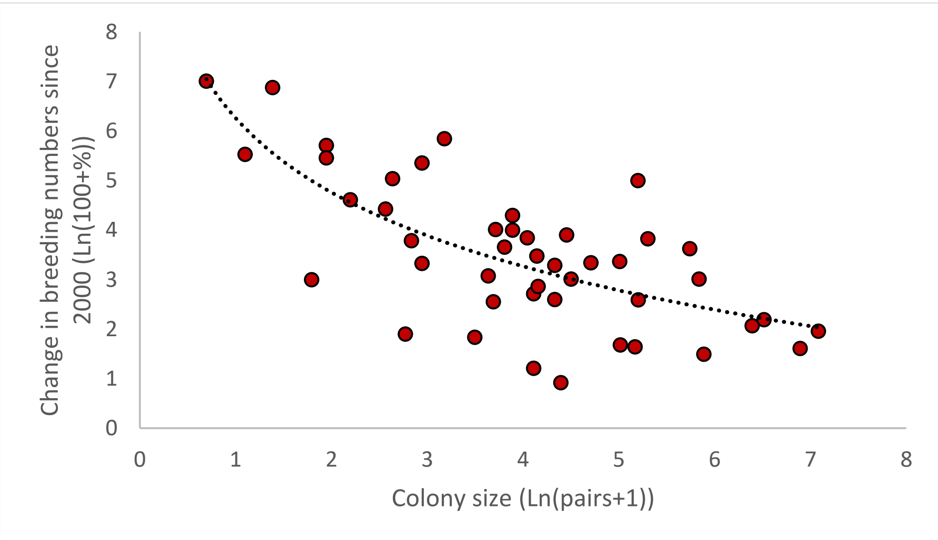


Figure 3. Change in breeding numbers of Great Black-backed Gulls (Ln transformed) at colonies in Scotland since Seabird 2000 (up to 2020) in relation to colony size (Ln transformed). The dotted line shows the best fit logarithmic regression (r=-0.708, p<0.001). From Furness (2022).

60. All of the above, taken together, provides overwhelming evidence for the importance of compensatory density-dependence in seabird populations, such that small to moderate reductions below environmental carrying capacity will result in changes to various demographic parameters that increase population growth rate to tend to bring numbers back towards carrying capacity.

3.2.2 Experimental evidence: culling

61. In addition to the observational/correlational evidence reviewed in 3.2.1, there is experimental evidence of compensatory density-dependence in seabird populations. Experimental evidence is often considered to be stronger than observational evidence because experimental design can avoid some of the potentially confounding relationships that might exist in purely observational studies. Culling of very large numbers of gulls at certain colonies provides a strong example of the response of a seabird population to experimentally-reduced population density.

62. At the Isle of May, Firth of Forth, the Nature Conservancy Council (NCC) culled about 45,000 herring gulls between 1972 and 1981. This reduced the colony size from an estimated 15,000 pairs in 1972 to about 3,700 pairs (Coulson *et al*. 1982). Several aspects of herring gull demography altered as a consequence of this cull. Firstly, the age of first breeding became younger. Before the cull there were no records of 3rd year birds breeding but after the cull some birds started to breed when only 3 years old, and the mean age of first breeding reduced by over one year (Coulson *et al*. 1982). There was evidence that the proportion of young birds returning to recruit into the Isle of May colony increased. Body weight and wing length of breeding herring gulls increased as the population size was reduced. There is evidence that this increase took place within individual cohorts and that individual birds gained body condition as a consequence of reduced competition either in the breeding or feeding areas (Coulson *et al*. 1982). Younger herring gulls lay smaller eggs than older herring gulls. However, despite the effect of culling being to reduce the average age of breeding gulls in the colony, average egg size increased, which also was considered to reflect an improvement in the body condition of adults as a consequence of reduced competition. All of these changes were interpreted by Coulson *et al*. (1982) as strong evidence of compensatory density-dependence that would result in the impact of the cull being mitigated.

3.3 Empirical evidence relating to positive density-dependence (depensation) in seabird demography

63. Gascoigne and Lipcius (2004) presented theoretical work confirming that Allee effects can be driven by predation. Since predation is a widespread phenomenon, this suggests that Allee effects could be widespread in nature. However, they noted that there are few empirical data confirming the existence of Allee effects. Gascoigne and Lipcius (2004) concluded that conservation biologists should be aware of the possibility of Allee effects in very small populations where extinction is likely, but that empirical evidence for these effects being important is very limited. Modelling indicates that Allee effects might be responsible for reduced recolonization distances when tern colonies are extirpated by predation, leading to parts of metapopulations becoming more isolated (Schippers *et al*. 2011). This may make Allee

effects less detectable in populations that have high rates of immigration/emigration between colonies.

64. In their literature review of density-dependence in seabirds, Horswill *et al*. (2016) found 11 out of 89 studies identified examples of depensatory (i.e. positive) density-dependence compared with 67 that reported compensatory density-dependence. Depensatory density-dependence was almost completely limited to increased predation of eggs and chicks at lower population densities, and was mostly observed in terns, small gulls and auks. The causal mechanism for depensatory predation was attributed primarily to the spacing of adults influencing the ability of a predator to approach nests, and to a limited extent to decrease in breeding synchrony and incubation tenacity at lower nesting densities (Horswill *et al*. 2016).

65. Yellow-legged gulls *Larus michahellis* are predators on Audouin's gull eggs and chicks. Analysis of the relationship between Audouin's gull breeding success and the relative abundances of Audouin's gull and yellow-legged gull in the area showed evidence of negative and positive density-dependence in this association (Oro *et al*. 2006). Breeding success decreased where Audouin's gulls were at high density, indicating negative density-dependence. Breeding success also decreased where the local abundance of yellow-legged gulls exceeded the local abundance of Audouin's gull, indicating predatory depensatory density-dependence (Oro *et al*. 2006). However, in this case study, depensatory density-dependence only became evident when the absolute abundance of the predator exceeded the abundance of the prey species, which is a relatively rare situation in ecology.

66. Apparent survival of adult Mediterranean gulls *Ichthyaetus melanocephalus* at colonies of different size in Belgium and The Netherlands showed no change across small colony sizes, but apparent survival of juveniles increased from colonies of <100 pairs to about 600 pairs (te Marvelde *et al*. 2009). This indicates no depensatory density-dependent effect for adult survival (or dispersal) but an effect for juvenile survival (or dispersal). For both adults and juveniles, apparent survival decreased with colony size when colonies were of more than 600 pairs, indicating negative density dependence across larger colony sizes. Highest survival in juveniles approximately coincided with the average colony size. For juveniles the depensatory effect was small (survival increasing from 0.5 in the smallest colonies to 0.6 at 600 pairs, and considerably smaller than the compensatory effect (juvenile survival falling from 0.6 at 600 pairs to <0.3 at 1,300 pairs.

67. Minias *et al*. (2015) found that fledging success of common terns was 30% higher on a raft holding *ca*. 100 nests than on three rafts holding 30-40 nests each but that chick body condition was poorer on the raft with larger number of nests. They cross-fostered chicks between the large and small rafts and showed that differences in chick condition were not inherited but were determined by local environmental conditions (specifically higher intraspecific competition at the raft with larger number of nests). Evidence for depensation in terms of fledging success may therefore possibly be confounded by impacts on chick condition or the levels of stress in adults, although in this case it seems likely that a 30% difference in fledging success is likely to have a greater demographic effect than a difference in body condition of surviving chicks. Similarly, Phillips *et al*. (1998) found that Arctic skua *Stercorarius parasiticus* hatching success and post-fledging survival were higher in parts of the colony where nest density was higher because adults nesting close together were better able to mob and repel attacking great skuas. However, Arctic skua chick growth rate was lower in these high-density

areas (Phillips *et al*. 1998). Although this example is one of the 11 cited by Horswill *et al*. (2016) as an example of depensatory density-dependence, that may not be the case if predation rates by great skuas are low. Under such conditions reduced chick growth may mean that density-dependence is compensatory, whereas under conditions of high predation rates the lower success of predation at higher nest density may be depensatory.

68. For species with positive density-dependence, costs and benefits of increasing density may depend on environmental conditions. Guillemots breeding at the Isle of May experienced a period of severe food shortage in 2007 and 2008 resulting in the lowest breeding success at this colony recorded over a 25-year period (Ashbrook *et al*. 2010). Birds were observed at nest sites to compare departures and arrivals of parents, food delivery to chicks, instances of aggression to chicks and any fatalities of chicks between low density and high density subgroups within the same colony under these adverse conditions. Birds at high density increased foraging effort more than birds at low density, often leaving their chick without a parent attending, whereas at low density unattended chicks tended to be killed by gulls or razorbills. However, at high density increased aggression of neighbouring conspecifics towards unattended chicks resulted in chick deaths, undermining benefits from collective defence against predators. The study concluded that there were previously unsuspected trade-offs between costs and benefits of increasing nesting density under changing environmental conditions (Ashbrook *et al*. 2010).

69. Predation rates by gulls on guillemot eggs and chicks were higher at declining colonies of guillemots because gulls were able to approach guillemot nest sites more easily when the birds nested at lower density (Gilchrist 1999). However, one consequence of decline in breeding numbers of guillemots was a shift to nesting in more protected sites. The birds studied by Gilchrist (1999) moved into areas inaccessible to gulls so avoided predation impacts when the numbers of guillemots reduced. Similarly, at Teuri Island, Hokkaido, guillemot numbers declined from 40,000 birds in 1938 to 8,000 in 1963, and to just 19 in 2010 (Hasebe *et al*. 2012). Up until 1994 the guillemots almost all nested in open habitat on sea stacks and ledges. As the population declined the impact of predation of eggs and chicks by gulls increased. After 1994 the reduced numbers of guillemots only nested in caves where they were no longer exposed to nest predation and there has been no significant decline in numbers between 1994 and 2010 (Hasebe *et al*. 2012). In the caves, nesting success was higher, reducing the rate of population decline to a negligible level compared to the situation before 1994. Although theory predicts that predation can impose depensatory density-dependent mortality, this can be avoided where birds are able to select higher quality nest sites that are safe from predators, as in this case for guillemots at Teuri Island. Despite the population being reduced to just 18 birds in 1994 and remaining at about that number until 2010, the high nest site quality of the few remaining pairs allowed relatively high breeding success without risk of nest predation and therefore prevented detection of any Allee effect in that extremely reduced population.

70. Votier *et al*. (2009) found a weak but statistically significant relationship between guillemot population size and timing of breeding. When population size was 4,000 the median laying date was Julian day 137. When population size was 16,000 the median laying date was Julian day 132. Laying earlier tends to result in higher breeding success so this relationship could possibly be an Allee effect through, for example, social stimulation. However, Votier *et al*. (2009) warned that due to the correlative nature of this result considerable caution should be expressed in the interpretation of this.

71. In Shetland the local sandeel stock collapsed in the 1980s. Kittiwake breeding numbers at Shetland fell from 54,664 pairs in 1981 to 15,825 pairs in 2000 (Pennington *et al*. 2004). The decline was attributed not only to food shortage for breeding kittiwakes but also to predation by great skuas (Heubeck *et al*. 1997, Oro and Furness 2002). As numbers declined, an increasing proportion of the remaining kittiwakes nested in very sheltered situations such as the back of large caves or under overhangs where great skuas find it difficult to manoeuvre (Pennington *et al*. 2004). Breeding success was higher at sheltered colonies, higher where local numbers of great skuas were smaller, and the rate of decline of kittiwakes at Shetland colonies was much higher at exposed colonies than at colonies sheltered from great skuas (Votier *et al*. 2008). Kittiwake numbers declined at Foula from 4,350 AONs in 1987 to 259 AONs in 2019 before a slight recovery to 425 AONs in 2021. However, the decline is a loss of >94% of the population between 1987 and the minimum count in 2019. Nevertheless, a plot of $\log_{10}$ kittiwake AONs against year (Figure 4) shows no sign of any detectable Allee effect at this colony, despite it being adjacent to the largest great skua colony in the world and subject to heavy predation by great skuas (Oro and Furness 2002, Church *et al*. 2018). The rate of decline (the slope in Figure 4) remains consistent throughout, with no acceleration towards extinction as predicted if there was a weak Allee effect and no sudden drop to extinction as predicted if there was a strong Allee effect.

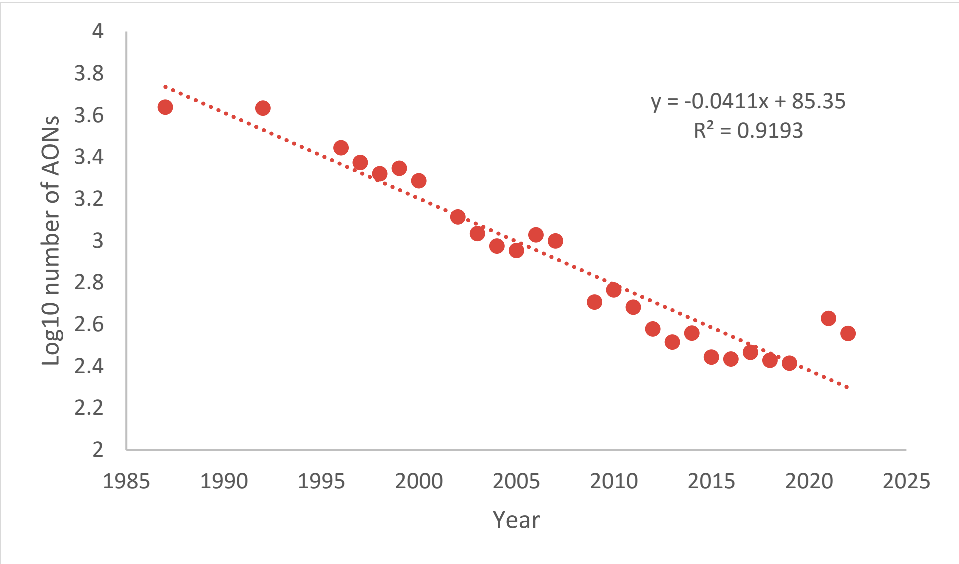


Figure 4. Log_{10} of kittiwake AONs at Foula 1987-2022. Census data from JNCC Seabird Monitoring Programme online database with data for 2022 from Miles et al. 2022.

72. Kittiwake numbers declined at Fair Isle from 18,159 AONs in 1992 to 323 AONs in 2021. The decline is a loss of >98% of the population between 1992 and 2021. Nevertheless, a plot of $\log_{10}$ kittiwake AONs against year (Figure 5) shows no sign of any detectable Allee effect at this colony, despite it being adjacent to a large great skua colony and subject to heavy predation by great skuas (Fair Isle Bird Observatory Annual Reports). The rate of decline (the slope in Figure 5) remains consistent throughout, with no acceleration towards extinction as predicted if there was a weak Allee effect and no sudden drop to extinction as predicted if there was a strong Allee effect.

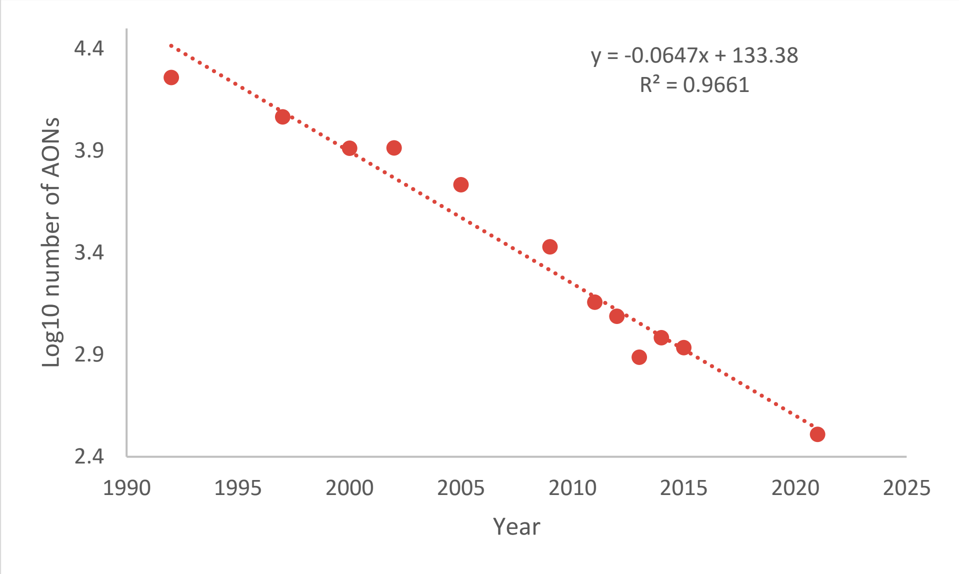


Figure 5. Log$_{10}$ of kittiwake AONs at Fair Isle 1992-2021. Census data from JNCC Seabird Monitoring Programme online database.

73. Kittiwake numbers declined at Noss from 9,438 AONs in 1985 to 44 AONs in 2017. The decline is a loss of >99.5% of the population between 1985 and 2017. Nevertheless, a plot of log$_{10}$ kittiwake AONs against year (Figure 6) shows no sign of any detectable Allee effect at this colony, despite it being adjacent to a large great skua colony and subject to heavy predation by great skuas (Shetland Bird Reports). The rate of decline (the slope in Figure 6) remains consistent throughout, with no acceleration towards extinction as predicted if there was a weak Allee effect and no sudden drop to extinction as predicted if there was a strong Allee effect.

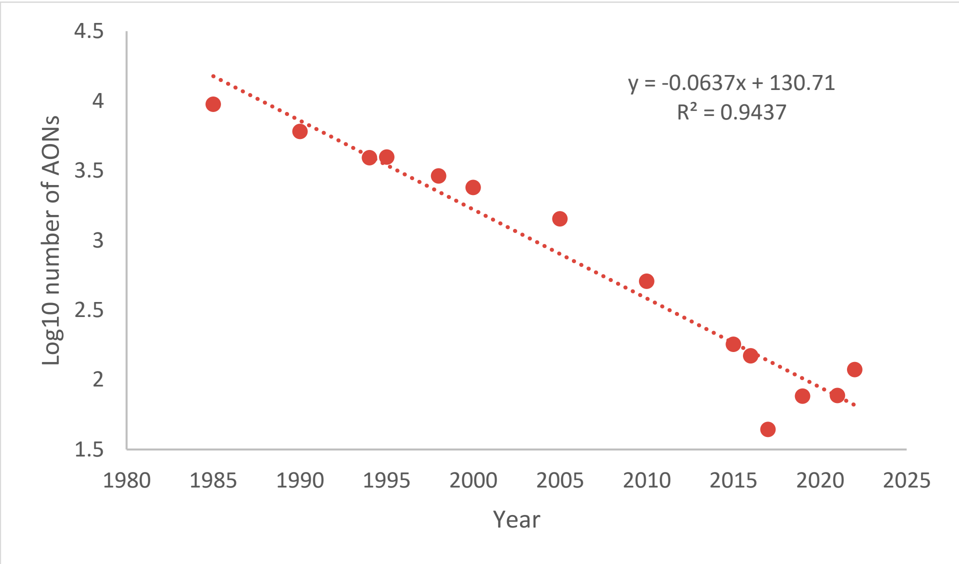


Figure 6. Log$_{10}$ of kittiwake AONs at Noss 1985-2022. Census data from JNCC Seabird Monitoring Programme online database with 2022 data from Miles *et al*. 2022.

74. These empirical data suggest either that there is no Allee effect in individual colonies of kittiwakes, or that any Allee effect only occurs once numbers are reduced by more than 99.5%, or that any Allee effect is hidden by other factors such as changes in mean nest site quality increasing as numbers decline. There is evidence for the last of these and the empirical

evidence suggests that nest site quality effects may be considerably stronger than depensatory effects of predation.

75. Overall, the evidence for positive density-dependence in seabirds is very limited, most examples being related to increased risk of nest predation at low population size or nesting density. There is very little evidence to suggest that positive density-dependence acts on moderate or large seabird colonies. It may have an effect on small colonies, especially of terns as terns are highly vulnerable to nest predation. Empirical evidence suggests that for most seabird species positive density-dependence is likely to have less influence on rate of change in numbers than the effect of improvement in the average quality of occupied nest sites as a population is reduced (Potts *et al*. 1980, Werner *et al*. 2014, Bennett *et al*. 2022). For example, only 4% of all shag nest sites on the Farne Islands were considered to be entirely satisfactory, and nest site quality acted as strongly negatively density-dependent (Potts *et al*. 1980).

3.4 Empirical evidence for seabird populations at low numbers: sustainable or not?

76. Theoretical Allee effects include possible genetic effects and possible ecological effects of very small population size. There are examples of extremely rare seabirds that may inform whether these Allee effects can be detected in very small populations. This prompts consideration of case studies of seabirds with very small population sizes to seek evidence for genetic or ecological Allee effects.

77. Several million pairs of short-tailed albatrosses *Phoebastria albatrus* bred in at least 14 colonies in the North Pacific Ocean off Japan in the late 19th century, but numbers were drastically reduced by harvesting and the species was declared extinct in 1949 (Sato *et al*. 2009, Finkelstein *et al*. 2010, Eda *et al*. 2020). However, a remnant population was discovered on Torishima Island in 1951, possibly derived from immature birds that escaped the harvest. There were only 23 birds in the population in 1954-55 which produced 7 eggs. Genetic analysis showed that about 1,000 years ago there were two very closely related species of short-tailed albatross and it was thought that only one of these survived, at Torishima Island. However, a very few breeding short-tailed albatrosses were found on the Senkaku Islands in 1971. These turn out to be of the second species, not the same as those on Torishima Island, so both these two species survived a close-to-extinction experience (Eda *et al*. 2020). Numbers at Torishima Island increased so that by 2014 the population there was estimated at 3,540 birds. A small group of birds from Torishima was translocated to the Bonin Islands to form a new colony, as the Torishima colony is on an active volcano and was considered at risk of extinction when the volcano erupted. In 2014 there were 10 birds in the Bonin Islands population, all derived from Torishima. All chicks at Torishima have been ringed each year, and yet ten unringed birds joined the colony at Torishima. Those birds, on genetic analysis, were found to be from the Senkaku Islands population of the sibling species, which by 2014 held 650 birds on the Senkaku Islands. Now both the two species of short-tailed albatross breed side-by-side on Torishima Island, while the second species breeds also on Senkaku Islands and the first also on Bonin Island (as a consequence of translocation). Birds from the two sibling species paired assortatively on Torishima, showing that these two species are indeed behaviourally distinct as well as genetically divergent. The key point in relation to possible Allee effects is that both these endangered sibling species of albatross have increased from a handful of birds to hundreds of birds of one species and thousands of the other, over a period of about 65 years. There has been no evidence of any adverse genetic effects that could be described as Allee effects (Kuro-

O *et al*. 2010, Eda *et al*. 2020), and no evidence of any ecological Allee effects (Finkelstein *et al*. 2010). Clearly there was no strong Allee effect even though populations were reduced from millions of birds to fewer than 20 (Finkelstein *et al*. 2010, Eda *et al*. 2020).

78. The Amsterdam albatross *Diomedea amsterdamensis* was identified in the early 1980s as an extremely rare endemic species at Amsterdam Island, Indian Ocean, and probably the rarest seabird in the world. The breeding population comprised 42 birds in the early to mid-1980s with between 1 and 12 pairs breeding in different years (Jouventin *et al*. 1989). It is thought that the population was very much larger in the past and was reduced close to extinction by harvesting by sealers, whalers and fishermen, by habitat degradation by people living on the island, and by introduced rats, cats, dogs, pigs and cattle (Jouventin *et al*. 1989). Although the population is at risk of extinction from fishery bycatch (Weimerskirch *et al*. 1997), demographic data collected on the small population indicate that breeding success, immature survival, age of first breeding and adult survival are typical of large albatrosses, and do not show any clear evidence of any genetic or ecological Allee effect (Jouventin *et al*. 1989, Weimerskirch *et al*. 1997).

79. Band-rumped storm-petrels *Hydrobates castro* were once abundant in Hawaii but have been brought close to extinction by introduced mammal predators (Antaky *et al*. 2020). Nevertheless, despite the very large reduction in population and the species now being considered at risk of extinction in Hawaii, with the associated theoretical prediction of low genetic diversity, Antaky *et al*. (2020) found only very low levels of inbreeding and a high maintained genetic diversity in this population, despite small effective population size (mean estimate of 414 individuals). They concluded that there was no evidence to suggest any genetic Allee effect in this population despite the small effective population size. Antaky *et al*. (2020) noted that this conclusion is entirely consistent with findings regarding the population genetics of other rare, endangered, seabird species, namely Hawaiian petrel *Pterodroma sandwichensis* (Welch *et al*. 2012), Balearic shearwater *Puffinus mauretanicus* (Genovart *et al*. 2007), and Magenta petrel *Pterodroma magentae* (Lawrence *et al*. 2008).

80. Barau's petrel *Pterodroma baraui* was once abundant on Reunion Island but has been driven close to extinction by invasive rats and cats, by habitat modification and by artificial light pollution attracting fledglings (Danckwerts *et al*. 2021). Genetic analysis of two small remnant populations breeding 5 km apart in the central mountains of Reunion Island showed high genetic diversity in both populations despite small effective population sizes (550 and 1,200 individuals), no inbreeding, but significant genetic difference between the two populations (Danckwerts *et al*. 2021). The authors inferred that the genetic differences were the result of extremely high philopatry. They concluded that there was no evidence of any genetic Allee effect in either of these two populations, and that threats to these populations are introduced mammal predators and light pollution rather than genetic Allee effects, despite their small population size.

81. Although genetic Allee effects could (at least theoretically) arise as a result of seabird populations being reduced to very small numbers, the empirical evidence suggests that many seabird populations that have been reduced drastically in numbers close to extinction do not show any clear genetic Allee effects. Examples of seabirds recovering from a handful of breeding birds suggest that landscape-scale ecological factors that threaten seabird populations, such as prey-fish depletion, fishery bycatch of seabirds, introduced mammal predators at colonies, represent clear threats to seabird survival, and that depensatory density-

dependent effects have little influence by comparison with these major landscape-scale impacts.

3.5 Barents Sea guillemot crash and recovery

82. The Barents Sea supports large stocks of cod, herring and capelin, all of which are the target of commercial fisheries. It also holds large populations of seabirds. In 1986-87 the capelin stock collapsed and there were also extremely low abundances of 0-group herring and 0-group cod. This two-year period was unique in having exceptionally low abundance of all three fish at the same time. About 90% of the common guillemots in the Barents Sea died, an exceptional catastrophic mortality that was linked to the exceptional shortage of suitable food for this piscivore specialist (Vader *et al.* 1990, Erikstad *et al.* 2013). Guillemot breeding numbers have been monitored in detail at Hornøya, north Norway and showed the crash in numbers in 1987 with a decrease of about 80% in common guillemot numbers (Figure 7), similar to that seen throughout the rest of the Barents Sea. In 1988 0-group herring abundance was higher, capelin abundance increased and 0-group cod abundance began to increase slowly (Erikstad *et al.* 2013). Common guillemot breeding numbers at Hornøya slowly recovered and by 2005 had returned to the level present before the population crash (Figure 7). It took about 20 years for this population to recover from an 80% loss of breeding adults.

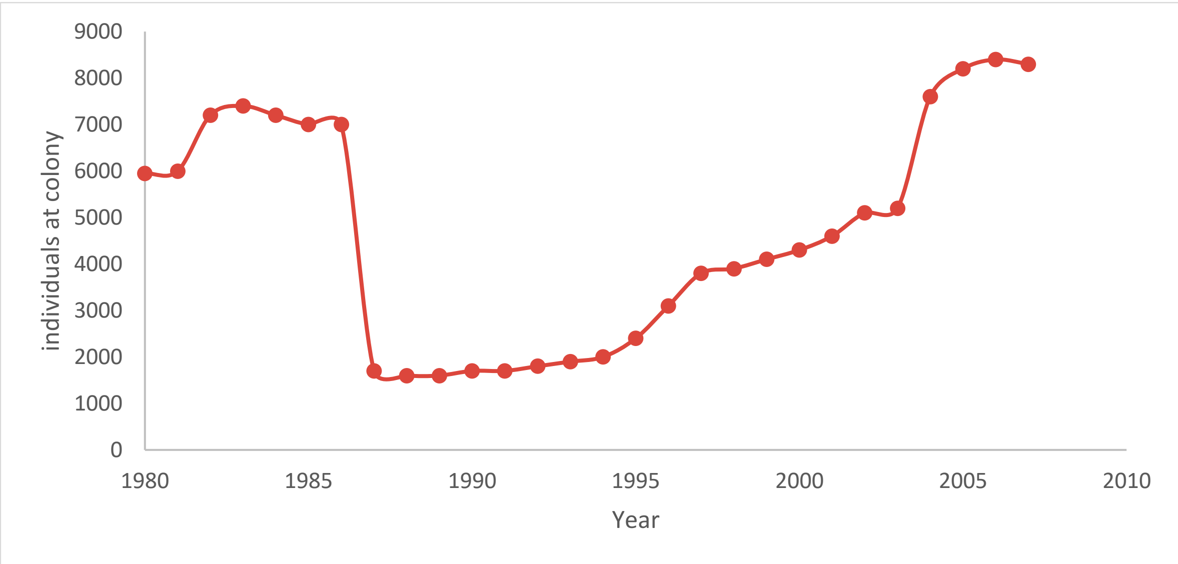


Figure 7. Number of common guillemots at Hornøya, north Norway 1980 to 2007. Data from Erikstad *et al.* (2013).

83. It would be reasonable to assume that the recovery of breeding numbers in Hornøya and throughout the Barents Sea during 1988-2005 occurred in an effectively closed population, as the birds in the Barents Sea are described as a distinct subspecies of common guillemot *Uria aalge hyperborea*. That subspecies is considerably larger than the subspecies found in Scotland (*Uria aalge aalge*) while another subspecies (*Uria aalge albionis*), which is even smaller and paler (browner) on the upperparts, breeds in southern Europe as far north as England and Ireland. There is also strong clinal variation in the proportion of common guillemots that are 'bridled' which is a genetic feature (bridled birds have a white eye-ring and white line behind the eye). Colonies further north have a much higher proportion of 'bridled' birds as well as having larger birds. These genetic differences suggest that there is little gene-flow between common guillemot populations, and therefore that the recovery of the Barents Sea '*hyperborea*'

population would not involve immigration of guillemots from outside that area. Remarkably, we know from ringing that some birds from north Scotland moved to breed at colonies in the Barents Sea shortly after the population collapse occurred. A guillemot ringed as a chick at Shetland in 1990 was found breeding at Hornøya in 1994, and a second Shetland-ringed chick was found at a nearby southern Barents Sea colony at Vardø in 1995 (Pennington *et al*. 2004). There have also been examples of *aalge* guillemots moving to breed at colonies within the geographical range of *albionis* and vice-versa. It is interesting that chicks from Shetland moved to north Norway, as the collapse of the sandeel stock at Shetland in the late 1980s led to poor conditions there for seabirds dependent on sandeels as prey. However, since only a very small proportion of the guillemot chicks at Shetland are ringed each year, the fact that two are known to have moved to breed in the Barents Sea suggests that larger numbers of unringed birds from Shetland most likely also did that. How could Shetland guillemots become aware of the opportunity to join the Barents Sea guillemot population at a time when food supply was improving but guillemot numbers were far below carrying capacity? Recent geolocator tracking of guillemots (Buckingham *et al*. 2022) found that a small proportion of guillemots from Shetland visit the Barents Sea in late summer to moult, which would give them the opportunity to assess the potential to breed there rather than to return to Shetland. This suggests that the recovery of the Hornøya common guillemot population, which took 20 years, might have taken even longer if immigration of birds from far away into the region had not been possible. However, this case study shows that common guillemot populations can be limited by food supply, that they can recover when food supply has recovered, and that recovery can occur even when the regional population has been reduced by as much as 80-90%.

3.6 Historical evidence on population change in great skua and gannet

3.6.1 Great skua

84. Great skua numbers are relatively well documented since the 18th Century because this has been a rare species of interest to naturalists visiting remote areas where it breeds. Although always a relatively scarce species because it is a top predator, the great skua was severely reduced in numbers in the late 19th century by human harvesting of eggs and chicks but mainly by shooting of adults for museum collections (Furness 1987). Harvesting of eggs and chicks by local people may have been sustainable, but shooting by collectors from Britain, Germany and elsewhere was not. The great skua population in the Faeroe Islands was reduced to about 36 pairs in 1872, and by 1897 was down to just four pairs, each of the four pairs nesting on a different island (Furness 1987). Many of the birds shot in the 1870s to 1890s are now in collections in major museums such as the British Museum of Natural History, the Copenhagen Natural History Museum, the National Museums of Scotland. In December 1897 an Act of Parliament was passed in the Faeroes that gave protection to the great skua. Numbers then recovered as visiting shooters from overseas were unable to get to the remaining birds in the Faeroes. The population increased to 71 breeding pairs in 1930, occupying all four of the sites where just a single pair had remained at each in 1897 (Furness 1987). There were 530 pairs of great skuas in the Faeroes in 1961 (Bayes *et al*. 1964), 500 pairs in 1977 (Furness 1987), 270 pairs in the 1980s-1990s (Mitchell *et al*. (2004), and 500 pairs in 2010 (Hammer *et al*. 2014). Furness (1987) concluded "*the history of the great skua in the Faeroe Islands suggests that great skuas*

are surprisingly capable of increasing from very low numbers despite the devastation that can be caused by shooting".

85. The history of great skuas in Scotland is similar to that in the Faeroes. In 1774 great skuas only nested at two sites in Scotland, both in Shetland; three pairs nested at Saxavord on Unst, and six or seven pairs high on the hills of Foula (Furness 1987). Numbers increased at Foula to 30 pairs in 1804, but during the early 19th century taxidermists began to visit Shetland to shoot great skuas. By the 1880s conservationists argued that the species was likely to be lost from Scotland as a result of uncontrolled and excessive shooting pressure. The near-extermination of great skuas and the success story of protection by volunteer wardens of the few pairs left at Hermaness and Foula, played an important role in promoting the formation of a protection of birds society and in developing legislation to protect birds. After 1900, great skua numbers increased at an almost constant rate of 7% per annum at Foula, reaching 3,000 pairs in 1975 (Furness 1987). It is likely that the growth was encouraged by provision of large volumes of fishery discards from trawlers fishing for whitefish around Shetland and other parts of Scotland, as discards form an important part of the diet of breeding great skuas (Votier *et al.* 2004, Church *et al*. 2018). The much greater increase in numbers in Shetland compared to the Faeroes may reflect the high volumes of discards provided around Shetland in the 1950s-1970s, much greater than was ever the case around the Faeroes. Ringing of great skua chicks at Foula showed that new colonies that developed in other areas of Shetland, in Orkney, Western Isles and mainland Scotland were founded by birds that included chicks fledged from Foula, as were new colonies founded in Norway (including Bear Island and Spitsbergen) and north Russia (Furness 1987). Many new "colonies" were initially colonised by a single pair of great skuas, with numbers then increasing over following decades. For example, 1 pair took up territory on Hirta, St Kilda, in 1956, and only one pair nested there in 1963, and 1965, but there were 3 pairs in 1965, 5 or 6 pairs in 1968, 6 in 1969, 8 in 1971, 8 in 1972, 9 in 1974, 15 in 1975, 20 in 1976, 22 in 1977, 25 in 1978 (Harris and Murray 1978). One pair nested on Noss, Shetland in 1913 and 1914, increasing to 20 pairs in 1946 (Perry 1948). One pair nested on Hoy, Orkney, in 1914, 1915, 1916, 1917 increasing to 4 pairs in 1921, 8 in 1933, 20 in 1941, 70 in 1961, 462 in 1975 (Furness 1977). One pair nested at Handa in 1964, 1 in 1965, 2 in 1966, 3 in 1967, 1968, 1969, 1970 and 1971, 4 in 1972, 5 in 1973, 7 in 1974 (Furness 1977). Clearly great skua colonies can often start from a single pair and may take some years for numbers to build up.

86. The national breeding seabird census in 2000 found a population of 9,600 pairs of great skuas in Scotland (Mitchell *et al*. 2004). Between 2000 and 2019, numbers increased at most small colonies but decreased at some of the largest colonies (Figure 2). The decreases that occurred at the largest colonies were associated with low breeding success, increased age of first breeding and reduced survival associated with the collapse of the Shetland sandeel stock in the early 1980s and reduced volumes of whitefish discards that occurred mostly in the 1980s and has continued to be reduced since then. The provision of a discards food subsidy to great skuas for several decades probably allowed the population to grow to a level that is unsustainable in an environment with a zero-discard fisheries policy. Special Protection Areas established with breeding great skua as a feature were mostly designated in the 1990s, at a time when great skuas were close to their all-time highest breeding numbers in Scotland since the early 1700s. HPAIV has killed very large numbers of adult great skuas in 2021 and especially in 2022, and is likely to see populations in SPAs fall further below the numbers that were present at designation, but there is a case to be made that this has simply accelerated a process

of decline in size of the largest colonies towards a better fit with reduced environmental carrying capacity for this species (although that argument probably has no traction in relation to Birds Directive legal requirements to maintain features of SPAs unless reduced carrying capacity after removal of an anthropogenic food subsidy is considered to be part of 'natural change').

3.6.2 Gannet

87. The gannet is relatively easy to census because there are not very many colonies of this species, it nests in well-formed nests in the open that are generally closely-packed with other neighbouring gannet nests, one of the adults is normally on the nest throughout the breeding season from April to September, and breeding success in this species is generally high in all years in all colonies, so that attendance remains consistent throughout almost all of the breeding season (Nelson 1978). In 1939 two ornithologists coordinated a census of all the world's northern gannet colonies (Fisher and Vevers 1943-44) and that census has been repeated every ten years since at all Scottish colonies and in most decades at all North Atlantic colonies. All Scottish colonies were counted in 2013-14, with 243,505 AOS and an average rate of increase of 2.9% per annum from 2004 to 2014 (Murray *et al*. 2015). Icelandic colonies were counted in 2013-14, with 37,000 AOS so an annual increase of 1.88% over recent decades (Gardarsson 2019). North Norwegian colonies were counted in 2015-16 with 3,300 AONs, increasing at an average rate of 3% per annum from 2008 to 2016 (Barrett *et al*. 2017). Including the colony at Runde in southern Norway, the Norwegian population in 2015-16 was 6,900 AONs, up from 3,700 in 1995 and 4,500 in 2008 (Barrett *et al*. 2017). North American colonies in 2009 held 116,825 pairs with an average growth rate from 1984 to 2009 of 4.4% per annum but slowing in the later part of this period most likely due to density-dependent competition for food (Chardine *et al*. 2013). Many individual colonies have been counted again since those coordinated surveys so that population data for gannet are exceptionally detailed and accurate as well as covering an exceptionally long time period.

88. Formation of new colonies by gannets tends to be a slow process, often with large numbers of immature birds aggregating at a potential new colony site each summer for some years before birds start to nest, as seen at Fair Isle (Nelson 1978) and Foula (Furness 1981). At some colonies several pairs nested in the first year of breeding at the new colony, but some new colonies have been founded by just one pair with very slow initial growth. Nelson (1978) describes the very slow start to colony growth at Great Saltee and at Bempton. At Great Saltee one (or possibly two) pairs nested in 1929. There were still only 1 or 2 pairs until 1949 when a third pair nested. In 1954 there were 4 pairs, in 1955 8 pairs, in 1956 17 pairs, in 1960 60 pairs and in 1973 200 pairs (Nelson 1978). At Bempton one (or possibly two) pairs nested in 1929, 2 pairs in 1934, 2 pairs in 1939, 2 pairs in 1951, 12 pairs in 1954, 18 pairs in 1959, 26 pairs in 1964, 30 pairs in 1969, 33 pairs in 1971, 44 pairs in 1972, 100 pairs in 1974, 120 pairs in 1975 (Nelson 1978). Bear Island was colonised by only two pairs in 2011, and 2 pairs nested there in 2012, but the numbers increased to 10 pairs in 2013, 11 in 2014, 25 in 2015 and 52 in 2016 (Barrett *et al*. 2017), the relatively rapid growth clearly being due to immigration as chicks produced at Bear Island would not be old enough to breed during the first few years of colony growth. Kharlov, north Russia, was colonised by one pair of gannets in 1995, and one pair nested in 1996, but the colony grew to 19 pairs in 1997, 18 in 1998, 16 in 1999, 22 in 2000 and 2001, 48 in 2002, 30 in 2004, 145 in 2005, 161 in 2006, 232 in 2007 (Barrett *et al*. 2017).

89. The ability of gannet colonies to grow from just one or two pairs reflects the high adult survival of this species and the fact that it is not subject to much predation impact while breeding – in part because of its large size so that gulls and crows are unable to access nests defended by an adult gannet unless the adult is displaced by human disturbance (Nelson 1978). The general increase in gannet populations will also mean that there is a pool of immature nonbreeding birds seeking to find nest sites so likely to join growing colonies. However, gannets can be subject to predation by white-tailed eagles. In Norway, the increasing population of white-tailed eagles has led to declines in gannet numbers at a few colonies, but the affected colonies are not necessarily small ones. For example, the two largest gannet colonies in the Lofoten/Versterålen region were abandoned by gannets as a result of harassment by white-tailed eagles (Barrett *et al*. 2017). Despite local effects of white-tailed eagles, the regional population of gannets continued to increase, and there was no evidence to suggest that impacts of eagles inhibited population growth or the formation of new colonies (Barrett *et al*. 2017).

4 POSSIBLE RESPONSES OF SEABIRDS IN THE NORTH OF SCOTLAND TO THE HPAI EPIDEMIC

90. The seabirds in north Scotland most severely affected by HPAIV in 2021 and 2022 breeding seasons were great skua and gannet. Towards the end of the 2022 breeding season an impact on common guillemots started to become evident at a few colonies and more widely from beached birds on coasts, both in east and west Scotland, but apparently not so much in Shetland or Orkney. The HPAIV outbreak in Newfoundland in 2022 apparently hit common guillemots much harder than it did in the UK, and apparently hit guillemots harder than gannets (Bill Montevecchi, pers. comm.). There might well be further mass mortality of UK seabirds from HPAIV in 2023 and beyond, and a heavy toll on common guillemots might be anticipated given their dense packing on nesting ledges.

91. Predicting what will happen in 2023 is extremely difficult as this virus is novel in colonial seabirds. Immunity to HPAIV may arise in some or most populations of our seabirds, reducing long-term impacts. Experimental infection of tufted ducks and mallards in the laboratory showed that birds given a low pathogenicity infection developed protective immunity that protected against experimental infection with HPAIV nine months later (Caliendo et al. 2022b). It is uncertain if HPAIV will have created immunity in a significant proportion of the survivors in populations worst hit by the virus in 2022. However, it would not be a surprise if the 50% or greater mortality of UK great skuas and Dutch Sandwich terns in 2022 might be followed in 2023 by similar mass mortality of other seabird species. In Scotland we can anticipate likely further outbreaks in great skuas and gannets as well as spread to other seabird species.

4.1 Great skua

92. Shortly before the HPAIV epidemic, great skua SPA feature status was classified by NatureScot as Favourable Maintained at all but one of the Scottish SPA network sites for breeding great skua, although numbers had decreased at three sites; Foula, Hoy, and St Kilda (Table 1).

Table 1. Summary of great skua breeding SPA feature conservation status up to 2019

SPA	Pairs in citation	Most recent published count	Change from designation	Percent change	SCM
Hermaness, Saxa Vord & Valla	788	955 in 2018	+167	**+21**	FM
Fetlar	508	743 in 2017	+235	**+46**	FM
Foula	2,270	1,846 in 2015	-424	**-19**	FR
Ronas Hill	130	289 in 2017	+159	**+122**	FM
Noss	420	476 in 2018	+56	**+13**	FM
Fair Isle	110	490 in 2019	+380	**+345**	FM
Hoy	1,900	1,063 in 2019	-837	**-44**	UD
Handa	66	283 in 2018	+217	**+329**	FM
St Kilda	270	179 in 2012-19	-91	**-34**	FM

93. The deaths of a minimum of 1,500 adult great skuas at Foula in summer 2022 (Camphuysen and Gear 2022) can be considered equivalent to the loss of at least 750 pairs from this colony, as evidence from ring numbers on dead birds was that dead birds were likely to be of breeding age. Putting this into context, it took about 65 years for the colony to grow from tens of pairs in 1890 to 750 pairs (around 1955), but less than 10 years to increase from 2,000 pairs in the early 1970s to 3,000 pairs in the late 1970s (Figure 8). The time required for population recovery depends on how much the population is reduced. Not only does it take longer to recover from a larger impact, but it also takes longer to recover from a smaller starting size than from a larger starting size. How quickly the population can recover will depend in part on the size at which it ends up after HPAIV has taken its toll. The time to recovery will also depend on the extent to which negative (compensatory) density-dependence results in higher survival, younger age of first breeding and increased breeding success in a smaller post-HPAIV population, and on the extent to which carrying capacity might change as a result of landscape-scale changes in food availability and impacts of climate change. Breeding numbers of great skuas at Foula had been declining gradually from 1977 to 2015 (Figure 9), and this is interpreted as a response to a reduced carrying capacity, especially in relation to availability of sandeels and fishery discards at Shetland.

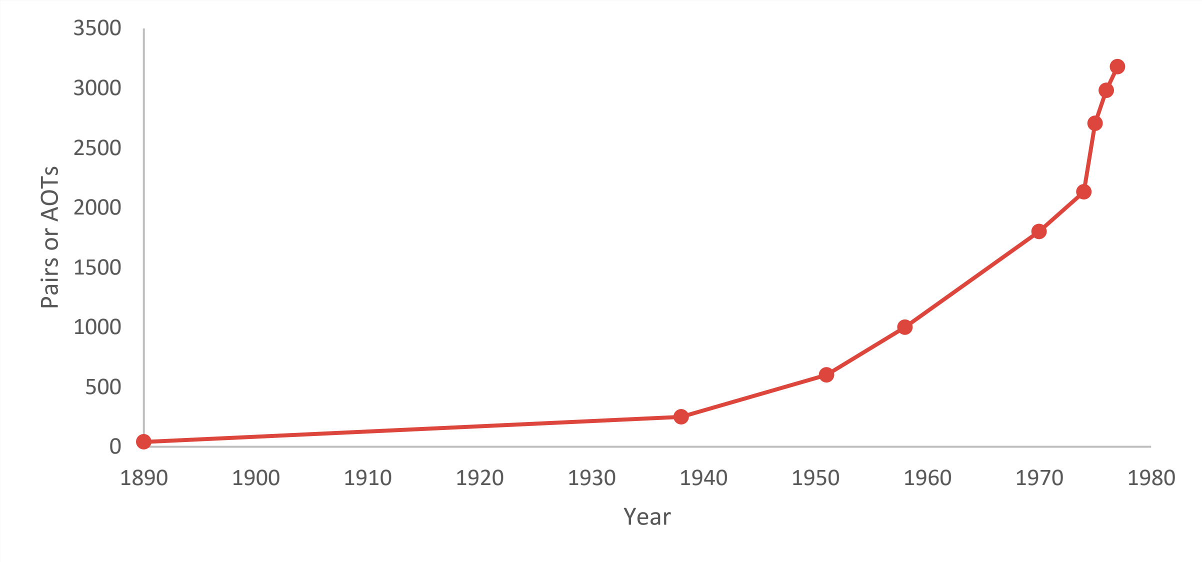


Figure 8. Numbers of great skua pairs or AOTs at Foula, 1890 to 1977.

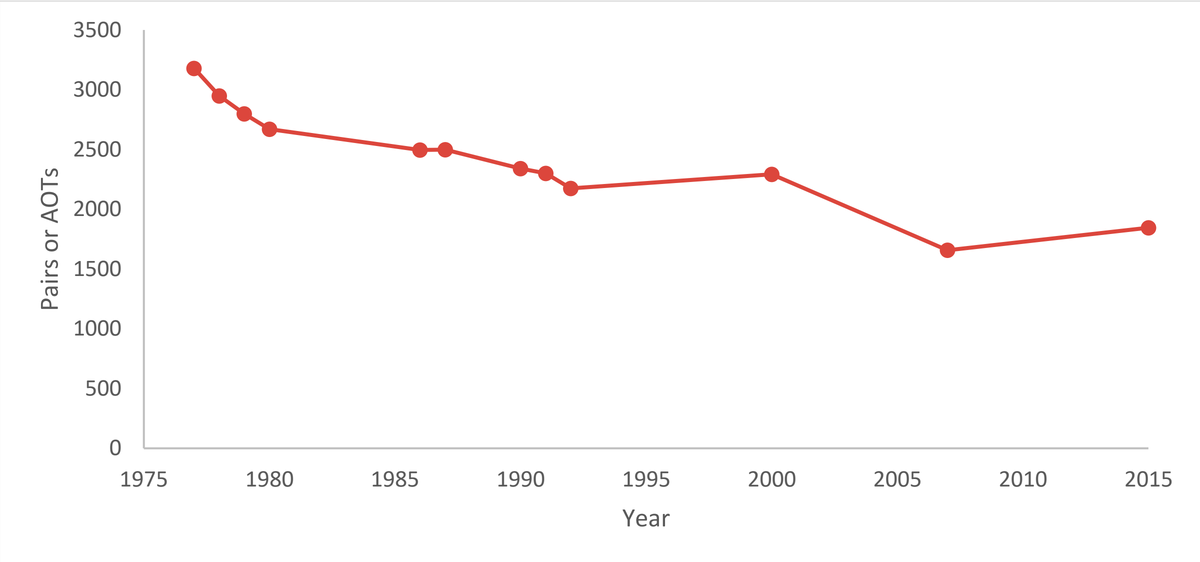


Figure 9. Numbers of great skua pairs or AOTs at Foula, 1977 to 2015.

94. As discussed earlier, it is likely that the carrying capacity of great skuas in northern Scotland was increased artificially by provision of fishery discards, and that the changes to fishery management since the 1970s (a combination of changed technical measures such as net mesh size, and legal measures such as total allowable catches and limits on discarding towards a zero-discard policy) will have progressively reduced the carrying capacity for great skuas in the region. Since SPAs with great skua as a breeding feature were established around the time when great skua breeding numbers were at their peak at the largest colonies (but still increasing at almost all smaller colonies), it is likely that even without the HPAIV outbreak great skua breeding numbers at some or most Scottish SPAs with this species as a breeding feature would in future fall below the numbers at site designation. Breeding numbers of great skuas increased by an average of 23% (median 10%, range -40% to +200%) between 2000 and 2019 at the nine colonies designated as SPAs for breeding great skua (Furness 2022). At colonies that were not SPAs for breeding great skua the change in the same time period was +221% (median

240%, range -40% to +600%). This difference is statistically significant (Mann-Whitney U = 26, $p<0.05$), showing a higher growth in the smaller colonies. The impact of HPAIV is likely to take some or most of the SPA populations below the numbers where the site will be assessed as in unfavourable conservation status for breeding great skua if that assessment is based simply on breeding numbers rather than considering HPAIV as part of 'natural change'. It is difficult to see how HPAIV could be considered 'natural change' as this virus originated in intensive chicken farms and only spread to seabirds from outbreaks in domestic birds, so this impact on seabirds is anthropogenically-derived rather than part of the natural environment of seabirds.

95. Even if HPAIV has no further impact on great skuas in northern Scotland (which seems improbable) it will probably take 20 years or more for numbers to recover from the impact of HPAIV in 2021 and 2022. A more likely scenario may be that it will take even longer than that and that numbers at the largest colonies may never recover to 1980-2000 numbers because of the reduced carrying capacity for this species, with most recovery occurring in small colonies. If further HPAIV outbreaks occur then the medium-term changes in great skua numbers may depend on the extent to which birds develop immunity to the infection, but it is possible that smaller colonies may be slightly more likely to escape reinfections than would the larger and denser colonies. Unfortunately, we cannot be confident in predicting any of these scenarios at this stage, but perhaps the most likely will be a long-term reduction in numbers of great skuas at large colonies but some further colonisation of new sites with establishment of small colonies that grow more than the largest ones do.

4.2 Gannet

96. All gannet colonies in Scotland have been increasing, though some colonies have recently increased much more than others (Table 2). Shortly before the HPAIV epidemic, gannet SPA feature status was classified by NatureScot as Favourable Maintained at all eight of the Scottish SPA network sites for breeding gannet. The SPA colonies in Scotland held about 95,000 pairs more in 2013-2019 than they did at SPA designation (Table 2). This suggests that the HPAIV mortality at gannet colonies in 2022 is unlikely to have reduced breeding numbers below the numbers present at SPA designation as the total mortality of adult gannets from Scottish colonies in 2022 is likely to have been many tens of thousands of individuals, but probably not in excess of 190,000. However, this remains uncertain and further evidence from beached bird surveys, migration counts at coastal sites, and counts of gannet AOS at colonies in 2023 will be needed to get a better understanding of the scale of mortality.

Table 2. Summary of gannet breeding SPA feature conservation status up to 2019.

SPA	Pairs in citation	Most recent count	Change from designation	Percent change	SCM
Ailsa Craig	23,000	33,226 in 2014	+10,226	**+44**	FM
Fair Isle	1,166	4,211 in 2019	+3,045	**+261**	FM
Forth Islands	21,600	75,259 in 2014	+53,659	**+248**	FM
Hermaness, Saxa Vord & Valla	16,400	25,580 in 2014	+9,180	**+56**	FM

SPA	Pairs in citation	Most recent count	Change from designation	Percent change	SCM
North Rona & Sula Sgeir	10,400	11,230 in 2013	+830	**+8**	FM
Noss	6,860	13,765 in 2019	+6,905	**+101**	FM
St Kilda	50,050	60,290 in 2013	+10,240	**+20**	FM
Sule Skerry & Sule Stack	5,900	6,420 in 2013	+520	**+9**	FM

97. It is likely that breeding numbers of gannets will be significantly reduced at most Scottish colonies as a result of HPAIV impact on gannets in 2022. Breeding success of gannets was exceptionally poor in 2022, but that is unlikely to play any important role in the population dynamics. Survival of gannets through the first few weeks of life is low, and the loss of just one or a few cohorts will have little implication in terms of potential recruitment of four to six year old birds into colonies. Decreases in numbers are likely to be driven almost entirely by mortality of adults.

98. Whereas many or most great skuas that died were to be found at colonies, often in communal areas where birds bathe/preen, many dead gannets appeared on beaches. Although numbers of dead gannets were especially high on beaches close to major colonies, there were large numbers of dead gannets on beaches throughout the British Isles and on the continental coast of the North Sea, even into the Norwegian Sea and Baltic Sea. That makes estimating the impact of HPAIV on gannets more difficult. It is entirely possible that the impact might reduce gannet breeding numbers by 50% or more, but this will not be evident for at least one or more years, depending on whether gannets develop resistance to HPAIV and return to 'normal' breeding, or whether breeding is disrupted in future years by adult mortality from HPAIV and consequent abandonment of nest sites by many of the surviving gannets. Counts of breeding numbers cannot be considered reliable if high proportions of the breeding population choose to leave or not to return to nest sites.

99. Analysis of the Trektellen online data[2] on gannet numbers observed passing coastal observation sites (e.g. Figure 10), and analysis of beached bird survey data on numbers of dead gannets, may help to improve understanding of HPAIV impact on the gannet population, but it is difficult to know how to interpret changes in numbers in those data sets in terms of evidence for change in population size rather than bird behaviour.

[2] https://www.trektellen.org/

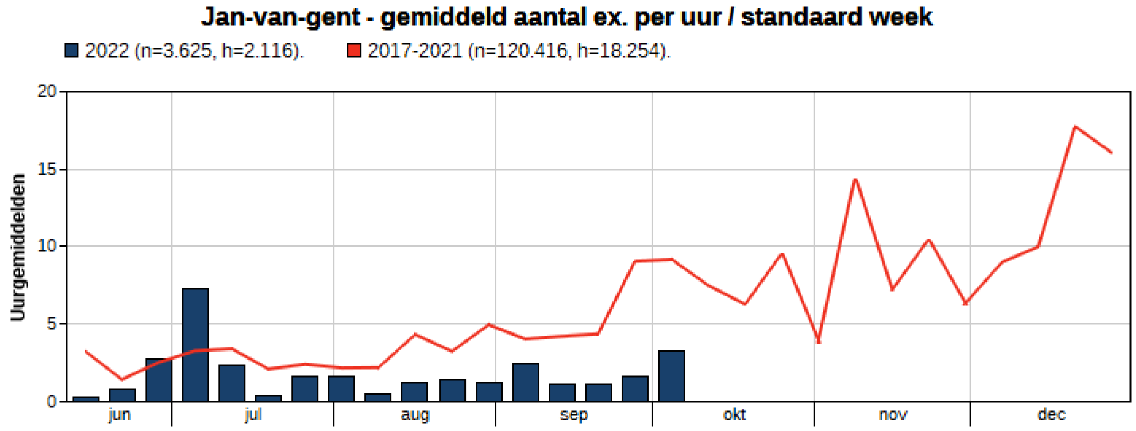


Figure 10. Gannet numbers observed at seawatching sites in The Netherlands in 2022 (blue histogram) compared to the average numbers in 2017-2021. The data suggest an early departure of gannets in early July but much lower numbers in August-October than in 'normal' years. Data provided by Kees Camphuysen from the Trektrellen online database.

100. It may be possible to obtain estimates of numbers of gannets that died at sea from HPAIV in summer 2022 from the SCANS IV aerial surveys (which target mapping of porpoises but in 2022 also included mapping of dead gannets seen from transects throughout UK waters in July-August). Any such estimates would be likely to be in the low thousands but would have to make various assumptions about the proportion of dead gannets that are on the water rather than washed up on shores, and on how long corpses float on the surface before sinking or decomposing.

101. If gannets do develop resistance to HPAIV then it would be reasonable to expect gannet breeding numbers to resume their increase at a similar rate to that seen for several decades before HPAIV arrived. However, there was very little evidence of compensatory density-dependence affecting gannet population growth. Growth rate of the total population had declined slightly over recent decades, suggesting possible density-dependence as numbers trended towards carrying capacity, but some of the fastest growing colonies included very large ones such as Bass Rock. Foraging trips by breeding gannets were longer at larger colonies, consistent with compensatory density-dependence. However, breeding success showed no clear variation with colony size and no clear evidence has been found of difference in adult survival rate between colonies of differing size. This suggests that gannets had not yet reached carrying capacity, and therefore that growth rate of a population reduced by HPAIV may not benefit from any significant compensatory density-dependent gains to demographic parameters in this species.

4.3 Guillemot

102. Guillemot is a breeding feature of 30 SPAs in Scotland, 5 in Shetland, 6 in Orkney, 7 from Caithness to Berwickshire, 12 in the west of Scotland (Table 3). Shortly before the HPAIV epidemic, guillemot SPA feature status was classified by NatureScot as Favourable at 11 of the Scottish SPA network sites for breeding guillemot, but Unfavourable at 19 (Table 3). Unfavourable conservation status was especially clear at colonies in Shetland, where the collapse of the local sandeel stock in the 1980s can be considered a contributory factor to

reducing local carrying capacity but was also evident at colonies in Orkney and much of north and north-west Scotland (Table 3). Colonies with Favourable conservation status tend to be in eastern, south-eastern or south-western Scotland (Table 3).

Table 3. Summary of common guillemot breeding SPA feature conservation status in Scotland up to 2019

SPA	Individuals in citation	Most recent published count (individuals)	Change from designation	Percent change	SCM
Hermaness, Saxa Vord & Valla	25,000	6,109 in 2016	-18,891	-76	UD
Noss	38,970	24,456 in 2015	-14,514	-37	UNc
Foula	37,500	24,799 in 2007	-12,701	-34	UD
Sumburgh Head	16,000	7,749 in 2018	-8,251	-52	UD
Fair Isle	32,300	20,924 in 2015	-11,376	-35	UD
West Westray	42,150	28,697 in 2017	-13,453	-32	UD
Calf of Eday	12,645	5,524 in 2018	-7,121	-56	UD
Rousay	10,600	6,500 in 2016	-4,100	-39	UD
Hoy	13,400	12,198 in 2017	-1,202	-9	UNc
Marwick Head	37,700	11,985 in 2018	-25,715	-68	UD
Copinsay	29,450	18,454 in 2015	-10,996	-37	UNc
North Caithness Cliffs	38,300	25,000 in 2016	-13,300	-35	FM
East Caithness Cliffs	106,700	149,228 in 2015	-42,528	-40	FM
Troup, Pennan and Lion's Hd	44,600	23,800 in 2017	-20,800	-47	UD
Fowlsheugh	56,450	69,828 in 2018	+13,378	+24	FM
Buchan Ness to Collieston	8,640	29,187 in 2019	+20,547	+238	FM
Forth Islands	16,000	25,956 in 2018	+9,956	+62	FM
St Abb's Head to Fast Castle	31,750	43,000 in 2018	+11,250	+35	FM
Cape Wrath	13,700	38,109 in 2017	+24,409	+178	FM
North Rona & Sula Sgeir	43,200	4,961 in 2012	-38,239	-89	UD
Sule Skerry & Sule Stack	6,298	10,068 in 2018	+3,770	+60	FM
Handa	98,686	54,664 in 2016	-44,022	-45	UNc
St Kilda	22,700	10,300 in 2016	-12,400	-55	UD

SPA	Individuals in citation	Most recent published count (individuals)	Change from designation	Percent change	SCM
Mingulay & Berneray	30,900	22,265 in 2014	-8,635	**-28**	FR
Flannan Isles	21,930	9,807 in 2000	-12,123	**-55**	UD
Canna and Sanday	5,800	2,850 in 2018	-2,950	**-51**	UD
Rum	4,000	2,454 in 2000	-1,546	**-39**	UNc
Shiant Isles	18,380	9,054 in 2015	-9,326	**-51**	UNc
North Colonsay & Western Cl	6,656	18,724 in 2018	+12,068	**+181**	FM
Ailsa Craig	3,350	6,180 in 2019	+2,830	**+84**	FM

103. Additional adult guillemot mortality caused by HPAIV is likely to move some of the SPA breeding guillemot populations that have been in Favourable conservation status towards Unfavourable conservation status, and to move some in Unfavourable status to being further depleted. The extent to which this will occur is not yet clear. Guillemot mortality in 2022 seems only to have been evident towards the time when birds were leaving colonies. It is unclear if chick mortality in 2022 was due directly to HPAIV, or to birds starving because a parent had died from HPAIV or had deserted the colony, or to other factors such as low sandeel abundance in 2022. The risk that large numbers of guillemots packed closely together on nesting ledges may die from HPAIV in the 2023 breeding season seems potentially high but remains uncertain.

4.4 Other species

104. It is to be hoped that seabirds that nest at relatively low density and do not interact in dense gatherings at foraging sites or at social and bathing sites may avoid high infection and high mortality from HPAIV in 2023 and following seasons. It seems likely that there will be a significant impact of HPAIV on kittiwakes given their relatively dense nesting and the risk of infected droppings falling from one nest onto others below. Similarly, tern colonies appear to be at high risk of virus transmission, although most Scottish tern colonies were apparently little affected by HPAIV in 2022 (but tern colonies at Farnes SPA, Coquet Island SPA, North Norfolk Coast SPA and colonies in The Netherlands were badly hit). It may be relatively difficult to detect impacts of HPAIV in seabirds that are cryptic such as nocturnal burrow-nesting petrels and Manx shearwaters. There will be an urgent need for increased monitoring in such species. It had been assumed that seabirds most at risk of HPAIV would be scavenging species likely to feed from carcasses of wildfowl that had died from HPAIV. There is little evidence this is the case, and it seems more likely that transmission has primarily been from bird to bird during close physical contact, especially at colonies but presumably also at sea during foraging. In that case, flock foraging may increase the chances of transmission of HPAIV.

105. There would be merit in assessing the extent to which apparently healthy seabirds at colonies in Scotland in 2023 and subsequent seasons show antibody responses to HPAIV and so are likely to have some immunity; that monitoring is urgently required in order to

understand how soon seabird populations may become resistant to the HPAIV mass mortality events seen in 2022. It is to be hoped that SNCBs and the APHA lab will work together to determine levels of immunity to HPAIV in seabird populations.

5 HPAIV EVIDENCE AT WEST OF ORKNEY WINDFARM

106. The impact of the HPAIV epidemic on gannets and great skuas recorded for the baseline site characterisation data used in the West of Orkney Windfarm (the 'Project') Offshore Environmental Impact Assessment (EIA) Report and Offshore Report to Inform Appropriate Assessment (RIAA) was reviewed.

107. Baseline data was collected within the offshore ornithology survey area for the offshore Project by HiDef Aerial Surveying Limited using digital aerial survey methods (video cameras) over 27 surveys between July 2020 to September 2022. For further details of the baseline surveys, refer to the Supporting Study 8: Digital video aerial survey methodology and marine mammal survey results.

108. Digital aerial survey (DAS) data recorded the following information: species of each bird observation, count (number of individuals), behaviour either alive (flying, sitting on the sea) or dead, position (longitude and latitude coordinates) and a date and time stamp.

109. Dead birds were recorded for three bird species within the offshore ornithology survey area over the 27 surveys; a total of 31 dead gannets and one dead great skua and fulmar each were recorded.

110. Figure 11 shows the number of individual alive and dead gannets recorded in each survey within the offshore ornithology survey area; dead gannets were recorded much more frequently in August and September 2022 than in any other month, prior to October 2021, no dead birds were recorded during DASs. Fewer alive gannets were recorded in August and September 2022 compared with the same months in 2021 and 2020.

111. Figure 12 shows the number of individual alive and dead great skuas recorded in each survey within the offshore ornithology survey area; the number of skuas recorded each month was highly variable between years with no clear decline in 2022.

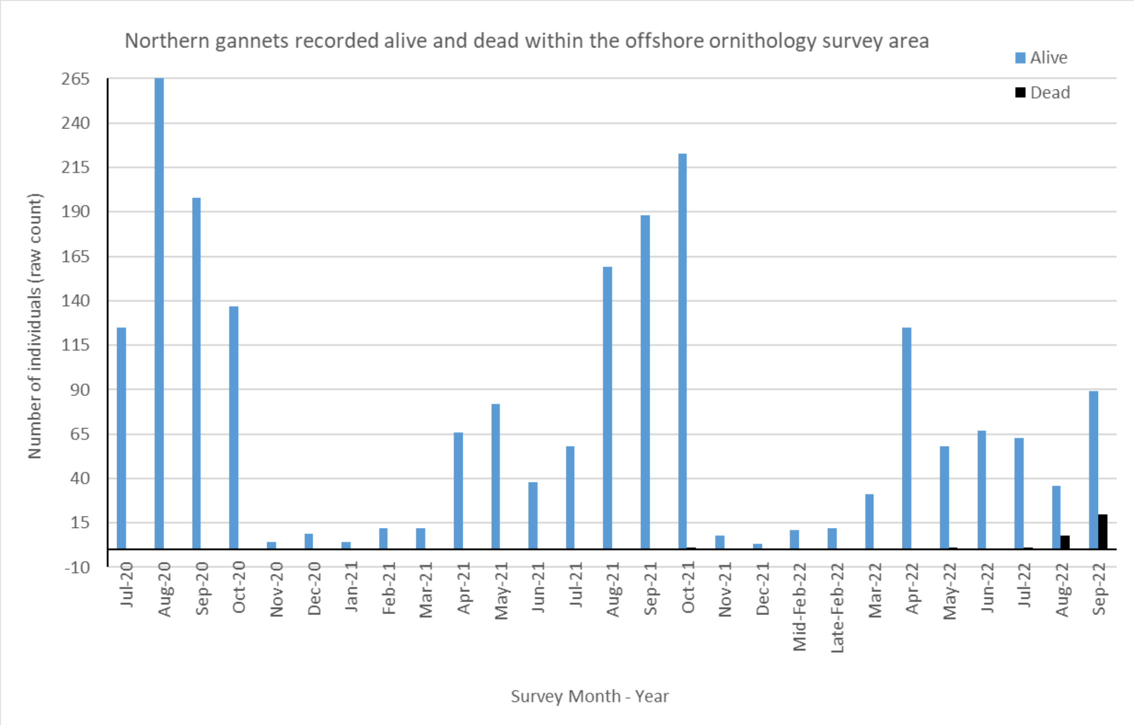


Figure 11. Gannet raw count data showing the number of individual alive and dead birds recorded in each survey.

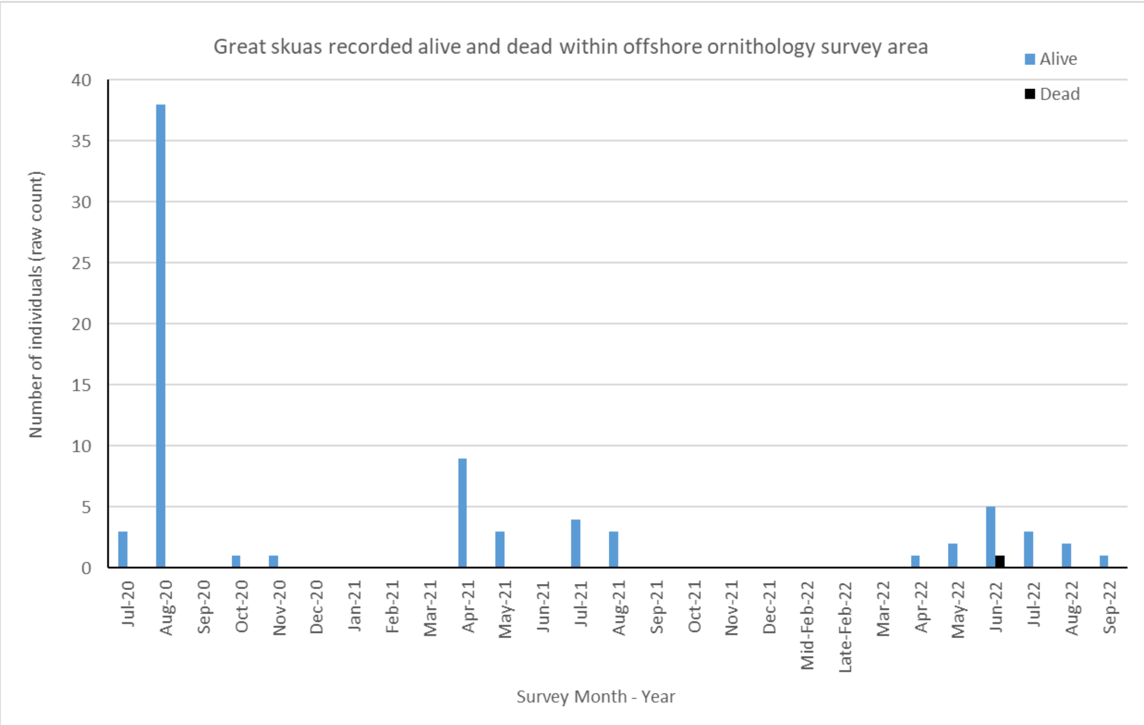


Figure 12. Great skua raw count data showing the number of individual alive and dead birds recorded in each survey.

112. As a decline in raw count data was recorded for gannet in August and September 2022, the mean abundance and density estimates of gannets used in the displacement and collision risk assessments for the months of August and September were compared with and without the comparable 2022 data (Table 4 and Table 5).

113. For further information about abundance and density estimates used in the Offshore EIA and Offshore RIAA, refer to the Supporting Study 12: Offshore ornithology technical supporting study, Annex 12.3 (displacement assessment) and Annex 12.5 (collision risk assessment) for details.

114. Due to the overlap in confidence intervals, it is clear that there is no significant difference between the August and September abundance (Table 4) and density (Table 5) estimates when the August and September 2022 data is added or removed.

Table 4. Mean abundance (number of individuals) of all gannets in flight and on the sea, standard deviation (S.D.) and confidence intervals (95% c.i.,) in the Option Agreement Area and 2 km buffer estimated for August and September. Abundance is estimated with and without data collected in August and September 2022.

Month	Mean abundance			
	With August and September 2022 data		Without August and September 2022 data	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
August	958.12 (477.89)	318.11-2070.05	1331.84 (697.46)	406.93-2960.71
September	902.28 (116.67)	679.07-1135.98	1084.66 (132.09)	828.99-1344.31

Table 5. Mean density (birds/km2) of all gannets in flight, standard deviation (S.D.) and confidence intervals (95% c.i.,) in the Option Agreement Area estimated for August and September. Abundance is estimated with and without data collected in August and September 2022.

Month	Mean density			
	With August and September 2022 data		Without August and September 2022 data	
	Estimate (S.D.)	95% c.i.	Estimate (S.D.)	95% c.i.
August	0.36 (0.13)	0.17-0.65	0.49 (0.1)	0.32-0.7
September	0.66 (0.1)	0.47-0.88	0.78 (0.15)	0.51-1.08

6 REFERENCES

Alfarwi, I. 2022. The avian flu outbreak on Coquet Island, Northumberland. Seabird Group Conference, Cork. Surveillance and monitoring responses to Highly Pathogenic Avian Influenza, a workshop at Cork Seabird Conference (2022) - YouTube

Antaky, C.C., Conklin, E.E., Toonen, R.J., Knapp, I.S.S. and Price, M.R. 2020. Unexpectedly high genetic diversity in a rare and endangered seabird in the Hawaiian Archipelago. PEERJ 8: e8463.

Ashbrook, K., Wanless, S., Harris, M.P. and Hamer, K.C. 2010. Impacts of poor food availability on positive density dependence in a highly colonial seabird. Proceedings of the Royal Society B Biological Sciences 277: 2355-2360.

Banyard, A.C., Lean, F.Z.X., Robinson, C., Howie, F. et al. 2022. Detection of highly pathogenic avian influenza virus H5N1 clade 2.3.4.4b in great skuas: a species of conservation concern in Great Britain. Viruses 14: 212.

Barbraud, C., Bertrand, A., Bouchon, M., Chaigneau, A. et al. 2018. Density dependence, prey accessibility and prey depletion by fisheries drive Peruvian seabird population dynamics. Ecography 41: 1092-1102.

Barrett, R.T., Strøm, H. and Melnikov, M. 2017. On the polar edge: the status of the northern gannet (*Morus bassanus*) in the Barents Sea in 2015-16. Polar Research 36: 1390384.

Bayes, J.C., Dawson, M.J., Joensen, A.H. and Potts, G.R. 1964. The distribution and numbers of the great skua breeding in the Faeroes in 1961. Dansk Ornitologisk Forenings Tidsskrift 58: 36-41.

Bennett, S., Wanless, S., Harris, M.P., Newell, M.A., Searle, K., Green, J.A. and Daunt, F. 2022. Site-dependent regulation of breeding success: evidence for the buffer effect in the common guillemot, a colonially breeding seabird. Journal of Animal Ecology 91: 752-765.

BirdLife 2022. www.Birdlife.org/news/2022/08/08 accessed 23/09/2022.

Bregnballe, T. and Frederiksen, M. 2021. Conspecific density as a driver of offspring body condition in three cormorant colonies in Denmark. Ardea 109: 593-608.

Buckingham, L., Bogdanova, M.I., Green, J.A., Dunn, R.E. et al. 2022. Interspecific variation in non-breeding aggregation: a multi-colony tracking study of two sympatric seabirds. Marine Ecology Progress Series 684: 181-197.

Caliendo, V., Lewis, N.S., Pohlmann, A., Baillie, S.R. et al. 2022a. Transatlantic spread of highly pathogenic avian influenza H5N1 by wild birds from Europe to North America in 2021. Scientific Reports 12: 11729.

Caliendo, V., Leijten, L., van der Bildt, M.W.G., Poen, M.J. et al. 2022b. Long-term protective effect of serial infections with H5N8 highly pathogenic avian influenza virus in wild ducks. Journal of Virology 96: doi 10.1128/jvi.01233-22.

Camphuysen, C.J. 2022. Beached bird surveys in The Netherlands, autumn 2021 and winter 2021/22. NIOZ Report, Aug 2022. Royal Netherlands Institute for Sea Research, Texel.

Camphuysen, C.K. and Gear, S.C. 2022. Great skuas and northern gannets on Foula, summer 2022 – an unprecedented, H5N1 related massacre. NIOZ Report 2022-02. NIOZ Royal Netherlands Institute for Sea Research, Texel. https://doi.org/10.25850/nioz/7b.b.gd

Camphuysen, C.J., Gear, S.C. and Furness, R.W. 2022. Avian influenza leads to mass mortality of adult great skuas in Foula in summer 2022. Scottish Birds in press.

Chardine, J.W., Rail, J-F. and Wilhelm, S. 2013. Population dynamics of northern gannets in North America, 1984-2009. Journal of Field Ornithology 84: 187-192.

Chen H., Smith, G.J.D., Zhang, S.Y., Qin, K. et al. 2005. H5N1 virus outbreak in migratory waterfowl - A worrying development could help to spread this dangerous virus beyond its stronghold in southeast Asia. Nature 436: 191-192.

Church, G.E., Furness, R.W., Tyler, G., Gilbert, L. and Votier, S.C. 2018. Change in the North Sea ecosystem from the 1970s to the 2010s: great skua diets reflect changing forage fish, seabirds, and fisheries. ICES Journal of Marine Science 76: 925-937.

Convention on Migratory Species 2022. Scientific task force on avian influenza and wild birds statement on: H5N1 highly pathogenic avian influenza in poultry and wild birds: winter of 2021/2022 with focus on mass mortality of wild birds in UK and Israel. 24 January 2022. www.cms.int/sites/default/files/uploads/avian_influenza_0.pdf

Cortes-Hinojosa, G., Broitman, B., Rivadeneira, M. and Luna-Jorquera, G. 2017. Effect of environmental variables and population density on the development of Humboldt penguin (*Spheniscus humboldti*) chicks. Revista Chilena de Ornitologia 23: 55-62.

Coulson, J.C. 1999. Variation in clutch size of the common eider: a study based on 41 breeding seasons on Coquet Island, Northumberland, England. Waterbirds 22: 225-238.

Coulson, J.C., Duncan, N. and Thomas, C. 1982. Changes in the breeding biology of the herring gull (*Larus argentatus*) induced by reduction in the size and density of the colony. Journal of Animal Ecology 51: 739-756.

Cui, P., Shi, J., Wang, C., Zhang, Y. et al. 2022. Global dissemination of H5N1 influenza viruses bearing the clade 2.3.4.4b HA gene and biologic analysis of the ones detected in China. Emerging Microbes and Infections 11: 1693-1704.

Daily Maverick 2022. Deadly avian flu hits endangered penguin colony on Cape Peninsula. https://www.dailymaverick.co.za/article/2022-09-20-deadly-avian-flu-hits-endangered-penguin-colony-on-cape-peninsula/

Danckwerts, D.K., Humeau, L., Pinet, P., McQuaid, C.D. and Le Corre, M. 2021. Extreme philopatry and genetic diversification at unprecedented scales in a seabird. Scientific Reports 11: 6834.

Eda, M., Yamasaki, T., Izumi, H., Tomita, N., Konno, S., Konno, M., Murakami, H. and Sato, F. 2020. Cryptic species in a vulnerable seabird: short-tailed albatross consists of two species. Endangered Species Research 43: 375-386.

Erikstad, K.E., Reiertsen, T.K., Barrett, R.T., Vikebø, F. and Sandvik, H. 2013. Seabird-fish interactions: the fall and rise of a common guillemot *Uria aalge* population. Marine Ecology Progress Series 475: 267-276.

Fay, R., Barbraud, C., Delord, K. and Weimerskirch, H. 2017. Contrasting effects of climate and population density over time and life stages in a long-lived seabird. Functional Ecology 31: 1275-1284.

Finkelstein, M.E., Wolf, S., Goldman, M., Doak, D.F., Sievert, P.R., Balogh, G. and Hasegawa, H. 2010. The anatomy of a (potential) disaster: volcanoes, behavior, and population viability of the short-tailed albatross (*Phoebastria albatrus*). Biological Conservation 143: 321-331.

Fisher, J. and Vevers, H.G. 1943-44. The breeding distribution, history and population of the North Atlantic gannet *Sula bassana*. Journal of Animal Ecology 12: 173-213; 13: 49-62.

Furness, R.W. 1977. Studies on the breeding biology and population dynamics of the great skua (*Catharacta skua* Brünnich). Ph.D. thesis, University of Glasgow.

Furness, R.W. 1981. Colonisation of Foula by gannets. Scottish Birds 11: 211-213.

Furness, R.W. 1987. The Skuas. T. & A.D. Poyser, Calton.

Furness, R.W. 2015. Density dependence in seabirds: great skuas *Stercorarius skua* start to breed at a younger age when conditions are better. Ringing & Migration 30: 43-50.

Furness, R.W. 2022. Recent changes in colony sizes of two seabird species in Scotland are not strongly influenced by Birds Directive status of the colony. Ibis doi: 10.1111/ibi.13127.

Furness, R.W. and Birkhead, T.R. 1984. Seabird colony distributions suggest competition for food supplies during the breeding season. Nature 311: 655-656.

Gardarsson, A. 2019. Icelandic colonies of the northern gannet in 2013-2014. Bliki 33: 69-71.

Gascoigne, J.C. and Lipcius, R.N. 2004. Allee effects driven by predation. Journal of Applied Ecology 41: 801-810.

Gear, S. 2022. Appendix 1 Seabird monitoring on Foula in 2021. pp. 42-44 In Miles, W. and Mellor, M. SOTEAG ornithological monitoring programme – 2021 report. University of St Andrews.

Genovart, M., Oro, D., Juste, J. and Bertorelle, G. 2007. What genetics tells us about the conservation of the critically endangered Balearic shearwater. Biological Conservation 137: 283-293.

Genovart, M., Oro, D. and Tenan, S. 2018. Immature survival, fertility, and density dependence drive global population dynamics in a long-lived species. Ecology 99: 2823-2832.

Gilchrist, H.G. 1999. Declining thick-billed murre *Uria lomvia* colonies experience higher gull predation rates: an intercolony comparison. Biological Conservation 87: 21-29.

Globig A., Staubach, C., Beer, M., Köppen, U. et al. 2009. Epidemiological and ornithological aspects of outbreaks of highly pathogenic avian influenza virus H5N1 of Asian lineage in wild birds in Germany, 2006 and 2007. Transb. Emerg. Dis. 56: 57-72.

Goyert, H.F., Garton, E.O., Drummond, B.A. and Renner, H.M. 2017. Density dependence and changes in the carrying capacity of Alaskan seabird populations. Biological Conservation 209: 178-187.

Goyert, H.F., Garton, E.O. and Poe, A.J. 2018. Effects of climate change and environmental variability on the carrying capacity of Alaskan seabird populations. Auk 135: 975-991.

Grear, J.S., Meyer, M.W., Cooley, J.H., Kuhn, A. et al. 2009. Population growth and demography of common loons in the northern United States. Journal of Wildlife Management 73: 1108-1115.

Hammer, S., Madsen, J.J., Jensen, J-K., Pedersen, K.T., Bloch, D. and Thorup, K. 2014. Færøsk Trækfugleatlas. Faroe University Press, Tórshavn.

Harris, M.P. and Murray, S. 1978. Birds of St Kilda. Institute of Terrestrial Ecology, Banchory.

Hasebe, M., Aotsuka, M., Terasawa, T., Fukuda, Y., Niimura, Y., Watanabe, Y., Watanuki, Y. and Ogi, H. 2012. Status and conservation of the common murre *Uria aalge* breeding on Teuri Island, Hokkaido. Ornithological Science 11: 29-38.

Heubeck, M., Mellor, R.M. and Harvey, P.V. 1997. Changes in the breeding distribution and numbers of kittiwakes *Rissa tridactyla* around Unst, Shetland, and the presumed role of predation by great skuas *Stercorarius skua*. Seabird 19: 12-21.

