Bellrock Offshore Wind Farm

Wind Farm Development Area

Environmental Impact Assessment Report - Volume IV

Appendix 10.1: Offshore Ornithology Digital Aerial Survey Baseline Report

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Annex C: Ornithology MRSea Modelling and Reporting

Annex D: MRSea Modelling Data Pack

Annex E: Ornithological & Mammal Survey Report

Glossary of Terminology

Term	Definition
Applicant	Bellrock Offshore Wind Farm Limited, the legal entity submitting Section 36 Consent and Marine Licence applications for the Bellrock Wind Farm Development Area.
Apportioning	The process of assigning individual birds which were identified to a broad species grouping, to species level, based on proportions of known species – to produce 'apportioned' bird density and abundance estimates accounting for a volume of individuals not identified to species. (Also applicable to age classes of bird).
Bellrock Offshore Wind Farm (or the Bellrock Project)	An offshore wind farm capable of exporting up to 1.8 GW of renewable energy to the National Electricity Transmission System. The Wind Farm Development Area is located 120 km east of Stonehaven, and will connect to the National Electricity Transmission System at the proposed SSEN Transmission Hurlie substation, west of Stonehaven in Aberdeenshire. The Bellrock Offshore Wind Farm comprises of the following Development Areas: ▪ Wind Farm Development Area; ▪ Offshore Transmission Development Area; and ▪ Onshore Transmission Development Area.
Bootstrap iteration	(a.k.a. Bootstrap sample) A single resample of data from the original data sample.
Bootstrap/Bootstrapping	A method of estimating the distribution of an estimator (here estimated bird density and its upper and lower confidence intervals), by resampling (typically many times) from one's data sample.
Density	The number of individual birds per unit area (e.g. kilometre square)
Development Area	For consenting purposes, the area for which separate consents and/or Marine Licences will be sought by the Applicant, comprising: ▪ Wind Farm Development Area; ▪ Offshore Transmission Development Area; and ▪ Onshore Transmission Development Area.
SSEN Transmission Hurlie substation	The onshore substation to be developed by SSEN Transmission, which will receive renewable electricity from the Bellrock Project onshore substation and allow supply of renewable electricity from the wind farm to the National Electricity Transmission System.
Transect	A straight line or strip across a natural feature along which observations are made
Wind Farm Development Area	The boundary within which the Wind Farm Infrastructure will be constructed, operated and maintained, and decommissioned.
Wind Farm Infrastructure	Infrastructure located within the Wind Farm Development Area including wind turbine generators; floating substructures, station keeping systems and associated scour protection; inter-array cables and associated cable protection; subsea cable hubs; and ancillary infrastructure including buoys (including activities associated with the Wind Farm Infrastructure construction, operation and maintenance, and decommissioning).

Glossary of Abbreviations

Term	Definition
CEA	Cumulative Effects Assessment
CI	Confidence interval
CV	Coefficient of variance
DAS	Digital aerial survey
EIA	Environmental impact assessment
GLM	Generalised Linear Model
KDE	Kernel density estimation
MD-LOT	Marine Directorate - Licensing Operations Team
OASA	Offshore Aerial Survey Area
QBIC	Quasi-Bayesian information criterion
RIAA	Report to Inform Appropriate Assessment
SALSA	Spatially Adaptive Local Smoothing Algorithm
SE	Standard errors
SNCB	Statutory nature conservation body
VIF	Variance inflation factor
WFDA	Wind Farm Development Area

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1 Introduction

1. This offshore ornithology digital aerial survey baseline report is an Appendix to **Chapter 10: Offshore Ornithology (Volume II)** of the Bellrock Wind Farm Development Area (WFDA) environmental impact assessment (EIA) Report, and provides key inputs to other appendices (e.g. **Appendix 10.2: Collision Risk Modelling Technical Report** and **Appendix 10.3: Displacement Assessment Technical Report (Volume IV).** This report also supports the **Volume VI: Shadow Habitats Regulations Appraisal**.

2. This Appendices is accompanied by the following Annes:

   - Annex A: Figures;
   - Annex B: Density and Abundance Estimates by Survey;
   - Annex C: Ornithology MRSea Modelling and Reporting;
   - Annex D: MRSea Modelling Data Pack; and
   - Annex E: Ornithological & Mammal Survey Report.

3. This report sets out the baseline characteristics of the Bellrock WFDA by providing details of the occurrence, distribution and abundance of seabird species in the Bellrock offshore aerial survey area (OASA), which is defined as the Bellrock WFDA plus a 4 km buffer (**Figure 10.1.1 in Annex A**) The offshore ornithology baseline survey data were collected at monthly intervals from March 2022 to February 2024 (inclusive) using digital aerial video methods (HiDef, 2024 presented in **Annex E**).

4. In addition to detailing species occurrence, distribution and abundance, data are also presented on broad-level behaviours of species within the Bellrock OASA, as well as on the proportion of different broad-level age categories (e.g. immatures and adults) for those species for which this is possible.

2 Methods

2.1 Survey Area and Surveys

5. The Bellrock WFDA is located in the North Sea, 120 km east of Stonehaven, and 116 km southeast of Peterhead. The Bellrock OASA extended over an area of 658 km^2 and comprised the Bellrock WFDA plus a 4 km buffer (**Figure 10.1.1 in Annex A**).

6. A digital aerial survey (DAS) method was used, with consultation on the Method Statements for offshore aerial surveys undertaken with NatureScot and Marine Directorate Licensing and Operations Team (MD-LOT (MS-LOT at the time)) in February to March 2022. Advice was given on the focal species and alignment of survey approaches with those for adjacent lease option awards to facilitate future Cumulative Effects Assessment (CEA). Comments from NatureScot and MD-LOT were considered in the scope of works for the offshore aerial survey. The DAS surveys were flown once per month over a two-year survey period (giving a total of 24 surveys). Sampling was based on 15 strip transects located within the Bellrock OASA. Transects were orientated in an approximate southwest to northeast direction (i.e. perpendicular to the coast) and spaced at 2.5 km intervals. This design aimed to maximise the chances that each transect sampled a similar range of habitats (primarily as determined by water depth), which should act to reduce the variation in estimated bird abundance between transects. Images were captured using digital video to sample each transect, with the processed images giving a total strip width of 250 m for each transect. This meant that slightly more than 10% of the Bellrock OASA was sampled on each survey, although on two surveys (March 2022 and June 2023) only 14 of the 15 transects were covered. On these two surveys, the small (approximately 1.5 km long) transect on the northwest edge of the Bellrock OASA was omitted (due the aircraft flight path falling slightly outside the Bellrock OASA), meaning this omission had minimal effect on the sampling effort (Table 3; HiDef, 2024).

7. The dates, times and coverage achieved for each survey are given in **Table 2.1**, and full details of the DAS specifications and methods (e.g. in terms of aircraft flight altitudes, image resolution and image processing) are provided in the HiDef two-year DAS report (HiDef, 2024).

Table 2.1: Survey Effort at the Bellrock Offshore Aerial Survey Area March 2022 to February 2024 Inclusive[1]

Survey Number	Date	Start Time (hh:mm)	End Time (hh:mm)	Number of Transects Analysed	Area Covered (% of Bellrock OASA)
1	15 March 2022	12:58	14:39	14*	10.26
2	17 April 2022	13:01	14:55	15	10.28
3	14 May 2022	12:03	13:49	15	10.31
4	06 June 2022	11:52	14:05	15	10.29
5	19 July 2022	12:06	13:47	15	10.27
6	07 August 2022	12:43	14:40	15	10.25
7	07 September 2022	12:41	14:30	15	10.30
8	02 October 2022	13:16	14:52	15	10.31
9	03 November 2022	11:59	13:43	15	10.32
10	20 December 2022	11:08	13:34	15	10.14
11	20 January 2023	11:49	13:44	15	10.28
12	04 February 2023	10:50	12:25	15	10.32
13	04 March 2023	13:30	15:16	15	10.34
14	03 April 2023	12:09	14:05	15	10.27
15	04 May 2023	12:52	15:00	15	10.28
16	13 June 2023	13:10	14:56	14*	10.25
17	07 July 2023	13:10	14:40	15	10.32
18	17 August 2023	13:02	14:33	15	10.31
19	04 September 2023	11:04	13:02	15	10.26
20	13 October 2023	11:13	13:37	15	10.30
21	14 November 2023	09:19	11:04	15	10.28
22	10 December 2023	10:51	12:47	15	10.38
23	30 January 2024	11:52	14:20	15	10.28
24	08 February 2024	11:21	13:03	15	10.29

[1] In March 2022 and June 2023, 15 transects were flown, however only 14 transects were analysed as the flight path of the far northwest transect was slightly out of the OASA. All data were cropped to the Bellrock OASA prior to analysis. As this transect was at the far northwest edge of the Bellrock OASA, it is much smaller than others (ca. 1.5 km), so the potential data loss is minimal. All surveys met the required 10% coverage.

2.2 Bird Density and Abundance Estimation

2.2.1 Approaches to Estimating Densities and Abundance

8. Two broad approaches may be used for deriving estimates of the density (and hence abundance) of seabird species from DAS data, i.e. design-based and model-based approaches (NatureScot, 2023). NatureScot (2023) guidance advocates for the use of model-based approaches where sample sizes are considered sufficient, specifically as derived using the MRSea package (Mackenzie et al. 2013). However, such advanced modelling approaches are not always well suited for use with DAS data, particularly in cases where either (i) bird densities are low, (ii) survey areas are relatively small and/or (iii) there are few environmental gradients providing little potential for correlation with variation in bird densities. These are all factors that are relevant to the Bellrock OASA.

9. It is notable that recent experience in applying model-based approaches to the estimation of seabird densities using offshore survey data appears to demonstrate no advantages over design-based approaches. For example, work undertaken for both the Berwick Bank Offshore Wind Farm and the Ossian Offshore Wind Farm demonstrated that the monthly density estimates for a range of the key seabird species derived by design-based and model-based approaches were generally similar with no consistent directional differences and no clear indications of lower variability in the model-based estimates (Harker et al. 2022; RPS/NIRAS, 2024). However, reliance on model-based estimates can create problems because small sample sizes can prevent density estimation for some survey months, even amongst the more abundant key species. For Berwick Bank, it was noted that some of the model-based estimates were unrealistic due to spatial and temporal gaps in survey coverage (and stochasticity within the modelling process meant that markedly different outputs could be generated from different model runs based on identical inputs and parameters). The DAS data for both Berwick Bank and Ossian Offshore Wind Farms are considerably better suited to model-based estimation than those from Bellrock because densities of key species are often higher (substantially so in the case of Berwick Bank), whilst the survey areas are considerably larger and are also closer to the coast (which increases the likelihood of stronger environmental gradients for correlating with variation in bird densities).

10. Given the above, and following advice received from NatureScot[2], design-based approaches were used for deriving density estimates for all species except guillemot (*Uria aalge*). Density estimates for guillemot were generated by both approaches, on the basis that guillemot was the most abundant and frequently occurring species recorded in the Bellrock DAS and, therefore, the most suitable species for the application of model-based methods.

2.2.2 Design-based Methods

11. Both the density and abundance estimates of each species and species group recorded during the DAS were calculated using design-based methods for three different areas, as follows:

- The Bellrock OASA which, as detailed above, comprises the Bellrock WFDA plus 4 km buffer (and equates to an area of 658 km^2);

[2] Minutes from NatureScot and Bellrock Project team (the Applicant, Haskoning) meeting held 19 June 2024 and email from NatureScot to the Applicant on 19 July 2024.

- The Bellrock WFDA plus 2 km buffer, which equates to an area of 456 km^2, with the resulting estimates being used for displacement assessments (**Appendix 10.3: Displacement Assessment Technical Report (Volume IV)**) (statutory nature conservation bodies (SNCBs), 2022); and
- The Bellrock WFDA, which equates to an area of 280 km^2, with the resulting estimates (for birds in flight) being used in the collision risk assessment (**Appendix 10.2: Collision Risk Modelling Technical Report (Volume IV)**) (Band, 2012).

12. Each area as described in the bullets above is shown in **Table 10.1.1** in **Annex A**.

13. For each of the three areas defined above, analyses were undertaken separately using the transect lengths and bird records as they related to each of these areas. Analyses were also performed on the data with those records identified only to broader species groups both apportioned and unapportioned to species (with details of the process for apportioning to species presented in HiDef (2024)). For each species or species group, densities and abundances were calculated for birds in flight, birds on the water and all birds.

14. To estimate densities, each strip transect was treated as a statistically independent random sample. The length and breadth of each transect was multiplied to give the transect area, with the number of observations for each species on each transect divided by the transect area to give a point estimate of the density of that species for the transect. The estimated mean density for the relevant area, the standard deviation of the means (standard errors, SE), the 95% confidence intervals (CIs) and coefficient of variance (CV) were then estimated using a non-parametric block bootstrap method with replacement (Buckland et al. 2001), to ensure equal transect effort was sampled across each bootstrap iteration. A total of 1,000 bootstrap iterations (resamples from the original data) were performed using transect ID as the sampling unit with the transects randomly sampled until their total length equalled approximately the same length as the total survey length.

15. The mean species abundance was obtained by multiplying the density estimate by the total area of the Bellrock WFDA (with this also undertaken on the associated 95% CIs and CV).

2.2.3 Model-based Methods

16. As stated above, model-based density estimation was limited to guillemot. Modelling was undertaken using the MRSea tool in R (Scott-Hayward et al. 2014), as advised in the NatureScot guidance (NatureScot, 2023). This was undertaken on the data as apportioned to species, with separate models produced for birds in flight, birds on the water and all birds. The modelling was conducted at the scale of the Bellrock OASA, which then enabled density estimates to also be derived for the Bellrock WFDA plus 2 km buffer and the Bellrock WFDA only.

17. Count data were aggregated into segments approximately 500 m in length along each transect for inclusion in the modelling. In addition to the aggregated count data, environmental covariates ("*predictors*") were collated for inclusion in the modelling in line with NatureScot guidance (NatureScot, 2023). Covariates comprised distance to the coast, bathymetry, slope, aspect, sea surface temperature and sea surface temperature gradient. Values of the covariates were assigned to the mid-point co-ordinates of the 500 m transect segments. Having defined counts and covariates, prediction grids were estimated for the Bellrock OASA at a 1 km resolution.

18. Modelling in MRSea was conducted separately for surveys within the guillemot breeding and non-breeding periods, as defined in the NatureScot (2020) guidance. Although this differed from the seasonal periods that were subsequently advised by NatureScot to be used for guillemot in the current assessment[3], it was considered to be unimportant to the estimation of densities because survey identity is included as a factor in the analysis, meaning that 'intercept' values are estimated for each survey to provide separate density estimates for each survey. On this basis, NatureScot agreed with the decision not to re-run the modelling according to the amended seasonal periods subsequently advised for guillemot[4]. Given that the modelling was also undertaken separately for the three behaviour categories (as set out above), this gave six modelling scenarios with each scenario comprising multiple surveys. Surveys were excluded from the models when the total number of records was below ten. For each behaviour/seasonal period combination, an initial Generalised Linear Model (GLM) with log link function and quasi-Poisson errors (to account for over-dispersion) was applied to the data. For each GLM, the scaled covariates listed above and individual survey identity were made the predictor variables, with the log of the 'cell' area declared as an offset (to correct for differences in the aggregated areas due to small differences in segment lengths), whilst the aggregated counts was the response variable.

19. Residual plots were used to assess the linearity of responses by predictor, and where non-linearity existed, model-selected natural splines were applied to the relevant predictors. Variance inflation factors (VIF) were determined, and predictors removed where VIF exceeded five; this process resulted in sea surface temperature being excluded across all models, due to its high collinearity with specific survey. The tweedie.check() function from the tweedie package (Dunn, 2022) was used to assess the fit of the quasi-Poisson model versus a variance power of greater than one, with the best fit chosen for use in the initial model.

20. A one-dimensional smooth was fitted to the covariate data using the initial model via SALSA (Spatially Adaptive Local Smoothing Algorithm) using the runSALSA1D() function in the MRSea package (Mackenzie et al. 2013), setting a minimum of one and maximum of three knots per covariate and testing both b-splines and natural splines. Quasi-Bayesian information criterion (QBIC) was used to assess the model fit, and the best fit of the two spline types selected. The best one-dimensional model was extracted from the output and further refined to include only covariates with a significant effect based on analysis of variance outputs (with inclusion based on a significance level of $p<0.01$).

21. To allow for flexible spatial surfaces within the models, knot grids and distances between knots were generated per survey, with 300 knots per survey. Spatially adaptive two-dimensional smooths of spatial coordinates were applied to the best one-dimensional model using the runSALSA2D() function in the MRSea package (Mackenzie et al. 2013), with the knot grids applied as generated per survey, with a maximum of two knots x number of surveys (e.g. 24 knots if 12 surveys in the data set) and a minimum of two knots with a minimum 1 km gap between individual knots. Start knots were set at five and adjusted down to a minimum of two where models generated poor convergence or fit. Transect ID (unique integer values per survey and transect combination) was included as a blocking effect in the modelling. A second two-dimensional model was fitted to the data excluding all covariates.

[3] Email from NatureScot to Bellrock Offshore Wind Farm Limited on 8 October 2024.

[4] Email from NatureScot to Bellrock Offshore Wind Farm Limited on 9 January 2025.

22. Model fit was assessed for two-dimensional models with or without covariates using a ten-fold cross-validation, and the best fit model chosen in each case. Analysis of variance was applied to the final model to test significance of predictors. Final model fit was assessed in line with NatureScot guidance (NatureScot, 2023), with predicted versus observed values, scaled Pearson residuals, partial plots and cumulative residual plots (for significant covariates) outputted. The predict() function was used to predict densities for the prediction grid, followed by bootstrap estimates derived via the do.bootstrap.cress.robust() function in MRSea (Mackenzie et al. 2013), with 1,000 bootstraps per grid cell.

23. Bootstrap outputs were used to generate mean, standard error, lower 2.5% and upper 97.5% estimated densities per prediction grid 1 km x 1 km cell. Poorly converged bootstrap estimates per grid cell were excluded where the estimated grid cell value exceeded twice that of the cell-based prediction obtained via the predict() function. Summed predictions by individual bootstrap were used to generate abundance estimates and similar metric estimates. Poorly converged abundance estimates were removed based on a threshold equivalent to every cell having a density equal to the upper 95th percentile prediction of the 97.5th percentile bootstrap density.

24. Full details of the methods used for the MRSea modelling are detailed in **Annex C** of this Appendix.

2.2.4 Availability Bias

25. Availability bias correction factors were applied to the density and abundance estimates for guillemot, razorbill *Alca torda* and puffin *Fratercula arctica* on the water to account for likely underestimation because a proportion of the individuals of these diving species are likely to be underwater at the time of image capture and, hence, undetected by the DAS. These correction factors are based on data on time spent underwater by these species and is calculated following Barlow et al. (1988):

$$\Pr(being\ visible) = \frac{(s+t)}{(s+d)}$$

Where:

- ‘s’ is the average time spent at the surface;
- ‘t’ is the window of time the animal is within view - treated as zero in digital video surveys as is negligibly small (HiDef, 2024); and
- ‘d’ is the average time below the surface.

26. The values of each bootstrap sample for sitting birds of each of these three species in each survey were divided by their respective correction factor, therefore accounting for birds not visible at the time of data collection. These corrections to the values for sitting birds were also made within the bootstrap estimates for all birds (i.e. sitting plus flying birds).

27. For guillemots and razorbills, correction factors of 0.7595 and 0.8182, respectively, were used based on data logger studies during the chick-rearing period (Thaxter et al. 2010), whilst for puffin a correction factor of 0.8584 was used, again based on data logger studies (as reported in Spencer, 2012). Further details are provided in HiDef (2024).

28. For guillemot, the approach taken to accounting for availability bias was the same for both the design-based and model-based methods of estimating densities. See Annex C of this Appendix for more information.

2.2.5 Definition of Biological Seasons

29. The abundance and distribution of each species varies with the time of year, due to bird biology and the season. Species-specific biological seasons are based primarily on the definitions provided in Guidance Note 9 from NatureScot (2020), with this being used to define the breeding and (overall) non-breeding periods for each species. For most species, the defined non-breeding period is also sub-divided according to the different periods as identified in Furness (2015). These non-breeding periods are curtailed accordingly in any cases where they overlap with the NatureScot (2020) defined breeding season (**Table 2.2**), The two exceptions in this regard are herring gull *Larus argentatus* and guillemot. For herring gull, NatureScot agreed that the assessment should assume a single non-breeding period, as used in the assessment for Berwick Bank[5]. For guillemot, the Nature Scot (2020) guidance also assumes a single non-breeding (as does Furness, 2015) but NatureScot provided advice (specific to the Bellrock WFDA) that an additional post-breeding dispersal period should be included for this species[6]. Consequently, the data on guillemot densities and abundance are presented according to both the 'generic' guidance and project-specific advice on seasonal periods (**Table 2.2**).

Table 2.2: Species-specific Bio-seasons Taken from NatureScot (2020) for the Breeding Season, and Adapted from Furness (2015) for all of the Non-breeding Season(s)

Species	Breeding Season	Autumn Passage /Post-Breeding Dispersal (Guillemot)	Migration Free Winter or Non-Breeding Period	Spring Passage
Kittiwake	Mid Apr – Aug	Sept – Dec	-	Jan – Mid Apr
Herring gull	Apr – Aug	-	Sept – Mar	-
Great black-backed gull	Apr – Aug	Sept – Nov	Dec	Jan – Mar
Common gull	Apr – Aug	-	Sept – Mar	-
Arctic tern	May – Aug	Early Sept	Early Sept – Mar	Apr
Arctic skua	May – Aug	Sept – Oct	Nov – Mar	Apr
Guillemot[1]	Apr – mid Aug	-	Mid Aug – Mar	-
	Apr – Jun	Jul – Sep	Oct – Mar	-
Razorbill	Apr – mid Aug	Mid Aug – Oct	Nov – Dec	Jan – Mar
Puffin	Apr – mid Aug	-	Mid Aug – Mar	-
Fulmar	April – mid Sept	Mid Sept - Oct	Nov	Dec - Mar

[5] Minutes of Bellrock WFDA Scoping Workshop held on 30 October 2023.

[6] Email from NatureScot to Bellrock Offshore Wind Farm Limited on 10 October 2024.

Species	Breeding Season	Autumn Passage /Post-Breeding Dispersal (Guillemot)	Migration Free Winter or Non-Breeding Period	Spring Passage
Gannet	Mid Mar – Sept	Oct – Nov	-	Dec – mid Mar
Notes: [1] Data for guillemot are presented according to both the seasonal periods as defined in NatureScot (2020) guidance (upper row) and as advised specifically for this Project[7] (lower row).				

2.2.6 Species Distributions

30. Distribution maps for each survey were produced for the most abundant and frequently occurring species. Where sample size (i.e. number of survey records) was considered sufficient, a Watson-Nadaraya type kernel density estimation (KDE) technique was used to interpolate densities across the OASA, otherwise maps were limited to plots of the observations (Simonoff, 1996; HiDef, 2024). These plots could not account for those records which had been apportioned to species from an identification to the level of a species-group only, nor could they account for the underestimation of the densities of diving species due to availability bias (see **Section 2.2.4**). Therefore, the KDE mapping will often represent a relative estimate of density only.

31. Further details of the KDE analysis are provided in HiDef (2024).

2.2.7 Age Class Determination

32. DAS data enables the determination of broad age classes (i.e. adult, immature and/or juvenile) for some species on the basis of plumage characteristics, primarily gannet *Morus bassanus*, gull species and tern species. However, it is only possible to determine age classes for a sample of the records from such surveys. Thus, for species for which age class data were obtained, data are presented on the proportions of each age class for each seasonal period, together with the proportion of the total records for which age class has been determined. Data were combined across the survey years for each seasonal period (e.g. seven months of surveys (March to September) fall into the breeding season for gannet, meaning age class proportions for the breeding season were derived from the data deriving from a total of 14 surveys). Data from months that fall across two seasonal periods were assigned to both given periods when calculating the seasonally specific age class proportions (e.g. for gannet, the data for the March surveys contributed to estimates for both the spring passage and breeding periods). Records of deceased birds were not included in these calculations, even though some may have been assigned an age class.