Horswill, C., O'Brien, S.H. and Robinson, R.A. 2017. Density dependence and marine bird populations: are wind farm assessments precautionary? Journal of Applied Ecology 54: 1406-1414.

Huang Y., G.J. Robertson, D. Ojkic, H. Whitney and A.S. Lang 2014. Diverse inter-continental and host lineage reassortant avian influenza A viruses in pelagic seabirds. Infection, Genetics and Evolution 22: 103-111.

Jhung, M.A. and Nelson, D.I. 2015. Outbreaks of avian influenza A (H5N2), (H5N8), and (H5N1) among birds – United States, December 2014-January 2015. MMWR Morbidity and Mortality Weekly Report 64: 111.

JNCC 2022. Seabird Monitoring Programme Database.
https://app.bto.org/seabirds/public/index.jsp

Jouventin, P., Martinez, J. and Roux, J.P. 1989. Breeding biology and current status of the Amsterdam albatross *Diomedea amsterdamensis*. Ibis 131: 171-182.

Kaplan, B.S. and Webby, R.J. 2013. The avian and mammalian host range of highly pathogenic avian H5N1 influenza. Virus Research 178: 3-11.

Kokubun, N., Emmerson, L., McInnes, J., Wienecke, B. and Southwell, C. 2021. Sea-ice and density-dependent factors affecting foraging habitat and behaviour of Adelie penguins throughout the breeding season. Marine Biology 168: 97.

Kuro-O, M., Yonekawa, H., Saito, S., Eda, M., Higuchi, H., Koike, H. and Hasegawa, H. 2010. Unexpectedly high genetic diversity of mtDNA control region through severe bottleneck in vulnerable albatross *Phoebastria albatrus*. Conservation Genetics 11: 127-137.

Lamb, J.S., Stage, Y.G. and Jodice, P.G.R. 2017. Influence of density-dependent competition on foraging and migratory behavior of a subtropical colonial seabird. Ecology and Evolution 7: 6469-6481.

Lang, A.S., Lebarbenchon, C., Ramey, A.M., Robertson, G.J. and Waldenström, J. 2016. Assessing the role of seabirds in the ecology of influenza A viruses. Avian Diseases 60: 378-386.

Lawrence, H.A., Taylor G.A., Millar, C.D. and Lambert, D.M. 2008. High mitochondrial and nuclear genetic diversity in one of the world's most endangered seabirds, the Chatham Island taiko (*Pterodroma magentae*). Conservation Genetics 9: 1293-1301.

Lycett, S.J., Bodewes, R., Pohlmann, A., Banks, J. et al. 2016. Role for migratory wild birds in the global spread of avian influenza H5N8. Science 354: 213-217.

te Marvelde, L., Meininger, P.L., Flamant, R. and Dingemanse, N.J. 2009. Age-specific density-dependent survival in Mediterranean gulls *Larus melanocephalus*. Ardea 97: 305-312.

McKnight, A., Blomberg, E.J., Irons, D.B., Loftin, C.S. and McKinney, S.T. 2019. Survival and recruitment dynamics of black-legged kittiwakes *Rissa tridactyla* at an Alaskan colony. Marine Ornithology 47: 209-222.

Miles, W., Mellor, M., Clark, J., Reay, S., Pennington, M., Tyler, G., Kelly, K. and Gear, S. 2022. Seabird breeding season summary. Shetland Bird Club Newsletter No. 196.

Miller, J.A.O., Furness, R.W., Trinder, M. and Matthiopoulos, J. 2019. The sensitivity of seabird populations to density-dependence, environmental stochasticity and anthropogenic mortality. Journal of Applied Ecology 56: 2118-2130.

Minias, P., Wlodarczyk, R. and Janiszewski, T. 2015. Opposing selection pressures may act on the colony size in a waterbird species. Evolutionary Ecology 29: 283-297.

Mitchell, P.I., Newton, S.F., Ratcliffe, N. and Dunn, T.E. 2004. Seabird Populations of Britain and Ireland. T. & A.D. Poyser, London.

Munilla, I., Genovart, M., Paiva, V.H. and Velando, A. 2016. Colony foundation in an oceanic seabird. PLoS ONE 11: e0147222.

Murray, S., Harris, M.P. and Wanless, S. 2015. The status of the gannet in Scotland in 2013-14. Scottish Birds 35: 3-18.

Nager, R.G. and O'Hanlon, N.J. 2016. Changing numbers of three gull species in the British Isles. Waterbirds 39: 15-28.

National Geographic 2022. The UK's largest avian flu outbreak has left millions of birds dead – and scientists extremely concerned | National Geographic

NE 2022. Highly Pathogenic Avian Influenza (HPAI) outbreak in seabirds and Natural England advice on impact assessment (specifically relating to offshore wind) September 2022. Natural England, Peterborough.

Nelson, J.B. 1978. The Sulidae: gannets and boobies. Oxford University Press, Oxford.

Oro, D. and Furness, R.W. 2002. Influences of food availability and predation on survival of kittiwakes. Ecology 83: 2516-2528.

Oro, D., Martinez-Abrain, A., Paracuellos, M., Nevado, J.C. and Genovart, M. 2006. Influence of density dependence on predator-prey seabird interactions at large spatio-temporal scales. Proceedings of the Royal Society B 273: 379-383.

Oro, D., Becares, J., Bartumeus, F. and Arcos, J.M. 2021. High frequency of prospecting for informed dispersal and colonisation in a social species at large spatial scale. Oecologia 197: 395-409.

Pacoureau, N., Authier, M., Delord, K. and Barbraud, C. 2019. Population response on an apex Antarctic consumer to its prey and climate fluctuations. Oecologia 189: 279-291.

Patterson, A., Gilchrist, H.G., Benjaminsen, S., Bolton, M. et al. 2022. Foraging range scales with colony size in high-latitude seabirds. Current Biology 32: 3800-3807.

Payo-Payo, A., Genovart, M., Bertolero, A., Pradel, R. and Oro, D. 2016. Consecutive cohort effects driven by density-dependence and climate influence early-life survival in a long-lived bird. Proceedings of the Royal Society B – Biological Sciences 283: 20153042.

Pearce-Higgins, J. and Toms, M. 2022. Tragedy of the colonies. BTO News 344: 12-15.

Pennington, M., Osborn, K., Harvey, P., Riddington, R., Okill, D., Ellis, P. and Heubeck, M. 2004. The Birds of Shetland. Christopher Helm, London.

Perry, R. 1948. Shetland Sanctuary. Faber & Faber, London.

Philip, E. and Tyler, G. 2022. Weathering the storm: a policy response. Surveillance and monitoring responses to Highly Pathogenic Avian Influenza, a workshop at Cork Seabird Conference (2022) - YouTube

Phillips, R.A. and Furness, R.W. 1998. The influence of territory density on the vulnerability of Arctic skuas *Stercorarius parasiticus* to predation. Biological Conservation 86: 21-31.

Potts, G.R., Coulson, J.C. and Deans, I.R. 1980. Population dynamics and breeding success of the shag, *Phalacrocorax aristotelis*, on the Farne Islands, Northumberland. Journal of Animal Ecology 49: 465-484.

Pöysä, H. and Pöysä, S. 2002. Nest-site limitation and density dependence of reproductive output in the common goldeneye *Bucephala clangula*: implications for the management of cavity-nesting birds. Journal of Applied Ecology 39: 502-510.

Radio Canada 2022. https://ici.radio-canada.ca/nouvelle/1899344 and https://ici.radio-canada.ca/nouvelle/1915297

Ramey A.M., A.B. Reeves, B.J. Lagassé, V. Patil, L.E. Hubbard, D.W. Kolpin, R.B. McCleskey, D.A. Repert, D.E. Stallknecht and R.L. Poulson 2022. Evidence for interannual persistence of infectious influenza A viruses in Alaska wetlands. Science of the Total Environment 803: 150078.

Real, E., Oro, D., Martinez-Abrain, A., Manuel Igual, J., Bertolero, A., Bosch, M. and Tavecchia, G. 2017. Predictable anthropogenic food subsidies, density-dependence and socio-economic factors influence breeding investment in a generalist seabird. Journal of Avian Biology 48: 1462-1470.

Rijks, J.M., Leopold, M.F., Kühn, S., in 't Veld, R., Schenk, F., Brennunkmeijer, A., Lilipaly, S.J., Ballmann, M.Z., Kelder, L., de Jong, J.W., Courtens, W., Slaterus, R., Kleyheeg, E., Vreman, S., Kik, M.J.L., Gröne, A., Fouchier, R.A.M., Engelsma, M., de Jong, M.C.M., Kuiken, T. and Beerens, N. 2022. Mass mortality caused by highly pathogenic influenza A (H5N1) virus in Sandwich terns, the Netherlands, 2022. Emerging Infectious Diseases 28: 2538-2542.

Roche B., C. Lebarbenchon, M. Gauthier-Clerc, C-M Chang, F. Thomas, F. Renaud, S. van der Werf and J-F. Guégan 2009. Water-borne transmission drives avian influenza dynamics in wild birds: The case of the 2005-2006 epidemics in the Camargue area. Infection, Genetics & Evolution 9: 800-805.

RSPB 2022. How together we can protect wild birds from Avian Flu. https://rspb.org.uk/birdflu accessed 23/09/2022.

Sato, F. 2009. Increase in pairs of the short-tailed albatross *Diomedea albatrus* at an artificial breeding ground. Journal of the Yamashina Institute for Ornithology 40: 139-143.

Schippers, P., Stienen, E.W.M., Schotman, A.G.M., Snep, R.P.H. and Slim, P.A. 2011. The consequences of being colonial: Allee effects in metapopulations of seabirds. Ecological Modelling 222: 3061-3070.

Serrano, D., Oro, D., Ursua, E. and Tella, J.L. 2005. Colony size selection determines adult survival and dispersal preferences: Allee effects in a colonial bird. American Naturalist 166: E22-E31.

Sonnberg, S., Webby, R.J. and Webster, R.G. 2013. Natural history of highly pathogenic avian influenza H5N1. Virus Research 178: 63-77.

Southwell, C. and Emmerson, L. 2020. Density dependence forces divergent population growth rates and alters occupancy patterns of a central place foraging Antarctic seabird. Ecology and Evolution 10: 2339-2351.

Southwell, C., Wotherspoon, S. and Emmerson, L. 2021. Emerging evidence of resource limitation in an Antarctic seabird metapopulation after 6 decades of sustained population growth. Oecologia 196: 693-705.

Vader, W., Barrett, R.T., Erikstad, K.E. and Strann, K.B. 1990. Differential responses of common and thick-billed murres to a crash in the capelin stock in the southern Barents Sea. Studies in Avian Biology 14: 175-180.

Votier, S.C., Furness, R.W., Bearhop, S., Crane, J.E. et al. 2004. Changes in fisheries discard rates and seabird communities. Nature 427: 727-730.

Votier, S.C., Heubeck, M. and Furness, R.W. 2008. Using inter-colony variation in demographic parameters to assess the impact of skua predation on seabird populations. Ibis 150: 45-53.

Votier, S.C., Hatchwell, B.J., Mears, M. and Birkhead, T.R. 2009. Changes in the timing of egg-laying of a colonial seabird in relation to population size and environmental conditions. Marine Ecology Progress Series 393: 225-233.

Wakefield, E.D., Owen, E., Baer, J., Carroll, M.J. et al. 2017. Breeding density, fine-scale tracking, and large-scale modelling reveal the regional distribution of four seabird species. Ecological Applications 27: 2074-2091.

Weber, S.B., Richardson, A.J., Brown, J., Bolton, M. et al. 2021. Direct evidence of a prey depletion "halo" surrounding a pelagic predator colony. Proceedings of the National Academy of Sciences of the United States of America 118: e2101325118.

Weimerskirch, H., Brothers, N. and Jouventin, P. 1997. Population dynamics of wandering albatross *Diomedea exulans* and Amsterdam albatross *D. amsterdamensis* in the Indian Ocean and their relationships with long-line fisheries: conservation implications. Biological Conservation 79: 257-270.

Welch, A.J., Wiley, A.E., James, H.F., Ostrom, P.H., Stafford, T.W. and Fleischer, R.C. 2012. Ancient DNA reveals genetic stability despite demographic decline: 3,000 years of population history in the endemic Hawaiian petrel. Molecular Biology and Evolution 29: 3729-3740.

Werner, A.C., Paiva, V.H. and Ramos, J.A. 2014. On the "real estate market": individual quality and the foraging ecology of male Cory's shearwaters. Auk 131: 265-274.

WHO 2022. Cumulative number of confirmed human cases for avian influenza A (H5N1) reported to WHO, 2003-2022. www.who.int/publications_2022_june_tableh5n1.pdf

Wille, M., Huang, Y., Roberston, G.J., Ryan, P. et al. 2014. Evaluation of seabirds in Newfoundland and Labrador, Canada, as hosts of influenza A viruses. Journal of Wildlife Diseases 50: 98-103.

West of Orkney Windfarm

Offshore Ornithology Technical Supporting Study 12

Annex 12.9
Density surface models for key species

Date:	25th January 2023
Tel:	0141 342 5404
Web:	www.macarthurgreen.com
Address:	93 South Woodside Road |Glasgow | G20 6NT

Document Quality Record

Version	Status	Person Responsible	Date
0.1	Draft	Dr. S. Raveh	24/01/2023
0.2	Reviewed	Dr. N. Goodship	24/01/2023
1	Internal Approval	Dr Ross McGregor	09/05/2023

CONTENTS

LIST OF TABLES

1 INTRODUCTION

1. This Annex 12.9 presents fitted mean density surface model (DSM) maps for kittiwake, guillemot, razorbill, puffin, fulmar and gannet. The models and the maps were produced by DMP Statistical Solutions Ltd (DMP Stats) using Digital Aerial Survey (DAS) baseline data collected by HiDef Aerial Surveying Limited (HiDef) for the West of Orkney Windfarm ('the Project') Offshore Environmental Impact Assessment (EIA) Report and Offshore Report to Inform Appropriate Assessment (RIAA).
2. The models have been derived from data collected over 27 DASs between July 2020 to September 2022. The maps present the fitted mean DSM by species and survey for which there were sufficient data of birds on the sea surface to support the model. A table at the start of each species section illustrates which of the 27 surveys there was sufficient data to fit a model and produce a map.
3. Each map shows the fitted DSM within the study area including the OAA, a 2 km buffer and a 4 km buffer.
4. For methodology details on DSM, refer to Supporting Study 12: Offshore ornithology technical supporting study.

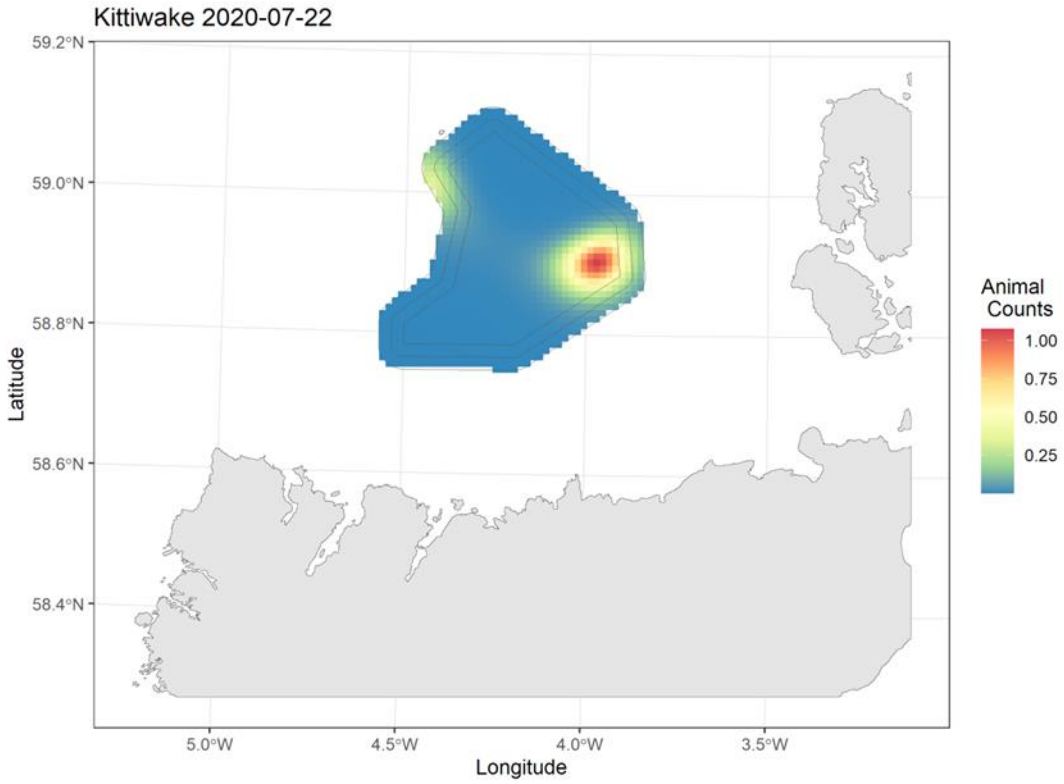
2 KITTIWAKE

Table 2-1 Illustration of which surveys carried out for the offshore Project between July 2020 to September 2022 recorded enough kittiwake to support density surface modelling.

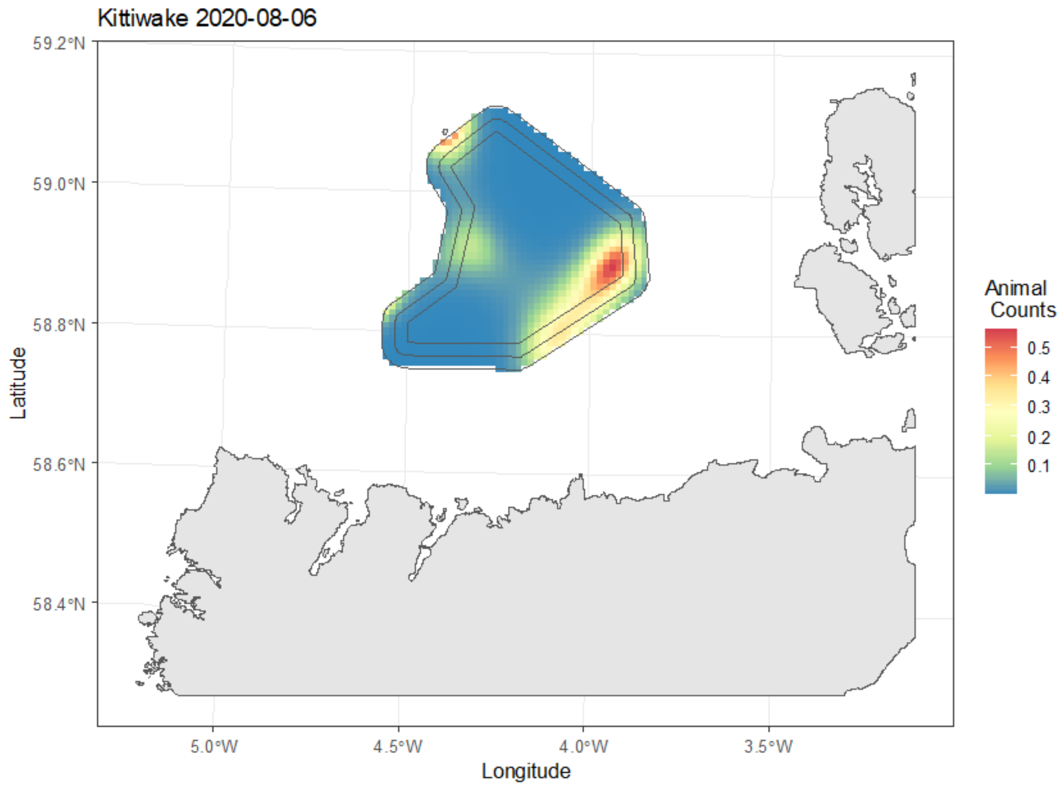
Month	2020	2021	2022
January	-	X	-
February	-	X	X
March	-	X	X
April	-	X	X
May	-	X	X
June	-	X	X
July	X	X	X
August	X	X	X
September	X	X	X
October	X	X	-
November	X	X	-
December	X	X	-

X: Survey recorded sufficient data to support DSM; X: Survey undertaken but numbers of birds too low to support DSM; -: No survey undertaken.

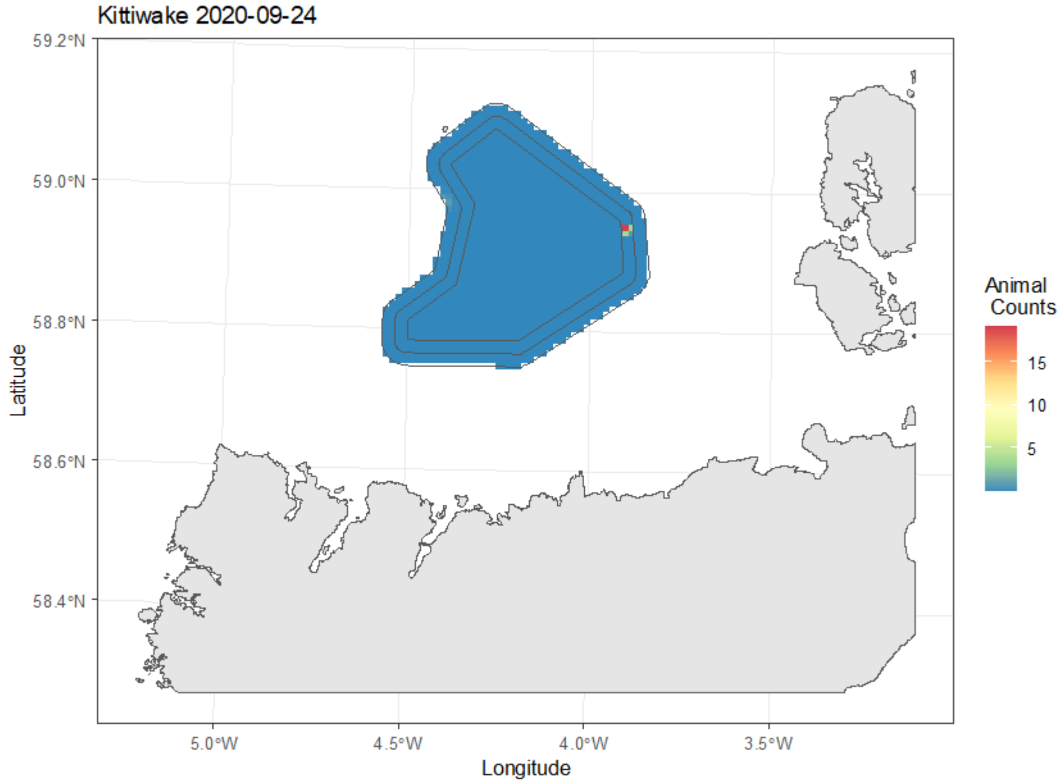
2.1.1 July 2020



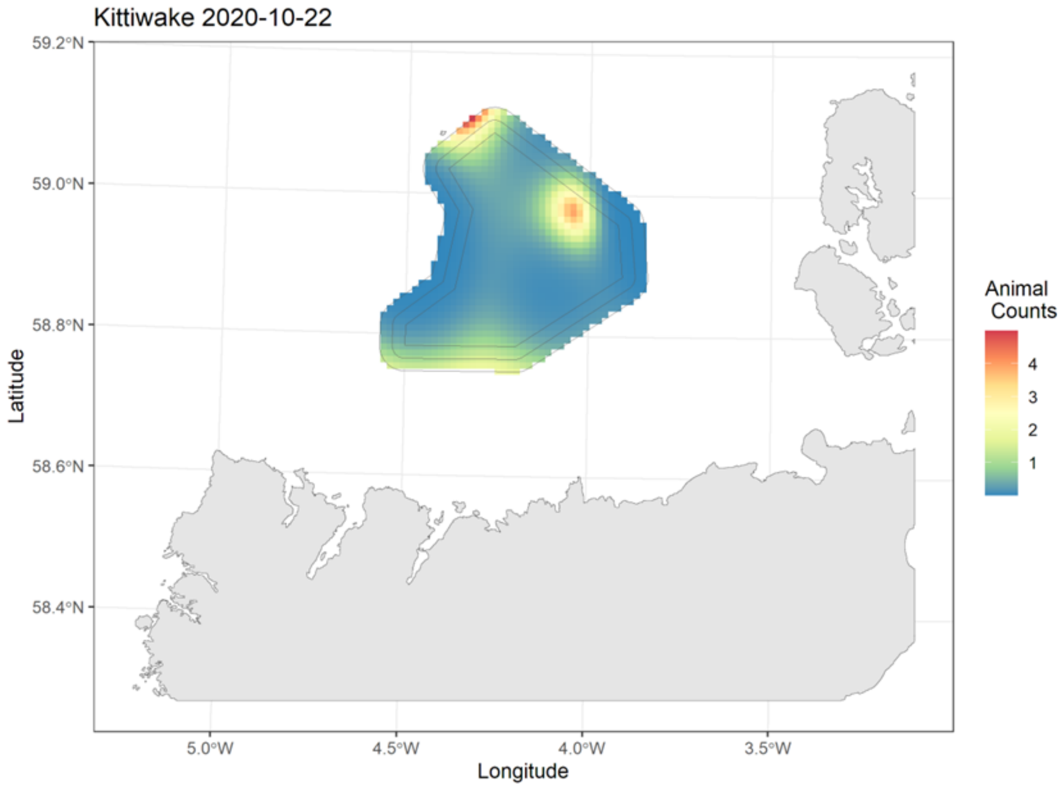
2.1.2 August 2020



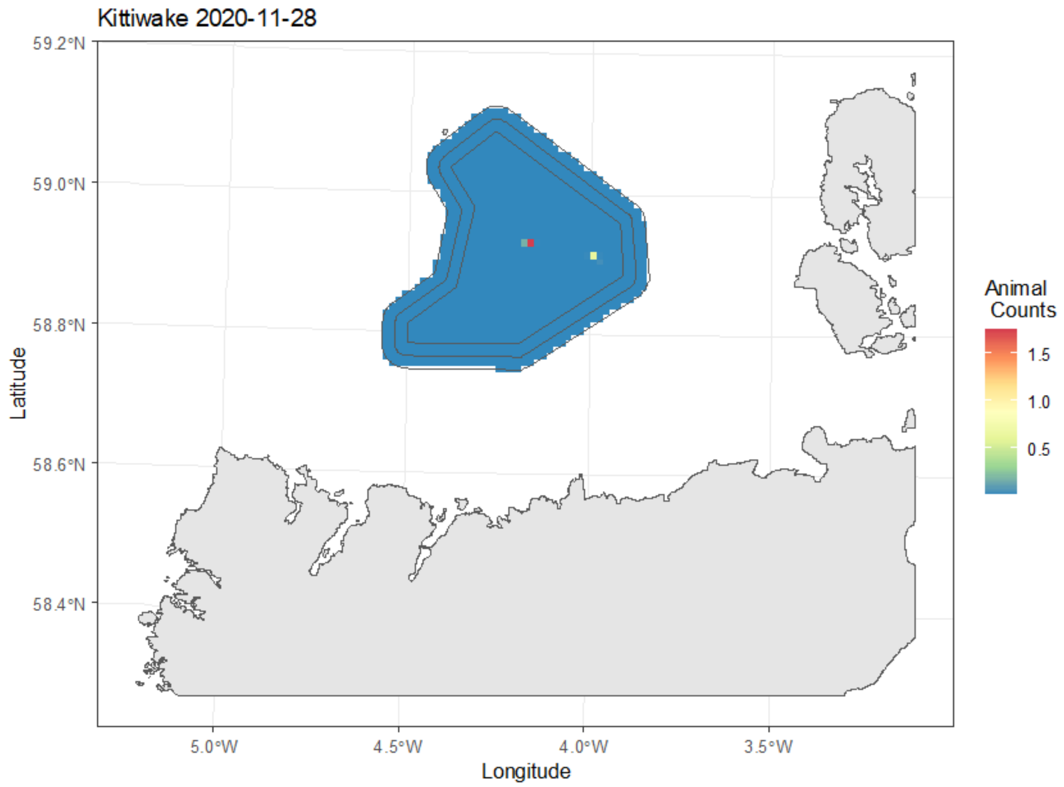
2.1.3 September 2020



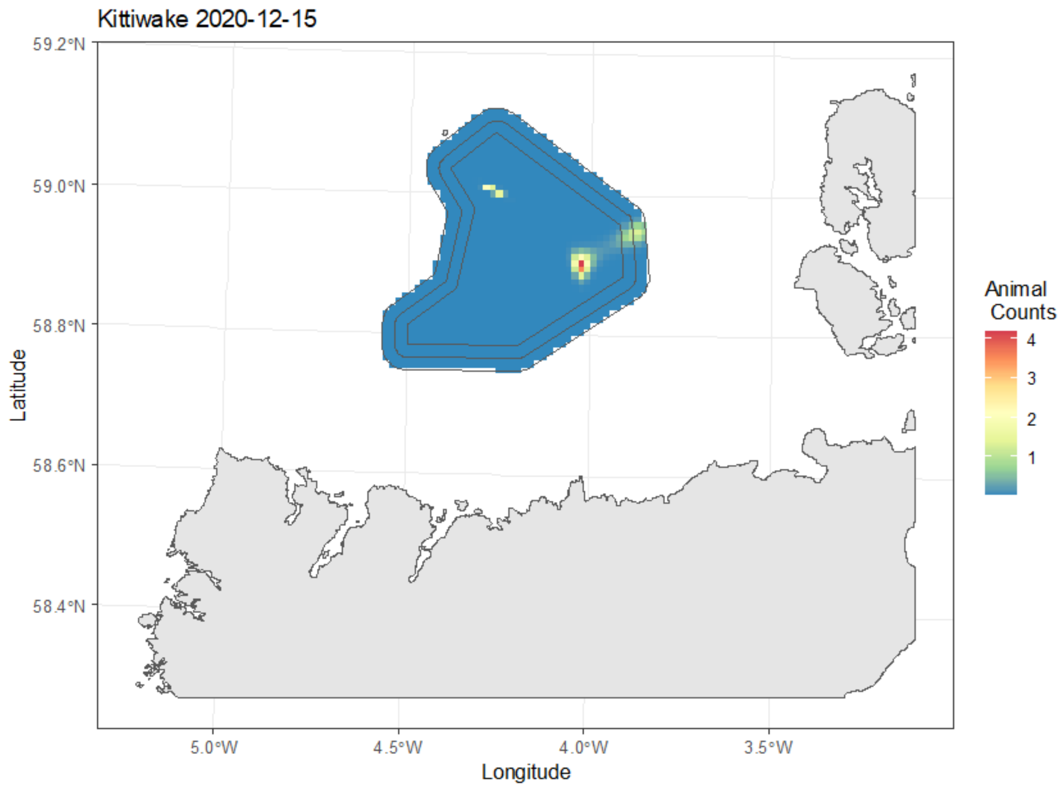
2.1.4 October 2020



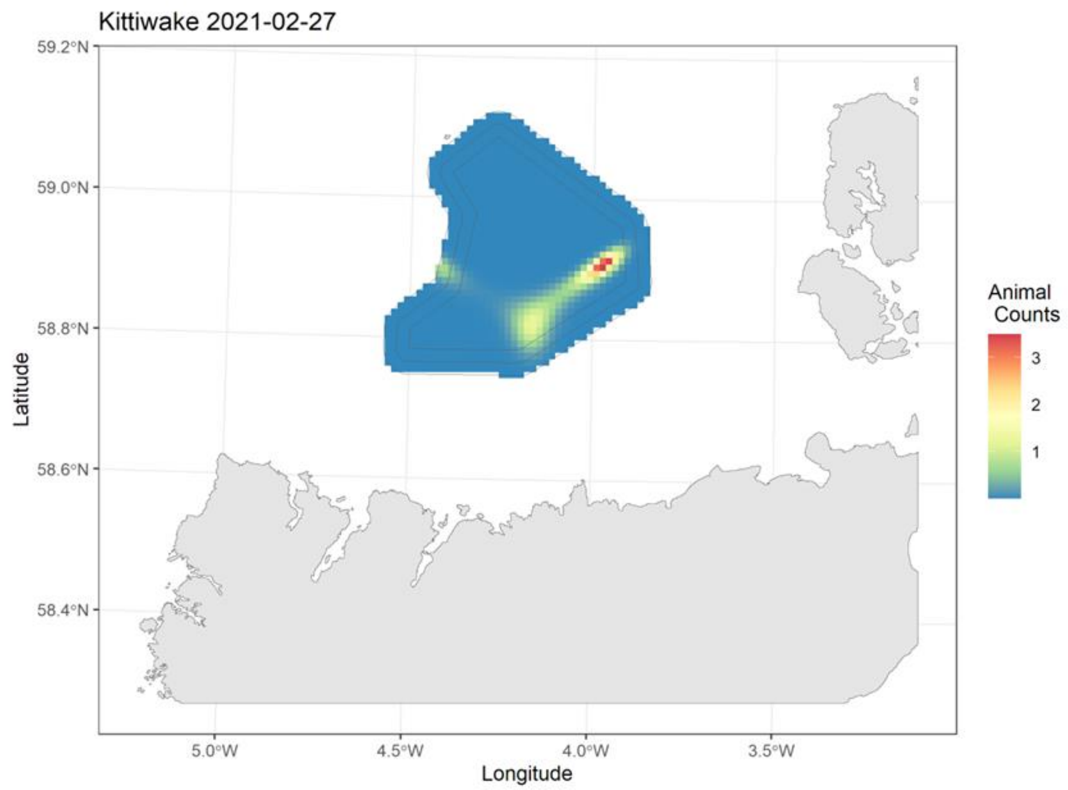
2.1.5 November 2020



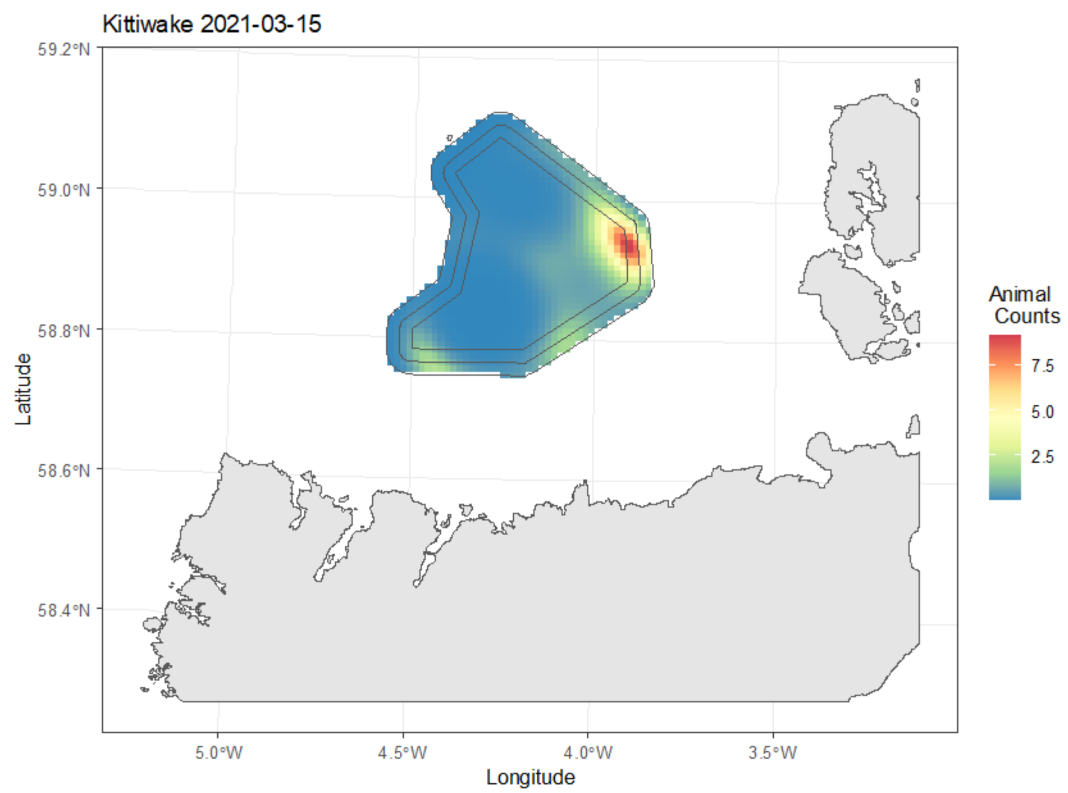
2.1.6 December 2020



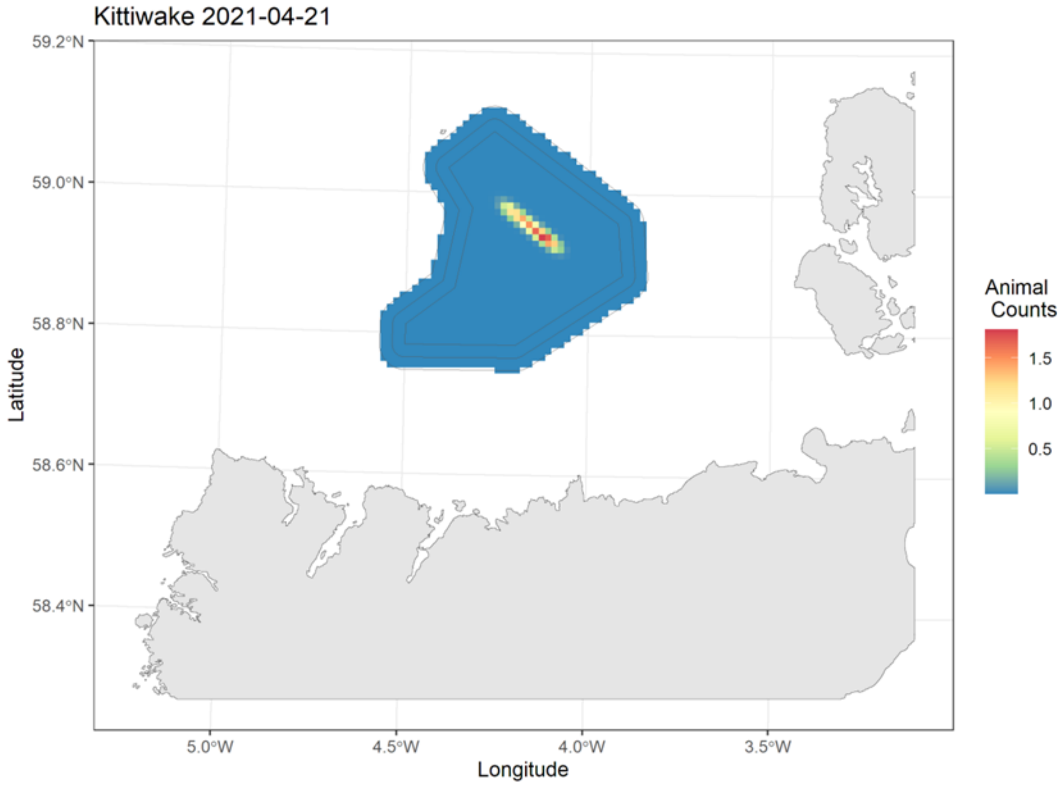
2.1.7 February 2021



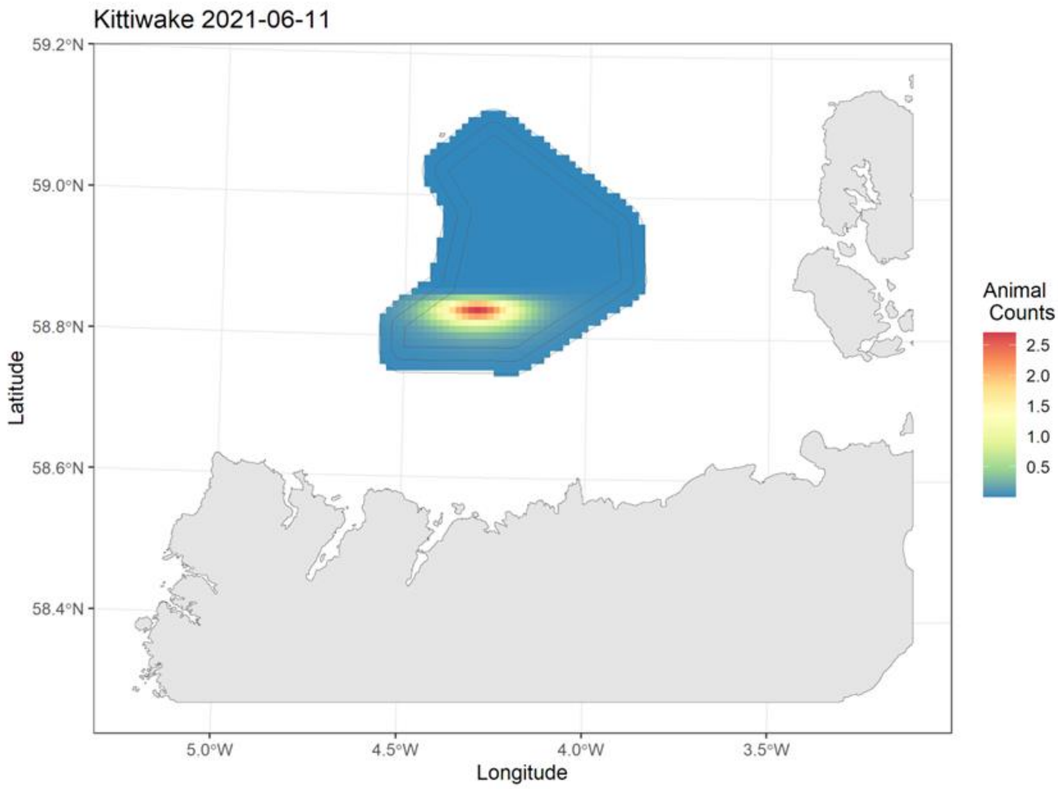
2.1.8 March 2021



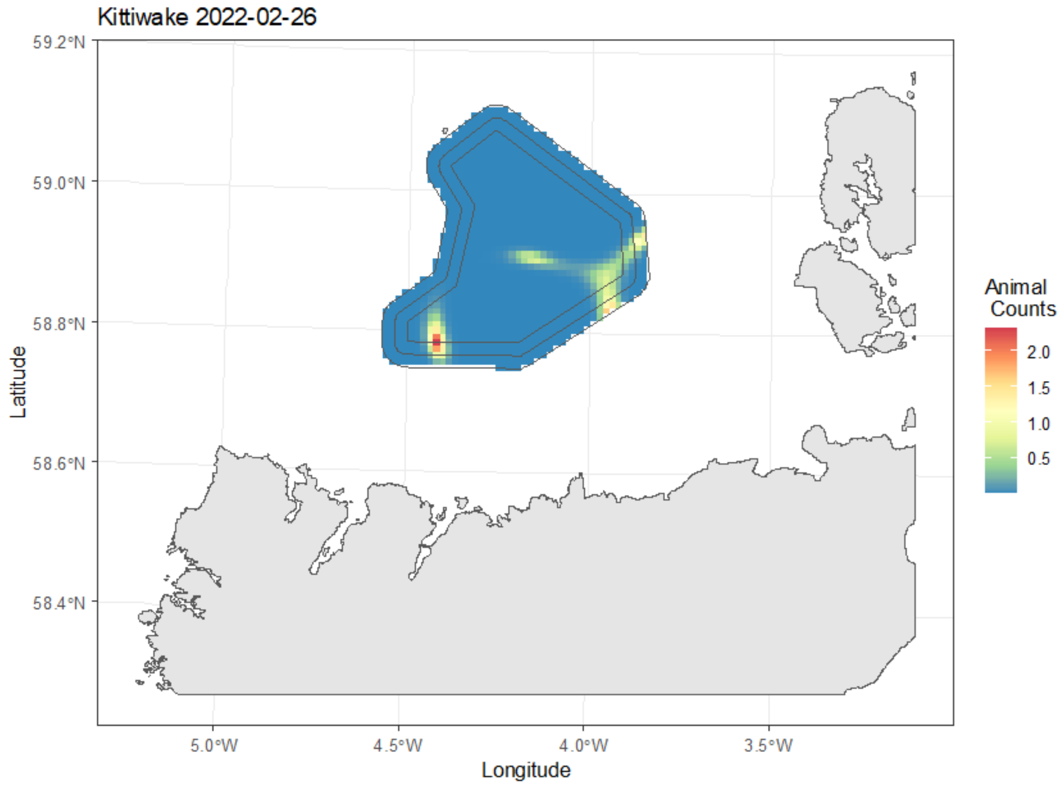
2.1.9 April 2021



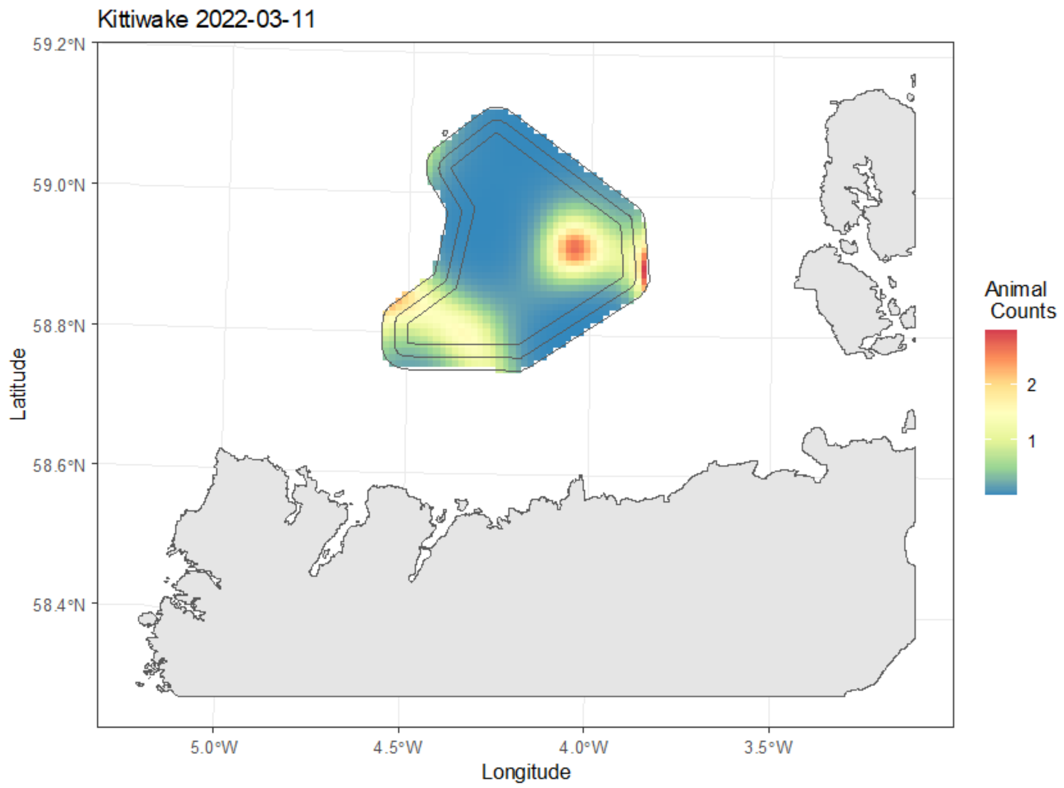
2.1.10 June 2021



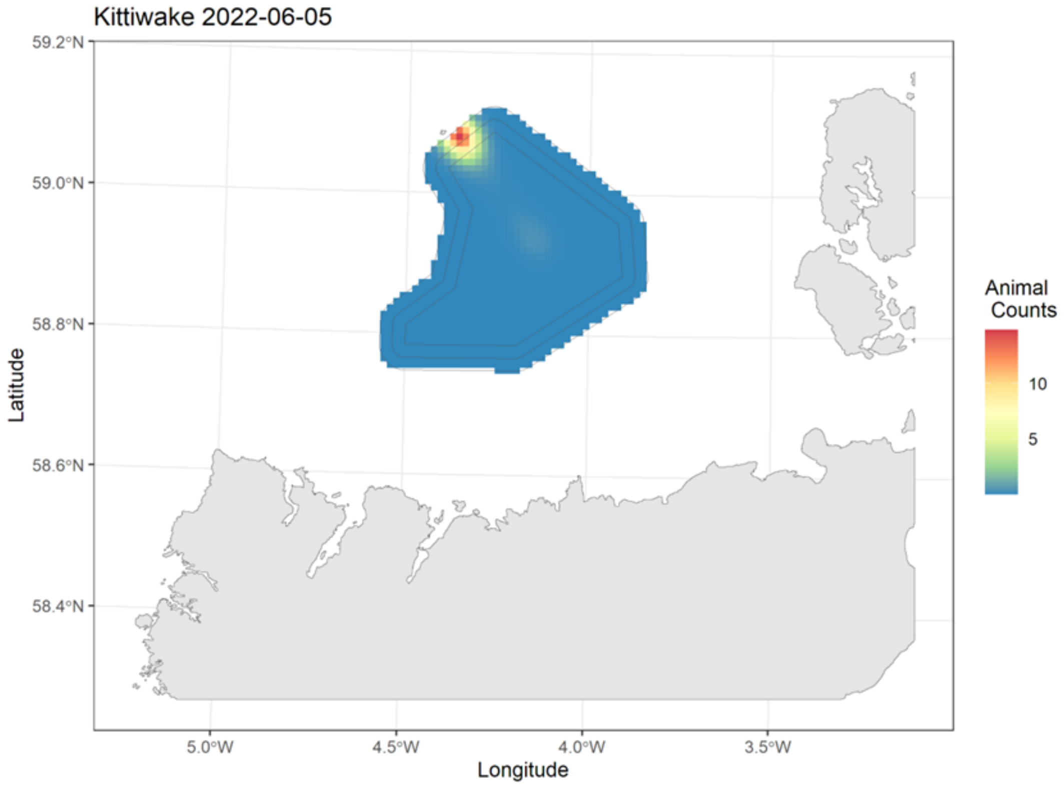
2.1.11 February 2022



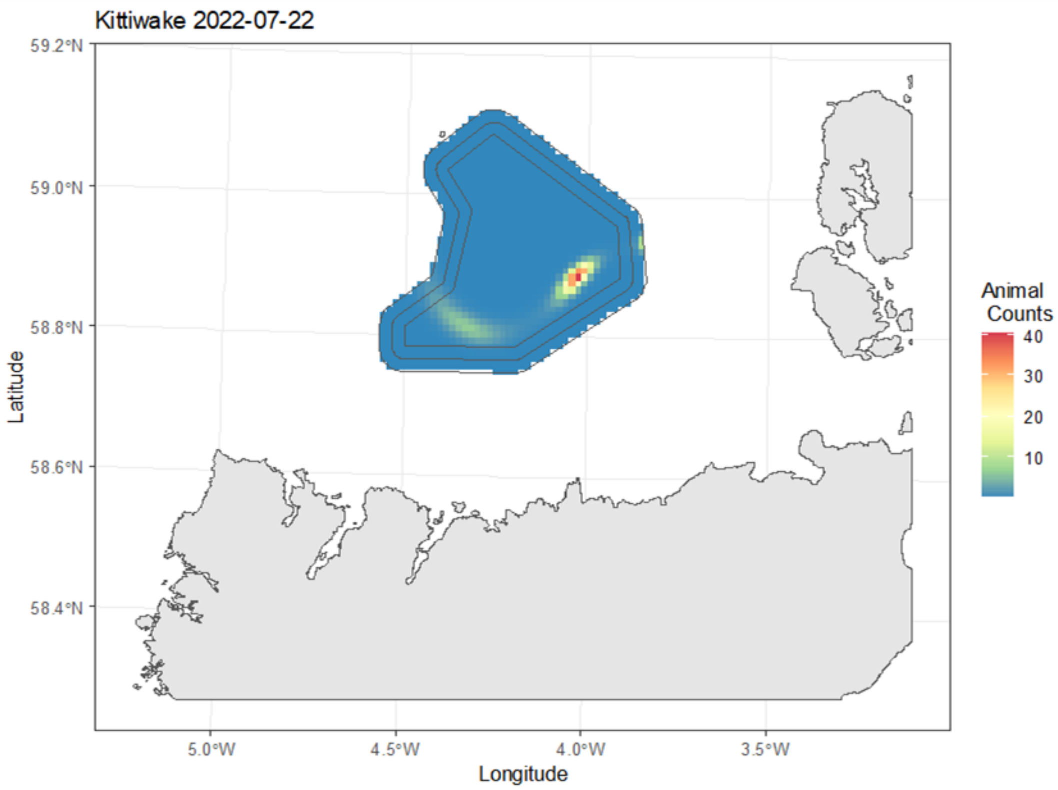
2.1.12 March 2022



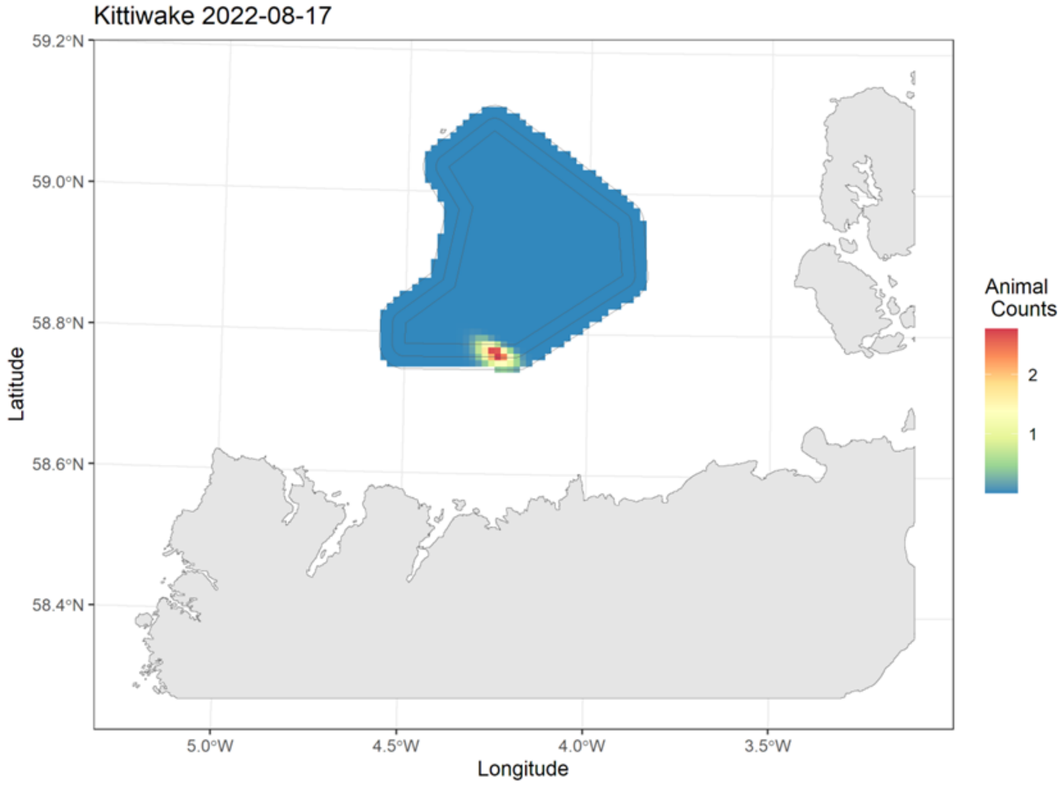
2.1.13 June 2022



2.1.14 July 2022



2.1.15 August 2022



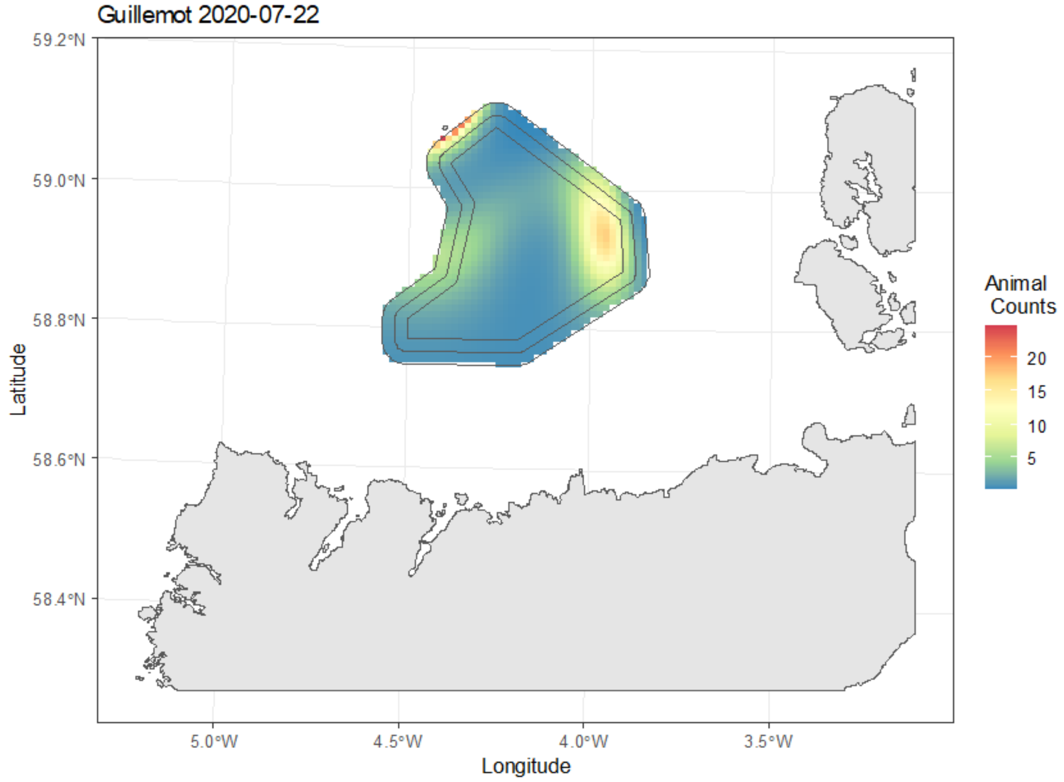
3 GUILLEMOT

Table 3-1 Illustration of which surveys carried out for the offshore Project between July 2020 to September 2022 recorded enough guillemot to support density surface modelling.

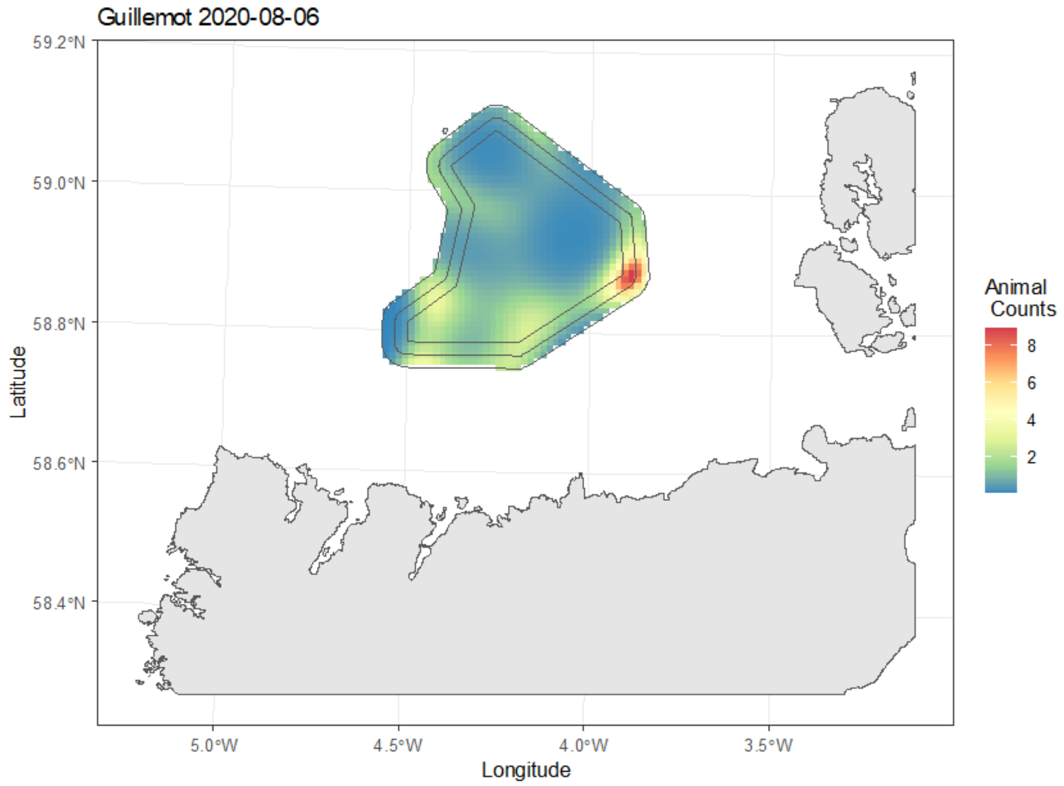
Month	2020	2021	2022
January	-	X	-
February	-	X	XX
March	-	X	X
April	-	X	X
May	-	X	X
June	-	X	X
July	X	X	X
August	X	X	X
September	X	X	X
October	X	X	-
November	X	X	-
December	X	X	-

X: Survey recorded sufficient data to support DSM; X: Survey undertaken but numbers of birds too low to support DSM; -: No survey undertaken.