33. The estimation of age class proportions on the basis of plumage characteristics (as determined using DAS data) has to be treated with considerable caution for some species because the plumage of some of the older immature age classes may be indistinguishable from that of adults. Thus, for kittiwake *Rissa tridactyla*, the average age of first breeding is four years, but it is only birds in their first year which are readily and consistently distinguishable from adults on the basis

[7] Email from NatureScot to Bellrock Offshore Wind Farm Limited on 8 October 2024.

of the plumage characteristics that can be determined from DAS data (Coulson, 2011; Olsen and Larsson, 2003). Therefore, DAS data may substantially overestimate the proportion of adult birds recorded during the surveys.

34. Age classes of guillemots *Uria aalge* and razorbills *Alca torda* cannot usually be determined from DAS data except in the specific instance of single adults and chicks occurring together in pairs. Consequently, age class proportions are not presented for these species although details of the occurrence of survey records comprising adult-chick pairs are noted in the species accounts in **Section 3** below.

3 Species Accounts

3.1 Overview

35. A total of 16 species were recorded within the Bellrock OASA during the two years of DAS. Guillemot and fulmar *Fulmarus glacialis* were recorded in all surveys, with another three species (gannet, kittiwake and puffin) recorded in more than half of the surveys (**Table 3.1**). The six least frequently occurring species were each recorded in a single survey only. Amongst the most frequently occurring species, there was a tendency for them to be recorded in slightly more surveys during the first than second year of the DAS programme.

Table 3.1: Occurrence of Different Species within the Bellrock Offshore Aerial Survey Area During the Two-year year Digital Aerial Survey Programme (Comprising 24 Monthly Surveys)

Species	Number of Surveys in Which Recorded		
	Year 1 (Mar 2022 – Feb 2023)	Year 2 (Mar 2023 – Feb 2024)	Total
Oystercatcher	0	1	1
Curlew	1	0	1
Kittiwake	11	7	18
Common gull	1	1	2
Great black-backed gull	3	5	8
Herring gull	3	4	7
Arctic tern[1]	3	1	4
Arctic skua	1	0	1
Little auk	0	1	1
Guillemot	12	12	24
Razorbill	4	3	7
Puffin	10	8	18
Red-throated diver	0	1	1
European storm petrel	0	1	1
Fulmar	12	12	24
Gannet	12	9	21

Notes:

[1] Records identified to species level for Arctic tern were limited to two months in year 1, but the records of Arctic/common terms in August 2022 are also assumed to be the former species (noting that these records could not be apportioned to species due to the absence of any definite records of either species in this survey, although there were no definite common tern records during the DAS programme).

36. **Sections 3.2** to **3.10** below set out the baseline characteristics for each of the more abundant and frequently occurring species within the Bellrock OASA (as determined from the DAS data), including details of the estimated densities and abundance of all birds within the Bellrock OASA and the Bellrock WFDA plus 2 km buffer (using the data as apportioned to species and, where relevant, with correction for availability bias). **Section 3.11** summarises the occurrence and abundance of species recorded rarely within the Bellrock OASA. Estimates of density and abundance for the different behaviour categories (i.e. in flight and on the water) of each species, both with and without apportionment of unidentified birds, for the Bellrock WFDA alone, Bellrock WFDA plus 2 km buffer and Bellrock OASA, are presented in Annex B of this Appendix.

3.2 Kittiwake

37. Kittiwake densities in the Bellrock OASA were highest during the first four months of the DAS programme, with a marked peak in June 2022, after which densities were considerably lower (**Plate 3.1**). The mean density estimate in June 2022 was an order of magnitude greater than in any other survey month. Although the pattern during the first survey year suggested that the Bellrock OASA holds greater densities of kittiwake during the breeding season than during the non-breeding passage periods, this was not apparent during the second survey year (when densities were consistently low).

38. Densities for the Bellrock WFDA plus 2 km buffer tended to be similar to those for the Bellrock OASA (**Plate 3.2** (HiDef, 2024)), and there was no clear pattern for high densities to be consistently associated with particular areas within the Bellrock OASA (**Plate 3.2** to **Plate 3.5** (HiDef, 2024)). However, in the June 2022 survey, some of the main concentrations occurred beyond the 2 km buffer (and hence also outside the Bellrock WFDA). Consequently, the mean estimated density for the Bellrock WFDA plus 2 km buffer for June 2022 is lower than that for the Bellrock OASA, at 1.29 (95% CI 0.71 – 2.04) birds/km^2 (**Plate 3.2** (HiDef, 2024)).

39. The majority of kittiwake recorded during the DAS were in flight (64% overall), with 56 – 100% of kittiwake recorded as being in flight in any single survey in which a total of 10 or more kittiwake were recorded (**Table 3.3**).

40. Overall, approximately 90% of kittiwake that could be aged during the DAS were assigned as adults (on the basis of plumage) (**Table 3.4**). There were suggestions of some seasonal variation, with the percentage of birds classed as adults being lowest (at 80%) during the autumn passage period (when there was a relatively high percentage of juveniles recorded in the DAS). A relatively high percentage (75%) of all kittiwakes recorded during the DAS were assigned an age category (**Table 3.4**).

Plate 3.1: Kittiwake Apportioned Density Estimates, in the Bellrock Offshore Aerial Survey Area, Between March 2022 and February 2024. Error Bars Represent the 95% Lower and Upper Confidence Limits

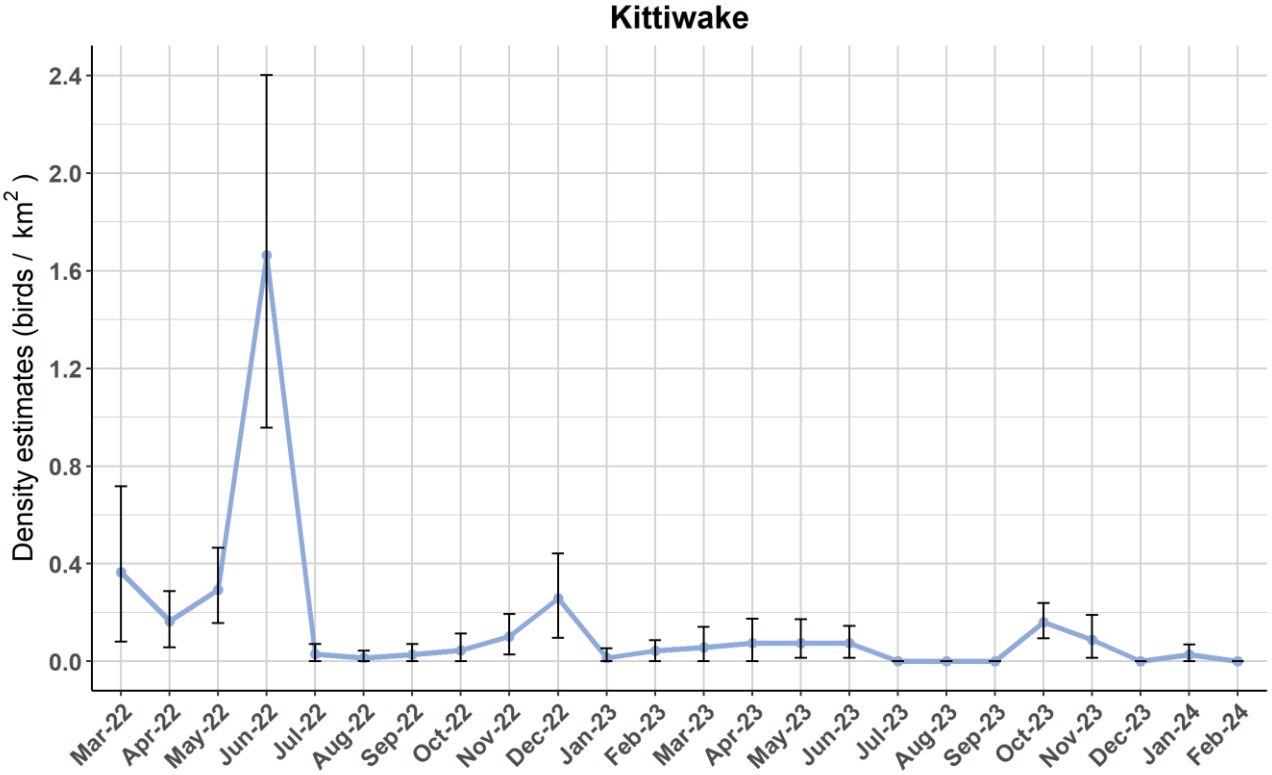


Table 3.2: Monthly Density and Abundance Estimates of All Kittiwakes Across the Bellrock Wind Farm Development Area Plus 2 km, and Across the Bellrock Wind Farm Development Area Plus 4 km (Bellrock Offshore Aerial Survey Area) Using Design-based Analysis

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Bellrock WFDA + 2 km								
Mar-22	0.28	0.04	0.65	129	19	299	75	57.98%
Apr-22	0.21	0.06	0.37	97	29	171	37	37.78%
May-22	0.30	0.13	0.55	137	58	249	49	35.48%
Jun-22	1.29	0.71	2.04	591	325	932	154	26.03%
Jul-22	0.04	0.00	0.10	19	0	47	12	61.67%
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00%
Sep-22	0.04	0.00	0.10	19	0	44	12	60.77%
Oct-22	0.06	0.00	0.15	28	0	67	18	64.24%

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Nov-22	0.06	0.00	0.16	28	0	74	20	71.14%
Dec-22	0.24	0.09	0.42	112	40	192	39	34.90%
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00%
Feb-23	0.02	0.00	0.06	9	0	28	9	90.91%
Mar-23	0.09	0.00	0.20	40	0	93	25	62.57%
Apr-23	0.06	0.00	0.19	29	0	86	26	89.41%
May-23	0.02	0.00	0.06	9	0	28	9	94.80%
Jun-23	0.08	0.02	0.18	38	9	82	19	51.16%
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00%
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00%
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00%
Oct-23	0.17	0.06	0.28	76	28	130	26	34.38%
Nov-23	0.02	0.00	0.06	10	0	29	9	90.92%
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00%
Jan-24	0.02	0.00	0.06	10	0	29	9	97.99%
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00%
Bellrock WFDA + 4 km (Bellrock OASA)								
Mar-22	0.37	0.08	0.72	241	54	472	107	44.41%
Apr-22	0.17	0.06	0.29	109	37	189	39	36.09%
May-22	0.29	0.16	0.47	194	104	307	51	26.45%
Jun-22	1.66	0.96	2.40	1,095	629	1,580	241	22.01%
Jul-22	0.03	0.00	0.07	20	0	47	12	59.81%
Aug-22	0.01	0.00	0.04	9	0	29	9	91.10%
Sep-22	0.03	0.00	0.07	19	0	46	12	61.69%
Oct-22	0.05	0.00	0.11	30	0	75	19	64.62%
Nov-22	0.10	0.03	0.19	67	19	128	29	43.06%
Dec-22	0.26	0.10	0.44	171	63	291	60	35.16%

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Jan-23	0.02	0.00	0.05	10	0	36	10	100.39%
Feb-23	0.04	0.00	0.09	29	0	58	15	49.75%
Mar-23	0.06	0.00	0.14	38	0	93	25	65.90%
Apr-23	0.07	0.00	0.18	49	0	115	29	59.78%
May-23	0.07	0.01	0.17	49	9	114	29	58.94%
Jun-23	0.07	0.01	0.14	49	9	95	21	43.65%
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00%
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00%
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00%
Oct-23	0.16	0.09	0.24	106	62	157	25	23.81%
Nov-23	0.09	0.01	0.19	58	10	125	30	52.31%
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00%
Jan-24	0.03	0.00	0.07	19	0	45	12	61.12%
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00%

Table 3.3: Percentage of Kittiwakes Flying per Survey Across the Bellrock Offshore Aerial Survey Area in Survey Years One and Two

Year	Season		Breeding					Autumn Passage				Spring Passage	
Year 1	*Month*	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
	Flying %	56	82	74	57	0	N/A	0	67	71	94	100	67
Year 2	*Month*	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
	Flying %	25	80	80	67	N/A	N/A	N/A	100	50	N/A	0	N/A

Table 3.4: Occurrence of Different Kittiwake Age Classes (as Determined from Plumage Characteristics) by Seasonal Period

Seasonal Period	Number Aged As		Number of Unaged Birds	Total Number of Birds Recorded	Percentage of Adults (From Aged Sample Only)	Percentage of Birds for Which Age Class Determined
	Adults	Sub-adults				
Breeding Season	116	7	36	159	94.3%	77.4%
Autumn Passage	28	7	11	46	80.0%	76.1%
Spring Passage	35	2	14	51	94.6%	72.5%
Total[1]	**164**	**16**	**60**	**240**	**91.1%**	**74.4%**

Notes:

[1] Total numbers differ slightly from the numbers summed across seasons because the records from the April surveys contribute to both the spring passage and breeding periods.

Plate 3.2: Detections, Density (Number/km²) and Number of Detections per Segment of Kittiwakes in the Bellrock Offshore Aerial Survey Area Between March and August 2022

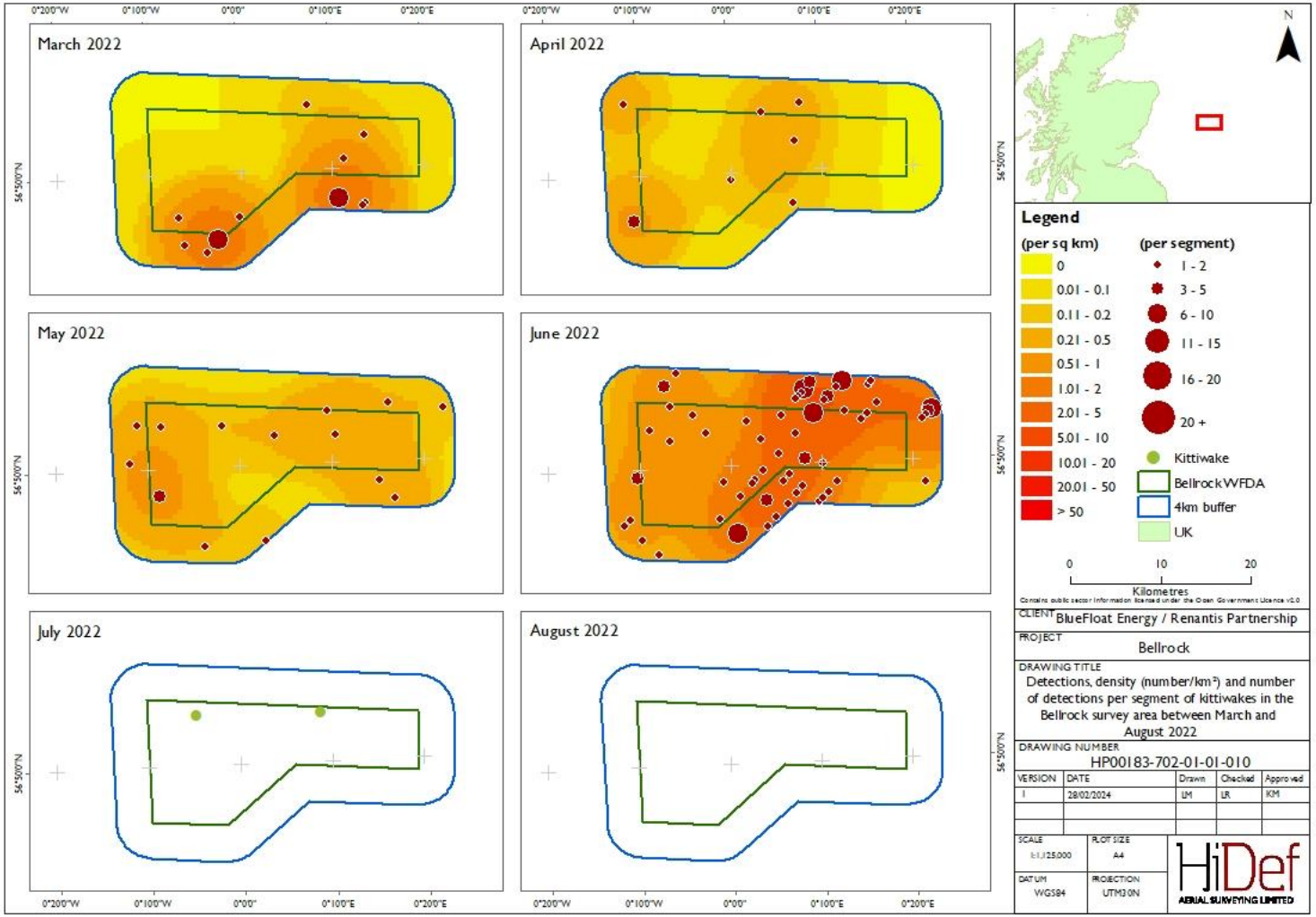


Plate 3.3: Detections, Density (Number/km²) and Number of Detections per Segment of Kittiwakes in the Bellrock Offshore Aerial Survey Area Between September 2022 and February 2023

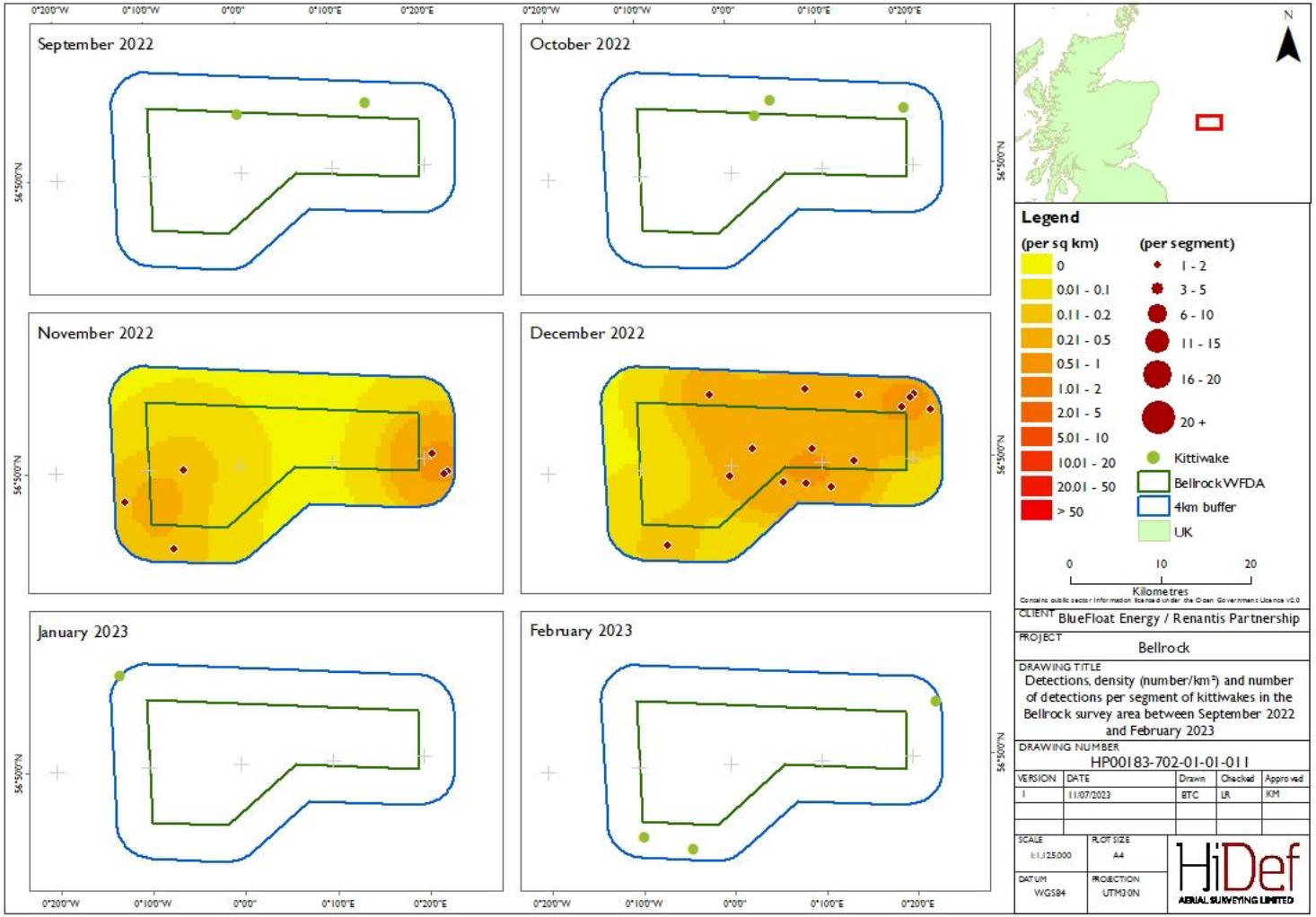


Plate 3.4: Detections of Kittiwakes in the Bellrock Offshore Aerial Survey Area Between March and August 2023