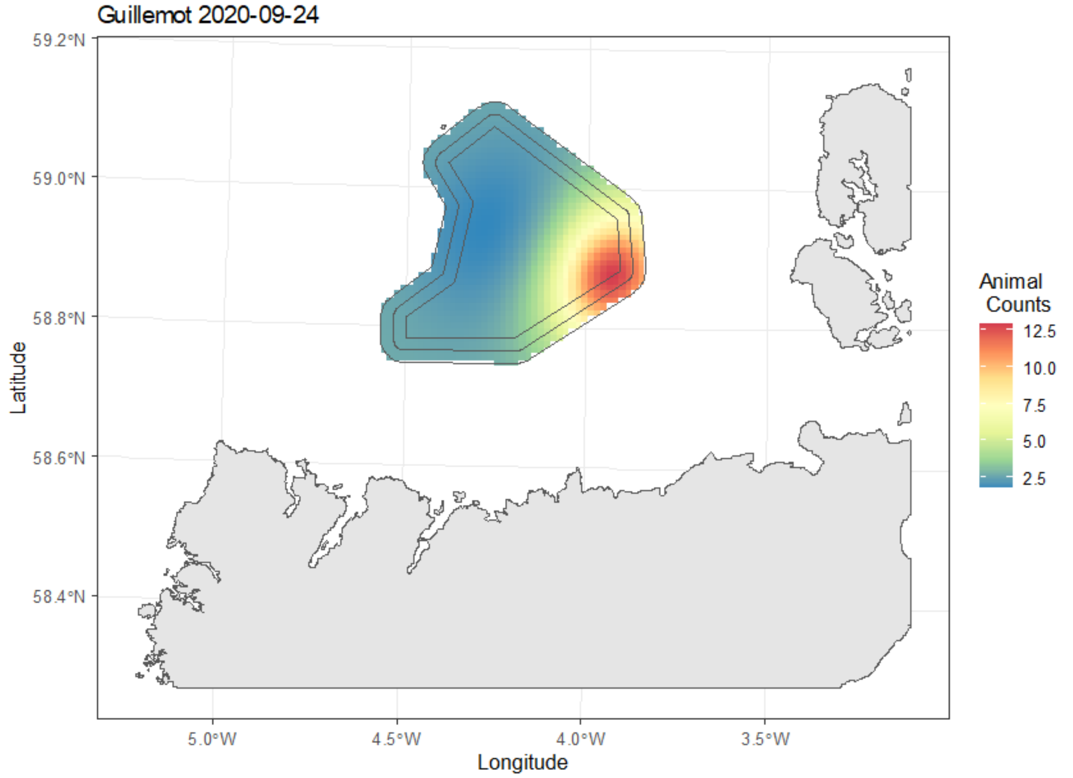
3.1.1 July 2020



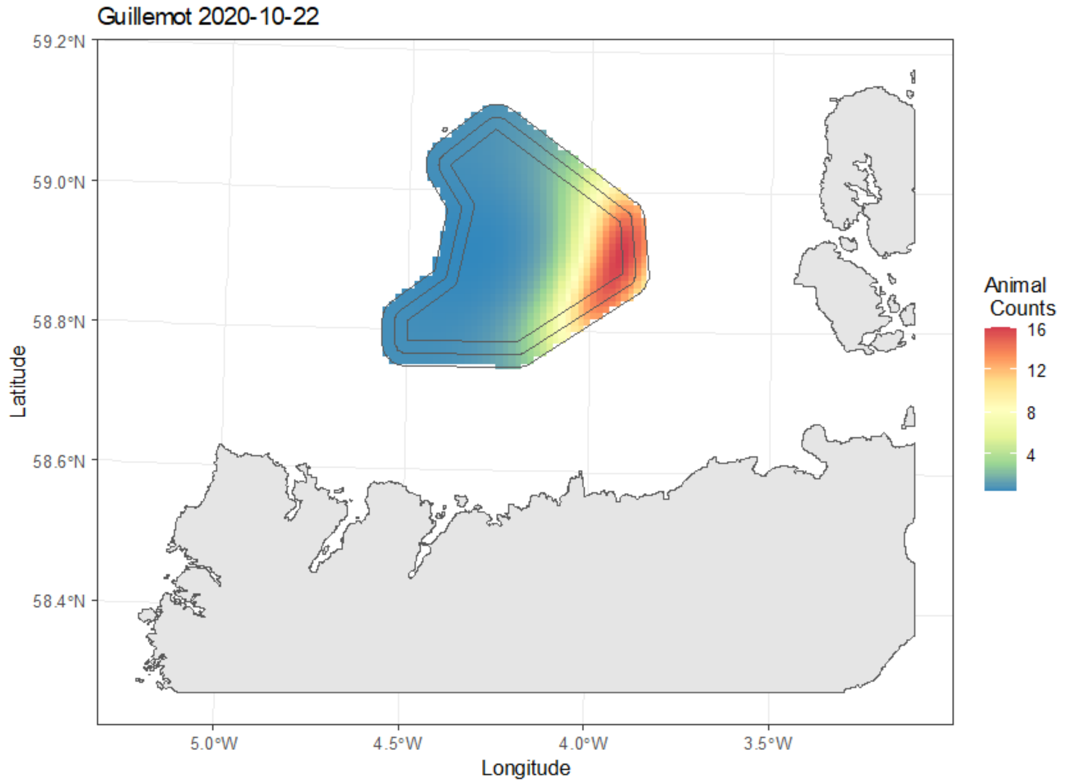
3.1.2 August 2020



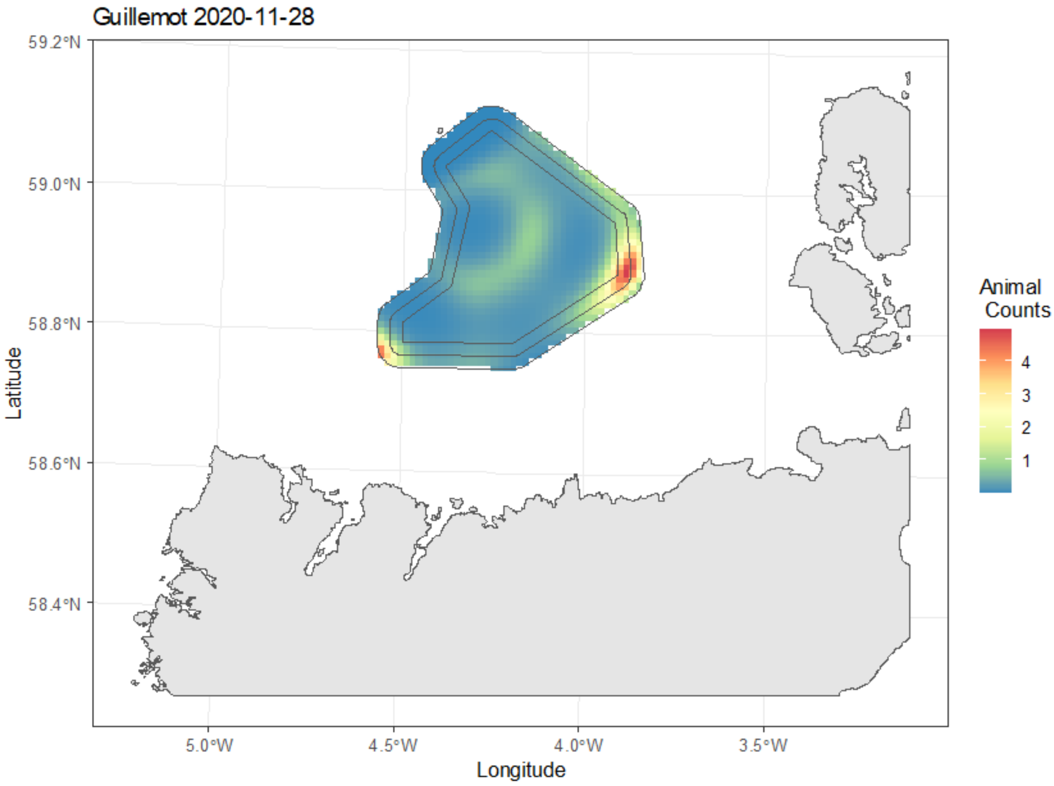
3.1.3 September 2020



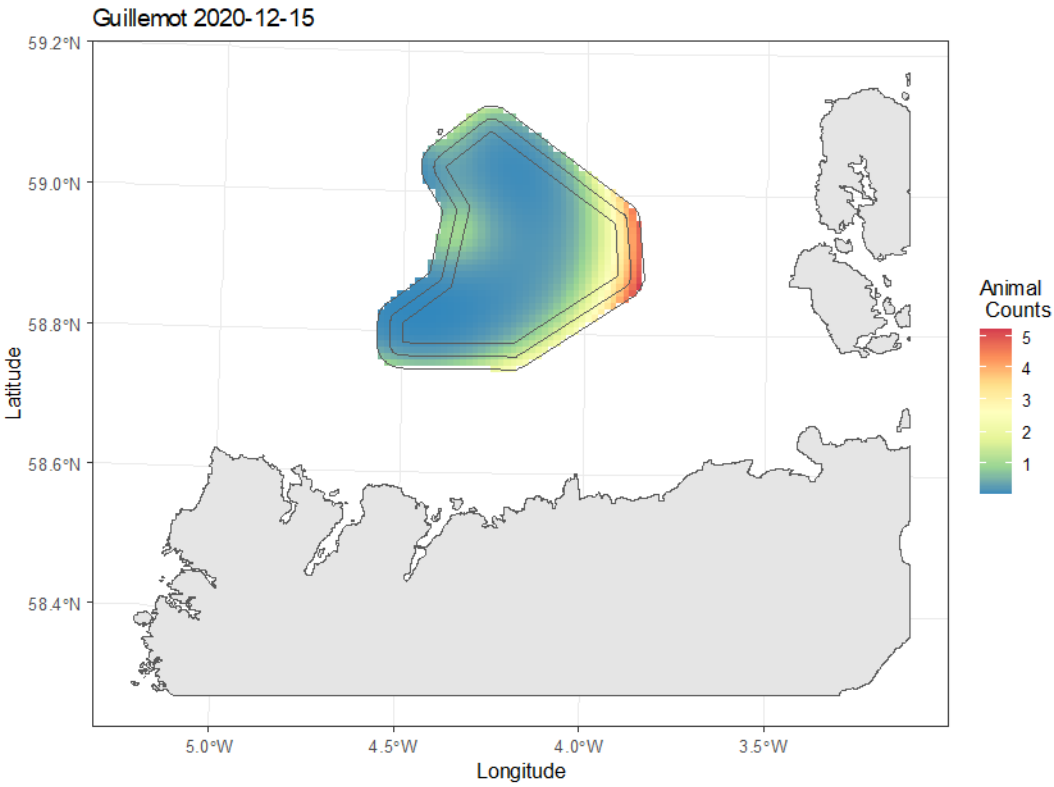
3.1.4 October 2020



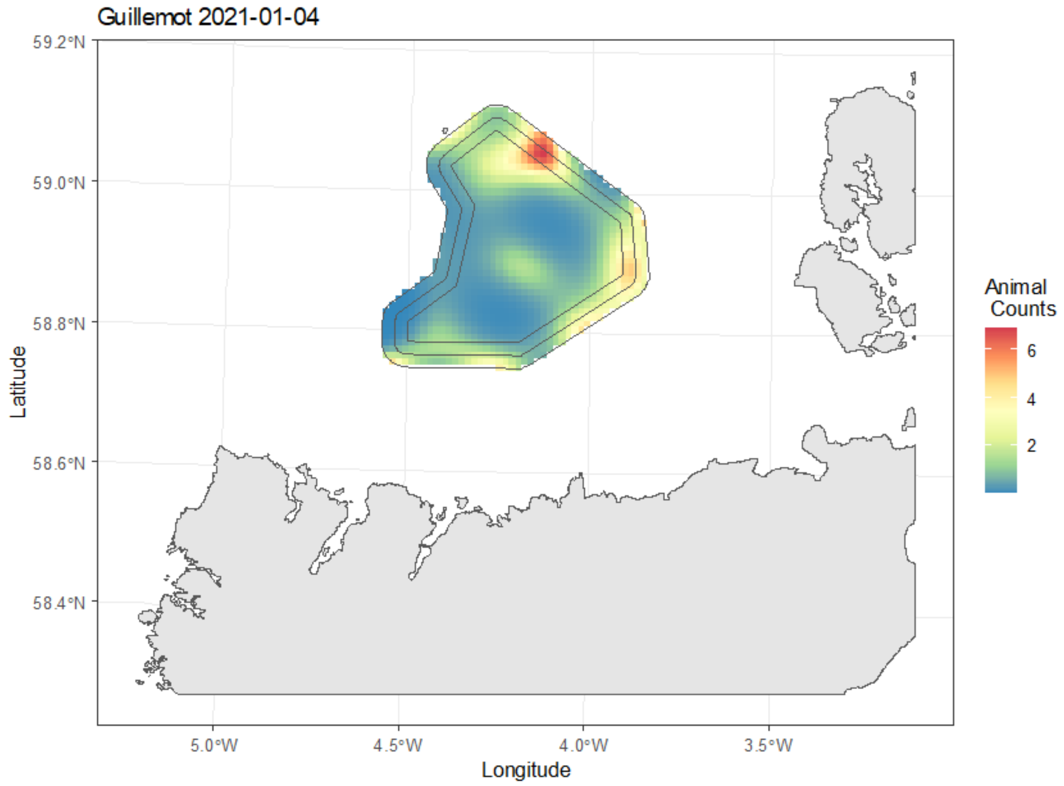
3.1.5 November 2020



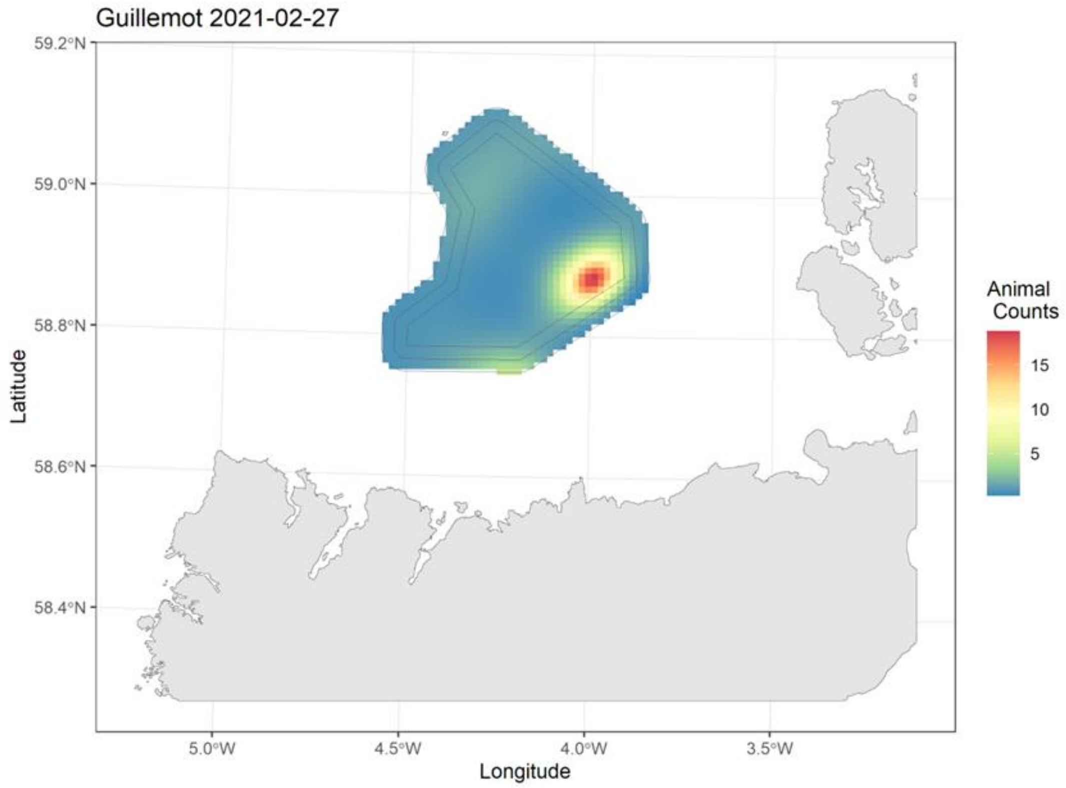
3.1.6 December 2020



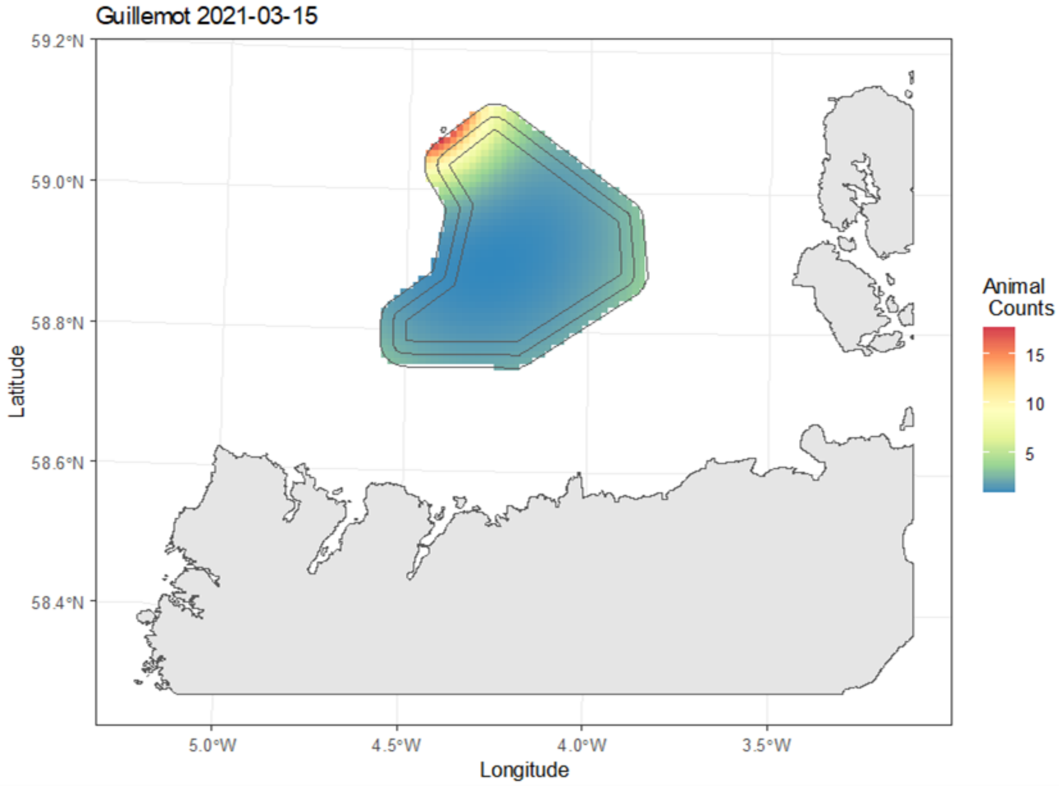
3.1.7 January 2021



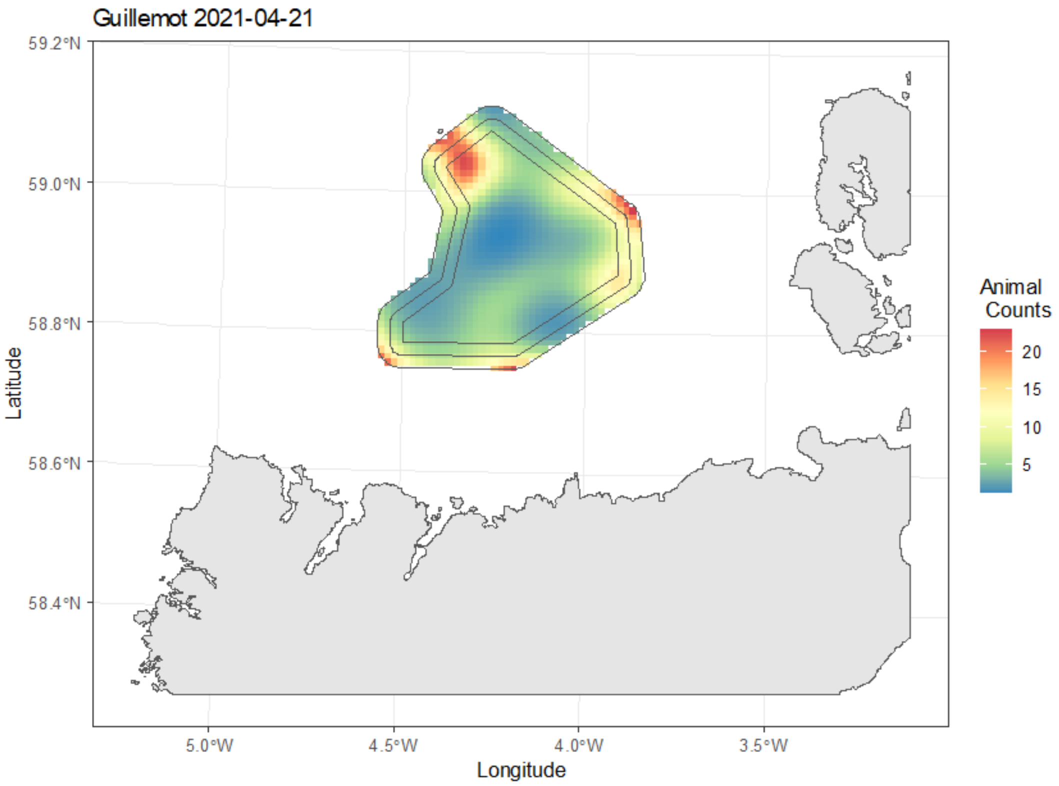
3.1.8 February 2021



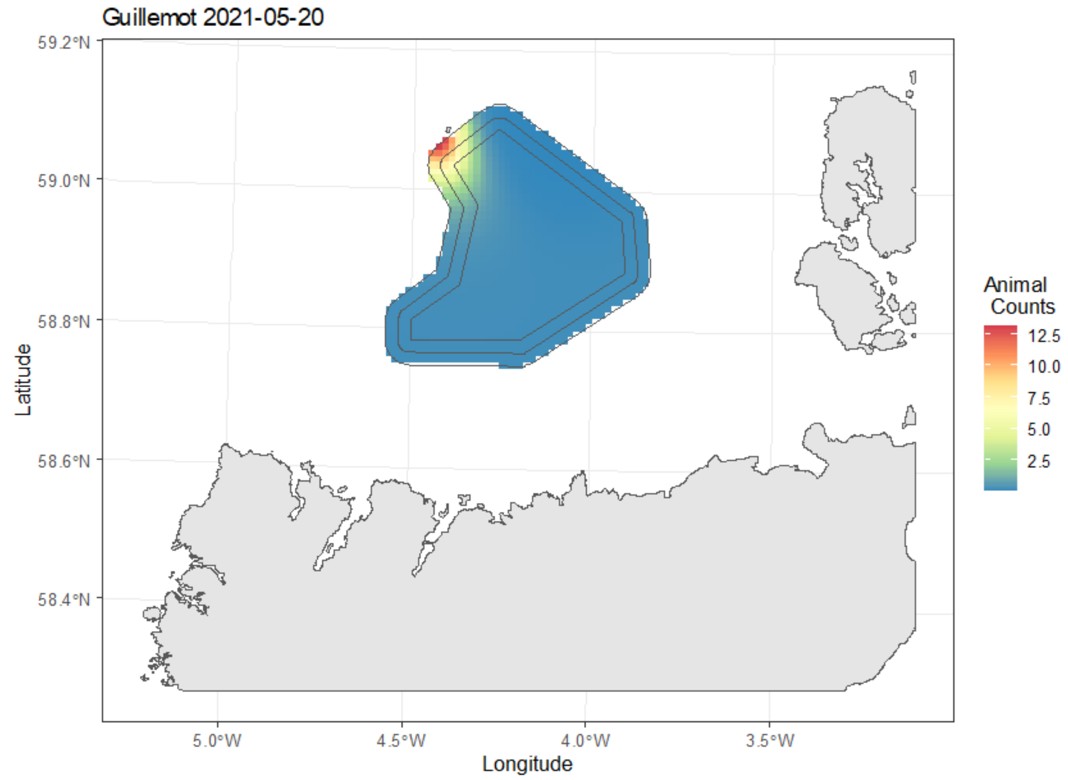
3.1.9 March 2021



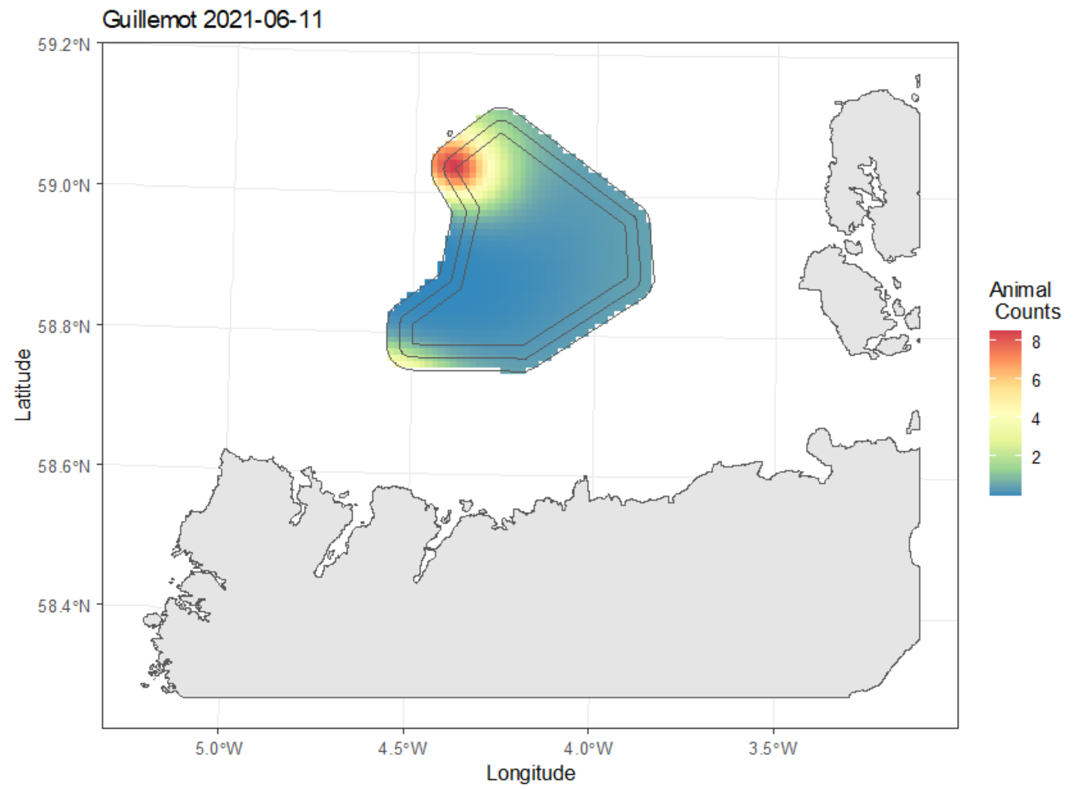
3.1.10 April 2021



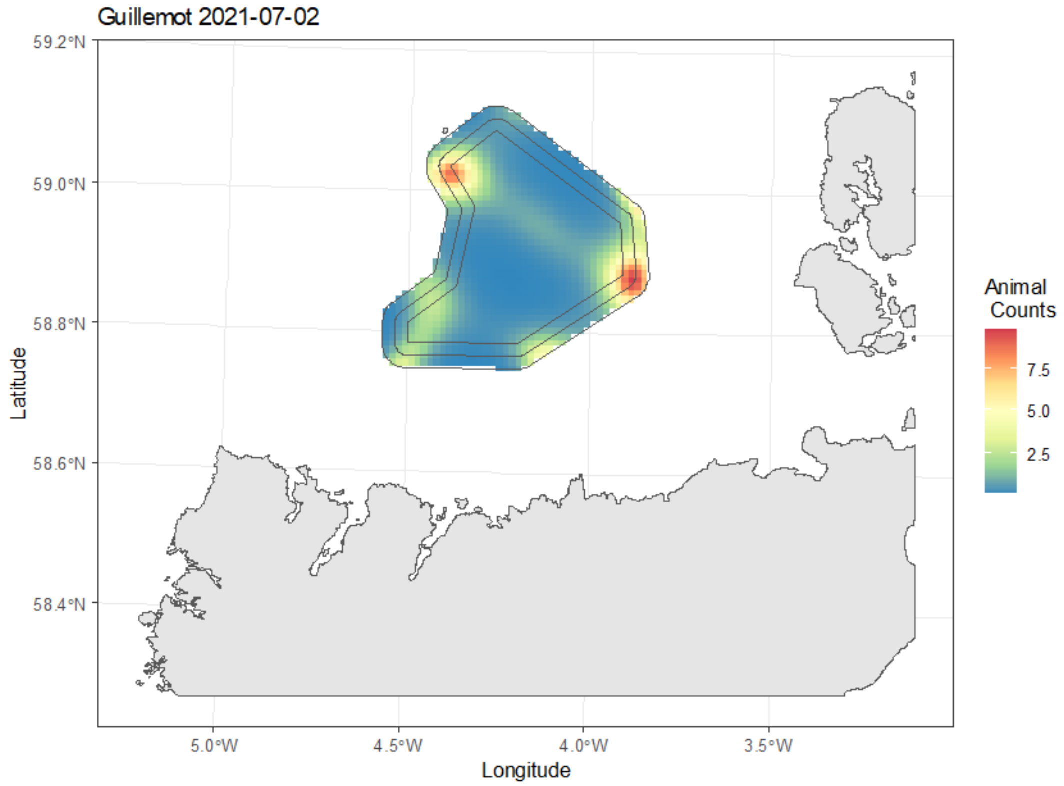
3.1.11 May 2021



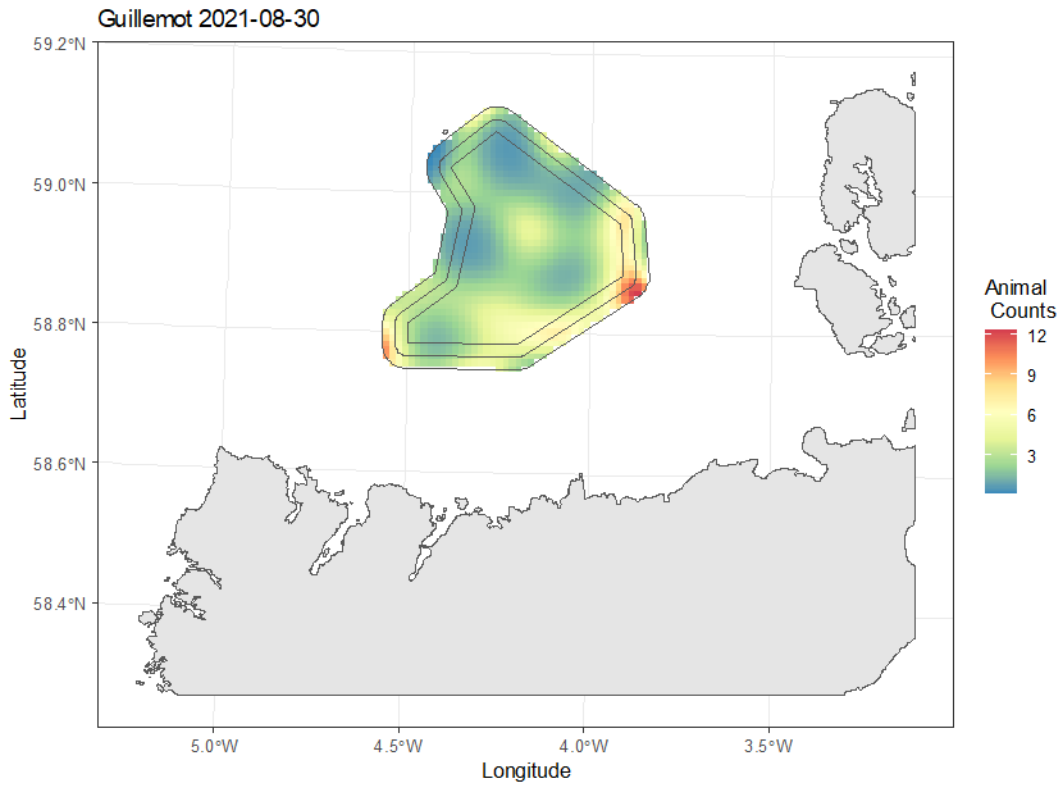
3.1.12 June 2021



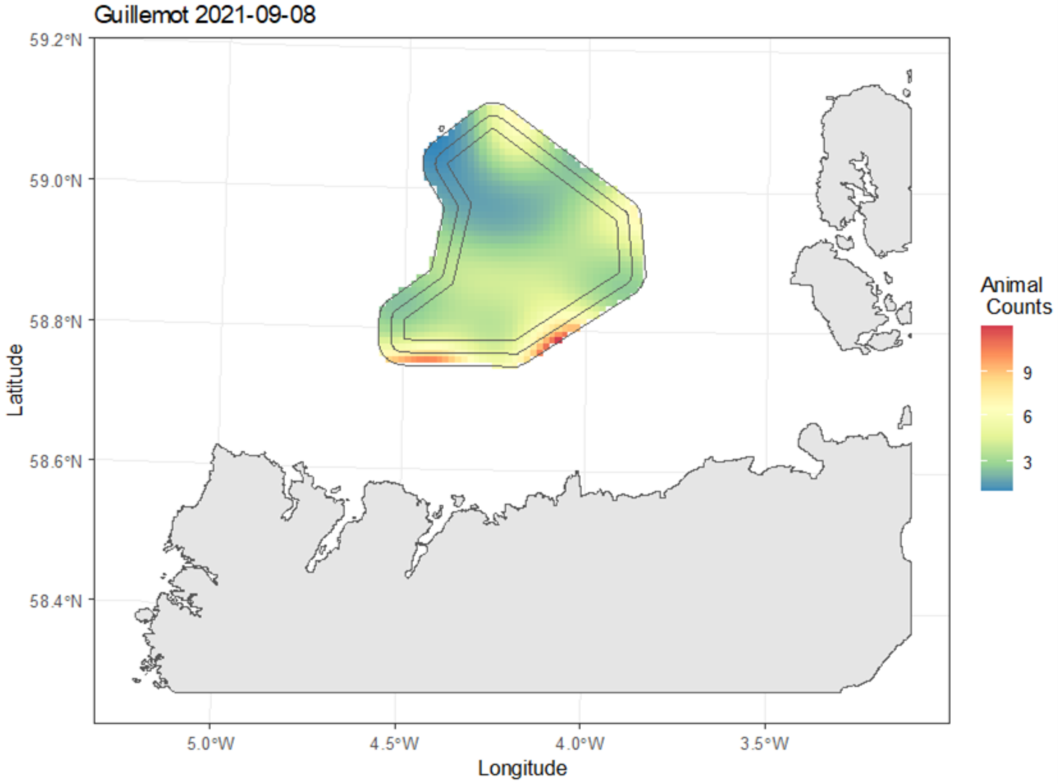
3.1.13 July 2021



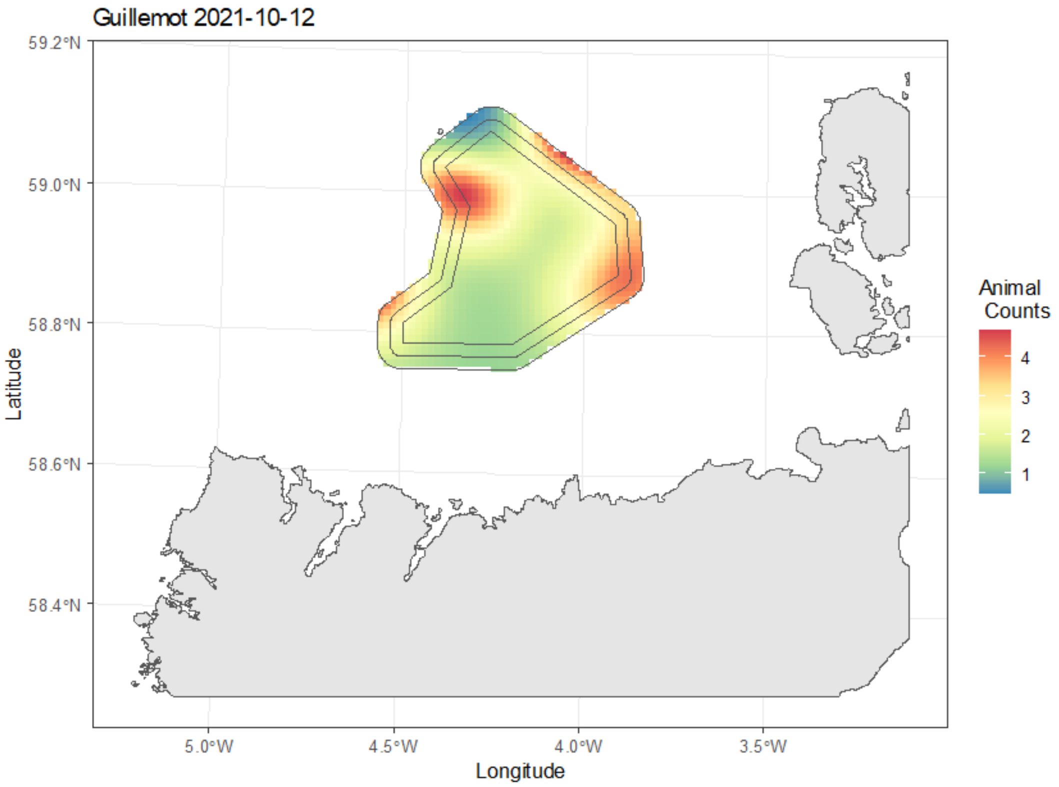
3.1.14 August 2021



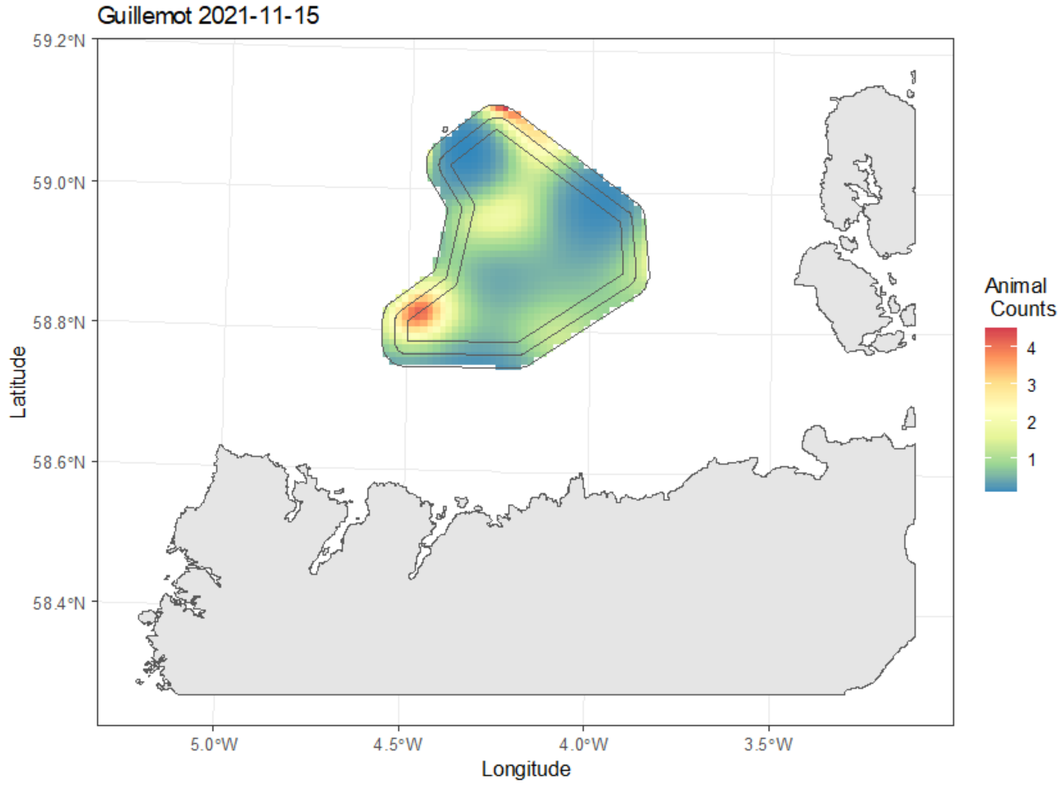
3.1.15 September 2021



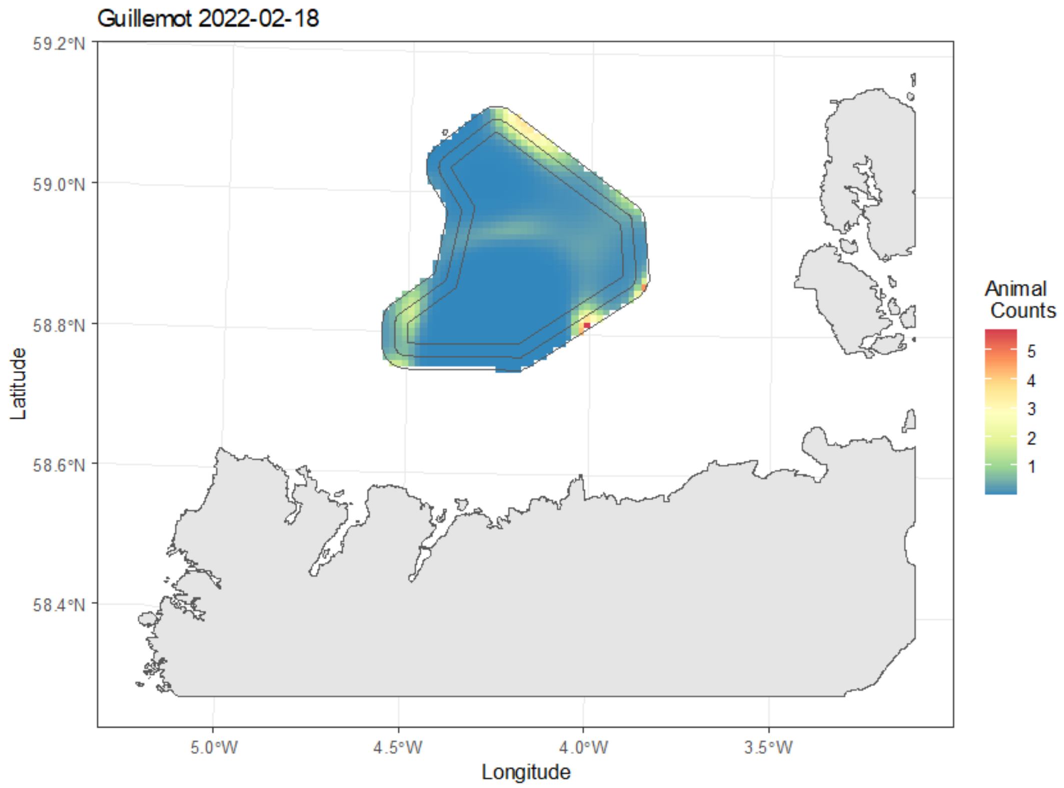
3.1.16 October 2021



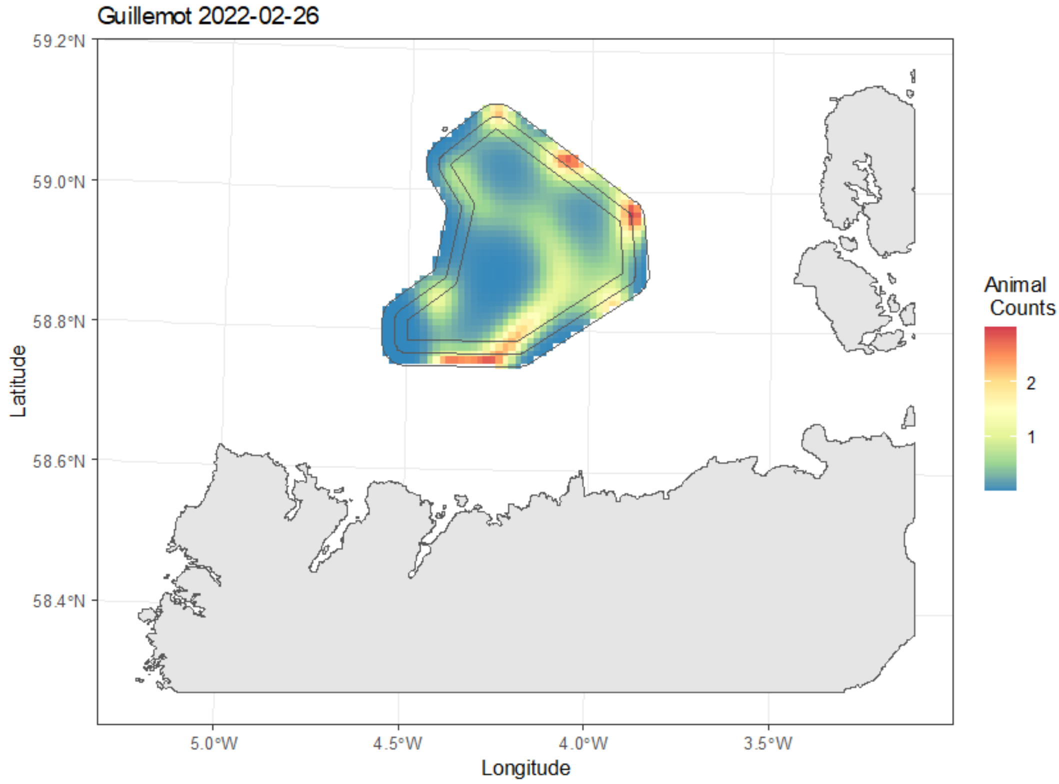
3.1.17 November 2021



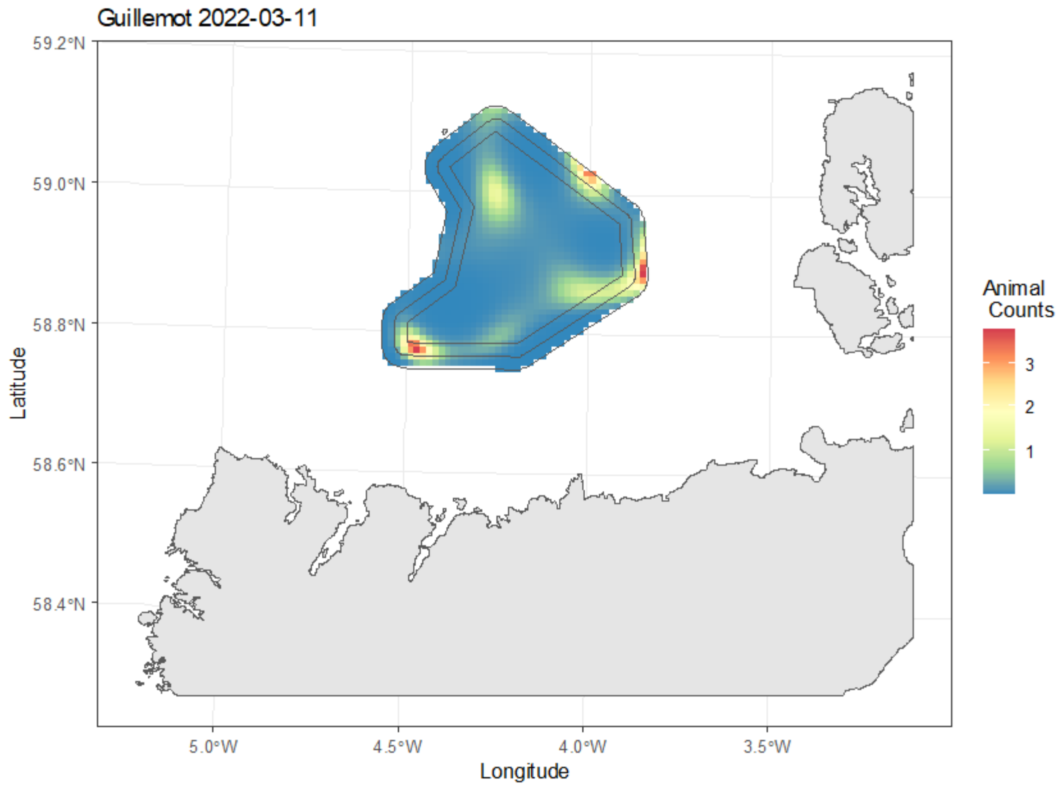
3.1.18 February 2022



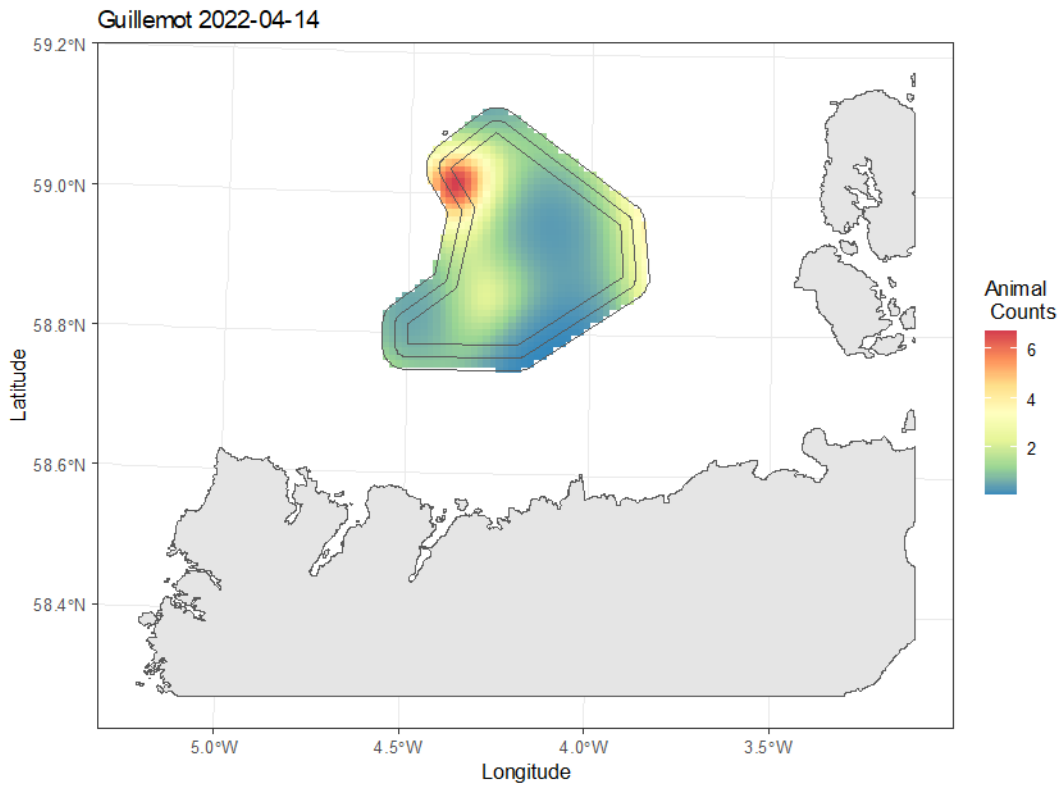
3.1.19 February 2022



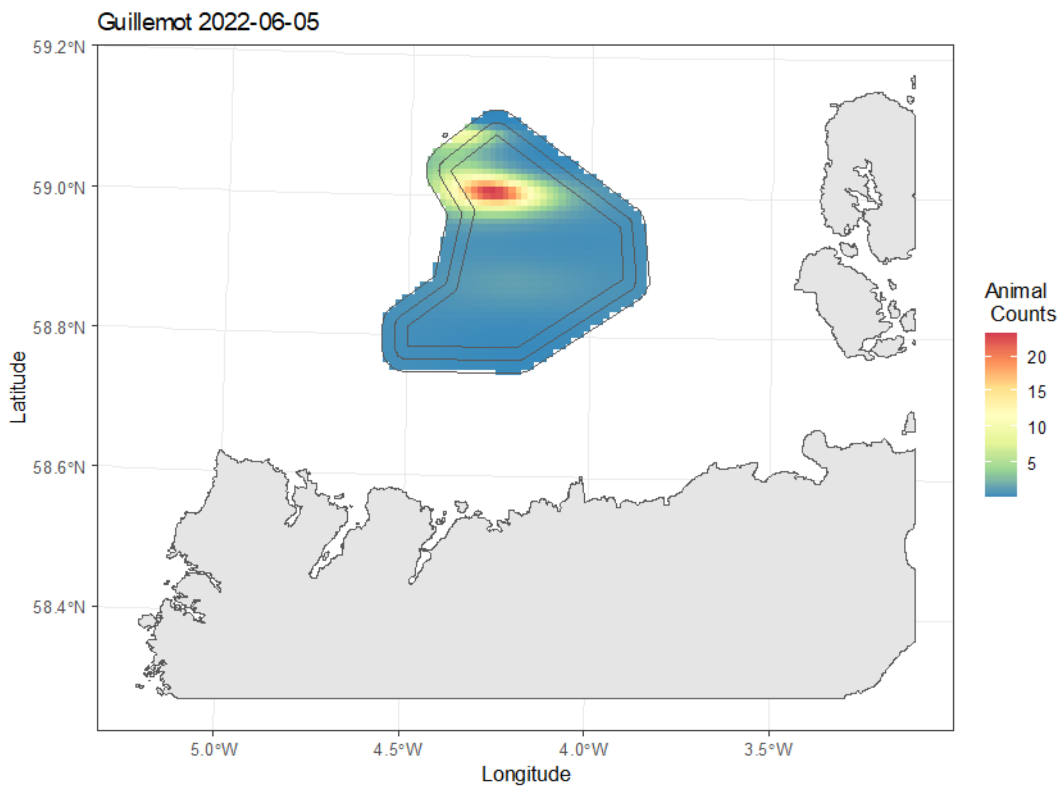
3.1.20 March 2022



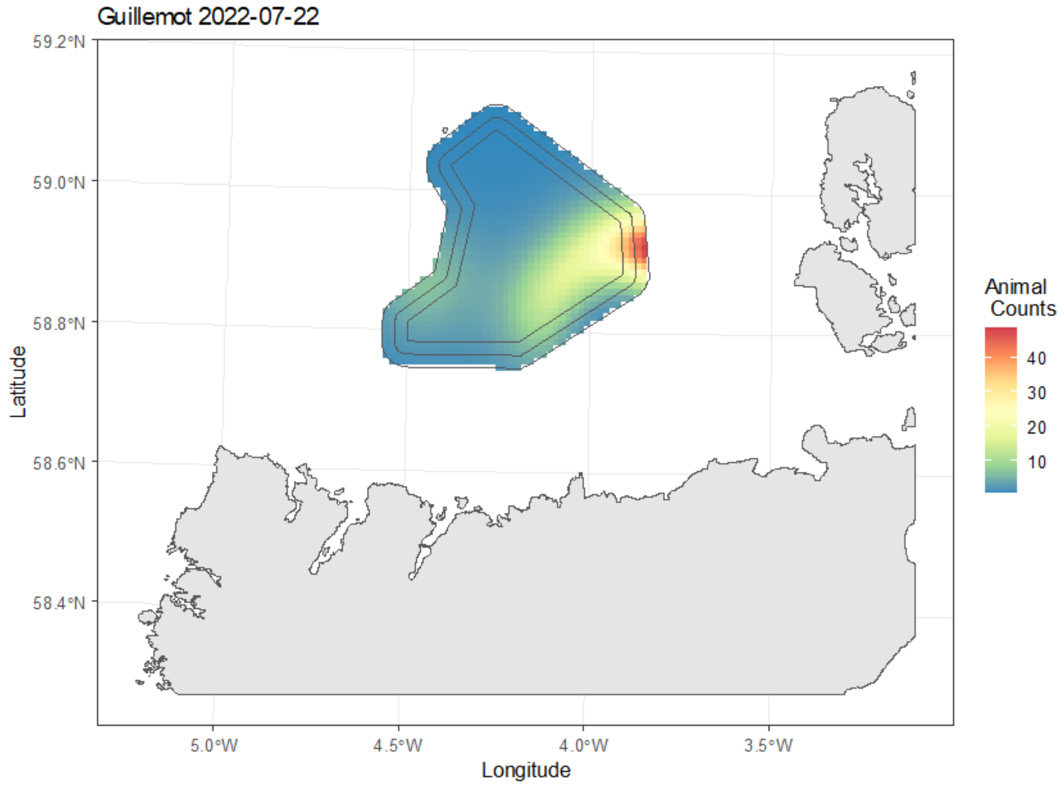
3.1.21 April 2022



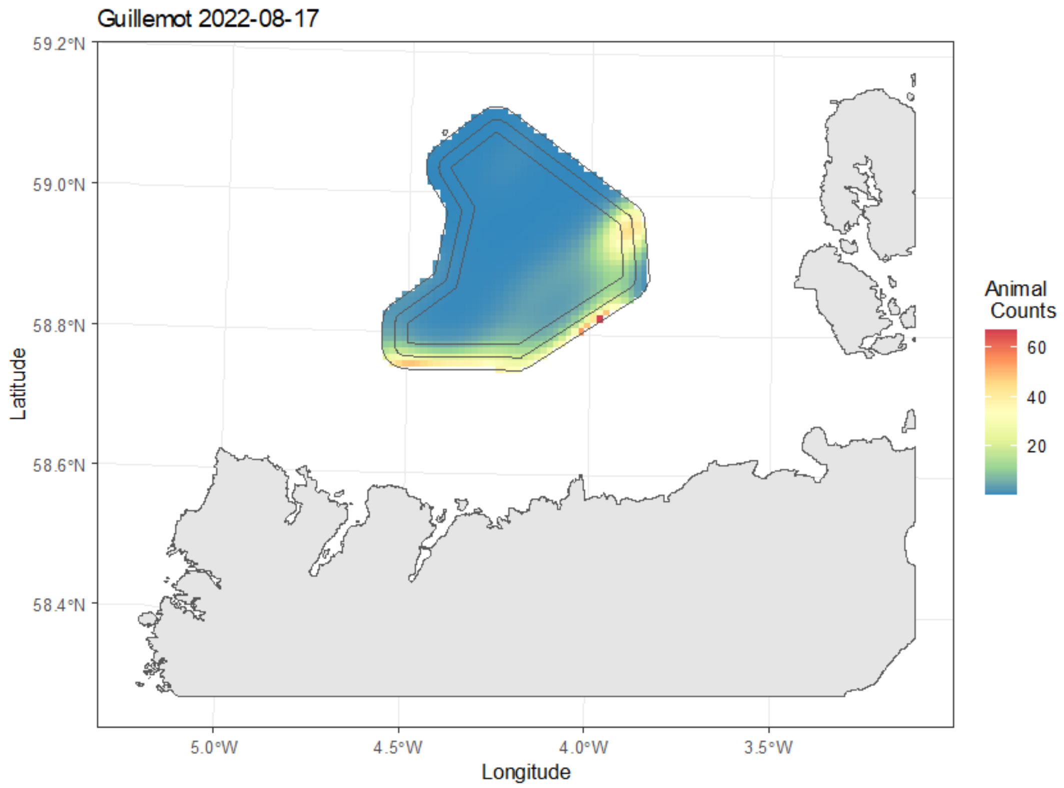
3.1.22 June 2022



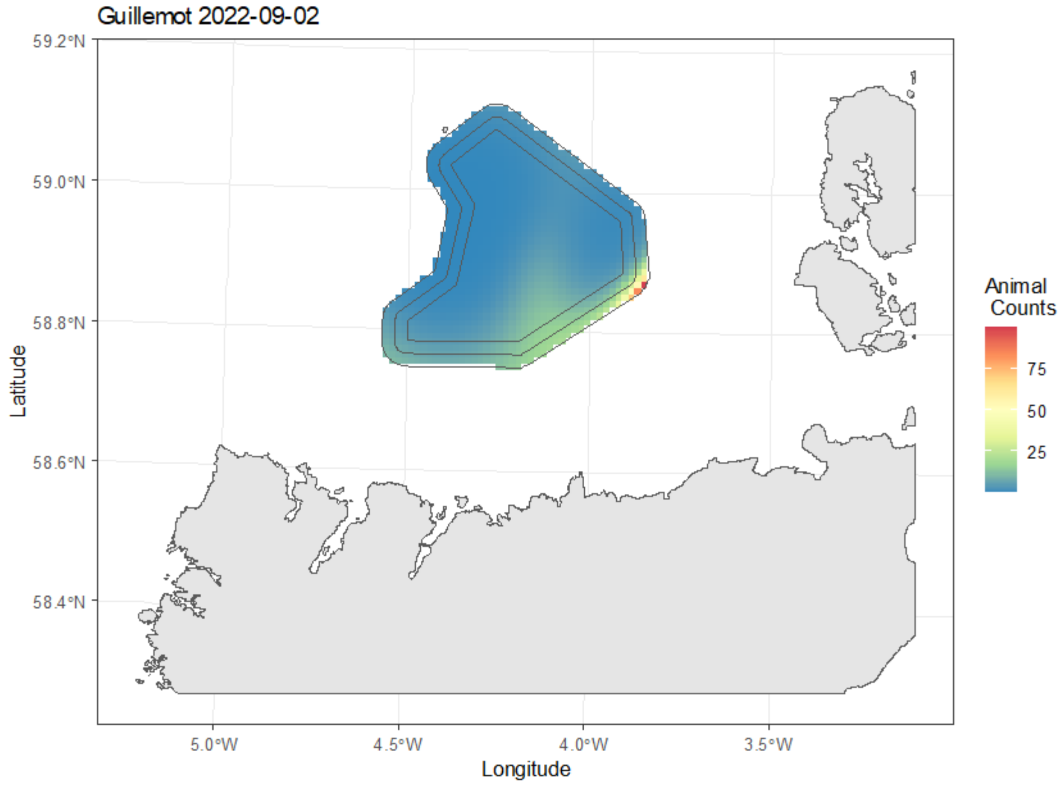
3.1.23 July 2022



3.1.24 August 2022



3.1.25 September 2022



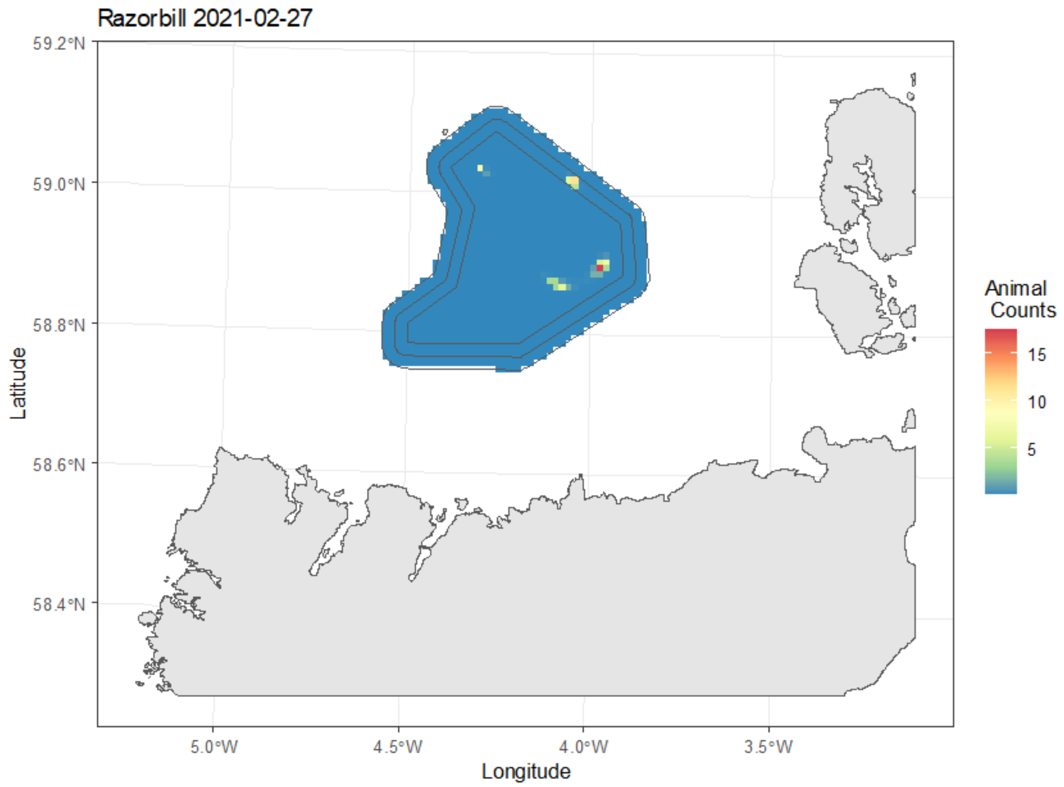
4 RAZORBILL

Table 4-1 Illustration of which surveys carried out for the offshore Project between July 2020 to September 2022 recorded enough razorbill to support density surface modelling.

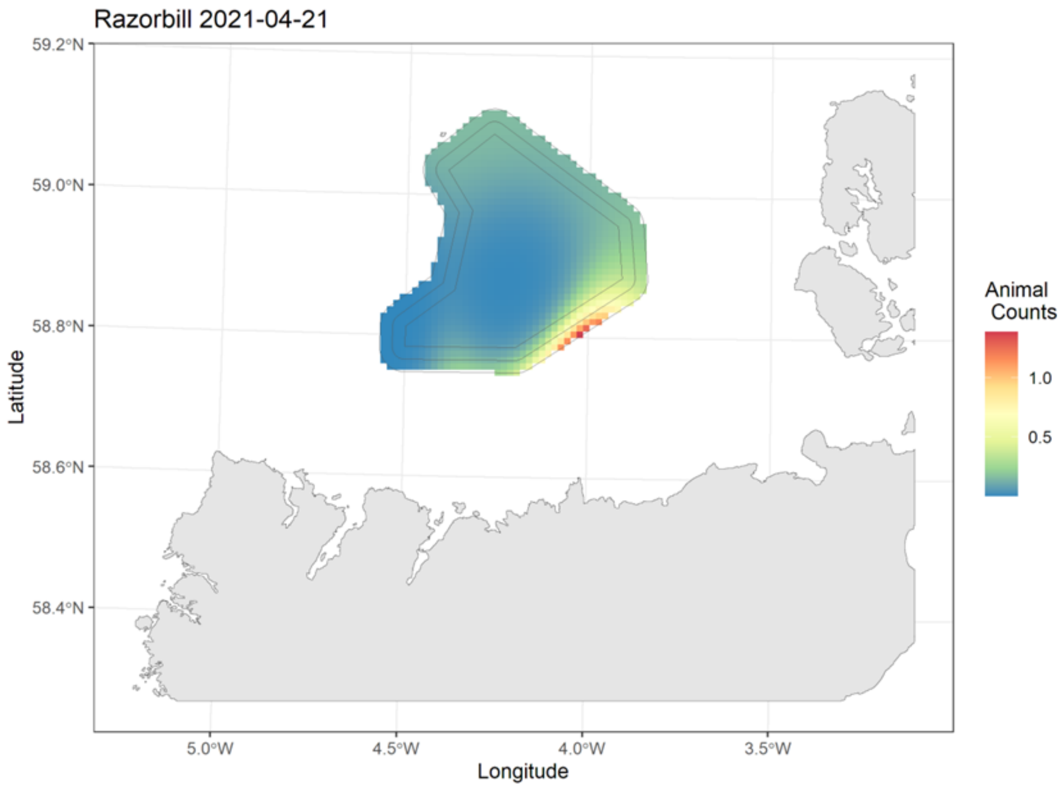
Month	2020	2021	2022
January	-	X	-
February	-	X	X
March	-	X	X
April	-	X	X
May	-	X	X
June	-	X	X
July	X	X	X
August	X	X	X
September	X	X	X
October	X	X	-
November	X	X	-
December	X	X	-

X: Survey recorded sufficient data to support DSM; X: Survey undertaken but numbers of birds too low to support DSM; -: No survey undertaken.

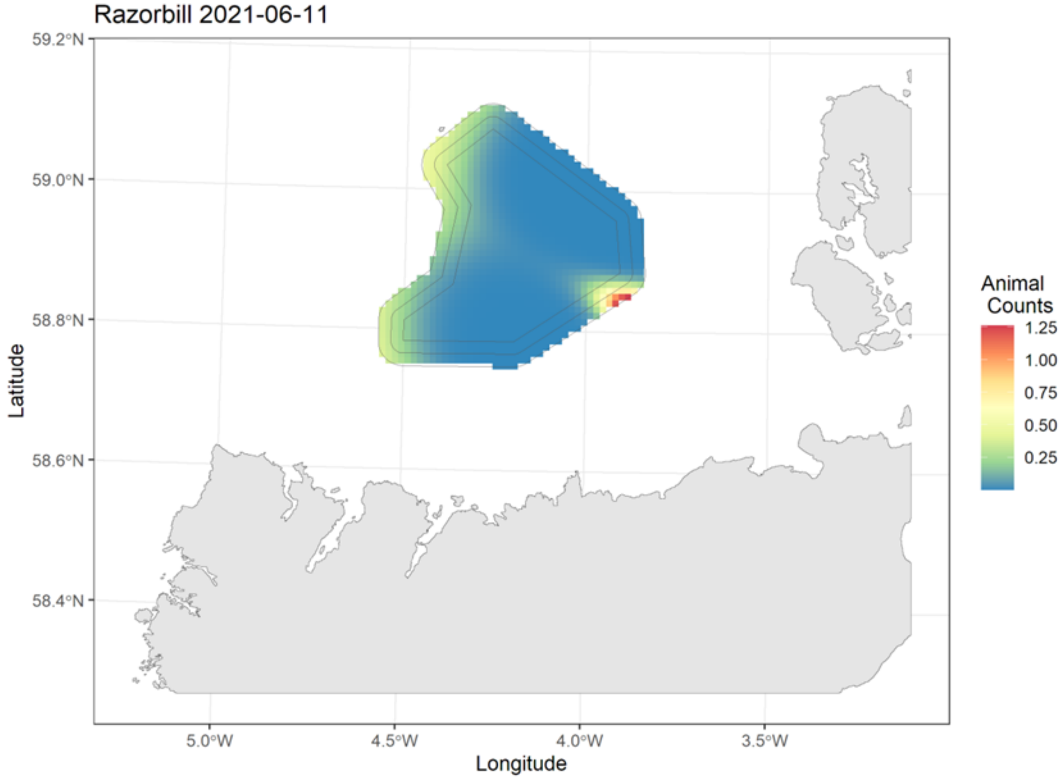
4.1.1 February 2021



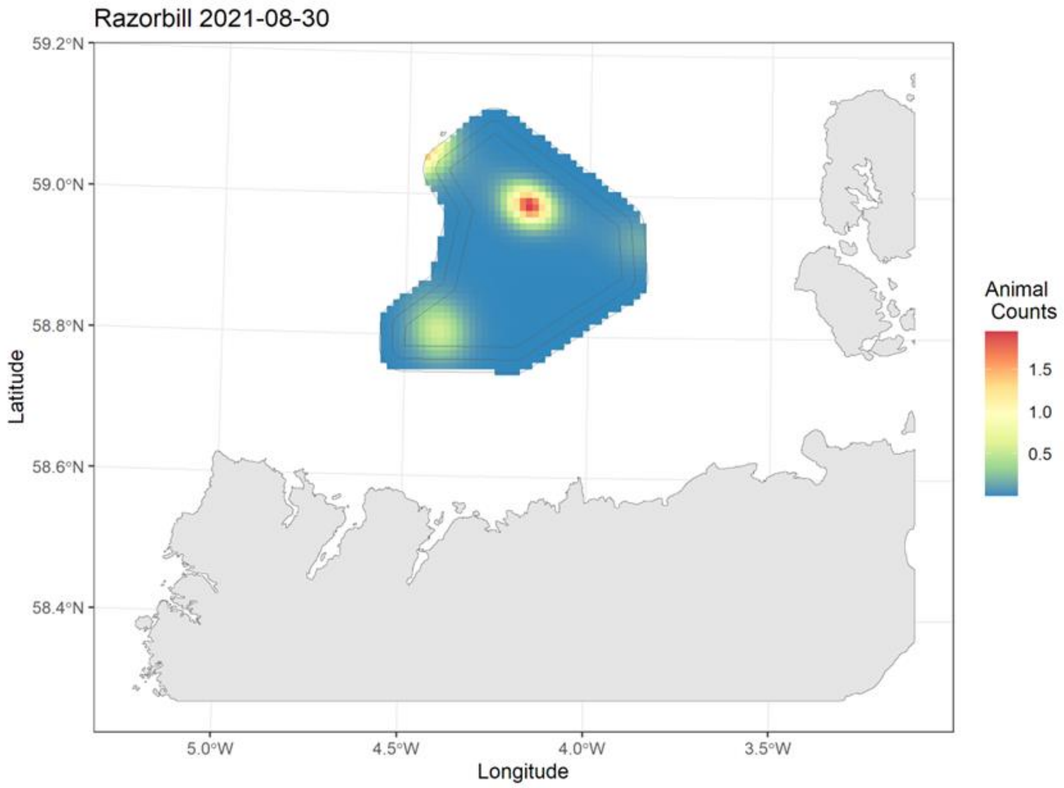
4.1.2 April 2021



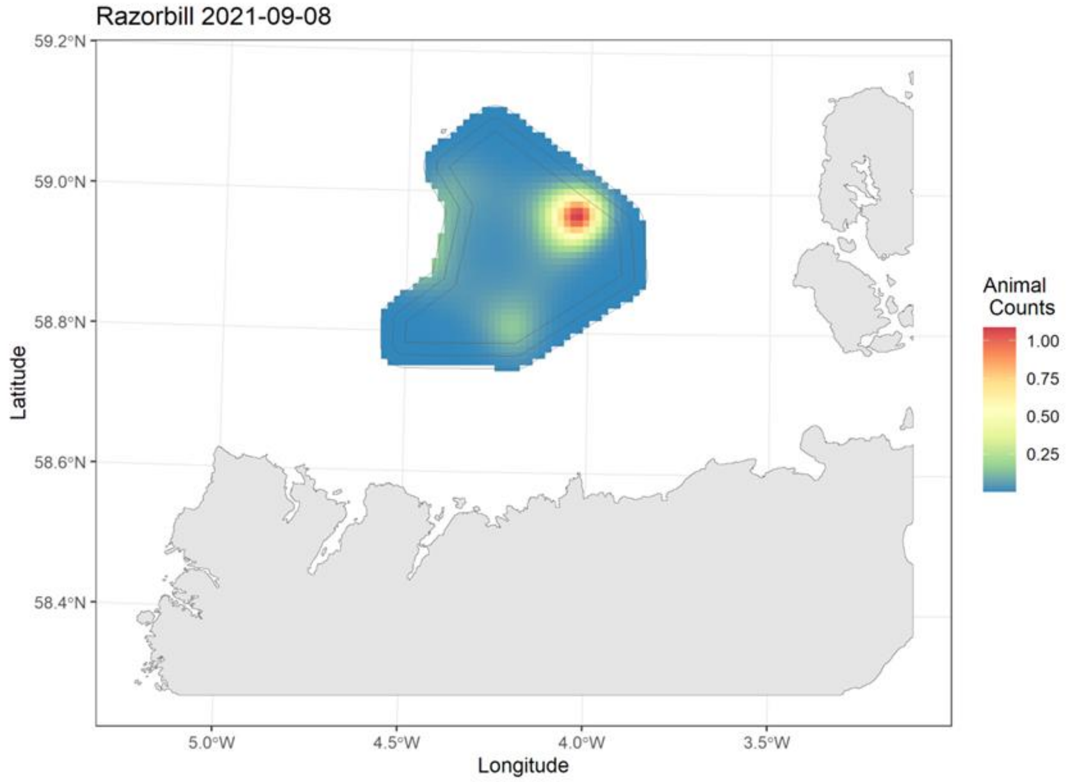
4.1.3 June 2021



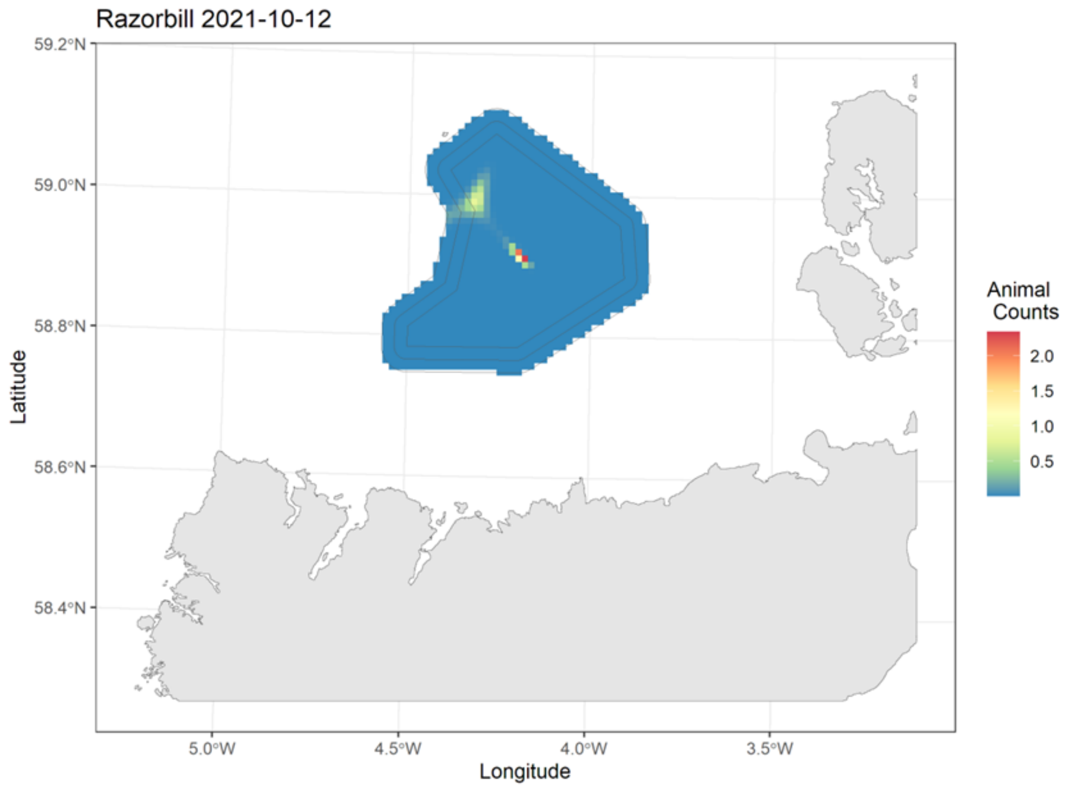
4.1.4 August 2021



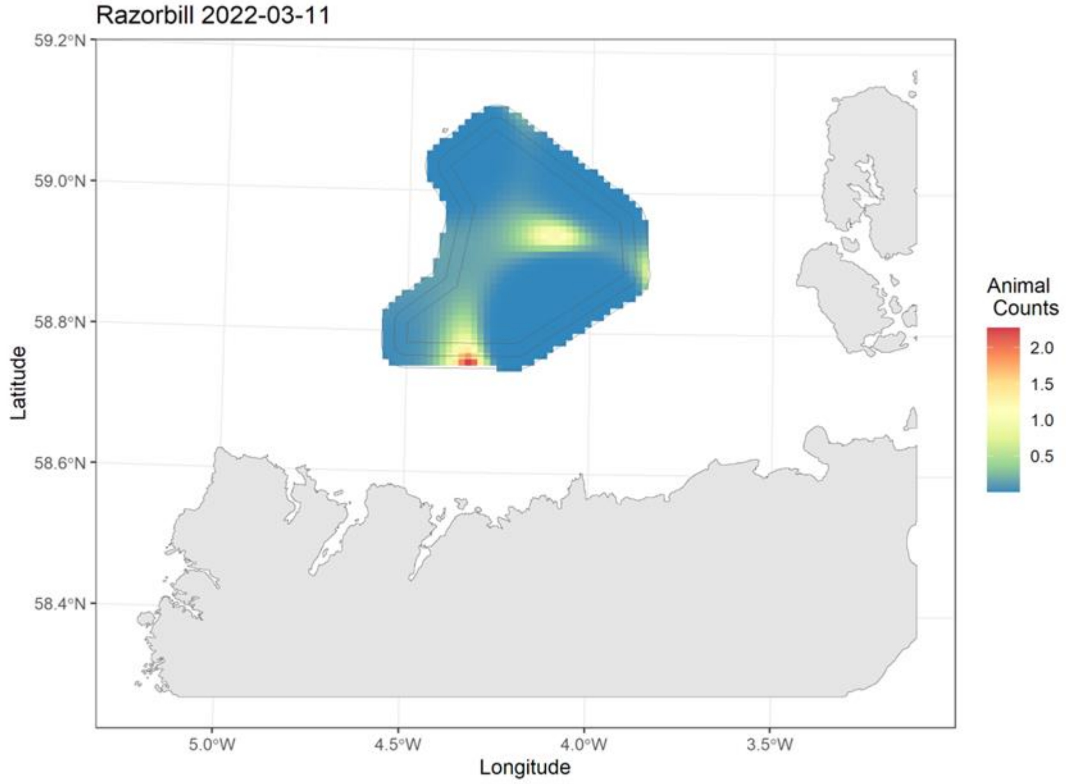
4.1.5 September 2021



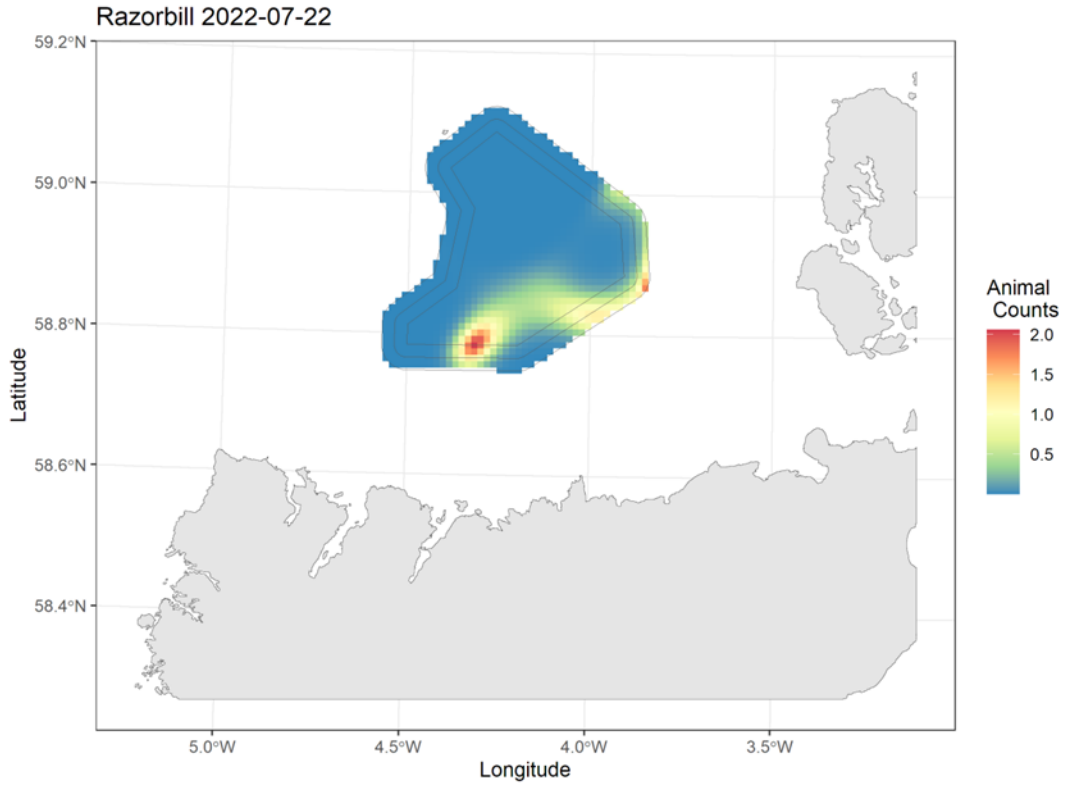
4.1.6 October 2021



4.1.7 March 2022



4.1.8 July 2022



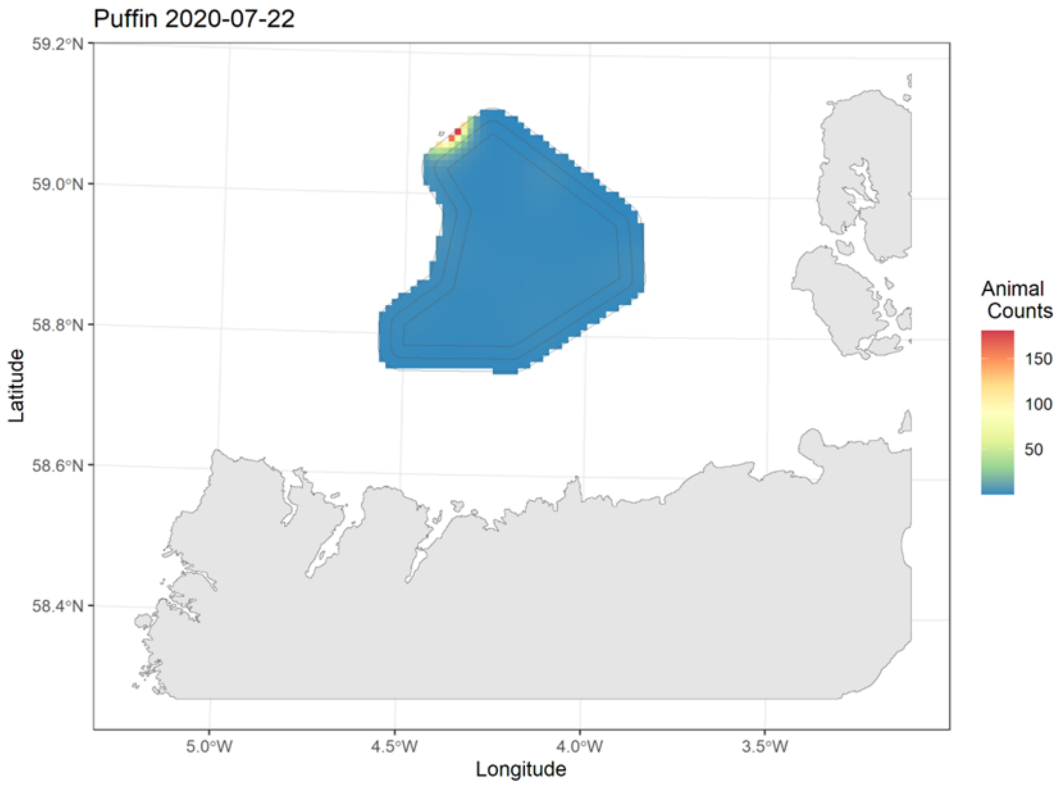
5 PUFFIN

Table 5-1 Illustration of which surveys carried out for the offshore Project between July 2020 to September 2022 recorded enough puffin to support density surface modelling.

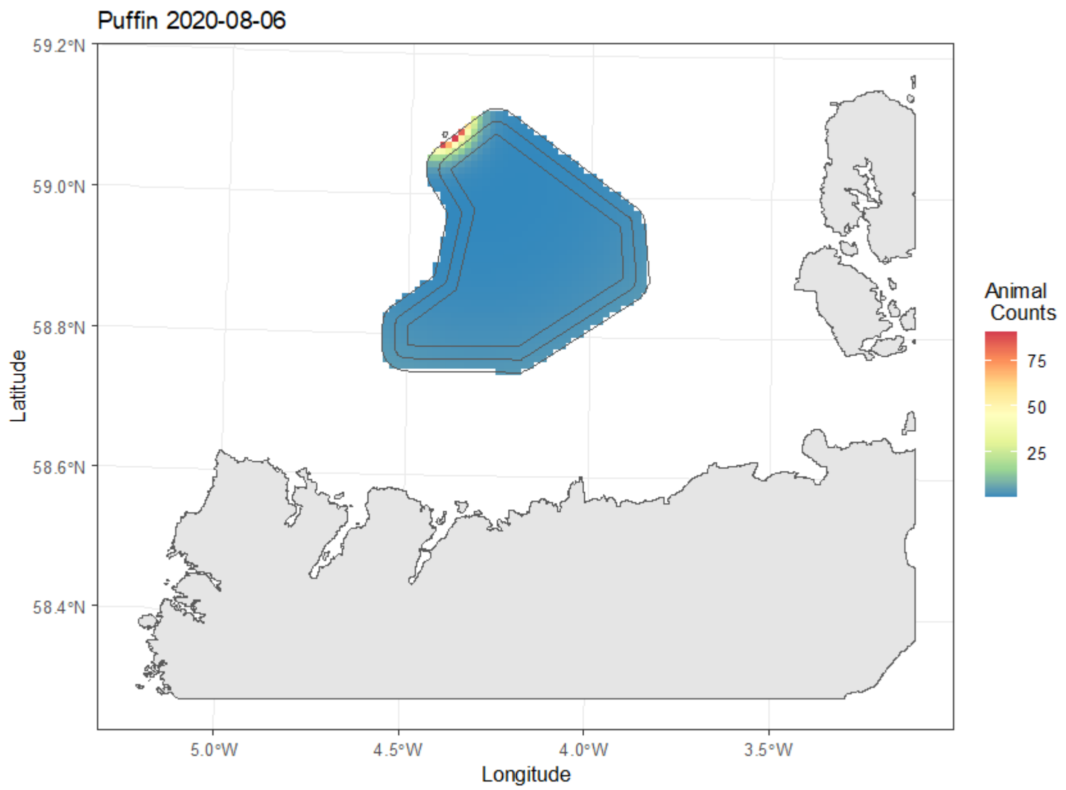
Month	2020	2021	2022
January	-	X	-
February	-	X	X
March	-	X	X
April	-	X	X
May	-	X	X
June	-	X	X
July	X	X	X
August	X	X	X
September	X	X	X
October	X	X	-
November	X	X	-
December	X	X	-

X: Survey recorded sufficient data to support DSM; X: Survey undertaken but numbers of birds too low to support DSM; -: No survey undertaken.

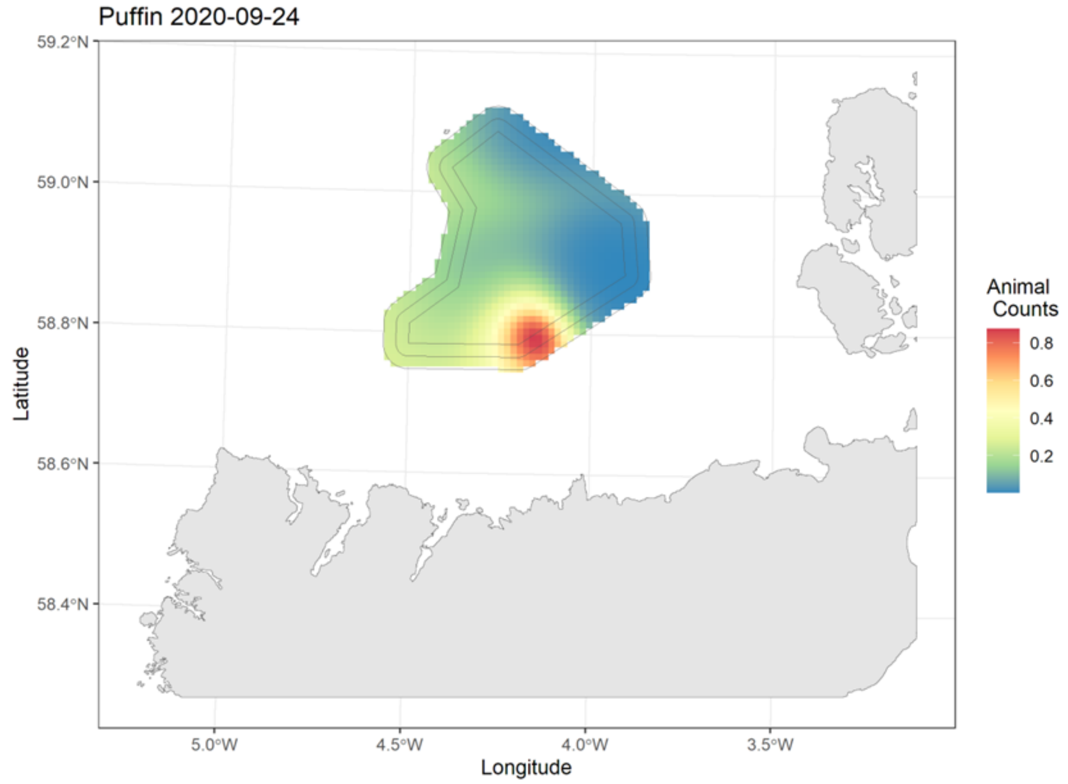
5.1.1 July 2020



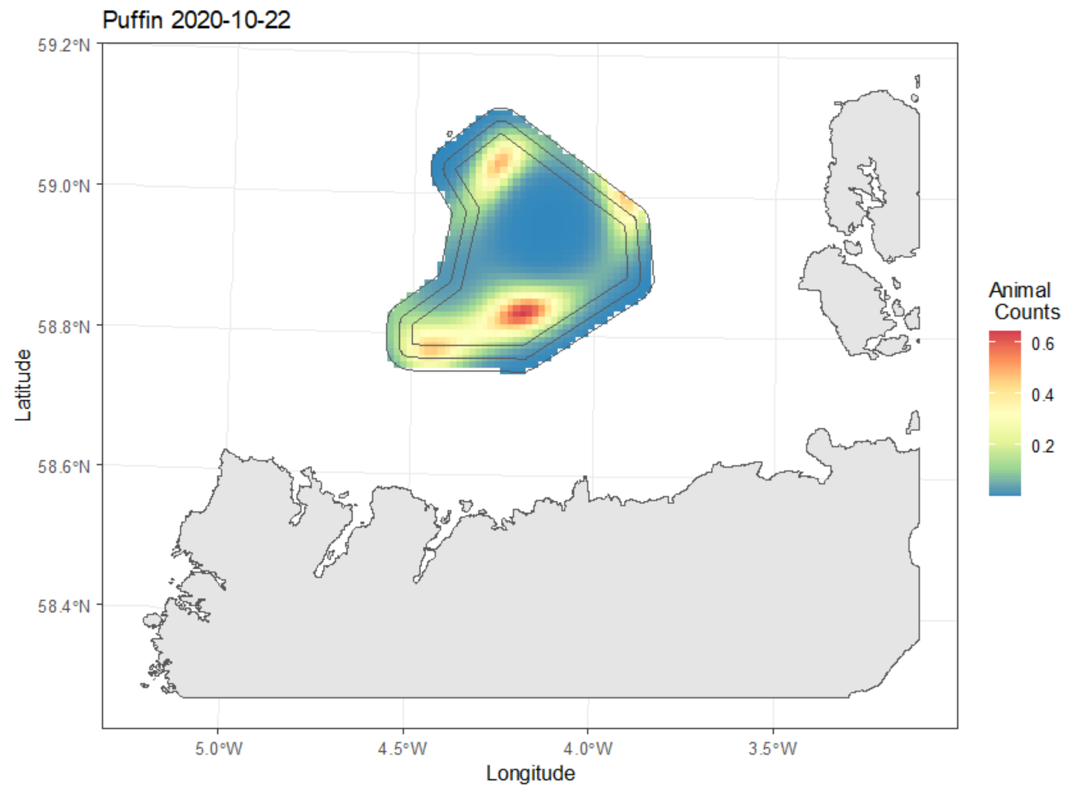
5.1.2 August 2020



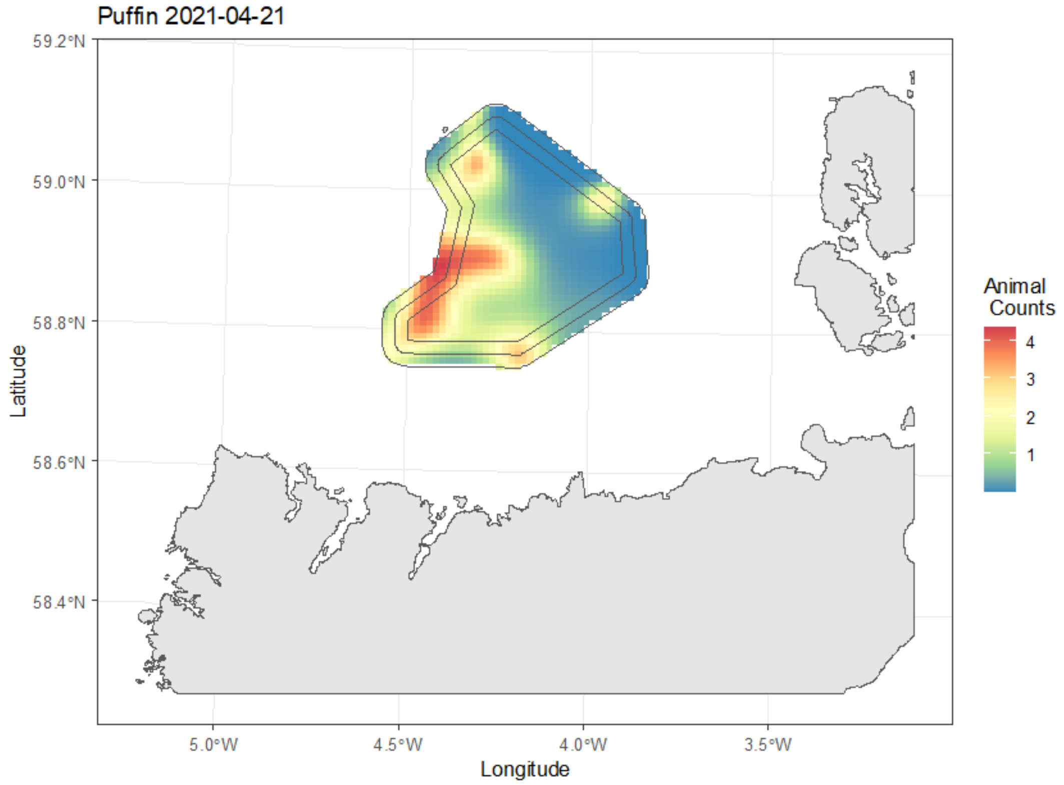
5.1.3 September 2020



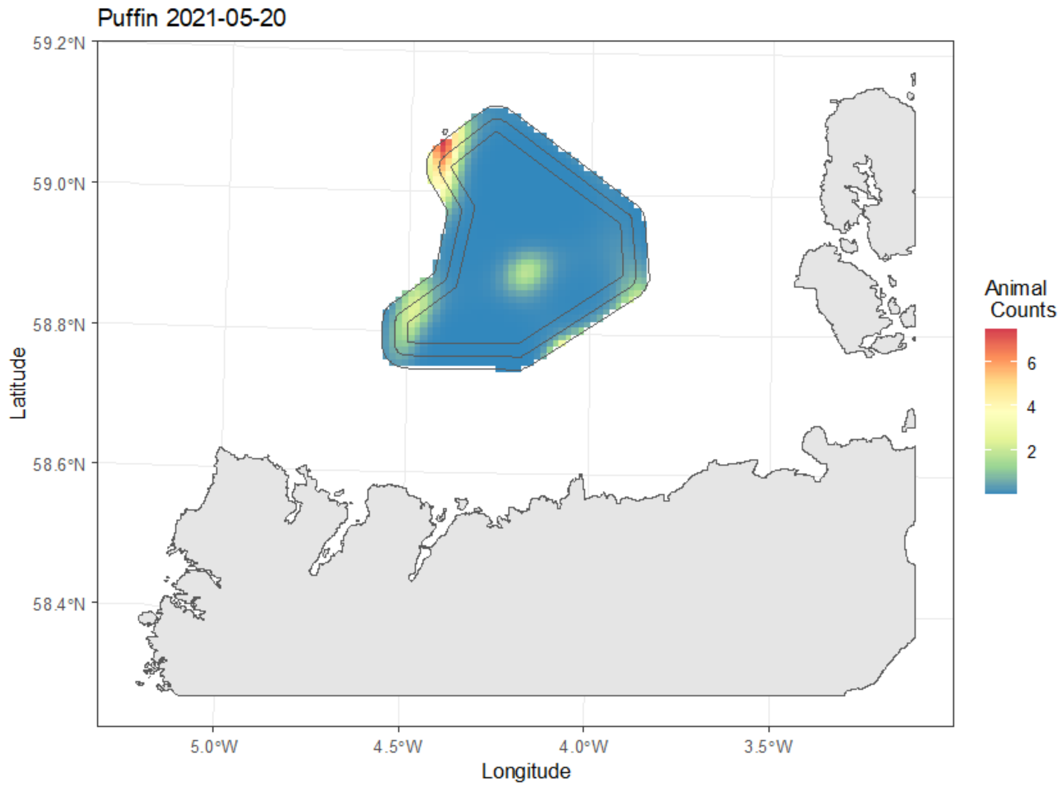
5.1.4 October 2020



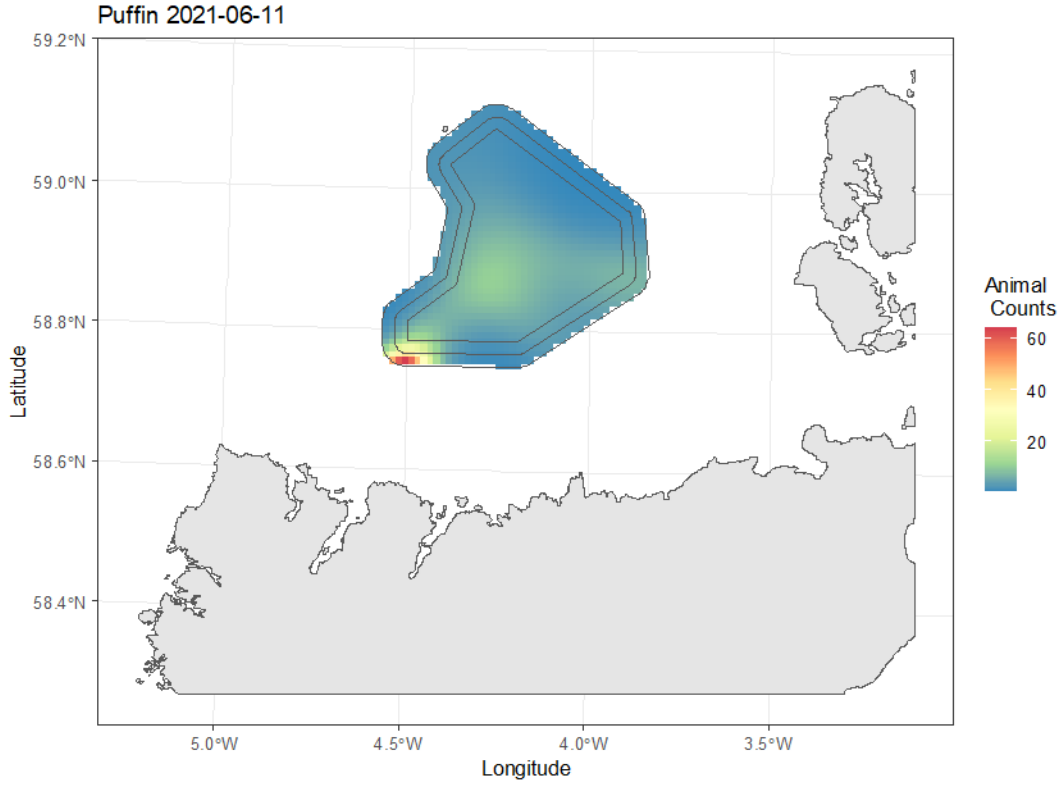
5.1.5 April 2021



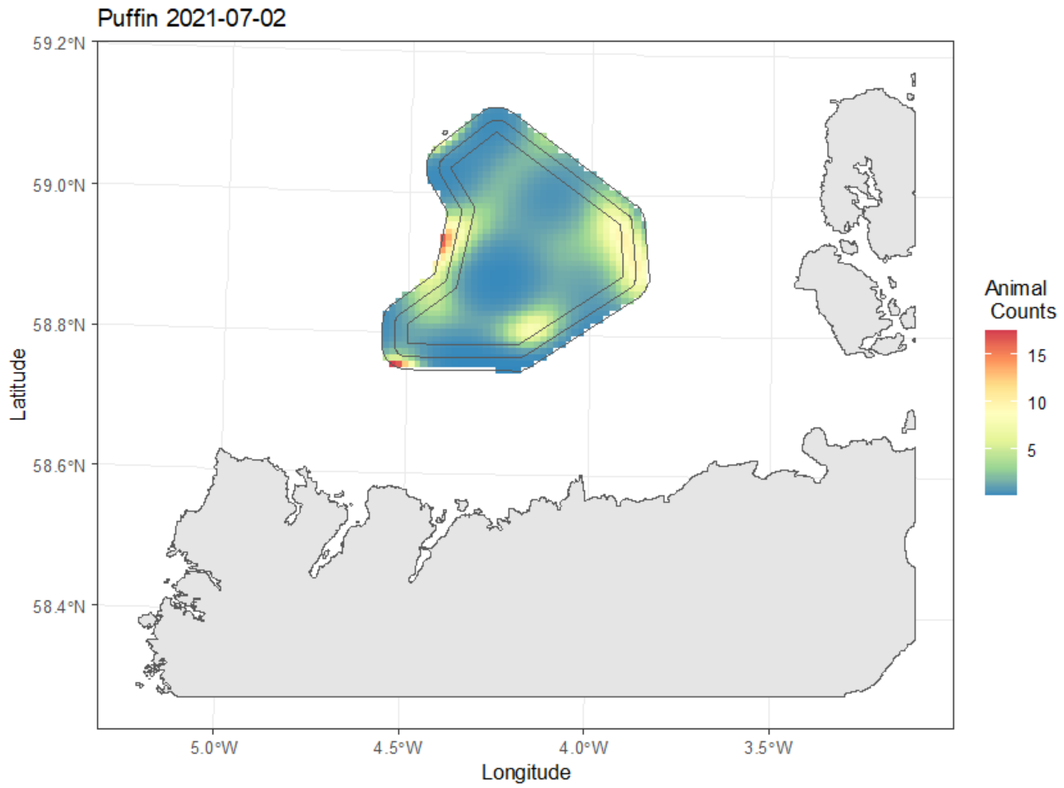
5.1.6 May 2021



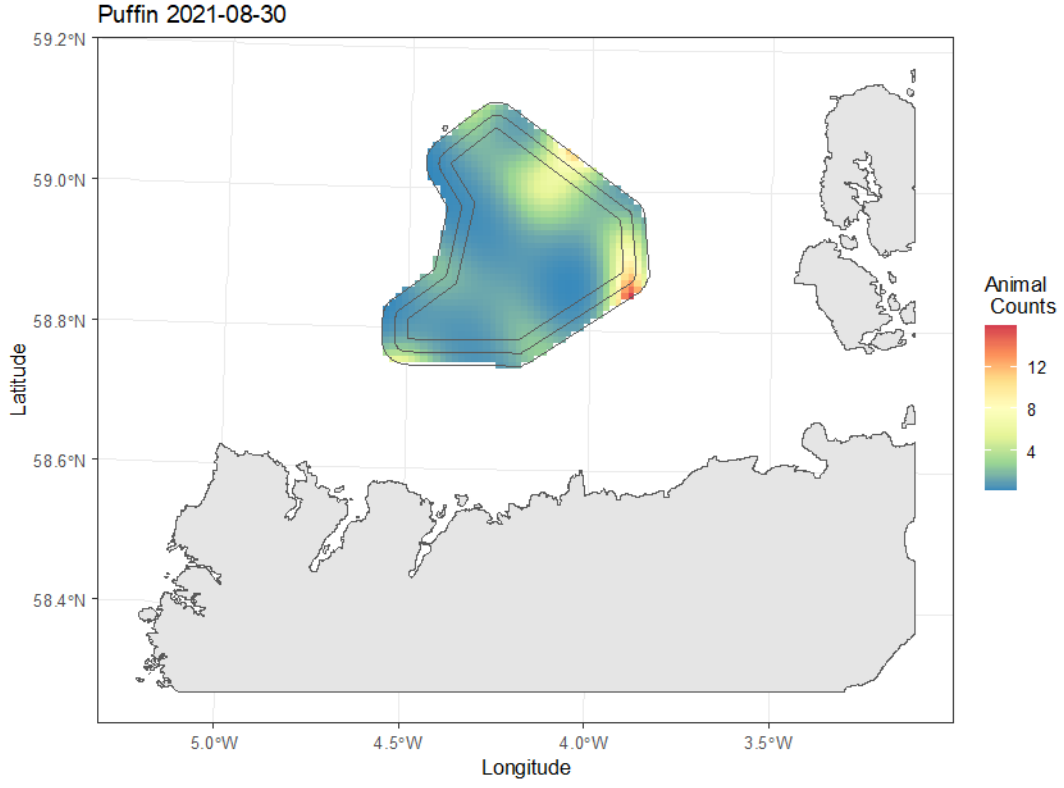
5.1.7 June 2021



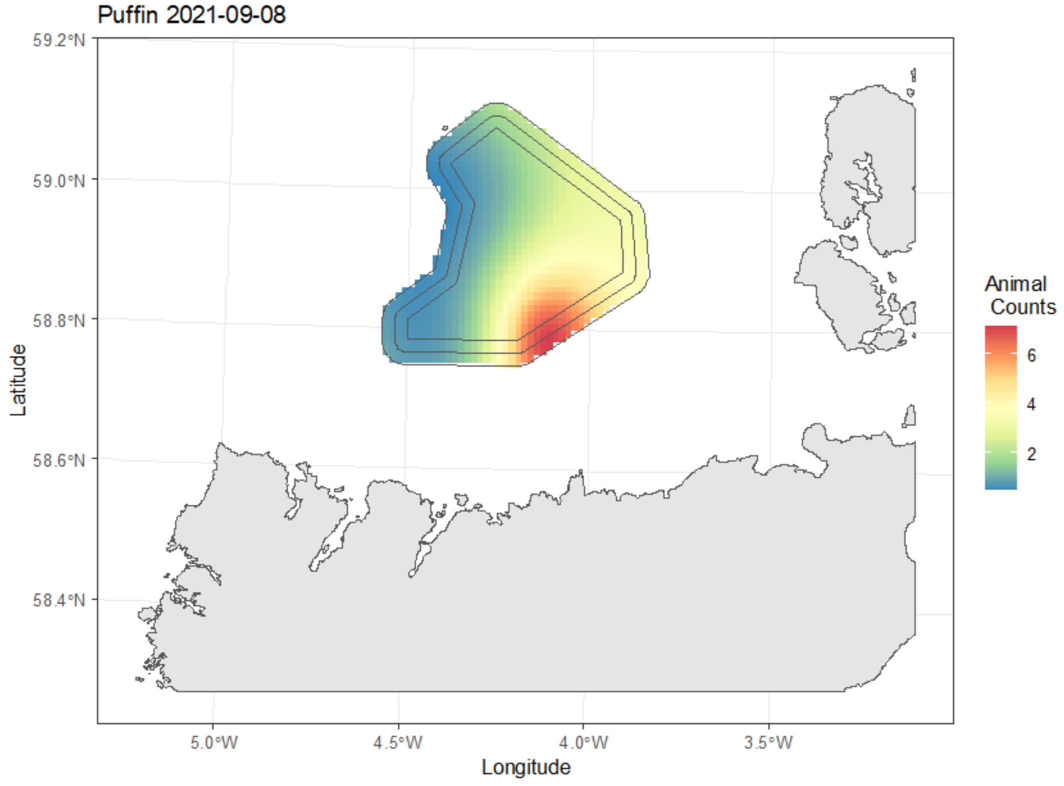
5.1.8 July 2021



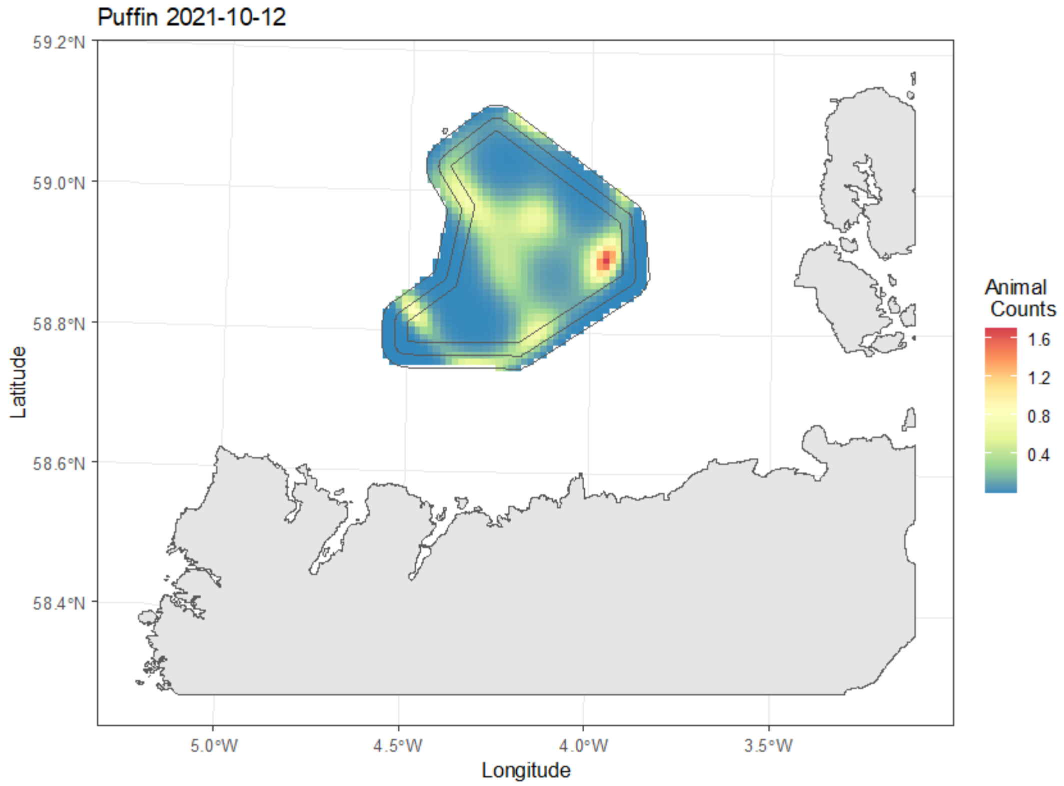
5.1.9 August 2021



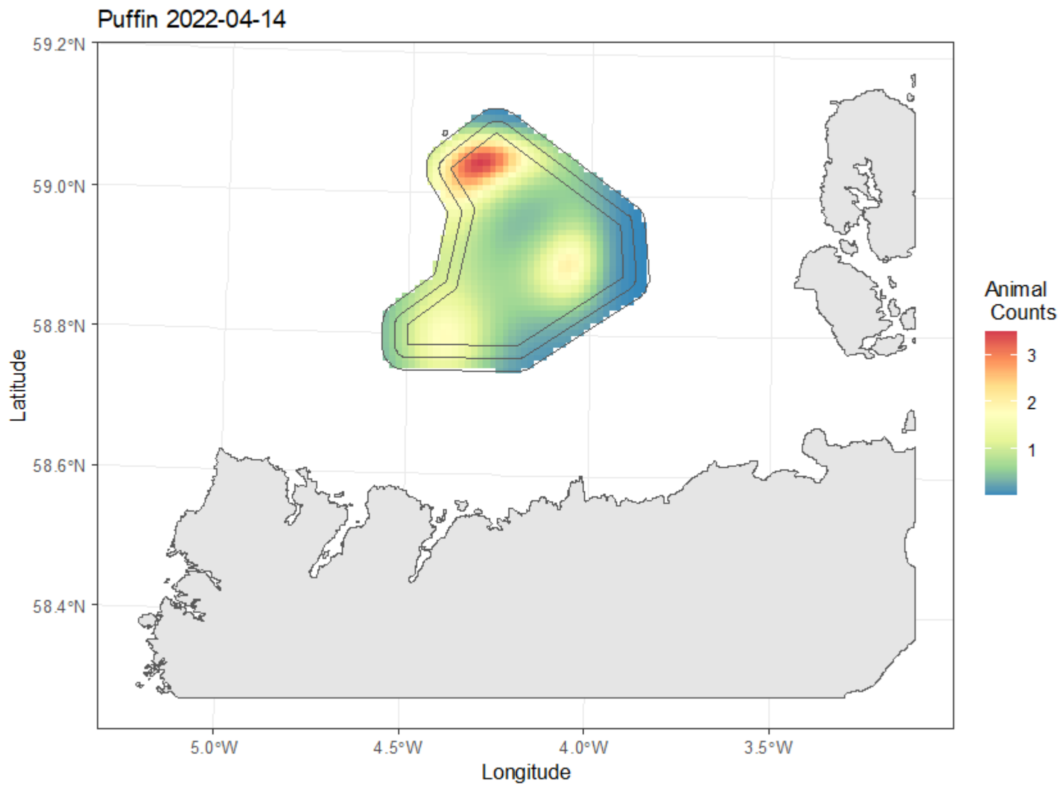
5.1.10 September 2021



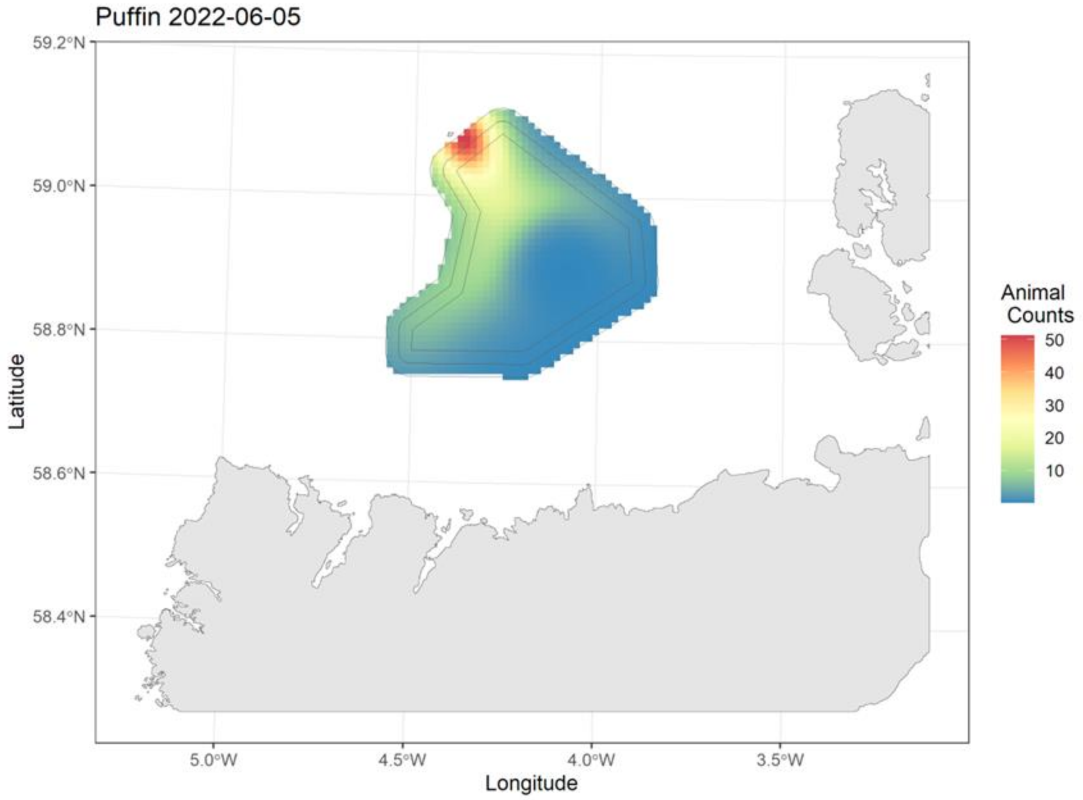
5.1.11 October 2021



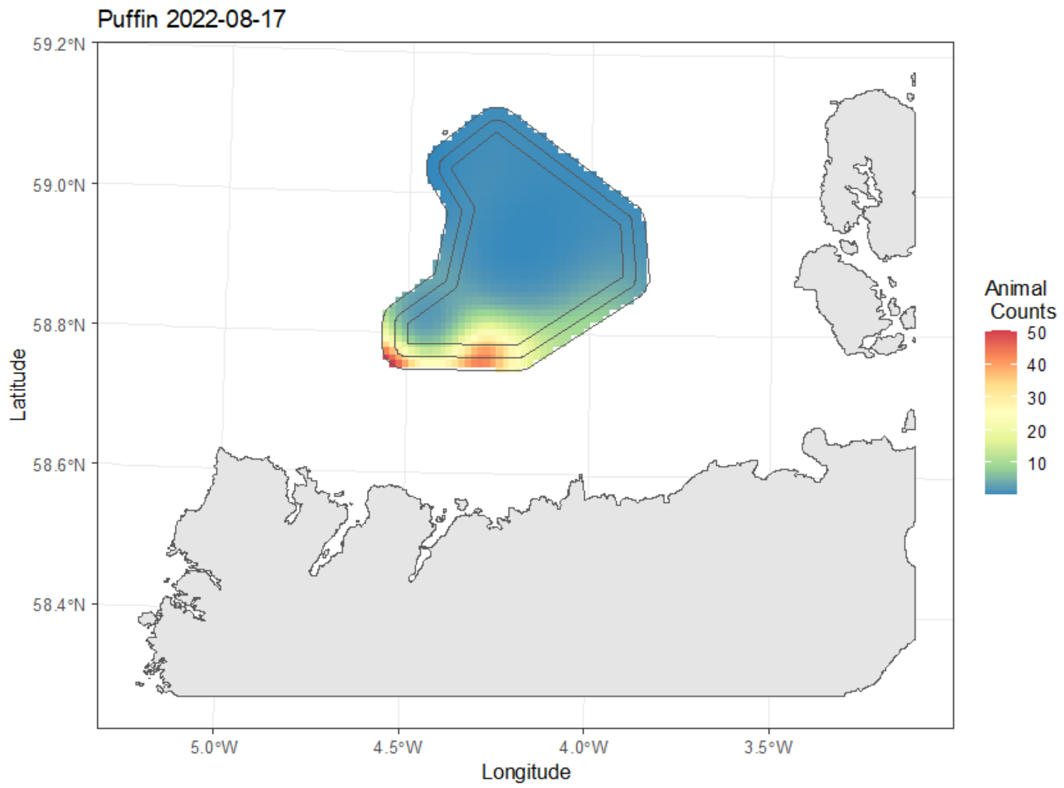
5.1.12 April 2022



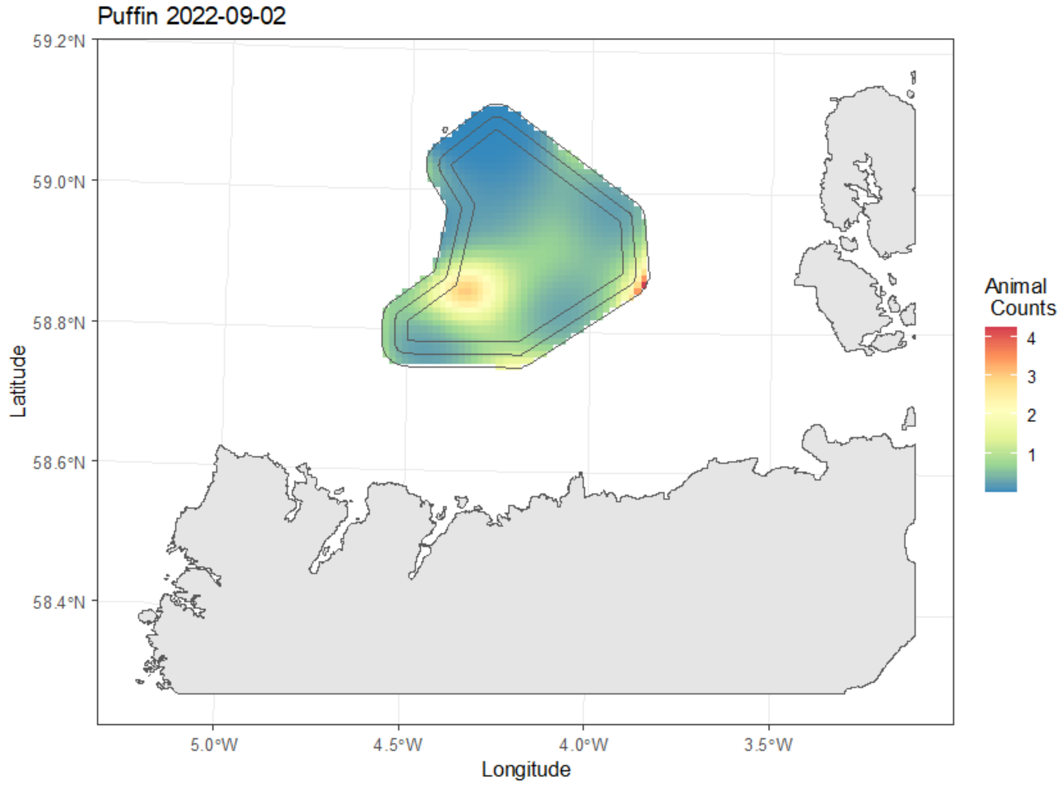
5.1.13 June 2022



5.1.14 August 2022



5.1.15 September 2022



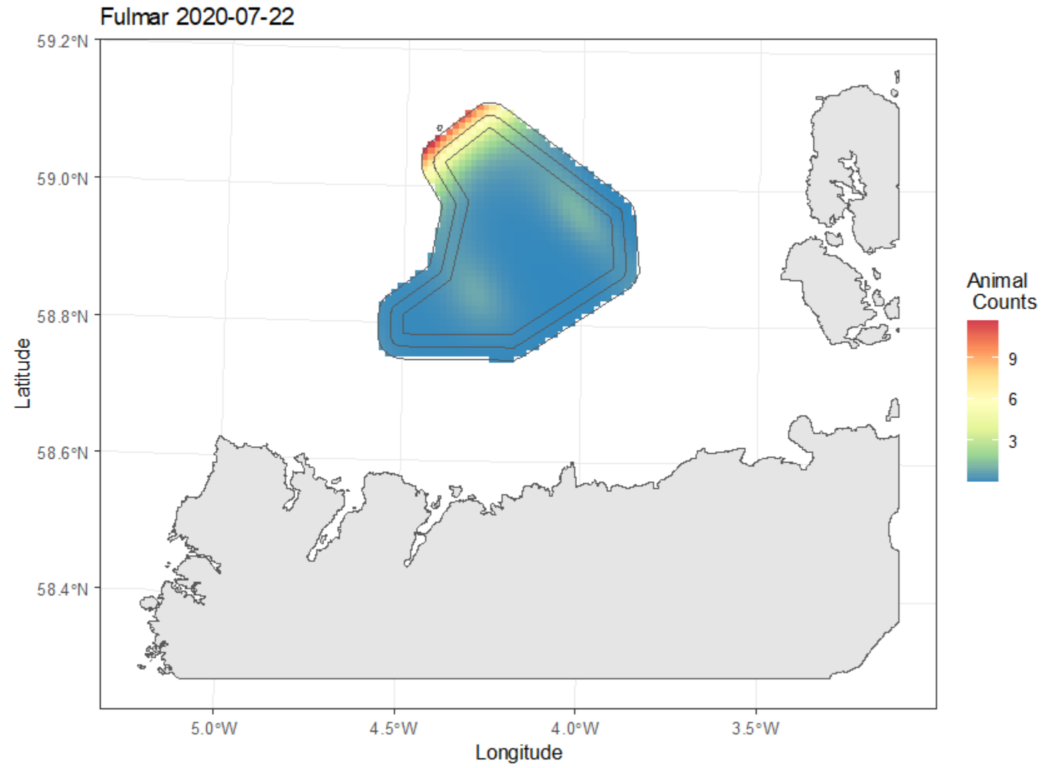
6 FULMAR

Table 6-1 Illustration of which surveys carried out for the offshore Project between July 2020 to September 2022 recorded enough fulmar to support density surface modelling.

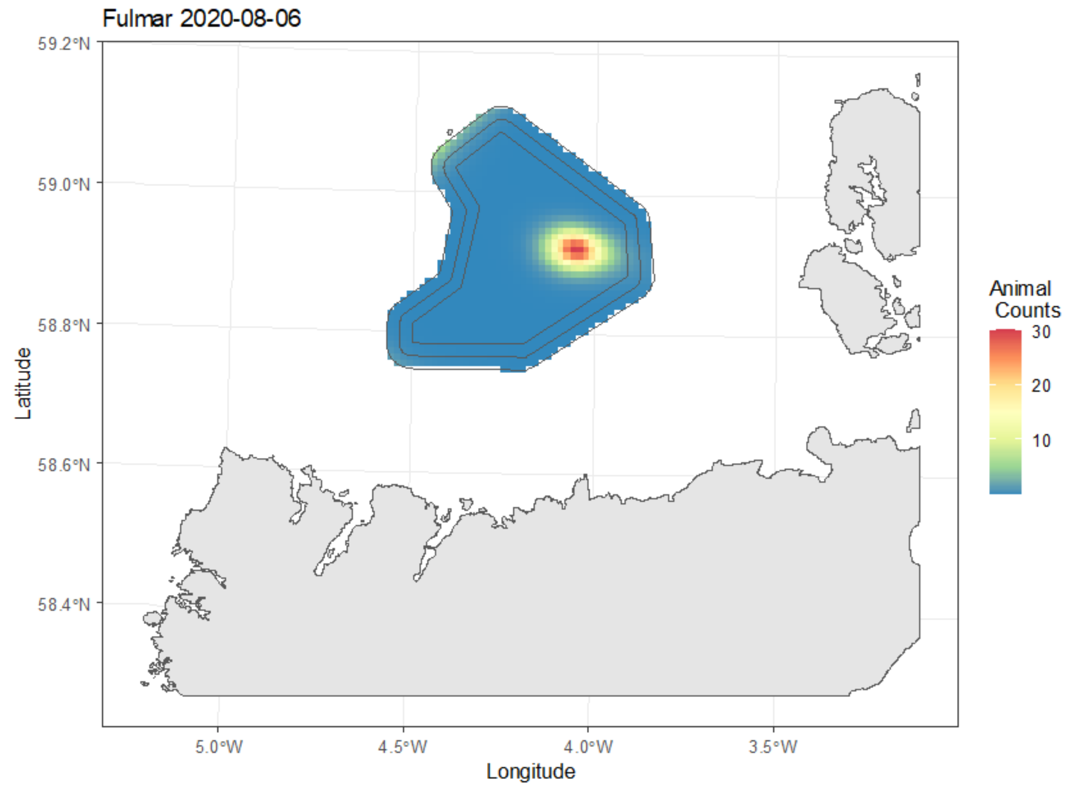
Month	2020	2021	2022
January	-	X	-
February	-	X	XX
March	-	X	X
April	-	X	X
May	-	X	X
June	-	X	X
July	X	X	X
August	X	X	X
September	X	X	X
October	X	X	-
November	X	X	-
December	X	X	-

X: Survey recorded sufficient data to support DSM; X: Survey undertaken but numbers of birds too low to support DSM; -: No survey undertaken.

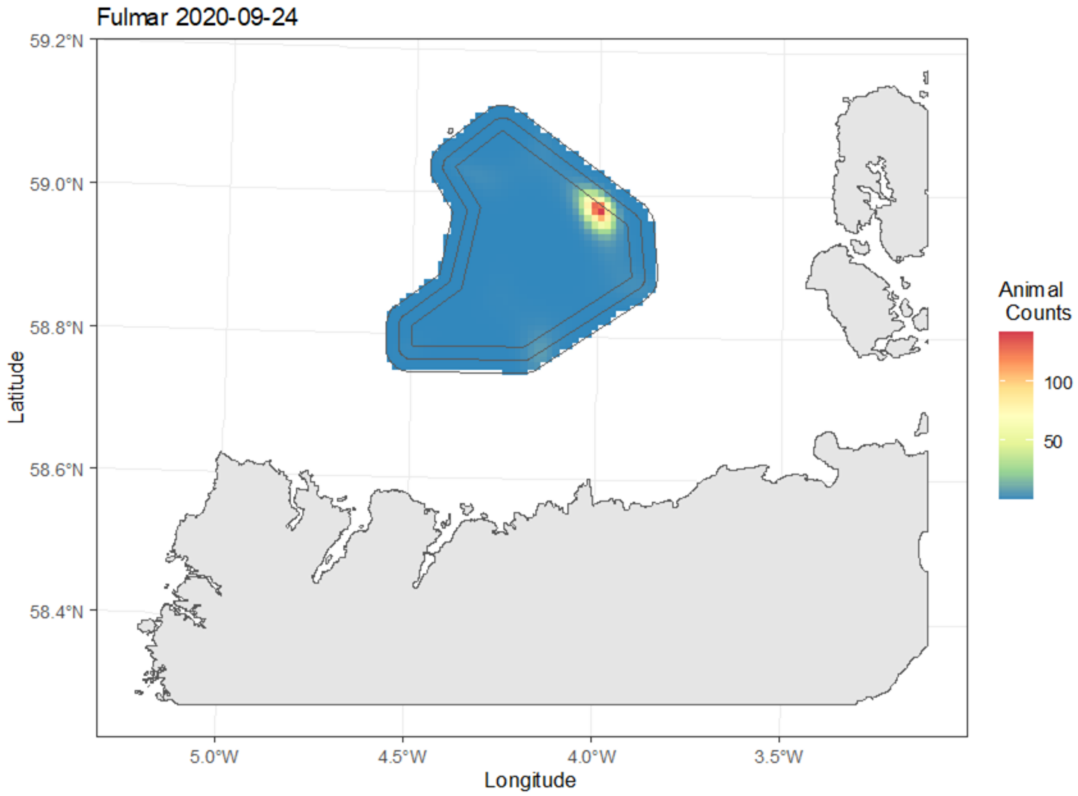
6.1.1 July 2020



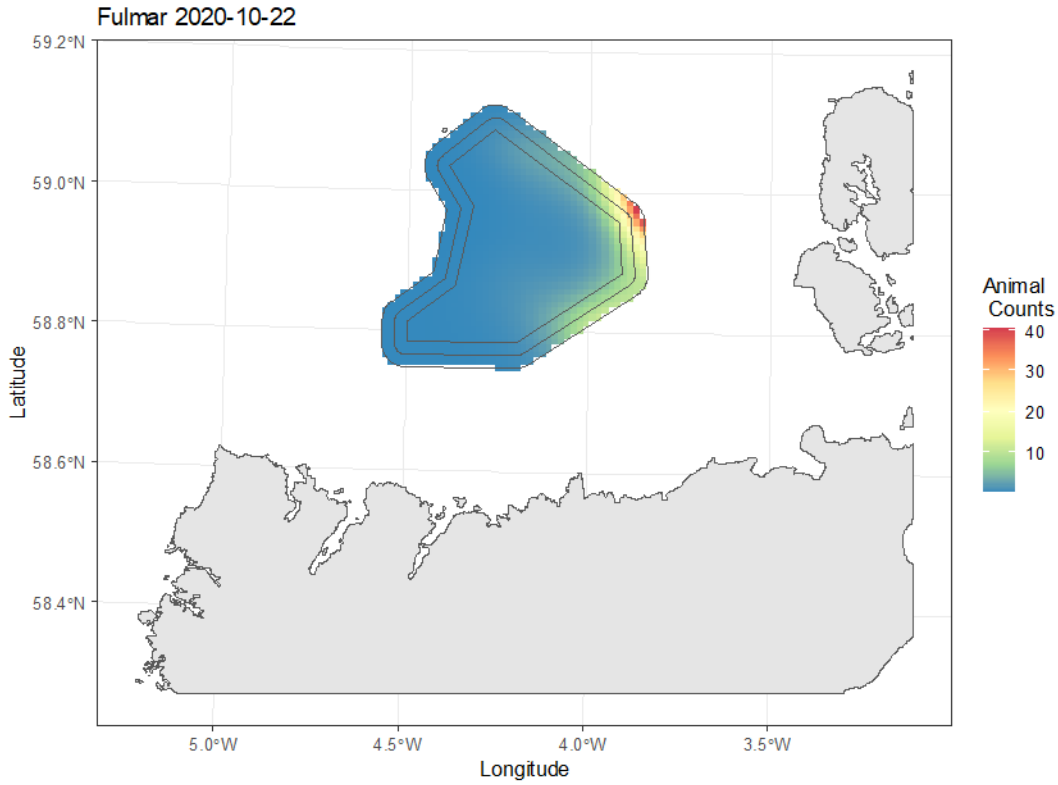
6.1.2 August 2020



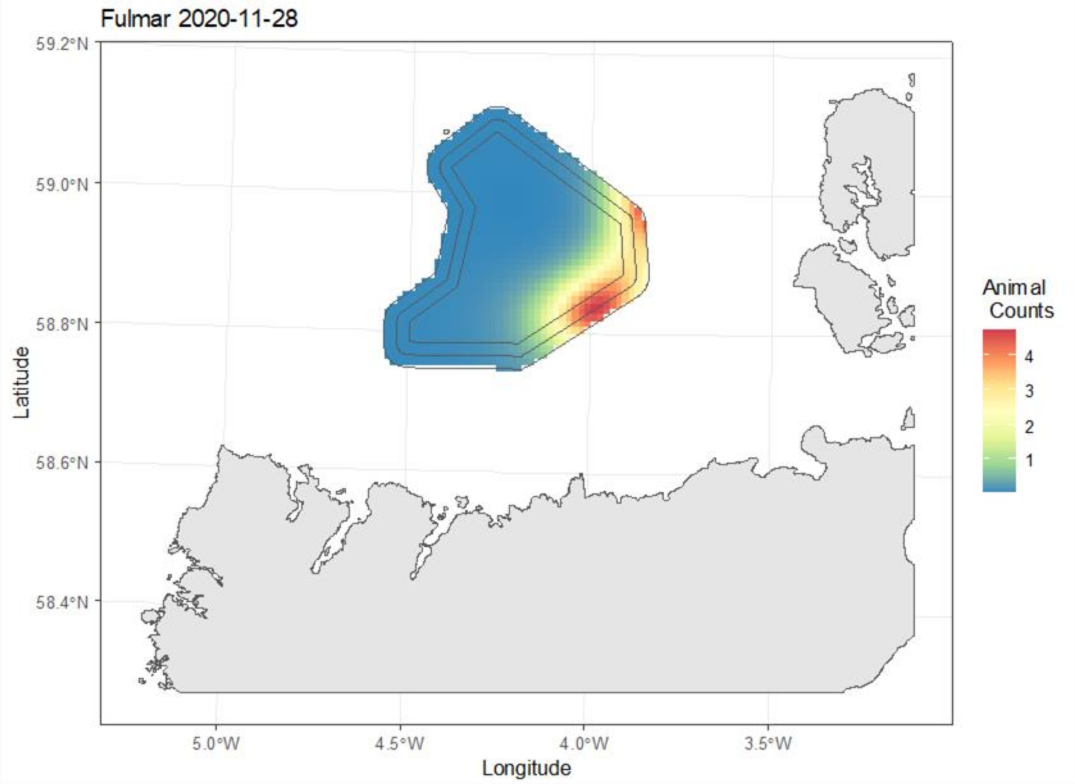
6.1.3 September 2020



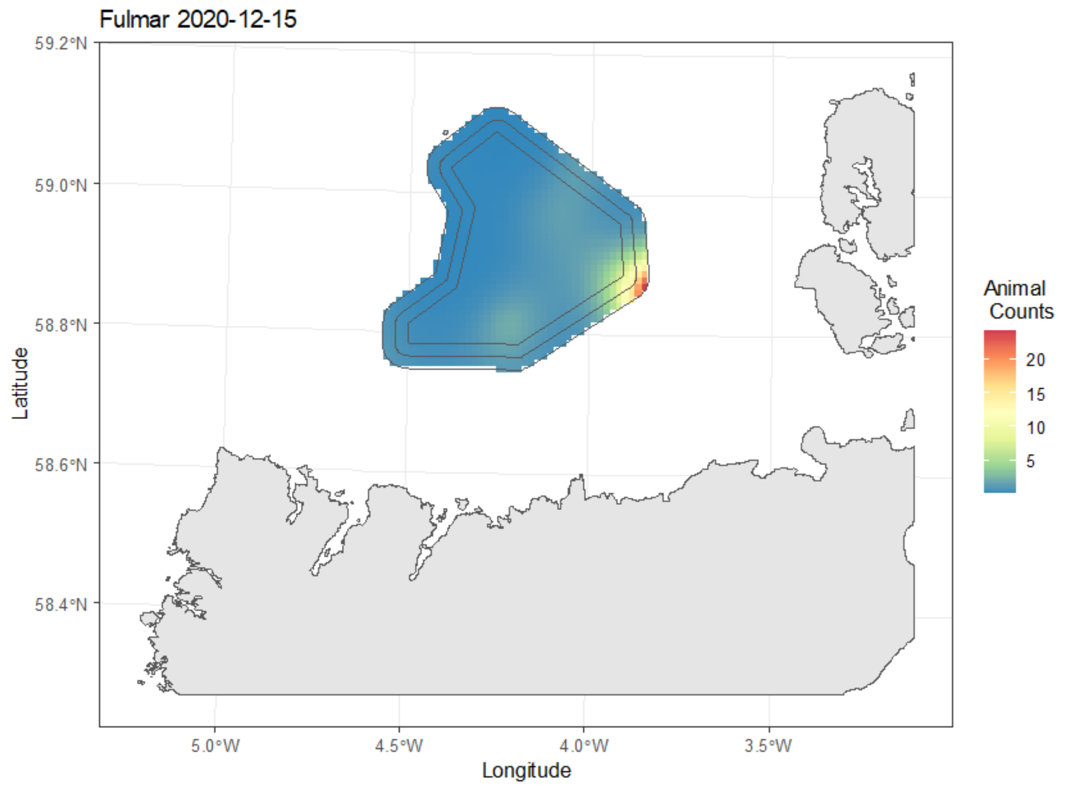
6.1.4 October 2020



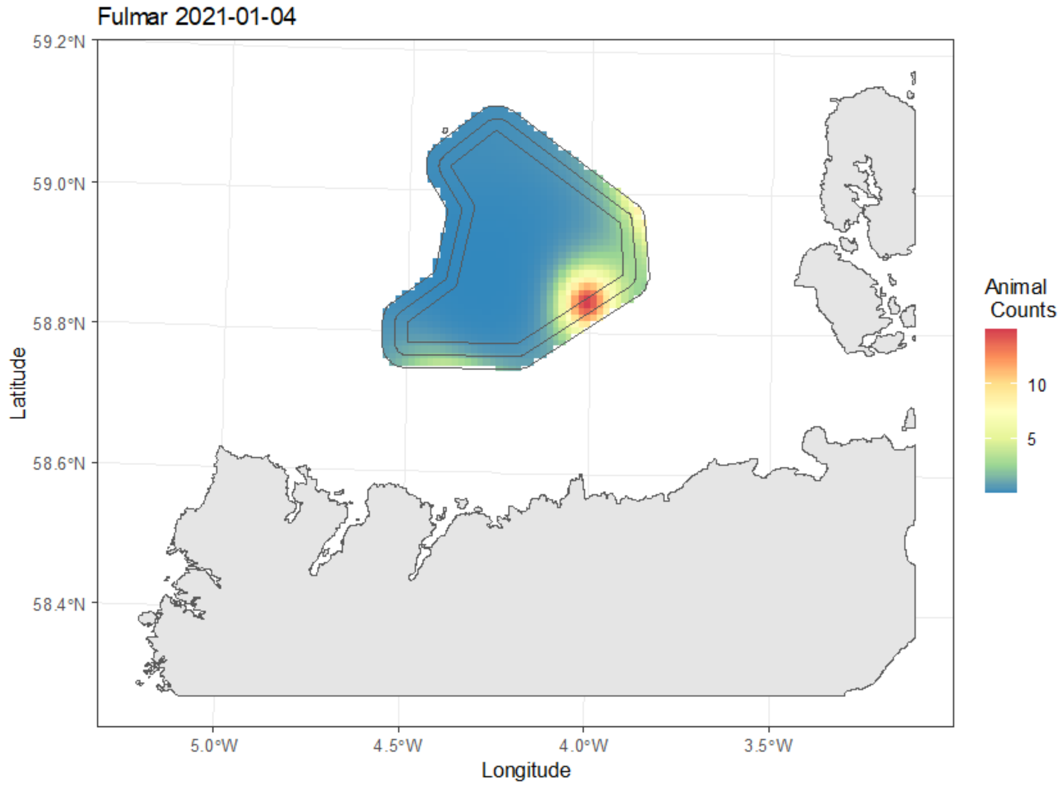
6.1.5 November 2020



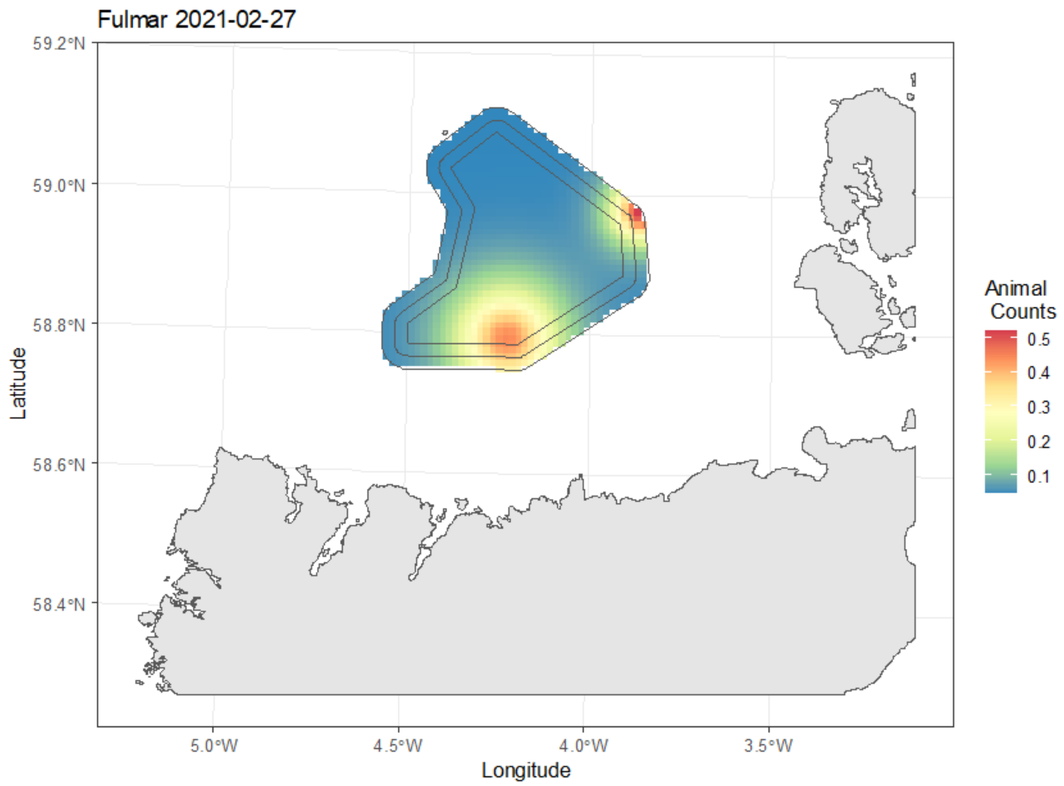
6.1.6 December 2020



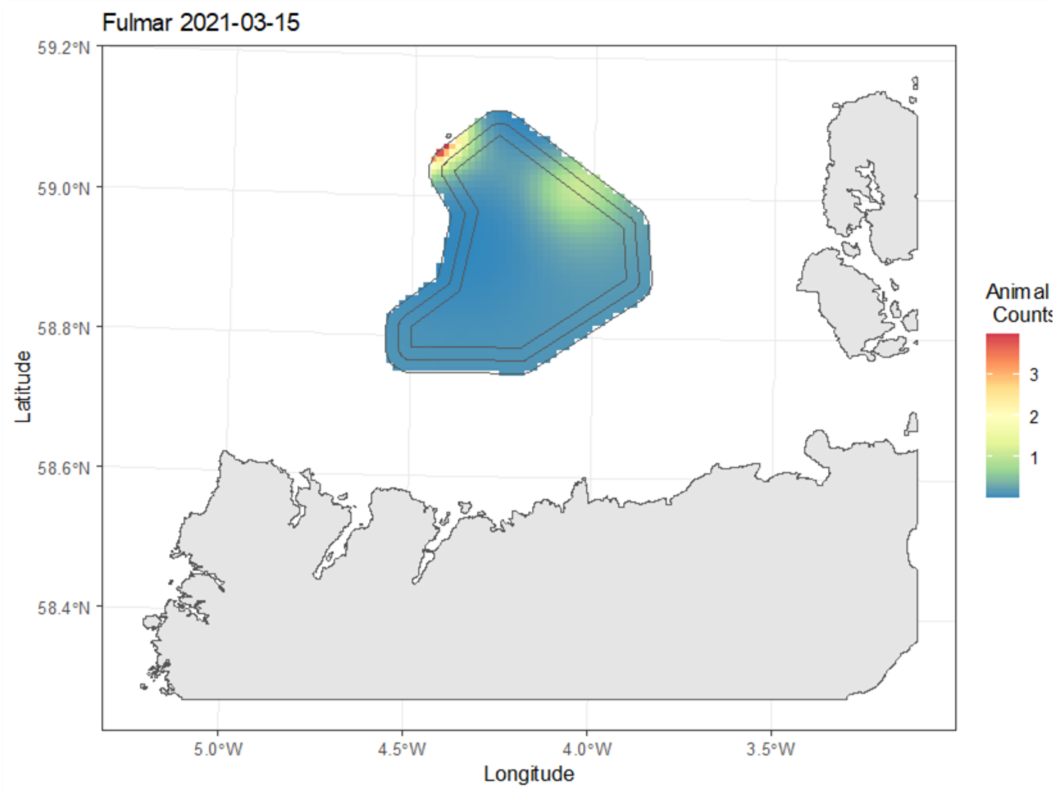
6.1.7 January 2021



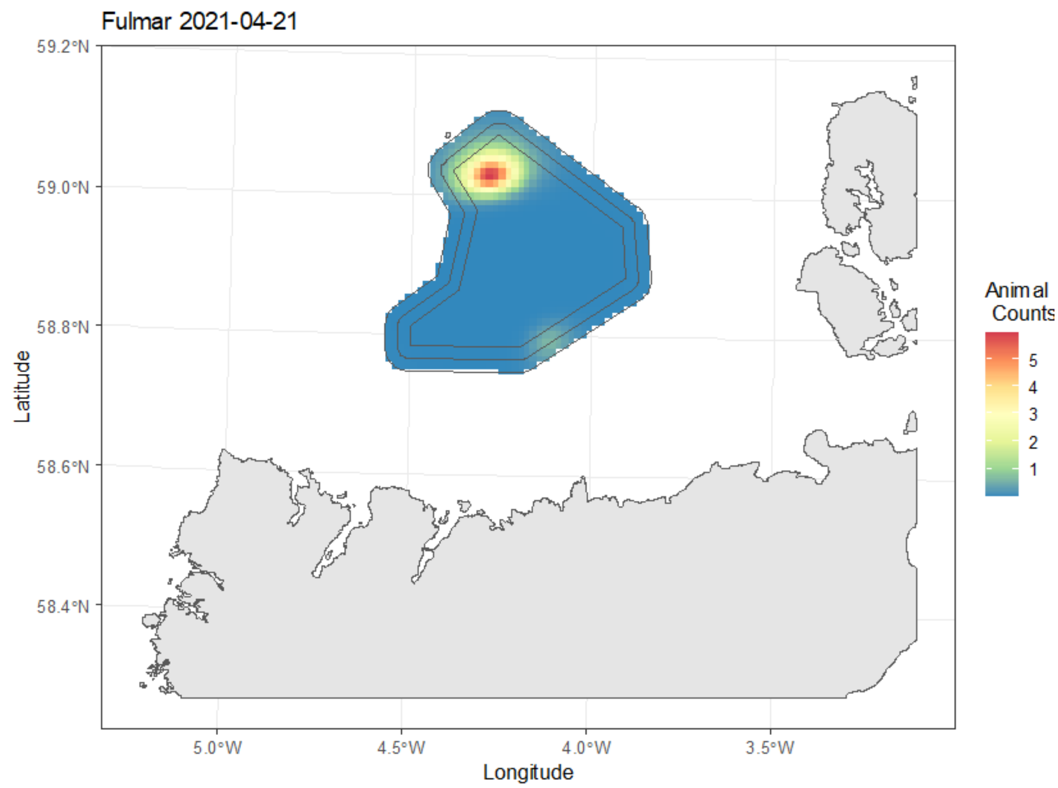
6.1.8 February 2021



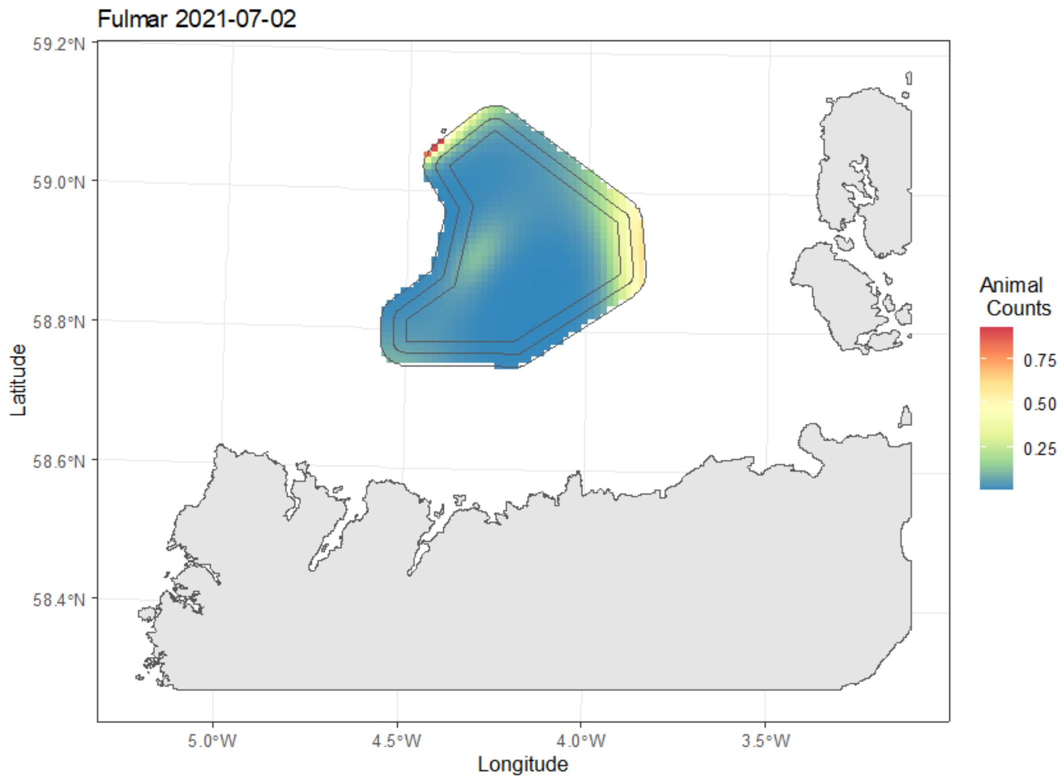
6.1.9 March 2021



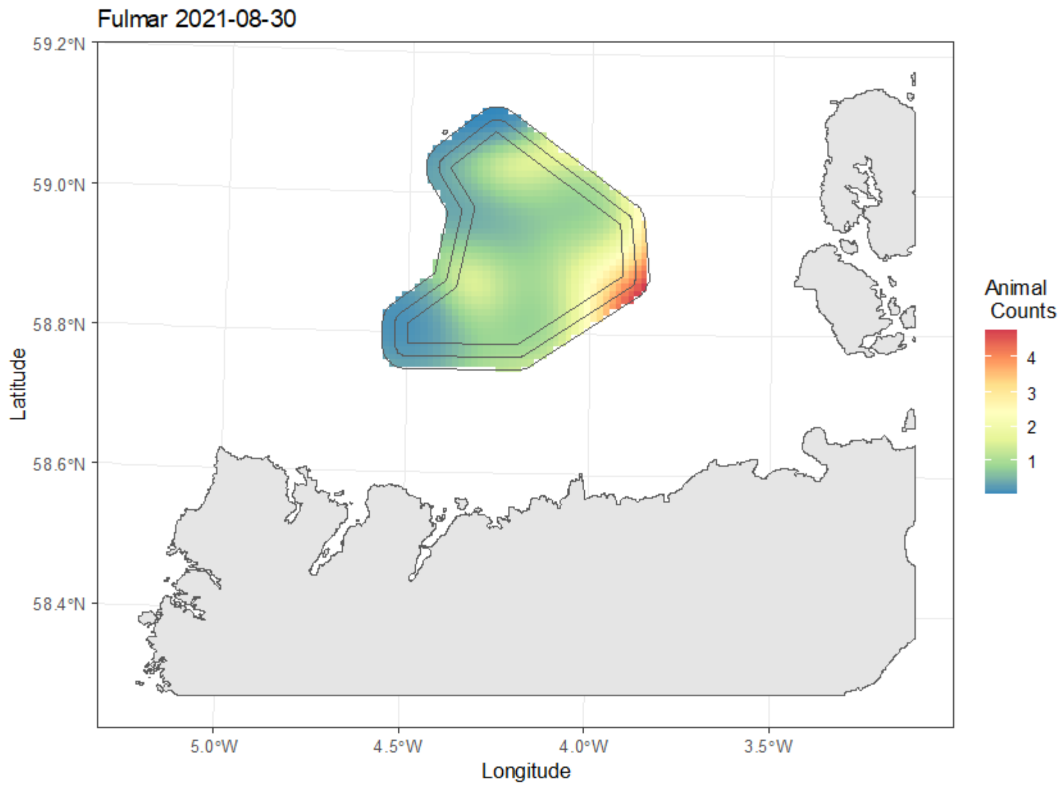
6.1.10 April 2021



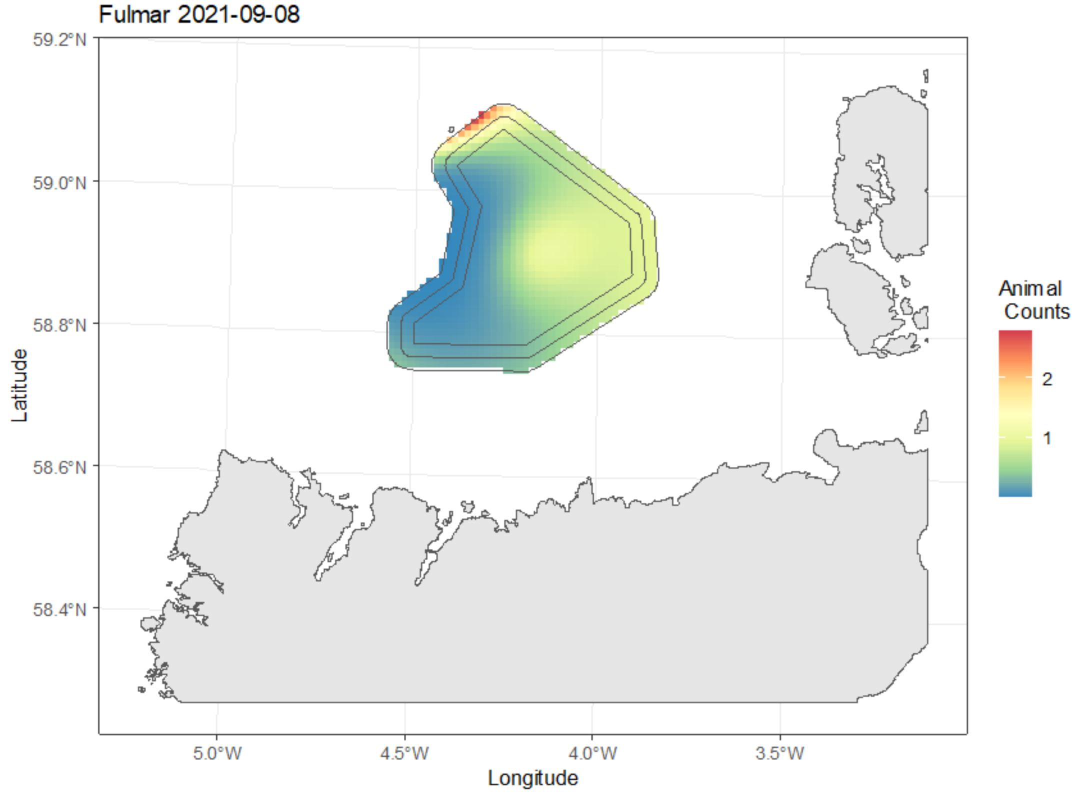
6.1.11 July 2021



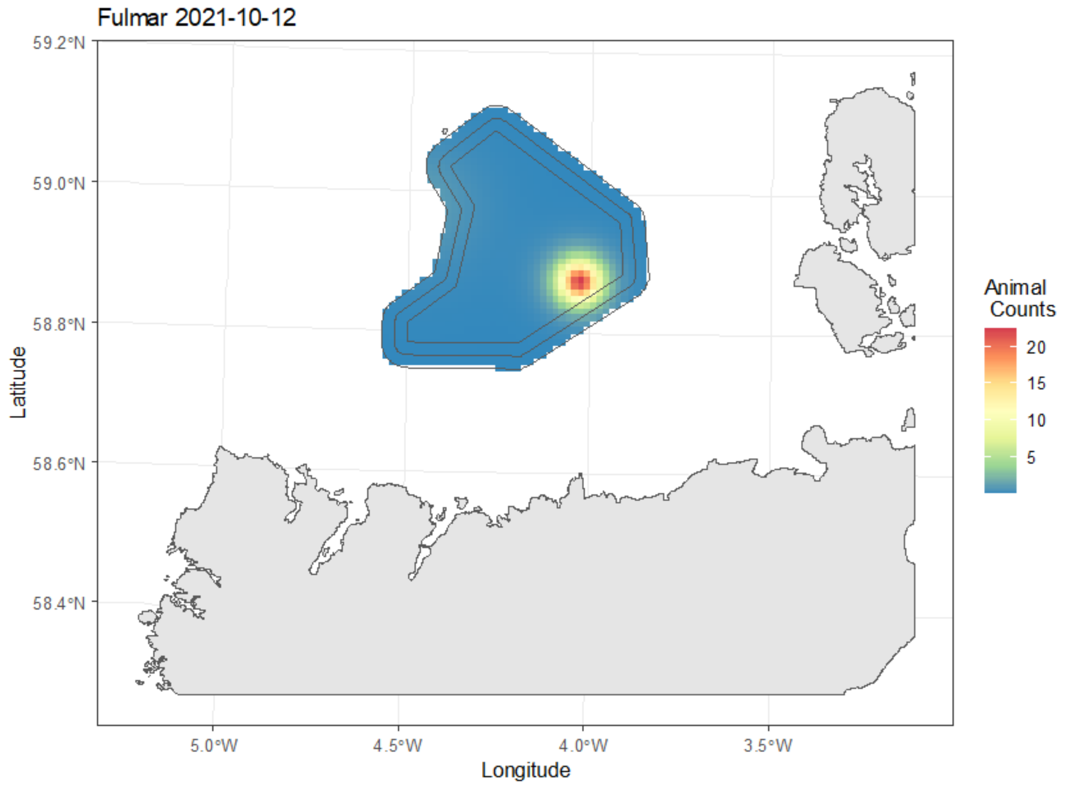
6.1.12 August 2021



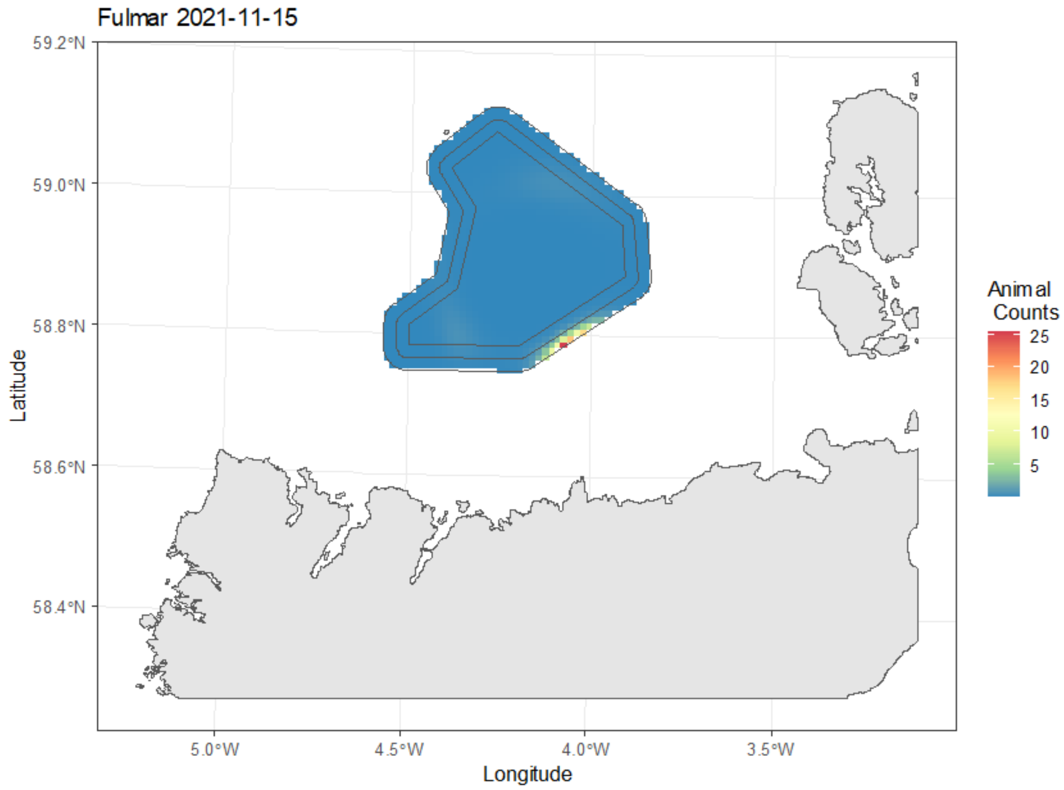
6.1.13 September 2021



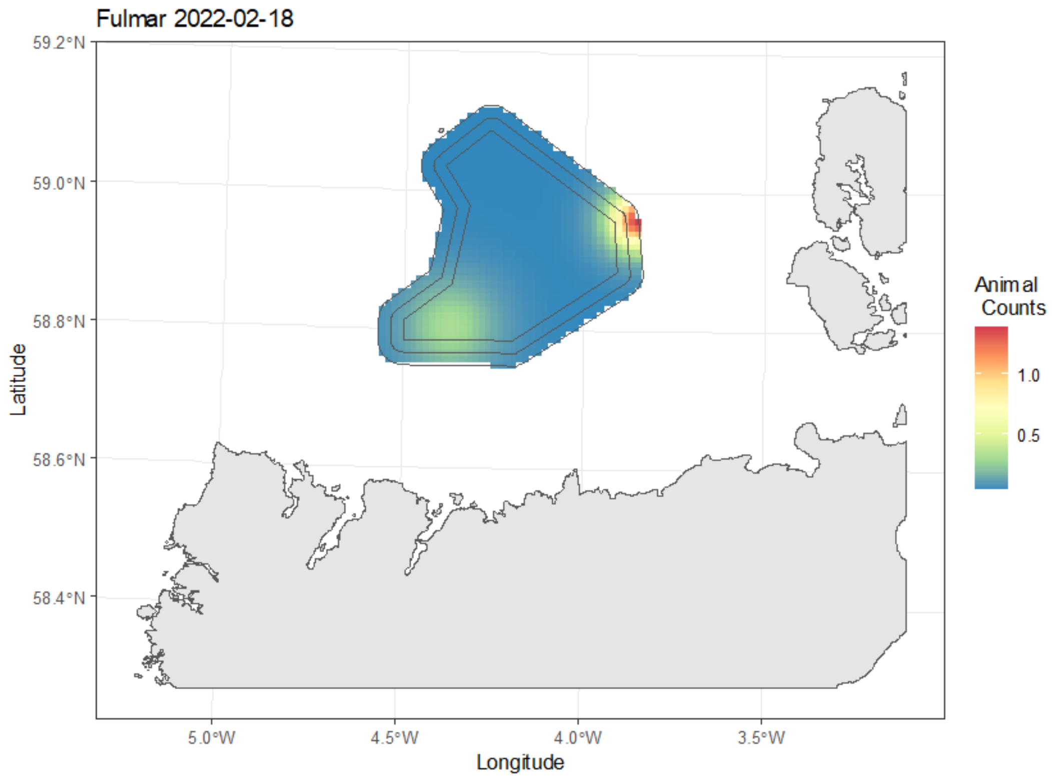
6.1.14 October 2021



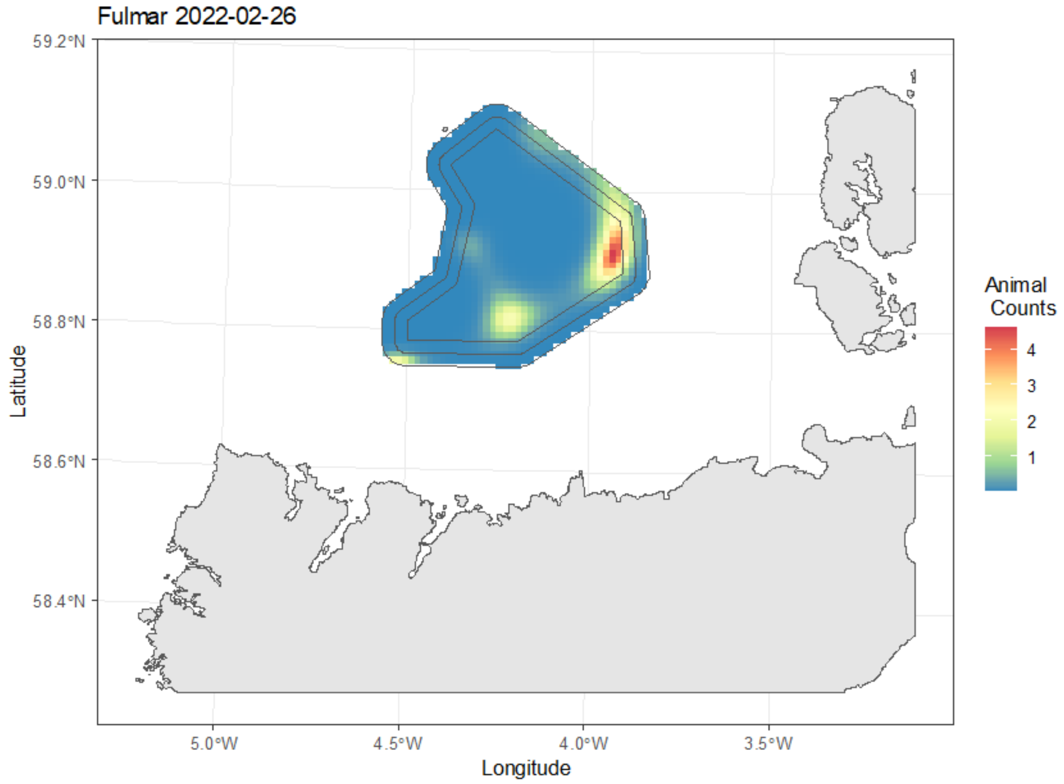
6.1.15 November 2021



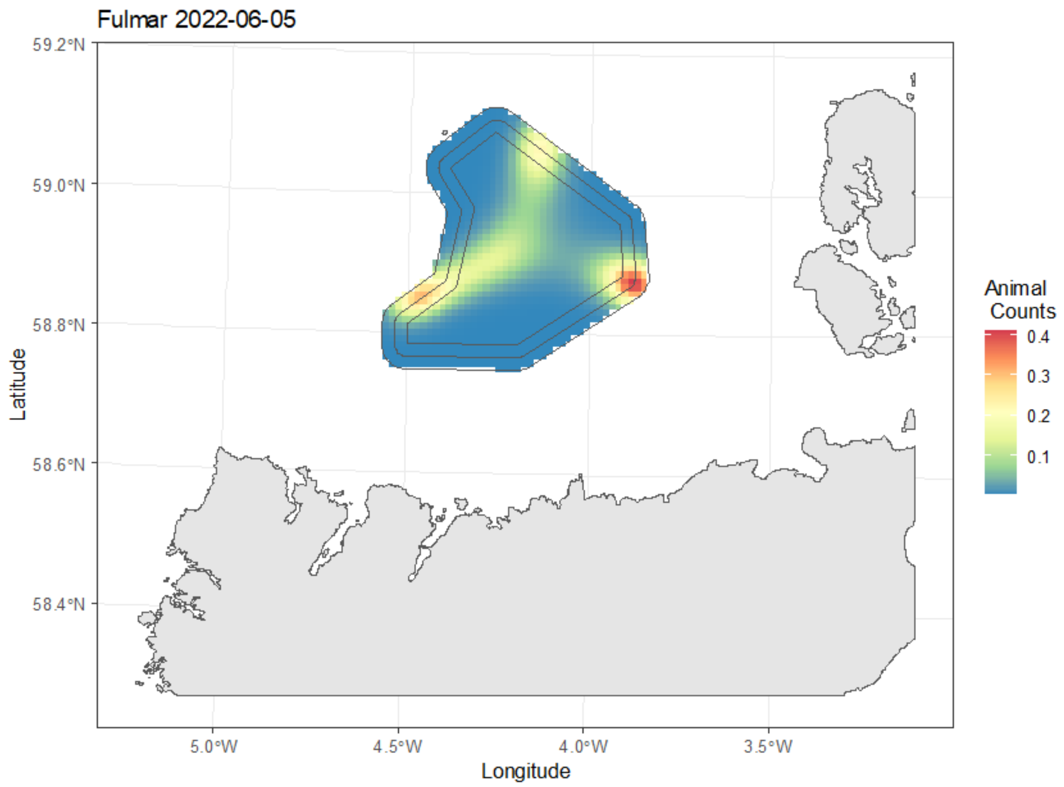
6.1.16 February 2022



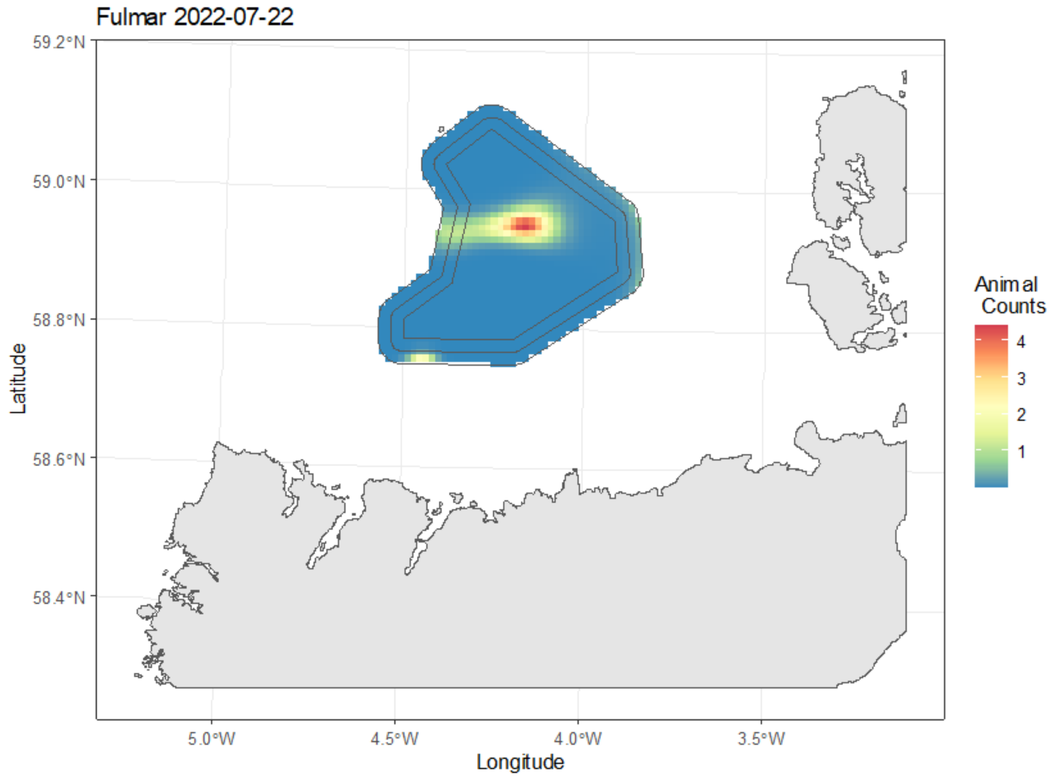
6.1.17 February 2022



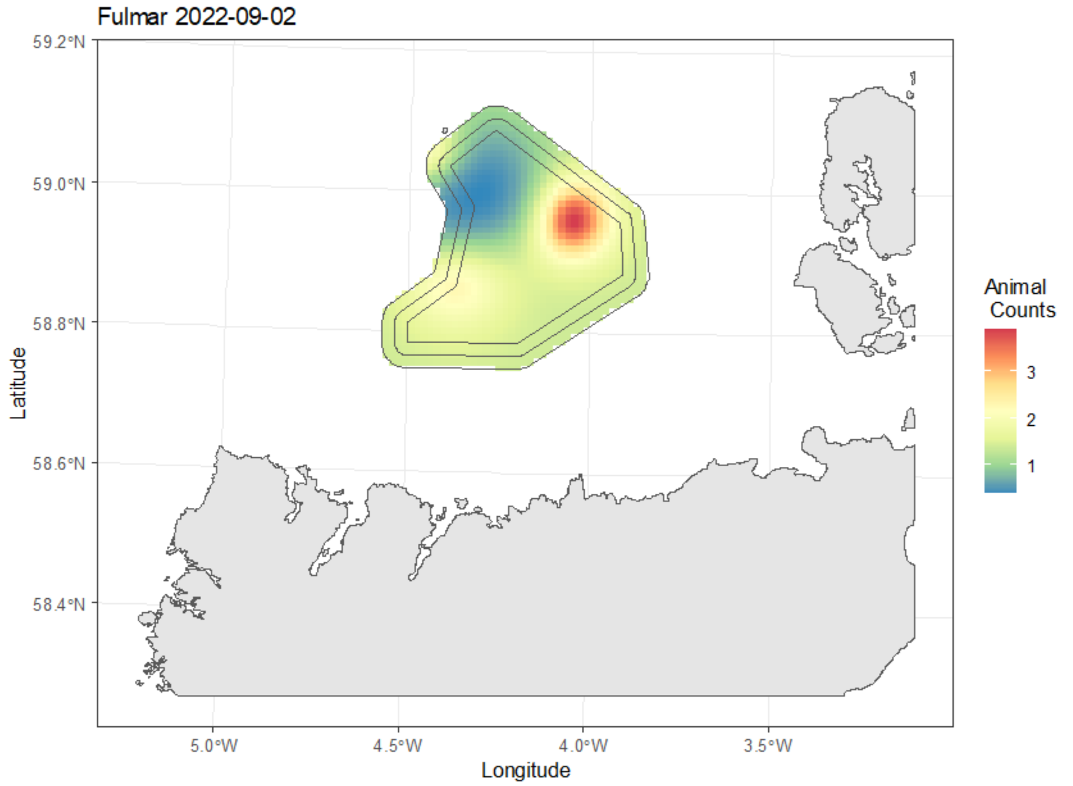
6.1.18 June 2022



6.1.19 July 2022



6.1.20 September 2022



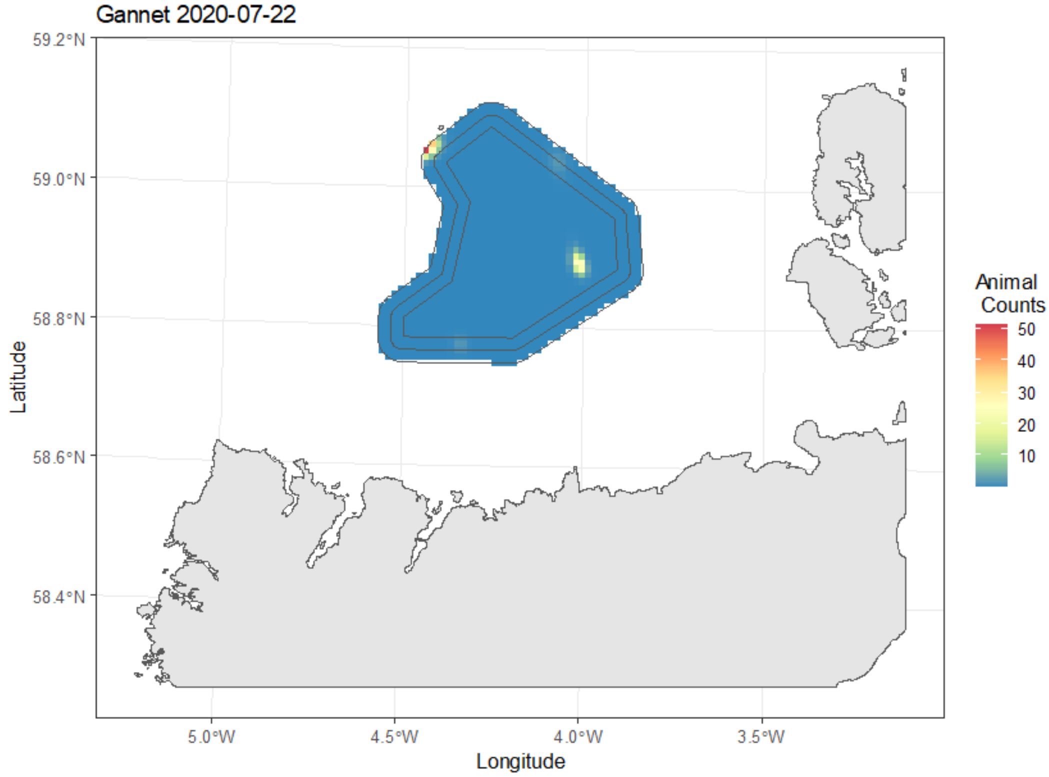
7 GANNET

Table 7-1 Illustration of which surveys carried out for the offshore Project between July 2020 to September 2022 recorded enough gannet to support density surface modelling.

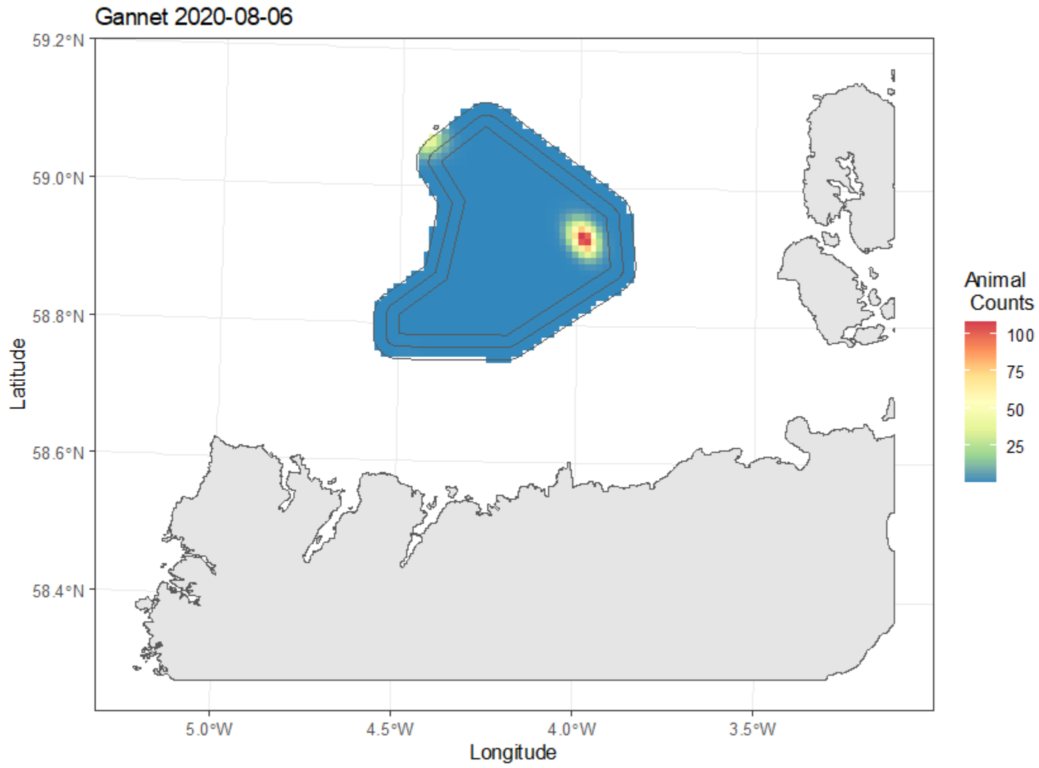
Month	2020	2021	2022
January	-	X	-
February	-	X	X
March	-	X	X
April	-	X	X
May	-	X	X
June	-	X	X
July	X	X	X
August	X	X	X
September	X	X	X
October	X	X	-
November	X	X	-
December	X	X	-

X: Survey recorded sufficient data to support DSM; X: Survey undertaken but numbers of birds too low to support DSM; -: No survey undertaken.