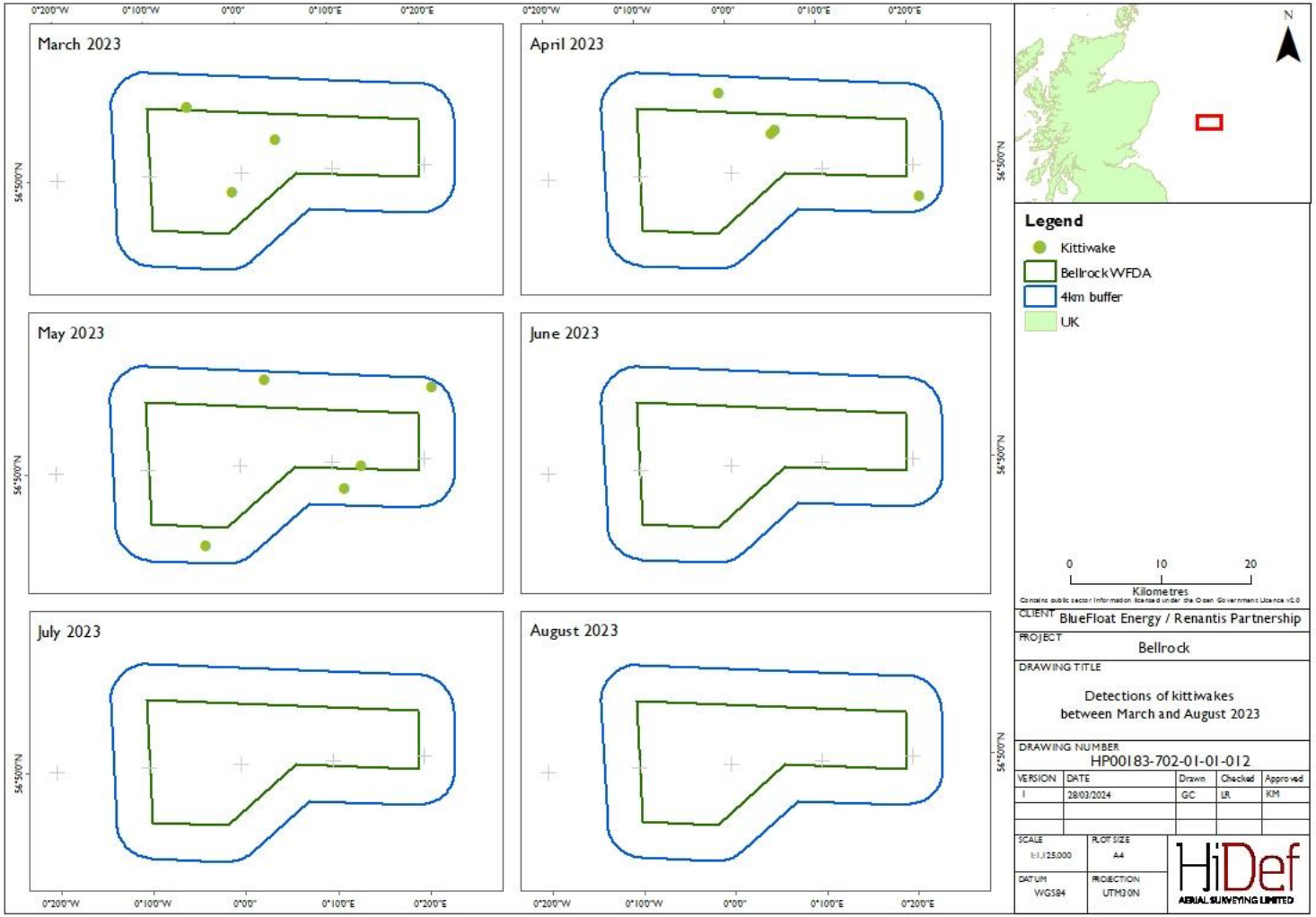
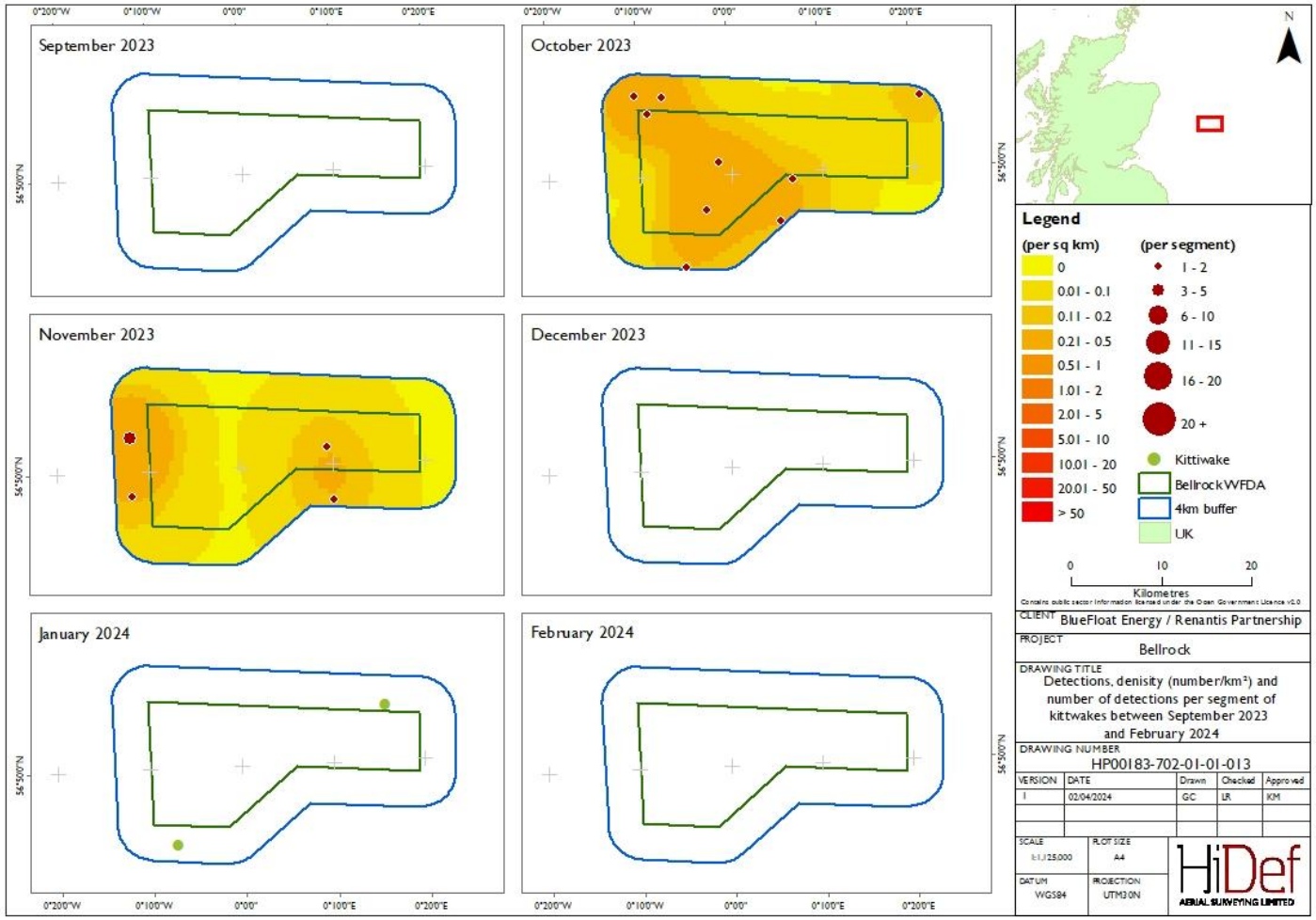


Plate 3.5: Detections, Density (Number/km²) and Number of Detections per Segment of Kittiwakes in the Bellrock Offshore Aerial Survey Area Between September 2023 and February 2024



3.3 Great Black-backed Gull

41. Great black-backed gulls *Larus marinus* were recorded during a total of eight surveys (**Table 3.5**). These records were limited to the non-breeding periods and, specifically, November to March (**Plate 3.6**). When present, densities within the Bellrock OASA were invariably low, with the maximum number of birds estimated during any one survey being 77 in December 2023 (**Table 3.5**).

42. As would be expected (given the scarcity of this species within the Bellrock OASA), there are fewer surveys with the species recorded in the Bellrock WFDA plus 2 km buffer than in the Bellrock OASA (**Figure 10.1.2** in **Annex A**), whilst overall abundance (when considered across all surveys) was lower within the Bellrock WFDA plus 2 km buffer (**Table 3.5**). The majority of the records were outside the Bellrock WFDA, with records of birds in flight within the Bellrock WFDA limited to a single survey in March 2023 (**Plate 3.7**) when 100% of birds (total of three) were recorded in flight (**Plate 3.6**).

43. Of the 24 observations identified to species level for great black-backed gull, 11 (46%) were of birds in flight and 13 (54%) of birds sitting on the water. Age class was established for all but five of the records, with 19 of the 24 total observations being classed as adults (**Table 3.7**).

Plate 3.6: Great Black-Backed Gull Apportioned Density Estimates, in the Bellrock Offshore Aerial Survey Area, Between March 2022 and February 2024. Error Bars Represent the 95% Lower and Upper Confidence Limits

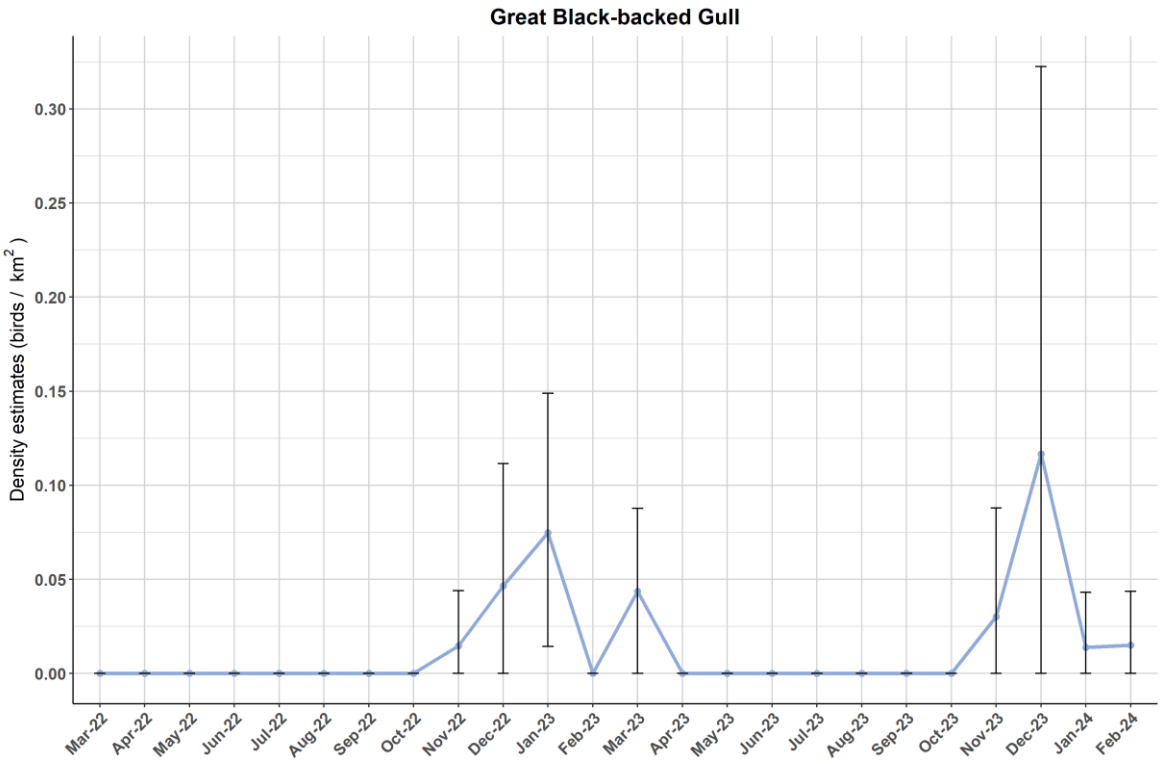


Table 3.5: Monthly Density and Abundance Estimates of All Great Black-Backed Gulls Across the Bellrock Wind Farm Development Area Plus 2 km, and Across the Bellrock Wind Farm Development Area Plus 4 km (Bellrock Offshore Aerial Survey Area) Using Design-based Analysis. Estimates Are Only Shown for Those Surveys in Which the Species was Recorded Within the Bellrock Offshore Aerial Survey Area

Month	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Bellrock WFDA + 2 km								
Nov-22	0.02	0.00	0.08	10	0	36	10	99.80
Dec-22	0.02	0.00	0.06	10	0	29	9	87.76
Jan-23	0.09	0.00	0.19	39	0	87	22	57.20
Mar-23	0.02	0.00	0.06	10	0	29	9	91.55
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.13	0.00	0.47	57	0	213	59	102.59
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.02	0.00	0.06	9	0	28	9	92.68
Bellrock WFDA + 4 km								
Nov-22	0.01	0.00	0.04	10	0	29	10	98.68
Dec-22	0.05	0.00	0.11	31	0	73	20	65.01
Jan-23	0.07	0.01	0.15	49	9	98	22	45.18
Mar-23	0.04	0.00	0.09	29	0	58	15	50.75
Nov-23	0.03	0.00	0.09	20	0	58	19	93.25
Dec-23	0.12	0.00	0.32	77	0	212	60	77.57
Jan-24	0.01	0.00	0.04	9	0	28	9	94.13
Feb-24	0.02	0.00	0.04	10	0	29	9	90.34

Table 3.6: Percentage of Great Black-backed Gulls Flying per Survey Across the Bellrock Offshore Aerial Survey Area in Survey Years One and two

Year	Season		Breeding					Autumn Passage			Winter	Spring Passage	
Year 1	*Month*	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
	Flying %	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	100	33	60	N/A
Year 2	*Month*	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
	Flying %	100	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	25	0	100

Table 3.7: Occurrence of Different Great Black-backed Gull Age Classes (As Determined from Plumage Characteristics) By Seasonal Period

Seasonal Period	Number aged as		Number of unaged birds	Total number of birds recorded	Percentage of adults (from aged sample only)	Percentage of birds for which age class determined
	Adults	Sub-adults				
Breeding Season	0	0	0	0	N/A	N/A
Autumn Passage	1	2	0	3	33.3%	100%
Non-breeding	10	1	0	11	90.9%	100%
Spring Passage	8	1	1	10	88.9%	90.0%
Total	**19**	**4**	**1**	**24**	**82.6%**	**95.8%**

3.4 Herring Gull

44. Herring gulls were recorded during a total of seven surveys (**Table 3.8**). These records were primarily in the non-breeding season, with seven of the nine individuals (prior to apportioning to species) occurring between the months of September and January. When present, densities (based upon the data as apportioned to species) within the Bellrock OASA were invariably low, with the maximum number of birds estimated during any one survey being 30 in October 2023 (**Plate 3.7, Table 3.8**).

45. As would be expected (given the scarcity of this species within the Bellrock OASA), there are fewer surveys with the species recorded in the Bellrock WFDA plus 2 km buffer than in the wider Bellrock OASA, whilst overall abundance (when considered across all surveys) was lower within the Bellrock WFDA plus 2 km buffer (**Table 3.8**). All observations of herring gull were outside the Bellrock WFDA (**Figure 10.1.3 in Annex A**).

46. A total of three individual herring gull were recorded in flight throughout the survey period, with these records being in August 2022, January 2023 and July 2023. This comprised 33% of total herring gulls records (i.e. nine) across the 24 surveys (**Table 3.9**). Age class was established for five of the nine birds, of which all were classed as adults (**Table 3.10**).

Plate 3.7: Herring Gull Apportioned Density Estimates, in the Bellrock Offshore Aerial Survey Area, Between March 2022 and February 2024. Error Bars Represent the 95% Lower and Upper Confidence Limits

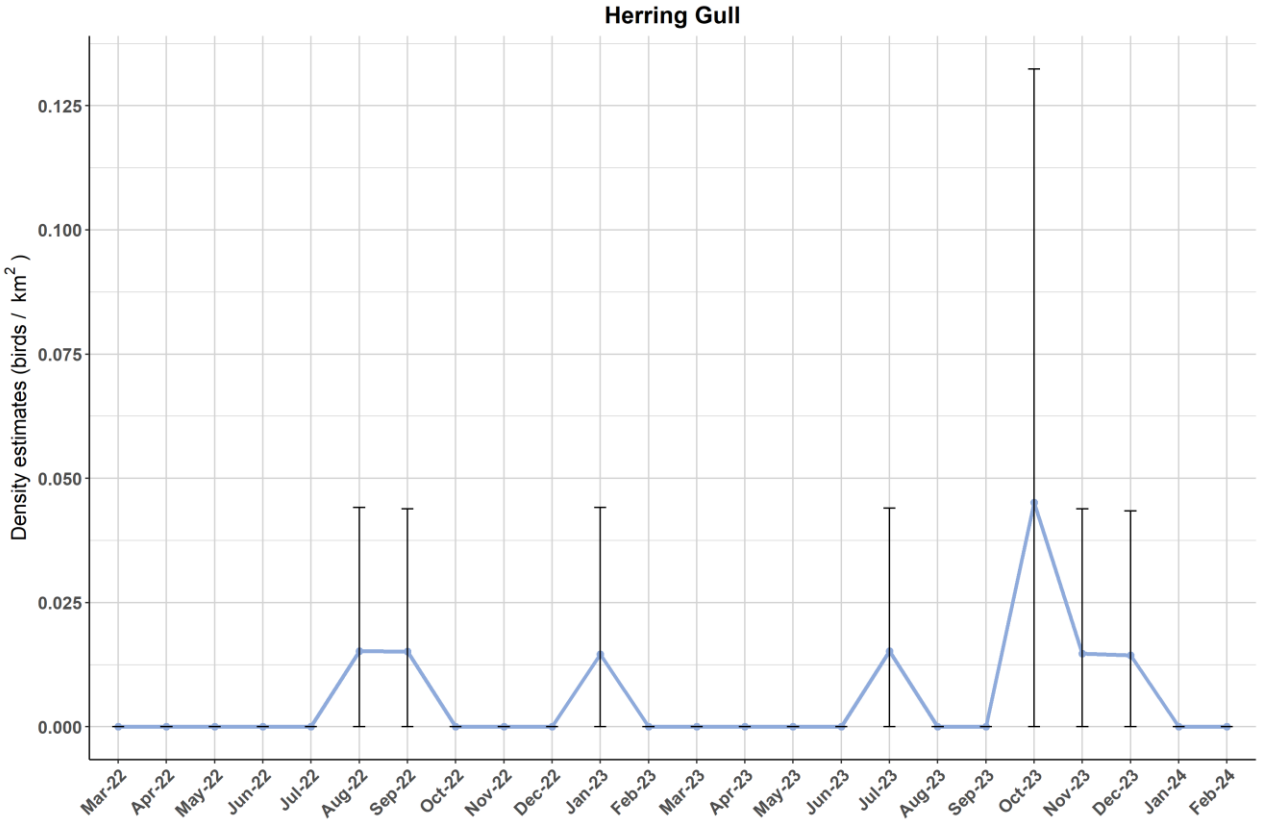


Table 3.8: Monthly Density and Abundance Estimates of All Herring Gulls Across the Bellrock Wind Farm Development Area Plus 2 km, and Across the Bellrock Wind Farm Development Area Plus 4 km (Bellrock Offshore Aerial Survey Area) Using Design-Based Analysis. Estimates Are Only Shown for Those Surveys in Which the Species Was Recorded Within the Bellrock Offshore Aerial Survey Area

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Bellrock WFDA + 2 km								
Aug-22	0.02	0.00	0.06	9	0	28	9	92.71%
Sep-22	0.02	0.00	0.06	9	0	28	9	97.07%
Jan-23	0.02	0.00	0.06	10	0	29	9	93.05%
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00%
Oct-23	0.06	0.00	0.24	30	0	110	30	100.14%
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00%
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00%

Bellrock WFDA + 4 km								
Aug-22	0.02	0.00	0.04	10	0	29	9	91.01%
Sep-22	0.02	0.00	0.04	10	0	29	9	95.26%
Jan-23	0.01	0.00	0.04	10	0	29	10	100.55%
Jul-23	0.02	0.00	0.04	10	0	29	9	91.08%
Oct-23	0.05	0.00	0.13	30	0	87	29	99.20%
Nov-23	0.01	0.00	0.04	10	0	29	9	96.39%
Dec-23	0.01	0.00	0.04	9	0	29	9	98.61%

Table 3.9: Percentage of Herring Gulls Flying per Survey Across the Bellrock Offshore Aerial Survey Area in Survey Years One and Two

Year	**Season**		**Breeding**					**Non-breeding**					
Year 1	*Month*	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
	Flying %	N/A	N/A	N/A	N/A	N/A	100	0	N/A	N/A	N/A	100	N/A
Year 2	*Month*	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
	Flying %	N/A	N/A	N/A	N/A	100	N/A	N/A	0	0	0	N/A	N/A

Table 3.10: Occurrence of Different Herring Gull Age Classes (As Determined from Plumage Characteristics) by Seasonal Period

Seasonal Period	**Number Aged as:**		**Number of Unaged Birds**	**Total Number of Birds Recorded**	**Percentage of Adults (from Aged Sample Only)**	**Percentage of Birds for which Age Class Determined**
	Adults	**Sub-adults**				
Breeding Season	1	0	0	1	100%	100%
Non-breeding	4	0	1	5	100%	80.0%
Total	**5**	**0**	**1**	**6**	**100%**	**83%**

3.5 Arctic Tern

47. Confirmed records of Arctic terns *Sterna paradisaea* occurred during a total of three surveys. However, the records of six Arctic or common terns during a fourth survey (August 2022) were also highly likely to have been Arctic terns, given that there were no confirmed common tern records during the entire DAS programme (**Table 3.11**). The absence of any confirmed records of either tern species during the August 2022 survey meant that these six records were not subsequently apportioned to species (see **Annex B**) (HiDef 2024).

48. Arctic tern records were primarily in the breeding season, with 20 of the 21 individuals (prior to apportioning to species) occurring during the months of July 2022 and August 2023 (with a single record in the September 2022 survey). Consequently, densities (based upon the data as apportioned to species) within the Bellrock OASA showed a marked peak in July 2022 (equating to an estimated 657 individuals), with a smaller peak in August 2023 (equating to 49 individuals) (**Plate 3.8, Table 3.11**).

49. For the three surveys in which the species was definitely recorded, densities were higher in the Bellrock OASA than in the Bellrock WFDA plus 2 km buffer (with the species recorded in the latter during only two of these three surveys) (**Table 3.11**). Overall, 15 of the 21 confirmed records of Arctic tern (prior to apportioning to species) were outside the Bellrock WFDA (**Figure 10.1.4 in Annex A).** None of the six Arctic/common tern records from the August 2022 survey occurred within the Bellrock WFDA, with approximately one third of the Arctic/common terns present during this survey estimated to be within the Bellrock WFDA plus 2 km buffer (**Annex B**) (HiDef 2024).

50. A total of eight individual Arctic tern were recorded in flight throughout the survey period, making up 38% of the total Arctic terns (21) observed across the 24 surveys. All Arctic terns recorded in the September 2022 and August 2023 surveys were in flight (**Table 3.12**). Age class was established for seven of the 21 records, of which all were classed as adults (**Table 3.13**).

Plate 3.8: Arctic Tern Apportioned Density Estimates, in the Bellrock Offshore Aerial Survey Area, Between March 2022 and February 2024. Error Bars Represent the 95% Lower and Upper Confidence Limits

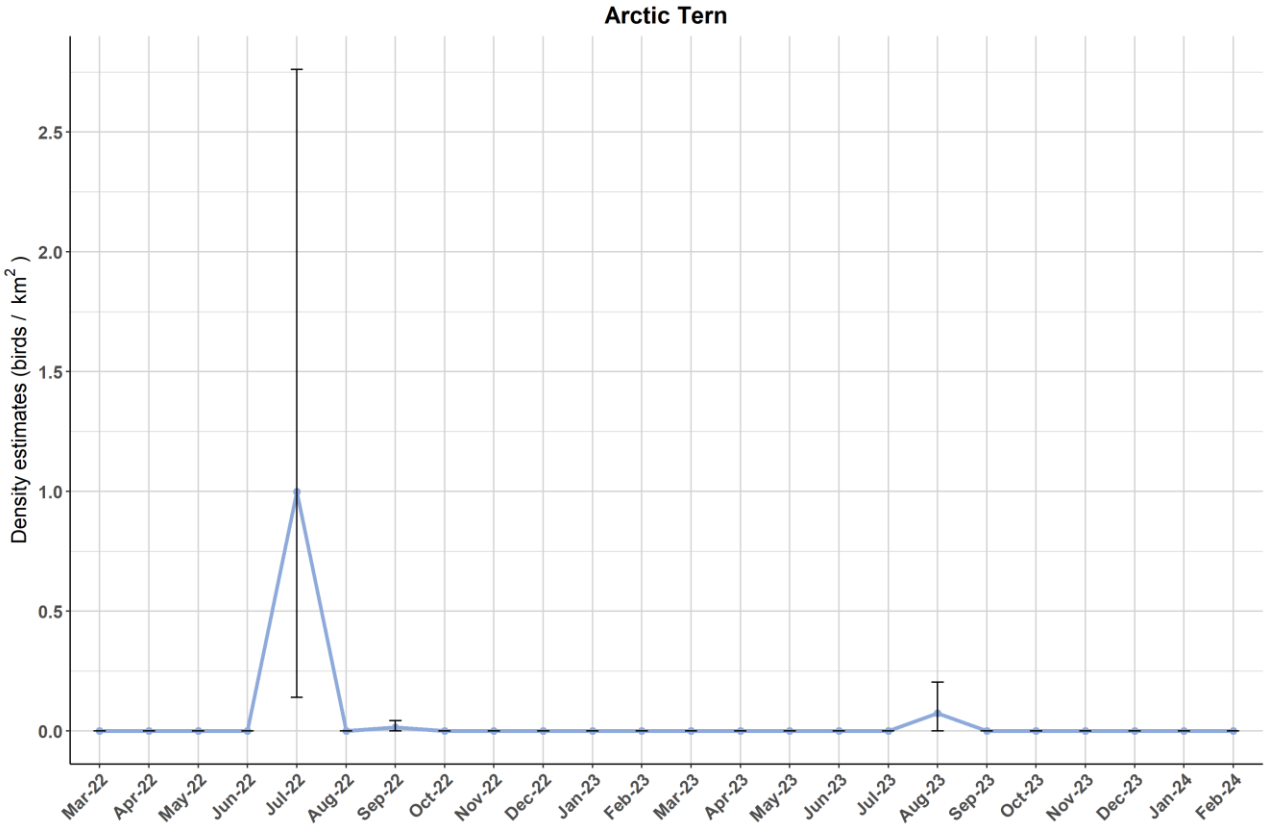


Table 3.11: Monthly Density and Abundance Estimates of All Arctic Terns Across the Bellrock Wind Farm Development Area Plus 2 km, and Across the Bellrock Wind Farm Development Area Plus 4 km (Bellrock Offshore Aerial Survey Area) Using Design-based Analysis

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Bellrock WFDA + 2 km								
Jul-22	0.36	0.06	0.67	163	29	305	73	44.88%
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00%
Aug-23	0.02	0.00	0.06	10	0	29	9	93.11%
Bellrock WFDA + 4 km								
Jul-22	1.00	0.14	2.76	657	93	1,817	454	69.00%
Sep-22	0.01	0.00	0.04	10	0	29	9	90.16%
Aug-23	0.07	0.00	0.20	49	0	134	38	77.56%

Table 3.12: Percentage of Arctic Terns Flying Per Survey Across the Bellrock Offshore Aerial Survey Area in Survey Years One and Two

Year	Season		Spring Passage	Breeding				Autumn Passage	Non-breeding				
Year 1	*Month*	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
	Flying %	N/A	N/A	N/A	N/A	19	N/A	100	N/A	N/A	N/A	N/A	N/A
Year 2	*Month*	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
	Flying %	N/A	N/A	N/A	N/A	N/A	100	N/A	N/A	N/A	N/A	N/A	N/A

Table 3.13: Occurrence of Different Arctic Tern Age Classes (As Determined from Plumage Characteristics) by Seasonal Period

Seasonal Period	Number aged as:		Number of unaged birds	Total number of birds recorded	Percentage of adults (from aged sample only)	Percentage of birds for which age Class determined
	Adults	Sub-adults				
Breeding Season	7	0	13	20	100%	35.0%
Autumn Passage	0	0	2	2	N/A	N/A
Non-breeding	0	0	1	1	N/A	N/A
Spring Passage	0	0	0	0	N/A	N/A
Total[1]	**7**	**0**	**16**	**23**	**100%**	**30.4%**

Notes:

[1] Total numbers differ slightly from the numbers summed across seasons because the records from the September surveys contribute to both the breeding and autumn passage periods.

3.6 Guillemot

3.6.1 Design-based Density Estimates

51. Guillemots were recorded in all 24 surveys of the Bellrock OASA. Based upon the data as apportioned to species (and corrected for availability bias), the estimated mean densities of guillemot across the Bellrock OASA range from 0.04 (95% CI 0.00 – 0.09) in December 2023, up to 33.56 (95% CI 24.01 – 43.73) birds/km^2 in July 2022. This extrapolates to mean abundance estimates for the Bellrock OASA ranging from 26 (95% CI 0 – 62) to 22,080 (95% CI 15,798 – 28,775) birds (**Table 3.14**).

52. Guillemot densities in the Bellrock OASA tended to be highest in the first nine months of the DAS programme (except in May and June 2022), with a marked peak occurring in July 2022 when the density was an order of magnitude higher than in any other survey month (**Plate 3.9**). The marked peak in density during the July 2022 survey was associated with the occurrence of a high number of single adult-chick pairs, comprising almost 30% of the total guillemot records during this survey (see **Section 3.6.3**). Densities declined after November 2022 and remained relatively low in the remaining survey months.

53. For a given survey, densities for the Bellrock WFDA plus 2 km buffer were similar to those for the wider Bellrock OASA (**Table 3.14**). In several survey months (most notably July 2022 but also May 2022, August 2022 and February 2023) densities tended to be highest in the west of the Bellrock OASA and decreased eastwards (**Plate 3.10** to **Plate 3.13**), with this pattern reflected in the findings from the MRSea modelling (**Annex C**). For other survey months, there was no notable or obviously discernible patterns in distribution across the Bellrock OASA.

Plate 3.9: Guillemot Apportioned Density Estimates, in the Bellrock Offshore Aerial Survey Area, Between March 2022 and February 2024. Error Bars Represent the 95% Lower and Upper Confidence Limits

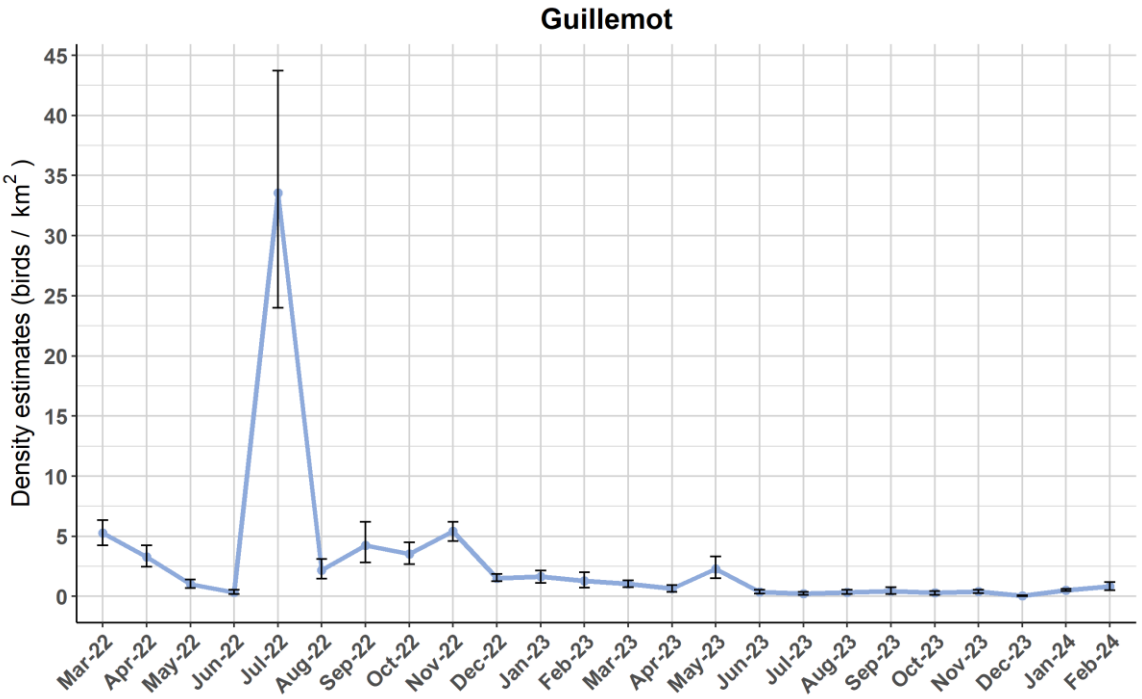


Table 3.14: Monthly Density and Abundance Estimates of All Guillemots Across the Bellrock Wind Farm Development Area Plus 2 km, and Across the Bellrock Wind Farm Development Area Plus 4 km (Bellrock Offshore Aerial Survey Area) Using Design-Based Analysis

Month	Density Estimate (birds/ km²)	Lower 95% CI (birds/ km²)	Upper 95% CI (birds/ km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Bellrock WFDA + 2 km								
Mar-22	4.98	3.93	6.15	2,274	1,794	2,805	257	11.31%
Apr-22	3.45	2.38	4.92	1,576	1,087	2,245	298	18.93%
May-22	1.06	0.68	1.46	483	308	668	90	18.55%
Jun-22	0.29	0.11	0.47	132	49	213	42	31.92%
Jul-22	35.92	25.58	47.08	16,393	11,676	21,491	2,512	15.32%
Aug-22	1.82	1.11	2.63	828	508	1,198	178	21.55%
Sep-22	3.64	2.54	5.00	1,662	1,159	2,284	295	17.78%
Oct-22	4.13	2.91	5.48	1,883	1,330	2,502	303	16.07%
Nov-22	5.68	4.72	6.71	2,594	2,155	3,061	240	9.26%
Dec-22	1.50	1.22	1.86	687	557	847	76	11.04%
Jan-23	1.60	1.02	2.17	728	466	992	137	18.80%
Feb-23	1.17	0.54	1.93	536	245	881	166	30.94%
Mar-23	1.02	0.63	1.40	465	286	639	90	19.45%
Apr-23	0.57	0.26	0.89	260	120	407	73	28.00%
May-23	2.20	1.35	3.13	1,003	617	1,431	210	20.95%
Jun-23	0.29	0.10	0.52	134	46	239	49	36.37%
Jul-23	0.29	0.12	0.46	133	55	210	40	30.10%
Aug-23	0.36	0.19	0.55	165	88	249	41	24.99%
Sep-23	0.31	0.14	0.50	141	63	228	41	29.20%
Oct-23	0.23	0.10	0.41	106	44	185	36	34.49%
Nov-23	0.44	0.23	0.67	200	105	304	48	24.21%
Dec-23	0.03	0.00	0.08	13	0	37	11	90.45%
Jan-24	0.54	0.40	0.68	247	184	310	33	13.39%
Feb-24	0.65	0.36	0.94	295	164	431	68	23.13%

Month	Density Estimate (birds/ km²)	Lower 95% CI (birds/ km²)	Upper 95% CI (birds/ km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Bellrock WFDA + 4 km								
Mar-22	5.27	4.24	6.34	3,468	2,792	4,170	367	10.57%
Apr-22	3.28	2.48	4.25	2,160	1,629	2,799	305	14.12%
May-22	1.01	0.68	1.39	665	451	917	126	18.91%
Jun-22	0.35	0.19	0.54	231	124	352	57	24.85%
Jul-22	33.56	24.01	43.73	22,080	15,798	28,775	3247	14.71%
Aug-22	2.20	1.47	3.09	1,447	970	2,035	269	18.61%
Sep-22	4.24	2.83	6.20	2,789	1,861	4,078	538	19.29%
Oct-22	3.52	2.66	4.48	2,316	1,753	2,947	316	13.63%
Nov-22	5.41	4.60	6.18	3,557	3,029	4,068	260	7.31%
Dec-22	1.51	1.25	1.86	996	825	1,227	103	10.35%
Jan-23	1.63	1.13	2.14	1,075	742	1,408	170	15.79%
Feb-23	1.29	0.72	2.02	846	474	1,327	212	25.11%
Mar-23	1.05	0.75	1.33	688	492	877	98	14.17%
Apr-23	0.64	0.37	0.93	424	244	615	94	22.18%
May-23	2.29	1.50	3.33	1,507	986	2,194	290	19.23%
Jun-23	0.37	0.22	0.54	246	146	355	55	22.46%
Jul-23	0.24	0.12	0.36	155	79	238	41	26.22%
Aug-23	0.35	0.19	0.55	227	125	359	59	25.98%
Sep-23	0.45	0.19	0.76	293	125	499	96	32.85%
Oct-23	0.28	0.13	0.46	187	84	300	55	29.23%
Nov-23	0.40	0.26	0.54	265	174	357	48	17.96%
Dec-23	0.04	0.00	0.09	26	0	62	16	64.13%
Jan-24	0.53	0.44	0.62	347	288	406	31	8.98%
Feb-24	0.85	0.51	1.19	557	338	780	114	20.46%

3.6.2 Model-based Density Estimates

54. As outlined in **Section 2.2.3**, guillemot densities were estimated using model-based, as well as design-based, methods. Full details of the model-based estimates are provided in **Annex C**, and summary information is presented below. The data pack underlying the MRSea modelling and results is provided electronically in **Annex D**.

55. Model-based density estimates were produced for most surveys when considering all birds and sitting birds but for only four surveys when considering birds in flight (due to the relatively low numbers of guillemot recorded in flight on most surveys – e.g. see **Table 3.16**). The low total numbers of guillemot recorded during the December 2023 survey meant that no model-based estimates were produced for this survey for any behaviour category, whilst poor agreement between the model-based and designed-based density estimates for all birds for the June 2022 survey meant that the model-based estimates were regarded as unreliable in this case (as indicated by an erroneous knot location in the modelling) and were not used (**Annex C**).

56. Overall, the density estimates produced by model-based methods were similar to those produced using the design-based methods (**Table 3.15**). When considering the densities for all birds for the Bellrock OASA, the mean of the magnitude of the absolute differences in the estimates derived by the two methods across the 22 surveys for which model-based estimates were produced (and considered reliable) was 0.16 (with the mean percentage difference being 7%), whilst the maximum absolute difference for any one survey was 1.4. Similarly, when considering all birds for the Bellrock WFDA plus 2 km buffer, the mean of the magnitude of the absolute differences in the estimates derived by the two methods across these 22 surveys was 0.37 (with the mean percentage difference being 14%), whilst the maximum absolute difference was 4.6. There was no consistent directional difference in the estimates produced by the two methods (with the design-based estimates being higher in 10 and 12 of the 22 surveys for all birds for the Bellrock OASA and Bellrock WFDA plus 2 km buffer, respectively).

Table 3.15 Comparison Between Design-based and (MRSea) Model-based Density Estimates for Guillemot, in the Bellrock Wind Farm Development Area + 2km buffer and wider Bellrock Offshore Aerial Survey Area

Month	Design-based Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Model-based Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)
Bellrock WFDA + 2 km						
Mar-22	4.98	3.93	6.15	4.92	3.88	6.04
Apr-22	3.45	2.38	4.92	3.17	2.02	4.81
May-22	1.06	0.68	1.46	1.01	0.73	1.35
Jun-22	0.29	0.11	0.47	(not modelled)		
Jul-22	35.92	25.58	47.08	31.30	25.11	38.78
Aug-22	1.82	1.11	2.63	2.18	1.56	3.00

Month	Design-based Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Model-based Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)
Sep-22	3.64	2.54	5.00	4.35	2.82	6.43
Oct-22	4.13	2.91	5.48	3.42	2.60	4.50
Nov-22	5.68	4.72	6.71	5.35	4.65	6.11
Dec-22	1.50	1.22	1.86	1.44	1.09	1.86
Jan-23	1.60	1.02	2.17	2.43	1.53	3.73
Feb-23	1.17	0.54	1.93	1.19	0.61	2.13
Mar-23	1.02	0.63	1.40	1.03	0.78	1.35
Apr-23	0.57	0.26	0.89	0.64	0.41	0.95
May-23	2.20	1.35	3.13	2.03	1.10	3.44
Jun-23	0.29	0.10	0.52	0.39	0.22	0.66
Jul-23	0.29	0.12	0.46	0.26	0.14	0.44
Aug-23	0.36	0.19	0.55	0.36	0.21	0.59
Sep-23	0.31	0.14	0.50	0.36	0.17	0.69
Oct-23	0.23	0.10	0.41	0.30	0.15	0.52
Nov-23	0.44	0.23	0.67	0.41	0.30	0.56
Dec-23	0.03	0.00	0.08	(not modelled)		
Jan-24	0.54	0.40	0.68	0.53	0.41	0.67
Feb-24	0.65	0.36	0.94	0.86	0.55	1.27
Bellrock WFDA + 4 km						
Mar-22	5.27	4.24	6.34	4.92	3.88	6.03
Apr-22	3.28	2.48	4.25	3.36	2.11	5.16
May-22	1.01	0.68	1.39	1.02	0.73	1.40
Jun-22	0.35	0.19	0.54	(not modelled)		
Jul-22	33.56	24.01	43.73	32.16	25.35	40.62
Aug-22	2.20	1.47	3.09	2.27	1.59	3.17
Sep-22	4.24	2.83	6.20	4.35	2.80	6.46

Month	Design-based Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Model-based Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)
Oct-22	3.52	2.66	4.48	3.42	2.60	4.49
Nov-22	5.41	4.60	6.18	5.34	4.65	6.11
Dec-22	1.51	1.25	1.86	1.44	1.09	1.86
Jan-23	1.63	1.13	2.14	2.43	1.54	3.75
Feb-23	1.29	0.72	2.02	1.20	0.62	2.15
Mar-23	1.05	0.75	1.33	1.03	0.78	1.35
Apr-23	0.64	0.37	0.93	0.67	0.42	1.00
May-23	2.29	1.50	3.33	2.07	1.11	3.53
Jun-23	0.37	0.22	0.54	0.40	0.22	0.69
Jul-23	0.24	0.12	0.36	0.27	0.14	0.46
Aug-23	0.35	0.19	0.55	0.36	0.21	0.59
Sep-23	0.45	0.19	0.76	0.38	0.18	0.71
Oct-23	0.28	0.13	0.46	0.30	0.15	0.52
Nov-23	0.40	0.26	0.54	0.41	0.30	0.56
Dec-23	0.04	0.00	0.09	(not modelled)		
Jan-24	0.53	0.44	0.62	0.53	0.41	0.67
Feb-24	0.85	0.51	1.19	0.86	0.55	1.27

57. In terms of the extent of variability in the estimates produced by the two approaches, again there was little evidence of marked differences. When considering the Bellrock OASA, the mean values of the CV were 20.4% and 21.6% for model-based and design-based methods, respectively, with the CV being greater for the design-based methods for 14 of the 22 surveys. For the Bellrock WFDA plus 2 km buffer, the mean values of the CV were 20.4% and 18.6% for model-based and design-based methods, respectively, with the CV being greater for the design-based methods for five of the 22 surveys (see **Table 3.14** and **Table A2.2** in **Annex C** for a comparison).

58. The comparisons described above suggest that the model-based density estimates for guillemot offer no clear benefits over the design-based density estimates. In addition to the basic characterisation of the Bellrock WFDA and the wider Bellrock OASA, the density estimates also contribute directly to the assessment of effects. The main effect pathway relevant to guillemot which relies on a quantitative approach to the assessment is displacement (inclusive of barrier

effects) (**Appendix 1.1: Bellrock WFDA Scoping Report (Volume IV)**), with this using the density estimates for all birds (i.e. sitting plus flying) within the Bellrock WFDA plus 2 km buffer (at least when the matrix approach is used – SNCBs, 2022). As detailed above, there are very few differences between the model-based and design-based density estimates for all birds within the Bellrock WFDA plus 2 km buffer. Given this, the assessment for the Bellrock WFDA EIA Report in **Chapter 10: Offshore Ornithology (Volume II)** relies upon the design-based density estimates (with little further consideration given to the model-based estimates), as agreed with NatureScot.

59. In addition to generating density estimates, the MRSea modelling for guillemot also provided evidence for associations between guillemot distribution and several environmental variables (Annex C). Amongst these various relationships, the trend for densities to be higher in more westerly parts of the Bellrock OASA during the breeding season was the strongest effect and probably of most direct relevance to the assessment for the Bellrock WFDA. This trend aligns closely with the interpretation of the guillemot distribution maps in **Plate 3.9** (see **Section 3.6.1**). Full details of the relationships between guillemot densities and environmental variables identified in the MRSea modelling are detailed in **Annex C**).

3.6.3 Behaviours and Occurrence of Chicks

60. Recorded behaviours differed across guillemot bio-seasons (**Table 2.2**). The largest proportions of flying birds occurred in April and February during year one, and between April and July in year two, indicating a possible tendency for flying birds to be more prevalent during the latter part of the non-breeding period and into the breeding period. However, in some cases the relatively high proportion of birds in flight was associated with low abundance (and hence small sample size), so limiting the extent to which any apparent trends can be regarded with confidence. This was particularly the case for the February, April, June and July surveys in 2023 (**Table 3.16**).

61. As stated in **Section 2.2.7**, age classes for guillemot cannot be determined from DAS data except in the specific instance of single adults and chicks occurring together in pairs. A total of 225 such adult-chick pairs were recorded during the July 2022 survey, whilst there were three such records in the August 2022 survey. These adult-chick pairs represented 28% of the total 1,600 records identified as guillemots in the July 2022 survey and 5% of the 116 records in the August 2022 survey (HiDef, 2024). There were no adult-chick pairs recorded during the 2023 breeding or post-breeding dispersal periods (or indeed during any of the other surveys).

Table 3.16: Percentage of Guillemots Flying Per Survey Across the Bellrock Offshore Aerial Survey Area in Survey Years One and Two

Year	Season		Breeding			Post-breeding dispersal			Non-breeding				
Year 1	*Month*	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
	Flying %	0	46	4	6	0	1	0	1	3	8	13	55
Year 2	*Month*	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
	Flying %	6	44	57	20	23	0	5	13	5	0	0	0

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Plate 3.10: Density of Guillemots (Number/km²) and Number of Detections per Segment in the Bellrock Offshore Aerial Survey Area Between March and August 2022

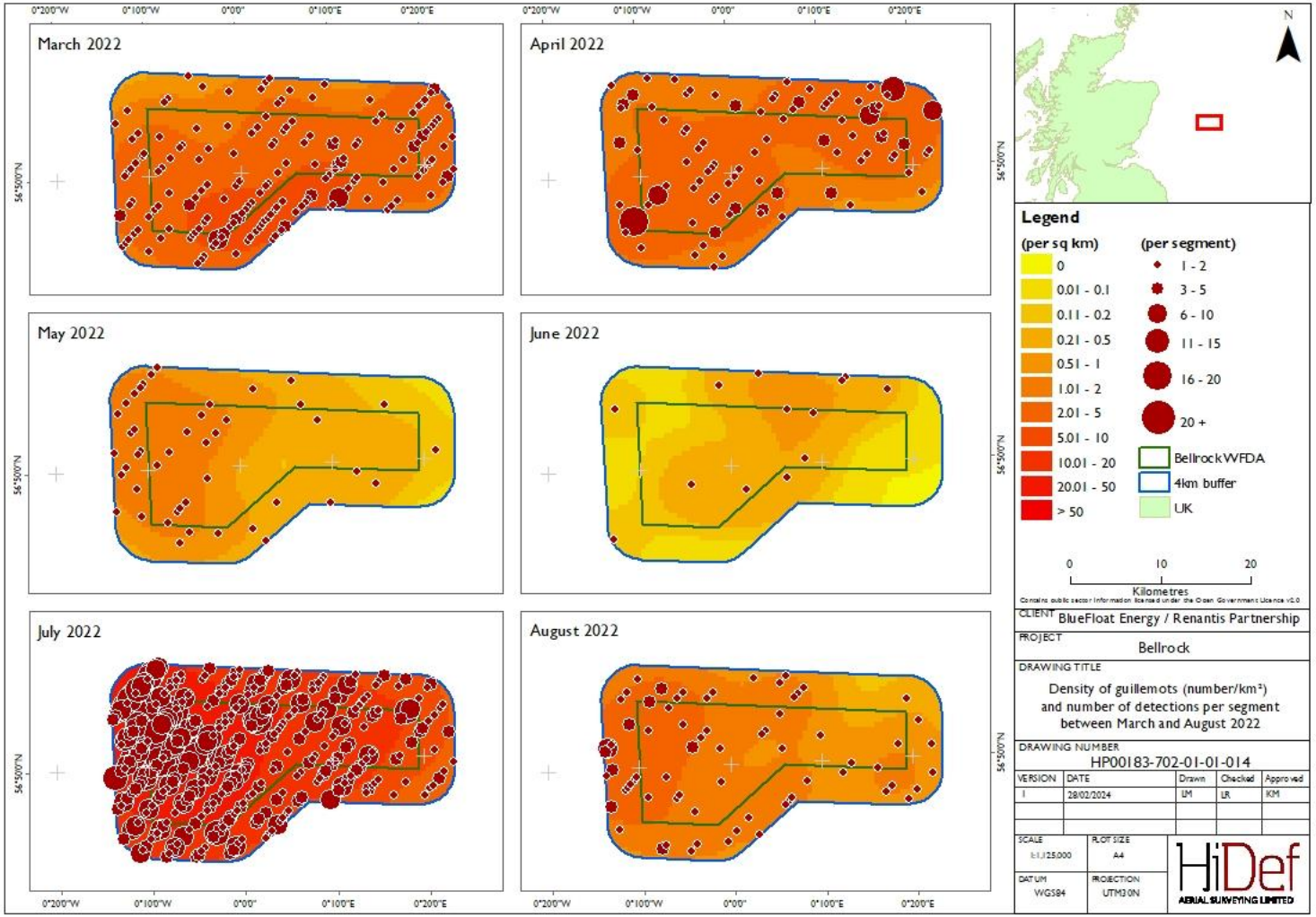


Plate 3.11: Density of Guillemots (Number/km²) and Number of Detections per Segment in the Bellrock Offshore Aerial Survey Area Between September 2022 and February 2023