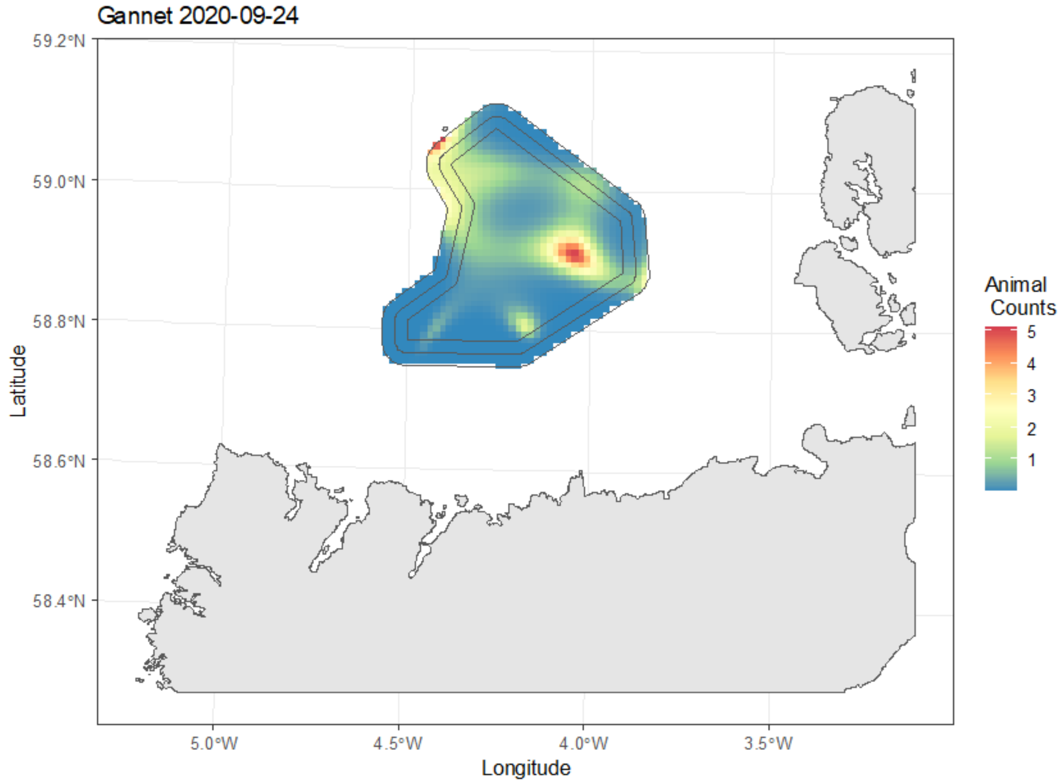
7.1.1 July 2020



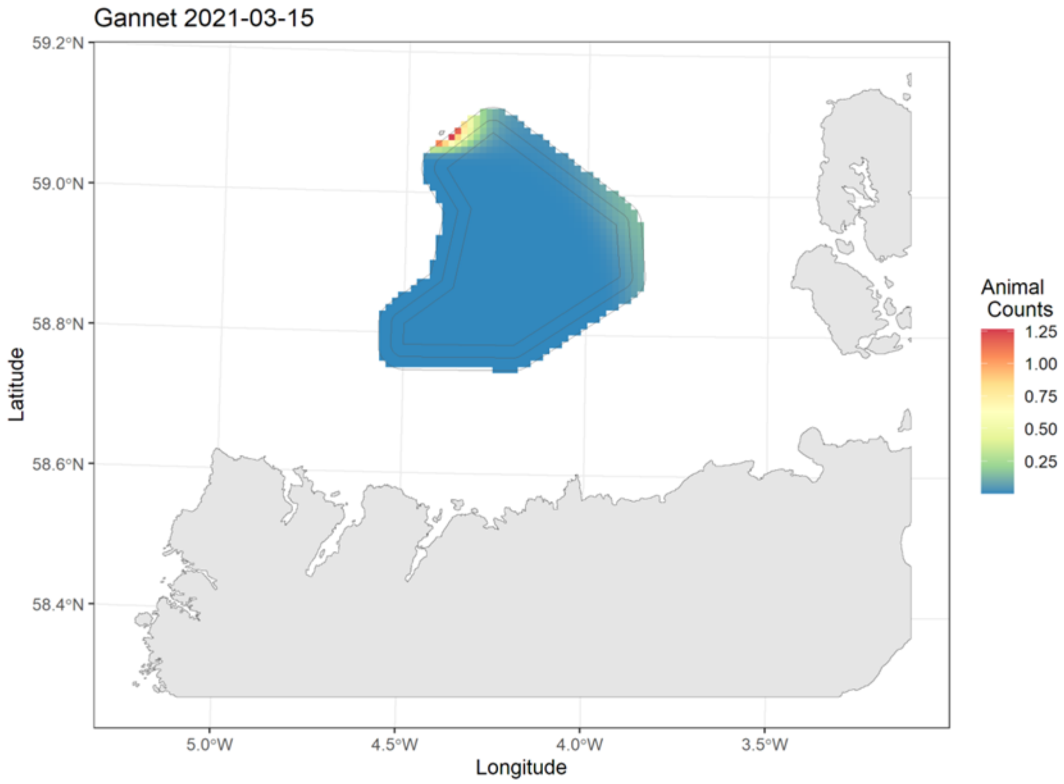
7.1.2 August 2020



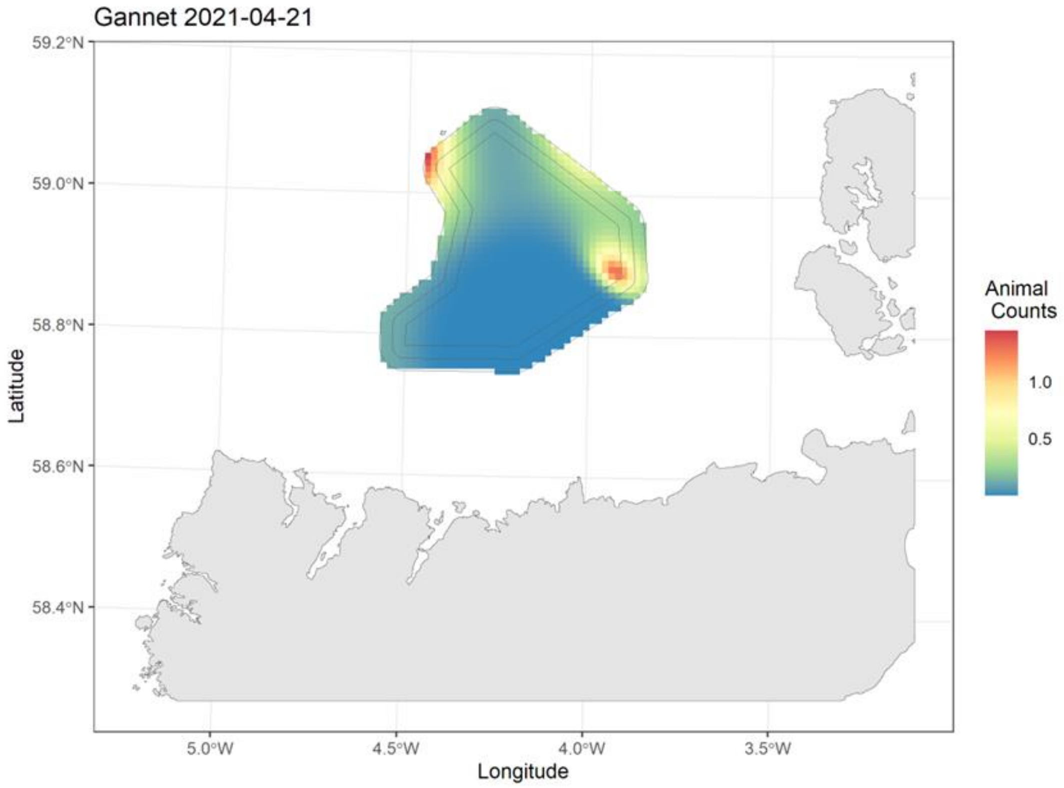
7.1.3 September 2020



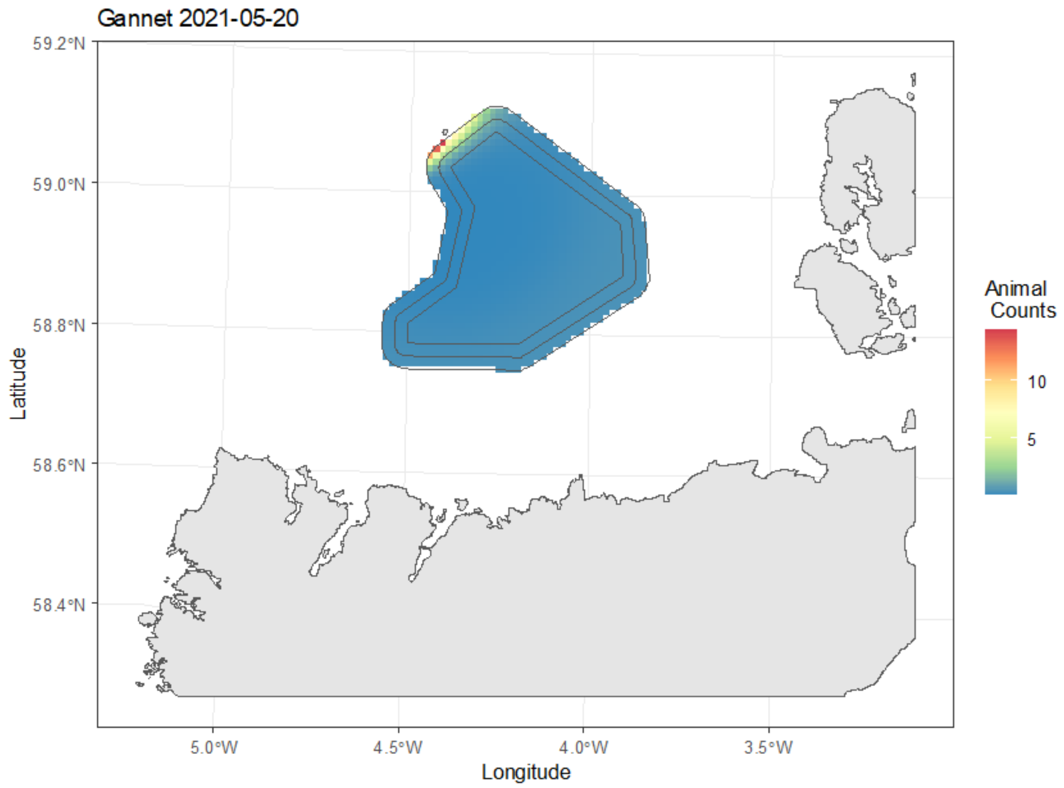
7.1.4 March 2021



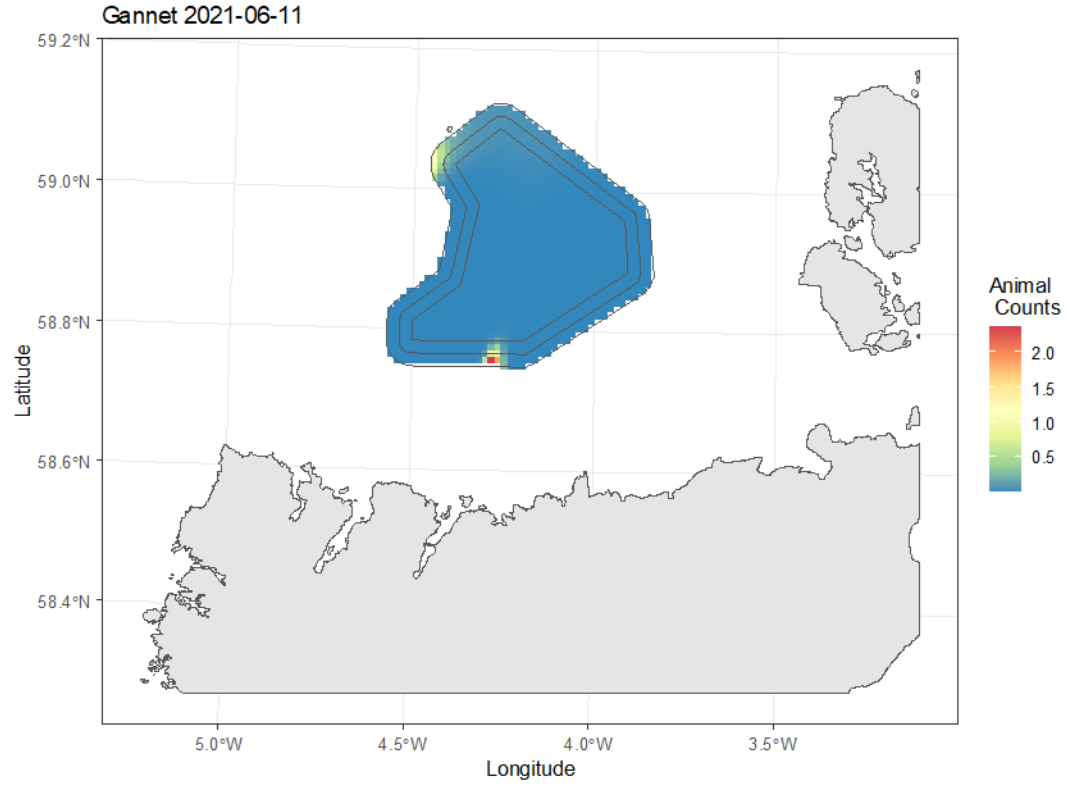
7.1.5 April 2021



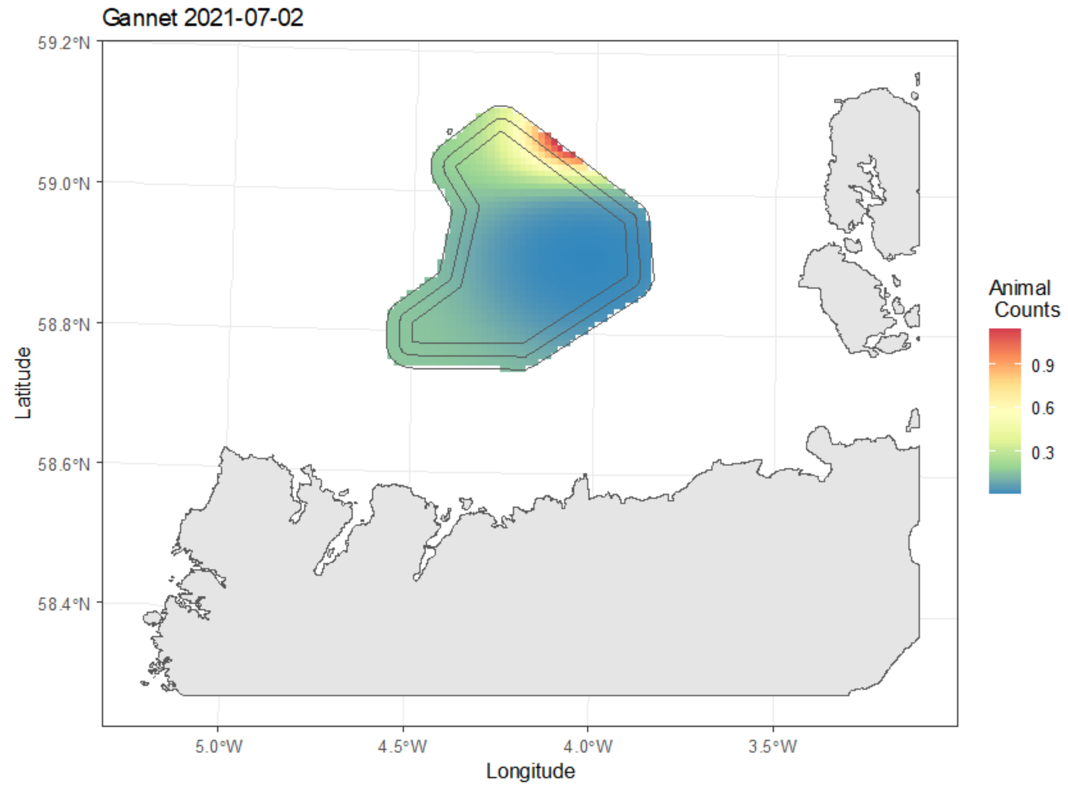
7.1.6 May 2021



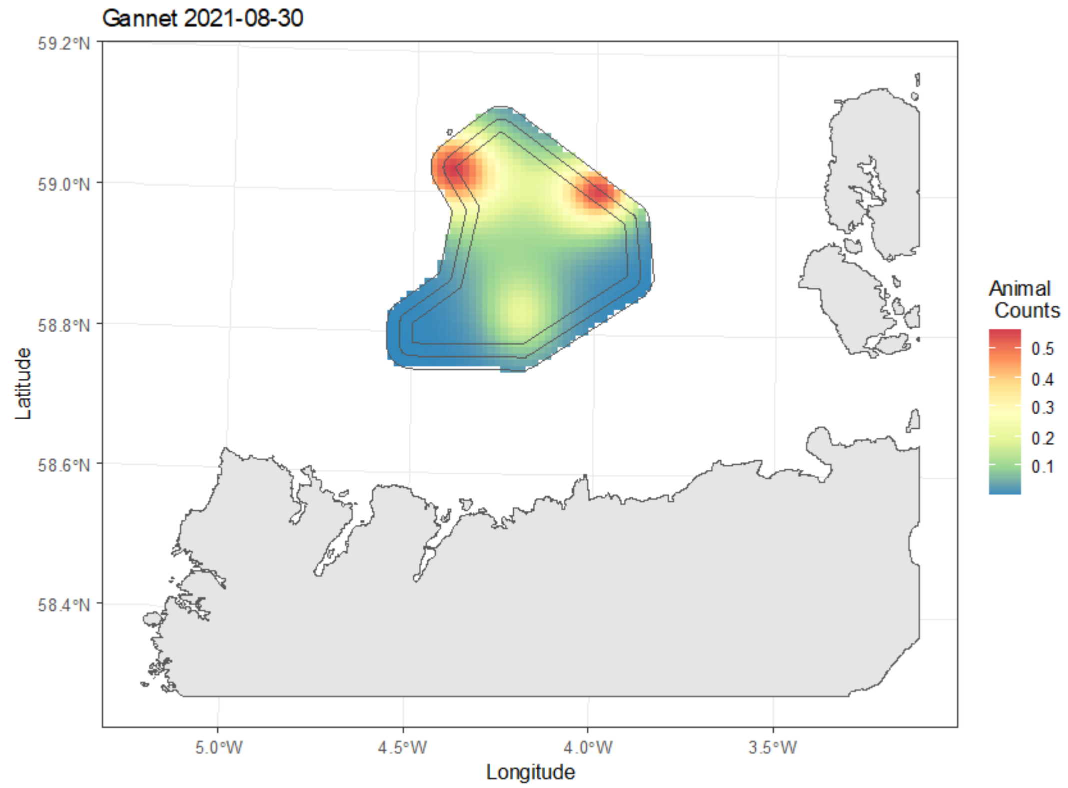
7.1.7 June 2021



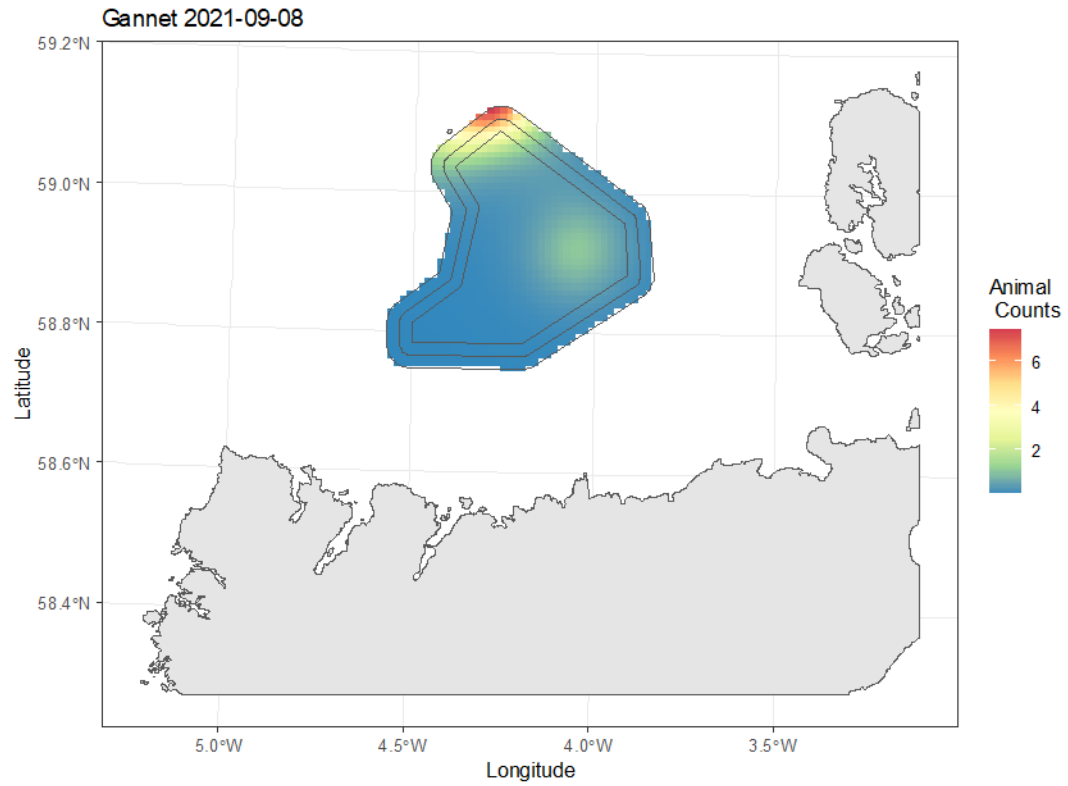
7.1.8 July 2021



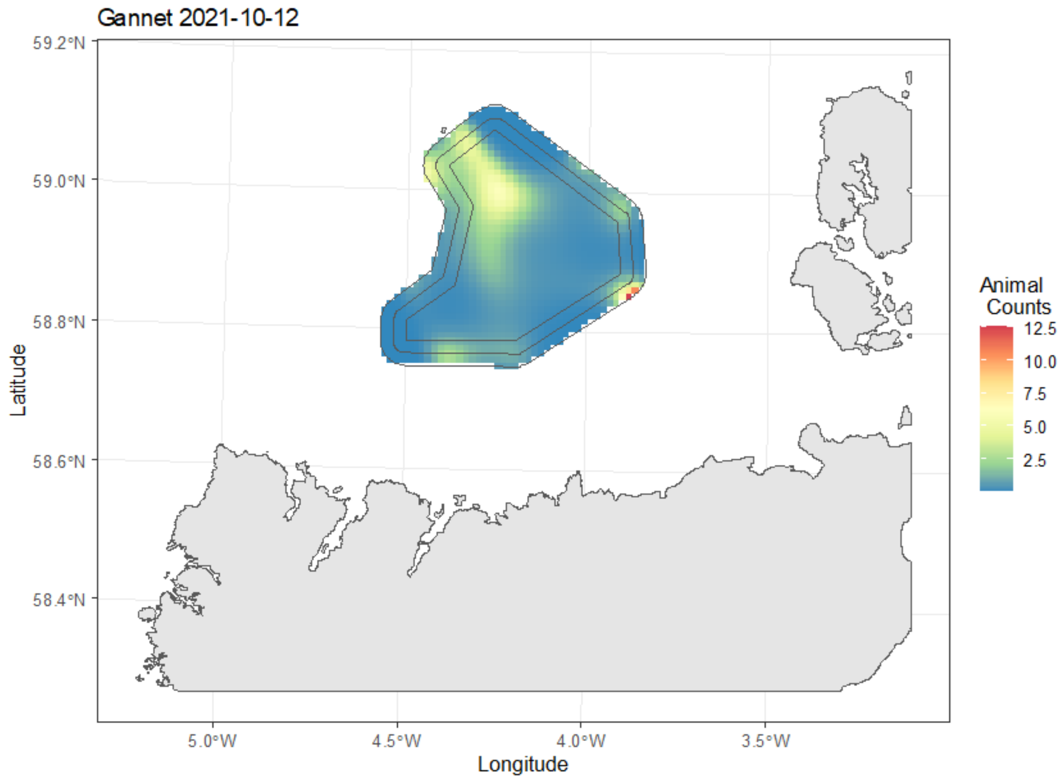
7.1.9 August 2021



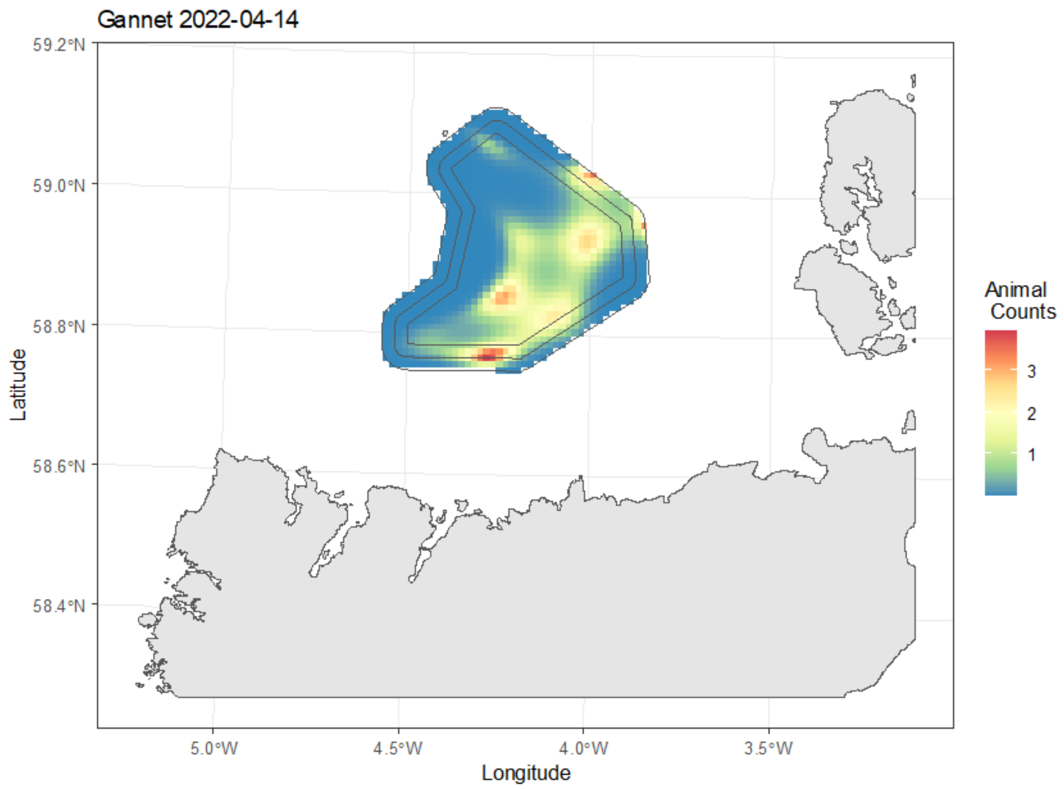
7.1.10 September 2021



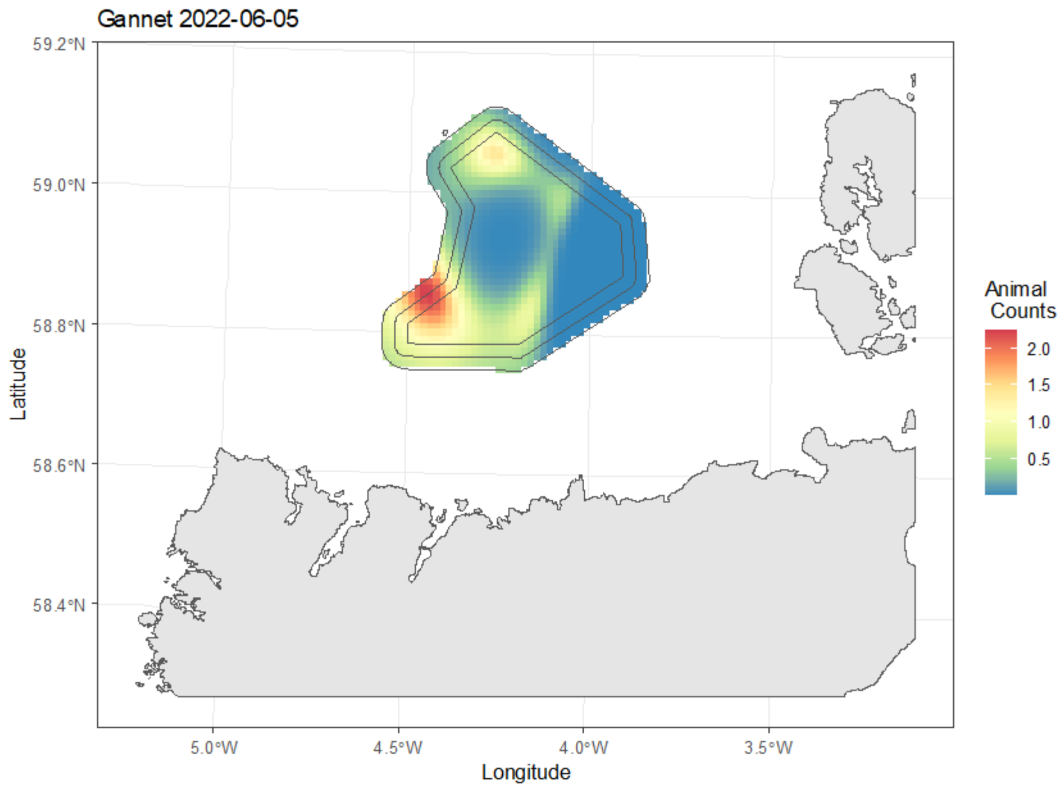
7.1.11 October 2021



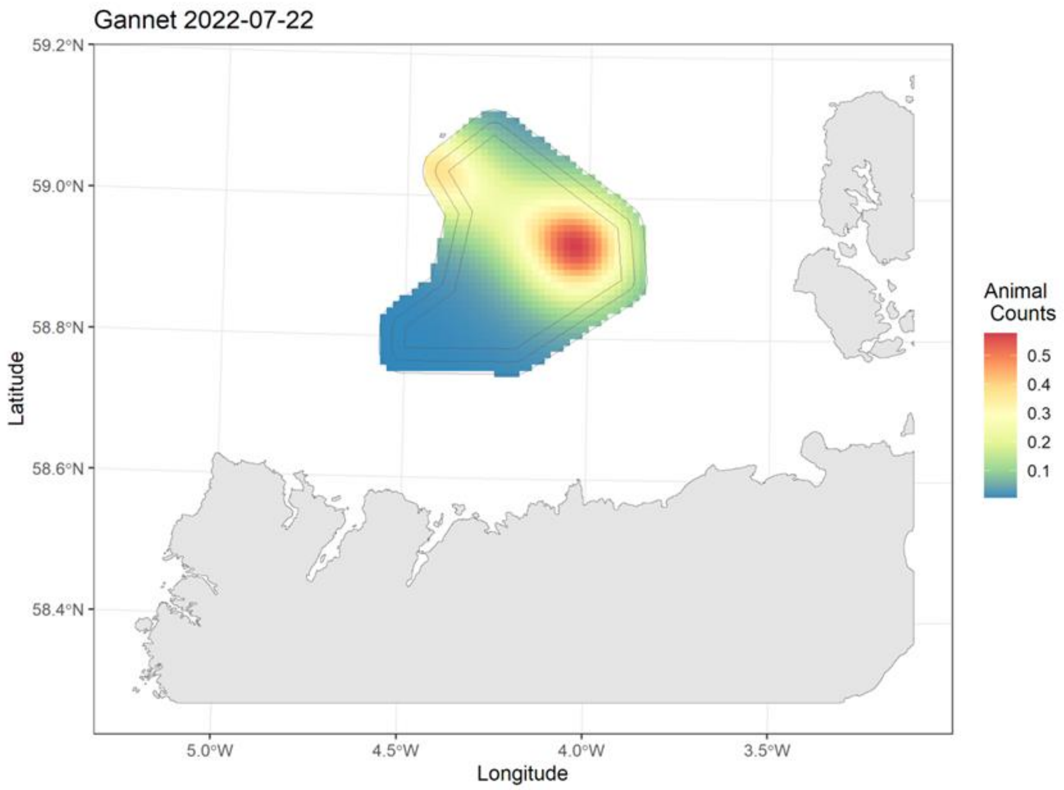
7.1.12 April 2022



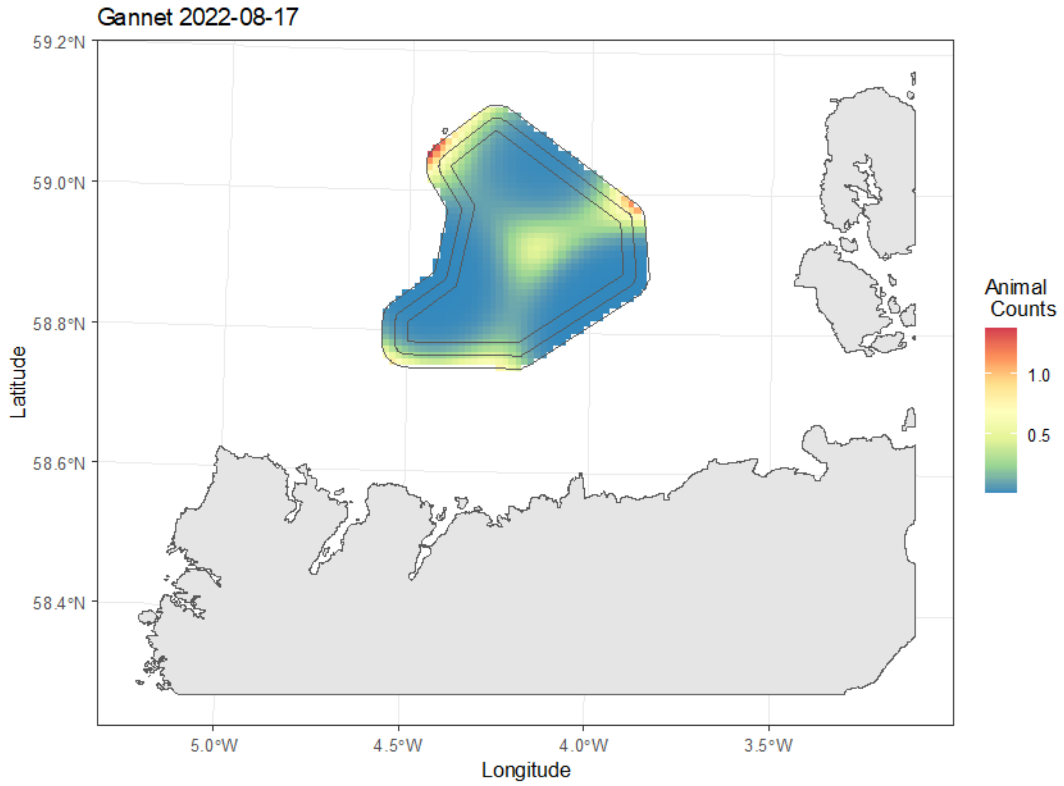
7.1.13 June 2022



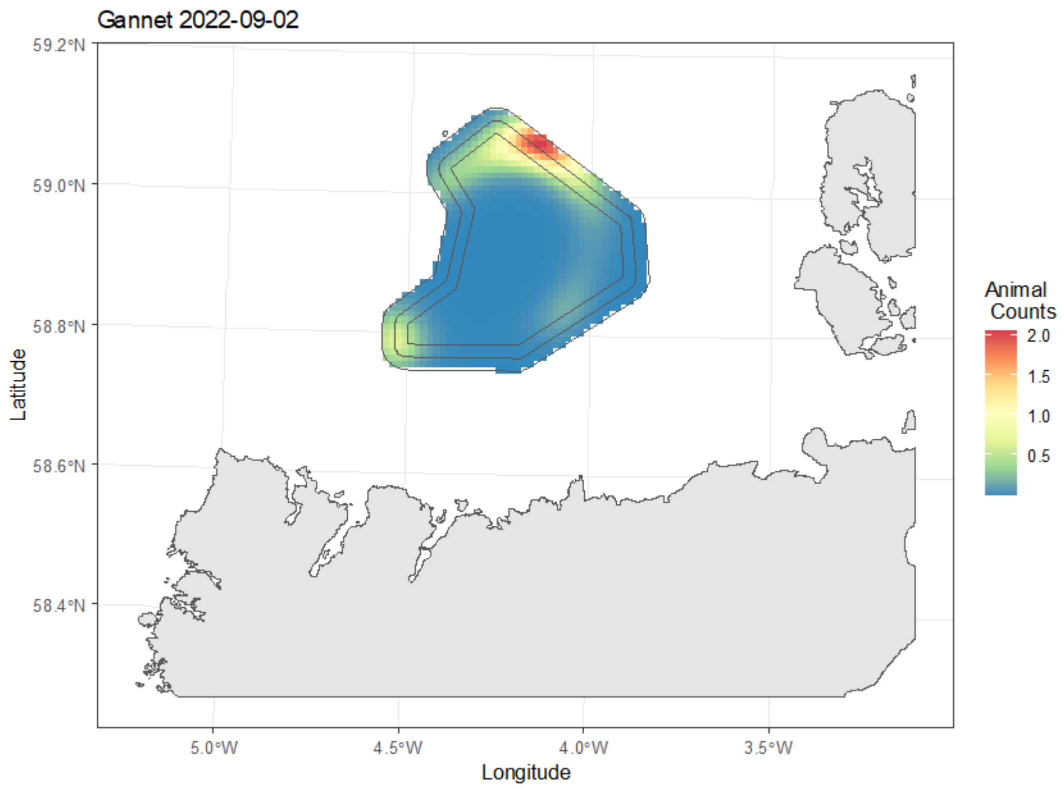
7.1.14 July 2022



7.1.15 August 2022



7.1.16 September 2022



MacArthur Green

West of Orkney Windfarm

Offshore Ornithology Technical Supporting Study 12

Annex 12.10
PVA methods, inputs and results

Date:	20/01/2023
Tel:	0141 342 5404
Web:	www.macarthurgreen.com
Address:	93 South Woodside Road |Glasgow | G20 6NT

Document Quality Record

Version	Status	Person Responsible	Date
0.1	Draft	Dr. Ross McGregor	18/01/2023
0.2	Reviewed	Dr Mark Trinder	19/01/2023
0.3	Updated	Dr. Ross McGregor	20/01/2023
1	Internal Approval	Dr. Ross McGregor	20/01/2023
2	Updated	Dr. Ross McGregor	10/05/2023
3	Updated	Dr. Ross McGregor	10/08/2023

MacArthur Green is helping to combat the climate crisis through working within a carbon negative business model. Read more at www.macarthurgreen.com.

CO_2e Assessed Organisation

CO_2e Negative Organisation

Woodland Carbon CO_2de

CONTENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1 INTRODUCTION

1. This Annex provides a description of the methods used to complete the Population Viability Analyses (PVA) for the West of Orkney Windfarm (the Project). The PVA is used to aid the assessment of significance of predicted impacts on regional populations of seabirds using the offshore Project in the breeding season and non-breeding season.

2. The input values used to parameterise the PVA models are summarised in Table 3-3 and can be used to repeat these analyses if necessary.

3. The projected counterfactuals of population size, growth rate and quantile metrics from the PVA models run for those species requiring them were output every five years from year 10 to year 35. The Project is applying for consent to operate the wind farm from 2027 to 2062, so the PVA was run across these years with a 5 year burn-in and no recovery period.

2 PVA METHODOLOGY

4. PVA is an approach to assessing projected future changes to populations using numerical population models. In the case of the Offshore EIA for the Project, PVA is used to assess the possible effects on regional populations from predicted impacts on breeding and non-breeding seabirds.

5. The PVA approach was to use Leslie Matrix models to project future population size and growth rates using the Natural England PVA tool[1]. The PVA tool is a suite of R functions that operate as an R package (nepva R package). The PVA tool was used only in the Shiny app2, which provides a user friendly interactive web-based mechanism.

6. The PVA were mostly run as stochastic models that allow the inclusion of environmental variability in the input parameters to provide outputs that incorporate this variability into suitable outputs. One exception to this approach was for Arctic tern, where low productivity with high variability, combined with a relatively small starting population resulted in zero values during the model burn-in, and the model failing to run. Therefore, to obtain outputs, for this species only, the model was run with no environmental stochasticity applied to the mean input parameters, though demographic stochasticity was included.

7. The PVA was used initially to estimate the stable age structure of each population, the values of which were then used to divide the predicted impacts (estimated across all age classes) in proportion between adult birds and immature birds (all sub-adult age classes combined). This approach was applied to the following species where impacts on the adult population required estimation:

    - Kittiwake;
    - Great black-backed gull;
    - Arctic tern;
    - Guillemot;
    - Razorbill;

[1] *Tool v 2 (Code: v 4.18 Interface: v 1.7) - https://github.com/naturalengland/Seabird_PVA_Tool*
[2] *http://ec2-34-243-66-127.eu-west-1.compute.amazonaws.com/shiny/seabirds/PVATool_Nov2022/R/*

- Puffin; and
- Gannet.

8. Following this step, the PVA was only applied to species where the predicted impacts were estimated to result in a 0.02% (percentage point) decrease in adult survival (see Offshore EIA Report, chapter 13: Offshore and intertidal ornithology). This was estimated for both breeding season populations and non-breeding season populations (see Offshore EIA Report, chapter 13: Offshore and intertidal ornithology for definitions of populations). For those predicted impacts resulting in a reduction in adult survival of 0.02% points or more, separate PVAs were run for breeding and non-breeding seasons as the starting population sizes were based on different scales (regional breeding population for the breeding season and Biologically Defined Minimum Population Scale (BDMPS) population in the non-breeding season). Thus, PVA models were run for the following species for the Project alone:

- Great black-backed gull in the non-breeding season;
- Arctic tern in the breeding season; and
- Puffin in the breeding season; and

9. In addition, PVA models were run for the following species for the Project cumulatively:

- Kittiwake in the breeding and non-breeding seasons;
- Great black-backed gull in the breeding and non-breeding seasons;
- Arctic tern in the breeding season;
- Guillemot in the breeding and non-breeding seasons;
- Razorbill in the breeding and non-breeding seasons;
- Puffin in the breeding and non-breeding seasons; and
- Gannet in the breeding and non-breeding seasons.

3 INPUT PARAMETERS

10. All the species demographic input parameters used in all models are summarised in Table 3-3. The decision making for selection of key input parameters is described below.

3.1 Breeding success

11. A suitable input value for the mean breeding success and SD of that mean was selected in all cases as the default values in the NE PVA tool for "Region Type CRB, Sector NW.Scotland.Orkney.Shetland". This was the most suitable for the regional populations used. These default values were compared with available information at a regional level from the Seabird Monitoring Programme (SMP) database (Table 3-1). SMP data were filtered so that only sites with more than 5 years of data were included. In the case of great skua, sites with more than five years of data, but only one pair in the site (e.g., Auskerry) were excluded to avoid undue bias. No data were available from the SMP database for breeding success of European storm petrel.

12. Overall, the default values in the NE PVA tool were fairly similar to the data from the SMP database, so none of these values were changed.

Table 3-1 Breeding success input parameters compared with selected data from SMP database.

Breeding success (NE PVA tool default values)			Value		Breeding success from SMP database	Value		
Species	Region type	Sector	Mean	SD	Location	Mean	SD	n
Kittiwake	CRB	NW.Scotland.Orkney.Shetland	0.5691	0.3903	Costa Head, Holm, Marwick Head, Mull Head, Papa Westray, Rousay, Row Head, and West Westray	0.6495	0.4863	162
Great black-backed gull	CRB	NW.Scotland.Orkney.Shetland	0.9002	0.4201	Hoy, Papa Westray & Noss	1.0053	0.4962	51
Arctic tern	N/A	SMP database Orkney Shetland Caithness Sutherland all 1990 to 2022	0.2322	0.2189	Caithness, Orkney & Shetland (only sites with >5 years)	0.2241	0.3608	247
Guillemot	CRB	NW.Scotland.Orkney.Shetland	0.4871	0.2100	Orkney & Shetland	0.5003	0.5003	0.5003
Razorbill	CRB	NW.Scotland.Orkney.Shetland	0.4155	0.2120	Papa Westray, Fair Isle, Sumburgh	0.4730 35181	0.4730 35181	40
Puffin	CRB	NW.Scotland.Orkney.Shetland	0.4435	0.1791	Fair Isle	0.4730	0.2566	40
Gannet	CRB	NW.Scotland.Orkney.Shetland	0.6622	0.0821	Fair Isle, Noss & Hermaness	0.6862	0.0723	93

3.2 Adult survival rates

13. Adult survival rates were mostly based on the "National" values in the NE PVA tool, which are those suggested in Horswill & Robinson (2015). There were no default values available for Arctic tern. For Arctic tern the adult survival rates were those suggested by Horswill & Robinson (2015). Finally, there was no standard deviation (SD) value available for great black-backed gull, so the value available for herring gull was used.

Table 3-2 Adult survival rates used in PVA population models.

Species	Age	Source	Mean	SD
Kittiwake	Ad	National	0.854	0.077
Great black-backed gull	Ad	National	0.93	0.079
Arctic tern	Ad	Horswill & Robinson 2015	0.837	0.035
Guillemot	Ad	National	0.94	0.025
Razorbill	Ad	National	0.895	0.067
Puffin	Ad	National	0.907	0.083
Gannet	Ad	National	0.919	0.042

3.3 Other baseline demographic rates

14. Other baseline demographic parameters that had to be defined were:

- Immature survival;
- Age at first breeding; and
- Maximum brood size per pair.

15. These values (summarised in Table 3-3) were mostly based on the default values available in the NE PVA tool, though there were some exceptions. For fulmar the default values in the NE PVA tool were incorrectly specified. The values provided as age specific annual survival rates to age eight were the overall survival rate across these age classes (i.e. from 0 to 8 years). Raising this value to the power of 0.125 (= 1/8) provided age specific survival rates, albeit the same value for each year. Age specific immature survival rates for Arctic tern were also recalculated from the overall survival rate provided in Horswill & Robinson (2015) in the same manner.

Table 3-3 Summary of all PVA input parameters used in NE PVA tool.

Parameter	Source	Metric	Kittiwake	Great black-backed gull	Arctic tern	Guillemot	Razorbill	Puffin	Gannet
Breeding success (chicks per pair)	CRB	Mean	0.569	0.900	0.232	0.487	0.444	0.415	0.662
	NW Scotland Orkney Shetland	SD	0.390	0.420	0.219	0.210	0.179	0.212	0.082
Adult survival rate	National	Mean	0.854	0.930	0.837	0.940	0.895	0.907	0.919
		SD	0.077	0.079	0.035	0.025	0.067	0.083	0.042
Immature survival rate	National	Mean for age class 0-1	0.790	0.930	0.761	0.560	0.630	0.709	0.424
		SD for age class 0-1	0.077	0.050	0.006	0.058	0.067	0.108	0.045
		Mean for age class 1-2	0.854	0.930	0.761	0.792	0.630	0.709	0.829
		SD for age class 1-2	0.077	0.050	0.006	0.152	0.067	0.108	0.026
		Mean for age class 2-3	0.854	0.930	0.761	0.917	0.895	0.709	0.891
		SD for age class 2-3	0.077	0.050	0.006	0.098	0.067	0.108	0.019
		Mean for age class 3-4	0.854	0.930	0.837	0.938	0.895	0.760	0.895
		SD for age class 3-4	0.077	0.050	0.035	0.107	0.067	0.093	0.019
		Mean for age class 4-5	-	0.930	-	0.940	0.895	0.805	0.919
		SD for age class 4-5	-	0.050	-	0.025	0.067	0.083	0.042
		Mean for age class 5-6	-	-	-	0.940	-	-	-
		SD for age class 5-6	-	-	-	0.025	-	-	-
		Mean for age class 6-7	-	-	-	-	-	-	-
		SD for age class 6-7	-	-	-	-	-	-	-

MacArthur Green

Parameter	Source	Metric	Kittiwake	Great black-backed gull	Arctic tern	Guillemot	Razorbill	Puffin	Gannet
		Mean for age class 7-8	-	-	-	-	-	-	-
		SD for age class 7-8	-	-	-	-	-	-	-
		Mean for age class 8-9	-	-	-	-	-	-	-
		SD for age class 8-9	-	-	-	-	-	-	-
Age at first breeding (years)	NE PVA tool input value	Years	4	5	4	6	5	5	5
Maximum brood size per pair	NE PVA tool input value	Number of chicks	2	3	4	1	1	1	1
Starting population size (individuals)	Breeding season (SMP database)	Number of individual adults	256,327	2,524	1,724	612,608	95,725	333,421	404,008
		Year	2022	2022	2022	2022	2022	2022	2022
	Non-breeding season (BDMPS West; Furness 2015)	Number of individual adults	375,711	14,238	-	612,608	179,183	249,896	318,001
		Year	2022	2022	2022	2022	2022	2022	2022
	Non-breeding season (BDMPS East; Furness 2015)	Number of individual adults	375,815	32,070	-	612,608	106,183	199,974	163,701
		Year	2022	2022	2022	2022	2022	2022	2022
Adult survival impacts (Project alone)	NE PVA tool input value	Breeding season	0.00008	0.00010	0.00069	0.00012	0.000012	0.00026	0.00008
		Non-breeding season (West)	0.00012	0.00019	-	0.00006	0.000007	0.00009	0.00006
		Non-breeding season (East)	0.00012	0.00042	-	0.00006	0.000012	0.00003	0.00008
	NE PVA tool input value	Breeding season	0.00062	0.00219	0	0.00027	0.00026	0.00017	0.00017

Parameter	Source	Metric	Kittiwake	Great black-backed gull	Arctic tern	Guillemot	Razorbill	Puffin	Gannet
Adult survival impacts (Cumulative only impacts)	NE PVA tool input value	Non-breeding season (West)	0.00083	0.00707	0	0.00016	0.00029	0.00010	0.00025
	NE PVA tool input value	Non-breeding season (East)	0.00814	0.00010	0	0.00155	0.00519	0.00067	0.00017
Adult survival impacts (Cumulative impacts)	NE PVA tool input value	Breeding season	0.00073	0.00522	0.00069	0.00040	0.00028	0.00044	0.00025
	NE PVA tool input value	Non-breeding season (BDMPS West; Furness 2015)	0.00095	0.00726	-	0.00022	0.00030	0.00029	0.00031
	NE PVA tool input value	Non-breeding season (BDMPS East; Furness 2015)	0.00826	0.00052	-	0.00161	0.00520	0.00070	0.00025

4 RESULTS

4.1 Proportion of adults in the baseline population

16. Based on the input parameters described above, the proportion of adult birds in the regional population of each species was predicted using population models applied using the NE PVA tool (Table 4-1). These values were used to estimate the predicted proportion of adults in the baseline population. This proportion was based on the combined immature and adult populations predicted by the model, with the predicted population in the first age class (i.e., chicks) excluded as these birds are not at risk of impacts from the Project.

Table 4-1 Predicted proportion of adult birds in the baseline population.

Species	Proportion of adults
Kittiwake	0.681
Great black-backed gull	0.485
Arctic tern	0.773
Guillemot	0.680
Razorbill	0.723
Puffin	0.730
Gannet	0.691

4.2 Projected PVA metrics.

17. Three PVA metrics were calculated by the NE PVA tool annually for each age class:

- the ratio of projected end population sizes of the baseline and impacted population size, referred to as the Counterfactual of Population Size (CPS);
- the ratio of projected population growth rates of the baseline and impacted populations, referred to as the Counterfactual of Growth Rate (CGR); and
- The quantile from the unimpacted population that matched the 50% quantile for the impacted population (U=50%I) and the quantile from the impacted population that match the 50% quantile for the unimpacted population (I=50%U).

18. The PVA metrics from years 10 to 35, in five year increments, are provided for all the species that needed PVA's during the breeding and non-breeding seasons for the Project alone (Table 4-2 to Table 4-4) and the Project cumulatively (Table 4-5 to Table 4-20).

4.2.1 Project alone

Table 4-2 Project PVA metrics from 10 to 35 years for great black-backed gull in the non-breeding season (West) for the Project alone. (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

	CGR					CPS					Quantiles	
Year	Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
10	0.9998	0.9998	0.0004	0.9991	1.0005	0.9974	0.9975	0.0047	0.9886	1.0066	49.6	50.0
15	0.9999	0.9999	0.0004	0.9992	1.0007	0.9992	0.9993	0.0046	0.9902	1.0092	50.3	49.8
20	0.9997	0.9997	0.0004	0.9989	1.0005	0.9967	0.9967	0.0049	0.9869	1.0062	49.4	50.0
25	0.9998	0.9998	0.0003	0.9993	1.0003	0.9962	0.9963	0.0049	0.9868	1.0062	49.1	50.7
30	1.0000	0.9999	0.0003	0.9994	1.0005	0.9988	0.9990	0.0048	0.9900	1.0089	50.0	49.9
35	0.9997	0.9997	0.0003	0.9992	1.0003	0.9954	0.9954	0.0050	0.9855	1.0045	48.9	50.5

Table 4-3 Projected PVA metrics from 10 to 35 years for Arctic tern in the breeding season for the Project alone. (model with no environmental stochasticity).

	CGR					CPS					Quantiles	
Year	Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
10	0.9993	0.9993	0.0076	0.9837	1.0140	0.9936	0.9959	0.0880	0.8287	1.1746	48.0	52.5
15	0.9999	0.9999	0.0076	0.9849	1.0155	1.0000	1.0025	0.0895	0.8280	1.2016	49.6	50.6
20	0.9988	0.9991	0.0076	0.9842	1.0134	0.9882	0.9940	0.0892	0.8326	1.1771	48.7	52.6
25	0.9994	0.9994	0.0074	0.9846	1.0136	0.9882	0.9972	0.1223	0.7766	1.2464	50.5	50.4
30	1.0000	1.0002	0.0074	0.9853	1.0150	1.0039	1.0102	0.1238	0.7773	1.2712	52.1	48.6
35	0.9994	0.9992	0.0074	0.9851	1.0127	0.9935	0.9943	0.1221	0.7722	1.2587	49.9	50.7

Table 4-4 Projected PVA metrics from 10 to 35 years for puffin in the breeding season for the Project alone. (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

	CGR					CPS					Quantiles	
Year	**Median**	**Mean**	**SD**	**LCI**	**UCI**	**Median**	**Mean**	**SD**	**LCI**	**UCI**	**U=50%I**	**I=50%U**
10	0.9998	0.9998	0.0003	0.9992	1.0003	0.9976	0.9974	0.0037	0.9896	1.0044	50.0	50.0
15	0.9998	0.9998	0.0003	0.9993	1.0003	0.9963	0.9966	0.0045	0.9879	1.0053	49.8	50.2
20	0.9998	0.9998	0.0002	0.9993	1.0003	0.9951	0.9953	0.0054	0.9849	1.0065	49.7	50.4
25	0.9998	0.9998	0.0002	0.9993	1.0003	0.9942	0.9943	0.0063	0.9823	1.0077	49.8	50.4
30	0.9998	0.9998	0.0002	0.9993	1.0002	0.9930	0.9933	0.0073	0.9797	1.0079	49.3	50.7
35	0.9998	0.9998	0.0002	0.9993	1.0003	0.9921	0.9923	0.0084	0.9755	1.0093	49.4	50.5

4.2.2 Project cumulatively

Table 4-5 Projected PVA metrics from 10 to 35 years for kittiwake in the breeding season for the Project cumulatively. (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

	CGR					CPS					Quantiles	
Year	Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
10	0.9995	0.9995	0.0003	0.9988	1.0002	0.9943	0.9942	0.0040	0.9861	1.0021	49.4	51.2
15	0.9995	0.9995	0.0003	0.9989	1.0001	0.9915	0.9915	0.0047	0.9821	1.0016	48.9	51.4
20	0.9995	0.9995	0.0002	0.9990	1.0000	0.9890	0.9890	0.0054	0.9783	0.9994	48.5	51.0
25	0.9995	0.9995	0.0002	0.9990	0.9999	0.9865	0.9866	0.0061	0.9740	0.9989	49.0	50.8
30	0.9995	0.9995	0.0002	0.9991	0.9999	0.9839	0.9840	0.0066	0.9714	0.9970	48.7	51.3
35	0.9995	0.9995	0.0002	0.9991	0.9999	0.9816	0.9814	0.0072	0.9671	0.9956	48.9	51.3

Table 4-6 Projected PVA metrics from 10 to 35 years for kittiwake in the non-breeding season for the Project cumulatively in the West. (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

	CGR					CPS					Quantiles	
Year	Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
10	0.9993	0.9993	0.0003	0.9987	0.9998	0.9921	0.9921	0.0033	0.9856	0.9981	49.1	51.5
15	0.9993	0.9993	0.0002	0.9988	0.9997	0.9890	0.9888	0.0039	0.9808	0.9962	48.3	51.6
20	0.9993	0.9993	0.0002	0.9989	0.9997	0.9856	0.9854	0.0043	0.9764	0.9936	48.7	51.4
25	0.9993	0.9993	0.0002	0.9989	0.9996	0.9826	0.9822	0.0047	0.9720	0.9906	48.4	51.6
30	0.9993	0.9993	0.0002	0.9990	0.9996	0.9791	0.9789	0.0052	0.9678	0.9885	47.8	51.7
35	0.9993	0.9993	0.0002	0.9990	0.9996	0.9756	0.9756	0.0057	0.9637	0.9865	48.9	52.0

Table 4-7 Projected PVA metrics from 10 to 35 years for kittiwake in the non-breeding season for the Project cumulatively in the East. (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

	CGR					CPS					Quantiles	
Year	Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
10	0.9938	0.9938	0.0005	0.9926	0.9947	0.9341	0.9337	0.0057	0.9219	0.9436	42.0	59.1
15	0.9939	0.9939	0.0004	0.9930	0.9947	0.9069	0.9065	0.0064	0.8935	0.9183	41.1	58.6
20	0.9940	0.9939	0.0004	0.9932	0.9946	0.8808	0.8803	0.0071	0.8659	0.8927	39.2	59.8
25	0.9940	0.9940	0.0003	0.9933	0.9946	0.8551	0.8547	0.0075	0.8399	0.8684	37.9	63.0
30	0.9940	0.9940	0.0003	0.9934	0.9946	0.8303	0.8299	0.0079	0.8138	0.8447	35.5	62.4
35	0.9940	0.9940	0.0003	0.9935	0.9945	0.8059	0.8059	0.0082	0.7906	0.8210	36.4	64.7

Table 4-8 Projected PVA metrics from 10 to 35 years for great black-backed gull in the breeding season for the Project cumulatively. (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

	CGR					CPS					Quantiles	
Year	Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
10	0.9970	0.9970	0.0014	0.9940	1.0001	0.9667	0.9670	0.0175	0.9336	1.0024	46.4	55.7
15	0.9971	0.9971	0.0010	0.9951	0.9991	0.9535	0.9539	0.0173	0.9201	0.9881	42.2	55.3
20	0.9972	0.9971	0.0008	0.9956	0.9987	0.9412	0.9411	0.0176	0.9068	0.9754	42.1	57.0
25	0.9972	0.9972	0.0006	0.9958	0.9984	0.9281	0.9281	0.0175	0.8934	0.9633	41.6	57.5
30	0.9972	0.9972	0.0005	0.9961	0.9982	0.9155	0.9156	0.0173	0.8804	0.9506	42.9	58.2
35	0.9972	0.9972	0.0005	0.9962	0.9981	0.9027	0.9029	0.0173	0.8696	0.9378	40.2	58.4

Table 4-9 Projected PVA metrics from 10 to 35 years for great black-backed gull in the non-breeding season for the Project cumulatively in the West. (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

	CGR					CPS					Quantiles	
Year	Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
10	0.9958	0.9958	0.0007	0.9945	0.9970	0.9549	0.9551	0.0074	0.9406	0.9701	43.5	57.6
15	0.9959	0.9959	0.0005	0.9950	0.9969	0.9372	0.9371	0.0076	0.9225	0.9523	40.6	58.1
20	0.9960	0.9960	0.0004	0.9953	0.9967	0.9194	0.9193	0.0077	0.9044	0.9345	39.8	59.2
25	0.9960	0.9960	0.0003	0.9954	0.9966	0.9018	0.9018	0.0078	0.8874	0.9170	39.0	60.2
30	0.9961	0.9961	0.0003	0.9956	0.9966	0.8848	0.8848	0.0078	0.8695	0.9003	39.2	61.5
35	0.9961	0.9961	0.0002	0.9956	0.9965	0.8680	0.8679	0.0078	0.8530	0.8830	37.6	61.5

Table 4-10 Projected PVA metrics from 10 to 35 years for great black-backed gull in the non-breeding season for the Project cumulatively in the East (North Sea & Channel). (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

	CGR					CPS					Quantiles	
Year	Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
10	0.9997	0.9997	0.0004	0.9989	1.0005	0.9967	0.9967	0.0049	0.9869	1.0062	49.4	50.0
15	0.9997	0.9997	0.0003	0.9992	1.0003	0.9954	0.9954	0.0050	0.9855	1.0045	48.9	50.5
20	0.9997	0.9997	0.0002	0.9993	1.0002	0.9939	0.9939	0.0052	0.9841	1.0040	49.4	50.4
25	0.9997	0.9997	0.0002	0.9994	1.0001	0.9924	0.9925	0.0052	0.9827	1.0031	49.3	51.1
30	0.9997	0.9997	0.0002	0.9994	1.0000	0.9911	0.9912	0.0052	0.9810	1.0018	49.4	50.5
35	0.9997	0.9997	0.0001	0.9995	1.0000	0.9896	0.9898	0.0053	0.9796	1.0006	49.3	50.9

Table 4-11 Projected PVA metrics from 10 to 35 years for guillemot in the breeding season for the Project cumulatively. (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

	CGR					CPS					Quantiles	
Year	Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
10	0.9997	0.9997	0.0001	0.9994	1.0000	0.9967	0.9966	0.0016	0.9935	0.9998	49.3	50.6
15	0.9997	0.9997	0.0001	0.9995	0.9999	0.9952	0.9952	0.0018	0.9916	0.9989	49.1	51.8
20	0.9997	0.9997	0.0001	0.9995	0.9999	0.9937	0.9938	0.0020	0.9900	0.9978	48.3	51.1
25	0.9997	0.9997	0.0001	0.9996	0.9999	0.9923	0.9924	0.0021	0.9882	0.9966	48.8	51.5
30	0.9997	0.9997	0.0001	0.9996	0.9998	0.9909	0.9909	0.0022	0.9867	0.9954	48.5	52.3
35	0.9997	0.9997	0.0001	0.9996	0.9998	0.9896	0.9895	0.0024	0.9847	0.9944	48.1	51.8

Table 4-12 Projected PVA metrics from 10 to 35 years for guillemot in the non-breeding season for the Project cumulatively in the West. (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

	CGR					CPS					Quantiles	
Year	Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
10	0.9998	0.9998	0.0001	0.9996	1.0001	0.9982	0.9982	0.0017	0.9950	1.0013	49.5	50.4
15	0.9998	0.9998	0.0001	0.9996	1.0000	0.9975	0.9974	0.0019	0.9938	1.0009	49.4	50.9
20	0.9998	0.9998	0.0001	0.9997	1.0000	0.9967	0.9967	0.0020	0.9928	1.0004	49.1	50.9
25	0.9998	0.9998	0.0001	0.9997	1.0000	0.9959	0.9959	0.0022	0.9916	1.0002	49.3	50.7
30	0.9998	0.9998	0.0001	0.9997	1.0000	0.9952	0.9951	0.0023	0.9905	0.9996	48.9	51.0
35	0.9998	0.9998	0.0001	0.9997	1.0000	0.9943	0.9943	0.0024	0.9894	0.9988	48.7	50.9

Table 4-13 Projected PVA metrics from 10 to 35 years for guillemot in the non-breeding season for the Project cumulatively in the East (North Sea & Channel). (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

	CGR					CPS					Quantiles	
Year	Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
10	0.9988	0.9988	0.0001	0.9985	0.9990	0.9864	0.9864	0.0017	0.9830	0.9898	45.4	54.1
15	0.9988	0.9988	0.0001	0.9986	0.9990	0.9807	0.9807	0.0020	0.9768	0.9847	45.3	56.0
20	0.9988	0.9988	0.0001	0.9986	0.9990	0.9751	0.9751	0.0022	0.9706	0.9793	44.6	54.9
25	0.9988	0.9988	0.0001	0.9986	0.9990	0.9694	0.9694	0.0023	0.9649	0.9738	44.2	55.6
30	0.9988	0.9988	0.0001	0.9987	0.9990	0.9639	0.9638	0.0025	0.9589	0.9685	44.2	57.7
35	0.9988	0.9988	0.0001	0.9987	0.9990	0.9583	0.9583	0.0026	0.9531	0.9631	43.3	57.3

Table 4-14 Projected PVA metrics from 10 to 35 years for razorbill in the breeding season for the Project cumulatively. (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

	CGR					CPS					Quantiles	
Year	Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
10	0.9998	0.9998	0.0006	0.9987	1.0009	0.9979	0.9977	0.0066	0.9852	1.0116	49.9	50.1
15	0.9998	0.9998	0.0005	0.9988	1.0007	0.9968	0.9966	0.0080	0.9810	1.0132	49.3	50.4
20	0.9998	0.9998	0.0004	0.9990	1.0006	0.9953	0.9954	0.0093	0.9782	1.0146	49.4	50.5
25	0.9998	0.9998	0.0004	0.9990	1.0006	0.9940	0.9941	0.0108	0.9736	1.0166	49.5	50.4
30	0.9998	0.9998	0.0004	0.9990	1.0006	0.9932	0.9936	0.0126	0.9688	1.0194	48.6	50.8
35	0.9998	0.9998	0.0004	0.9990	1.0006	0.9921	0.9923	0.0144	0.9641	1.0223	49.0	50.6

Table 4-15 Projected PVA metrics from 10 to 35 years for razorbill in the non-breeding season for the Project cumulatively in the West. (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

	CGR					CPS					Quantiles	
Year	Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
10	0.9997	0.9997	0.0004	0.9990	1.0005	0.9971	0.9972	0.0049	0.9871	1.0064	49.7	50.5
15	0.9998	0.9998	0.0003	0.9991	1.0004	0.9962	0.9962	0.0058	0.9848	1.0080	49.3	50.7
20	0.9998	0.9998	0.0003	0.9991	1.0003	0.9950	0.9950	0.0068	0.9811	1.0081	49.3	50.8
25	0.9998	0.9998	0.0003	0.9992	1.0003	0.9939	0.9938	0.0078	0.9775	1.0089	50.1	50.0
30	0.9998	0.9998	0.0003	0.9992	1.0003	0.9924	0.9927	0.0091	0.9745	1.0108	49.7	51.0
35	0.9998	0.9998	0.0003	0.9992	1.0004	0.9915	0.9916	0.0101	0.9710	1.0130	48.7	50.7

Table 4-16 Projected PVA metrics from 10 to 35 years for razorbill in the non-breeding season for the Project cumulatively in the East (North Sea & Channel). (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

	CGR					CPS					Quantiles	
Year	Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
10	0.9956	0.9956	0.0005	0.9946	0.9967	0.9528	0.9531	0.0062	0.9415	0.9655	41.5	57.6
15	0.9957	0.9957	0.0005	0.9948	0.9966	0.9337	0.9338	0.0074	0.9195	0.9490	39.4	60.8
20	0.9957	0.9958	0.0004	0.9949	0.9966	0.9147	0.9147	0.0086	0.8986	0.9316	38.5	61.7
25	0.9958	0.9958	0.0004	0.9950	0.9966	0.8960	0.8962	0.0097	0.8770	0.9171	38.1	62.6
30	0.9958	0.9958	0.0004	0.9950	0.9966	0.8778	0.8779	0.0111	0.8558	0.8999	36.8	64.5
35	0.9958	0.9958	0.0004	0.9950	0.9966	0.8597	0.8597	0.0120	0.8353	0.8848	34.2	63.1

Table 4-17 Projected PVA metrics from 10 to 35 years for puffin in the breeding season for the Project cumulatively. (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

	CGR					CPS					Quantiles	
Year	Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
10	0.9996	0.9996	0.0003	0.9990	1.0002	0.9958	0.9958	0.0037	0.9884	1.0033	49.7	50.2
15	0.9996	0.9996	0.0003	0.9991	1.0001	0.9943	0.9942	0.0045	0.9848	1.0030	49.2	50.8
20	0.9996	0.9996	0.0003	0.9991	1.0001	0.9926	0.9924	0.0055	0.9805	1.0036	49.3	50.9
25	0.9996	0.9996	0.0002	0.9991	1.0001	0.9903	0.9904	0.0064	0.9774	1.0036	48.8	50.7
30	0.9996	0.9996	0.0002	0.9991	1.0001	0.9884	0.9884	0.0075	0.9735	1.0035	49.3	51.0
35	0.9996	0.9996	0.0002	0.9991	1.0001	0.9863	0.9864	0.0085	0.9683	1.0027	49.1	51.1

Table 4-18 Projected PVA metrics from 10 to 35 years for puffin in the non-breeding season for the Project cumulatively in the East. (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

	CGR					CPS					Quantiles	
Year	Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
10	0.9994	0.9994	0.0004	0.9986	1.0001	0.9932	0.9932	0.0046	0.9840	1.0021	49.4	50.7
15	0.9994	0.9994	0.0003	0.9987	1.0001	0.9901	0.9902	0.0056	0.9795	1.0018	48.9	51.5
20	0.9994	0.9994	0.0003	0.9988	1.0000	0.9873	0.9873	0.0067	0.9740	1.0007	49.1	51.2
25	0.9994	0.9994	0.0003	0.9988	1.0000	0.9846	0.9843	0.0080	0.9691	1.0010	48.5	51.2
30	0.9994	0.9994	0.0003	0.9988	1.0000	0.9819	0.9816	0.0089	0.9643	0.9993	48.4	50.9
35	0.9994	0.9994	0.0003	0.9987	1.0000	0.9784	0.9782	0.0110	0.9556	1.0008	48.8	51.4

Table 4-19 Projected PVA metrics from 10 to 35 years for gannet in the breeding season for the Project cumulatively. (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

	CGR					CPS					Quantiles	
Year	Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
10	0.9998	0.9998	0.0002	0.9994	1.0002	0.9979	0.9979	0.0025	0.9933	1.0026	49.5	50.4
15	0.9998	0.9998	0.0002	0.9995	1.0002	0.9969	0.9969	0.0028	0.9915	1.0029	48.6	50.7
20	0.9998	0.9998	0.0001	0.9995	1.0001	0.9961	0.9961	0.0031	0.9897	1.0025	48.5	51.0
25	0.9998	0.9998	0.0001	0.9996	1.0001	0.9950	0.9951	0.0034	0.9883	1.0018	49.3	51.3
30	0.9998	0.9998	0.0001	0.9996	1.0000	0.9941	0.9941	0.0037	0.9870	1.0017	48.5	51.8
35	0.9998	0.9998	0.0001	0.9996	1.0000	0.9931	0.9932	0.0039	0.9861	1.0012	49.4	50.9

Table 4-20 Projected PVA metrics from 10 to 35 years for gannet in the non-breeding season for the Project cumulatively in the East (North Sea & Channel). (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

	CGR					CPS					Quantiles	
Year	Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
10	0.9998	0.9998	0.0003	0.9992	1.0004	0.9980	0.9980	0.0039	0.9902	1.0056	49.5	50.5
15	0.9998	0.9998	0.0003	0.9993	1.0003	0.9971	0.9971	0.0044	0.9888	1.0057	49.5	50.8
20	0.9998	0.9998	0.0002	0.9994	1.0002	0.9962	0.9961	0.0049	0.9865	1.0056	48.4	51.1
25	0.9998	0.9998	0.0002	0.9994	1.0002	0.9950	0.9951	0.0054	0.9848	1.0056	48.6	51.3
30	0.9998	0.9998	0.0002	0.9995	1.0002	0.9943	0.9942	0.0058	0.9831	1.0060	48.7	51.5
35	0.9998	0.9998	0.0002	0.9995	1.0001	0.9931	0.9931	0.0061	0.9818	1.0058	48.8	50.9

Table 4-21 Projected PVA metrics from 10 to 35 years for gannet in the non-breeding season for the Project cumulatively in the West (UK western waters). (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

	CGR					CPS					Quantiles	
Year	Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
10	0.9998	0.9998	0.0002	0.9993	1.0002	0.9974	0.9974	0.0028	0.9921	1.0030	49.0	50.5
15	0.9998	0.9998	0.0002	0.9994	1.0001	0.9963	0.9963	0.0032	0.9899	1.0021	49.5	51.1
20	0.9998	0.9998	0.0002	0.9995	1.0001	0.9952	0.9951	0.0036	0.9880	1.0029	48.2	50.8
25	0.9998	0.9998	0.0001	0.9995	1.0001	0.9939	0.9940	0.0039	0.9865	1.0018	48.8	51.9
30	0.9998	0.9998	0.0001	0.9995	1.0000	0.9927	0.9928	0.0042	0.9845	1.0010	48.0	51.3
35	0.9998	0.9998	0.0001	0.9995	1.0000	0.9916	0.9916	0.0045	0.9830	1.0006	48.8	51.1

4.3 Projected population plots

19. The NE PVA tool provides plots of the projected baseline and impacted populations for each population model run. These plots are provided below for the impacts from the Project alone and cumulatively. However, it is important to note that these population projections are not representative projections of future population trends. This is due to the assumptions, used in the model; that populations are density independent, and that population are closed (there is no immigration or emigration). It is highly unlikely that any populations act in a density independent manner (Horswill & Robinson 2015) or is closed. The populations models are a useful tool in the assessment of risk to populations from the Project alone and cumulative, rather than a tool for predicting future population size. Therefore, the plots below are only illustrative and were requested by NatureScot.

4.3.1 Project alone plots

20. Projected population sizes for the baseline and impacted scenarios from the Project alone are provided for great black-backed gull (Figure 4-1), Arctic tern (Figure 4-2), and puffin (Figure 4-3).

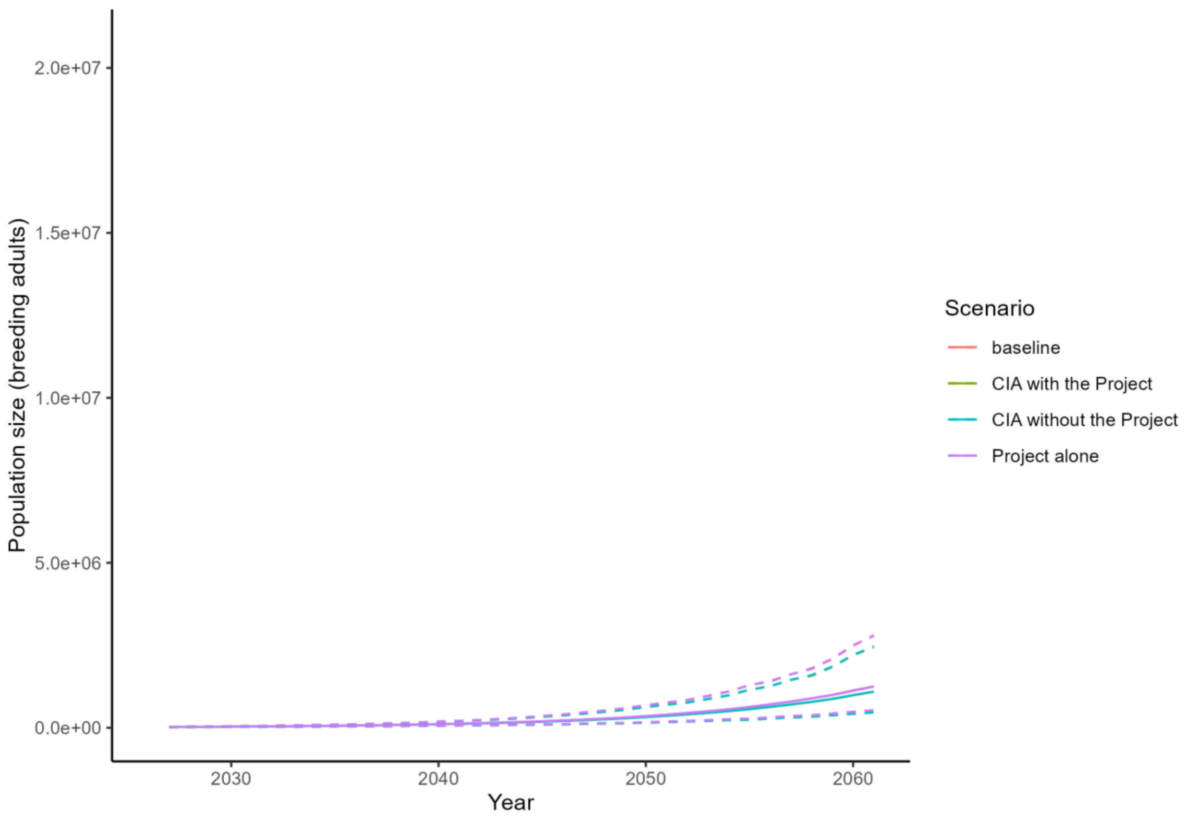


Figure 4-1 Projected population size plots for great black-backed gull in the non-breeding season (West) from the Project alone, cumulatively without the Project and cumulatively with the Project.

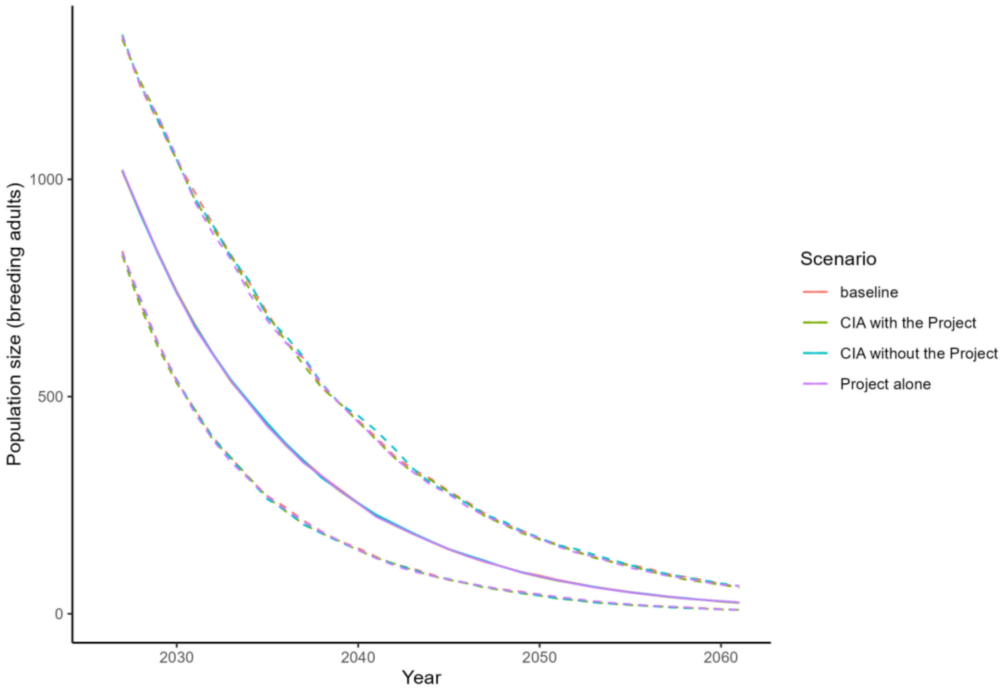


Figure 4-2 Projected population size plots for Arctic tern in the breeding season from the Project alone, cumulatively without the Project and cumulatively with the Project.

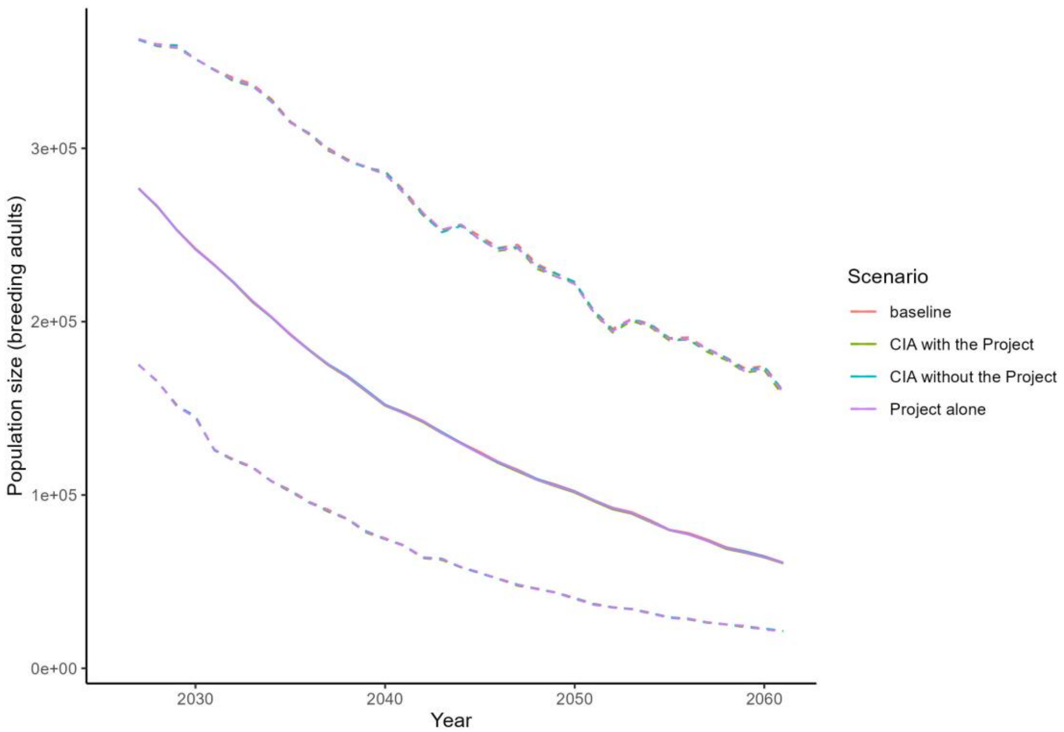
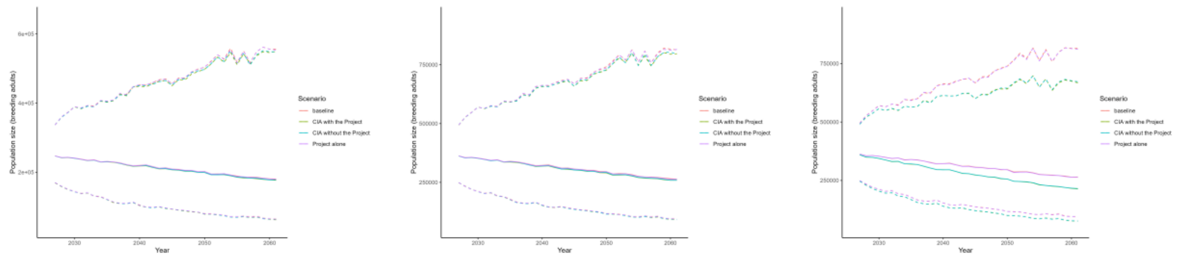


Figure 4-3 Projected population size plots for puffin in the breeding season from the Project alone, cumulatively without the Project and cumulatively with the Project.

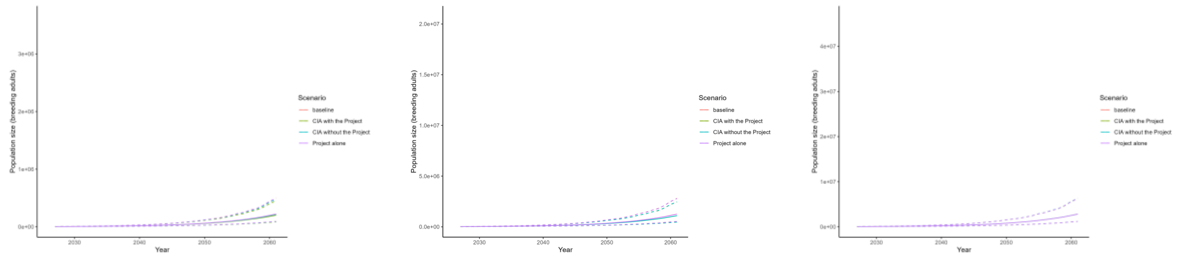
4.3.2 Project cumulatively plots

21. Projected population sizes for the baseline and Impacted scenarios from the Project cumulatively are provided for kittiwake (Figure 4-4), great black-backed gull (Figure 4-5), Arctic tern (Figure 4-6), guillemot (Figure 4-7), razorbill (Figure 4-8), puffin (Figure 4-9) and gannet (Figure 4-10).



Breeding season | Non-breeding season West | Non-breeding season East

Figure 4-4 Projected population size plots for kittiwake in the breeding and non-breeding seasons from the Project cumulatively.



Breeding season | Non-breeding season West | Non-breeding season East

Figure 4-5 Projected population size plots for great black-backed gull in the breeding and non-breeding seasons from the Project cumulatively.

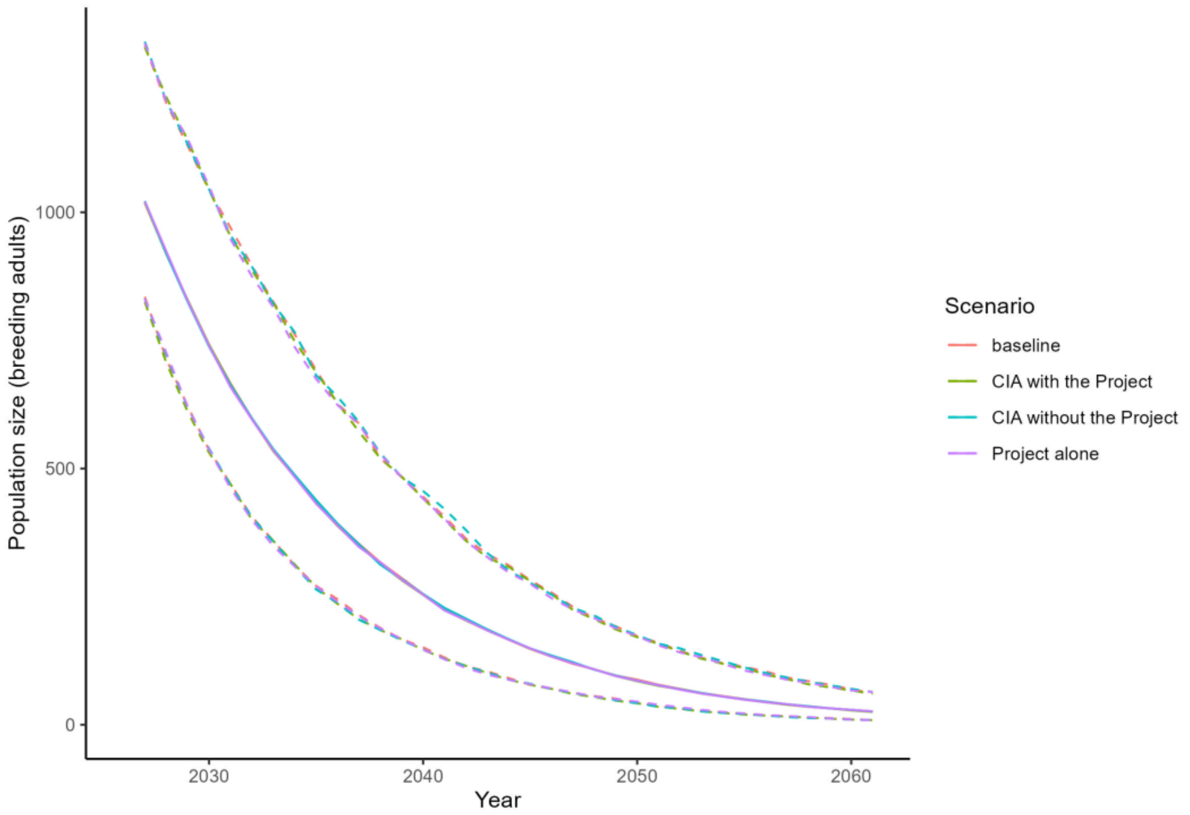
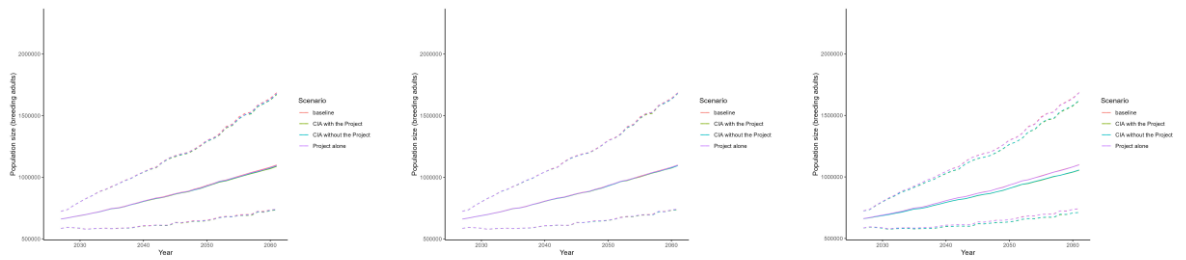
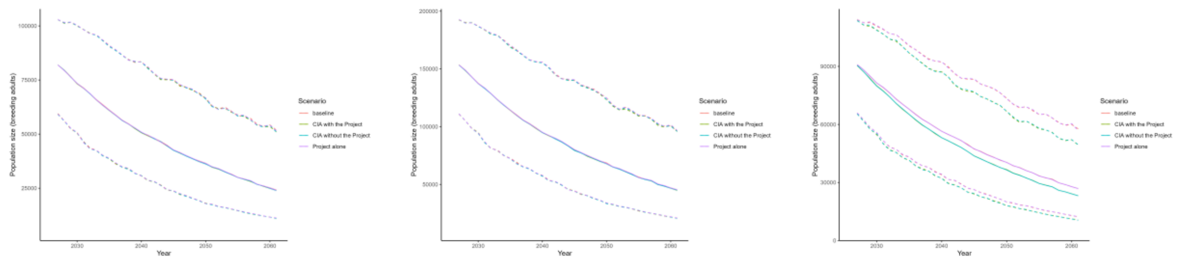


Figure 4-6 Projected population size plots for Arctic in the breeding season from the Project cumulatively.



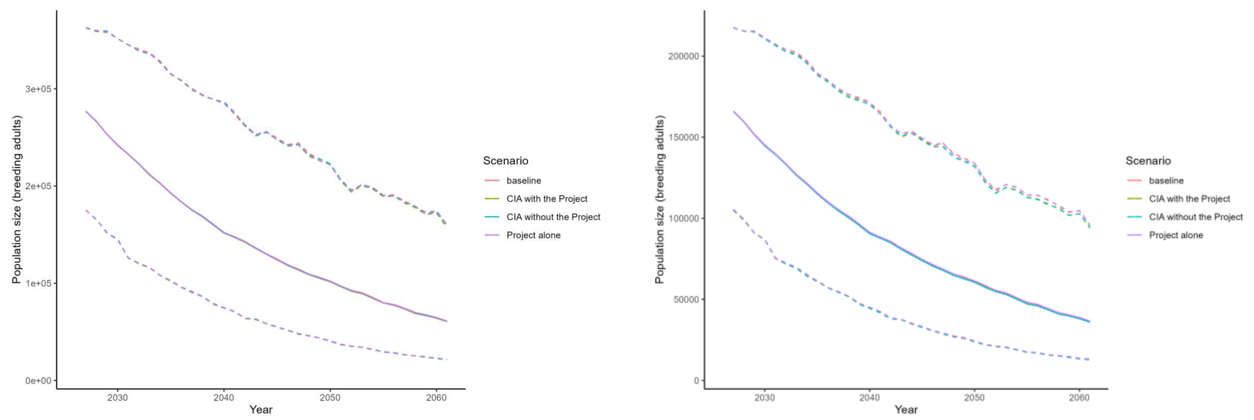
Breeding season | Non-breeding season West | Non-breeding season East

Figure 4-7 Projected population size plots for guillemot in the breeding and non-breeding seasons from the Project cumulatively.



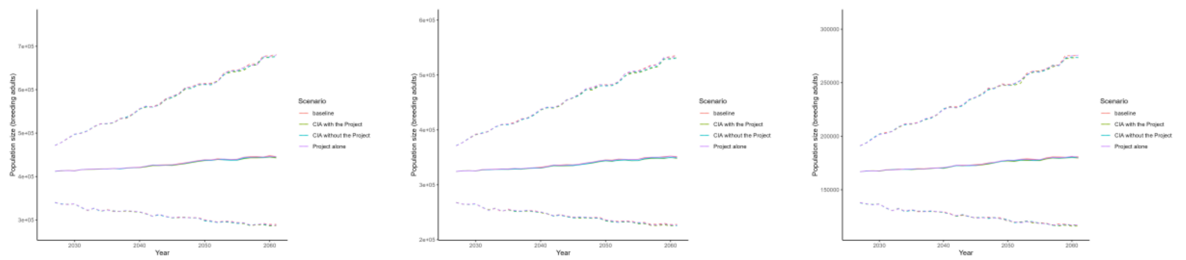
Breeding season | Non-breeding season West | Non-breeding season East

Figure 4-8 Projected population size plots for razorbill in the breeding and non-breeding seasons from the Project cumulatively.



Breeding season | Non-breeding season East

Figure 4-9 Projected population size plots for puffin in the breeding and non-breeding seasons from the Project cumulatively.



Breeding season | Non-breeding season West | Non-breeding season East

Figure 4-10 Projected population size plots for gannet in the breeding and non-breeding seasons from the Project cumulatively.

5 REFERENCES

Horswill, C. & Robinson R. A. 2015. Review of seabird demographic rates and density dependence. JNCC Report No. 552. Joint Nature Conservation Committee, Peterborough.

West of Orkney Windfarm

Offshore Ornithology Technical Supporting Study 12

Annex 12.11

Digital aerial survey raw count data

Date:	12th May 2023
Tel:	0141 342 5404
Web:	www.macarthurgreen.com
Address:	93 South Woodside Road |Glasgow | G20 6NT

Document Quality Record

Version	Status	Person Responsible	Date
0.1	Draft	Dr. S. Raveh	12/04/2023
0.2	Reviewed	Dr N. Goodship	03/05/2023
1	Internal Approval	Dr. R. McGregor	09/05/2023

CONTENTS

LIST OF TABLES

1 INTRODUCTION

1. This Annex provides tables of bird raw counts (individuals) recorded in each survey by HiDef Aerial Surveying Limited (HiDef) for the West of Orkney Windfarm ('the Project') Offshore Environmental Impact Assessment (EIA) Report and Offshore Report to Inform Appropriate Assessment (RIAA).

2. The tables provide raw counts for each species recorded in flight and on the sea within the OAA, 2 km and 4 km buffer per survey. These estimates have been derived from data collected over 27 surveys between July 2020 to September 2022.

Table 1-1 Key to species raw counts tables.

Species	Section Number
Kittiwake	2
Black-headed gull	3
Little gull	4
Common gull	5
Great black-backed gull	6
Herring gull	7
Lesser black-backed gull	8
Common tern	9
Arctic tern	10
Great skua	11
Arctic skua	12
Little auk	13
Guillemot	14
Razorbill	15
Black guillemot	16
Puffin	17
Auk species group	18
Large auk species group	19
Red-throated diver	20
Great northern diver	21
European storm-petrel	22
Fulmar	23
Cory's shearwater	24
Sooty shearwater	25
Great shearwater	26
Manx shearwater	27
Gannet	28
Shag	29
Other non-seabird species	30

2 KITTIWAKE

Table 2-1 Raw counts of kittiwakes recorded per survey in flight and on the sea in the OAA, 2 km buffer and 4 km buffer.

Survey	Raw counts (individuals)					
	OAA		2 km buffer		4 km buffer	
	On the sea	In flight	On the sea	In flight	On the sea	In flight
Jul-2020	8	15	2	5	2	5
Aug-2020	6	17	0	6	4	6
Sep-2020	0	1	1	0	0	0
Oct-2020	43	43	12	31	20	37
Nov-2020	2	23	0	5	0	0
Dec-2020	5	4	0	4	1	2
Jan-2021	0	6	1	5	2	1
Feb-2021	12	16	0	2	1	2
Mar-2021	54	55	16	28	35	17
Apr-2021	3	36	0	25	0	17
May-2021	0	5	0	4	0	1
Jun-2021	13	4	1	0	2	1
Jul-2021	0	10	0	3	0	4
Aug-2021	0	20	0	0	0	0
Sep-2021	1	64	0	12	1	29
Oct-2021	0	11	0	3	0	2
Nov-2021	0	4	0	1	0	2
Dec-2021	0	7	0	4	0	5
Feb-2022	4	36	2	9	2	12
Feb-2022	38	91	10	22	21	49
Mar-2022	0	12	0	6	0	8
Apr-2022	0	8	1	3	0	5
May-2022	7	3	0	0	0	1
Jun-2022	75	101	6	36	8	11
Jul-2022	1	1	0	1	3	1
Aug-2022	1	1	0	1	0	3
Sep-2022	8	15	2	5	2	5

3 BLACK-HEADED GULL

Table 3-1 Raw counts of black-headed gull recorded per survey in flight and on the sea in the OAA, 2 km buffer and 4 km buffer.

Survey	Raw counts (individuals)					
	OAA		2 km buffer		4 km buffer	
	On the sea	In flight	On the sea	In flight	On the sea	In flight
Jul-2020	0	0	0	0	0	0
Aug-2020	0	0	0	0	0	0
Sep-2020	0	0	0	0	0	0
Oct-2020	0	0	0	0	0	0
Nov-2020	0	0	0	0	0	0
Dec-2020	0	0	0	0	0	0
Jan-2021	0	0	0	0	0	0
Feb-2021	0	0	0	0	0	0
Mar-2021	0	0	0	0	0	0
Apr-2021	0	0	0	0	0	0
May-2021	0	0	0	0	0	0
Jun-2021	0	0	0	0	0	0
Jul-2021	0	0	0	0	0	0
Aug-2021	0	0	0	0	0	0
Sep-2021	0	0	0	0	0	0
Oct-2021	0	0	0	0	0	0
Nov-2021	0	0	0	0	0	0
Dec-2021	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Mar-2022	0	0	0	0	0	0
Apr-2022	0	1	0	0	0	0
May-2022	0	0	0	0	0	0
Jun-2022	0	0	0	0	0	0
Jul-2022	0	0	0	0	0	0
Aug-2022	0	0	0	0	0	0
Sep-2022	0	0	0	0	0	0

4 LITTLE GULL

Table 4-1 Raw counts of little gull recorded per survey in flight and on the sea in the OAA, 2 km buffer and 4 km buffer.

Survey	Raw counts (individuals)					
	OAA		2 km buffer		4 km buffer	
	On the sea	In flight	On the sea	In flight	On the sea	In flight
Jul-2020	0	0	0	0	0	0
Aug-2020	0	0	0	0	0	0
Sep-2020	0	1	0	0	0	0
Oct-2020	0	0	0	0	0	0
Nov-2020	0	0	0	0	0	0
Dec-2020	0	0	0	0	0	0
Jan-2021	0	0	0	0	0	0
Feb-2021	0	0	0	0	0	0
Mar-2021	0	0	0	0	0	0
Apr-2021	0	0	0	0	0	0
May-2021	0	0	0	0	0	0
Jun-2021	0	0	0	0	0	0
Jul-2021	0	0	0	0	0	0
Aug-2021	0	0	0	0	0	0
Sep-2021	0	0	0	0	0	0
Oct-2021	0	0	0	0	0	0
Nov-2021	0	0	0	0	0	0
Dec-2021	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Mar-2022	0	0	0	0	0	0
Apr-2022	0	0	0	0	0	0
May-2022	0	0	0	0	0	0
Jun-2022	0	0	0	0	0	0
Jul-2022	0	0	0	0	0	0
Aug-2022	0	0	0	0	0	0
Sep-2022	0	0	0	0	0	0

5 COMMON GULL

Table 5-1 Raw counts of common gull recorded per survey in flight and on the sea in the OAA, 2 km buffer and 4 km buffer.

Survey	Raw counts (individuals)					
	OAA		2 km buffer		4 km buffer	
	On the sea	In flight	On the sea	In flight	On the sea	In flight
Jul-2020	0	0	0	0	0	0
Aug-2020	0	0	0	0	0	0
Sep-2020	0	0	0	0	0	0
Oct-2020	0	0	0	0	0	0
Nov-2020	0	0	0	0	0	0
Dec-2020	0	0	0	0	0	0
Jan-2021	0	0	0	0	0	0
Feb-2021	0	0	0	0	0	0
Mar-2021	0	0	0	0	0	0
Apr-2021	0	0	0	1	0	0
May-2021	0	0	0	0	0	0
Jun-2021	0	0	0	0	0	0
Jul-2021	0	0	0	0	0	0
Aug-2021	0	0	0	0	0	0
Sep-2021	0	0	0	0	0	0
Oct-2021	0	0	0	0	0	0
Nov-2021	0	0	0	0	0	0
Dec-2021	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Mar-2022	0	0	0	0	0	0
Apr-2022	0	0	0	0	0	0
May-2022	0	0	0	0	0	0
Jun-2022	0	0	0	0	0	0
Jul-2022	0	0	0	0	0	0
Aug-2022	0	0	0	0	0	0
Sep-2022	0	0	0	0	0	0

6 GREAT BLACK-BACKED GULL

Table 6-1 Raw counts of great black-backed gull recorded per survey in flight and on the sea in the OAA, 2 km buffer and 4 km buffer.

Survey	Raw counts (individuals)					
	OAA		2 km buffer		4 km buffer	
	On the sea	In flight	On the sea	In flight	On the sea	In flight
Jul-2020	0	0	0	0	0	0
Aug-2020	0	0	0	0	0	0
Sep-2020	0	0	0	0	0	0
Oct-2020	0	1	1	0	0	2
Nov-2020	6	8	0	2	0	0
Dec-2020	1	1	5	1	0	3
Jan-2021	5	3	0	0	3	0
Feb-2021	3	2	15	0	3	7
Mar-2021	2	0	1	0	0	1
Apr-2021	0	0	0	0	0	0
May-2021	0	0	0	0	0	0
Jun-2021	0	2	0	0	0	0
Jul-2021	0	0	0	0	0	0
Aug-2021	0	0	0	0	0	0
Sep-2021	0	0	0	0	0	0
Oct-2021	0	0	0	0	0	0
Nov-2021	14	2	5	5	3	2
Dec-2021	20	14	9	6	7	4
Feb-2022	5	1	0	0	5	3
Feb-2022	11	6	0	2	2	1
Mar-2022	0	1	1	1	1	1
Apr-2022	0	0	0	0	0	0
May-2022	0	0	0	0	0	0
Jun-2022	0	0	0	0	0	0
Jul-2022	0	0	0	0	0	0
Aug-2022	0	0	0	0	0	0
Sep-2022	0	0	0	0	0	0

7 HERRING GULL

Table 7-1 Raw counts of herring gull recorded per survey in flight and on the sea in the OAA, 2 km buffer and 4 km buffer.

Survey	Raw counts (individuals)					
	OAA		2 km buffer		4 km buffer	
	On the sea	In flight	On the sea	In flight	On the sea	In flight
Jul-2020	0	0	0	0	0	0
Aug-2020	0	0	0	0	0	0
Sep-2020	0	0	0	0	0	0
Oct-2020	0	0	0	0	0	0
Nov-2020	1	2	0	0	0	1
Dec-2020	0	0	0	0	0	0
Jan-2021	0	1	0	0	0	1
Feb-2021	0	0	0	0	0	1
Mar-2021	0	0	0	1	0	0
Apr-2021	0	0	0	0	0	0
May-2021	0	0	2	0	0	0
Jun-2021	0	0	0	0	0	0
Jul-2021	0	0	0	0	0	0
Aug-2021	0	0	0	0	0	0
Sep-2021	0	0	0	0	0	0
Oct-2021	0	0	0	0	0	0
Nov-2021	1	0	0	0	0	0
Dec-2021	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Feb-2022	0	2	0	0	0	0
Mar-2022	1	0	0	0	0	0
Apr-2022	0	0	0	0	0	0
May-2022	0	0	0	0	0	0
Jun-2022	0	0	0	0	0	0
Jul-2022	0	0	0	0	0	0
Aug-2022	0	0	0	0	0	0
Sep-2022	0	0	0	0	0	0

8 LESSER BLACK-BACKED GULL

Table 8-1 Raw counts of lesser black-backed gull recorded per survey in flight and on the sea in the OAA, 2 km buffer and 4 km buffer.

Survey	Raw counts (individuals)					
	OAA		2 km buffer		4 km buffer	
	On the sea	In flight	On the sea	In flight	On the sea	In flight
Jul-2020	0	0	0	0	0	0
Aug-2020	1	0	0	0	0	0
Sep-2020	0	0	0	0	0	0
Oct-2020	0	0	0	0	0	0
Nov-2020	0	0	0	0	0	0
Dec-2020	0	0	0	0	0	0
Jan-2021	0	0	0	0	0	0
Feb-2021	0	0	0	0	0	0
Mar-2021	0	0	0	0	0	0
Apr-2021	0	0	0	0	0	0
May-2021	0	0	0	0	0	0
Jun-2021	0	0	0	0	0	0
Jul-2021	0	0	0	0	0	0
Aug-2021	1	0	0	0	1	0
Sep-2021	0	0	0	0	0	0
Oct-2021	0	0	0	0	0	0
Nov-2021	0	0	0	0	0	0
Dec-2021	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Mar-2022	0	0	0	0	0	0
Apr-2022	0	0	0	0	0	0
May-2022	0	0	0	0	0	0
Jun-2022	0	0	0	0	0	0
Jul-2022	0	0	0	0	0	0
Aug-2022	0	0	0	0	0	0
Sep-2022	0	0	0	0	0	0

9 COMMON TERN

Table 9-1 Raw counts of common tern recorded per survey in flight and on the sea in the OAA, 2 km buffer and 4 km buffer.

Survey	Raw counts (individuals)					
	OAA		2 km buffer		4 km buffer	
	On the sea	In flight	On the sea	In flight	On the sea	In flight
Jul-2020	0	0	0	0	0	0
Aug-2020	0	0	0	1	0	1
Sep-2020	0	0	0	0	0	0
Oct-2020	0	0	0	0	0	0
Nov-2020	0	0	0	0	0	0
Dec-2020	0	0	0	0	0	0
Jan-2021	0	0	0	0	0	0
Feb-2021	0	0	0	0	0	0
Mar-2021	0	0	0	0	0	0
Apr-2021	0	0	0	0	0	0
May-2021	0	0	0	0	0	0
Jun-2021	0	0	0	0	0	0
Jul-2021	0	0	0	0	0	0
Aug-2021	0	0	0	0	0	0
Sep-2021	0	0	0	0	0	0
Oct-2021	0	0	0	0	0	0
Nov-2021	0	0	0	0	0	0
Dec-2021	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Mar-2022	0	0	0	0	0	0
Apr-2022	0	0	0	0	0	0
May-2022	0	0	0	0	0	0
Jun-2022	0	0	0	0	0	0
Jul-2022	0	0	0	0	0	0
Aug-2022	0	0	0	0	0	0
Sep-2022	0	0	0	0	0	0

10 ARCTIC TERN

Table 10-1 Raw counts of arctic tern recorded per survey in flight and on the sea in the OAA, 2 km buffer and 4 km buffer.

Survey	Raw counts (individuals)					
	OAA		2 km buffer		4 km buffer	
	On the sea	In flight	On the sea	In flight	On the sea	In flight
Jul-2020	0	0	0	0	0	0
Aug-2020	0	0	0	0	0	0
Sep-2020	0	0	0	0	0	0
Oct-2020	0	0	0	0	0	0
Nov-2020	0	0	0	0	0	0
Dec-2020	0	0	0	0	0	0
Jan-2021	0	0	0	0	0	0
Feb-2021	0	0	0	0	0	0
Mar-2021	0	0	0	0	0	0
Apr-2021	0	0	0	0	0	0
May-2021	0	0	0	0	0	0
Jun-2021	10	13	0	0	0	0
Jul-2021	0	0	0	0	0	0
Aug-2021	0	0	0	3	0	0
Sep-2021	0	0	0	0	0	0
Oct-2021	0	0	0	0	0	0
Nov-2021	0	0	0	0	0	0
Dec-2021	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Mar-2022	0	0	0	0	0	0
Apr-2022	0	0	0	0	0	0
May-2022	0	1	0	0	0	0
Jun-2022	0	0	0	0	0	0
Jul-2022	0	2	0	4	0	0
Aug-2022	8	1	0	0	1	1
Sep-2022	0	0	0	0	0	0

11 GREAT SKUA

Table 11-1 Raw counts of great skua recorded per survey in flight and on the sea in the OAA, 2 km buffer and 4 km buffer.

Survey	Raw counts (individuals)					
	OAA		2 km buffer		4 km buffer	
	On the sea	In flight	On the sea	In flight	On the sea	In flight
Jul-2020	1	1	0	1	0	0
Aug-2020	30	8	0	0	0	0
Sep-2020	0	0	0	0	0	0
Oct-2020	1	0	0	0	0	0
Nov-2020	1	0	0	0	0	0
Dec-2020	0	0	0	0	0	0
Jan-2021	0	0	0	0	0	0
Feb-2021	0	0	0	0	0	0
Mar-2021	0	0	0	0	0	0
Apr-2021	1	5	1	0	2	0
May-2021	1	0	0	1	1	0
Jun-2021	0	0	0	0	0	0
Jul-2021	0	1	0	3	0	0
Aug-2021	3	0	0	0	0	0
Sep-2021	0	0	0	0	0	0
Oct-2021	0	0	0	0	0	0
Nov-2021	0	0	0	0	0	0
Dec-2021	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Mar-2022	0	0	0	0	0	0
Apr-2022	1	0	0	0	0	0
May-2022	0	0	1	0	1	0
Jun-2022	3	0	0	0	1	1
Jul-2022	0	0	0	1	1	1
Aug-2022	1	1	0	0	0	0
Sep-2022	0	0	0	0	0	1

12 ARCTIC SKUA

Table 12-1 Raw counts of Arctic skua recorded per survey in flight and on the sea in the OAA, 2 km buffer and 4 km buffer.

Survey	Raw counts (individuals)					
	OAA		2 km buffer		4 km buffer	
	On the sea	In flight	On the sea	In flight	On the sea	In flight
Jul-2020	0	0	0	0	0	0
Aug-2020	0	0	0	0	0	0
Sep-2020	0	0	0	0	0	0
Oct-2020	0	0	0	0	0	0
Nov-2020	0	0	0	0	0	0
Dec-2020	0	0	0	0	0	0
Jan-2021	0	0	0	0	0	0
Feb-2021	0	0	0	0	0	0
Mar-2021	0	0	0	0	0	0
Apr-2021	0	0	0	0	0	0
May-2021	0	0	0	0	0	0
Jun-2021	0	0	0	0	0	0
Jul-2021	0	0	0	0	0	0
Aug-2021	0	0	0	0	0	0
Sep-2021	0	0	0	0	0	0
Oct-2021	0	0	0	0	0	0
Nov-2021	0	0	0	0	0	0
Dec-2021	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Mar-2022	0	0	0	0	0	0
Apr-2022	0	0	0	0	0	0
May-2022	0	0	0	0	0	0
Jun-2022	0	1	0	0	0	0
Jul-2022	1	0	2	1	0	0
Aug-2022	0	0	0	0	0	0
Sep-2022	0	0	0	0	0	0

13 LITTLE AUK

Table 13-1 Raw counts of little auk recorded per survey in flight and on the sea in the OAA, 2 km buffer and 4 km buffer.

Survey	Raw counts (individuals)					
	OAA		2 km buffer		4 km buffer	
	On the sea	In flight	On the sea	In flight	On the sea	In flight
Jul-2020	0	0	0	0	0	0
Aug-2020	0	0	0	0	0	0
Sep-2020	0	0	0	0	0	0
Oct-2020	0	0	0	0	0	0
Nov-2020	0	0	0	0	0	0
Dec-2020	0	0	0	0	0	0
Jan-2021	0	0	0	0	0	0
Feb-2021	0	1	0	0	0	0
Mar-2021	0	0	0	0	0	0
Apr-2021	0	0	0	0	0	0
May-2021	0	0	0	0	0	0
Jun-2021	0	0	0	0	0	0
Jul-2021	0	0	0	0	0	0
Aug-2021	0	0	0	0	0	0
Sep-2021	0	0	0	0	0	0
Oct-2021	0	0	0	0	0	0
Nov-2021	1	0	0	2	2	0
Dec-2021	0	0	0	0	0	0
Feb-2022	0	0	0	1	0	1
Feb-2022	0	0	0	0	0	0
Mar-2022	0	0	0	0	0	0
Apr-2022	0	0	0	0	0	0
May-2022	0	0	0	0	0	0
Jun-2022	0	0	0	0	0	0
Jul-2022	0	0	0	0	0	0
Aug-2022	0	0	0	0	0	0
Sep-2022	0	0	0	0	0	0

14 GUILLEMOT

Table 14-1 Raw counts of guillemot recorded per survey in flight and on the sea in the OAA, 2 km buffer and 4 km buffer.

Survey	Raw counts (individuals)					
	OAA		2 km buffer		4 km buffer	
	On the sea	In flight	On the sea	In flight	On the sea	In flight
Jul-2020	250	5	103	1	77	5
Aug-2020	72	2	46	1	45	2
Sep-2020	296	3	133	5	94	2
Oct-2020	236	6	147	8	89	3
Nov-2020	23	3	23	1	13	1
Dec-2020	35	6	33	4	31	1
Jan-2021	70	9	55	0	42	2
Feb-2021	187	18	35	5	50	18
Mar-2021	164	20	73	6	122	4
Apr-2021	431	4	195	5	266	3
May-2021	21	3	15	0	37	1
Jun-2021	73	6	17	4	38	1
Jul-2021	62	24	47	14	58	11
Aug-2021	209	0	106	0	113	0
Sep-2021	303	3	93	1	141	0
Oct-2021	175	36	72	31	73	44
Nov-2021	75	5	19	1	36	6
Dec-2021	89	1	59	0	59	1
Feb-2022	9	0	10	0	18	0
Feb-2022	35	1	17	0	16	0
Mar-2022	17	0	14	0	11	0
Apr-2022	115	8	36	8	54	7
May-2022	88	51	40	16	119	21
Jun-2022	194	12	28	9	38	9
Jul-2022	515	22	299	6	119	7
Aug-2022	252	0	169	0	300	0
Sep-2022	239	3	125	0	198	0

15 RAZORBILL

Table 15-1 Raw counts of razorbill recorded per survey in flight and on the sea in the OAA, 2 km buffer and 4 km buffer.

Survey	Raw counts (individuals)					
	OAA		2 km buffer		4 km buffer	
	On the sea	In flight	On the sea	In flight	On the sea	In flight
Jul-2020	2	0	0	0	0	0
Aug-2020	2	0	0	0	0	0
Sep-2020	8	0	2	0	2	0
Oct-2020	0	0	0	0	2	0
Nov-2020	0	0	1	0	0	0
Dec-2020	0	0	0	0	0	0
Jan-2021	0	0	0	0	0	0
Feb-2021	7	0	2	1	0	0
Mar-2021	1	0	1	1	6	0
Apr-2021	6	1	7	0	7	0
May-2021	0	0	0	0	3	0
Jun-2021	4	1	0	0	7	0
Jul-2021	0	0	0	0	0	0
Aug-2021	11	1	1	0	3	0
Sep-2021	7	0	0	0	3	0
Oct-2021	2	0	0	1	0	0
Nov-2021	0	1	0	0	0	0
Dec-2021	2	0	1	0	0	0
Feb-2022	0	0	0	0	0	0
Feb-2022	5	0	0	0	0	0
Mar-2022	9	0	6	0	2	1
Apr-2022	0	0	0	0	0	0
May-2022	1	0	0	0	0	0
Jun-2022	0	0	0	0	0	0
Jul-2022	10	0	5	0	8	0
Aug-2022	1	0	4	0	0	0
Sep-2022	10	0	17	0	17	0

16 BLACK GUILLEMOT

Table 16-1 Raw counts of black guillemot recorded per survey in flight and on the sea in the OAA, 2 km buffer and 4 km buffer.

Survey	Raw counts (individuals)					
	OAA		2 km buffer		4 km buffer	
	On the sea	In flight	On the sea	In flight	On the sea	In flight
Jul-2020	0	0	0	0	0	0
Aug-2020	0	0	0	0	0	0
Sep-2020	0	0	0	0	0	0
Oct-2020	0	0	0	0	0	0
Nov-2020	0	0	0	0	0	0
Dec-2020	0	0	0	0	0	0
Jan-2021	0	0	0	0	0	0
Feb-2021	0	0	0	0	0	0
Mar-2021	0	0	0	0	0	0
Apr-2021	0	0	0	0	0	0
May-2021	0	0	0	0	0	0
Jun-2021	0	0	0	0	0	0
Jul-2021	1	0	0	0	0	0
Aug-2021	0	0	0	0	0	0
Sep-2021	0	0	0	0	0	0
Oct-2021	0	1	0	0	0	0
Nov-2021	0	0	0	0	0	0
Dec-2021	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Mar-2022	0	0	0	0	0	0
Apr-2022	0	0	0	0	0	0
May-2022	0	0	0	0	0	0
Jun-2022	0	0	0	0	0	0
Jul-2022	0	0	0	0	0	0
Aug-2022	0	0	0	0	0	0
Sep-2022	0	0	0	0	0	0

17 PUFFIN

Table 17-1 Raw counts of puffin recorded per survey in flight and on the sea in the OAA, 2 km buffer and 4 km buffer.

Survey	Raw counts (individuals)					
	OAA		2 km buffer		4 km buffer	
	On the sea	In flight	On the sea	In flight	On the sea	In flight
Jul-2020	90	0	65	2	165	0
Aug-2020	92	1	61	7	108	15
Sep-2020	14	0	4	0	8	0
Oct-2020	10	0	3	0	3	0
Nov-2020	0	0	0	0	1	0
Dec-2020	0	0	0	0	0	0
Jan-2021	0	0	1	0	0	0
Feb-2021	1	0	0	0	0	0
Mar-2021	0	0	0	0	0	0
Apr-2021	106	2	32	0	34	0
May-2021	13	0	13	0	26	0
Jun-2021	413	31	88	20	141	20
Jul-2021	139	13	89	1	88	18
Aug-2021	143	0	69	0	84	0
Sep-2021	232	1	61	0	63	0
Oct-2021	19	1	4	0	3	0
Nov-2021	0	0	0	0	0	0
Dec-2021	1	0	0	0	1	0
Feb-2022	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Mar-2022	0	0	0	0	0	0
Apr-2022	87	38	27	5	17	1
May-2022	292	37	167	22	206	38
Jun-2022	484	3	121	7	165	9
Jul-2022	349	10	164	8	153	21
Aug-2022	225	4	255	0	197	0
Sep-2022	57	1	9	0	18	1

18 AUK SPECIES GROUP (GUILLEMOT, RAZORBILL OR PUFFIN)

Table 18-1 Raw counts of unidentified auk species (guillemot, razorbill or puffin) recorded per survey in flight and on the sea in the OAA, 2 km buffer and 4 km buffer.

Survey	Raw counts (individuals)					
	OAA		2 km buffer		4 km buffer	
	On the sea	In flight	On the sea	In flight	On the sea	In flight
Jul-2020	31	1	16	0	22	0
Aug-2020	6	0	6	0	8	0
Sep-2020	3	0	1	0	1	0
Oct-2020	7	0	2	0	1	0
Nov-2020	5	0	3	0	1	0
Dec-2020	0	1	0	0	0	0
Jan-2021	10	0	6	0	0	0
Feb-2021	2	0	0	0	2	0
Mar-2021	4	0	1	0	1	0
Apr-2021	26	0	8	1	15	0
May-2021	1	0	0	0	1	0
Jun-2021	1	0	0	0	1	0
Jul-2021	2	0	4	0	1	0
Aug-2021	21	0	9	0	4	1
Sep-2021	14	1	4	0	6	0
Oct-2021	3	1	6	0	2	0
Nov-2021	8	1	2	1	0	0
Dec-2021	7	0	3	0	1	0
Feb-2022	1	0	0	0	0	0
Feb-2022	2	0	0	0	0	0
Mar-2022	0	0	1	0	0	0
Apr-2022	4	4	1	0	0	0
May-2022	6	0	5	1	7	1
Jun-2022	9	0	3	0	7	1
Jul-2022	32	0	7	1	12	3
Aug-2022	4	0	1	0	1	0
Sep-2022	14	0	6	0	2	0

19 LARGE AUK SPECIES GROUP (GUILLEMOT OR RAZORBILL)

Table 19-1 Raw counts of large auk species (guillemot or razorbill) recorded per survey in flight and on the sea in the OAA, 2 km buffer and 4 km buffer.

Survey	Raw counts (individuals)					
	OAA		2 km buffer		4 km buffer	
	On the sea	In flight	On the sea	In flight	On the sea	In flight
Jul-2020	0	0	0	0	0	0
Aug-2020	3	0	0	0	2	0
Sep-2020	5	0	1	0	1	0
Oct-2020	5	1	6	0	0	0
Nov-2020	2	0	2	0	1	0
Dec-2020	3	0	5	0	2	0
Jan-2021	2	1	1	0	4	2
Feb-2021	4	4	1	0	0	0
Mar-2021	9	0	3	0	2	0
Apr-2021	11	2	3	1	4	0
May-2021	0	0	0	0	1	0
Jun-2021	1	0	0	0	0	0
Jul-2021	0	0	0	0	1	0
Aug-2021	2	0	0	0	0	0
Sep-2021	9	1	0	0	1	0
Oct-2021	9	2	3	0	6	1
Nov-2021	5	0	2	0	1	0
Dec-2021	9	2	6	0	2	0
Feb-2022	0	0	1	0	5	0
Feb-2022	5	0	5	0	1	0
Mar-2022	6	0	2	0	4	0
Apr-2022	1	0	1	0	1	0
May-2022	1	1	0	0	4	0
Jun-2022	2	0	0	0	0	0
Jul-2022	6	0	6	0	6	0
Aug-2022	0	0	1	0	3	0
Sep-2022	2	1	6	0	2	1

20 RED-THROATED DIVER

Table 20-1 Raw counts of red-throated diver recorded per survey in flight and on the sea in the OAA, 2 km buffer and 4 km buffer.

Survey	Raw counts (individuals)					
	OAA		2 km buffer		4 km buffer	
	On the sea	In flight	On the sea	In flight	On the sea	In flight
Jul-2020	0	0	0	0	0	0
Aug-2020	0	0	0	0	0	0
Sep-2020	0	0	0	0	0	0
Oct-2020	1	0	0	0	0	0
Nov-2020	0	0	0	0	0	0
Dec-2020	0	0	0	0	0	0
Jan-2021	0	0	0	0	0	0
Feb-2021	0	0	0	0	0	0
Mar-2021	0	0	0	0	0	0
Apr-2021	0	0	0	0	0	0
May-2021	0	0	0	0	0	0
Jun-2021	0	0	0	0	0	0
Jul-2021	0	0	0	0	0	0
Aug-2021	0	0	0	0	0	0
Sep-2021	0	0	0	0	0	0
Oct-2021	0	0	0	0	0	0
Nov-2021	0	0	1	0	0	0
Dec-2021	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Mar-2022	0	0	0	0	0	0
Apr-2022	0	0	0	0	0	0
May-2022	0	0	1	0	0	0
Jun-2022	0	0	0	0	0	0
Jul-2022	0	0	0	0	0	0
Aug-2022	0	0	0	0	0	0
Sep-2022	0	0	0	0	0	0

21 GREAT NORTHERN DIVER

Table 21-1 Raw counts of great northern diver recorded per survey in flight and on the sea in the OAA, 2 km buffer and 4 km buffer.

Survey	Raw counts (individuals)					
	OAA		2 km buffer		4 km buffer	
	On the sea	In flight	On the sea	In flight	On the sea	In flight
Jul-2020	0	0	0	0	0	0
Aug-2020	0	0	0	0	0	0
Sep-2020	0	0	0	0	0	0
Oct-2020	0	1	0	0	0	0
Nov-2020	0	0	0	0	0	0
Dec-2020	0	0	0	0	0	0
Jan-2021	0	0	0	0	0	0
Feb-2021	0	0	0	0	0	0
Mar-2021	0	0	0	0	0	0
Apr-2021	0	0	0	0	0	0
May-2021	1	0	0	0	0	0
Jun-2021	0	0	0	0	0	0
Jul-2021	0	0	0	0	0	0
Aug-2021	0	0	0	0	0	0
Sep-2021	0	0	0	0	0	0
Oct-2021	0	0	0	0	0	0
Nov-2021	0	0	0	0	0	0
Dec-2021	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Mar-2022	0	0	0	0	0	0
Apr-2022	0	0	0	0	0	0
May-2022	1	0	0	0	0	0
Jun-2022	0	0	0	0	0	0
Jul-2022	0	0	0	0	0	0
Aug-2022	0	0	0	0	0	0
Sep-2022	0	0	0	0	0	0

22 EUROPEAN STORM-PETREL

Table 22-1 Raw counts of European storm-petrel recorded per survey in flight and on the sea in the OAA, 2 km buffer and 4 km buffer.

Survey	Raw counts (individuals)					
	OAA		2 km buffer		4 km buffer	
	On the sea	In flight	On the sea	In flight	On the sea	In flight
Jul-2020	0	0	0	0	0	0
Aug-2020	0	0	0	0	0	1
Sep-2020	0	0	0	0	0	11
Oct-2020	0	0	0	0	0	0
Nov-2020	0	0	0	0	0	0
Dec-2020	0	0	0	0	0	0
Jan-2021	0	0	0	0	0	0
Feb-2021	0	0	0	0	0	0
Mar-2021	0	0	0	0	0	0
Apr-2021	0	0	0	0	0	0
May-2021	0	0	0	0	0	0
Jun-2021	0	0	0	0	0	0
Jul-2021	0	0	0	0	0	0
Aug-2021	0	26	0	3	0	7
Sep-2021	0	4	0	1	0	0
Oct-2021	0	0	0	0	0	0
Nov-2021	0	0	0	0	0	0
Dec-2021	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Mar-2022	0	0	0	0	0	0
Apr-2022	0	0	0	0	0	0
May-2022	0	0	0	0	0	0
Jun-2022	0	0	0	0	0	0
Jul-2022	0	0	0	0	0	0
Aug-2022	0	0	0	0	0	0
Sep-2022	0	0	0	0	0	0

23 FULMAR

Table 23-1 Raw counts of fulmar recorded per survey in flight and on the sea in the OAA, 2 km buffer and 4 km buffer.

Survey	Raw counts (individuals)					
	OAA		2 km buffer		4 km buffer	
	On the sea	In flight	On the sea	In flight	On the sea	In flight
Jul-2020	42	17	27	13	58	16
Aug-2020	144	45	5	7	12	10
Sep-2020	300	54	20	38	5	17
Oct-2020	98	52	49	27	210	29
Nov-2020	50	67	3	20	41	66
Dec-2020	51	149	63	184	21	117
Jan-2021	74	88	38	48	55	58
Feb-2021	10	13	5	11	3	12
Mar-2021	15	88	14	25	7	30
Apr-2021	27	11	2	6	4	10
May-2021	0	6	5	20	0	1
Jun-2021	0	0	0	0	0	0
Jul-2021	3	18	2	3	5	13
Aug-2021	89	35	28	12	35	15
Sep-2021	47	29	11	11	20	16
Oct-2021	101	83	17	17	28	54
Nov-2021	6	40	2	22	23	169
Dec-2021	62	160	27	20	19	13
Feb-2022	8	89	8	38	2	58
Feb-2022	24	107	6	59	10	62
Mar-2022	33	171	26	62	11	61
Apr-2022	4	54	0	12	2	15
May-2022	3	13	2	10	3	6
Jun-2022	3	13	1	5	3	2
Jul-2022	19	30	2	7	6	5
Aug-2022	3	39	4	11	8	17
Sep-2022	131	42	40	15	39	12

24 CORY'S SHEARWATER

Table 24-1 Raw counts of Cory's shearwater recorded per survey in flight and on the sea in the OAA, 2 km buffer and 4 km buffer.

Survey	Raw counts (individuals)					
	OAA		2 km buffer		4 km buffer	
	On the sea	In flight	On the sea	In flight	On the sea	In flight
Jul-2020	0	0	0	0	0	0
Aug-2020	0	0	0	0	0	0
Sep-2020	0	0	0	0	0	0
Oct-2020	0	0	0	0	0	0
Nov-2020	0	0	0	0	0	0
Dec-2020	0	0	0	0	0	0
Jan-2021	0	0	0	0	0	0
Feb-2021	0	0	0	0	0	0
Mar-2021	0	0	0	0	0	0
Apr-2021	0	0	0	0	0	0
May-2021	0	0	0	0	0	0
Jun-2021	0	0	0	0	0	0
Jul-2021	0	0	0	0	0	0
Aug-2021	0	1	0	0	0	0
Sep-2021	0	0	0	0	0	0
Oct-2021	0	0	0	0	0	0
Nov-2021	0	0	0	0	0	0
Dec-2021	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Mar-2022	0	0	0	0	0	0
Apr-2022	0	0	0	0	0	0
May-2022	0	0	0	0	0	0
Jun-2022	0	0	0	0	0	0
Jul-2022	0	0	0	0	0	0
Aug-2022	0	0	0	0	0	0
Sep-2022	0	0	0	0	0	0

25 SOOTY SHEARWATER

Table 25-1 Raw counts of sooty shearwater recorded per survey in flight and on the sea in the OAA, 2 km buffer and 4 km buffer.

Survey	Raw counts (individuals)					
	OAA		2 km buffer		4 km buffer	
	On the sea	In flight	On the sea	In flight	On the sea	In flight
Jul-2020	0	0	0	0	0	0
Aug-2020	0	0	0	0	0	0
Sep-2020	0	0	0	0	0	0
Oct-2020	0	0	0	0	0	0
Nov-2020	0	0	0	0	0	0
Dec-2020	0	0	0	0	0	0
Jan-2021	0	0	0	0	0	0
Feb-2021	0	0	0	0	0	0
Mar-2021	0	0	0	0	0	0
Apr-2021	0	0	0	0	0	0
May-2021	0	0	0	0	0	0
Jun-2021	0	0	0	0	0	0
Jul-2021	0	0	0	0	0	0
Aug-2021	0	1	0	1	0	0
Sep-2021	0	0	0	1	0	0
Oct-2021	0	0	0	0	0	0
Nov-2021	0	0	0	0	0	0
Dec-2021	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Mar-2022	0	0	0	0	0	0
Apr-2022	0	0	0	0	0	0
May-2022	0	0	0	0	0	0
Jun-2022	0	0	0	0	0	0
Jul-2022	0	0	0	0	0	0
Aug-2022	0	0	0	0	0	0
Sep-2022	0	0	0	0	0	0

26 GREAT SHEARWATER

Table 26-1 Raw counts of great shearwater recorded per survey in flight and on the sea in the OAA, 2 km buffer and 4 km buffer.

Survey	Raw counts (individuals)					
	OAA		2 km buffer		4 km buffer	
	On the sea	In flight	On the sea	In flight	On the sea	In flight
Jul-2020	0	0	0	0	0	0
Aug-2020	0	0	0	0	0	0
Sep-2020	0	0	0	0	0	0
Oct-2020	0	0	0	0	0	0
Nov-2020	0	0	0	0	0	0
Dec-2020	0	0	0	0	0	0
Jan-2021	0	0	0	0	0	0
Feb-2021	0	0	0	0	0	0
Mar-2021	0	0	0	0	0	0
Apr-2021	0	0	0	0	0	0
May-2021	0	0	0	0	0	0
Jun-2021	0	0	0	0	0	0
Jul-2021	0	0	0	0	0	0
Aug-2021	0	0	0	0	0	0
Sep-2021	0	0	0	0	0	0
Oct-2021	0	0	0	0	0	0
Nov-2021	0	0	0	0	0	0
Dec-2021	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Mar-2022	0	0	0	0	0	0
Apr-2022	0	0	0	0	0	0
May-2022	0	0	0	0	0	0
Jun-2022	0	0	0	0	0	0
Jul-2022	0	0	0	0	0	0
Aug-2022	0	0	0	0	0	0
Sep-2022	0	0	0	0	0	1

27 MANX SHEARWATER

Table 27-1 Raw counts of Manx shearwater recorded per survey in flight and on the sea in the OAA, 2 km buffer and 4 km buffer.

Survey	Raw counts (individuals)					
	OAA		2 km buffer		4 km buffer	
	On the sea	In flight	On the sea	In flight	On the sea	In flight
Jul-2020	0	0	0	0	0	0
Aug-2020	0	0	0	0	0	0
Sep-2020	0	0	0	0	0	1
Oct-2020	0	0	0	0	0	0
Nov-2020	0	0	0	0	0	0
Dec-2020	0	0	0	0	0	0
Jan-2021	0	0	0	0	0	0
Feb-2021	0	0	0	0	0	0
Mar-2021	0	0	0	0	0	0
Apr-2021	0	0	0	0	0	0
May-2021	0	0	0	0	0	0
Jun-2021	0	1	0	1	0	0
Jul-2021	0	0	0	0	0	0
Aug-2021	0	0	0	0	0	1
Sep-2021	0	0	0	0	0	0
Oct-2021	0	0	0	0	0	1
Nov-2021	0	0	0	0	0	0
Dec-2021	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Feb-2022	0	0	0	0	0	0
Mar-2022	0	0	0	0	0	0
Apr-2022	0	0	0	0	0	0
May-2022	0	0	0	0	0	0
Jun-2022	0	0	0	0	0	0
Jul-2022	0	1	0	0	1	1
Aug-2022	1	0	0	0	1	0
Sep-2022	0	1	0	0	0	1

28 GANNET

Table 28-1 Raw counts of gannet recorded per survey in flight and on the sea in the OAA, 2 km buffer and 4 km buffer.

Survey	Raw counts (individuals)					
	OAA		2 km buffer		4 km buffer	
	On the sea	In flight	On the sea	In flight	On the sea	In flight
Jul-2020	19	26	1	8	39	32
Aug-2020	210	32	1	5	5	12
Sep-2020	54	75	14	22	15	18
Oct-2020	51	47	13	3	14	9
Nov-2020	0	1	0	2	0	1
Dec-2020	3	4	2	0	0	0
Jan-2021	2	1	1	0	0	0
Feb-2021	1	7	0	2	0	2
Mar-2021	0	3	0	4	2	3
Apr-2021	10	24	7	10	7	8
May-2021	13	32	13	6	3	15
Jun-2021	1	21	2	7	2	5
Jul-2021	6	24	5	9	6	8
Aug-2021	13	51	4	21	2	68
Sep-2021	31	57	5	22	40	33
Oct-2021	92	51	28	16	26	10
Nov-2021	1	1	2	2	1	1
Dec-2021	0	1	0	1	0	1
Feb-2022	0	2	0	1	1	7
Feb-2022	1	8	0	1	1	1
Mar-2022	0	19	0	7	0	5
Apr-2022	54	27	14	10	12	8
May-2022	11	8	8	5	10	16
Jun-2022	31	15	10	0	11	0
Jul-2022	17	26	3	7	3	7
Aug-2022	10	4	3	6	4	9
Sep-2022	7	24	5	15	9	29

29 SHAG

Table 29-1 Raw counts of shag recorded per survey in flight and on the sea in the OAA, 2 km buffer and 4 km buffer.

Survey	Raw counts (individuals)					
	OAA		2 km buffer		4 km buffer	
	On the sea	In flight	On the sea	In flight	On the sea	In flight
Jul-2020	0	0	0	0	0	0
Aug-2020	0	0	0	0	0	0
Sep-2020	0	0	0	0	0	0
Oct-2020	0	0	0	0	0	0
Nov-2020	0	0	0	0	0	0
Dec-2020	0	0	0	0	0	0
Jan-2021	0	0	0	0	0	0
Feb-2021	0	0	0	0	0	0
Mar-2021	0	0	0	0	0	0
Apr-2021	1	0	0	1	0	1
May-2021	0	0	0	0	0	0
Jun-2021	0	0	0	0	0	0
Jul-2021	0	0	0	0	0	0
Aug-2021	0	0	0	0	0	0
Sep-2021	0	0	0	0	0	0
Oct-2021	0	0	0	0	0	0
Nov-2021	0	0	0	0	0	0
Dec-2021	0	0	0	0	0	0
Feb-2022	0	0	0	0	1	0
Feb-2022	0	0	0	0	0	0
Mar-2022	0	0	0	0	0	0
Apr-2022	0	0	0	0	0	0
May-2022	0	0	0	0	0	0
Jun-2022	0	0	0	0	0	0
Jul-2022	0	0	0	0	0	0
Aug-2022	0	0	0	0	0	0
Sep-2022	0	0	0	0	0	0

30 OTHER NON-SEABIRD SPECIES

Table 30-1 Raw counts of other non-seabird species recorded per survey in flight and on the sea in the OAA, 2 km buffer and 4 km buffer.

Species	Survey	Raw counts (individuals)					
		OAA		2 km buffer		4 km buffer	
		On the sea	In flight	On the sea	In flight	On the sea	In flight
Golden plover	Sep-2020	0	5	0	0	0	0
Curlew	Jul-2021	0	1	0	0	0	0
Greylag goose	Oct-2021	0	11	0	0	0	0
Pink-footed goose	Oct-2021	0	2	0	0	0	0
Whimbrel	April-2022	0	0	0	0	0	2

West of Orkney Windfarm

Offshore Ornithology Technical Appendix 12

Annex 12.12 Regional population estimates

Date: 12th May 2023

Tel: 0141 342 5404

Web: www.macarthurgreen.com

Address: 93 South Woodside Road |Glasgow | G20 6NT

Document Quality Record

Version	Status	Person Responsible	Date
0.1	Draft	Dr. N. Goodship	08/05/2023
0.2	Reviewed	Dr. R. McGregor	09/05/2023
1	Internal Approval	Dr. R. McGregor	09/05/2023

CONTENTS

LIST OF TABLES

1 INTRODUCTION

1. This Annex provides a list of seabird colony counts used to estimate regional population estimates for the West of Orkney Windfarm ('the Project') Offshore Environmental Impact Assessment (EIA) Report and Offshore Report to Inform Appropriate Assessment (RIAA).

2. Colony counts were obtained from the Seabird Monitoring Programme Database Seabird Monitoring Programme (SMP) Database.

2 REGIONAL POPULATIONS

Table 2-1 Regional populations for West of Orkney Windfarm

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
Aber Bach - Ynys Barry					248					
Aberdaron Coast and Bardsey Island SPA					28					
Aberdaron Coast not in SPA					70					
Abereiddy - Treginnnis, St Davids					70					
Ailsa Craig SPA					238			980	66,452	
Aith to Brae					202					
Aithsting					18		16			
Ardnamurchan and Loch Sunart										
Arisdale							40			
Arran					16					
Assynt (Inland Lochs)							2			
Auskerry SPA		446	237	1,988	396		2			59
Aywick							2			
Babbacombe Bay					34					
Balcary Point					14					
Bamburgh Castle, Bamburgh										
Barafundle to Giltar Point					162					

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
Barlocco					18					
Barra & Vatersay					82		2			
Basta							4			
Bay of Berstane to Rerwick Head Tankerness					678					
Bay of Meil, Head Of Holland					440	2				
Bay of Stoer					4					
Bearasay - Lewis					264		2			7
Bennane Lea to Games Loup					12					
Berry Head to Sharkham Point SSSI					10					
Bigbury Bay					8					
Bigton to Maywick		40			3,798			44		
Birsay Cliffs - Point of Buckquoy to Loop of Cruie	22	38	31		886					77
Birsay Moors to South of Hillside Road						94	104			
Bishop & Clerks and Ramsey					452					
Blackhead					62					
Bluemull Sound Islands					130					
Blyth Power Station										
Bodorgan Head to Abermenai										
Border to Burnmouth					146					
Boulby Cliffs					110					

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
Bounds Cliff - North Cornwall					148					
Bradda Quarry										
Brenish to Valtos - Lewis					1,950					
Bressay		1			4,742		332	92		
Bressay - North					268					
Brig O' Waithe to Hamnavoe, Stromness					30					
Brighton to Newhaven Cliffs SSSI					42					
Brindister					82		2			
Brora						2				
Brough of Birsay		5	348		336			2		26
Buchan Ness to Collieston Coast SPA		170			1,652			22,590		
Burn of Daff		2			154			2,186		
Burra							4			
Burrafirth							6			
Burravoe							2			
Burray					270					
Burton Cliff, Burton Bradstock					32					
Bute										
Butt of Lewis to Gress - Lewis			525		4,548			624		122
Cadgwith - Helford River (East Lizard)					44					

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
Caithness - Inland Gulls	100									
Caithness - Wick Bay to Freshwick Bay	200	3			1,074	8		90		376
Caithness Urban						2				
Caldey Island					226					
Calf of Eday SPA		48	7,181		4,648	2	74	284		131
Calf of Flotta					122	6				
Campay - Lewis					40					
Canis Dale							52			
Canna and Sanday SPA		1,935			118		28	2,994		
Cape Wrath (West)					42					
Cape Wrath SPA		2,244	49,542		2,954	26		7,244		4,220
Cardigan Island and Mwnt to Carreg Lydan					156					
Carmel Head South					10					
Carness to Skerry of Work, St Ola					10					
Carnweather Point, North Cornwall					50					
Carr Craig, Eyebroughy and Haystack					1,924			2,352		
Castle Point to Portankill (Mull of Galloway) - Tysties					12					
Castlemartin Coast (Berryslade to Barafundle Bay)					130					
Catterline to Inverbervie		10			736			4,093		

MacArthur Green

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
Causamul, Haskeir, Boreray and Spuir		2			618		12	444		
Causeway Coast					1,760					
Cayton Bay to Filey					822					
Chapel Porth to Perranporth					162					
Church Cove 2 - Cadgwith					32					
Clovelly to Hartland Quay					44					
Cnoc na Banaraich to Sound of Handa						4				
Coll					110		6			
Com Head - North Cornwall					46					
Copinsay SPA		1,263	23,999	68	3,236	142	22	1,910		755
Coppay					6			390		
Coppister							8			
Coquet Island SPA		24,688			106					
Costa Head		47	6,599		4,212	4		104		855
Costa Head ("Inland")					4					
Craigaig					2					
Cromwell Fort to Point of Carness					2					
Crossbost to Arnish - Lewis					6					
Culzean Country Park - Sea cliffs					18					
Cunningsburgh							24			

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
Cunningsburgh to Sandwick					3,912					
Dale Hill							136			
Dale to Huxter					5,736					
Dawlish Warren to Teignmouth					34					
Deepdale							72			
Deerness		2	2,045		9,178	40	4	10		415
Delabole Point - North Cornwall					38					
Dinas Fach, Solva - Newgale (Pen-y-Cwm)					12					
Dounreay	16									
Downhill					190					
Doyden Point, North Cornwall										
Droman to Geodha Ruadh na Fola		96	2,035		998	4	2	322		347
Druim Mor - Lewis							24			
Drumshang to Heads of Ayr					8					
Dun-aarn - Harris					4					
Dunderhole Point, North Cornwall					16					
Dunglass to Fast Castle					132					
Dunrobin					2					
Durness	-									
East Antrim Coast					84					

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
East Caithness Cliffs SPA	4	189	193,447		27,628	532		48,958		38,835
East Island					816					
East Jura										
East Loch Nedd to Rubha Creag Lomhair					10	16				
East Lunna Ness					164					
East Mainland - Orkney - Tysties		986				188	16			
East Trotternish					2		2			
Eday					2,208	36	192			
Eddrachillis Bay					26	56				
Edinburgh					16					
Effirth to Ness of Bixter					18					
Egilsay					374					
Eilean Creagach and South Ascrib		100								
Eilean Hoan, Eilean Cluimhrig, An Dubh-Sgeir	4			242	54	80	10			
Enard Bay										
Eswick							2			
Eye Peninsula - Lewis			252		962			334		124
Eyemouth to Burnmouth					84					
Eynhallow		26			234	10	30	76		
Fair Isle SPA		6,666	23,784		64,982		860	896	7,182	2,503

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
Fan Bay										
Fara					66	14	34			
Faraid Head/ Balnakeil		70	693		498	4		656		196
Faray, Holm of Faray & Rusk Holm					566	18	10			
Farne Islands SPA		79,924			372			8804		
Fethaland to North Roe					1,610			4		
Fetlar							40	128		
Fetlar SPA					18,388		1,704	124		
Fife Ness to St Andrews					22					
Findon Ness - Hare Ness		16			212			2,354		
Finstown and Kirkwall					42					
Firth of Forth SPA					10					
Fishtown of Usan to River North Esk										
Fitful							420			
Flamborough and Filey Coast SPA		1,916			1,692			91008	22,122	20,002
Flamborough Head South					28					
Flamister							22			
Flannan Isles SPA		95,460			6,132		22	1,650		2,102
Fleet Bay + Wigtown Bay										
Floday - Lewis					22					

Seabird colony ID	Colony counts (Individuals)								
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
Flotta & Calf of Flotta		6	83		1,388	14				347
Flotta (West Hill)							8			
Forth Islands SPA		124,462			1,422			15030	110,964	5,250
Foula SPA		6,351			20,506		3,692	850	4,886	635
Fowlsheugh SPA		37			1,050			47,388		7,048
Fraochlan to Lochinver										
Fraserburgh								162		
Freshwater West to West Angle Bay					4					
Friog					26					
Gairsay, Hen of Gairsay, Boray Holm, Sweyn Holm					546	6				
Garvellachs					14					
Gerrans Bay to Camels Cove SSSI					56					
Giants Causeway Coast					422					
Gigha					32					
Gilfach yr halen					20					
Gilsay - Harris							2			
Girdle Ness to Hare Ness					176			4,186		
Girlsta							6			
Glasleac Island, Soyea Island, Rubha Rodha, Loch Roe							4			

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
Glenthorne to Ivy Stone					12					
Glimps Holm					34					
Gloup Ness to Gutcher (N.W. Yell)					942					
Godrevy Head to St Agnes SSSI					386					
Gossa Water							6			
Gower					6					
Graemsay					110					
Grass Holm					34					
Grassholm SPA									78,584	
Great Cumbrae Island										
Great Mew Stone (Island)					44					
Great Orme and Little Orme					98					
Green Holms		33			322	36		64		
Gremista							2			
Grobsness							2			
Gruinard Bay							4			
Grunnafirth							4			
Gruting										
Gulberwick to Fladdabister		5			842					
Gunwallor Fishing Cove to Kynance Cove					78					

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
Hagmark Hill					40		4			
Hall Bay to Craigeven Bay					14			158		
Hallilee										
Handa SPA		860	89,081		1,382	20	146	7,498		10,669
Hascosay					344		38			
Hastings Cliffs SSSI					26					
Hayle - Chapel Porth										
Heisgeir							4			
Helliar Holm					312	4	6			
Helliness										
Hermaness, Saxa Vord and Valla Field SPA		47,322			26,416		1,950	530	51,160	
Heylor to Stenness		5			2,952			354		
Hill of Dale										
Hill of Halsagarth							74			
Hill of Noub							24			
Hill of Scarvister					20					
Hillswick					1,082					
Holm			1,216		3,962	8		28		653
Holm of Grimbister and Damsay										
Holm of Huip and Little Linga Holm					300					

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
Holm of Melby, Forewick Holm, Crog Holm, Holm of Culsetter, Isle of Gunniste					26					
Holm of Scockness and Kili Holm					6	16				
Holm, Deerness and Tankerness					94	108	6			
Holms of Spurness					94					
Holy Island not in SPA										
Hopeman Bay					462			1,120		
Horse Island, Colsay, Little and Ladies Holm to Fitful Head		28			1,400			24		
Horse of Copinsay			1,394		262	16		144		120
Housabister to Catfirth					1,162					
Housel to Church Cove 1					4					
Howick - Cullornose Point - Dunstanburgh Castle Point					184					
Hoy and South Walls - Tysties		97								
Hoy and Southwalls	5		1,620		2,406	4		66		237
Hoy SPA	2	3,000	15,857		42,202	10	876	608		2,837
Huesbreck					12					
Hushinish Point - Harris										
Huxter to Brindister		26			4,338			88		
Inchgarvie and Forth Rail Bridge					848					

Seabird colony ID	Colony counts (Individuals)								
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
Inner Moray Firth SPA					4					
Inverbervie to St Cyrus										
Ireland - Houton Head (near gun-replacement)										
Ireland to Maywick		1			1,252					
Islay - East (Port Askaig to Bowmore)					220					
Islay - West (Port Askaig to Bruichladdich)					624		2			
Isle of Colonsay					26					
Isle of Eigg (Summer Isles)					72		2			
Isle of Wight					6					
Isles of Scilly SPA					308					
Jura (West)										
Kebock Head - Lewis										
Keil Point to Kilmanshennachan					48					
Kettla Ness							10			
Killegray - Harris							2			
Kilmuir to Eathie - Black Isle										
Kinghorn & Pettycur					22					
Kirkcaldy to Fife Ness					14					
Kirkcaldy Town					24					
Kussa Waters							8			

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
Kyleakin to Portree							2			
Langdon Cliffs										
Largybaan					4					
Larne Lough to Portmuck					408					
Laxo to Housabister (Nesting)		5			476					
Lerwick to Gulberwick					168					
Lerwick/Gulberwick										
Lewis and Harris - Tysties		25			30		4			
Lewis SKUA/GBBG squares							134			
Ligger Point to Porth					194					
Linga Holm					360					
Little Cumbrae					22					
Little Haven to Newgale					180					
Liungaigh - Harris							2			
Llanddulas Quarries					50					
Llangrannog to Penpeles (includes Tresaith SSSI and Aberporth)					48					
Llanrhyslud - Llansanffraed					28					
Llansantffraid - Aberaeron										
Lleyn Peninsula					190					

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
Loch a' Chadh - Fi + Loch Laxford										
Loch Brooms										
Loch Ewe										
Loch Gairloch							12			
Loch Laxford					32	126				
Loch of Strathbeg SPA										
Loch of Vaara (Twatt)		19			48		12			
Loch Ryan					2					
Loch Torridon					8					
Lough Foyle										
Lunan Bay to Arbroath		26			384			1,126		
Lundy					530					
Lunnaness										
Lunning/Levaneap					1,122					
Maggy's Leap					4					
Mainland central: Terns					16					
Mainland north: Terns					24					
Mainland west: Terns										
Marrofield							6			
Marsden Bay					290					

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
Marwick Head SPA		6	15,581		1,260	2		1,812	18	1,438
Maywick to Scalloway		15			6,598			10		
Meall Mor and Isle Martin					2					
Melvich to Duncansby Stacks SSSI	4	9			1,612	6	2			29
Men-a-Vaur Island					38					
Menawethan Island					86					
Mid Walls					22					
Midi Field							96			
Mingulay and Berneray SPA		6,252			14,096		354	4,176	30	20,222
Monach Isles SPA				4	78					
Monreith Cliffs and Scar Rocks					8					
Montrose to Lunan Bay					132			740		
Morte Point - Bull Point										
Mount's Bay, Cornwall					20					
Mousa SPA				23,562	316		120			
Mousland	28				10					
Mousland South	2									
Muasdale to Port Crom										
Muck		69			560		4	48		
Muck Island					86					

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
Muckle Roe					4,280					
Muckle Roe Bridge to Mangaster					90					
Muckle Roe to Ura Firth		2			1,224					
Mull										
Mull of Galloway					2					
Mullion Cliff to Predannack Cliff SSSI										
Muskna							32			
N.Yorks Inland Gulls										
Nash Point					32					
Natural Arches -					4					
Nesbister							4			
Nesting / Laxo to Housabister					136					
Nesting to Lerwick					92					
New Quay to Lochtyn					74					
Newport to Poppit					310					
Newton Hill		1			128			4		
Newtonhill - Hall Bay					228			596		
No Ness to Levenwick and Boddam to Virkie		8			10,026			198		
North Antrim coast					42					
North Berwick Coast SSSI					254					

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
North Caithness Cliffs SPA	603	3,053	50,567		30,740	126	10	11,142		4,653
North Colonsay and Western Cliffs SPA					1,014		4	6304		
North Cornwall Coast					166					
North Devon Coast					92					
North Island					324					
North Mainland 1 - The Ness to The Rigg							114			
North Mainland 10 - Mangaster to Pinchdyke					144		2			
North Mainland 11 - Vidlin Voe to Lunning Sound					80		4			
North Mainland 12 - Gluss Isle and Calbeck Ness										
North Mainland 13 - Hamna Voe to Sand Voe					1,234		28			
North Mainland 16 - The Skiurds to Roonie							4			
North Mainland 17 - Whalwick Taing to Point of Quida Stac					60		94			
North Mainland 18 - Ladie Hill to Clubb of Mulla					10		12			
North Mainland 19 - Ness of Hillswick					634		12			
North Mainland 2 - Scatsta Ness to Burn of Easterburn							2			
North Mainland 20 - Djubi Dale to Scora Water										
North Mainland 21 - Hamar Voe to Mangaster Voe					350		24			
North Mainland 22 - Black Hill to Boat Geo South					1,124		26	4		

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
North Mainland 23 - Septa Field to White Grunafirth							24			
North Mainland 24 - Paidland Vird to Stourl					314		22			
North Mainland 25 - Voe to Logie Hill					2		18			
North Mainland 26 - Eela Water to Gluss Voe							4			
North Mainland 3 - Mossbank to Fora Ness					8		4			
North Mainland 4 - Hevdadale to Cairn							18			
North Mainland 5 - Whal Horn to Ronas Hill							34			
North Mainland 6 - Fethaland to Burravoe					200		38			
North Mainland 7 - Ay Wick to Firth					24		10			
North Mainland 8 - Croolar to Mucklamoor							6			
North Mainland 9 - Millburn to Quhamm							28			
North Roe to Gluss Ayre					1,226		2			
North Rona and Sula Sgeir SPA		2,834	10,045	760	4,420		74	1,424	22,460	515
North Ronaldsay					1,020		4			
North Sutherland Islands	54				1,346	94	60			53
North Sutor to Shandwick			1,586		444			846		226
North Uist							4			
North West Iona					20					
Northern End of Torbay										
Noss Mayo to Erme Estuary					8					

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
Noss SPA		1,174		56	8,694		206	236	23,572	
Ocraquoy/Aithsetter										
Old Hill - Lewis					108			186		35
Oronsay							10			
Otterswick							84			
Out Skerries					854					
Pabay Mor					36					
Pabbay										
Papa Little, Linga and Vementry Islets					372					
Papa Stour SPA					3,112		198	50		
Papa Stronsay					126					
Papa Westray					380	2				
Papa Westray - Tysties		25								
Papa Westray (North Hill and Holm) SPA		30	1,167		602		98	30		286
Parton Bay					2					
Peerie Voe of Spiggie to St. Ninian's					1,252					
Pegwell Bay - Kent					18					
Penally to Cornakey					114					
Pentire Peninsula SSSI					10					
Pentland Firth Islands SPA	120	4,546	8		954	40	20	612		265

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
Peterhead								66		
Pinbain Quarry - Kennedy's Pass					2					
Pine Haven, North Cornwall					20					
Plymouth - Falmouth					242					
Plymouth to Berry Head Coastline					4					
Point Lynas to Trwyn Du					238					
Point of Hisber to Woodwick House					46					
Port a' Ghleannain to Bay of Culkein					10					
Port Isaac, North Cornwall					120					
Port Mona, Devil's Bridge, Laggantalluch Head					30					
Port O'Warren					18					
Porth Llanlleiana to Porth Eilian					66					
Portknockie			64		6			680		88
Portland					40					
Portpatrick					176					
Portsoy to Cullen		32			244			1,032		60
Priest Island SPA			3	9,280			10			29
Puffin Island SPA					46					
Quarff							4			
Quilse							4			

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
Raasay							4			
Ramna Stacks and Gruney SPA		5		4	142			160		
Rathlin Island SPA		1,390			2,090		4	27534		30,786
Ravenscar to Robin Hood's Bay					22					
Reawick					1,884					
Red Holm										
Reedy Cliff, North Cornwall					34					
Rerwick Head to Mirkady Point		1			496	2		6		52
Rigg Bay + Cruggleton					8					
Ringdoo to Borness										
Rona										
Ronas Hill - North Roe and Tingon - CLIFF NESTERS ONLY		261			3,486			102		
Ronas Hill - North Roe and Tingon SPA - INLAND		1			1,274		366			
Ronas Hill to Uyea		27			1,564					
Ronas Voe to the Ness					276					
Rosehearty to Bay of Cullen					560			56		105
Round Hill and Pentireglaze, North Cornwall					6					
Rousay - Central					4	8	10			
Rousay - Faraclett Head					36					

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
Rousay - Saviskaill Bay Area					80	4				
Rousay - South and Central					80					
Rousay - South East						10	14	254		
Rousay Coast					384					
Rousay SPA		102	7,684		4,384	34		660		610
Rubha Coigeach					188					
Rubha Hunish		583			2,108		14	2,020		950
Rubha Reidh Peninsula					44		2			
Rum SPA					24			1,400		
Rysa Little and Cava	80	2			388	26	6			
Salcombe to Start Point										
Saltburn Coast					160					
Saltness to Skeld					416					
Sanda Islands - Kintyre					86					
Sanday		8			3,918					14
Sanday - Cata Sand					16		2			
Sanday - Kettletoft to Tresness					84					
Sanday - North					14					
Sanday - North and Holms of Ire					92					
Sanday - Sellibister to Lopness					14					

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
Sanday - Spurness					12		2			
Sanday - Start Point					36					
Sanday - Stove to Kettletoft					960			102		
Sanday - Tofts Ness					62					
Sandness		10			204		16			
Sandvoe to Fethaland		14			1,302					
Sandvoe to Uyea					1,802			8		
Sandwick							46			
Saxavord, Skaw, Haroldswick and Baltasound					940					
Scalby to Rocky Point					30					
Scalla Field							4			
Scalloway										
Scalloway Islands		1			424					
Scalloway Islands North					26					
Scalloway Islands South		5			118					
Scalloway to Semblister					210					
Scapa Bay to St. Marys					1,688			46		198
Scaravay - Harris							2			
Scarborough to Osgodby Point					26					
Scarp Island - Harris										

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
Scratby										
SE Lewis								22		
Seaford to Beachy Head SSSI					10					
Seahouses					4					
Shakespeare/Abbots Cliff					14					
Shandwick to Portmahomack					54					
Shapinsay					20					
Shapinsay (Coastal)		6	125		1,488			34		216
Sharkham Point to Start Point (South Hams)					80					
Sheddock Cliffs - Burrow Head					12					
Sheep Island SPA					122					
Shiant Isles SPA		129,390	11,770		3,012		78	2,150		10,438
Shillay				22						
Sidmouth to Beer					4					
Simli Field							2			
Skeld, Westerwick and Culswick		16			7,468			182		
Skomer, Skokholm and the Seas off Pembrokeshire / Sgomer, Sgogwm a Moroedd Penfro SPA		48,228			1,080			3088		12,002
SKUA/GBBGU - Burray						4	2			
SKUA/GBBGU - Central Mainland						6	14			

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
SKUA/GBBGU - East Mainland						16	6			
SKUA/GBBGU - Eday & Farray						4	2			
SKUA/GBBGU - Flotta, Fara, Switha & Cava						18	46			
SKUA/GBBGU - Gairsay							20			
SKUA/GBBGU - Hoy						74	3,150			
SKUA/GBBGU - Rousay						38	162			
SKUA/GBBGU - Shapinsay							16			
SKUA/GBBGU - South Ronaldsay						8	20			
SKUA/GBBGU - Stronsay & Auskerry							12			
SKUA/GBBGU - Sule Skerry							30			
SKUA/GBBGU - West Mainland						44	54			
SKUA/GBBGU - Westray & Papa Westray						34	80			
Skye		15			44		4	406		
Skye - Strathaird					4			100		
Skye: Hoe Point to Meanish					468			124		
Skye: Meanish Pier to Druim Slachaidh										
Sleet Moss, Mid Hill and Loch Swanney Area						26				
Smoo to Melvich		21	269		4,016	100	2	100		231
Sound of Barra							2			
Sound of Luing										

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
Sound of Pabbay					980		28			
Sound of Papa					14					
South Dorset Coast SSSI					40					
South East Sutherland / Alness Bay Ross-shire					50	6				
South Island					846					
South Nesting to Lerwick					412					
South Ronaldsay		24	4,633		6,300	8		102		506
South Ronaldsay (East)						8	8			
South Ronaldsay (South East)					260					
South Ronaldsay (West)										
South Stack					28					
South Sutor					62			50		7
South Walls	71	1								
South West Iona & Soa					112		2			
Spiggie							56			
St Abb's Head to Fast Castle SPA					380			9200	22	2,438
St Abbs to Eyemouth					88					
St Agnes Island					20					
St Anne's Head (Renny Slip to Dale)					16					
St Bees Head and Town					86					

MacArthur Green

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
St Bride's Bay (S & SE)					124					
St Cyrus NNR					86					
St Kilda SPA		69,622		10,000	58,372		188	840	120,580	3,400
St Margaret's					14					
St Martin's Island					92					
St. Ninian's Isle		34			7,862			140		
Stac Mhic Mhurchaidh, Reidh Eilean, Eilean Annraidh, Eilean Chalba					76		2			
Staffa				32	58		2			
Staffin					4		28			
Staithes to Sandsend					432					
Starling Knowe to Downan Point					18					
Stenness to Hillswick		9			1,832					
Stoer Headland			371		698		2	514		244
Stonehaven to Wine Cove					190			560		
Stourbrough Hill							4			
Straight Point and Otterton Ledge to Big Picket Rock					10					
Strathlene to Portknockie					114					36
Strom										

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
Stromness	20				10					
Stromness Area, Hundland	9		4		982					73
Stromness to Binnaness					36					
Stronsay		1	976		5,226	2	98	294		18
Strumble Head - Pwll Deri					76					
Strumble Head to Fishguard to Newport					122					
Studland SSSI - Purbeck					8					
Sule Skerry and Sule Stack SPA	2	95,484	13,088	618	238	30		100		30
Sullom Voe					298					
Sumburgh							6			
Sumburgh Head Quarries					2,446			276		
Sumburgh Head SPA		632			14,954		2	2,502		
Sumburgh to Peerie Voe of Spiggie		720			21,590			96		
Summer Isles					114		16			
Swanbister - Scapa Bay, West Mainland					1,178		12			
Switha		21	107		904					300
Taransay - Harris										
Tarbet, Badcail Bay and Edrachillis Bay					22	70				
Tenby to Amroth					38					
Thanet Coast and Sandwich Bay SPA										

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
The Bastard - Kintyre					2					
The Gauldrons										
The Taing - The Nev					3,160			100		
The Wash SPA					214					
Tingwall					28					
Tingwall to Hatston					544					
Tintagel Cliffs SSSI					34					
Tiree					2,108		4	466		
Toe Head - Harris					6			334		
Tolsta Chaolais to Bragair - Lewis					1,122					
Tolsta Head Moir - Lewis							26			
Tonga Field							92			
Traprain Law SSSI										
Treginnis - Dinas Fawr, Solva					82					
Trerubies Cove - North Cornwall					30					
Treshnish Isles SPA				20,544	702		20	1,926		
Tresta Voe - Weisdale Voe					106					
Tresungers Point, North Cornwall					192					
Trevan Point, North Cornwall					26					
Trevelgue Head to Merope Rocks					440					

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
Tronda, East Burra and Houss Ness					102					
Trondra					96		8			
Trondra (East Side), East Burra and Houss Ness					1,100					
Troup, Pennan and Lion's Heads SPA		30	30,941		3,788			35,592	9,650	5,873
Ulsta to Whalefirth (Yell)					5,334					
Unst - Clibberswick							4			
Unst - Crussa Field							106			
Unst - Lund							10			
Unst - Skaw							108			
Unst - south west		2			3,068					
Unst - Vallafield							266			
Unst -Saxavord							1,950			
Vaila					2,950		72	88		
Vane Farm RSPB Reserve to Cock Law										
Varley Head, North Cornwall					16					
Vementry Region					864					
Vigon							104			
Walls - Dale					2					
Walls to Dales					1,042		4	36		
Ward of Culswick							14			

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
Ward of Grimsetter							62			
Ward of Reafirth							6			
Ward of Redland and Cuffie Hill										
Wart Holm										
Weisdale Voe to Skeld					220					
Welcombe Mouth to Hartland Quay					6					
West Bay - Bridport					42					
West Burra - Shetland					1,116			58		
West Burrafirth to Longa Ness					20					
West Coast Wigtownshire					10					
West Exmoor Coast and Woods SSSI					382					
West Island					112					
West Mainland	4				24	2				
West Mainland (Coastal Sites)	174				20	2				
West Mainland (Houton - Stenness Hills)	-				206					
West Mainland (Inland) - HY31					46					
West Penwith					186					
West Westray SPA		38	37,306		2,428	8		5,510	2,768	2,807
Westray					394					
Westray - Aikerness					12					

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
Westray - Bakie Skerry to Gallo Hill					172					
Westray - Central										
Westray - North Hill and Loch of Burness					38					
Westray - North West					10					
Westray - Rapness		271			48					
Westray - Swartmill to Rapness					172					
Westray and adjacent Holms - Tysties		56								
Weybourne Cliffs SSSI					18					
Weybourne to Overstrand					20					
Whalefirth to Aastack					362					
Whalsay					8					
Whalsay 1							6			
Whalsay 2							2			
Whalsay: East Skerries and Holms					116		2			
Whalsay: Western Islands					58		2			
Whitby to Robin Hood's Bay					164					
Whitehead					10					
Woodwick House to Tingwall Pier					48					
Wyre							2			
Yell							10			

Seabird colony ID	Colony counts (Individuals)									
	Arctic tern	Puffin	Guillemot	European storm-petrel	Fulmar	Great black-backed gull	Great skua	Kittiwake	Gannet	Razorbill
Yell - Black Park							12			
Yell - East Coast		107			3,730			176		
Yell - Lumbister							26			
Yell - Lumbister South							186			
Yell - Whale Firth to Gloup					2,424					
Yell Sound Islands		58			1,078		38			
Yesnaby - Ness Point, Stromness	200		47		1,566	4		12		142
Yesnaby to Marwick (West Mainland)		7	5,749		1,714			2		436
Ythan Estuary, Sands of Forvie and Meikle Loch SPA					92			1,058		
GRAND TOTAL	1,724	333,421	612,608	67,180	647,236	2,524	21,124	256,327	404,008	95,725

West of Orkney Windfarm

Offshore Ornithology Technical Appendix 12

Annex 12.13 Alternative mean seasonal peak abundance matrix displacement tables and analyses

Date:	31st May 2023
Tel:	0141 342 5404
Web:	www.macarthurgreen.com
Address:	93 South Woodside Road |Glasgow | G20 6NT

Document Quality Record

Version	Status	Person Responsible	Date
0.1	Draft	Dr. R. McGregor	19/06/2023
0.2	Reviewed	Dr M. Trinder	21/06/2023
0.3	Updated	Dr. R. McGregor	22/06/2023
1	Internal Approval	Dr. R. McGregor	23/06/2023

CONTENTS

LIST OF TABLES

1 INTRODUCTION

1. This Annex provides the assessment of displacement using the ***Alternative Approach*** that closely follows SNCBs (2022) guidance. This approach was not the preferred approach taken for the Offshore EIA, as it does not make use of all of the available data from monthly Digital Aerial Surveys (DAS) of the Project and 2 km buffer.

2. The predicted impacts from the alternative displacement approach were collated and the effect of these predicted impacts on the annual adult survival rate was calculated for each species in each season and each BDMPS region.

3. Where this change in adult survival exceeded 0.02% points, a Population Viability Analyses PVA for each species in each season and in the BDMPS region with the largest predicted change in adult survival was run. The Annex provides a description of the PVA inputs used.

4. This Annex provides a complete ***Alternative Approach*** to the assessment of displacement, to provide NatureScot with their advised preferred approach.

1.1 Alternative displacement approach

5. The calculations for the peak mean abundance estimates using the ***Alternative Approach*** and resulting matrix displacement tables for the West of Orkney Windfarm ('the Project') Offshore Environmental Impact Assessment (EIA) Report and Offshore Report to Inform Appropriate Assessment (RIAA) are provided in Section 1.2.

1.2 Input mean seasonal peak abundance estimation

6. For each species requiring a displacement assessment the predicted abundance from each survey was summarised in Table 1-1 to Table 1-7. Within each season the peak abundance across all months and years within the season was identified. When a month was split between each season it was assumed that the abundance was appropriate for consideration for either season when identifying the seasonal peak.

Table 1-1 Predicted abundance of kittiwakes in the OAA + 2 km buffer in each month surveyed across all seasons surveyed. Peak abundance in each season in each year is shown in bold. Breeding season is shaded green, non-breeding season is shaded yellow; months shaded blue are spilt between seasons.

Month	Year		
	2020	2021	2022
Jan		93	85
Feb		232	395
Mar		**1,185**	**1,249**
Apr		**496**	139
May		70	93
Jun		140	77
July	**241**	101	**1,729**
Aug	231	0	23

Month	Year		
	2020	2021	2022
Sept	15	155	**24**
Oct	1,000	597	
Nov	233	108	
Dec	101	39	

Table 1-2 Predicted abundance of guillemots in the OAA + 2 km buffer in each month surveyed across all seasons surveyed. Peak abundance in each season in each year is shown in bold. Breeding season is shaded green, non-breeding season is shaded yellow; months shaded blue are spilt between seasons.

Month	Year		
	2020	2021	2022
Jan		1,542	217
Feb		2,540	651
Mar		2,773	380
Apr		**6,887**	1,725
May		395	1,871
Jun		1,000	2,462
July	**4,106**	1,419	**9,058**
Aug	1,338	3,399	**4,339**
Sept	**4,517**	**4,269**	4,039
Oct	4,210	3,249	
Nov	620	1,192	
Dec	860	1,782	

Table 1-3 Predicted abundance of razorbills in the OAA + 2 km buffer in each month surveyed across all seasons surveyed. Peak abundance in each season in each year is shown in bold. Breeding season is shaded green, non-breeding season is shaded yellow; months shaded blue are spilt between seasons.

Month	Year		
	2020	2021	2022
Jan		0	0
Feb		93	54
Mar		23	**171**
Apr		**140**	0
May		0	8
Jun		47	0
July	**16**	0	**143**

Month	Year		
	2020	2021	2022
Aug	16	132	47
Sept	**93**	62	**277**
Oct	0	23	
Nov	8	8	
Dec	0	31	

Table 1-4 Predicted abundance of puffins in the OAA + 2 km buffer in each month surveyed across all seasons surveyed. Peak abundance in each season in each year is shown in bold. Breeding season is shaded green, non-breeding season is shaded yellow; months shaded blue are spilt between seasons.