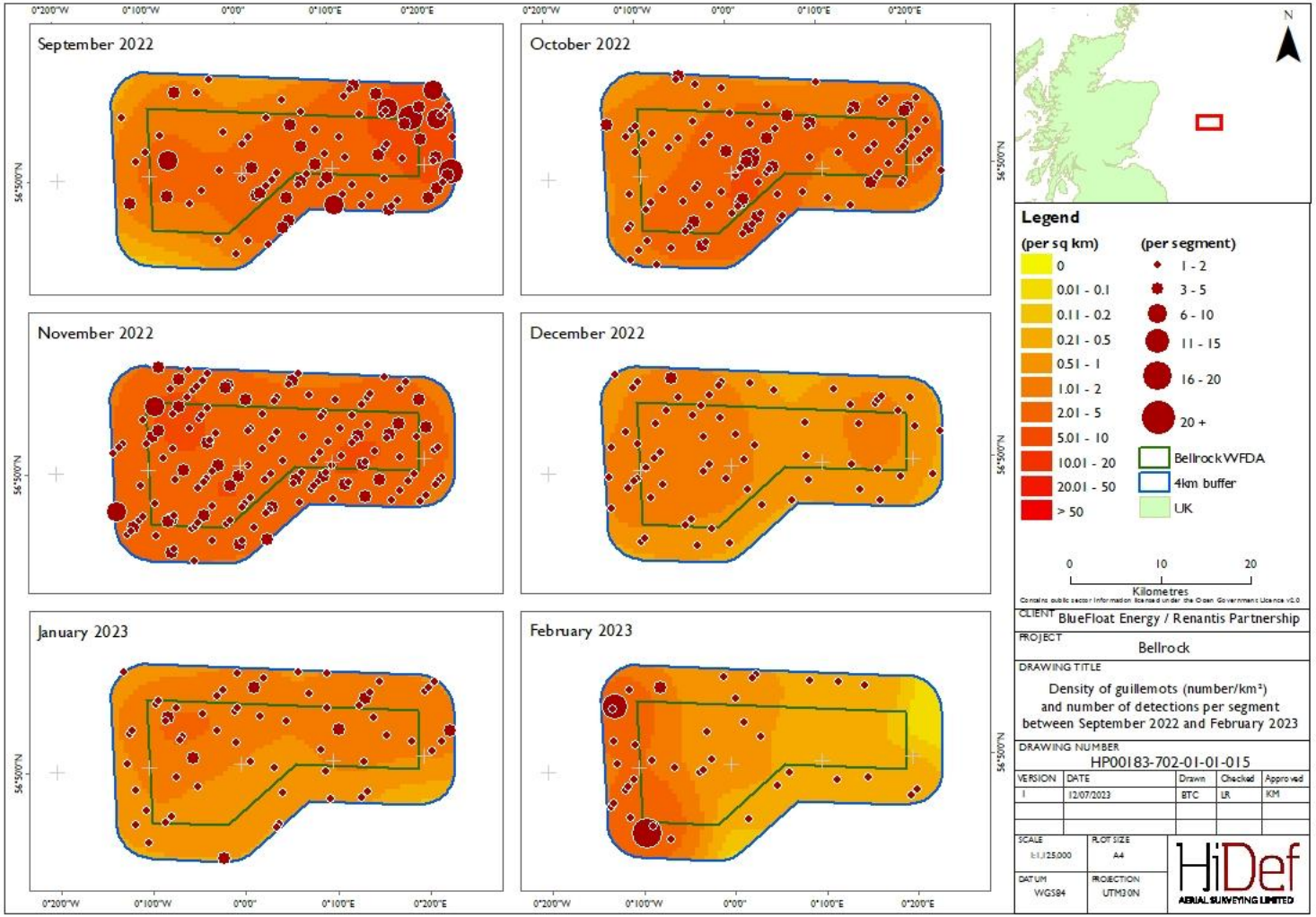


Plate 3.12: Density of Guillemots (Number/km²) and Number of Detections per Segment in the Bellrock Offshore Aerial Survey Area Between March and August 2023

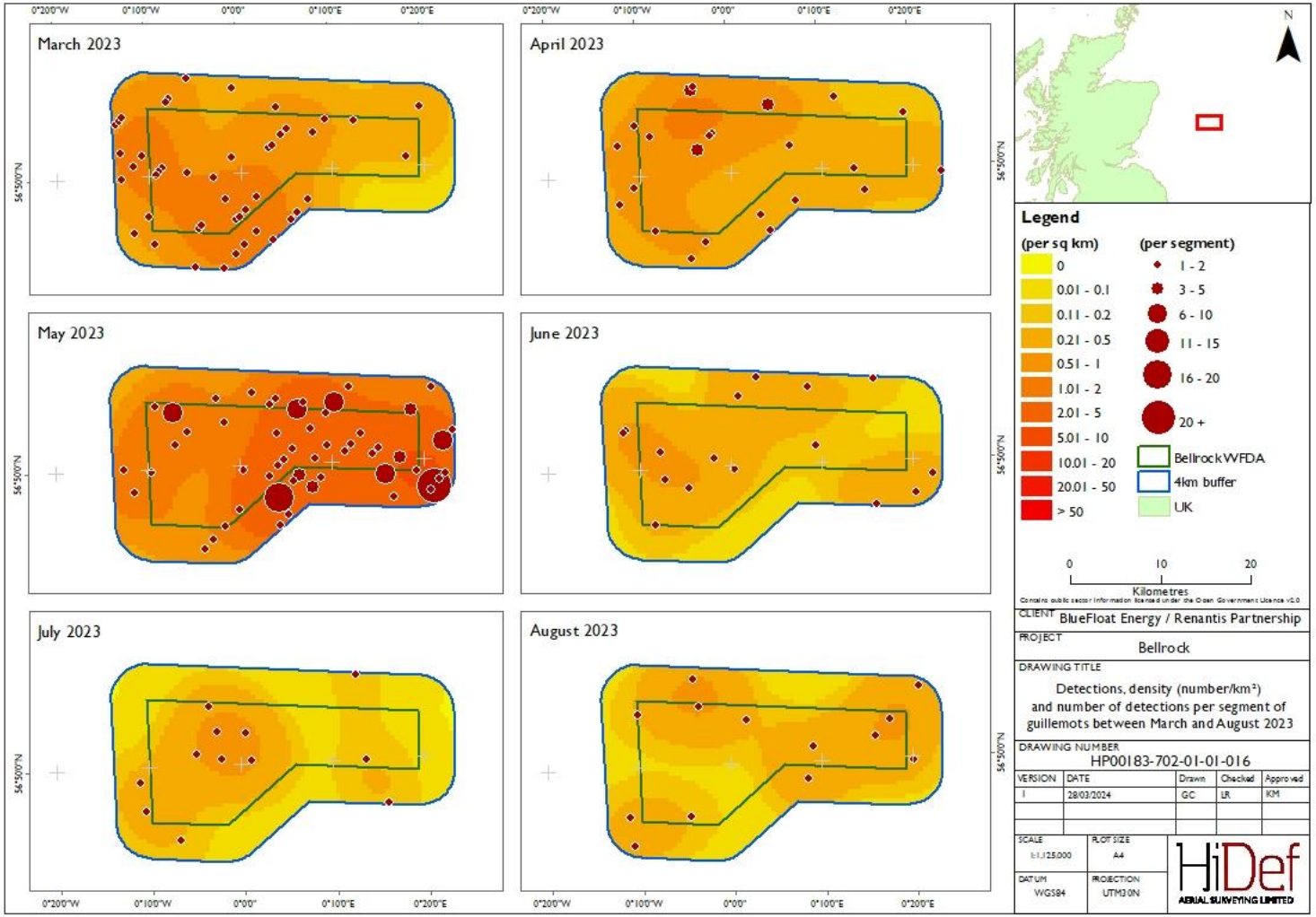
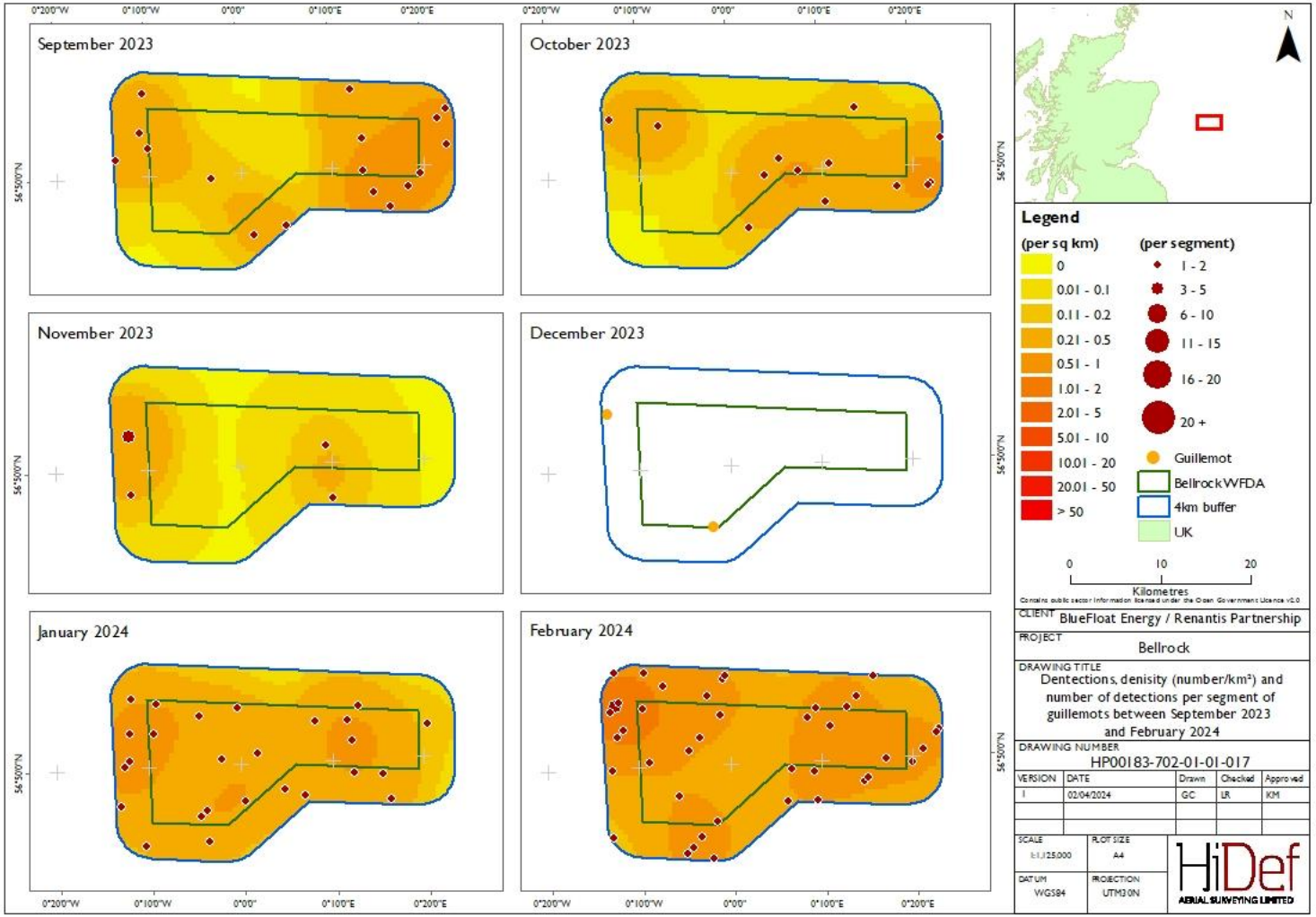


Plate 3.13: Detections, Density of Guillemots (Number/km²) and Number of Detections per Segment in the Bellrock Offshore Aerial Survey Area Between September 2023 and February 2024



3.7 Razorbill

62. Razorbills were recorded in seven of the 24 surveys of the Bellrock OASA. Based upon the data as apportioned to species (and corrected for availability bias), the estimated mean densities of razorbill across the Bellrock OASA range from 0.00 (95% CI 0 – 0), as recorded in several months, up to 5.31 (95% CI 4.17 – 6.38) birds/km^2 in July 2022. This extrapolates to mean abundance estimates for the Bellrock OASA ranging from 0 birds (95% CI 0 – 0) to 3,495 (95% CI 2,747 – 4,197) birds (**Table 3.17**).

63. Razorbill densities in the Bellrock OASA were highest in July 2022, when there was marked peak in abundance (as for guillemot). The July 2022 density in the Bellrock OASA was two orders of magnitude greater than densities recorded during any other survey month (**Plate 3.14, Table 3.17**). Densities were particularly low during the second year of the DAS. The occurrence of razorbills within the Bellrock OASA during the breeding period was limited to the June and July surveys in 2022, with no breeding season records in 2023.

64. In the months where razorbill were present, densities for the Bellrock WFDA plus 2 km buffer were similar to those for the wider Bellrock OASA (**Table 3.17**), and there was no clear pattern for high densities to be associated with particular areas within the Bellrock OASA (**Table 3.16** to **Plate 3.18**). However, in July 2022, the main aggregations were generally clustered around the boundary of the Bellrock WFDA. Hence the mean estimated density for the Bellrock WFDA plus 2 km buffer is slightly greater at 5.70 (95% CI 4.45 – 6.92) birds/km^2 than for the wider Bellrock OASA (**Table 3.17**).

65. Few razorbills recorded during the DAS were in flight (7.6% overall), with 9% and 100% of razorbill recorded as being in flight in June 2022 and February 2023, respectively (**Table 3.18**). However, this represents only a total of seven razorbills (six and one, respectively).

66. As for guillemot, age classes for razorbill cannot be determined from DAS data except in the specific instance of single adults and chicks occurring together in pairs. The only records of such single adult-chick pairs occurred during the July 2022 survey, when 27 such pairs were recorded. These adult-chick pairs represented 21% of the total 261 records identified as razorbills in the July 2022 survey (HiDef, 2024).

Plate 3.14: Razorbill Apportioned Density Estimates, in the Bellrock Offshore Aerial Survey Area, Between March 2022 and February 2024. Error Bars Represent The 95% Lower and Upper Confidence Limits

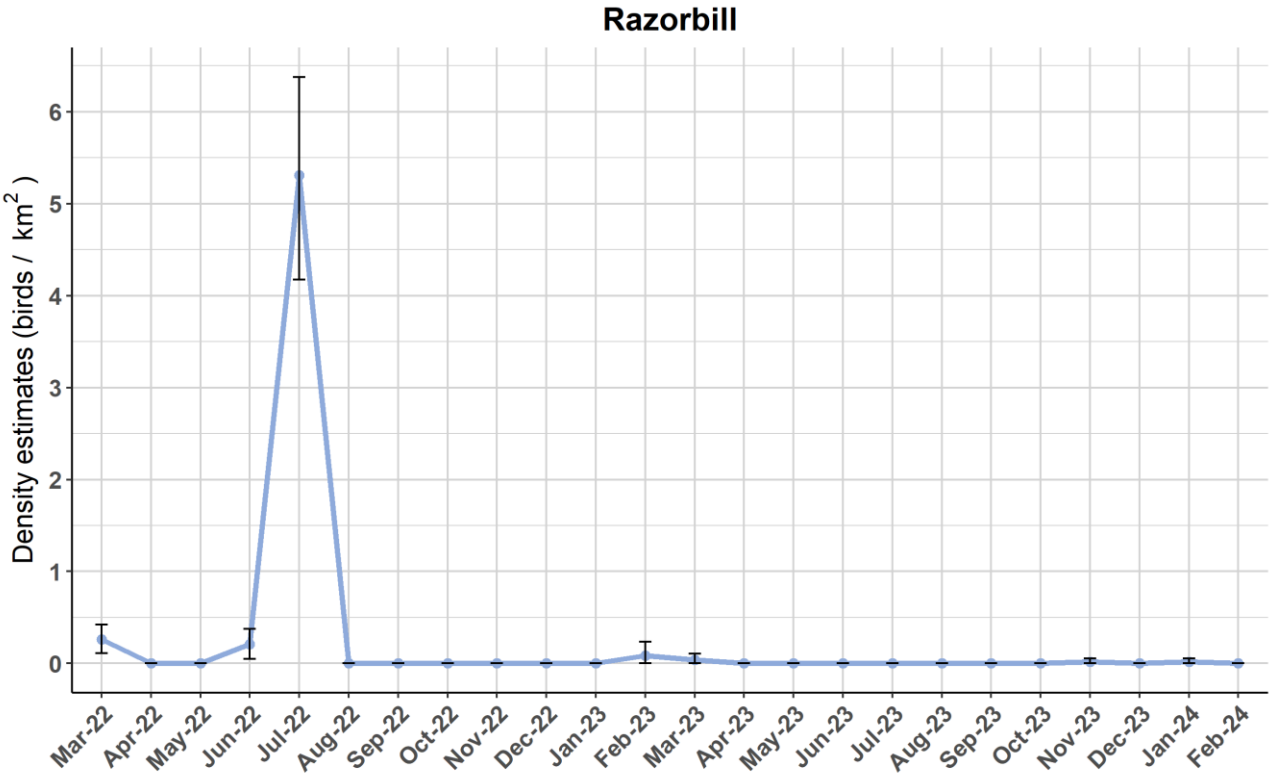


Table 3.17: Monthly Density and Abundance Estimates of All Razorbills Across the Bellrock Wind Farm Development Area Plus 2 km, and Across the Bellrock Wind Farm Development Area Plus 4 km (Bellrock Offshore Aerial Survey Area) Using Design-Based Analysis

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Bellrock WFDA + 2 km								
Mar-22	0.31	0.10	0.55	140	44	249	52	36.77%
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00%
May-22	0.00	0.00	0.00	0	0	0	0	0.00%
Jun-22	0.14	0.00	0.30	63	0	137	35	55.39%
Jul-22	5.70	4.45	6.92	2,600	2,030	3,158	287	11.02%
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00%
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00%
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00%

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00%
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00%
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00%
Feb-23	0.13	0.00	0.35	59	0	159	45	76.18%
Mar-23	0.05	0.00	0.15	24	0	69	21	87.98%
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00%
May-23	0.00	0.00	0.00	0	0	0	0	0.00%
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00%
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00%
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00%
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00%
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00%
Nov-23	0.03	0.00	0.08	12	0	35	12	96.24%
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00%
Jan-24	0.03	0.00	0.08	13	0	35	11	85.50%
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00%
Bellrock WFDA + 4 km								
Mar-22	0.26	0.11	0.42	171	73	278	54	31.51%
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00%
May-22	0.00	0.00	0.00	0	0	0	0	0.00%
Jun-22	0.21	0.05	0.37	136	31	247	54	39.88%
Jul-22	5.31	4.17	6.38	3,495	2,747	4,197	360	10.30%
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00%
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00%
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00%
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00%
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00%

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00%
Feb-23	0.09	0.00	0.24	57	0	155	45	78.08%
Mar-23	0.04	0.00	0.11	24	0	70	22	88.90%
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00%
May-23	0.00	0.00	0.00	0	0	0	0	0.00%
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00%
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00%
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00%
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00%
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00%
Nov-23	0.02	0.00	0.05	12	0	35	11	95.92%
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00%
Jan-24	0.02	0.00	0.05	12	0	35	11	89.83%
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00%

Table 3.18: Percentage of Razorbills Flying per Survey Across the Bellrock Offshore Aerial Survey Area in Survey Years One and Two

Year	Season		Breeding				Autumn Passage			Non-breeding		Spring Passage	
Year 1	*Month*	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
	Flying %	0	N/A	N/A	9	0	N/A	N/A	N/A	N/A	N/A	N/A	100
Year 2	*Month*	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
	Flying %	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	N/A	0	N/A

Plate 3.15: Density (Number/km²) and Number of Detections per Segment of Razorbills in the Bellrock Offshore Aerial Survey Area Between March and August 2022

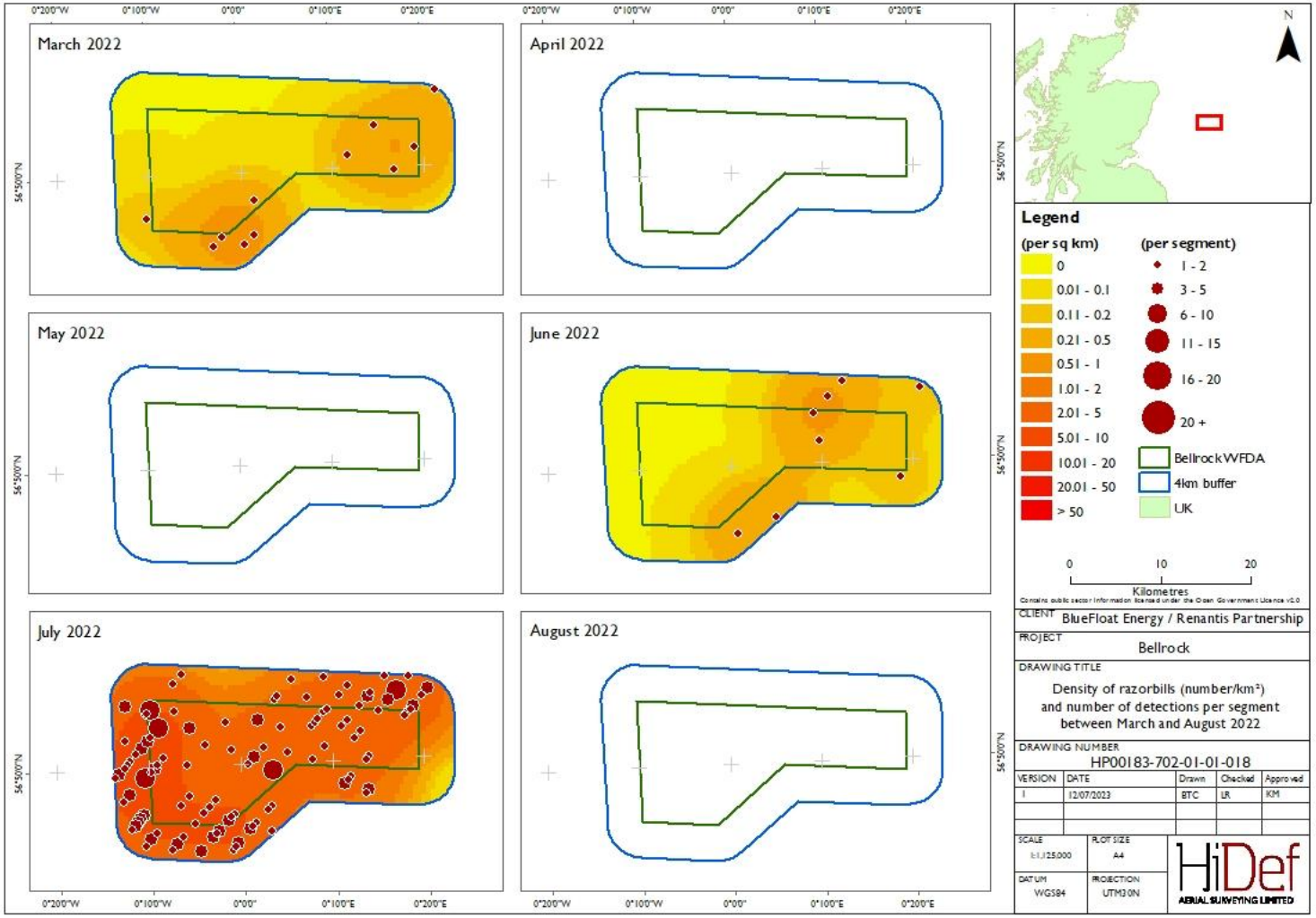


Plate 3.16: Density of Razorbills (Number/km²) and Number of Detections per Segment in the Bellrock Offshore Aerial Survey Area Between September 2022 and February 2023