Month	Year		
	2020	2021	2022
Jan		8	0
Feb		8	0
Mar		0	0
Apr		1,319	1,393
May		233	4,689
Jun		**4,930**	**5,614**
July	**1,604**	2,202	5,021
Aug	**1,545**	2,021	**4,424**
Sept	163	**2,727**	640
Oct	116	225	
Nov	0	0	
Dec	0	8	

Table 1-5 Predicted abundance of fulmars in the OAA + 2 km buffer in each month surveyed across all seasons surveyed. Peak abundance in each season in each year is shown in bold. Breeding season is shaded green, non-breeding season is shaded yellow, months shaded blue are spilt between seasons.

Month	Year		
	2020	2021	2022
Jan		1,922	1,108
Feb		302	1,518
Mar		1,100	**2,264**
Apr		357	542
May		240	217
Jun		0	170

Month	Year		
	2020	2021	2022
July	794	202	460
Aug	1,600	**1,270**	445
Sept	**3,192**	759	**1,802**
Oct	1,752	1,690	
Nov	1,086	542	
Dec	**3,464**	2,085	

Table 1-6 Predicted abundance of Arctic terns in the OAA + 2 km buffer in each month surveyed across all seasons surveyed. Peak abundance in each season in each year is shown in bold. Breeding season is shaded green, non-breeding season is shaded yellow.

Month	Year		
	2020	2021	2022
Jan		0	0
Feb		0	0
Mar		0	0
Apr		0	0
May		0	8
Jun		**178**	0
July	**0**	0	48
Aug	0	23	**70**
Sept	0	0	**0**
Oct	0	0	
Nov	0	0	
Dec	0	0	

Table 1-7 Predicted abundance of gannets in the OAA + 2 km buffer in each month surveyed across all seasons surveyed. Peak abundance in each season in each year is shown in bold. Breeding season is shaded green, non-breeding season is shaded yellow, months shaded blue are spilt between seasons.

Month	Year		
	2020	2021	2022
Jan		31	23
Feb		77	77
Mar		54	202
Apr		396	**812**
May		496	256

Month	Year		
	2020	2021	2022
Jun		240	434
July	433	341	428
Aug	**1,974**	689	211
Sept	1,278	**891**	538
Oct	**884**	**1,458**	
Nov	23	46	
Dec	70	15	

7. For each species the peak month and abundance estimate, assuming only complete seasons should be included, used to calculate the mean seasonal peak abundance are summarised in Table 1-8 to Table 1-14.

Table 1-8 Months and abundance estimated used in the calculation of the mean seasonal peak abundance of kittiwake.

Season	Peak month and abundance estimate		Mean seasonal peak abundance
Breeding	Apr-21	Jul-22	**1,113**
	496	1,729	
Non-breeding	Mar-21	Mar-22	**1,217**
	1,185	1,249	

Table 1-9 Months and abundance estimated used in the calculation of the mean seasonal peak abundance of guillemot.

Season	Peak month and abundance estimate		Mean seasonal peak abundance
Breeding	Apr-21	Jul-22	**7,973**
	6,887	9,058	
Non-breeding	Sep-20	Sep-21	**4,393**
	4,517	4,269	

Table 1-10 Months and abundance estimated used in the calculation of the mean seasonal peak abundance of razorbill.

Season	Peak month and abundance estimate		Mean seasonal peak abundance
Breeding	Apr-21	Jul-22	**141**
	140	143	
Non-breeding	Sep-20	Sep-21	**132**
	93	171	

Table 1-11 Months and abundance estimated used in the calculation of the mean seasonal peak abundance of puffin.

Season	Peak month and abundance estimate		Mean seasonal peak abundance
Breeding	Jun-21	Jun-22	**5,272**
	4,930	5,614	
Non-breeding	Aug-20	Sep-21	**2,136**
	1,545	2,727	

Table 1-12 Months and abundance estimated used in the calculation of the mean seasonal peak abundance of fulmar.

Season	Peak month and abundance estimate		Mean seasonal peak abundance
Breeding	Aug-21	Jun-22	**1,536**
	1,270	1,802	
Non-breeding	Dec-20	Mar-22	**2,864**
	3,464	2,264	

Table 1-13 Months and abundance estimated used in the calculation of the mean seasonal peak abundance of Arctic tern.

Season	Peak month and abundance estimate		Mean seasonal peak abundance
Breeding	Jun-21	Aug-22	**124**
	178	70	
Non-breeding	Sep-20	Sep-21	**0**
	0	0	

Table 1-14 Months and abundance estimated used in the calculation of the mean seasonal peak abundance of gannet.

Season	Peak month and abundance estimate		Mean seasonal peak abundance
Breeding	Sep-21	Apr-22	**852**
	891	812	
Non-breeding	Oct-20	Oct-21	**1,171**
	884	1,458	

1.3 Alternative approach displacement matrices

1.3.1 Kittiwake

Table 1-15 Displacement matrix for kittiwake in the breeding season

		DISPLACEMENT										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
MORTALITY	0%	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1%	0	1.1	2.2	3.3	4.5	5.6	6.7	7.8	8.9	10.0	11.1
	2%	0	2.2	4.5	**6.7**	8.9	11.1	13.4	15.6	17.8	20.0	22.3
	3%	0	3.3	6.7	10.0	13.4	16.7	20.0	23.4	26.7	30.0	33.4
	4%	0	4.5	8.9	13.4	17.8	22.3	26.7	31.2	35.6	40.1	44.5
	5%	0	5.6	11.1	16.7	22.3	27.8	33.4	38.9	44.5	50.1	55.6
	10%	0	11.1	22.3	33.4	44.5	55.6	66.8	77.9	89.0	100.1	111.3
	15%	0	16.7	33.4	50.1	66.8	83.5	100.1	116.8	133.5	150.2	166.9
	20%	0	22.3	44.5	66.8	89.0	111.3	133.5	155.8	178.0	200.3	222.5
	30%	0	33.4	66.8	100.1	133.5	166.9	200.3	233.7	267.1	300.4	333.8
	40%	0	44.5	89.0	133.5	178.0	222.5	267.1	311.6	356.1	400.6	445.1
	50%	0	55.6	111.3	166.9	222.5	278.2	333.8	389.5	445.1	500.7	556.4
	60%	0	66.8	133.5	200.3	267.1	333.8	400.6	467.3	534.1	600.9	667.6
	70%	0	77.9	155.8	233.7	311.6	389.5	467.3	545.2	623.1	701.0	778.9
	80%	0	89.0	178.0	267.1	356.1	445.1	534.1	623.1	712.1	801.2	890.2
	90%	0	100.1	200.3	300.4	400.6	500.7	600.9	701.0	801.2	901.3	1001.4
	100%	0	111.3	222.5	333.8	445.1	556.4	667.6	778.9	890.2	1001.4	1112.7

Table 1-16 Displacement matrix for kittiwake in the non-breeding season.

		DISPLACEMENT										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
MORTALITY	0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1%	0.0	1.2	2.4	3.7	4.9	6.1	7.3	8.5	9.7	11.0	12.2
	2%	0.0	2.4	4.9	7.3	9.7	12.2	14.6	17.0	19.5	21.9	24.3
	3%	0.0	3.7	7.3	11.0	14.6	18.3	21.9	25.6	29.2	32.9	36.5
	4%	0.0	4.9	9.7	14.6	19.5	24.3	29.2	34.1	38.9	43.8	48.7
	5%	0.0	6.1	12.2	18.3	24.3	30.4	36.5	42.6	48.7	54.8	60.8
	10%	0.0	12.2	24.3	36.5	48.7	60.8	73.0	85.2	97.3	109.5	121.7
	15%	0.0	18.3	36.5	54.8	73.0	91.3	109.5	127.8	146.0	164.3	182.5
	20%	0.0	24.3	48.7	73.0	97.3	121.7	146.0	170.3	194.7	219.0	243.4
	30%	0.0	36.5	73.0	109.5	146.0	182.5	219.0	255.5	292.0	328.5	365.0
	40%	0.0	48.7	97.3	146.0	194.7	243.4	292.0	340.7	389.4	438.0	486.7
	50%	0.0	60.8	121.7	182.5	243.4	304.2	365.0	425.9	486.7	547.6	608.4
	60%	0.0	73.0	146.0	219.0	292.0	365.0	438.0	511.0	584.1	657.1	730.1
	70%	0.0	85.2	170.3	255.5	340.7	425.9	511.0	596.2	681.4	766.6	851.7
	80%	0.0	97.3	194.7	292.0	389.4	486.7	584.1	681.4	778.7	876.1	973.4
	90%	0.0	109.5	219.0	328.5	438.0	547.6	657.1	766.6	876.1	985.6	1095.1
	100%	0.0	121.7	243.4	365.0	486.7	608.4	730.1	851.7	973.4	1095.1	1216.8

1.3.2 Arctic tern

Table 1-17 Displacement matrix for Arctic tern in the breeding season

		DISPLACEMENT										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
MORTALITY	0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1%	0.0	0.1	0.2	0.4	0.5	0.6	0.7	0.9	1.0	1.1	1.2
	2%	0.0	0.2	0.5	0.7	1.0	1.2	1.5	1.7	2.0	2.2	2.5
	3%	0.0	0.4	0.7	1.1	1.5	1.9	2.2	2.6	3.0	3.4	3.7
	4%	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
	5%	0.0	0.6	1.2	1.9	2.5	3.1	3.7	4.3	5.0	5.6	6.2
	10%	0.0	1.2	2.5	3.7	5.0	6.2	7.5	8.7	9.9	11.2	12.4
	15%	0.0	1.9	3.7	5.6	7.5	9.3	11.2	13.0	14.9	16.8	18.6
	20%	0.0	2.5	5.0	7.5	9.9	12.4	14.9	17.4	19.9	22.4	24.9
	30%	0.0	3.7	7.5	11.2	14.9	18.6	22.4	26.1	29.8	33.5	37.3
	40%	0.0	5.0	9.9	14.9	19.9	24.9	29.8	34.8	39.8	44.7	49.7
	50%	0.0	6.2	12.4	18.6	24.9	31.1	37.3	43.5	49.7	55.9	62.1
	60%	0.0	7.5	14.9	22.4	29.8	37.3	44.7	52.2	59.6	67.1	74.6
	70%	0.0	8.7	17.4	26.1	34.8	43.5	52.2	60.9	69.6	78.3	87.0
	80%	0.0	9.9	19.9	29.8	39.8	49.7	59.6	69.6	79.5	89.5	99.4
	90%	0.0	11.2	22.4	33.5	44.7	55.9	67.1	78.3	89.5	100.6	111.8
	100%	0.0	12.4	24.9	37.3	49.7	62.1	74.6	87.0	99.4	111.8	124.3

1.3.3 Guillemot

Table 1-18 Displacement matrix for guillemot in the breeding season

		DISPLACEMENT										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
MORTALITY	0.5%	0.0	0.0	0.0	0.0	0.0	19.9	23.9	27.9	0.0	0.0	0.0
	1%	0.0	8.0	15.9	23.9	31.9	39.9	47.8	55.8	63.8	71.8	79.7
	2%	0.0	15.9	31.9	47.8	63.8	79.7	95.7	111.6	127.6	143.5	159.5
	3%	0.0	23.9	47.8	71.8	95.7	119.6	143.5	167.4	191.3	215.3	239.2
	4%	0.0	31.9	63.8	95.7	127.6	159.5	**191.3**	223.2	255.1	287.0	318.9
	5%	0.0	39.9	79.7	119.6	159.5	199.3	239.2	279.0	318.9	358.8	398.6
	10%	0.0	79.7	159.5	239.2	318.9	398.6	478.4	558.1	637.8	717.5	797.3
	15%	0.0	119.6	239.2	358.8	478.4	597.9	717.5	837.1	956.7	1076.3	1195.9
	20%	0.0	159.5	318.9	478.4	637.8	797.3	956.7	1116.2	1275.6	1435.1	1594.5
	30%	0.0	239.2	478.4	717.5	956.7	1195.9	1435.1	1674.2	1913.4	2152.6	2391.8
	40%	0.0	318.9	637.8	956.7	1275.6	1594.5	1913.4	2232.3	2551.2	2870.1	3189.0
	50%	0.0	398.6	797.3	1195.9	1594.5	1993.1	2391.8	2790.4	3189.0	3587.6	3986.3
	60%	0.0	478.4	956.7	1435.1	1913.4	2391.8	2870.1	3348.5	3826.8	4305.2	4783.5
	70%	0.0	558.1	1116.2	1674.2	2232.3	2790.4	3348.5	3906.5	4464.6	5022.7	5580.8
	80%	0.0	637.8	1275.6	1913.4	2551.2	3189.0	3826.8	4464.6	5102.4	5740.2	6378.0
	90%	0.0	717.5	1435.1	2152.6	2870.1	3587.6	4305.2	5022.7	5740.2	6457.7	7175.3
	100%	0.0	797.3	1594.5	2391.8	3189.0	3986.3	4783.5	5580.8	6378.0	7175.3	7972.5

Table 1-19 Displacement matrix for guillemot in the non-breeding season

		DISPLACEMENT										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
MORTALITY	0.5%	0.0	2.2	4.4	6.6	8.8	11.0	13.2	15.4	17.6	19.8	22.0
	1%	0.0	4.4	8.8	13.2	17.6	22.0	26.4	30.8	35.1	39.5	43.9
	2%	0.0	8.8	17.6	26.4	35.1	43.9	**52.7**	61.5	70.3	79.1	87.9
	3%	0.0	13.2	26.4	39.5	52.7	65.9	79.1	92.3	105.4	118.6	131.8
	4%	0.0	17.6	35.1	52.7	70.3	87.9	105.4	123.0	140.6	158.1	175.7
	5%	0.0	22.0	43.9	65.9	87.9	109.8	131.8	153.8	175.7	197.7	219.6
	10%	0.0	43.9	87.9	131.8	175.7	219.6	263.6	307.5	351.4	395.4	439.3
	15%	0.0	65.9	131.8	197.7	263.6	329.5	395.4	461.3	527.2	593.0	658.9
	20%	0.0	87.9	175.7	263.6	351.4	439.3	527.2	615.0	702.9	790.7	878.6
	30%	0.0	131.8	263.6	395.4	527.2	658.9	790.7	922.5	1054.3	1186.1	1317.9
	40%	0.0	175.7	351.4	527.2	702.9	878.6	1054.3	1230.0	1405.7	1581.5	1757.2
	50%	0.0	219.6	439.3	658.9	878.6	1098.2	1317.9	1537.5	1757.2	1976.8	2196.5
	60%	0.0	263.6	527.2	790.7	1054.3	1317.9	1581.5	1845.0	2108.6	2372.2	2635.8
	70%	0.0	307.5	615.0	922.5	1230.0	1537.5	1845.0	2152.5	2460.0	2767.5	3075.0
	80%	0.0	351.4	702.9	1054.3	1405.7	1757.2	2108.6	2460.0	2811.5	3162.9	3514.3
	90%	0.0	395.4	790.7	1186.1	1581.5	1976.8	2372.2	2767.5	3162.9	3558.3	3953.6
	100%	0.0	439.3	878.6	1317.9	1757.2	2196.5	2635.8	3075.0	3514.3	3953.6	4392.9

1.3.4 Razorbill

Table 1-20 Displacement matrix for razorbill in the breeding season

		DISPLACEMENT										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
MORTALITY	0.5%	0.0	0.1	0.1	0.2	0.3	0.4	0.4	0.5	0.6	0.6	0.7
	1%	0.0	0.1	0.3	0.4	0.6	0.7	0.8	1.0	1.1	1.3	1.4
	2%	0.0	0.3	0.6	0.8	1.1	1.4	1.7	2.0	2.3	2.5	2.8
	3%	0.0	0.4	0.8	1.3	1.7	2.1	2.5	3.0	3.4	3.8	4.2
	4%	0.0	0.6	1.1	1.7	2.3	2.8	3.4	4.0	4.5	5.1	5.6
	5%	0.0	0.7	1.4	2.1	2.8	3.5	4.2	4.9	5.6	6.4	7.1
	10%	0.0	1.4	2.8	4.2	5.6	7.1	8.5	9.9	11.3	12.7	14.1
	15%	0.0	2.1	4.2	6.4	8.5	10.6	12.7	14.8	16.9	19.1	21.2
	20%	0.0	2.8	5.6	8.5	11.3	14.1	16.9	19.8	22.6	25.4	28.2
	30%	0.0	4.2	8.5	12.7	16.9	21.2	25.4	29.6	33.9	38.1	42.4
	40%	0.0	5.6	11.3	16.9	22.6	28.2	33.9	39.5	45.2	50.8	56.5
	50%	0.0	7.1	14.1	21.2	28.2	35.3	42.4	49.4	56.5	63.5	70.6
	60%	0.0	8.5	16.9	25.4	33.9	42.4	50.8	59.3	67.8	76.2	84.7
	70%	0.0	9.9	19.8	29.6	39.5	49.4	59.3	69.2	79.1	88.9	98.8
	80%	0.0	11.3	22.6	33.9	45.2	56.5	67.8	79.1	90.4	101.7	112.9
	90%	0.0	12.7	25.4	38.1	50.8	63.5	76.2	88.9	101.7	114.4	127.1
	100%	0.0	14.1	28.2	42.4	56.5	70.6	84.7	98.8	112.9	127.1	141.2

Table 1-21 Displacement matrix for razorbill in the non-breeding season

		DISPLACEMENT										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
MORTALITY	0.5%	0.0	0.1	0.1	0.2	0.3	0.3	0.4	0.5	0.5	0.6	0.7
	1%	0.0	0.1	0.3	0.4	0.5	0.7	0.8	0.9	1.1	1.2	1.3
	2%	0.0	0.3	0.5	0.8	1.1	1.3	**1.6**	1.8	2.1	2.4	2.6
	3%	0.0	0.4	0.8	1.2	1.6	2.0	2.4	2.8	3.2	3.6	4.0
	4%	0.0	0.5	1.1	1.6	2.1	2.6	3.2	3.7	4.2	4.7	5.3
	5%	0.0	0.7	1.3	2.0	2.6	3.3	4.0	4.6	5.3	5.9	6.6
	10%	0.0	1.3	2.6	4.0	5.3	6.6	7.9	9.2	10.5	11.9	13.2
	15%	0.0	2.0	4.0	5.9	7.9	9.9	11.9	13.8	15.8	17.8	19.8
	20%	0.0	2.6	5.3	7.9	10.5	13.2	15.8	18.5	21.1	23.7	26.4
	30%	0.0	4.0	7.9	11.9	15.8	19.8	23.7	27.7	31.6	35.6	39.5
	40%	0.0	5.3	10.5	15.8	21.1	26.4	31.6	36.9	42.2	47.4	52.7
	50%	0.0	6.6	13.2	19.8	26.4	32.9	39.5	46.1	52.7	59.3	65.9
	60%	0.0	7.9	15.8	23.7	31.6	39.5	47.4	55.4	63.3	71.2	79.1
	70%	0.0	9.2	18.5	27.7	36.9	46.1	55.4	64.6	73.8	83.0	92.3
	80%	0.0	10.5	21.1	31.6	42.2	52.7	63.3	73.8	84.3	94.9	105.4
	90%	0.0	11.9	23.7	35.6	47.4	59.3	71.2	83.0	94.9	106.7	118.6
	100%	0.0	13.2	26.4	39.5	52.7	65.9	79.1	92.3	105.4	118.6	131.8

1.3.5 Puffin

Table 1-22 Displacement matrix for puffin in the breeding season

		DISPLACEMENT										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
MORTALITY	0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1%	0.0	5.3	10.5	15.8	21.1	26.4	31.6	36.9	42.2	47.4	52.7
	2%	0.0	10.5	21.1	31.6	42.2	52.7	63.3	73.8	84.3	94.9	105.4
	3%	0.0	15.8	31.6	47.4	63.3	79.1	94.9	110.7	126.5	142.3	158.2
	4%	0.0	21.1	42.2	63.3	84.3	105.4	**126.5**	147.6	168.7	189.8	210.9
	5%	0.0	26.4	52.7	79.1	105.4	131.8	158.2	184.5	210.9	237.2	263.6
	10%	0.0	52.7	105.4	158.2	210.9	263.6	316.3	369.0	421.7	474.5	527.2
	15%	0.0	79.1	158.2	237.2	316.3	395.4	474.5	553.5	632.6	711.7	790.8
	20%	0.0	105.4	210.9	316.3	421.7	527.2	632.6	738.1	843.5	948.9	1054.4
	30%	0.0	158.2	316.3	474.5	632.6	790.8	948.9	1107.1	1265.2	1423.4	1581.6
	40%	0.0	210.9	421.7	632.6	843.5	1054.4	1265.2	1476.1	1687.0	1897.9	2108.7
	50%	0.0	263.6	527.2	790.8	1054.4	1318.0	1581.6	1845.2	2108.7	2372.3	2635.9
	60%	0.0	316.3	632.6	948.9	1265.2	1581.6	1897.9	2214.2	2530.5	2846.8	3163.1
	70%	0.0	369.0	738.1	1107.1	1476.1	1845.2	2214.2	2583.2	2952.2	3321.3	3690.3
	80%	0.0	421.7	843.5	1265.2	1687.0	2108.7	2530.5	2952.2	3374.0	3795.7	4217.5
	90%	0.0	474.5	948.9	1423.4	1897.9	2372.3	2846.8	3321.3	3795.7	4270.2	4744.7
	100%	0.0	527.2	1054.4	1581.6	2108.7	2635.9	3163.1	3690.3	4217.5	4744.7	5271.9

Table 1-23 Displacement matrix for puffin in the non-breeding season

		DISPLACEMENT										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
MORTALITY	0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1%	0.0	2.1	4.3	6.4	8.5	10.7	12.8	15.0	17.1	19.2	21.4
	2%	0.0	4.3	8.5	12.8	17.1	21.4	**25.6**	29.9	34.2	38.4	42.7
	3%	0.0	6.4	12.8	19.2	25.6	32.0	38.4	44.9	51.3	57.7	64.1
	4%	0.0	8.5	17.1	25.6	34.2	42.7	51.3	59.8	68.4	76.9	85.4
	5%	0.0	10.7	21.4	32.0	42.7	53.4	64.1	74.8	85.4	96.1	106.8
	10%	0.0	21.4	42.7	64.1	85.4	106.8	128.2	149.5	170.9	192.2	213.6
	15%	0.0	32.0	64.1	96.1	128.2	160.2	192.2	224.3	256.3	288.4	320.4
	20%	0.0	42.7	85.4	128.2	170.9	213.6	256.3	299.0	341.8	384.5	427.2
	30%	0.0	64.1	128.2	192.2	256.3	320.4	384.5	448.5	512.6	576.7	640.8
	40%	0.0	85.4	170.9	256.3	341.8	427.2	512.6	598.1	683.5	768.9	854.4
	50%	0.0	106.8	213.6	320.4	427.2	534.0	640.8	747.6	854.4	961.2	1068.0
	60%	0.0	128.2	256.3	384.5	512.6	640.8	768.9	897.1	1025.3	1153.4	1281.6
	70%	0.0	149.5	299.0	448.5	598.1	747.6	897.1	1046.6	1196.1	1345.6	1495.2
	80%	0.0	170.9	341.8	512.6	683.5	854.4	1025.3	1196.1	1367.0	1537.9	1708.8
	90%	0.0	192.2	384.5	576.7	768.9	961.2	1153.4	1345.6	1537.9	1730.1	1922.4
	100%	0.0	213.6	427.2	640.8	854.4	1068.0	1281.6	1495.2	1708.8	1922.4	2135.9

1.3.6 Fulmar

Table 1-24 Displacement matrix for fulmar in the breeding season

		DISPLACEMENT										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
MORTALITY	0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1%	0.0	1.5	3.1	4.6	6.1	7.7	9.2	10.8	12.3	13.8	15.4
	2%	0.0	3.1	**6.1**	9.2	12.3	15.4	18.4	21.5	24.6	27.7	30.7
	3%	0.0	4.6	9.2	13.8	18.4	23.0	27.7	32.3	36.9	41.5	46.1
	4%	0.0	6.1	12.3	18.4	24.6	30.7	36.9	43.0	49.2	55.3	61.4
	5%	0.0	7.7	15.4	23.0	30.7	38.4	46.1	53.8	61.4	69.1	76.8
	10%	0.0	15.4	30.7	46.1	61.4	76.8	92.2	107.5	122.9	138.3	153.6
	15%	0.0	23.0	46.1	69.1	92.2	115.2	138.3	161.3	184.3	207.4	230.4
	20%	0.0	30.7	61.4	92.2	122.9	153.6	184.3	215.1	245.8	276.5	307.2
	30%	0.0	46.1	92.2	138.3	184.3	230.4	276.5	322.6	368.7	414.8	460.8
	40%	0.0	61.4	122.9	184.3	245.8	307.2	368.7	430.1	491.6	553.0	614.4
	50%	0.0	76.8	153.6	230.4	307.2	384.0	460.8	537.6	614.4	691.3	768.1
	60%	0.0	92.2	184.3	276.5	368.7	460.8	553.0	645.2	737.3	829.5	921.7
	70%	0.0	107.5	215.1	322.6	430.1	537.6	645.2	752.7	860.2	967.8	1075.3
	80%	0.0	122.9	245.8	368.7	491.6	614.4	737.3	860.2	983.1	1106.0	1228.9
	90%	0.0	138.3	276.5	414.8	553.0	691.3	829.5	967.8	1106.0	1244.3	1382.5
	100%	0.0	153.6	307.2	460.8	614.4	768.1	921.7	1075.3	1228.9	1382.5	1536.1

Table 1-25 Displacement matrix for fulmar in the non-breeding season

		DISPLACEMENT										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
MORTALITY	0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1%	0.0	2.9	5.7	8.6	11.5	14.3	17.2	20.0	22.9	25.8	28.6
	2%	0.0	5.7	**11.5**	17.2	22.9	28.6	34.4	40.1	45.8	51.6	57.3
	3%	0.0	8.6	17.2	25.8	34.4	43.0	51.6	60.1	68.7	77.3	85.9
	4%	0.0	11.5	22.9	34.4	45.8	57.3	68.7	80.2	91.7	103.1	114.6
	5%	0.0	14.3	28.6	43.0	57.3	71.6	85.9	100.2	114.6	128.9	143.2
	10%	0.0	28.6	57.3	85.9	114.6	143.2	171.8	200.5	229.1	257.8	286.4
	15%	0.0	43.0	85.9	128.9	171.8	214.8	257.8	300.7	343.7	386.7	429.6
	20%	0.0	57.3	114.6	171.8	229.1	286.4	343.7	401.0	458.3	515.5	572.8
	30%	0.0	85.9	171.8	257.8	343.7	429.6	515.5	601.5	687.4	773.3	859.2
	40%	0.0	114.6	229.1	343.7	458.3	572.8	687.4	802.0	916.5	1031.1	1145.7
	50%	0.0	143.2	286.4	429.6	572.8	716.0	859.2	1002.4	1145.7	1288.9	1432.1
	60%	0.0	171.8	343.7	515.5	687.4	859.2	1031.1	1202.9	1374.8	1546.6	1718.5
	70%	0.0	200.5	401.0	601.5	802.0	1002.4	1202.9	1403.4	1603.9	1804.4	2004.9
	80%	0.0	229.1	458.3	687.4	916.5	1145.7	1374.8	1603.9	1833.0	2062.2	2291.3
	90%	0.0	257.8	515.5	773.3	1031.1	1288.9	1546.6	1804.4	2062.2	2320.0	2577.7
	100%	0.0	286.4	572.8	859.2	1145.7	1432.1	1718.5	2004.9	2291.3	2577.7	2864.1

1.3.7 Gannet

Table 1-26 Displacement matrix for gannet in the breeding season

		DISPLACEMENT										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
MORTALITY	0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1%	0.0	0.9	1.7	2.6	3.4	4.3	5.1	6.0	6.8	7.7	8.5
	2%	0.0	1.7	3.4	**5.1**	6.8	8.5	10.2	**11.9**	13.6	15.3	17.0
	3%	0.0	2.6	5.1	7.7	10.2	12.8	15.3	17.9	20.4	23.0	25.6
	4%	0.0	3.4	6.8	10.2	13.6	17.0	20.4	23.8	27.3	30.7	34.1
	5%	0.0	4.3	8.5	12.8	17.0	21.3	25.6	29.8	34.1	38.3	42.6
	10%	0.0	8.5	17.0	25.6	34.1	42.6	51.1	59.6	68.1	76.7	85.2
	15%	0.0	12.8	25.6	38.3	51.1	63.9	76.7	89.4	102.2	115.0	127.8
	20%	0.0	17.0	34.1	51.1	68.1	85.2	102.2	119.2	136.3	153.3	170.3
	30%	0.0	25.6	51.1	76.7	102.2	127.8	153.3	178.9	204.4	230.0	255.5
	40%	0.0	34.1	68.1	102.2	136.3	170.3	204.4	238.5	272.5	306.6	340.7
	50%	0.0	42.6	85.2	127.8	170.3	212.9	255.5	298.1	340.7	383.3	425.8
	60%	0.0	51.1	102.2	153.3	204.4	255.5	306.6	357.7	408.8	459.9	511.0
	70%	0.0	59.6	119.2	178.9	238.5	298.1	357.7	417.3	476.9	536.6	596.2
	80%	0.0	68.1	136.3	204.4	272.5	340.7	408.8	476.9	545.1	613.2	681.3
	90%	0.0	76.7	153.3	230.0	306.6	383.3	459.9	536.6	613.2	689.9	766.5
	100%	0.0	85.2	170.3	255.5	340.7	425.8	511.0	596.2	681.3	766.5	851.7

Table 1-27 Displacement matrix for gannet in the non-breeding season

		DISPLACEMENT										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
MORTALITY	0%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	1%	0.0	1.2	2.3	3.5	4.7	5.9	7.0	8.2	9.4	10.5	11.7
	2%	0.0	2.3	4.7	**7.0**	9.4	11.7	14.1	**16.4**	18.7	21.1	23.4
	3%	0.0	3.5	7.0	10.5	14.1	17.6	21.1	24.6	28.1	31.6	35.1
	4%	0.0	4.7	9.4	14.1	18.7	23.4	28.1	32.8	37.5	42.2	46.8
	5%	0.0	5.9	11.7	17.6	23.4	29.3	35.1	41.0	46.8	52.7	58.5
	10%	0.0	11.7	23.4	35.1	46.8	58.5	70.3	82.0	93.7	105.4	117.1
	15%	0.0	17.6	35.1	52.7	70.3	87.8	105.4	122.9	140.5	158.1	175.6
	20%	0.0	23.4	46.8	70.3	93.7	117.1	140.5	163.9	187.3	210.8	234.2
	30%	0.0	35.1	70.3	105.4	140.5	175.6	210.8	245.9	281.0	316.1	351.3
	40%	0.0	46.8	93.7	140.5	187.3	234.2	281.0	327.8	374.7	421.5	468.3
	50%	0.0	58.5	117.1	175.6	234.2	292.7	351.3	409.8	468.3	526.9	585.4
	60%	0.0	70.3	140.5	210.8	281.0	351.3	421.5	491.8	562.0	632.3	702.5
	70%	0.0	82.0	163.9	245.9	327.8	409.8	491.8	573.7	655.7	737.6	819.6
	80%	0.0	93.7	187.3	281.0	374.7	468.3	562.0	655.7	749.3	843.0	936.7
	90%	0.0	105.4	210.8	316.1	421.5	526.9	632.3	737.6	843.0	948.4	1053.8
	100%	0.0	117.1	234.2	351.3	468.3	585.4	702.5	819.6	936.7	1053.8	1170.9

1.4 Displacement Summary

Table 1-28 Summary of predicted seasonal displacement impacts (birds killed per annum) for LOW, MID and HIGH mortality values for each species.

Species	Season	LOW Displacement	MID Displacement impact	HIGH Displacement
Kittiwake	Breeding	3.3	6.7	10.0
	Non-breeding	3.7	7.3	10.0
Arctic tern	Breeding	143.5	1.5	239.2
Guillemot	Breeding	26.4	191.3	79.1
	Non-breeding	2.5	52.7	4.2
Razorbill	Breeding	0.8	3.4	2.4
	Non-breeding	94.9	1.6	158.2
Puffin	Breeding	12.8	126.5	38.4
	Non-breeding	3.1	25.6	9.2
Gannet	Breeding	5.7	11.9	17.2
	Non-breeding	1.1	16.4	1.9
Fulmar	Breeding	6.0	6.1	17.9
	Non-breeding	8.2	11.5	24.6

2 PREDICTED IMPACTS ON ADULT SURVIVAL

8. The predicted impact on adult survival were estimated based on the total impact on adult birds for each species from the Project alone and cumulatively (Table 2-1). For kittiwake and gannet impacts were based on collisions and displacement impacts combined. For guillemot, razorbill, puffin and fulmar impact were based on displacement alone. The predicted impacts from Table 1-28 were adjusted by removing the non-adult proportion of the population (based on a PVA stable age structure) and, in the breeding season only, the proportion of birds advised to be sabbatical birds. Thus, the predicted impacts in Table 2-1 are comparable to the estimate of the regional adult population from colony counts (in the breeding season) or from the BDMPS region.

9. The changes in adult survival for the Project alone and cumulatively were calculated from the predicted impacts (Table 2-1), the adult survival rate (Horswill & Robinson 2015) and the regional population size relevant to each season and BDMPS region (Table 3-3).

10. Where the predicted impacts from the Project alone or cumulatively exceeded a change in adult survival of more than 0.02% point then a PVA model was run to aid in the assessment of the scale of the predicted impact on each regional population.

11. In the non-breeding season, impacts and changes in adult survival were predicted for two BDMPS regions (UK North Sea waters and Western waters – with or without the English Channel depending on the species). Where the change in adult survival exceeded 0.02% points for more than one BDMPS region the PVA was only run for the region with the highest predicted change in adult survival, so the assessment was precautionary. This was account for the uncertainty in which BDMPS region the seabird using the Project and buffer in the non-breeding season were from. The Project location is unique among ScotWind projects as its location is very close to the BDMPS boundary for each species.

Table 2-1 Predicted total impacts (birds killed per annum) and resulting predicted change in adult survival (percentage points) for the Project alone and cumulatively, in the breeding and non-breeding (for both BDMPS regions) seasons. Low = lower advised displacement mortality, Mid = middle advised displacement mortality, High = higher advised displacement mortality. A change in adult survival of more than 0.02% points is highlighted in bold text.

Species	Season	Predicted impact						Predicted change in adult survival					
		Alone			Cumulative			Alone			Cumulative		
		Low	Mid	High	Low	Mid	High	Low	Mid	High	Low	Mid	High
Kittiwake	Breeding	20.4	22	24	186.8	188.8	190.9	0.0009%	0.0010%	0.0011%	**0.0729%**	**0.0737%**	**0.0745%**
	Non-breeding Western waters	44.3	47	49	354.4	356.9	358.7	0.0118%	0.0125%	0.0129%	**0.0943%**	**0.0950%**	**0.0955%**
	Non-breeding UK North Sea	44.3	47	49	3103.1	3105.5	3107.4	0.0118%	0.0125%	0.0129%	**0.8257%**	**0.8263%**	**0.8268%**
Arctic tern	Breeding	1.2	1.5	1.8	1.2	1.5	1.8	**0.0711%**	**0.0878%**	**0.1046%**	**0.0711%**	**0.0878%**	**0.1046%**
	Non-breeding	0.0	0.0	0.0	0.0	0.0	0.0	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
Guillemot	Breeding	90.7	121.0	151.2	261.3	291.6	321.8	0.0011%	0.0015%	0.0019%	**0.0427%**	**0.0476%**	**0.0525%**
	Non-breeding Western waters	17.9	35.8	53.8	110.3	128.2	146.1	0.0029%	0.0058%	0.0088%	0.0180%	**0.0209%**	**0.0239%**
	Non-breeding UK North Sea	17.9	35.8	53.8	969.6	987.5	1005.4	0.0029%	0.0058%	0.0088%	**0.1583%**	**0.1612%**	**0.1641%**
Razorbill	Breeding	1.7	2.3	2.8	27.7	28.2	28.8	0.0001%	0.0002%	0.0002%	**0.0289%**	**0.0295%**	**0.0301%**
	Non-breeding Western waters	0.6	1.1	1.7	52.5	53.0	53.6	0.0003%	0.0006%	0.0010%	**0.0293%**	**0.0296%**	**0.0299%**
	Non-breeding UK North Sea	0.6	1.1	1.7	551.9	552.4	553.0	0.0005%	0.0011%	0.0016%	**0.5197%**	**0.5203%**	**0.5208%**
Puffin	Breeding	64.4	85.9	107.3	124.3	145.8	167.2	0.0015%	0.0019%	0.0024%	**0.0373%**	**0.0437%**	**0.0502%**
	Non-breeding Western waters	9.4	18.7	28.1	11.5	20.9	30.2	0.0037%	0.0075%	0.0112%	0.0046%	0.0084%	0.0121%
	Non-breeding UK North Sea	7.8	18.7	28.1	142.1	153.0	162.3	0.0073%	0.0176%	**0.0264%**	**0.1338%**	**0.1441%**	**0.1529%**
Gannet	Breeding	27.2	30.9	34.6	97.5	101.2	104.9	0.0007%	0.0009%	0.0010%	**0.0241%**	**0.0251%**	**0.0260%**
	Non-breeding Western waters	12.7	18.3	24.0	91.5	97.2	102.8	0.0040%	0.0058%	0.0075%	**0.0288%**	**0.0306%**	**0.0323%**
	Non-breeding UK North Sea	12.7	18.3	24.0	708.0	713.6	719.3	0.0077%	0.0112%	0.0147%	**0.4325%**	**0.4359%**	**0.4394%**
Fulmar	Breeding	1.7	3.4	5.1	1.7	3.4	5.1	0.0003%	0.0005%	0.0008%	0.0003%	0.0005%	0.0008%

Species	Season	Predicted impact						Predicted change in adult survival					
		Alone			Cumulative			Alone			Cumulative		
		Low	Mid	High	Low	Mid	High	Low	Mid	High	Low	Mid	High
	Non-breeding Western waters	3.2	6.3	9.5	3.2	6.3	9.5	0.0009%	0.0017%	0.0026%	0.0009%	0.0017%	0.0026%
	Non-breeding UK North Sea	3.2	6.3	9.5	3.2	6.3	9.5	0.0008%	0.0015%	0.0023%	0.0008%	0.0015%	0.0023%

3 PVA ANALYSES

12. The PVA is used to aid the assessment of significance of predicted impacts on regional populations of seabirds using the offshore Project in the breeding season and non-breeding season.

13. The input values used to parameterise the PVA models are summarised in Table 3-3 and can be used to repeat these analyses if necessary.

14. The projected counterfactuals of population size, growth rate and quantile metrics from the PVA models run for those species requiring them were output every ten years from year 10 to year 35. The Project is applying for consent to operate the wind farm from 2027 to 2062, so the PVA was run across these years with a 5 year burn-in and no recovery period.

3.1 PVA methodology

15. PVA is an approach to assessing projected future changes to populations using numerical population models. In the case of the EIA for the Project, PVA has been used to assess the possible effects on regional populations from predicted impacts on breeding and non-breeding seabirds.

16. The PVA approach was to use Leslie Matrix models to project future population size and growth rates using the Natural England PVA tool[1]. The PVA tool is a suite of R functions that operate as an R package (nepva R package).

17. The PVA were mostly run as stochastic models that allow the inclusion of environmental variability in the input parameters to provide outputs that incorporate this variability into suitable outputs. One exception to this approach was for Arctic tern, where low productivity with high variability, combined with a relatively small starting population resulted in zero values during the model burn-in, and the model failing to run. Therefore, to obtain outputs for this species the model was run without a burn in period. As such, the initial few years of model projection are less reliable, but this approach was necessary to allow a stochastic population model to run.

18. All PVAs were run without density dependent regulation, and as a consequence the Counterfactual of Population Size (CPS) is an unreliable metric as it is a function of both impact and simulation duration. In contrast the Counterfactual of Growth Rate (CGR) is unaffected by duration and is therefore a more reliable metric for comparing density independent projections. Conversely, when density dependent regulation is operating population growth trends to zero (in the long term) and thus CGR also trends to one as duration increases while population sizes reach stable equilibria. Thus, CPS is more informative when density dependence is operating. Both metrics are provided here, but it is important that the limitations of the CPS metric are taken into account when considering the predicted effect of the Project alone and cumulatively.

19. The PVA was only applied to species where the predicted impacts were estimated to result in a 0.02% (percentage point) decrease in adult survival (see Offshore EIA Report, chapter 13: Offshore and intertidal ornithology). This was estimated for both breeding season populations and non-breeding season populations (see Offshore EIA Report, , chapter 13: Offshore and intertidal ornithology, for definitions of populations). For those predicted impacts resulting in a reduction in adult survival of 0.02% or more, separate PVAs were run for breeding and non-breeding seasons

[1] Tool v 2 (Code: v 4.18 Interface: v 1.7) - https://github.com/naturalengland/Seabird_PVA_Tool

as the starting population sizes were based on different scales (regional breeding population for the breeding season and Biologically Defined Minimum Population Scale (BDMPS) population in the non-breeding season). Thus, PVA models were run for the following species for the Project alone and cumulatively:

- Kittiwake in the breeding season and non-breeding season in the UK North Sea;
- Arctic tern in the breeding season;
- Guillemot in the breeding season and non-breeding season in the UK North Sea;
- Razorbill in the breeding season and non-breeding season in the UK North Sea;
- Puffin in the breeding season and non-breeding season in the UK North Sea; and
- Gannet in the breeding season and non-breeding season in the UK North Sea.

3.2 Input parameters

20. All the species demographic input parameters used in all models are summarised in Table 3-3. The decision making for selection of key input parameters is described below.

3.2.1 Breeding success.

21. A suitable input value for the mean breeding success and SD of that mean was selected in all cases as the default values in the NE PVA tool for "Region Type CRB, Sector NW.Scotland.Orkney.Shetland". This was the most suitable for the regional populations used. These default values were compared with available information at a regional level from the Seabird Monitoring Programme (SMP) database. SMP data were filtered so that only sites with more than 5 years of data were included.

Table 3-1 Breeding success (chicks per pair) input parameters compared with selected data from SMP database.

Species	Region type	Breeding success (NE PVA tool default values)			Breeding success from SMP database			
		Sector	Mean	SD	Location	Mean	SD	n
Arctic tern	N/A	SMP database Orkney Shetland Caithness Sutherland all 1990 to 2022	0.2322	0.2189	Caithness, Orkney & Shetland (only sites with >5 years)	0.2241	0.3608	247
Kittiwake	CRB	NW.Scotland.Orkney.Shetland	0.5691	0.3903	Costa Head, Holm, Marwick Head, Mull Head, Papa Westray, Rousay, Row Head, and West Westray	0.6495	0.4863	162
Guillemot	CRB	NW.Scotland.Orkney.Shetland	0.4871	0.2100	Orkney & Shetland	0.5003	0.5003	0.5003
Razorbill	CRB	NW.Scotland.Orkney.Shetland	0.4155	0.2120	Papa Westray, Fair Isle, Sumburgh	0.4730 35181	0.4730 35181	40
Puffin	CRB	NW.Scotland.Orkney.Shetland	0.4435	0.1791	Fair Isle	0.4730	0.2566	40
Gannet	CRB	NW.Scotland.Orkney.Shetland	0.6622	0.0821	Fair Isle, Noss & Hermaness	0.6862	0.0723	93

3.2.2 Adult survival rates

22. Adult survival rates were mostly based on the "National" values in the NE PVA tool, which are those suggested in Horswill & Robinson (2015). There were no default values available for Arctic tern. For Arctic tern the adult survival rates were those suggested by Horswill & Robinson (2015).

Table 3-2 Adult survival rates used in PVA population models.

Species	Age	Source	Mean	SD
Arctic tern	Adult	Horswill & Robinson 2015	0.837	0.035
Kittiwake	Adult	National	0.854	0.077
Guillemot	Adult	National	0.94	0.025
Razorbill	Adult	National	0.895	0.067
Puffin	Adult	National	0.907	0.083
Gannet	Adult	National	0.919	0.042

3.2.3 Other baseline demographic rates

23. Other baseline demographic parameters that had to be defined were:

- Immature survival;
- Age at first breeding; and
- Maximum brood size per pair.

24. These values (summarised in Table 3-3) were mostly based on the default values available in the NE PVA tool, though there were some exceptions. For Arctic tern the default values in the NE PVA tool were incorrectly specified. The values provided as age specific annual survival rates to age four were the overall survival rate across these age classes (i.e. from 0 to 4 years). Raising this value to the power of 0.25 (= 1/4) provided age specific survival rates, albeit the same value for each year.

Table 3-3 Summary of all PVA input parameters used in NE PVA tool.

Parameter	Source	Metric	Kittiwake	Arctic tern	Guillemot	Razorbill	Puffin	Gannet
Breeding success (chicks per pair)	CRB	Mean	0.569	0.232	0.487	0.444	0.415	0.662
	NW Scotland Orkney Shetland	SD	0.390	0.219	0.210	0.179	0.212	0.082
Adult survival rate	National	Mean	0.854	0.837	0.940	0.895	0.907	0.919
		SD	0.077	0.035	0.025	0.067	0.083	0.042
Immature survival rate	National	Mean for age class 0-1	0.790	0.761	0.560	0.630	0.709	0.424
		SD for age class 0-1	0.077	0.006	0.058	0.067	0.108	0.045
		Mean for age class 1-2	0.854	0.761	0.792	0.630	0.709	0.829
		SD for age class 1-2	0.077	0.006	0.152	0.067	0.108	0.026
		Mean for age class 2-3	0.854	0.761	0.917	0.895	0.709	0.891
		SD for age class 2-3	0.077	0.006	0.098	0.067	0.108	0.019
		Mean for age class 3-4	0.854	0.837	0.938	0.895	0.760	0.895
		SD for age class 3-4	0.077	0.035	0.107	0.067	0.093	0.019
		Mean for age class 4-5	-	-	0.940	0.895	0.805	0.919
		SD for age class 4-5	-	-	0.025	0.067	0.083	0.042
		Mean for age class 5-6	-	-	0.940	-	-	-
		SD for age class 5-6	-	-	0.025	-	-	-
		Mean for age class 6-7	-	-	-	-	-	-
		SD for age class 6-7	-	-	-	-	-	-
		Mean for age class 7-8	-	-	-	-	-	-
		SD for age class 7-8	-	-	-	-	-	-

Parameter	Source	Metric	Kittiwake	Arctic tern	Guillemot	Razorbill	Puffin	Gannet
		Mean for age class 8-9	-	-	-	-	-	-
		SD for age class 8-9	-	-	-	-	-	-
Age at first breeding (years)	NE PVA tool input value	Years	4	4	6	5	5	5
Maximum brood size per pair	NE PVA tool input value	Number of chicks	2	4	1	1	1	1
Starting population size (individuals)	Breeding season (SMP database)	Number of individual adults	256,327	1,724	612,608	95,725	333,421	404,008
		Year	2022	2022	2022	2022	2022	2022
	Non-breeding season (BDMPS West; Furness 2015)	Number of individual adults	375,711	-	612,608*	179,183	249,896	318,001
		Year	2022	2022	2022	2022	2022	2022
	Non-breeding season (BDMPS East; Furness 2015)	Number of individual adults	375,815	-	612,608*	106,183	199,974	163,701
		Year	2022	2022	2022	2022	2022	2022
Adult survival impacts (Project low)	NE PVA tool input value	Breeding season	0.000009	0.000711	0.000011	0.000001	0.000015	0.0000075
Adult survival impacts (Project mid)			0.000010	0.000878	0.000015	0.000002	0.000019	0.000009
Adult survival impacts (Project high)			0.000011	0.001046	0.000019	0.000002	0.000024	0.000010
Adult survival impacts (Project low)		Non-breeding season UK North Sea	0.000118	0	0.000029	0.000005	0.000039	0.000077
Adult survival impacts (Project mid)			0.000125	0	0.000058	0.000011	0.000094	0.000112

Parameter	Source	Metric	Kittiwake	Arctic tern	Guillemot	Razorbill	Puffin	Gannet
Adult survival impacts (Project high)			0.000129	0	0.000088	0.000016	0.000140	0.000147
Adult survival impacts (Project low)		Non-breeding season Western waters	0.000118	0	0.000029	0.000003	0.000037	0.000040
Adult survival impacts (Project mid)			0.000125	0	0.000058	0.000006	0.000075	0.000058
Adult survival impacts (Project high)			0.000129	0	0.000088	0.000010	0.000112	0.000075
Adult survival impact (Cumulative impacts without the Project)	NE PVA tool input value	Breeding season	0.000072	0	0.000021	0.000020	0.000014	0.000019
		Non-breeding season UK North Sea	0.008139	n/a	0.001553	0.005192	0.000671	0.004247
		Non-breeding season Western waters	0.000825	n/a	0.000151	0.000290	0.000009	0.000248
Adult survival impacts (Cumulative impacts low)	NE PVA tool input value	Breeding season	0.000726	0.000711	0.000427	0.000289	0.000373	0.000241
Adult survival impacts (Cumulative impacts mid)			0.000737	0.000878	0.000476	0.000295	0.000437	0.005220
Adult survival impacts (Cumulative impacts high)			0.000753	0.001046	0.000525	0.000301	0.000502	0.000260
Adult survival impacts (Cumulative impacts low)		Non-breeding season (BDMPS West; Furness 2015)	0.000943	n/a	0.000180	0.000293	0.000046	0.000288

Parameter	Source	Metric	Kittiwake	Arctic tern	Guillemot	Razorbill	Puffin	Gannet
Adult survival impacts (Cumulative impacts mid)			0.000950	n/a	0.000209	0.000296	0.000084	0.000306
Adult survival impacts (Cumulative impacts high)			0.000955	n/a	0.000239	0.000299	0.000121	0.000323
Adult survival impacts (Cumulative impacts low)		Non-breeding season (BDMPS East; Furness 2015)	0.008257	0	0.001583	0.005197	0.000710	0.004325
Adult survival impacts (Cumulative impacts mid)			0.008263	0	0.001612	0.005203	0.000765	0.004359
Adult survival impacts (Cumulative impacts high)			0.008268	0	0.001641	0.005208	0.000812	0.004394

3.3 Results

3.3.1 Projected PVA metrics.

25. Three PVA metrics were calculated by the NE PVA tool annually for each age class:

- the ratio of projected end population sizes of the baseline and impacted population size, referred to as the Counterfactual of Population Size (CPS);
- the ratio of projected population growth rates of the baseline and impacted populations, referred to as the Counterfactual of Growth Rate (CGR); and
- The quantile from the unimpacted population that matched the 50% quantile for the impacted population (U=50%I) and the quantile from the impacted population that match the 50% quantile for the unimpacted population (I=50%U).

26. The PVA metrics from years 10 to 35, in ten year increments to 30 years and a five year increment to 35 years, are provided for all the species that needed PVA's during the breeding and non-breeding seasons for the Project alone and cumulatively (Table 3-4 to Table 3-17).

3.3.1.1 *Breeding season*

Table 3-4 Projected PVA metrics from 10 to 35 years for Arctic tern in the breeding season for the Project alone and cumulatively. (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Project alone LOW	10	0.9997	0.9994	0.0081	0.9841	1.0153	0.9928	0.9966	0.0937	0.8270	1.1932	48.5	51.9
Project alone MID	10	0.9995	0.9994	0.0077	0.9845	1.0143	0.9938	0.9951	0.0908	0.8216	1.1878	48.2	53.3
Project alone HIGH	10	0.9996	0.9994	0.0075	0.9853	1.0139	0.9917	0.9963	0.0890	0.8374	1.1810	48.9	52.2
Cumulative impact without the Project	10	1.0004	1.0005	0.0077	0.9847	1.0148	1.0022	1.0085	0.0911	0.8434	1.1914	50.9	49.5
Cumulative impact with the Project LOW	10	0.9992	0.9994	0.0076	0.9846	1.0145	0.9931	0.9962	0.0898	0.8299	1.1816	49.5	52.1
Cumulative impact with the Project MID	10	0.9997	0.9995	0.0077	0.9847	1.0142	0.9940	0.9970	0.0914	0.8324	1.1761	49.5	51.3
Cumulative impact with the Project HIGH	10	0.9991	0.9992	0.0075	0.9839	1.0138	0.9929	0.9946	0.0864	0.8302	1.1732	49.5	51.5
Project alone LOW	20	0.9996	0.9996	0.0076	0.9848	1.0141	0.9925	1.0020	0.1645	0.7193	1.3483	50.7	50.4
Project alone MID	20	0.9998	0.9996	0.0076	0.9837	1.0147	0.9899	1.0028	0.1643	0.7053	1.3805	50.7	50.4

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Project alone HIGH	20	0.9992	0.9994	0.0075	0.9844	1.0143	0.9827	0.9985	0.1652	0.7168	1.3684	50.7	50.3
Cumulative impact without the Project	20	1.0005	1.0004	0.0078	0.9853	1.0154	1.0000	1.0209	0.1703	0.7355	1.3925	53.1	48.4
Cumulative impact with the Project LOW	20	0.9998	0.9998	0.0080	0.9846	1.0154	0.9940	1.0087	0.1725	0.7129	1.3733	50.7	50.8
Cumulative impact with the Project MID	20	0.9997	0.9994	0.0081	0.9822	1.0150	0.9866	1.0007	0.1721	0.6844	1.3708	49.8	51.3
Cumulative impact with the Project HIGH	20	0.9994	0.9993	0.0077	0.9838	1.0145	0.9841	0.9983	0.1647	0.7030	1.3572	50.7	50.1
Project alone LOW	30	0.9995	0.9996	0.0096	0.9804	1.0188	0.9792	1.0303	0.3240	0.5357	1.8126	48.4	52.9
Project alone MID	30	0.9997	0.9995	0.0097	0.9799	1.0189	0.9873	1.0259	0.3179	0.5312	1.8001	48.4	52.7
Project alone HIGH	30	0.9989	0.9992	0.0100	0.9800	1.0198	0.9664	1.0241	0.3468	0.5348	1.8235	48.4	54.0
Cumulative impact without the Project	30	1.0002	1.0004	0.0096	0.9809	1.0192	1.0000	1.0575	0.3237	0.5455	1.8005	52.7	48.9
Cumulative impact with the Project LOW	30	0.9993	0.9996	0.0101	0.9788	1.0197	0.9810	1.0358	0.3482	0.5116	1.8339	48.4	51.9

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Cumulative impact with the Project MID	30	0.9996	0.9991	0.0099	0.9783	1.0189	0.9821	1.0182	0.3288	0.5121	1.8056	48.4	54.1
Cumulative impact with the Project HIGH	30	0.9993	0.9993	0.0099	0.9794	1.0193	0.9869	1.0247	0.3293	0.5237	1.8008	48.4	53.6
Project alone LOW	35	0.9990	0.9994	0.0114	0.9760	1.0234	0.9608	1.0621	0.4767	0.4166	2.3333	47.4	52.6
Project alone MID	35	0.9993	0.9990	0.0113	0.9775	1.0214	0.9701	1.0461	0.4714	0.4324	2.1767	50.4	53.8
Project alone HIGH	35	0.9989	0.9991	0.0117	0.9751	1.0237	0.9677	1.0560	0.4954	0.3999	2.2869	50.4	52.4
Cumulative impact without the Project	35	1.0002	1.0003	0.0114	0.9775	1.0227	1.0000	1.0956	0.4734	0.4499	2.3000	53.5	49.9
Cumulative impact with the Project LOW	35	0.9992	0.9992	0.0117	0.9757	1.0241	0.9784	1.0637	0.5172	0.4102	2.3763	47.4	52.9
Cumulative impact with the Project MID	35	0.9987	0.9989	0.0115	0.9762	1.0215	0.9487	1.0472	0.4832	0.4165	2.1257	47.4	53.5
Cumulative impact with the Project HIGH	35	0.9993	0.9990	0.0115	0.9752	1.0211	1.0000	1.0494	0.4637	0.3997	2.1017	47.4	53.7

Table 3-5 Projected PVA metrics from 10 to 35 years for kittiwake in the breeding season for the Project alone and cumulatively. (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Project alone LOW	10	1.0000	1.0000	0.0003	0.9994	1.0007	1.0000	1.0001	0.0040	0.9913	1.0078	49.9	50.0
Project alone MID	10	1.0000	1.0000	0.0003	0.9993	1.0007	1.0004	1.0001	0.0041	0.9918	1.0078	49.9	50.1
Project alone HIGH	10	1.0000	1.0000	0.0003	0.9993	1.0007	0.9998	0.9999	0.0040	0.9918	1.0079	49.9	50.3
Cumulative impact without the Project	10	0.9999	0.9999	0.0003	0.9992	1.0006	0.9990	0.9990	0.0041	0.9909	1.0073	49.7	50.4
Cumulative impact with the Project LOW	10	0.9991	0.9991	0.0003	0.9985	0.9998	0.9905	0.9906	0.0039	0.9826	0.9982	49.0	51.5
Cumulative impact with the Project MID	10	0.9991	0.9992	0.0003	0.9985	0.9998	0.9908	0.9908	0.0040	0.9827	0.9992	49.0	51.3
Cumulative impact with the Project HIGH	10	0.9991	0.9991	0.0003	0.9985	0.9998	0.9902	0.9903	0.0039	0.9823	0.9980	49.0	51.2
Project alone LOW	20	1.0000	1.0000	0.0002	0.9995	1.0005	1.0000	1.0000	0.0052	0.9900	1.0105	49.8	50.2
Project alone MID	20	1.0000	1.0000	0.0002	0.9995	1.0005	1.0002	1.0000	0.0053	0.9898	1.0106	50.1	49.8

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Project alone HIGH	20	1.0000	1.0000	0.0002	0.9995	1.0005	0.9998	0.9999	0.0053	0.9897	1.0108	49.9	50.2
Cumulative impact without the Project	20	0.9999	0.9999	0.0003	0.9994	1.0004	0.9981	0.9981	0.0054	0.9873	1.0086	49.7	50.3
Cumulative impact with the Project LOW	20	0.9991	0.9991	0.0002	0.9987	0.9996	0.9821	0.9822	0.0051	0.9718	0.9922	48.5	51.4
Cumulative impact with the Project MID	20	0.9991	0.9991	0.0002	0.9986	0.9996	0.9821	0.9822	0.0052	0.9722	0.9921	48.6	51.8
Cumulative impact with the Project HIGH	20	0.9991	0.9991	0.0002	0.9986	0.9996	0.9817	0.9816	0.0050	0.9712	0.9917	48.5	51.5
Project alone LOW	30	1.0000	1.0000	0.0002	0.9996	1.0004	0.9999	0.9997	0.0064	0.9870	1.0117	50.0	50.1
Project alone MID	30	1.0000	1.0000	0.0002	0.9996	1.0004	0.9996	0.9997	0.0065	0.9876	1.0125	50.0	50.0
Project alone HIGH	30	1.0000	1.0000	0.0002	0.9996	1.0004	0.9997	0.9998	0.0063	0.9880	1.0128	50.0	49.9
Cumulative impact without the Project	30	0.9999	0.9999	0.0002	0.9995	1.0003	0.9971	0.9972	0.0065	0.9851	1.0100	50.0	50.1
Cumulative impact with the Project LOW	30	0.9991	0.9991	0.0002	0.9987	0.9995	0.9735	0.9733	0.0060	0.9619	0.9854	48.0	52.3

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Cumulative impact with the Project MID	30	0.9991	0.9991	0.0002	0.9987	0.9995	0.9735	0.9735	0.0063	0.9610	0.9857	48.0	52.1
Cumulative impact with the Project HIGH	30	0.9991	0.9991	0.0002	0.9987	0.9995	0.9728	0.9728	0.0062	0.9606	0.9853	48.0	52.2
Project alone LOW	35	1.0000	1.0000	0.0002	0.9996	1.0003	0.9998	0.9995	0.0071	0.9860	1.0134	49.9	50.1
Project alone MID	35	1.0000	1.0000	0.0002	0.9996	1.0004	0.9994	0.9994	0.0071	0.9861	1.0138	49.8	50.2
Project alone HIGH	35	1.0000	1.0000	0.0002	0.9996	1.0004	0.9996	0.9997	0.0072	0.9862	1.0140	49.9	50.1
Cumulative impact without the Project	35	0.9999	0.9999	0.0002	0.9995	1.0003	0.9966	0.9966	0.0071	0.9828	1.0103	49.9	50.1
Cumulative impact with the Project LOW	35	0.9991	0.9991	0.0002	0.9987	0.9995	0.9690	0.9689	0.0068	0.9555	0.9829	48.0	52.3
Cumulative impact with the Project MID	35	0.9991	0.9991	0.0002	0.9988	0.9995	0.9691	0.9691	0.0068	0.9561	0.9822	48.3	52.2
Cumulative impact with the Project HIGH	35	0.9991	0.9991	0.0002	0.9987	0.9995	0.9685	0.9684	0.0068	0.9543	0.9819	48.3	52.2

Table 3-6 Projected PVA metrics from 10 to 35 years for guillemot in the breeding season for the Project alone and cumulatively. (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Project alone LOW	10	1.0000	1.0000	0.0001	0.9997	1.0003	0.9999	0.9999	0.0016	0.9968	1.0030	50.2	49.8
Project alone MID	10	1.0000	1.0000	0.0001	0.9997	1.0002	0.9998	0.9998	0.0017	0.9964	1.0028	50.0	50.0
Project alone HIGH	10	0.9999	0.9999	0.0001	0.9996	1.0002	0.9990	0.9990	0.0016	0.9959	1.0022	49.4	50.4
Cumulative impact without the Project	10	1.0000	1.0000	0.0001	0.9997	1.0002	0.9997	0.9997	0.0016	0.9967	1.0029	49.8	50.2
Cumulative impact with the Project LOW	10	0.9995	0.9995	0.0001	0.9993	0.9998	0.9949	0.9948	0.0016	0.9915	0.9981	48.2	51.6
Cumulative impact with the Project MID	10	0.9995	0.9995	0.0001	0.9992	0.9997	0.9942	0.9943	0.0017	0.9910	0.9974	48.2	51.7
Cumulative impact with the Project HIGH	10	0.9994	0.9994	0.0001	0.9992	0.9997	0.9937	0.9937	0.0017	0.9901	0.9968	47.9	51.8
Project alone LOW	20	1.0000	1.0000	0.0001	0.9998	1.0002	0.9997	0.9997	0.0020	0.9960	1.0036	50.1	49.8
Project alone MID	20	1.0000	1.0000	0.0001	0.9998	1.0002	0.9995	0.9995	0.0021	0.9953	1.0037	49.9	50.0

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Project alone HIGH	20	0.9999	0.9999	0.0001	0.9997	1.0001	0.9979	0.9979	0.0021	0.9941	1.0021	49.3	50.6
Cumulative impact without the Project	20	1.0000	1.0000	0.0001	0.9998	1.0001	0.9994	0.9995	0.0020	0.9954	1.0035	49.5	50.3
Cumulative impact with the Project LOW	20	0.9995	0.9995	0.0001	0.9993	0.9997	0.9901	0.9900	0.0020	0.9860	0.9940	47.2	52.5
Cumulative impact with the Project MID	20	0.9995	0.9995	0.0001	0.9993	0.9996	0.9889	0.9889	0.0021	0.9851	0.9929	47.2	52.6
Cumulative impact with the Project HIGH	20	0.9994	0.9994	0.0001	0.9992	0.9996	0.9879	0.9878	0.0020	0.9837	0.9916	46.6	52.9
Project alone LOW	30	1.0000	1.0000	0.0001	0.9998	1.0001	0.9996	0.9996	0.0024	0.9947	1.0042	49.9	50.3
Project alone MID	30	1.0000	1.0000	0.0001	0.9998	1.0001	0.9993	0.9994	0.0024	0.9949	1.0042	49.9	50.2
Project alone HIGH	30	0.9999	0.9999	0.0001	0.9998	1.0001	0.9970	0.9970	0.0024	0.9925	1.0017	49.4	50.5
Cumulative impact without the Project	30	1.0000	1.0000	0.0001	0.9998	1.0001	0.9992	0.9992	0.0024	0.9947	1.0038	49.9	50.5
Cumulative impact with the Project LOW	30	0.9995	0.9995	0.0001	0.9994	0.9997	0.9855	0.9854	0.0023	0.9809	0.9897	46.9	53.4

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Cumulative impact with the Project MID	30	0.9995	0.9995	0.0001	0.9993	0.9996	0.9837	0.9837	0.0024	0.9790	0.9885	47.0	53.8
Cumulative impact with the Project HIGH	30	0.9994	0.9994	0.0001	0.9993	0.9996	0.9821	0.9821	0.0023	0.9774	0.9866	46.8	54.5
Project alone LOW	35	1.0000	1.0000	0.0001	0.9999	1.0001	0.9995	0.9995	0.0025	0.9946	1.0044	49.7	50.4
Project alone MID	35	1.0000	1.0000	0.0001	0.9998	1.0001	0.9993	0.9993	0.0025	0.9943	1.0043	49.7	50.4
Project alone HIGH	35	0.9999	0.9999	0.0001	0.9998	1.0000	0.9966	0.9966	0.0025	0.9916	1.0018	49.4	50.7
Cumulative impact without the Project	35	1.0000	1.0000	0.0001	0.9999	1.0001	0.9992	0.9992	0.0025	0.9943	1.0043	49.6	50.4
Cumulative impact with the Project LOW	35	0.9995	0.9995	0.0001	0.9994	0.9996	0.9830	0.9830	0.0024	0.9784	0.9876	47.0	53.9
Cumulative impact with the Project MID	35	0.9995	0.9995	0.0001	0.9993	0.9996	0.9811	0.9811	0.0025	0.9764	0.9860	46.8	54.0
Cumulative impact with the Project HIGH	35	0.9994	0.9994	0.0001	0.9993	0.9995	0.9793	0.9792	0.0024	0.9743	0.9836	46.4	54.3

Table 3-7 Projected PVA metrics from 10 to 35 years for razorbill in the breeding season for the Project alone and cumulatively. (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Project alone LOW	10	1.0000	1.0000	0.0006	0.9990	1.0011	0.9998	1.0001	0.0067	0.9872	1.0138	49.9	50.1
Project alone MID	10	1.0000	1.0000	0.0006	0.9989	1.0011	1.0001	1.0002	0.0067	0.9870	1.0145	49.9	50.1
Project alone HIGH	10	1.0000	1.0000	0.0005	0.9990	1.0011	1.0002	1.0002	0.0066	0.9873	1.0136	50.0	50.2
Cumulative impact without the Project	10	1.0000	1.0000	0.0006	0.9989	1.0010	0.9997	0.9999	0.0069	0.9870	1.0136	50.0	50.0
Cumulative impact with the Project LOW	10	0.9997	0.9997	0.0005	0.9986	1.0007	0.9966	0.9967	0.0065	0.9845	1.0090	49.5	50.5
Cumulative impact with the Project MID	10	0.9997	0.9997	0.0006	0.9986	1.0008	0.9964	0.9963	0.0068	0.9829	1.0099	49.8	50.4
Cumulative impact with the Project HIGH	10	0.9997	0.9997	0.0006	0.9986	1.0008	0.9964	0.9965	0.0066	0.9832	1.0097	49.4	50.7
Project alone LOW	20	1.0000	1.0000	0.0004	0.9992	1.0008	0.9997	1.0002	0.0092	0.9828	1.0180	50.2	49.9
Project alone MID	20	1.0000	1.0000	0.0004	0.9991	1.0009	1.0002	1.0003	0.0094	0.9823	1.0193	49.7	50.3

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Project alone HIGH	20	1.0000	1.0000	0.0004	0.9992	1.0009	1.0007	1.0006	0.0093	0.9827	1.0202	50.5	49.3
Cumulative impact without the Project	20	1.0000	1.0000	0.0004	0.9991	1.0009	0.9999	0.9999	0.0095	0.9804	1.0193	50.0	50.0
Cumulative impact with the Project LOW	20	0.9997	0.9997	0.0004	0.9988	1.0005	0.9939	0.9936	0.0090	0.9763	1.0114	49.0	51.1
Cumulative impact with the Project MID	20	0.9997	0.9997	0.0004	0.9988	1.0005	0.9932	0.9932	0.0095	0.9752	1.0134	48.6	51.2
Cumulative impact with the Project HIGH	20	0.9997	0.9997	0.0004	0.9988	1.0005	0.9931	0.9933	0.0095	0.9740	1.0118	48.6	51.5
Project alone LOW	30	1.0000	1.0000	0.0004	0.9992	1.0008	1.0003	1.0000	0.0126	0.9761	1.0246	49.5	50.3
Project alone MID	30	1.0000	1.0000	0.0004	0.9992	1.0008	1.0002	1.0004	0.0126	0.9760	1.0260	50.2	49.9
Project alone HIGH	30	1.0000	1.0000	0.0004	0.9992	1.0007	1.0006	1.0003	0.0126	0.9741	1.0243	50.2	50.0
Cumulative impact without the Project	30	1.0000	1.0000	0.0004	0.9992	1.0007	0.9995	0.9997	0.0127	0.9742	1.0241	49.5	50.2
Cumulative impact with the Project LOW	30	0.9997	0.9997	0.0004	0.9989	1.0004	0.9904	0.9903	0.0123	0.9658	1.0133	49.0	50.8

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Cumulative impact with the Project MID	30	0.9997	0.9997	0.0004	0.9989	1.0005	0.9896	0.9896	0.0123	0.9655	1.0141	49.0	51.0
Cumulative impact with the Project HIGH	30	0.9997	0.9997	0.0004	0.9988	1.0005	0.9899	0.9897	0.0129	0.9629	1.0147	49.1	51.2
Project alone LOW	35	1.0000	1.0000	0.0004	0.9992	1.0008	1.0002	0.9999	0.0141	0.9720	1.0291	50.1	49.9
Project alone MID	35	1.0000	1.0000	0.0004	0.9992	1.0007	1.0001	1.0001	0.0141	0.9722	1.0288	50.9	49.7
Project alone HIGH	35	1.0000	1.0000	0.0004	0.9992	1.0007	1.0005	1.0003	0.0143	0.9724	1.0279	49.3	50.3
Cumulative impact without the Project	35	1.0000	1.0000	0.0004	0.9992	1.0007	0.9998	0.9997	0.0144	0.9722	1.0277	49.8	50.1
Cumulative impact with the Project LOW	35	0.9997	0.9997	0.0004	0.9989	1.0004	0.9888	0.9888	0.0138	0.9607	1.0175	48.9	51.0
Cumulative impact with the Project MID	35	0.9997	0.9997	0.0004	0.9989	1.0004	0.9878	0.9880	0.0141	0.9611	1.0166	48.3	51.2
Cumulative impact with the Project HIGH	35	0.9997	0.9996	0.0004	0.9988	1.0004	0.9879	0.9874	0.0146	0.9582	1.0160	48.8	51.3

Table 3-8 Projected PVA metrics from 10 to 35 years for puffin in the breeding season for the Project alone and cumulatively. (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Project alone LOW	10	1.0000	1.0000	0.0003	0.9994	1.0006	0.9999	0.9999	0.0037	0.9927	1.0072	49.8	50.0
Project alone MID	10	1.0000	1.0000	0.0003	0.9994	1.0006	1.0000	0.9999	0.0035	0.9927	1.0067	50.1	49.9
Project alone HIGH	10	1.0000	1.0000	0.0003	0.9993	1.0005	0.9999	0.9998	0.0036	0.9924	1.0067	49.8	50.1
Cumulative impact without the Project	10	1.0000	1.0000	0.0003	0.9994	1.0006	0.9999	1.0000	0.0035	0.9932	1.0074	50.0	50.0
Cumulative impact with the Project LOW	10	0.9996	0.9996	0.0003	0.9989	1.0002	0.9956	0.9953	0.0036	0.9880	1.0025	49.5	50.1
Cumulative impact with the Project MID	10	0.9995	0.9995	0.0003	0.9989	1.0001	0.9947	0.9946	0.0035	0.9876	1.0014	49.3	50.2
Cumulative impact with the Project HIGH	10	0.9994	0.9994	0.0003	0.9988	1.0000	0.9938	0.9938	0.0035	0.9869	1.0005	49.2	50.5
Project alone LOW	20	1.0000	1.0000	0.0002	0.9995	1.0005	0.9999	0.9999	0.0053	0.9889	1.0109	49.7	50.4
Project alone MID	20	1.0000	1.0000	0.0002	0.9995	1.0005	0.9995	0.9996	0.0054	0.9888	1.0103	49.8	50.3

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Project alone HIGH	20	1.0000	1.0000	0.0002	0.9995	1.0004	0.9996	0.9994	0.0053	0.9889	1.0101	49.6	50.4
Cumulative impact without the Project	20	1.0000	1.0000	0.0002	0.9995	1.0005	0.9998	0.9999	0.0052	0.9898	1.0109	49.9	50.2
Cumulative impact with the Project LOW	20	0.9996	0.9996	0.0002	0.9991	1.0001	0.9911	0.9912	0.0053	0.9810	1.0014	48.6	51.5
Cumulative impact with the Project MID	20	0.9995	0.9995	0.0002	0.9990	1.0000	0.9898	0.9897	0.0052	0.9795	0.9996	48.6	51.3
Cumulative impact with the Project HIGH	20	0.9994	0.9994	0.0003	0.9989	0.9999	0.9881	0.9880	0.0054	0.9773	0.9989	48.3	51.5
Project alone LOW	30	1.0000	1.0000	0.0002	0.9995	1.0005	0.9999	1.0001	0.0073	0.9851	1.0148	50.0	49.9
Project alone MID	30	1.0000	1.0000	0.0002	0.9995	1.0004	0.9989	0.9995	0.0073	0.9846	1.0142	49.9	50.1
Project alone HIGH	30	1.0000	1.0000	0.0002	0.9995	1.0004	0.9993	0.9994	0.0071	0.9849	1.0134	50.1	49.7
Cumulative impact without the Project	30	1.0000	1.0000	0.0002	0.9995	1.0005	0.9997	0.9999	0.0074	0.9858	1.0156	50.0	50.0
Cumulative impact with the Project LOW	30	0.9996	0.9996	0.0002	0.9991	1.0000	0.9867	0.9869	0.0072	0.9736	1.0023	48.7	51.2

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Cumulative impact with the Project MID	30	0.9995	0.9995	0.0002	0.9990	1.0000	0.9848	0.9847	0.0071	0.9700	0.9990	48.1	51.3
Cumulative impact with the Project HIGH	30	0.9994	0.9994	0.0002	0.9990	0.9999	0.9821	0.9823	0.0073	0.9676	0.9964	48.1	51.5
Project alone LOW	35	1.0000	1.0000	0.0002	0.9996	1.0005	0.9994	0.9998	0.0084	0.9841	1.0168	50.1	49.8
Project alone MID	35	1.0000	1.0000	0.0002	0.9995	1.0005	0.9994	0.9993	0.0085	0.9825	1.0156	49.9	50.0
Project alone HIGH	35	1.0000	1.0000	0.0002	0.9995	1.0004	0.9990	0.9990	0.0083	0.9826	1.0155	49.8	50.1
Cumulative impact without the Project	35	1.0000	1.0000	0.0002	0.9996	1.0005	0.9993	0.9996	0.0085	0.9840	1.0176	49.9	50.1
Cumulative impact with the Project LOW	35	0.9996	0.9996	0.0002	0.9991	1.0000	0.9846	0.9847	0.0081	0.9685	1.0013	49.3	50.9
Cumulative impact with the Project MID	35	0.9995	0.9995	0.0002	0.9990	0.9999	0.9824	0.9821	0.0081	0.9660	0.9982	49.0	51.4
Cumulative impact with the Project HIGH	35	0.9994	0.9994	0.0002	0.9989	0.9999	0.9794	0.9793	0.0082	0.9627	0.9946	48.5	51.5

3.3.1.2 Non- breeding season – UK North Sea

Table 3-9 Projected PVA metrics from 10 to 35 years for kittiwake in the non-breeding season for the Project alone and cumulatively in the UK North Sea. (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Project alone LOW	10	0.9998	0.9998	0.0000	0.9998	0.9998	0.9979	0.9979	0.0000	0.9978	0.9979	49.8	50.5
Project alone MID	10	0.9998	0.9998	0.0000	0.9998	0.9998	0.9977	0.9977	0.0000	0.9976	0.9978	49.8	50.5
Project alone HIGH	10	0.9998	0.9998	0.0000	0.9998	0.9998	0.9977	0.9976	0.0000	0.9975	0.9977	49.8	50.5
Cumulative impact without the Project	10	0.9866	0.9866	0.0003	0.9860	0.9870	0.8618	0.8617	0.0026	0.8561	0.8663	33.6	67.4
Cumulative impact with the Project LOW	10	0.9864	0.9864	0.0003	0.9858	0.9869	0.8600	0.8598	0.0027	0.8541	0.8645	33.5	67.4
Cumulative impact with the Project MID	10	0.9864	0.9863	0.0003	0.9858	0.9868	0.8599	0.8597	0.0027	0.8540	0.8644	33.5	67.4
Cumulative impact with the Project HIGH	10	0.9864	0.9863	0.0003	0.9857	0.9868	0.8598	0.8596	0.0027	0.8539	0.8643	33.5	67.4
Project alone LOW	20	0.9998	0.9998	0.0000	0.9998	0.9998	0.9959	0.9959	0.0001	0.9958	0.9960	49.7	50.2
Project alone MID	20	0.9998	0.9998	0.0000	0.9998	0.9998	0.9957	0.9957	0.0001	0.9956	0.9958	49.7	50.3

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Project alone HIGH	20	0.9998	0.9998	0.0000	0.9998	0.9998	0.9955	0.9955	0.0001	0.9954	0.9956	49.7	50.3
Cumulative impact without the Project	20	0.9866	0.9865	0.0002	0.9862	0.9869	0.7526	0.7525	0.0030	0.7463	0.7577	26.7	73.5
Cumulative impact with the Project LOW	20	0.9864	0.9864	0.0002	0.9860	0.9867	0.7495	0.7494	0.0031	0.7431	0.7547	26.6	74.0
Cumulative impact with the Project MID	20	0.9863	0.9863	0.0002	0.9859	0.9867	0.7493	0.7492	0.0031	0.7429	0.7545	26.6	74.0
Cumulative impact with the Project HIGH	20	0.9863	0.9863	0.0002	0.9859	0.9867	0.7492	0.7490	0.0031	0.7428	0.7544	26.6	74.0
Project alone LOW	30	0.9998	0.9998	0.0000	0.9998	0.9998	0.9940	0.9940	0.0001	0.9938	0.9941	49.5	50.3
Project alone MID	30	0.9998	0.9998	0.0000	0.9998	0.9998	0.9936	0.9936	0.0001	0.9935	0.9938	49.5	50.3
Project alone HIGH	30	0.9998	0.9998	0.0000	0.9998	0.9998	0.9934	0.9934	0.0001	0.9932	0.9935	49.3	50.3
Cumulative impact without the Project	30	0.9866	0.9865	0.0002	0.9862	0.9868	0.6572	0.6571	0.0033	0.6505	0.6633	21.4	77.8
Cumulative impact with the Project LOW	30	0.9864	0.9864	0.0002	0.9860	0.9867	0.6532	0.6531	0.0033	0.6464	0.6593	21.1	78.2

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Cumulative impact with the Project MID	30	0.9863	0.9863	0.0002	0.9860	0.9866	0.6530	0.6529	0.0033	0.6462	0.6591	21.1	78.2
Cumulative impact with the Project HIGH	30	0.9863	0.9863	0.0002	0.9860	0.9866	0.6528	0.6527	0.0033	0.6460	0.6590	21.1	78.2
Project alone LOW	35	0.9998	0.9998	0.0000	0.9998	0.9998	0.9930	0.9930	0.0001	0.9928	0.9931	49.7	50.3
Project alone MID	35	0.9998	0.9998	0.0000	0.9998	0.9998	0.9926	0.9926	0.0001	0.9924	0.9928	49.7	50.3
Project alone HIGH	35	0.9998	0.9998	0.0000	0.9998	0.9998	0.9923	0.9923	0.0001	0.9921	0.9925	49.7	50.3
Cumulative impact without the Project	35	0.9866	0.9865	0.0001	0.9862	0.9868	0.6142	0.6141	0.0033	0.6072	0.6202	17.9	79.5
Cumulative impact with the Project LOW	35	0.9864	0.9864	0.0002	0.9860	0.9866	0.6098	0.6097	0.0033	0.6028	0.6159	17.8	79.7
Cumulative impact with the Project MID	35	0.9863	0.9863	0.0002	0.9860	0.9866	0.6096	0.6095	0.0034	0.6025	0.6156	17.8	79.7
Cumulative impact with the Project HIGH	35	0.9863	0.9863	0.0002	0.9860	0.9866	0.6094	0.6093	0.0034	0.6024	0.6155	17.7	79.7

Table 3-10 Projected PVA metrics from 10 to 35 years for guillemot in the non-breeding season for the Project alone and cumulatively in the UK North Sea & Channel. (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Project alone LOW	10	1.0000	1.0000	0.0000	1.0000	1.0000	0.9997	0.9996	0.0000	0.9996	0.9997	49.8	50.1
Project alone MID	10	0.9999	0.9999	0.0000	0.9999	0.9999	0.9993	0.9993	0.0000	0.9993	0.9993	49.8	50.4
Project alone HIGH	10	0.9999	0.9999	0.0000	0.9999	0.9999	0.9989	0.9989	0.0000	0.9989	0.9990	49.7	50.4
Cumulative impact without the Project	10	0.9983	0.9983	0.0000	0.9983	0.9983	0.9814	0.9814	0.0002	0.9811	0.9817	44.3	55.6
Cumulative impact with the Project LOW	10	0.9983	0.9983	0.0000	0.9982	0.9983	0.9811	0.9811	0.0002	0.9807	0.9813	44.2	55.7
Cumulative impact with the Project MID	10	0.9982	0.9982	0.0000	0.9982	0.9983	0.9807	0.9807	0.0002	0.9804	0.9810	44.2	55.9
Cumulative impact with the Project HIGH	10	0.9982	0.9982	0.0000	0.9982	0.9982	0.9804	0.9804	0.0002	0.9800	0.9807	44.0	56.0
Project alone LOW	20	1.0000	1.0000	0.0000	1.0000	1.0000	0.9993	0.9993	0.0000	0.9993	0.9993	49.9	50.1
Project alone MID	20	0.9999	0.9999	0.0000	0.9999	0.9999	0.9987	0.9987	0.0000	0.9986	0.9987	49.7	50.3

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Project alone HIGH	20	0.9999	0.9999	0.0000	0.9999	0.9999	0.9980	0.9980	0.0000	0.9979	0.9980	49.5	50.5
Cumulative impact without the Project	20	0.9983	0.9983	0.0000	0.9983	0.9983	0.9645	0.9645	0.0002	0.9641	0.9649	42.6	57.7
Cumulative impact with the Project LOW	20	0.9982	0.9982	0.0000	0.9982	0.9983	0.9639	0.9639	0.0002	0.9634	0.9642	42.3	57.8
Cumulative impact with the Project MID	20	0.9982	0.9982	0.0000	0.9982	0.9982	0.9632	0.9632	0.0002	0.9628	0.9636	42.2	58.0
Cumulative impact with the Project HIGH	20	0.9982	0.9982	0.0000	0.9982	0.9982	0.9626	0.9626	0.0002	0.9621	0.9629	42.0	58.2
Project alone LOW	30	1.0000	1.0000	0.0000	1.0000	1.0000	0.9990	0.9990	0.0000	0.9990	0.9990	49.7	50.1
Project alone MID	30	0.9999	0.9999	0.0000	0.9999	0.9999	0.9980	0.9980	0.0000	0.9980	0.9980	49.4	50.2
Project alone HIGH	30	0.9999	0.9999	0.0000	0.9999	0.9999	0.9970	0.9970	0.0000	0.9970	0.9970	49.3	50.4
Cumulative impact without the Project	30	0.9983	0.9983	0.0000	0.9983	0.9983	0.9480	0.9480	0.0002	0.9475	0.9484	40.8	61.4
Cumulative impact with the Project LOW	30	0.9982	0.9982	0.0000	0.9982	0.9983	0.9470	0.9470	0.0002	0.9465	0.9475	40.6	61.6

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Cumulative impact with the Project MID	30	0.9982	0.9982	0.0000	0.9982	0.9982	0.9460	0.9460	0.0003	0.9455	0.9465	40.6	61.8
Cumulative impact with the Project HIGH	30	0.9982	0.9982	0.0000	0.9982	0.9982	0.9451	0.9451	0.0003	0.9446	0.9456	40.4	61.9
Project alone LOW	35	1.0000	1.0000	0.0000	1.0000	1.0000	0.9988	0.9988	0.0000	0.9988	0.9989	49.7	50.4
Project alone MID	35	0.9999	0.9999	0.0000	0.9999	0.9999	0.9977	0.9977	0.0000	0.9977	0.9977	49.6	50.7
Project alone HIGH	35	0.9999	0.9999	0.0000	0.9999	0.9999	0.9965	0.9965	0.0000	0.9965	0.9965	49.6	50.8
Cumulative impact without the Project	35	0.9983	0.9983	0.0000	0.9983	0.9983	0.9398	0.9398	0.0003	0.9393	0.9403	39.7	61.0
Cumulative impact with the Project LOW	35	0.9982	0.9982	0.0000	0.9982	0.9983	0.9386	0.9386	0.0003	0.9381	0.9391	39.3	61.2
Cumulative impact with the Project MID	35	0.9982	0.9982	0.0000	0.9982	0.9982	0.9376	0.9376	0.0003	0.9370	0.9381	39.2	61.4
Cumulative impact with the Project HIGH	35	0.9982	0.9982	0.0000	0.9982	0.9982	0.9365	0.9365	0.0003	0.9359	0.9370	38.9	61.7

Table 3-11 Projected PVA metrics from 10 to 35 years for razorbill in the non-breeding season for the Project alone and cumulatively in the UK North Sea. (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Project alone LOW	10	1.0000	1.0000	0.0000	1.0000	1.0000	0.9998	0.9998	0.0000	0.9998	0.9998	49.9	50.1
Project alone MID	10	1.0000	1.0000	0.0000	1.0000	1.0000	0.9996	0.9996	0.0000	0.9996	0.9996	49.9	50.2
Project alone HIGH	10	0.9999	0.9999	0.0000	0.9999	0.9999	0.9994	0.9994	0.0000	0.9994	0.9994	49.9	50.2
Cumulative impact without the Project	10	0.9824	0.9824	0.0004	0.9816	0.9830	0.8226	0.8223	0.0032	0.8156	0.8278	20.5	79.8
Cumulative impact with the Project LOW	10	0.9824	0.9824	0.0004	0.9816	0.9829	0.8224	0.8221	0.0032	0.8154	0.8276	20.5	79.9
Cumulative impact with the Project MID	10	0.9824	0.9823	0.0004	0.9816	0.9829	0.8222	0.8220	0.0032	0.8152	0.8275	20.4	79.9
Cumulative impact with the Project HIGH	10	0.9823	0.9823	0.0004	0.9816	0.9829	0.8221	0.8218	0.0032	0.8151	0.8273	20.4	79.9
Project alone LOW	20	1.0000	1.0000	0.0000	1.0000	1.0000	0.9996	0.9996	0.0000	0.9996	0.9996	49.9	50.1
Project alone MID	20	1.0000	1.0000	0.0000	1.0000	1.0000	0.9992	0.9992	0.0000	0.9992	0.9993	49.9	50.3

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Project alone HIGH	20	0.9999	0.9999	0.0000	0.9999	0.9999	0.9988	0.9988	0.0000	0.9988	0.9989	49.9	50.3
Cumulative impact without the Project	20	0.9823	0.9823	0.0003	0.9818	0.9827	0.6870	0.6870	0.0037	0.6794	0.6938	11.0	88.9
Cumulative impact with the Project LOW	20	0.9823	0.9823	0.0003	0.9817	0.9827	0.6867	0.6867	0.0037	0.6791	0.6936	10.9	88.9
Cumulative impact with the Project MID	20	0.9822	0.9822	0.0003	0.9817	0.9827	0.6865	0.6864	0.0037	0.6788	0.6933	10.9	89.0
Cumulative impact with the Project HIGH	20	0.9822	0.9822	0.0003	0.9817	0.9827	0.6862	0.6862	0.0037	0.6786	0.6931	10.9	89.0
Project alone LOW	30	1.0000	1.0000	0.0000	1.0000	1.0000	0.9994	0.9994	0.0000	0.9994	0.9995	49.9	50.1
Project alone MID	30	1.0000	1.0000	0.0000	1.0000	1.0000	0.9989	0.9989	0.0000	0.9988	0.9989	49.9	50.2
Project alone HIGH	30	0.9999	0.9999	0.0000	0.9999	0.9999	0.9983	0.9983	0.0000	0.9982	0.9983	49.9	50.3
Cumulative impact without the Project	30	0.9822	0.9822	0.0002	0.9818	0.9826	0.5740	0.5739	0.0039	0.5660	0.5811	7.6	93.9
Cumulative impact with the Project LOW	30	0.9822	0.9822	0.0002	0.9818	0.9826	0.5736	0.5735	0.0039	0.5657	0.5808	7.6	93.9

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Cumulative impact with the Project MID	30	0.9822	0.9822	0.0002	0.9818	0.9826	0.5733	0.5732	0.0039	0.5653	0.5805	7.6	94.0
Cumulative impact with the Project HIGH	30	0.9822	0.9822	0.0002	0.9818	0.9826	0.5730	0.5729	0.0039	0.5650	0.5802	7.6	94.0
Project alone LOW	35	1.0000	1.0000	0.0000	1.0000	1.0000	0.9993	0.9993	0.0000	0.9993	0.9994	50.0	50.0
Project alone MID	35	1.0000	1.0000	0.0000	1.0000	1.0000	0.9987	0.9987	0.0000	0.9986	0.9987	49.9	50.1
Project alone HIGH	35	0.9999	0.9999	0.0000	0.9999	0.9999	0.9980	0.9980	0.0000	0.9980	0.9981	49.9	50.1
Cumulative impact without the Project	35	0.9822	0.9822	0.0002	0.9818	0.9826	0.5244	0.5244	0.0038	0.5170	0.5316	5.2	93.7
Cumulative impact with the Project LOW	35	0.9822	0.9822	0.0002	0.9818	0.9826	0.5240	0.5240	0.0038	0.5167	0.5312	5.2	93.7
Cumulative impact with the Project MID	35	0.9822	0.9822	0.0002	0.9818	0.9826	0.5236	0.5237	0.0038	0.5163	0.5309	5.2	93.7
Cumulative impact with the Project HIGH	35	0.9822	0.9822	0.0002	0.9818	0.9825	0.5233	0.5233	0.0038	0.5160	0.5305	5.2	93.7

Table 3-12 Projected PVA metrics from 10 to 35 years for puffin in the non-breeding season for the Project alone and cumulatively in the UK North Sea. (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Project alone LOW	10	0.9999	0.9999	0.0004	0.9992	1.0007	0.9994	0.9993	0.0049	0.9901	1.0087	50.1	50.0
Project alone MID	10	0.9998	0.9999	0.0004	0.9991	1.0007	0.9983	0.9984	0.0050	0.9884	1.0087	49.9	50.3
Project alone HIGH	10	0.9998	0.9998	0.0004	0.9989	1.0007	0.9979	0.9978	0.0052	0.9878	1.0083	49.9	50.1
Cumulative impact without the Project	10	0.9990	0.9990	0.0004	0.9980	0.9998	0.9890	0.9889	0.0053	0.9780	0.9987	48.6	51.4
Cumulative impact with the Project LOW	10	0.9989	0.9989	0.0004	0.9980	0.9998	0.9883	0.9882	0.0053	0.9781	0.9983	48.6	51.0
Cumulative impact with the Project MID	10	0.9988	0.9988	0.0005	0.9979	0.9997	0.9874	0.9873	0.0054	0.9765	0.9977	48.6	51.3
Cumulative impact with the Project HIGH	10	0.9987	0.9987	0.0004	0.9979	0.9995	0.9863	0.9863	0.0051	0.9757	0.9965	48.2	51.5
Project alone LOW	20	0.9999	0.9999	0.0004	0.9992	1.0007	0.9986	0.9988	0.0077	0.9837	1.0143	49.5	50.2
Project alone MID	20	0.9999	0.9999	0.0004	0.9992	1.0006	0.9971	0.9970	0.0078	0.9819	1.0124	50.0	50.1

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Project alone HIGH	20	0.9998	0.9998	0.0004	0.9990	1.0005	0.9960	0.9958	0.0081	0.9799	1.0124	49.5	50.5
Cumulative impact without the Project	20	0.9990	0.9990	0.0004	0.9982	0.9997	0.9785	0.9785	0.0079	0.9626	0.9937	47.6	52.2
Cumulative impact with the Project LOW	20	0.9989	0.9989	0.0004	0.9981	0.9997	0.9778	0.9776	0.0079	0.9614	0.9926	47.6	52.3
Cumulative impact with the Project MID	20	0.9988	0.9988	0.0004	0.9981	0.9995	0.9756	0.9757	0.0077	0.9607	0.9906	47.6	52.5
Cumulative impact with the Project HIGH	20	0.9987	0.9987	0.0004	0.9980	0.9994	0.9739	0.9738	0.0076	0.9588	0.9883	47.0	52.5
Project alone LOW	30	0.9999	0.9999	0.0003	0.9992	1.0006	0.9981	0.9980	0.0108	0.9765	1.0198	50.1	49.9
Project alone MID	30	0.9998	0.9998	0.0003	0.9992	1.0005	0.9951	0.9952	0.0106	0.9733	1.0160	49.2	50.7
Project alone HIGH	30	0.9998	0.9998	0.0003	0.9991	1.0004	0.9933	0.9933	0.0105	0.9724	1.0158	49.4	51.0
Cumulative impact without the Project	30	0.9990	0.9990	0.0003	0.9983	0.9996	0.9687	0.9684	0.0105	0.9471	0.9888	46.9	52.1
Cumulative impact with the Project LOW	30	0.9989	0.9989	0.0004	0.9981	0.9995	0.9671	0.9668	0.0107	0.9432	0.9865	46.5	52.0

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Cumulative impact with the Project MID	30	0.9988	0.9988	0.0003	0.9981	0.9995	0.9646	0.9643	0.0100	0.9436	0.9836	46.4	52.2
Cumulative impact with the Project HIGH	30	0.9988	0.9987	0.0003	0.9980	0.9994	0.9619	0.9616	0.0104	0.9401	0.9822	46.2	52.6
Project alone LOW	35	0.9999	0.9999	0.0004	0.9992	1.0006	0.9981	0.9977	0.0126	0.9731	1.0216	50.2	49.9
Project alone MID	35	0.9999	0.9998	0.0004	0.9992	1.0006	0.9945	0.9943	0.0127	0.9695	1.0206	49.5	50.3
Project alone HIGH	35	0.9998	0.9998	0.0003	0.9991	1.0005	0.9923	0.9922	0.0123	0.9662	1.0171	49.2	50.4
Cumulative impact without the Project	35	0.9990	0.9990	0.0004	0.9982	0.9996	0.9637	0.9633	0.0124	0.9383	0.9857	47.7	53.0
Cumulative impact with the Project LOW	35	0.9989	0.9989	0.0004	0.9981	0.9996	0.9624	0.9616	0.0125	0.9359	0.9853	47.2	52.8
Cumulative impact with the Project MID	35	0.9988	0.9988	0.0003	0.9981	0.9995	0.9589	0.9588	0.0115	0.9346	0.9815	47.6	53.1
Cumulative impact with the Project HIGH	35	0.9987	0.9987	0.0004	0.9980	0.9994	0.9555	0.9556	0.0123	0.9304	0.9784	46.5	53.1

Table 3-13 Projected PVA metrics from 10 to 35 years for gannet in the non-breeding season for the Project alone and cumulatively in the UK North Sea & Channel. (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Project alone LOW	10	0.9999	0.9999	0.0003	0.9993	1.0005	0.9990	0.9990	0.0038	0.9913	1.0064	50.1	49.9
Project alone MID	10	0.9999	0.9999	0.0003	0.9992	1.0005	0.9984	0.9986	0.0038	0.9913	1.0061	49.5	50.4
Project alone HIGH	10	0.9998	0.9998	0.0003	0.9992	1.0004	0.9979	0.9981	0.0039	0.9908	1.0061	49.6	50.6
Cumulative impact without the Project	10	0.9948	0.9948	0.0003	0.9942	0.9955	0.9445	0.9446	0.0037	0.9376	0.9514	32.6	66.9
Cumulative impact with the Project LOW	10	0.9947	0.9947	0.0003	0.9940	0.9954	0.9435	0.9434	0.0039	0.9357	0.9510	32.9	67.4
Cumulative impact with the Project MID	10	0.9947	0.9947	0.0004	0.9939	0.9953	0.9430	0.9429	0.0040	0.9350	0.9503	32.0	67.6
Cumulative impact with the Project HIGH	10	0.9946	0.9946	0.0004	0.9940	0.9953	0.9425	0.9425	0.0039	0.9351	0.9497	31.5	67.7
Project alone LOW	20	0.9999	0.9999	0.0002	0.9994	1.0003	0.9981	0.9979	0.0050	0.9879	1.0076	49.5	50.7
Project alone MID	20	0.9999	0.9999	0.0002	0.9994	1.0003	0.9970	0.9969	0.0050	0.9874	1.0066	48.8	51.7

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Project alone HIGH	20	0.9998	0.9998	0.0002	0.9994	1.0002	0.9960	0.9961	0.0050	0.9863	1.0056	49.0	51.4
Cumulative impact without the Project	20	0.9948	0.9948	0.0002	0.9943	0.9952	0.8956	0.8956	0.0046	0.8872	0.9041	25.8	73.9
Cumulative impact with the Project LOW	20	0.9947	0.9947	0.0002	0.9942	0.9951	0.8937	0.8937	0.0046	0.8847	0.9028	25.5	74.4
Cumulative impact with the Project MID	20	0.9946	0.9946	0.0002	0.9941	0.9951	0.8928	0.8928	0.0048	0.8830	0.9023	25.3	74.3
Cumulative impact with the Project HIGH	20	0.9946	0.9946	0.0002	0.9941	0.9950	0.8920	0.8919	0.0047	0.8828	0.9008	24.9	74.5
Project alone LOW	30	0.9999	0.9999	0.0002	0.9995	1.0002	0.9971	0.9969	0.0058	0.9849	1.0079	50.1	49.9
Project alone MID	30	0.9999	0.9998	0.0002	0.9995	1.0002	0.9954	0.9954	0.0058	0.9841	1.0062	48.6	50.5
Project alone HIGH	30	0.9998	0.9998	0.0002	0.9994	1.0002	0.9942	0.9941	0.0060	0.9827	1.0059	48.8	50.8
Cumulative impact without the Project	30	0.9947	0.9947	0.0002	0.9944	0.9951	0.8492	0.8493	0.0053	0.8391	0.8593	21.9	78.9
Cumulative impact with the Project LOW	30	0.9946	0.9946	0.0002	0.9942	0.9950	0.8467	0.8465	0.0052	0.8362	0.8564	21.4	79.0

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Cumulative impact with the Project MID	30	0.9946	0.9946	0.0002	0.9942	0.9950	0.8453	0.8453	0.0054	0.8348	0.8558	21.6	79.0
Cumulative impact with the Project HIGH	30	0.9946	0.9945	0.0002	0.9942	0.9949	0.8443	0.8441	0.0052	0.8336	0.8545	21.4	79.5
Project alone LOW	35	0.9999	0.9999	0.0002	0.9995	1.0002	0.9966	0.9964	0.0063	0.9835	1.0080	49.3	50.8
Project alone MID	35	0.9998	0.9998	0.0002	0.9995	1.0002	0.9945	0.9946	0.0063	0.9825	1.0074	48.8	51.5
Project alone HIGH	35	0.9998	0.9998	0.0002	0.9995	1.0001	0.9933	0.9932	0.0064	0.9808	1.0060	48.7	51.2
Cumulative impact without the Project	35	0.9947	0.9947	0.0002	0.9944	0.9951	0.8268	0.8267	0.0056	0.8160	0.8377	17.2	78.4
Cumulative impact with the Project LOW	35	0.9946	0.9946	0.0002	0.9943	0.9950	0.8241	0.8239	0.0054	0.8128	0.8338	16.9	78.8
Cumulative impact with the Project MID	35	0.9946	0.9946	0.0002	0.9942	0.9949	0.8226	0.8225	0.0056	0.8113	0.8326	16.9	79.0
Cumulative impact with the Project HIGH	35	0.9946	0.9945	0.0002	0.9942	0.9949	0.8213	0.8212	0.0054	0.8104	0.8320	16.6	79.2

3.3.1.3 Non-breeding season - Western

Table 3-14 Projected PVA metrics from 10 to 35 years for kittiwake in the non-breeding season for the Project alone and cumulatively in Western waters. (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Project alone LOW	10	0.9997	0.9997	0.0004	0.9989	1.0005	0.9968	0.9969	0.0049	0.9872	1.0071	49.6	50.3
Project alone MID	10	0.9997	0.9997	0.0004	0.9989	1.0005	0.9968	0.9967	0.0048	0.9877	1.0061	49.6	50.5
Project alone HIGH	10	0.9997	0.9997	0.0004	0.9988	1.0005	0.9966	0.9966	0.0049	0.9865	1.0066	49.6	50.5
Cumulative impact without the Project	10	0.9978	0.9978	0.0004	0.9971	0.9987	0.9763	0.9765	0.0049	0.9670	0.9863	47.0	53.2
Cumulative impact with the Project LOW	10	0.9975	0.9975	0.0004	0.9967	0.9983	0.9730	0.9731	0.0049	0.9640	0.9831	46.7	53.5
Cumulative impact with the Project MID	10	0.9975	0.9975	0.0004	0.9967	0.9983	0.9730	0.9730	0.0049	0.9631	0.9826	46.8	53.4
Cumulative impact with the Project HIGH	10	0.9975	0.9975	0.0004	0.9967	0.9983	0.9729	0.9727	0.0047	0.9631	0.9818	46.5	53.3
Project alone LOW	20	0.9997	0.9997	0.0003	0.9991	1.0003	0.9937	0.9938	0.0065	0.9809	1.0070	49.6	50.7
Project alone MID	20	0.9997	0.9997	0.0003	0.9991	1.0002	0.9934	0.9934	0.0063	0.9814	1.0055	49.4	50.6

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Project alone HIGH	20	0.9997	0.9997	0.0003	0.9991	1.0002	0.9930	0.9933	0.0065	0.9813	1.0057	49.6	50.3
Cumulative impact without the Project	20	0.9978	0.9978	0.0003	0.9972	0.9984	0.9553	0.9554	0.0063	0.9427	0.9682	46.6	54.1
Cumulative impact with the Project LOW	20	0.9975	0.9975	0.0003	0.9969	0.9981	0.9492	0.9490	0.0064	0.9361	0.9611	45.8	54.8
Cumulative impact with the Project MID	20	0.9975	0.9975	0.0003	0.9969	0.9981	0.9489	0.9488	0.0064	0.9366	0.9619	45.9	54.7
Cumulative impact with the Project HIGH	20	0.9975	0.9975	0.0003	0.9969	0.9981	0.9484	0.9485	0.0063	0.9362	0.9609	45.9	54.6
Project alone LOW	30	0.9997	0.9997	0.0003	0.9992	1.0002	0.9908	0.9908	0.0081	0.9744	1.0069	49.6	50.5
Project alone MID	30	0.9997	0.9997	0.0002	0.9992	1.0002	0.9898	0.9902	0.0077	0.9755	1.0057	49.3	50.5
Project alone HIGH	30	0.9997	0.9997	0.0002	0.9992	1.0001	0.9899	0.9900	0.0077	0.9754	1.0051	49.2	50.5
Cumulative impact without the Project	30	0.9978	0.9978	0.0003	0.9973	0.9983	0.9345	0.9345	0.0076	0.9195	0.9499	45.0	54.7
Cumulative impact with the Project LOW	30	0.9975	0.9975	0.0003	0.9970	0.9980	0.9253	0.9255	0.0077	0.9108	0.9403	44.7	55.1

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Cumulative impact with the Project MID	30	0.9975	0.9975	0.0002	0.9970	0.9980	0.9250	0.9252	0.0073	0.9114	0.9407	44.6	55.3
Cumulative impact with the Project HIGH	30	0.9975	0.9975	0.0003	0.9969	0.9980	0.9246	0.9247	0.0075	0.9094	0.9401	43.9	55.0
Project alone LOW	35	0.9997	0.9997	0.0002	0.9992	1.0002	0.9894	0.9892	0.0087	0.9720	1.0070	49.6	50.5
Project alone MID	35	0.9997	0.9997	0.0002	0.9992	1.0001	0.9882	0.9885	0.0084	0.9719	1.0049	49.6	51.0
Project alone HIGH	35	0.9997	0.9997	0.0002	0.9992	1.0001	0.9883	0.9882	0.0084	0.9719	1.0046	49.3	50.8
Cumulative impact without the Project	35	0.9978	0.9978	0.0002	0.9973	0.9983	0.9241	0.9243	0.0082	0.9082	0.9414	44.3	55.1
Cumulative impact with the Project LOW	35	0.9975	0.9975	0.0002	0.9970	0.9979	0.9139	0.9139	0.0082	0.8977	0.9301	43.1	56.1
Cumulative impact with the Project MID	35	0.9975	0.9975	0.0002	0.9970	0.9980	0.9136	0.9137	0.0079	0.8989	0.9303	43.1	56.1
Cumulative impact with the Project HIGH	35	0.9975	0.9975	0.0002	0.9970	0.9980	0.9128	0.9129	0.0082	0.8956	0.9296	43.1	56.2

Table 3-15 Projected PVA metrics from 10 to 35 years for guillemot in the non-breeding season for the Project alone and cumulatively in Western waters. (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Project alone LOW	10	1.0000	1.0000	0.0001	0.9997	1.0002	0.9996	0.9996	0.0016	0.9964	1.0028	50.1	49.9
Project alone MID	10	0.9999	0.9999	0.0001	0.9997	1.0002	0.9993	0.9993	0.0016	0.9960	1.0025	49.4	50.4
Project alone HIGH	10	0.9999	0.9999	0.0001	0.9996	1.0002	0.9990	0.9990	0.0016	0.9959	1.0021	49.5	50.3
Cumulative impact without the Project	10	0.9998	0.9998	0.0001	0.9996	1.0001	0.9982	0.9981	0.0016	0.9950	1.0014	49.1	50.4
Cumulative impact with the Project LOW	10	0.9998	0.9998	0.0001	0.9996	1.0001	0.9978	0.9978	0.0016	0.9945	1.0009	49.1	50.7
Cumulative impact with the Project MID	10	0.9998	0.9998	0.0001	0.9995	1.0001	0.9977	0.9976	0.0017	0.9943	1.0009	49.1	50.8
Cumulative impact with the Project HIGH	10	0.9997	0.9997	0.0001	0.9995	1.0000	0.9972	0.9972	0.0016	0.9942	1.0005	49.1	50.9
Project alone LOW	20	1.0000	1.0000	0.0001	0.9998	1.0001	0.9993	0.9993	0.0021	0.9951	1.0033	49.7	50.5
Project alone MID	20	0.9999	0.9999	0.0001	0.9998	1.0001	0.9986	0.9986	0.0021	0.9948	1.0026	49.6	50.3

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Project alone HIGH	20	0.9999	0.9999	0.0001	0.9997	1.0001	0.9979	0.9980	0.0020	0.9939	1.0018	49.5	50.2
Cumulative impact without the Project	20	0.9998	0.9998	0.0001	0.9996	1.0000	0.9965	0.9964	0.0021	0.9924	1.0005	49.0	50.8
Cumulative impact with the Project LOW	20	0.9998	0.9998	0.0001	0.9996	1.0000	0.9958	0.9958	0.0020	0.9918	0.9997	48.8	51.2
Cumulative impact with the Project MID	20	0.9998	0.9998	0.0001	0.9996	1.0000	0.9953	0.9953	0.0020	0.9913	0.9996	48.8	51.0
Cumulative impact with the Project HIGH	20	0.9997	0.9997	0.0001	0.9996	0.9999	0.9946	0.9947	0.0021	0.9908	0.9988	48.8	51.4
Project alone LOW	30	1.0000	1.0000	0.0001	0.9998	1.0001	0.9990	0.9990	0.0024	0.9940	1.0039	49.9	50.2
Project alone MID	30	0.9999	0.9999	0.0001	0.9998	1.0001	0.9979	0.9979	0.0024	0.9930	1.0026	49.9	50.3
Project alone HIGH	30	0.9999	0.9999	0.0001	0.9998	1.0000	0.9970	0.9971	0.0023	0.9926	1.0016	49.7	50.3
Cumulative impact without the Project	30	0.9998	0.9998	0.0001	0.9997	1.0000	0.9948	0.9948	0.0024	0.9899	0.9990	49.1	51.3
Cumulative impact with the Project LOW	30	0.9998	0.9998	0.0001	0.9996	0.9999	0.9938	0.9938	0.0023	0.9890	0.9982	48.9	51.5

MacArthur Green

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Cumulative impact with the Project MID	30	0.9998	0.9998	0.0001	0.9996	0.9999	0.9931	0.9931	0.0023	0.9886	0.9979	48.6	51.7
Cumulative impact with the Project HIGH	30	0.9997	0.9997	0.0001	0.9996	0.9999	0.9921	0.9922	0.0024	0.9874	0.9972	48.4	51.7
Project alone LOW	35	1.0000	1.0000	0.0001	0.9998	1.0001	0.9988	0.9988	0.0025	0.9938	1.0041	49.5	50.3
Project alone MID	35	0.9999	0.9999	0.0001	0.9998	1.0001	0.9977	0.9977	0.0025	0.9928	1.0024	49.5	50.6
Project alone HIGH	35	0.9999	0.9999	0.0001	0.9998	1.0000	0.9966	0.9966	0.0025	0.9917	1.0012	49.5	50.7
Cumulative impact without the Project	35	0.9998	0.9998	0.0001	0.9997	1.0000	0.9940	0.9940	0.0024	0.9892	0.9984	49.1	51.1
Cumulative impact with the Project LOW	35	0.9998	0.9998	0.0001	0.9997	0.9999	0.9929	0.9928	0.0024	0.9879	0.9976	49.1	51.4
Cumulative impact with the Project MID	35	0.9998	0.9998	0.0001	0.9997	0.9999	0.9919	0.9920	0.0024	0.9874	0.9970	48.6	51.6
Cumulative impact with the Project HIGH	35	0.9997	0.9997	0.0001	0.9996	0.9999	0.9910	0.9910	0.0025	0.9860	0.9960	48.5	51.7

Table 3-16 Projected PVA metrics from 10 to 35 years for razorbill in the non-breeding season for the Project alone and cumulatively in Western waters. (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Project alone LOW	10	1.0000	1.0000	0.0009	0.9983	1.0017	1.0006	1.0003	0.0101	0.9794	1.0205	50.3	49.9
Project alone MID	10	1.0000	1.0000	0.0008	0.9984	1.0017	0.9999	1.0000	0.0098	0.9804	1.0197	50.0	49.9
Project alone HIGH	10	1.0000	1.0000	0.0009	0.9983	1.0017	1.0000	1.0001	0.0102	0.9797	1.0197	50.1	49.8
Cumulative impact without the Project	10	0.9986	0.9986	0.0009	0.9969	1.0003	0.9848	0.9848	0.0100	0.9648	1.0045	46.9	52.3
Cumulative impact with the Project LOW	10	0.9987	0.9986	0.0008	0.9969	1.0000	0.9856	0.9851	0.0096	0.9648	1.0035	46.9	52.6
Cumulative impact with the Project MID	10	0.9986	0.9986	0.0008	0.9969	1.0003	0.9849	0.9847	0.0096	0.9656	1.0041	46.9	52.6
Cumulative impact with the Project HIGH	10	0.9986	0.9986	0.0009	0.9968	1.0002	0.9842	0.9844	0.0101	0.9633	1.0034	46.9	53.3
Project alone LOW	20	1.0000	1.0000	0.0006	0.9987	1.0013	0.9994	0.9996	0.0141	0.9721	1.0267	50.0	50.2
Project alone MID	20	0.9999	1.0000	0.0006	0.9988	1.0012	0.9990	0.9993	0.0134	0.9717	1.0260	50.0	49.8

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Project alone HIGH	20	1.0000	1.0000	0.0007	0.9986	1.0012	0.9994	0.9995	0.0143	0.9698	1.0275	49.9	50.4
Cumulative impact without the Project	20	0.9986	0.9986	0.0007	0.9974	0.9999	0.9704	0.9712	0.0138	0.9463	0.9981	45.8	54.4
Cumulative impact with the Project LOW	20	0.9986	0.9986	0.0006	0.9973	0.9998	0.9706	0.9707	0.0133	0.9429	0.9966	46.1	54.4
Cumulative impact with the Project MID	20	0.9986	0.9986	0.0007	0.9973	0.9999	0.9695	0.9702	0.0137	0.9439	0.9969	46.3	54.8
Cumulative impact with the Project HIGH	20	0.9986	0.9985	0.0006	0.9972	0.9998	0.9700	0.9699	0.0136	0.9423	0.9957	46.4	54.5
Project alone LOW	30	1.0000	1.0000	0.0006	0.9989	1.0011	0.9996	1.0001	0.0184	0.9649	1.0368	50.0	50.1
Project alone MID	30	1.0000	1.0000	0.0006	0.9989	1.0012	0.9992	0.9994	0.0185	0.9639	1.0375	50.5	49.7
Project alone HIGH	30	1.0000	1.0000	0.0006	0.9988	1.0011	0.9997	0.9992	0.0189	0.9630	1.0357	50.5	49.5
Cumulative impact without the Project	30	0.9986	0.9986	0.0006	0.9974	0.9997	0.9576	0.9575	0.0177	0.9234	0.9933	46.3	54.7
Cumulative impact with the Project LOW	30	0.9986	0.9986	0.0006	0.9974	0.9996	0.9570	0.9568	0.0175	0.9224	0.9903	46.2	55.0

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Cumulative impact with the Project MID	30	0.9986	0.9986	0.0006	0.9974	0.9997	0.9561	0.9562	0.0174	0.9200	0.9919	45.9	54.2
Cumulative impact with the Project HIGH	30	0.9986	0.9985	0.0006	0.9973	0.9996	0.9558	0.9560	0.0173	0.9216	0.9917	46.2	54.8
Project alone LOW	35	1.0000	1.0000	0.0006	0.9989	1.0011	0.9997	1.0002	0.0210	0.9577	1.0430	49.8	50.1
Project alone MID	35	1.0000	1.0000	0.0006	0.9989	1.0011	0.9995	0.9995	0.0207	0.9578	1.0402	49.5	50.4
Project alone HIGH	35	1.0000	1.0000	0.0006	0.9988	1.0011	0.9989	0.9990	0.0213	0.9578	1.0429	49.0	50.8
Cumulative impact without the Project	35	0.9986	0.9986	0.0006	0.9975	0.9997	0.9510	0.9510	0.0201	0.9129	0.9912	45.8	55.1
Cumulative impact with the Project LOW	35	0.9986	0.9986	0.0005	0.9975	0.9996	0.9505	0.9502	0.0192	0.9124	0.9875	45.8	55.6
Cumulative impact with the Project MID	35	0.9986	0.9986	0.0006	0.9973	0.9996	0.9496	0.9499	0.0199	0.9090	0.9881	45.8	55.6
Cumulative impact with the Project HIGH	35	0.9985	0.9985	0.0006	0.9974	0.9996	0.9490	0.9492	0.0196	0.9105	0.9889	45.0	55.4

Table 3-17 Projected PVA metrics from 10 to 35 years for gannet in the non-breeding season for the Project alone and cumulatively in Western waters. (SD = standard deviation, LCI = lower confidence interval, UCI = upper confidence interval, U=50%I = the quantile from the unimpacted population that matched the 50% quantile for the impacted population, I=50%U = the quantile from the impacted population that match the 50% quantile for the unimpacted population).

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Project alone LOW	10	1.0000	1.0000	0.0002	0.9995	1.0004	0.9995	0.9996	0.0029	0.9941	1.0053	50.0	50.0
Project alone MID	10	0.9999	0.9999	0.0002	0.9995	1.0004	0.9993	0.9993	0.0030	0.9931	1.0052	49.7	50.4
Project alone HIGH	10	0.9999	0.9999	0.0003	0.9994	1.0004	0.9990	0.9991	0.0030	0.9934	1.0049	49.3	50.5
Cumulative impact without the Project	10	0.9997	0.9997	0.0002	0.9992	1.0001	0.9968	0.9967	0.0029	0.9910	1.0020	49.2	51.1
Cumulative impact with the Project LOW	10	0.9996	0.9996	0.0002	0.9992	1.0001	0.9959	0.9960	0.0029	0.9903	1.0018	48.9	51.1
Cumulative impact with the Project MID	10	0.9996	0.9996	0.0002	0.9992	1.0001	0.9957	0.9957	0.0029	0.9903	1.0016	48.9	51.2
Cumulative impact with the Project HIGH	10	0.9996	0.9996	0.0002	0.9991	1.0000	0.9955	0.9955	0.0029	0.9899	1.0013	49.0	51.3
Project alone LOW	20	0.9999	1.0000	0.0002	0.9996	1.0003	0.9989	0.9990	0.0037	0.9921	1.0065	49.5	50.5
Project alone MID	20	0.9999	0.9999	0.0002	0.9996	1.0003	0.9985	0.9985	0.0037	0.9911	1.0061	49.3	50.5

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Project alone HIGH	20	0.9999	0.9999	0.0002	0.9996	1.0002	0.9980	0.9981	0.0037	0.9911	1.0054	49.5	50.6
Cumulative impact without the Project	20	0.9997	0.9997	0.0002	0.9994	1.0000	0.9934	0.9935	0.0037	0.9864	1.0014	48.1	52.0
Cumulative impact with the Project LOW	20	0.9996	0.9996	0.0002	0.9993	1.0000	0.9922	0.9924	0.0038	0.9850	0.9999	48.2	51.7
Cumulative impact with the Project MID	20	0.9996	0.9996	0.0002	0.9993	0.9999	0.9918	0.9918	0.0038	0.9847	0.9992	48.1	52.1
Cumulative impact with the Project HIGH	20	0.9996	0.9996	0.0002	0.9993	0.9999	0.9913	0.9914	0.0037	0.9842	0.9986	48.1	52.9
Project alone LOW	30	0.9999	1.0000	0.0001	0.9997	1.0002	0.9985	0.9985	0.0043	0.9904	1.0071	49.6	50.6
Project alone MID	30	0.9999	0.9999	0.0001	0.9997	1.0002	0.9978	0.9978	0.0043	0.9890	1.0061	49.5	50.6
Project alone HIGH	30	0.9999	0.9999	0.0001	0.9996	1.0002	0.9972	0.9972	0.0043	0.9888	1.0058	49.3	50.8
Cumulative impact without the Project	30	0.9997	0.9997	0.0001	0.9994	1.0000	0.9905	0.9903	0.0043	0.9818	0.9992	47.9	52.3
Cumulative impact with the Project LOW	30	0.9996	0.9996	0.0001	0.9994	0.9999	0.9889	0.9888	0.0043	0.9803	0.9974	47.8	52.7

Scenario	Year	CGR					CPS					Quantiles	
		Median	Mean	SD	LCI	UCI	Median	Mean	SD	LCI	UCI	U=50%I	I=50%U
Cumulative impact with the Project MID	30	0.9996	0.9996	0.0001	0.9993	0.9999	0.9880	0.9879	0.0044	0.9796	0.9962	47.8	52.4
Cumulative impact with the Project HIGH	30	0.9996	0.9996	0.0001	0.9993	0.9999	0.9872	0.9872	0.0043	0.9791	0.9955	47.2	52.6
Project alone LOW	35	0.9999	0.9999	0.0001	0.9997	1.0002	0.9981	0.9982	0.0046	0.9898	1.0073	50.3	49.5
Project alone MID	35	0.9999	0.9999	0.0001	0.9997	1.0002	0.9973	0.9973	0.0045	0.9886	1.0064	50.0	50.0
Project alone HIGH	35	0.9999	0.9999	0.0001	0.9997	1.0001	0.9964	0.9967	0.0046	0.9877	1.0056	49.7	50.2
Cumulative impact without the Project	35	0.9997	0.9997	0.0001	0.9995	0.9999	0.9887	0.9887	0.0046	0.9797	0.9980	47.6	51.4
Cumulative impact with the Project LOW	35	0.9996	0.9996	0.0001	0.9994	0.9999	0.9868	0.9869	0.0045	0.9777	0.9958	47.7	51.9
Cumulative impact with the Project MID	35	0.9996	0.9996	0.0001	0.9993	0.9999	0.9860	0.9859	0.0047	0.9770	0.9957	47.1	52.0
Cumulative impact with the Project HIGH	35	0.9996	0.9996	0.0001	0.9994	0.9998	0.9850	0.9851	0.0046	0.9764	0.9946	47.4	51.9

3.3.2 Projected population plots

27. The NE PVA tool provides plots of the projected baseline and impacted populations for each population model run. These plots are provided below for the impacts from the Project alone and cumulatively. However, it is important to note that these population projections are not representative projections of future population trends. This is due to the assumptions, used in the model; that populations are density independent, and that population are closed (there is no immigration or emigration). It is highly unlikely that any populations act in a density independent manner (Horswill & Robinson 2015) or are closed. The population models are a useful tool in the assessment of risk to populations from the Project alone and cumulative, rather than a tool for predicting future population size. Therefore, the plots below are only illustrative and were provided on request by NatureScot.

28. Projected population sizes for the baseline and Impacted scenarios from the Project alone are provided for the breeding season (Figure 3-1 to Figure 3-6), the non-breeding season in the UK North Sea (Figure 3-7 to Figure 3-11) and the non-breeding season Western waters (Figure 3-12 to Figure 3-15).

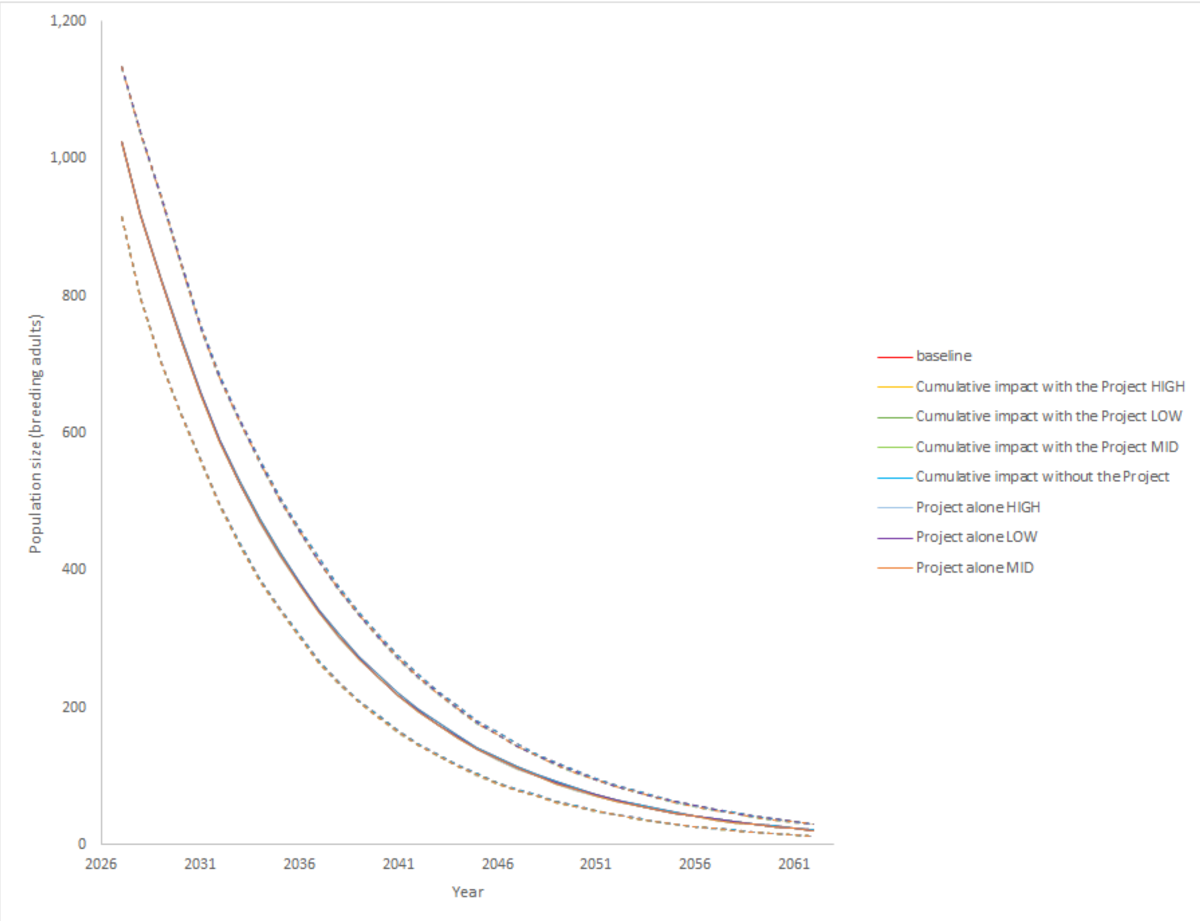


Figure 3-1 Projected population size plots for Arctic tern in the breeding season from the Project alone and cumulatively.

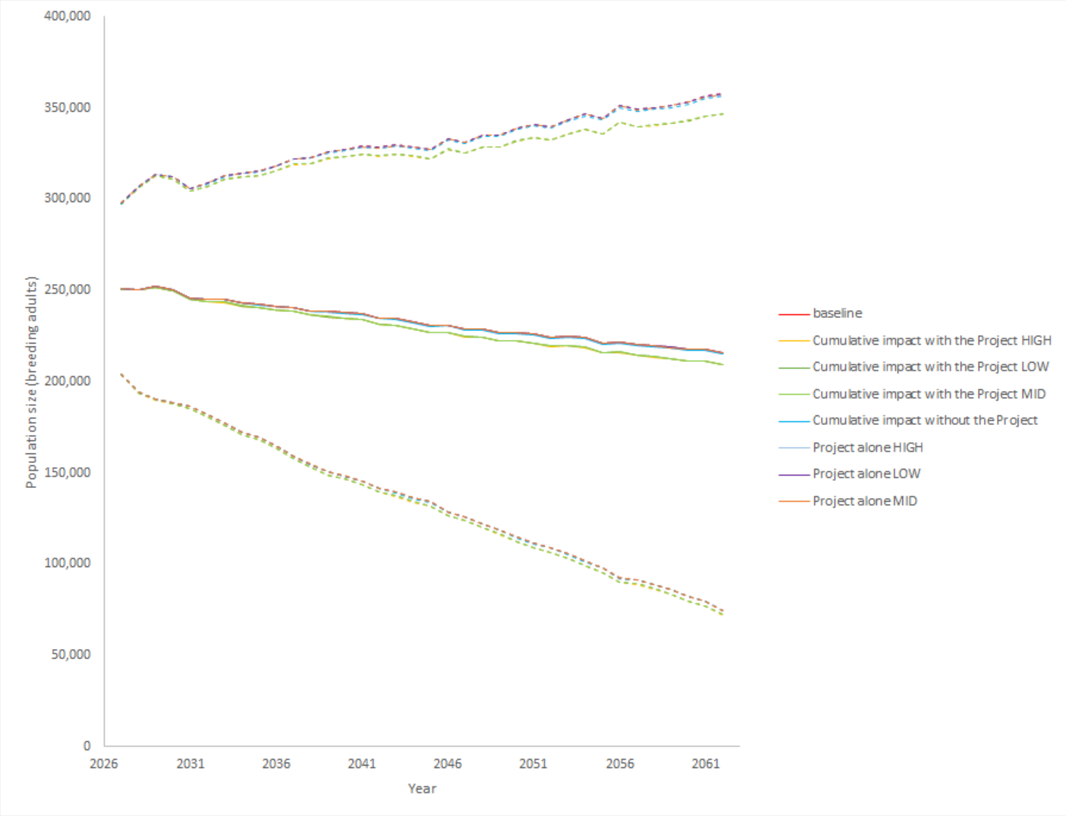


Figure 3-2 Projected population size plots for kittiwake in the breeding season from the Project alone and cumulatively.

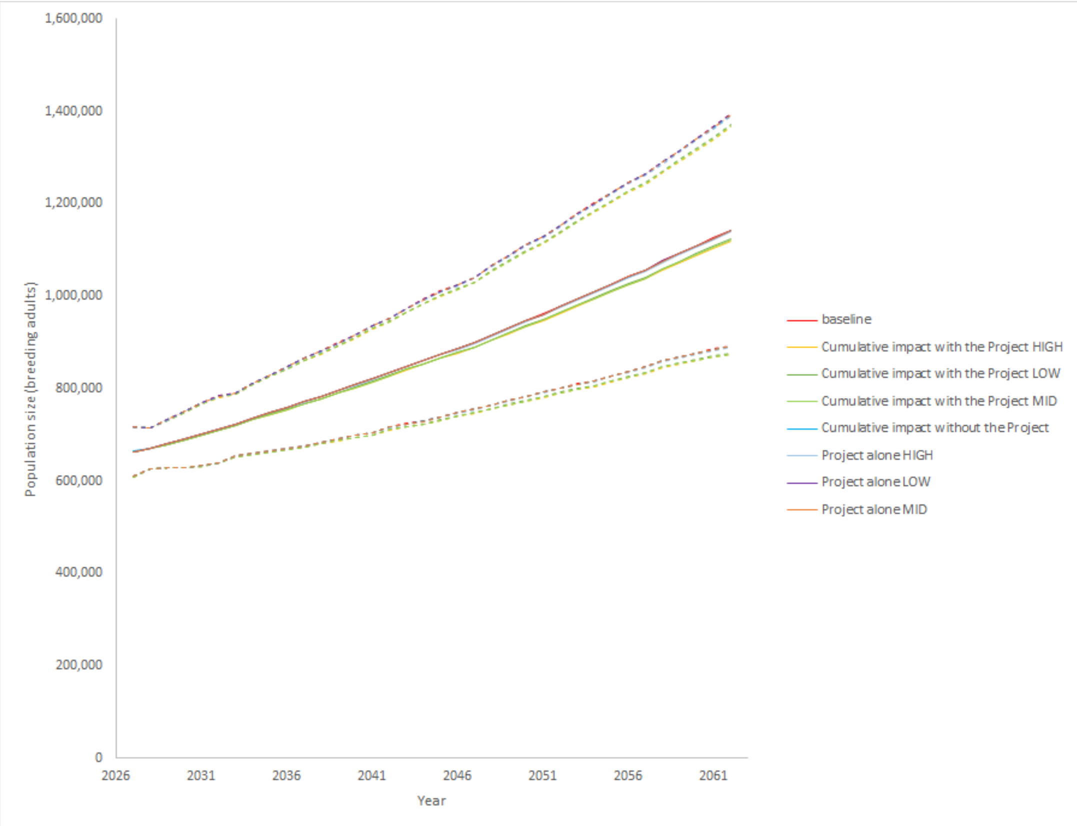


Figure 3-3 Projected population size plots for guillemot in the breeding season from the Project alone and cumulatively.

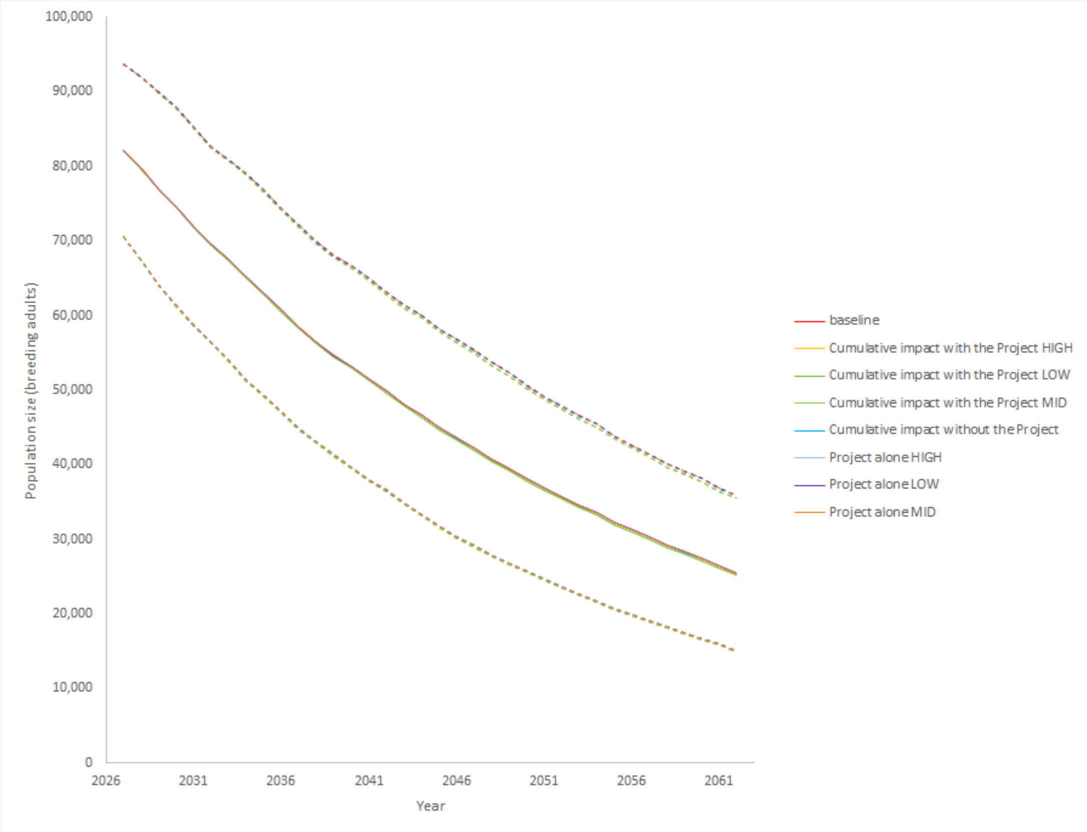


Figure 3-4 Projected population size plots for razorbill in the breeding season from the Project alone and cumulatively.

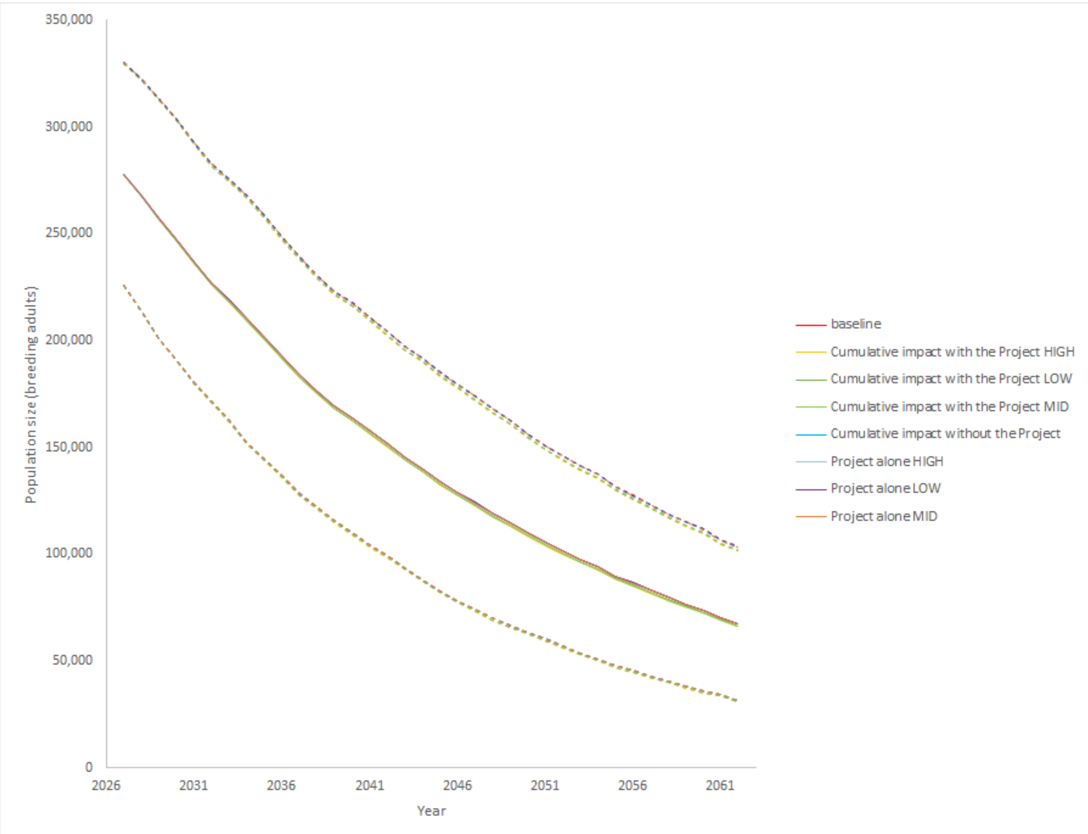


Figure 3-5 Projected population size plots for puffin in the breeding season from the Project alone and cumulatively.

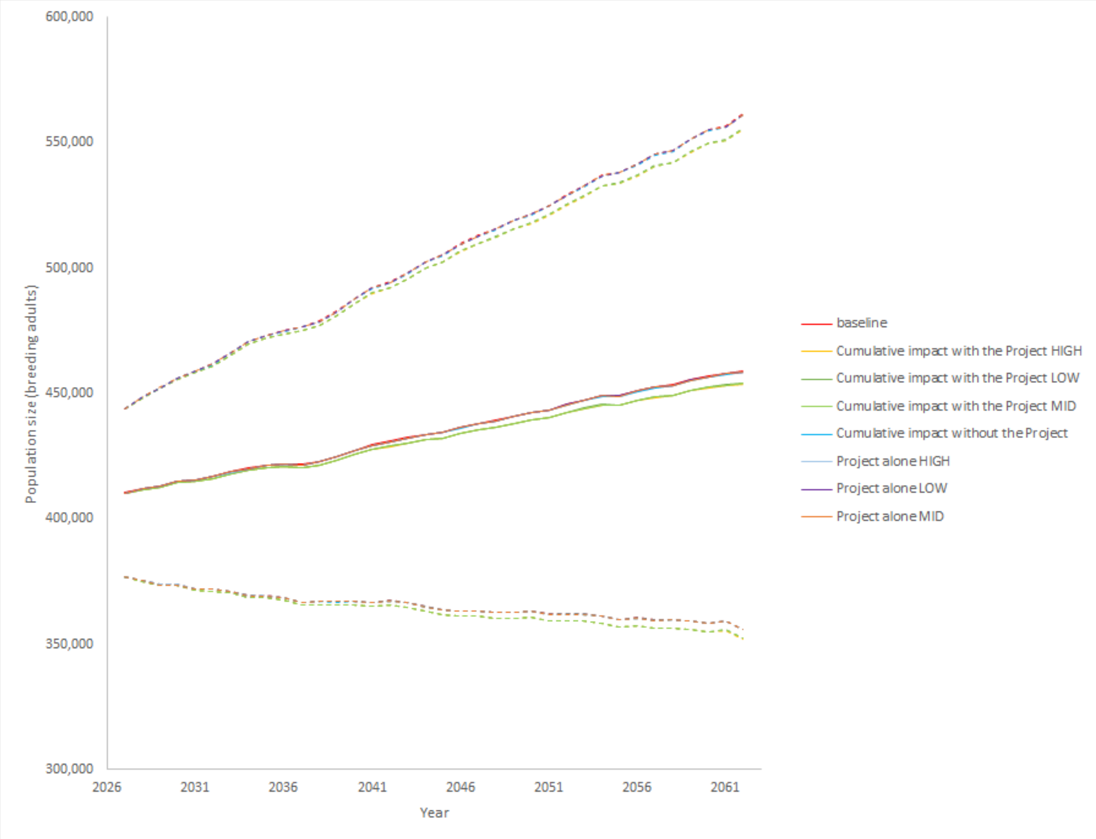


Figure 3-6 Projected population size plots for gannet in the breeding season from the Project alone and cumulatively.

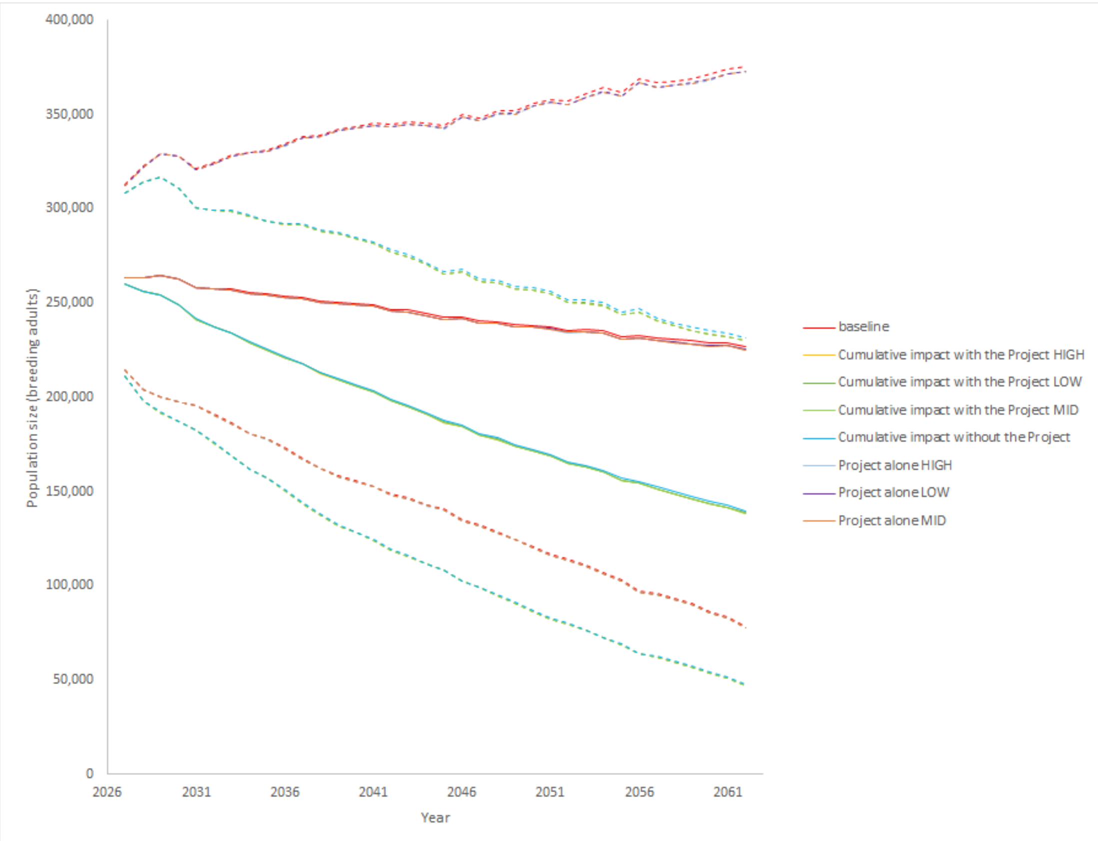


Figure 3-7 Projected population size plots for kittiwake in the non-breeding season from the Project alone and cumulatively in the UK North Sea.

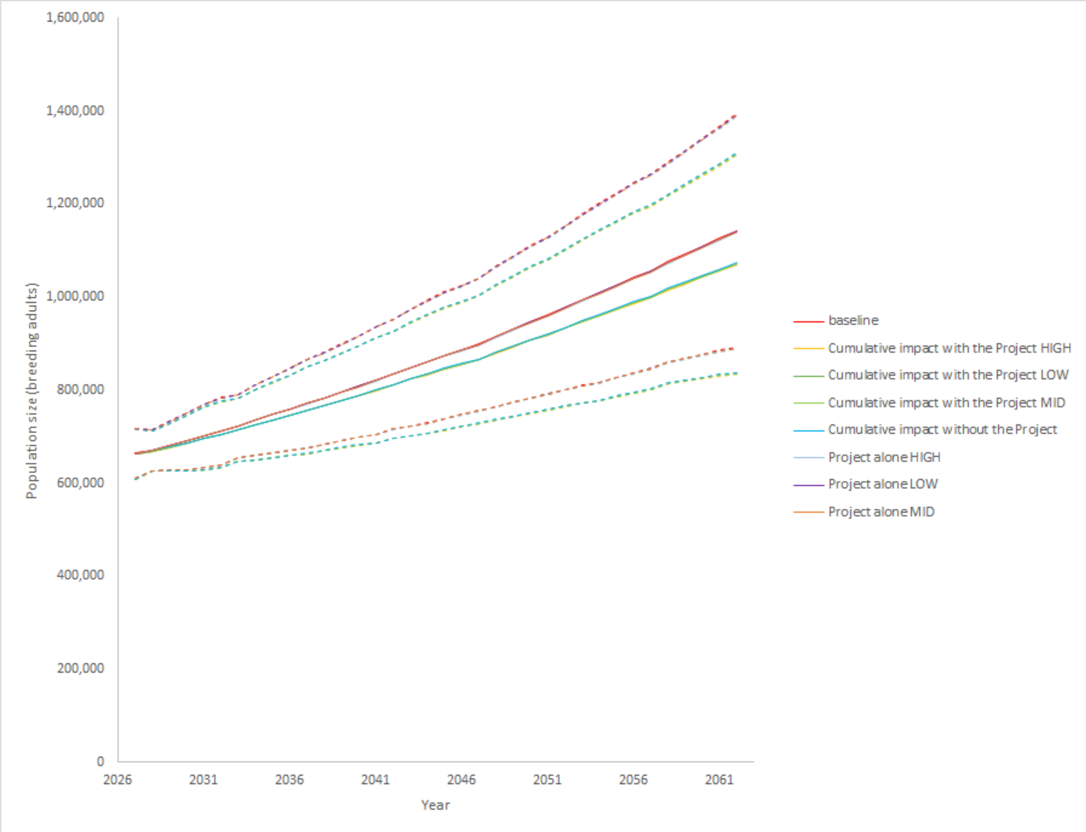


Figure 3-8 Projected population size plots for guillemot in the non-breeding season from the Project alone and cumulatively in the UK North Sea.

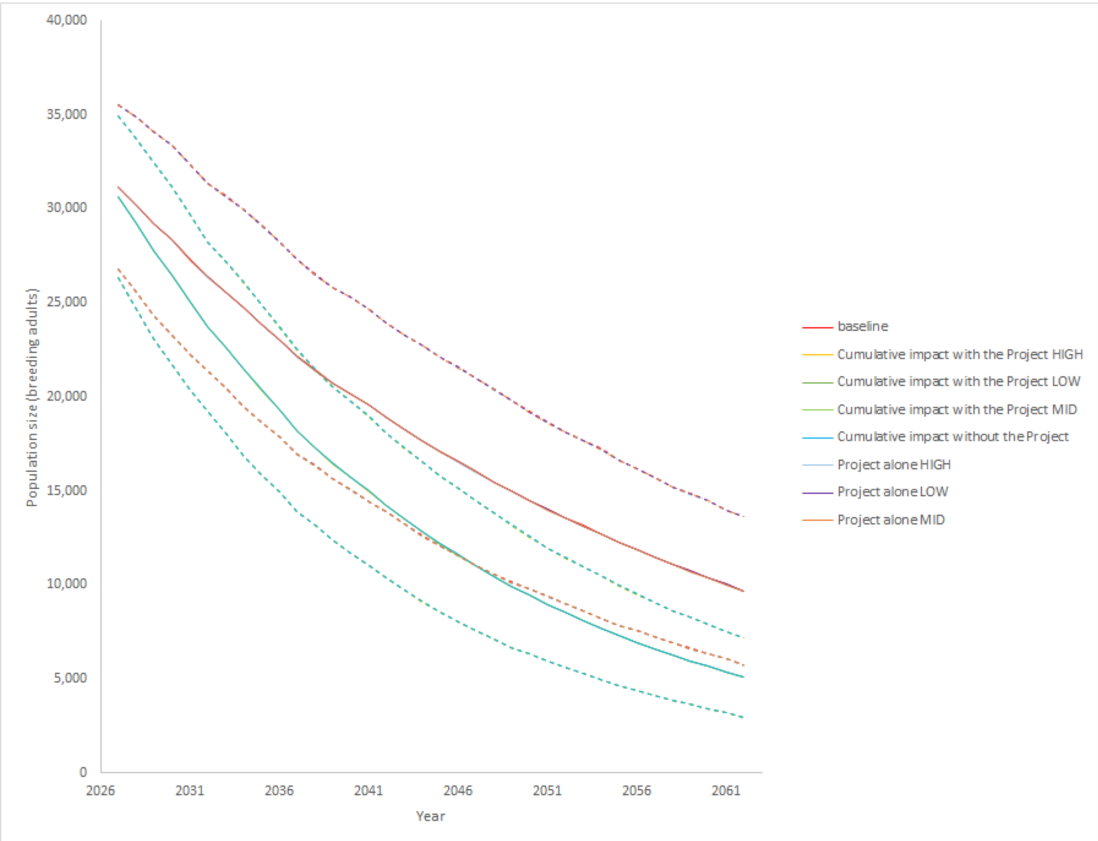


Figure 3-9 Projected population size plots for razorbill in the non-breeding season from the Project alone and cumulatively in the UK North Sea.

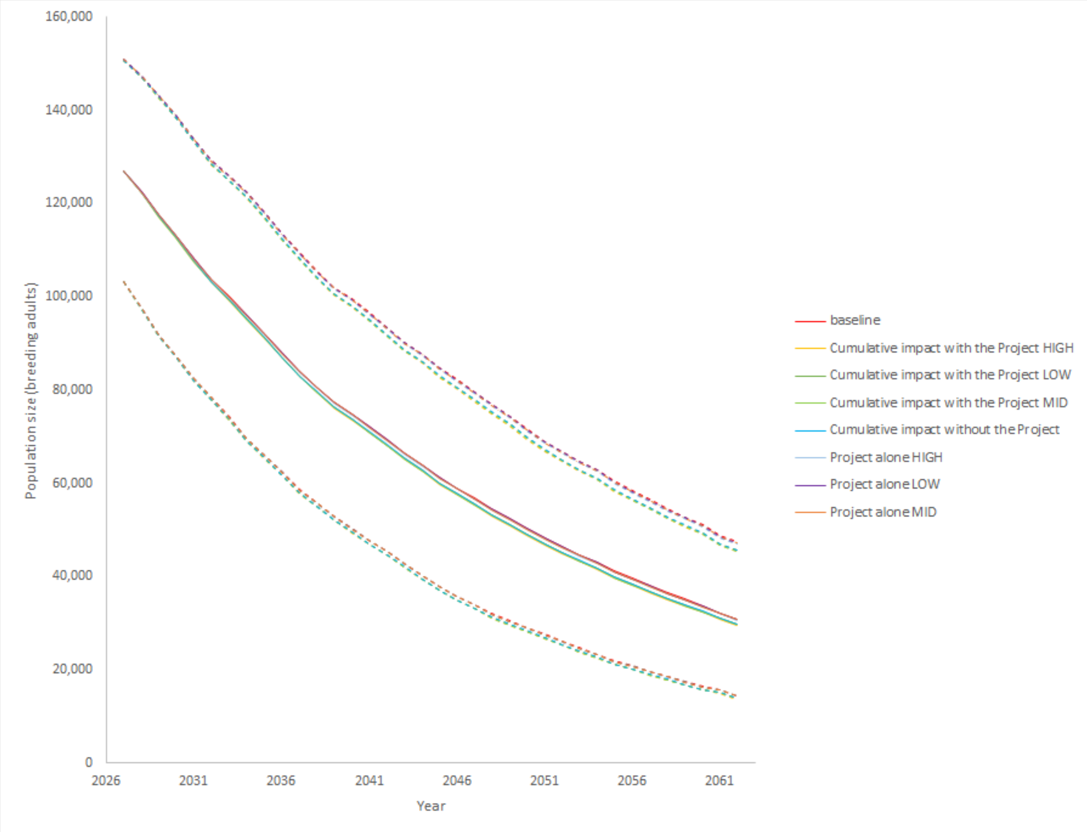


Figure 3-10 Projected population size plots for puffin in the non-breeding season from the Project alone and cumulatively in the UK North Sea.

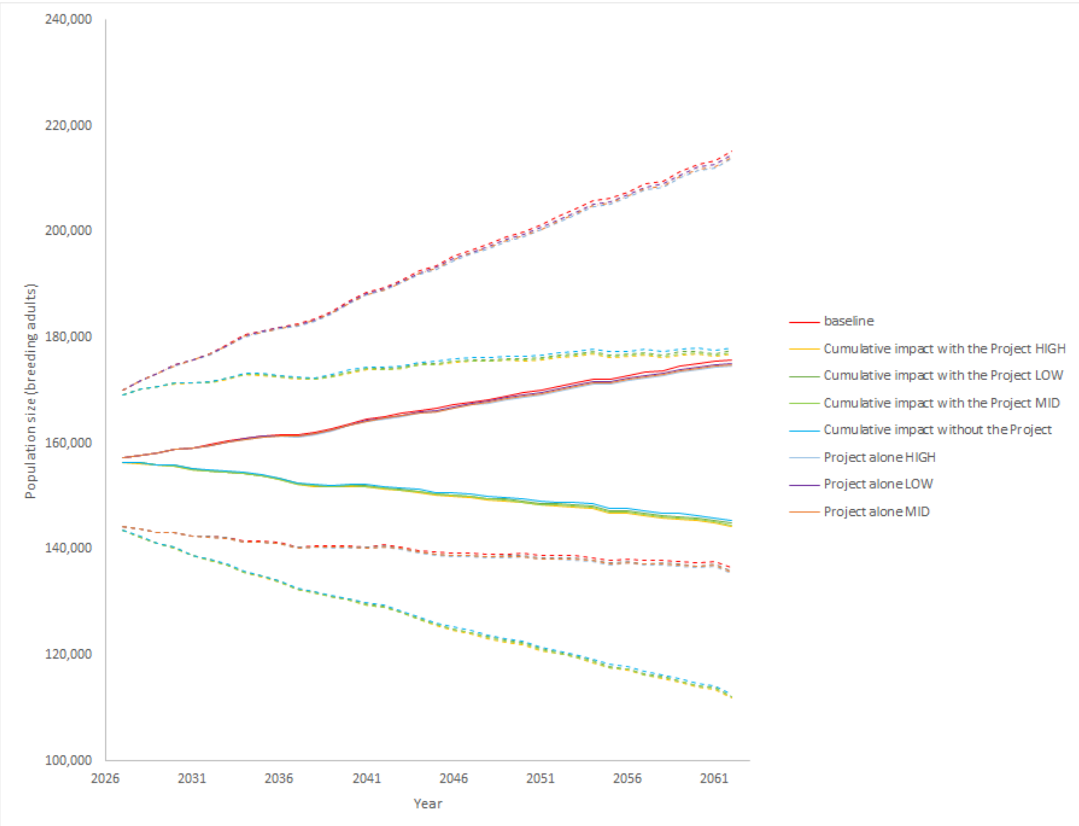


Figure 3-11 Projected population size plots for gannet in the non-breeding season from the Project alone and cumulatively in the UK North Sea.

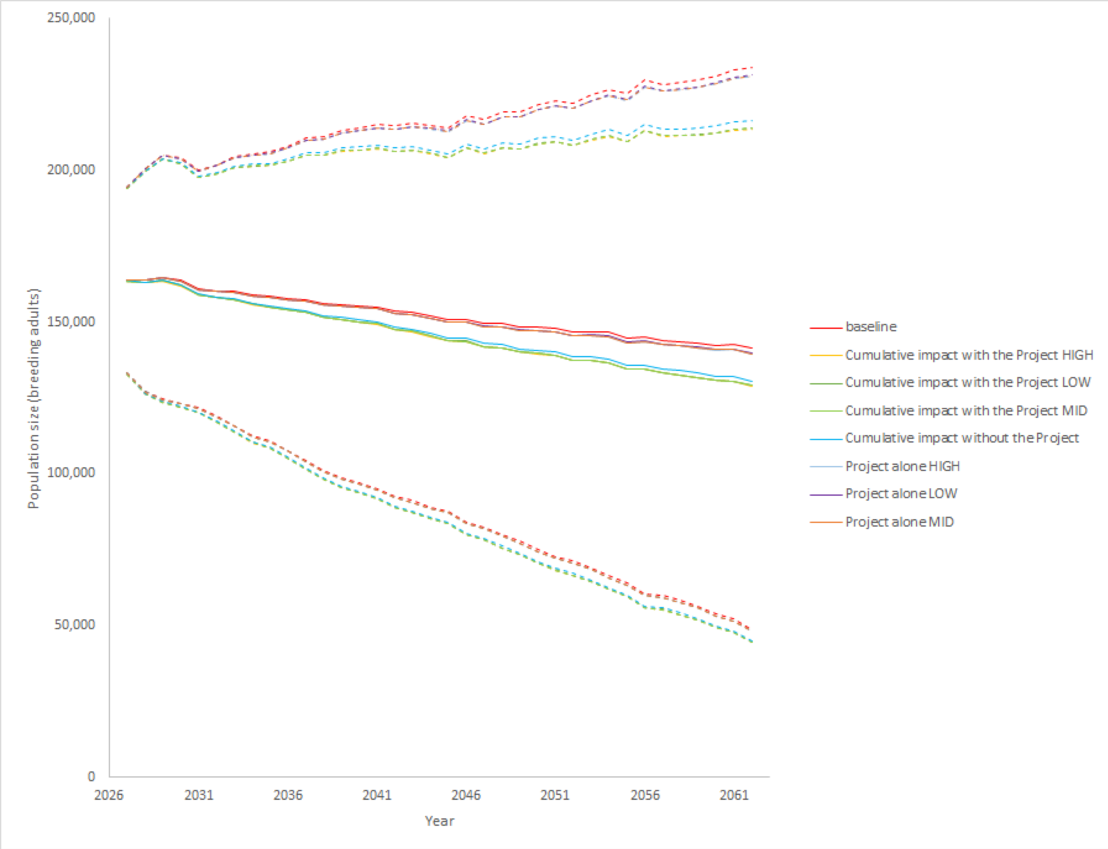


Figure 3-12 Projected population size plots for kittiwake in the non-breeding season from the Project alone and cumulatively in Western waters.

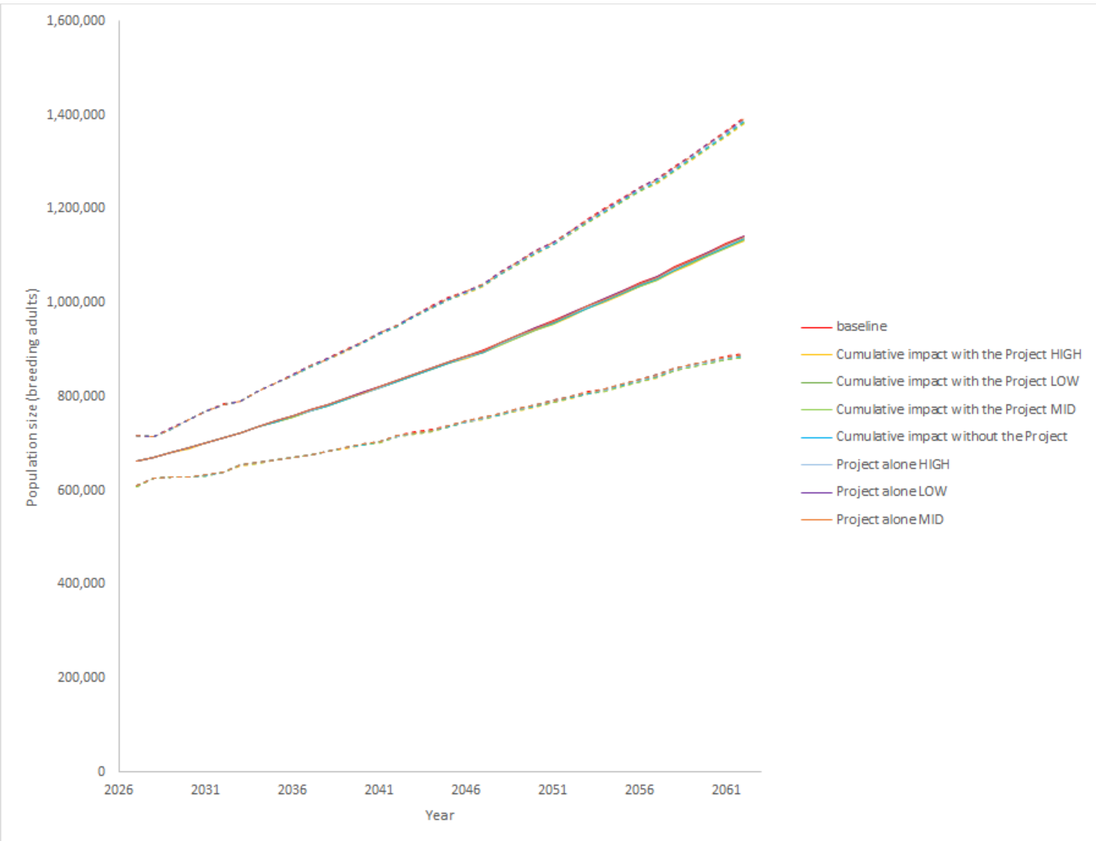


Figure 3-13 Projected population size plots for guillemot in the non-breeding season from the Project alone and cumulatively in Western waters.

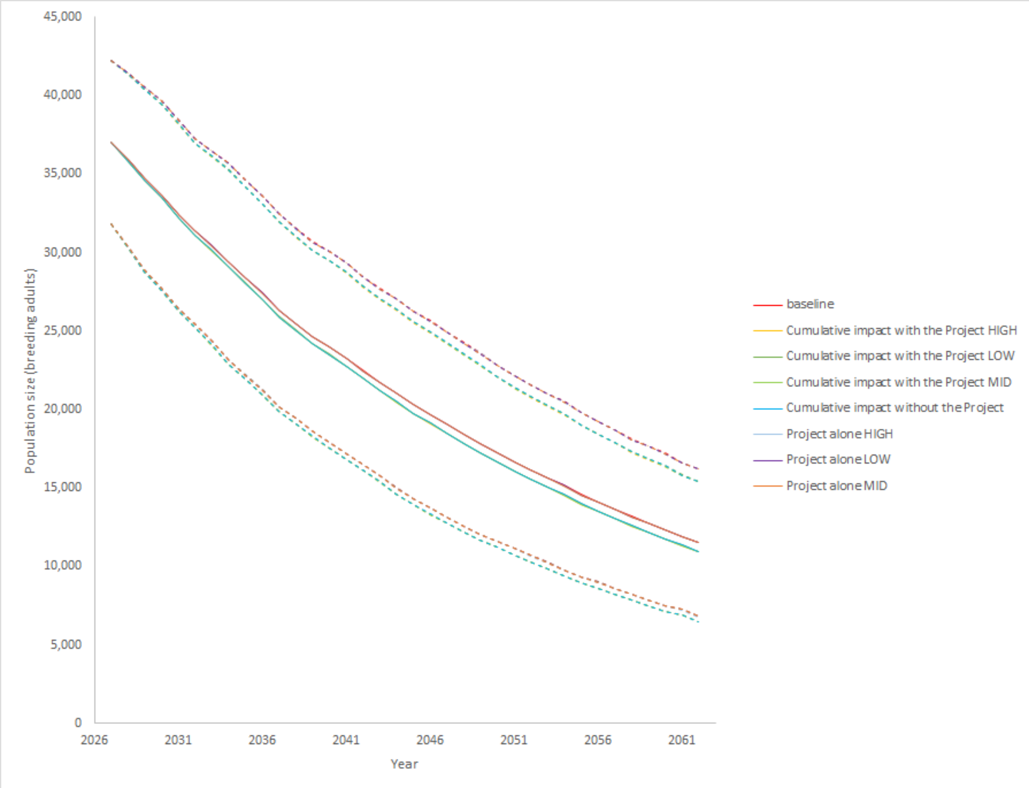


Figure 3-14 Projected population size plots for razorbill in the non-breeding season from the Project alone and cumulatively in Western waters.

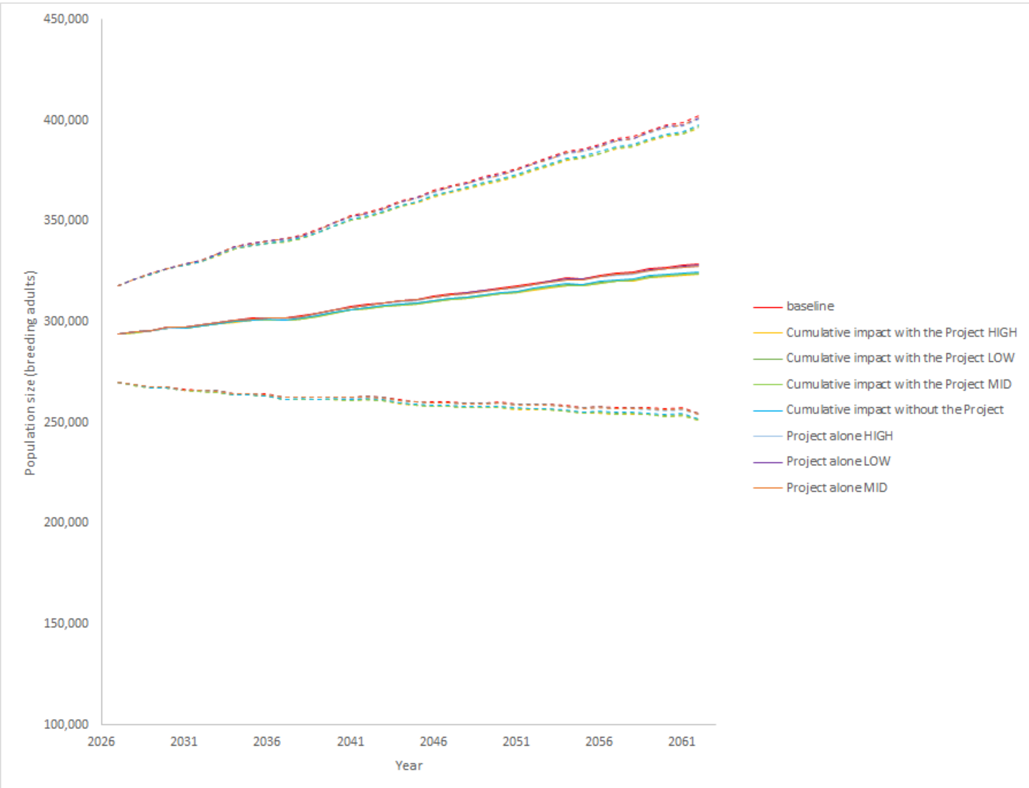


Figure 3-15 Projected population size plots for gannet in the non-breeding season from the Project alone and cumulatively in Western waters.

4 REFERENCES

Horswill, C. & Robinson R. A. 2015. Review of seabird demographic rates and density dependence. JNCC Report No. 552. Joint Nature Conservation Committee, Peterborough.