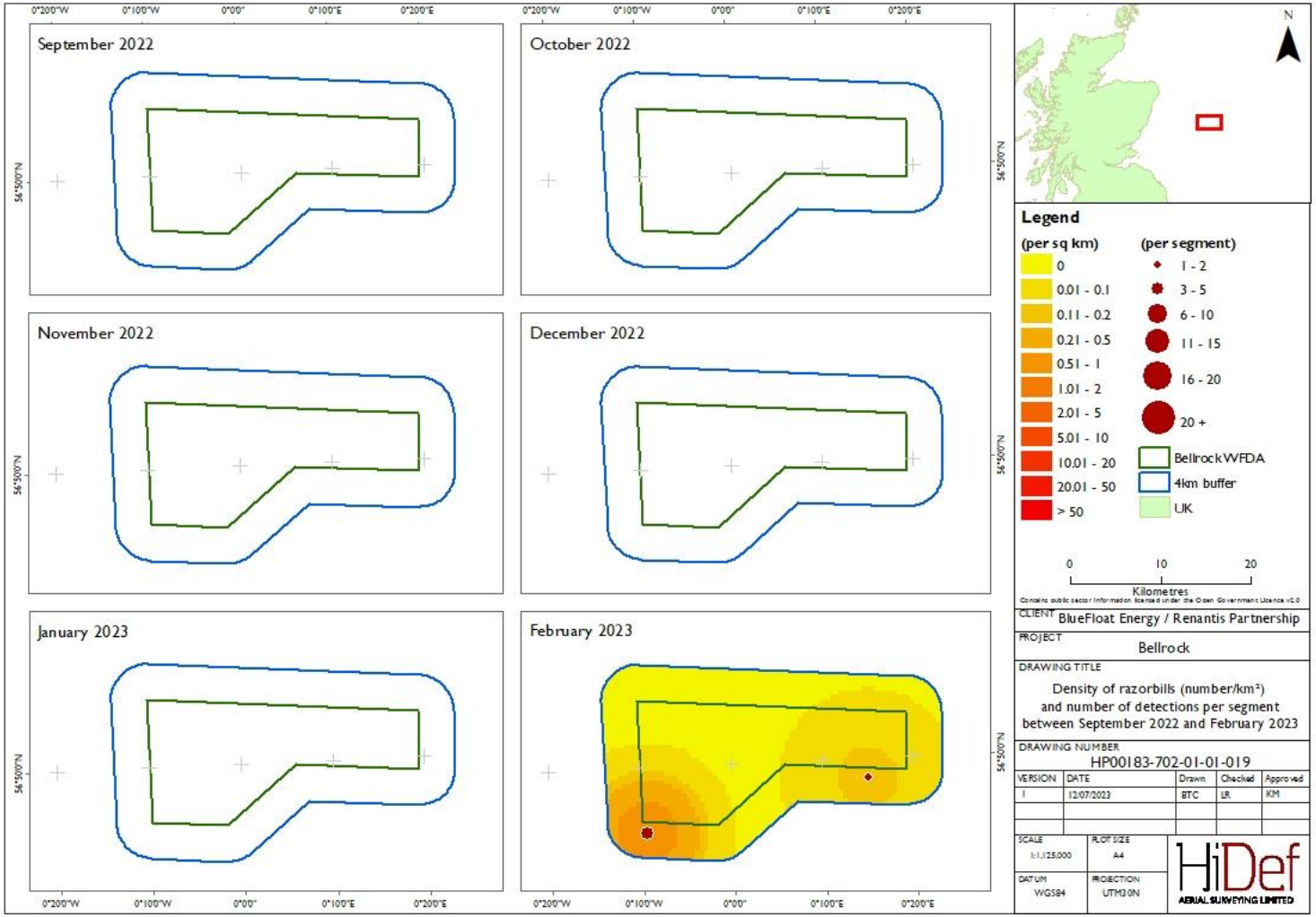


Plate 3.17: Detections of Razorbills in the Bellrock Offshore Aerial Survey Area Between March and August 2023

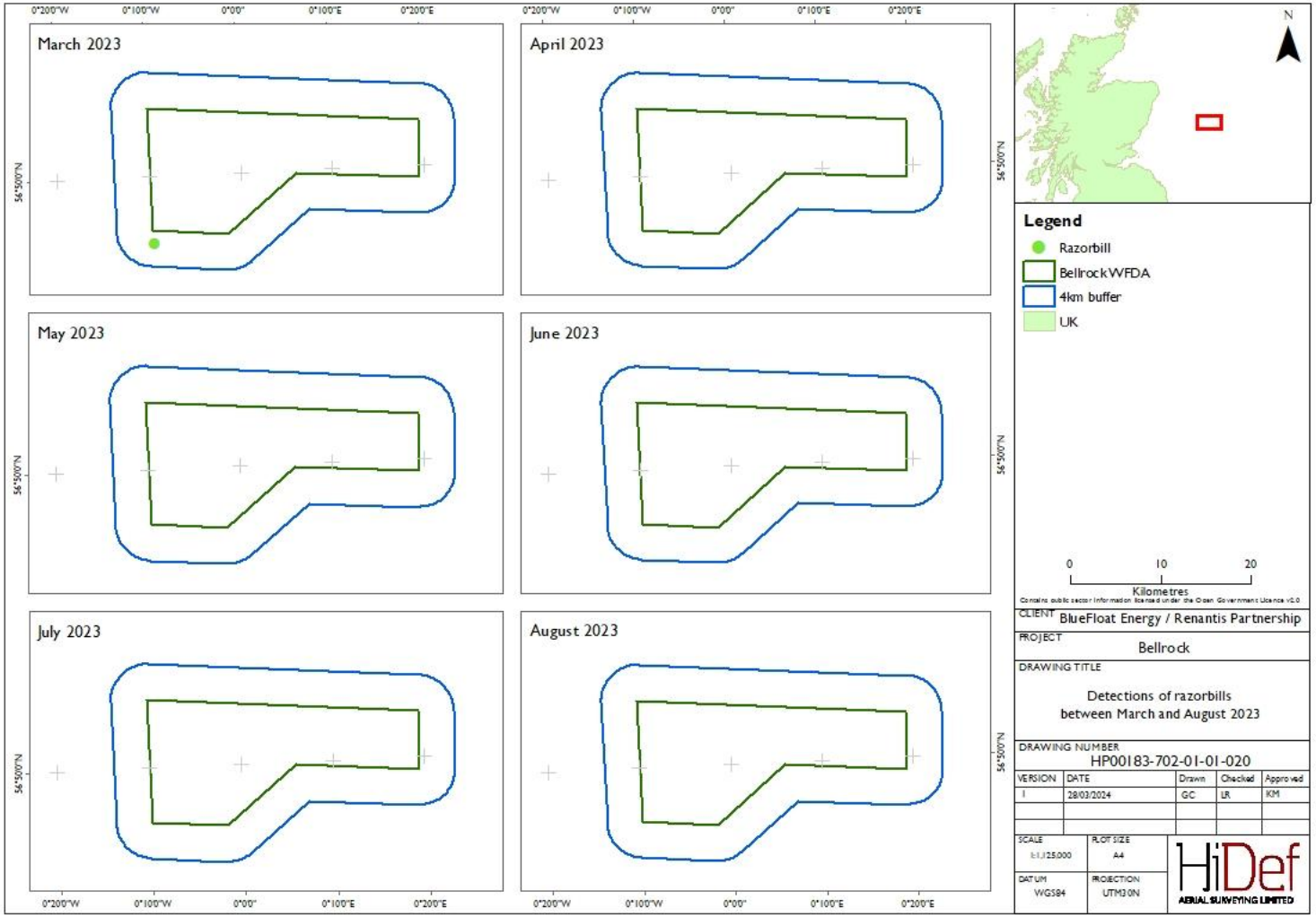
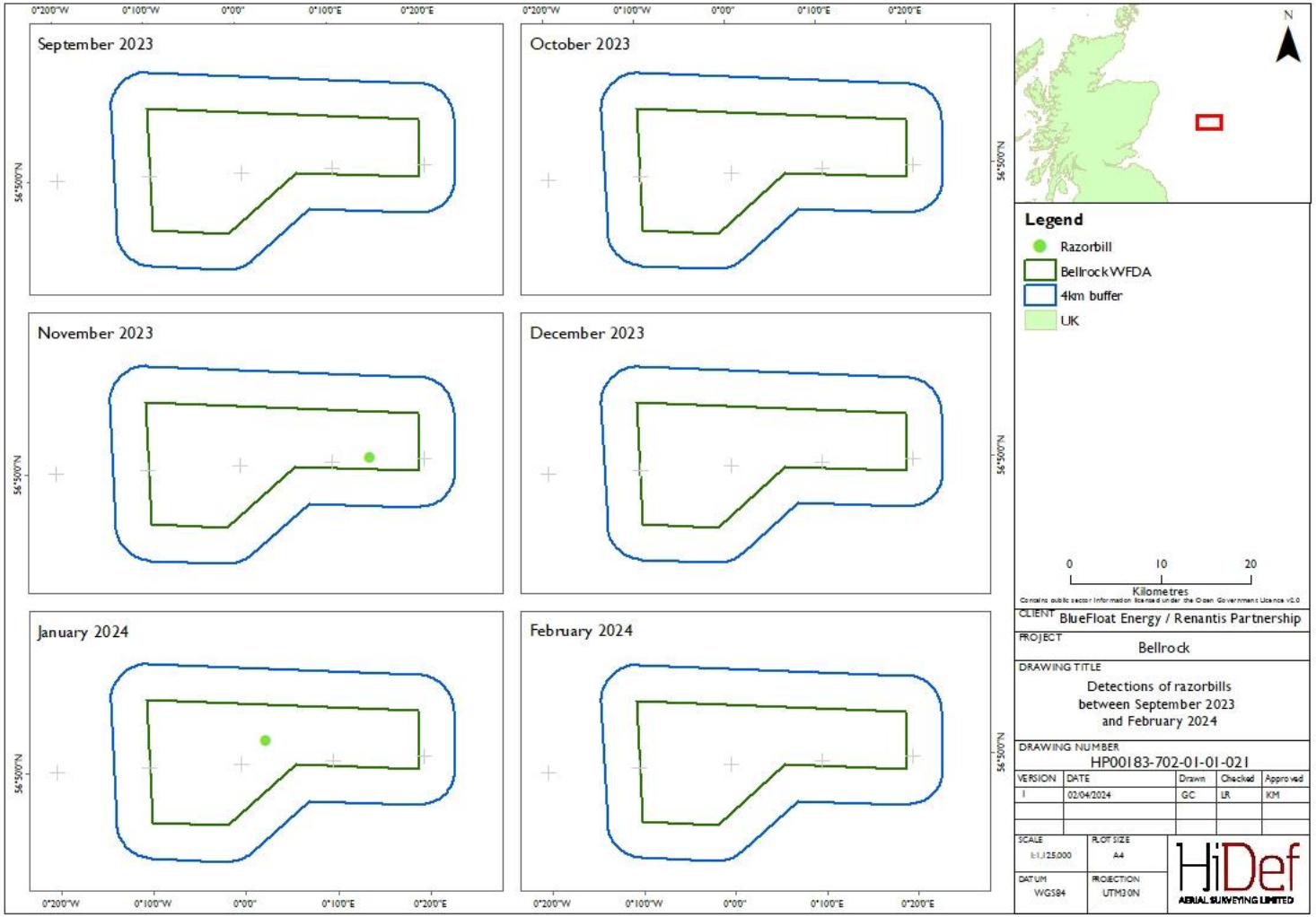


Plate 3.18: Detections of Razorbills in the Bellrock Offshore Aerial Survey Area Between September 2023 and February 2024



3.8 Puffin

67. Puffins were recorded in 18 of the 24 surveys of the Bellrock OASA. Based upon the data as apportioned to species (and corrected for availability bias), the estimated mean densities of puffin across the Bellrock OASA range from 0.00 (95% CI 0 – 0), as recorded in several months, up to 1.57 (95% CI 1.21 – 1.90) birds/km^2 in March 2022. This extrapolates to mean abundance estimates for the Bellrock OASA ranging from 0 birds (95% CI 0 – 0) to 1,030 (95% CI 798 – 1,252) birds (**Table 3.19**).

68. Puffin densities in the Bellrock OASA were highest in March 2022, with year one of the DAS generally having substantially higher densities and overall occurrence than year two (**Plate 3.19**). In both survey years, puffin tended to show a pattern of highest densities from late winter/early spring through to autumn (year one) or summer (year two), although during this period there was marked between-month fluctuations in density. Therefore, highest densities in the Bellrock OASA tended to be associated with the defined breeding period (April to mid-August – **Table 2.2**), with birds being scarce or absent in a high proportion of the surveys encompassing the non-breeding period.

69. In the months where puffins were recorded, densities for the Bellrock WFDA plus 2 km buffer were generally similar to those for the wider Bellrock OASA (**Table 3.19**).

70. Puffin records were often relatively evenly distributed throughout the Bellrock OASA or were too sporadic for any patterns to be discernible (**Table 3.21**, **Plate 3.20** to **Plate 3.23**)**.** However, in the March 2022 survey, the area of greatest concentration was centred on the boundary of the Bellrock WFDA to the south, resulting in a lower mean density for the Bellrock WFDA plus 2 km buffer than for the Bellrock OASA (i.e. 1.34 (95% CI 0.88 – 1.85) birds/km^2 compared to 1.57 (95% CI 1.21 – 1.90) birds/km^2 - **Table 3.19**.

71. By contrast, the density estimate for the Bellrock WFDA plus 2 km buffer for the July 2022 survey was higher than for the Bellrock OASA (due to the main concentration of birds being within the Bellrock WFDA - **Plate 3.20**). Consequently, densities for the Bellrock WFDA plus 2 km buffer were slightly higher (at 1.38 (95% CI 0.90 – 1.86) birds/km^2) for the July 2022 survey than for the March 2022 survey.

72. No puffin recorded during the surveys were in flight (**Table 3.20**), and no information is available on occurrence of different age classes.

Plate 3.19: Puffin Apportioned Density Estimates, in the Bellrock Offshore Aerial Survey Area, Between March 2022 and February 2024. Error Bars Represent The 95% Lower and Upper Confidence Limits

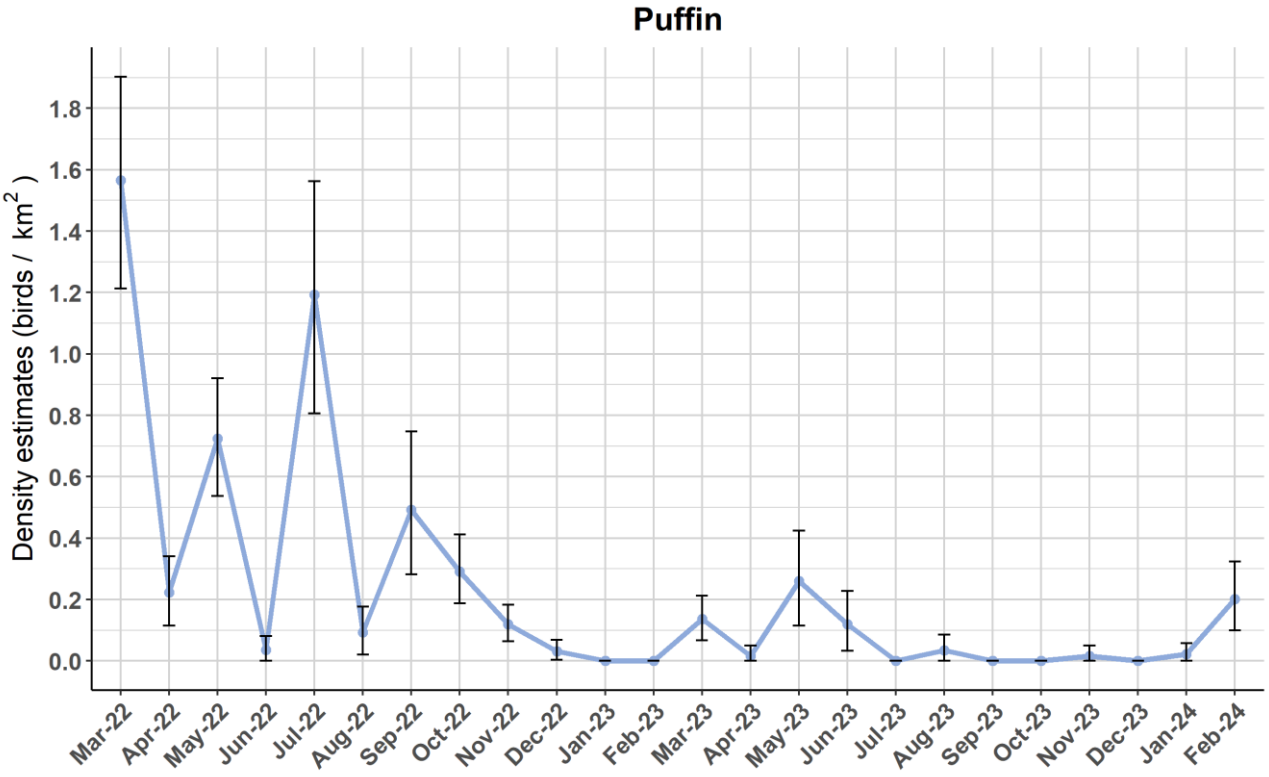


Table 3.19: Monthly Density and Abundance Estimates of All Puffins Across the Bellrock Wind Farm Development Area Plus 2 km, and Across the Bellrock Wind Farm Development Area Plus 4 km (Bellrock Offshore Aerial Survey Area) Using Design-Based Analysis

Month	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Bellrock WFDA + 2 km								
Mar-22	1.34	0.88	1.85	612	400	845	117	19.11%
Apr-22	0.24	0.07	0.43	111	33	198	42	37.79%
May-22	0.82	0.59	1.08	374	270	492	57	15.12%
Jun-22	0.05	0.00	0.11	22	0	51	13	58.67%
Jul-22	1.38	0.90	1.86	629	412	847	109	17.36%
Aug-22	0.09	0.00	0.21	41	0	95	27	64.62%
Sep-22	0.43	0.14	0.82	197	65	374	79	40.22%
Oct-22	0.32	0.18	0.48	147	83	221	35	23.50%

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Nov-22	0.10	0.02	0.17	46	11	78	17	38.26%
Dec-22	0.04	0.00	0.08	16	0	38	11	66.31%
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00%
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00%
Mar-23	0.13	0.04	0.23	60	19	104	22	36.72%
Apr-23	0.02	0.00	0.07	11	0	33	10	92.09%
May-23	0.20	0.07	0.32	90	32	145	29	31.97%
Jun-23	0.15	0.05	0.28	68	21	129	29	43.50%
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00%
Aug-23	0.02	0.00	0.07	11	0	34	11	99.54%
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00%
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00%
Nov-23	0.02	0.00	0.07	11	0	33	11	94.23%
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00%
Jan-24	0.03	0.00	0.09	15	0	39	11	76.02%
Feb-24	0.17	0.06	0.28	76	30	128	26	33.55%
Bellrock WFDA + 4 km								
Mar-22	1.57	1.21	1.90	1,030	798	1,252	117	11.35%
Apr-22	0.22	0.12	0.34	147	76	224	39	26.79%
May-22	0.72	0.54	0.92	477	353	606	67	14.06%
Jun-22	0.04	0.00	0.08	24	0	54	14	59.95%
Jul-22	1.19	0.81	1.56	785	531	1,028	126	16.12%
Aug-22	0.09	0.02	0.18	62	14	117	28	44.74%
Sep-22	0.49	0.28	0.75	324	186	492	78	24.17%
Oct-22	0.29	0.19	0.41	191	123	271	38	19.86%
Nov-22	0.12	0.06	0.18	78	42	121	21	26.31%
Dec-22	0.03	0.00	0.07	20	3	45	11	54.43%

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00%
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00%
Mar-23	0.14	0.07	0.21	90	44	140	25	28.01%
Apr-23	0.02	0.00	0.05	11	0	33	10	95.67%
May-23	0.26	0.11	0.42	172	75	279	53	30.85%
Jun-23	0.12	0.03	0.23	79	22	150	34	43.59%
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00%
Aug-23	0.03	0.00	0.09	23	0	56	16	68.07%
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00%
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00%
Nov-23	0.02	0.00	0.05	11	0	33	11	94.66%
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00%
Jan-24	0.02	0.00	0.06	15	0	38	11	72.68%
Feb-24	0.20	0.10	0.32	133	66	213	38	28.31%

Table 3.20: Percentage of Puffins Flying Per Survey Across the Bellrock Offshore Aerial Survey Area in Survey Years One and Two

Year	Season		Breeding					Non-breeding					
Year 1	*Month*	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
	Flying %	0	0	0	0	0	0	0	0	0	0	N/A	N/A
Year 2	*Month*	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
	Flying %	0	0	0	0	N/A	0	N/A	N/A	0	N/A	0	0

Plate 3.20: Detections, Density (Number/km²) And Number of Detections per Segment of Puffins in the Bellrock Offshore Aerial Survey Area Between March and August 2022

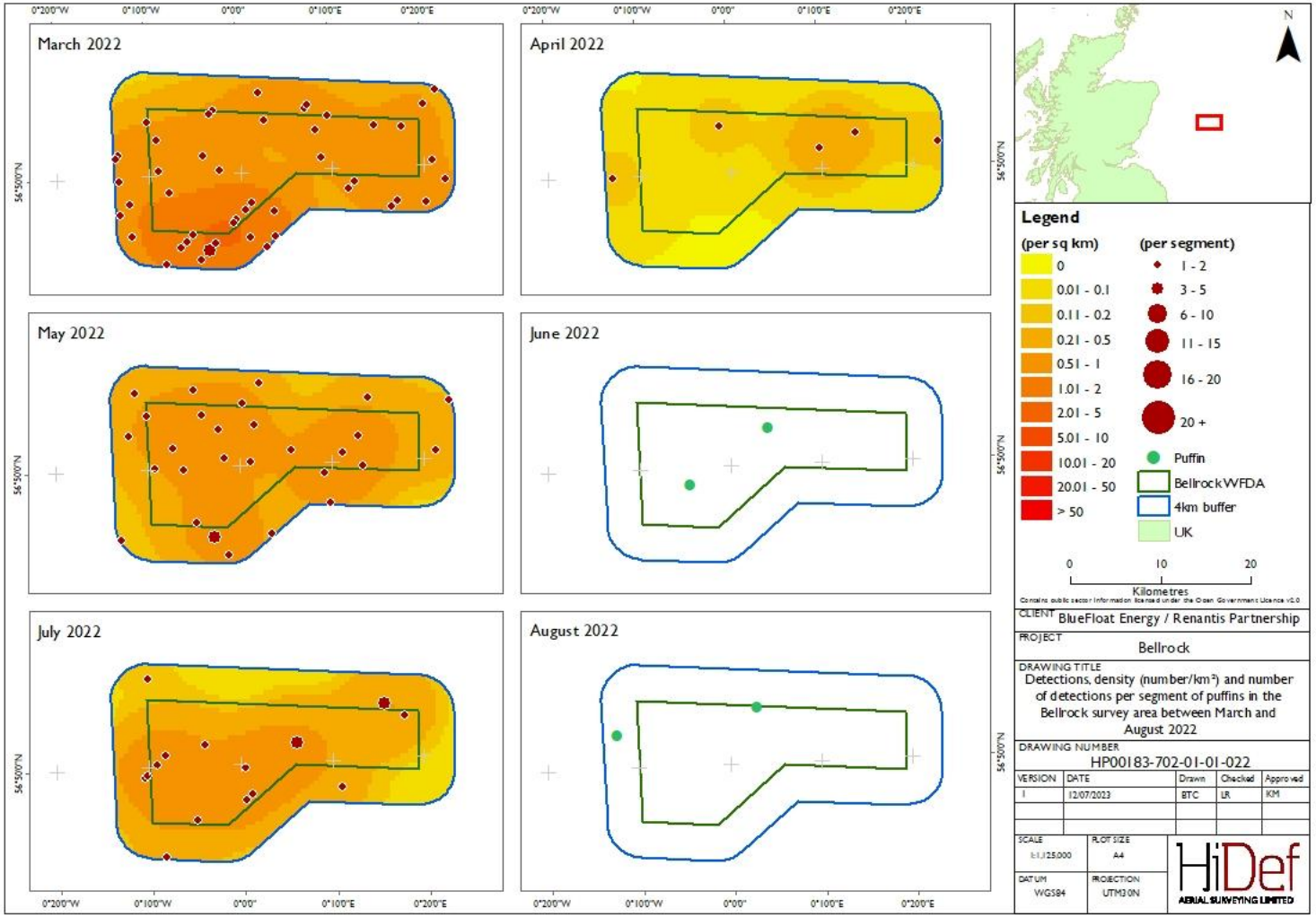


Plate 3.21: Detections, Density (Number/km²) and Number of Detections per Segment of Puffins in the Bellrock Offshore Aerial Survey Area Between September 2022 and February 2023

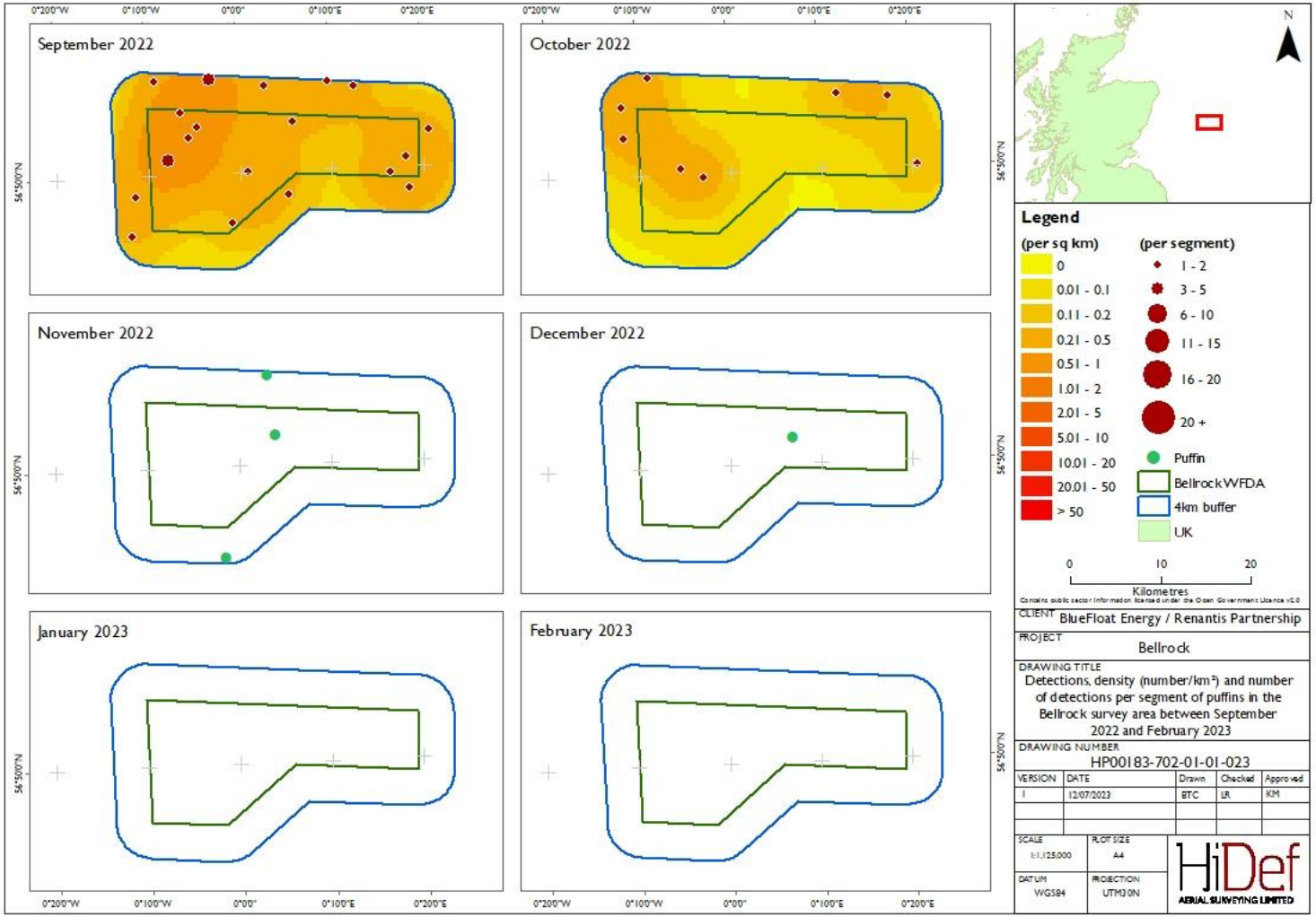


Plate 3.22: Detections of Puffins in the Bellrock Offshore Aerial Survey Area Between March and August 2023

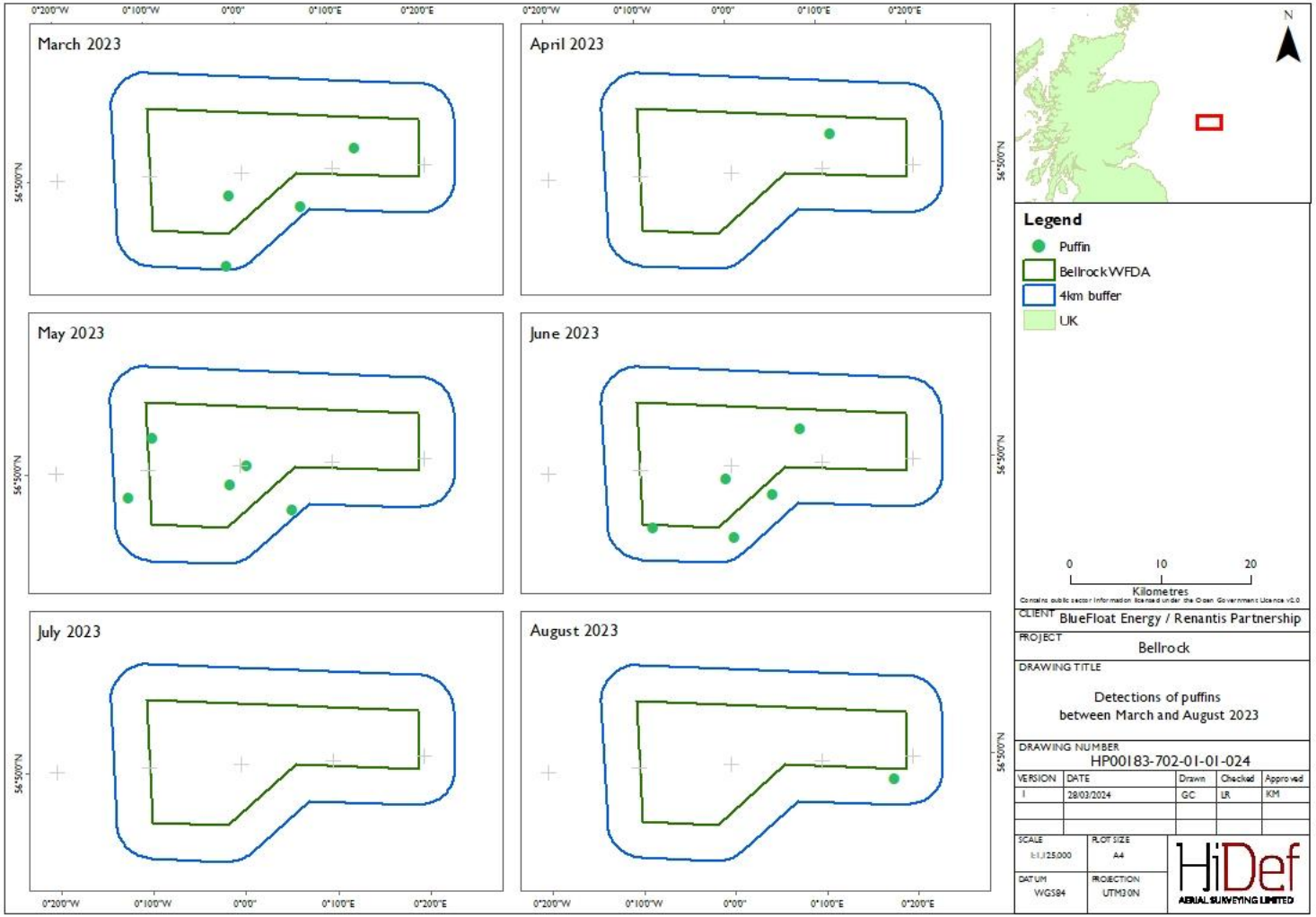
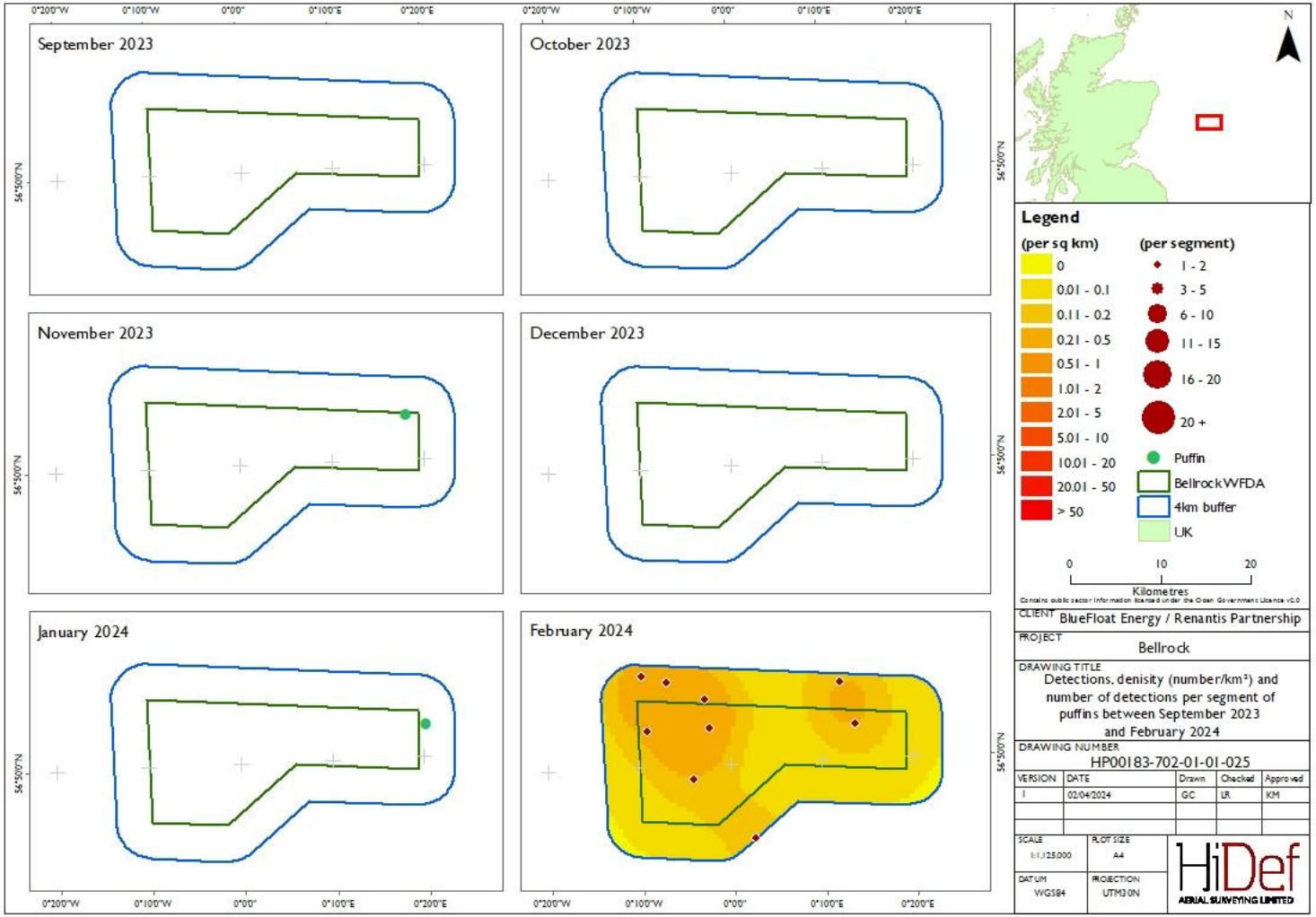


Plate 3.23: Detections of Puffins in the Bellrock Offshore Aerial Survey Area Between September 2023 and February 2024



3.9 Fulmar

73. Northern fulmar *Fulmarus glacialis* was recorded in all 24 surveys of the DAS programme (**Table 3.21**). Based upon the data as apportioned to species, the estimated mean densities of fulmar across the Bellrock OASA range from 0.03 (95% CI 0.00 – 0.07) birds/km^2 in June 2023, up to 6.40 (95% CI 1.45 – 12.70) birds/km^2 in October 2023 (**Table 3.21**). This extrapolates to mean abundance estimates of 19 (95% CI 0 – 48) birds to 4,212 (95% CI 951 – 8,357) birds.

74. The highest densities within the Bellrock OASA tended to occur during the non-breeding periods from the autumn passage period (mid Sept – Oct) through to the return spring passage period (Dec – Mar) (**Plate 3.24**). Densities in the October 2023 survey (at 8.57 (95% CI 1.57 – 18.33) birds/km^2 and 6.40 (95% CI 1.45 – 12.70) birds/km^2 within the Bellrock WFDA plus 2 km buffer and Bellrock OASA, respectively) were an order of magnitude higher than in any of the other surveys (**Plate 3.24, Table 3.21**). Densities for the Bellrock WFDA plus 2 km buffer tended to be similar to those for the wider Bellrock OASA.

75. There was no clear consistent pattern in the distribution of fulmars within the Bellrock OASA during the 24-month period (**Plate 3.25** to **Plate 3.28**).

76. The majority of fulmar recorded during the surveys were in flight (58% overall), with between 8 – 89% of fulmar recorded as being in flight in any single survey where a total of 10 or more fulmar were recorded (**Table 3.22**).

77. No data on age classes of fulmar were available from the DAS data.

Plate 3.24: Fulmar Apportioned Density Estimates, in the Bellrock Offshore Aerial Survey Area, Between March 2022 and February 2024. Error Bars Represent The 95% Lower and Upper Confidence Limits

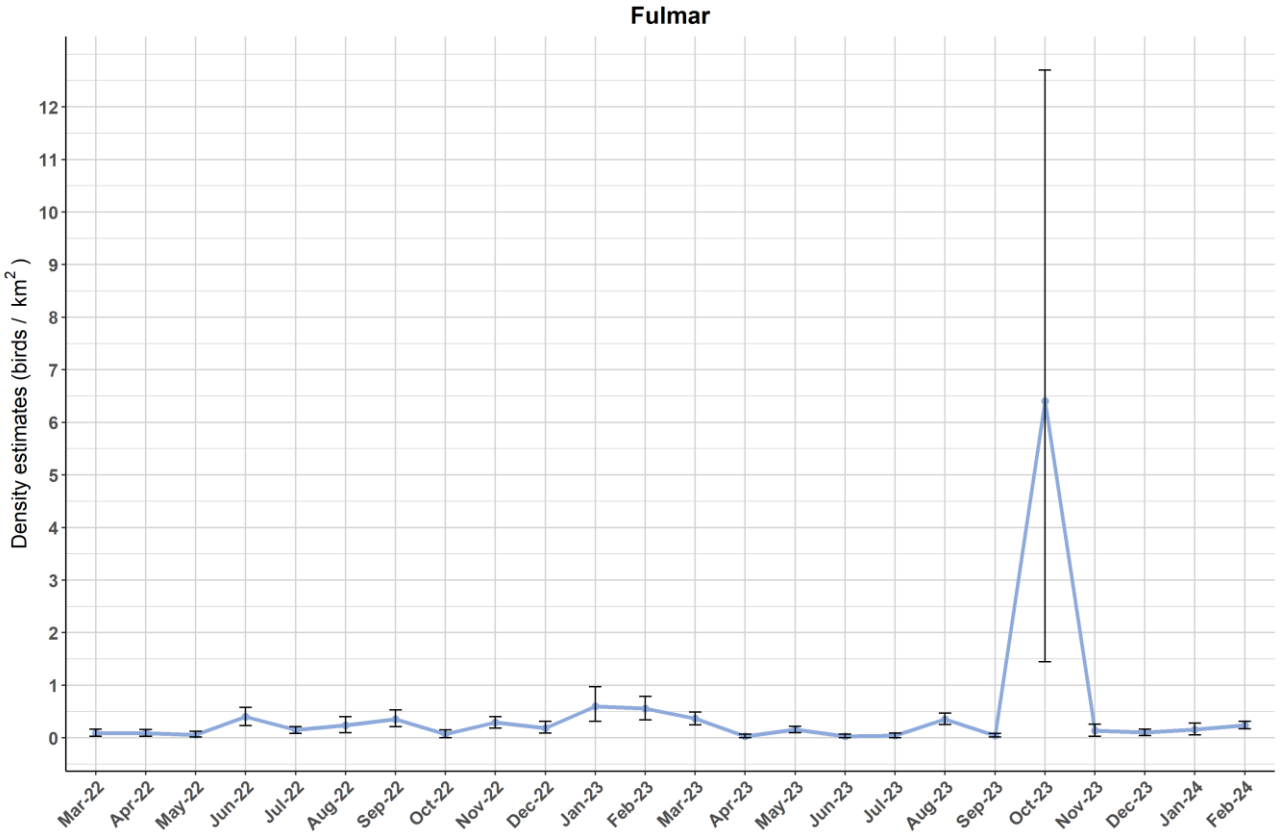


Table 3.21: Monthly Density and Abundance Estimates of All Fulmars Across the Bellrock Wind Farm Development Area plus 2 km, and Across the Bellrock Wind Farm Development Area plus 4 km (Bellrock Offshore Aerial Survey Area) Using Design-based Analysis

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Bellrock WFDA + 2 km								
Mar-22	0.04	0.00	0.10	19	0	46	12	64.04%
Apr-22	0.10	0.02	0.23	47	9	105	25	53.24%
May-22	0.08	0.02	0.18	39	9	80	19	49.17%
Jun-22	0.36	0.20	0.54	164	92	247	40	24.17%
Jul-22	0.19	0.10	0.28	87	46	128	21	24.05%
Aug-22	0.22	0.08	0.40	99	35	183	40	40.58%
Sep-22	0.36	0.22	0.50	164	102	230	34	20.71%
Oct-22	0.08	0.00	0.20	38	0	89	23	62.15%

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Nov-22	0.30	0.17	0.43	136	79	195	30	22.16%
Dec-22	0.24	0.14	0.38	112	64	174	29	25.52%
Jan-23	0.63	0.30	1.13	289	135	516	98	34.00%
Feb-23	0.59	0.31	0.90	271	141	411	69	25.63%
Mar-23	0.42	0.24	0.60	192	110	276	44	23.09%
Apr-23	0.04	0.00	0.10	19	0	46	12	63.57%
May-23	0.15	0.06	0.25	67	27	116	23	34.01%
Jun-23	0.02	0.00	0.06	10	0	29	9	96.86%
Jul-23	0.06	0.00	0.13	29	0	58	14	49.51%
Aug-23	0.44	0.31	0.60	202	141	273	33	16.48%
Sep-23	0.02	0.00	0.06	9	0	29	9	92.93%
Oct-23	8.57	1.57	18.33	3,914	717	8,368	2,014	51.46%
Nov-23	0.17	0.02	0.35	76	10	161	38	49.25%
Dec-23	0.11	0.02	0.21	49	10	94	21	42.59%
Jan-24	0.21	0.08	0.38	97	37	174	35	35.98%
Feb-24	0.29	0.20	0.41	134	92	185	24	18.28%
Bellrock WFDA + 4 km								
Mar-22	0.09	0.03	0.16	60	19	107	22	36.12%
Apr-22	0.09	0.03	0.16	58	18	106	23	40.66%
May-22	0.06	0.01	0.12	39	9	80	19	50.47%
Jun-22	0.40	0.23	0.58	263	153	382	59	22.28%
Jul-22	0.15	0.08	0.22	98	54	142	23	23.19%
Aug-22	0.24	0.10	0.40	157	66	265	51	32.26%
Sep-22	0.35	0.21	0.53	233	138	349	54	23.22%
Oct-22	0.07	0.00	0.15	48	0	98	25	51.72%
Nov-22	0.30	0.18	0.41	195	120	267	37	19.20%
Dec-22	0.19	0.09	0.31	123	59	206	38	31.10%

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Jan-23	0.60	0.31	0.97	394	206	638	113	28.65%
Feb-23	0.56	0.34	0.79	366	226	521	75	20.56%
Mar-23	0.37	0.25	0.49	244	163	325	42	17.20%
Apr-23	0.03	0.00	0.07	20	0	46	12	62.13%
May-23	0.16	0.10	0.22	106	66	144	20	18.72%
Jun-23	0.03	0.00	0.07	19	0	48	13	68.71%
Jul-23	0.04	0.00	0.09	29	0	58	14	48.64%
Aug-23	0.35	0.25	0.47	233	165	310	37	16.08%
Sep-23	0.04	0.01	0.09	29	9	57	13	45.04%
Oct-23	6.40	1.45	12.70	4,212	951	8,357	1,910	45.34%
Nov-23	0.13	0.03	0.26	89	19	170	37	42.31%
Dec-23	0.10	0.04	0.17	66	27	110	22	32.53%
Jan-24	0.16	0.06	0.28	106	38	184	37	34.56%
Feb-24	0.24	0.18	0.32	156	115	209	24	15.38%

Table 3.22: Percentage of Fulmars Flying per Survey Across the Bellrock Offshore Aerial Survey Area in Survey Years One and Two

Year	Season		Breeding					Autumn Passage		Non-breeding	Spring Passage		
Year 1	*Month*	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
	Flying %	60	50	75	63	60	44	8	60	40	73	59	89
Year 2	*Month*	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
	Flying %	56	100	64	100	100	42	33	59	78	63	73	47

Plate 3.25: Detections, Density (Number/km²) and Number of Detections per Segment of Fulmars in the Bellrock Offshore Aerial Survey Area Between March and August 2022

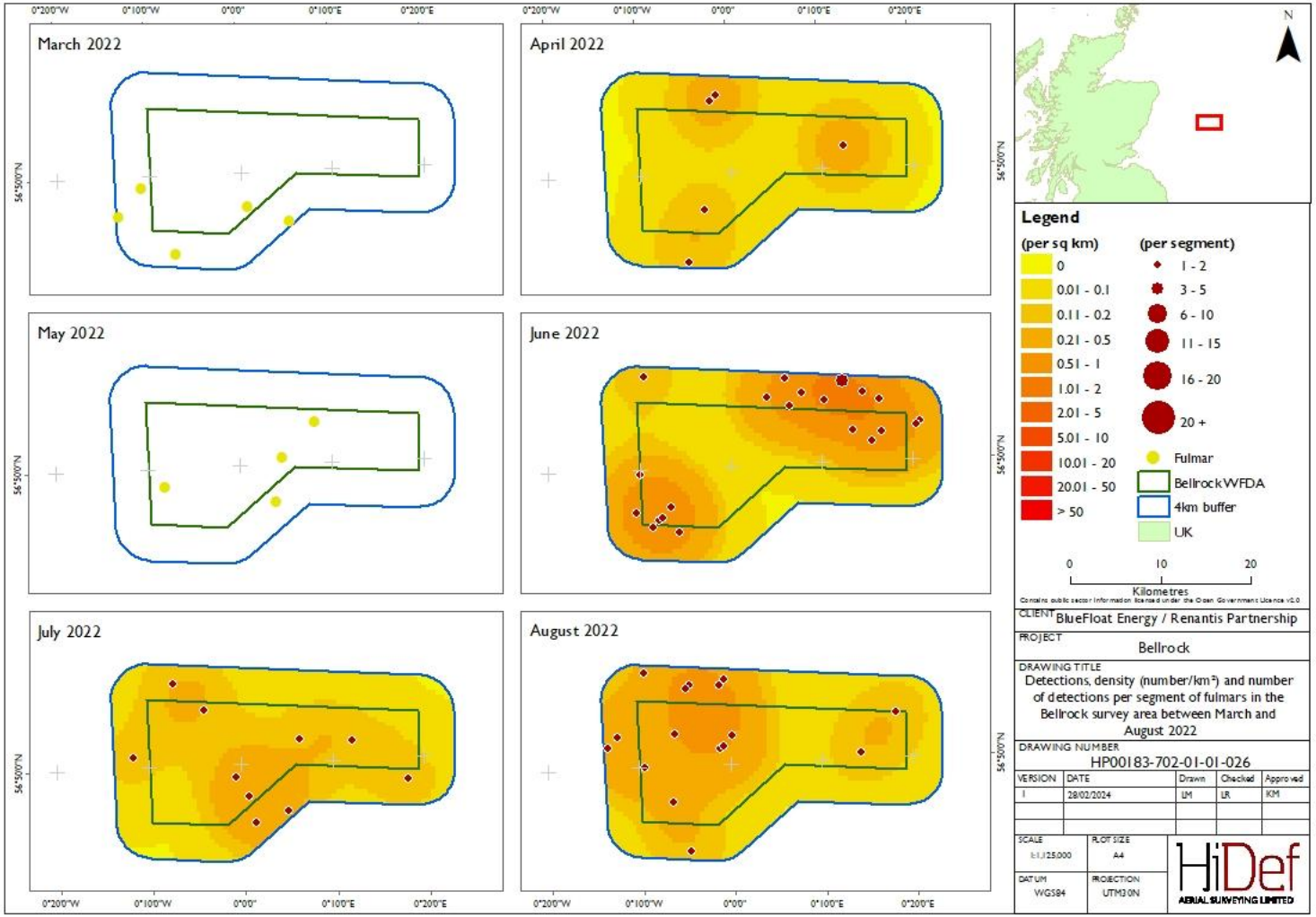


Plate 3.26: Detections, Density (Number/km²) and Number of Detections per Segment of Fulmars in the Bellrock Offshore Aerial Survey Area Between September 2022 and February 2023

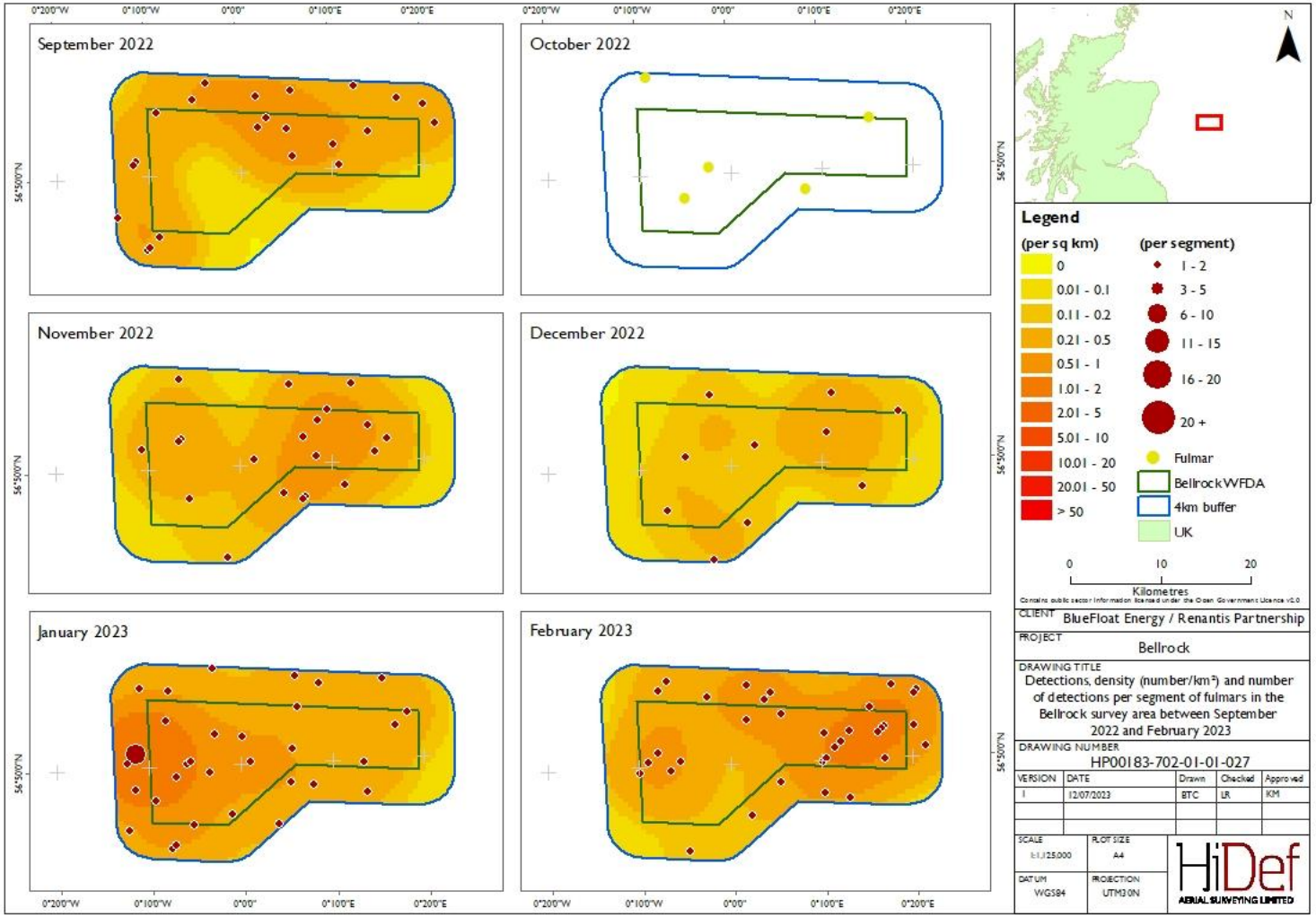


Plate 3.27: Detections, Density (Number/km²) and Number of Detections Per Segment of Fulmars in the Bellrock Offshore Aerial Survey Area Between March and August 2023

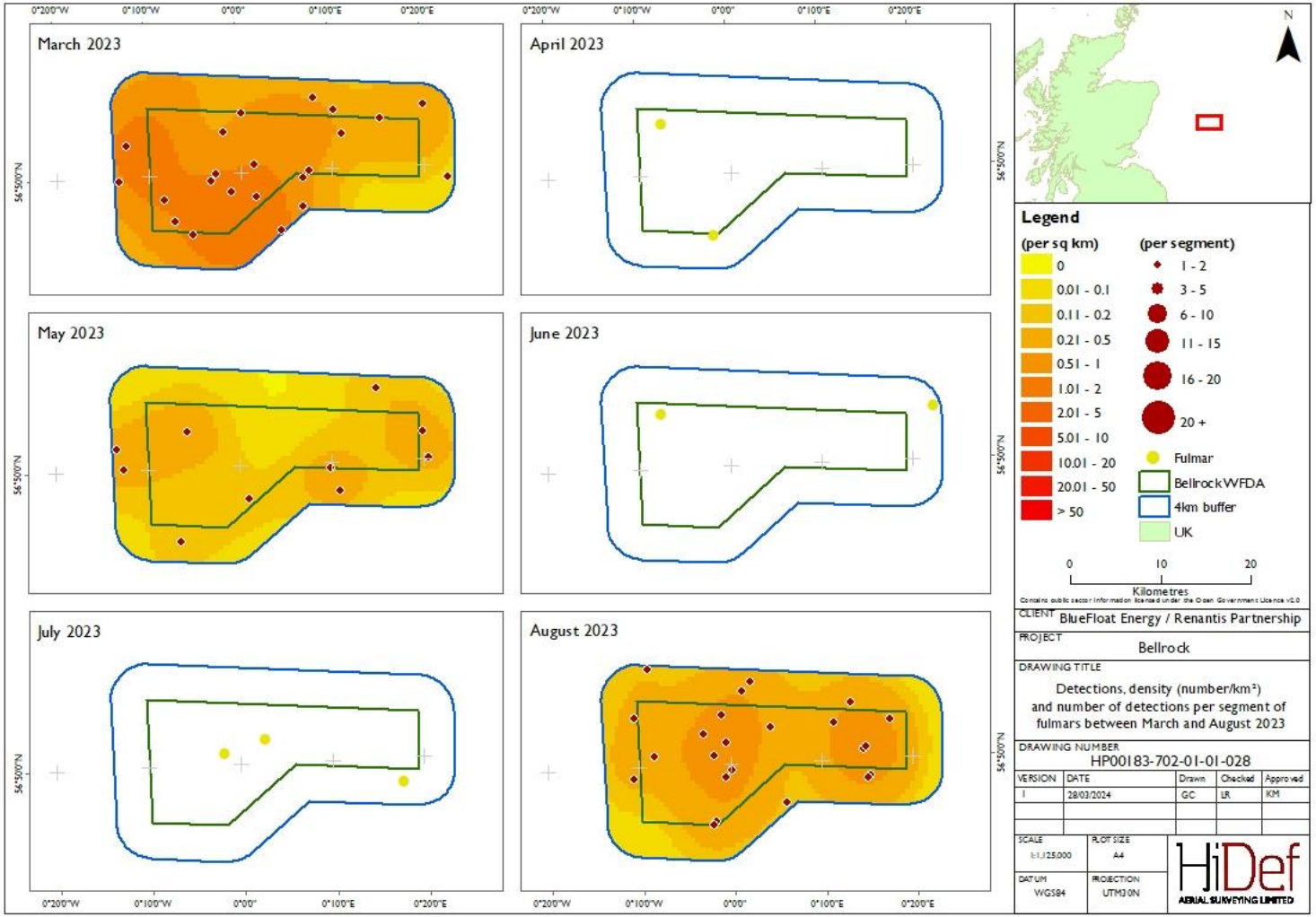
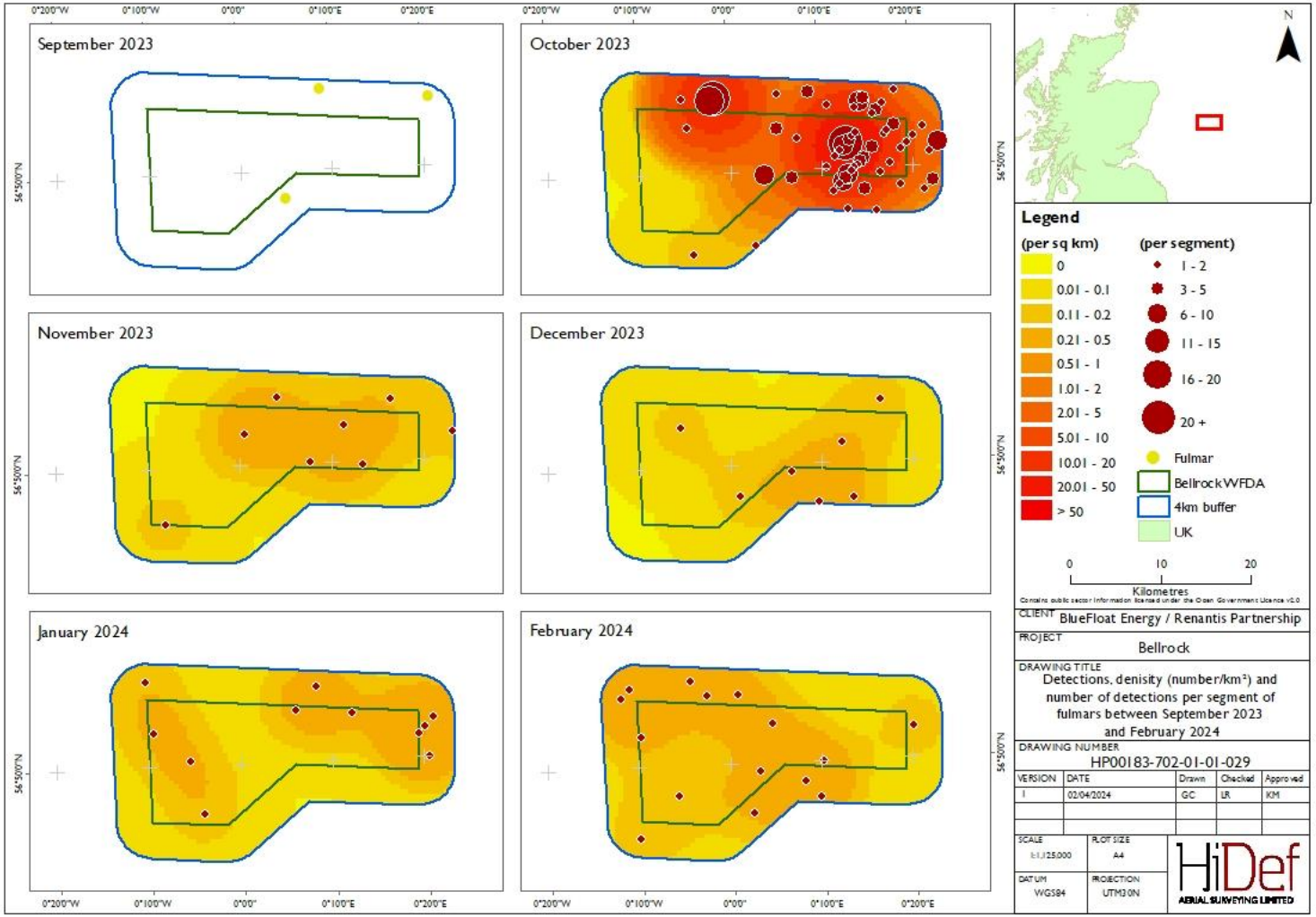


Plate 3.28: Detections, Density (Number/km²) and Number of Detections Per Segment of Fulmars in the Bellrock Offshore Aerial Survey Area Between September 2023 and February 2024



3.10 Gannet

78. Gannets were recorded in 21 of the 24 surveys of the Bellrock OASA. Based upon the data as apportioned to species, the estimated mean densities of gannet across the Bellrock OASA range from 0.00 (95% CI 0 – 0) birds/km^2, as recorded in November 2023, January 2024 and February 2024, up to 0.82 (95% CI 0.25 – 1.59) birds/km^2 in October 2023. This extrapolates to mean abundance estimates for the Bellrock OASA ranging from 0 (95% CI 0 – 0) birds to 541 (95% CI 164 – 1,044) birds (**Table 3.23**).

79. For both survey years, gannet densities were highest from March to October, encompassing the defined breeding period (i.e. mid-March to September – **Table 2.2**) (**Plate 3.29**). Overall, densities during the defined breeding period were higher during survey year one than during survey year two. The scarcity or absence of gannets within the Bellrock OASA from November to February coincides with the period when the vast majority of birds are in more southerly wintering areas (Furness, 2015). The peaks recorded in March/April and October are most likely to represent spring and autumn passage movements, with the (likely) spring passage peak being most marked in year one but the autumn passage peak being most marked in year two.

80. For a given survey, densities for the Bellrock WFDA plus 2 km buffer were generally similar to those for the wider Bellrock OASA. However, the aggregated distributions that characterised several of the surveys resulted in some variability in this regard but there was no consistent trend for densities to be higher or lower in the Bellrock WFDA plus 2 km buffer (**Table 3.23**). There was no clearly discernible pattern for high densities to be consistently associated with particular areas within the Bellrock OASA (**Plate 3.30**).

81. Overall, 50% of gannets recorded in the Bellrock OASA during the DAS were in flight, with this ranging from 11 – 100% in any single survey in which a total of 10 or more gannets were recorded (**Table 3.23**). The percentage of gannets recorded in flight was generally higher during year two of the DAS programme, with this difference apparent from March to September. However, whilst the difference is consistent over the March to September period, sample sizes were often small (<10 in seven of the 14 surveys – HiDef, 2024), limiting the reliance that can be placed upon this apparent difference.

82. Overall, approximately 98% of gannet that could be aged during the DAS were assigned as adults (on the basis of plumage) (**Table 3.25**). There was no evidence of seasonal variation, with the percentage of birds classed as adults ranging from 97 – 98% across the three defined periods (**Table 3.25**). Over 90% of all gannets recorded during the DAS were assigned an age category.

Plate 3.29: Gannet Apportioned Density Estimates, in the Bellrock Offshore Aerial Survey Area, Between March 2022 and February 2024. Error Bars Represent the 95% Lower and Upper Confidence Limits

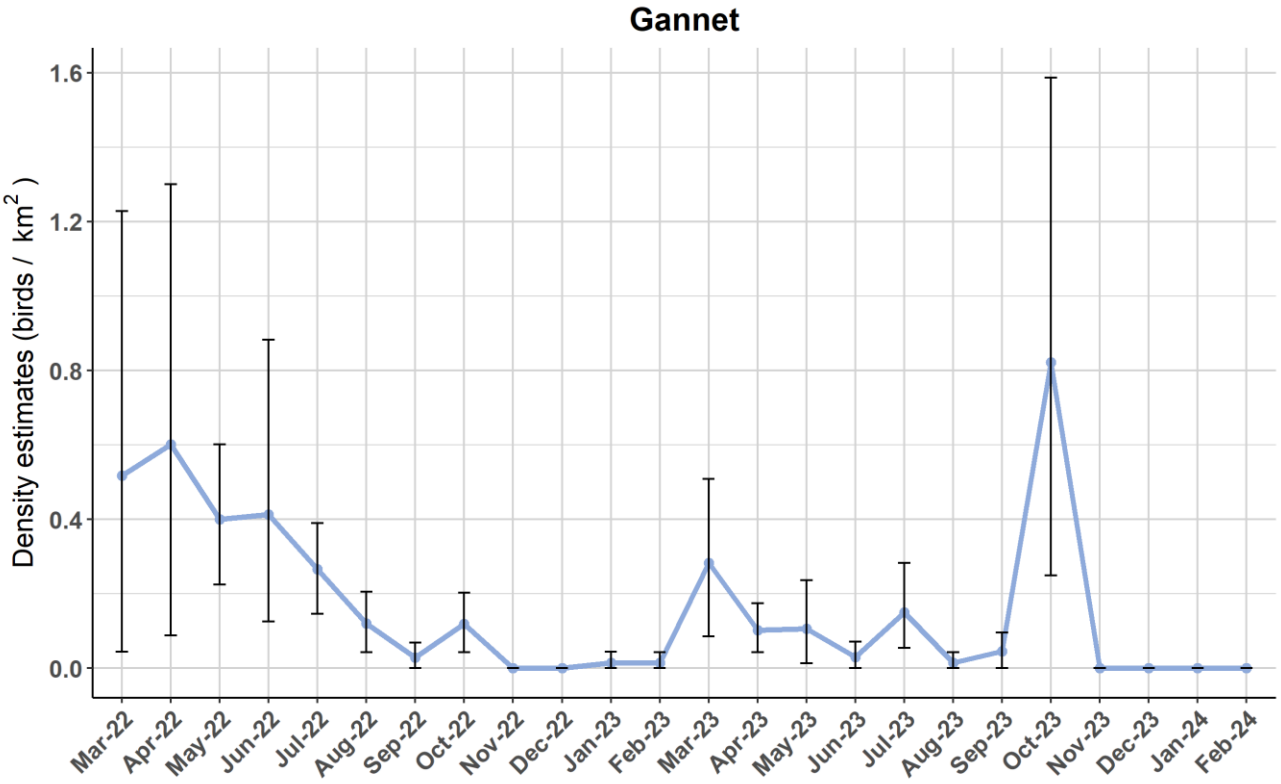


Table 3.23: Monthly Density and Abundance Estimates of All Gannets Across the Bellrock Wind Farm Development Area Plus 2 km, and Across the Bellrock Wind Farm Development Area Plus 4 km (Bellrock Offshore Aerial Survey Area) Using Design-Based Analysis

Month	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Bellrock WFDA + 2 km								
Mar-22	0.36	0.04	0.82	163	17	374	99	60.45%
Apr-22	0.79	0.08	1.82	361	36	828	203	56.08%
May-22	0.41	0.20	0.61	185	91	279	48	25.87%
Jun-22	0.19	0.08	0.31	88	38	141	25	28.84%
Jul-22	0.29	0.19	0.41	134	85	185	25	18.88%
Aug-22	0.09	0.02	0.15	39	9	67	15	37.31%
Sep-22	0.04	0.00	0.10	19	0	44	11	57.02%
Oct-22	0.11	0.02	0.21	48	9	96	24	49.79%

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00%
Dec-22	0.04	0.00	0.10	19	0	45	12	60.88%
Jan-23	0.02	0.00	0.06	10	0	29	9	93.39%
Feb-23	0.02	0.00	0.06	10	0	29	9	91.47%
Mar-23	0.34	0.10	0.63	156	45	290	63	40.77%
Apr-23	0.15	0.06	0.24	67	28	112	21	31.27%
May-23	0.13	0.02	0.30	57	9	135	36	63.12%
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00%
Jul-23	0.15	0.04	0.30	68	17	137	32	47.34%
Aug-23	0.02	0.00	0.06	10	0	29	9	89.85%
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00%
Oct-23	0.87	0.18	1.97	399	81	897	221	55.46%
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00%
Dec-23	0.02	0.00	0.06	10	0	29	9	93.22%
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00%
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00%
Bellrock WFDA + 4 km								
Mar-22	0.52	0.04	1.23	340	29	808	205	60.18%
Apr-22	0.60	0.09	1.30	395	58	855	205	51.90%
May-22	0.40	0.22	0.60	263	148	396	60	23.00%
Jun-22	0.41	0.13	0.88	272	83	581	134	49.38%
Jul-22	0.27	0.15	0.39	175	97	256	40	22.71%
Aug-22	0.12	0.04	0.21	79	28	136	28	35.13%
Sep-22	0.03	0.00	0.07	19	0	45	12	60.61%
Oct-22	0.12	0.04	0.20	78	28	134	27	34.55%
Nov-22	0.01	0.00	0.04	9	0	29	10	101.86%
Dec-22	0.06	0.01	0.13	40	9	86	21	52.40%

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Jan-23	0.01	0.00	0.04	10	0	29	9	95.22%
Feb-23	0.01	0.00	0.04	10	0	29	9	93.27%
Mar-23	0.28	0.09	0.51	186	57	335	70	37.73%
Apr-23	0.10	0.04	0.17	67	28	115	21	31.41%
May-23	0.11	0.01	0.24	70	9	155	40	57.07%
Jun-23	0.03	0.00	0.07	20	0	47	12	58.28%
Jul-23	0.15	0.05	0.28	99	36	186	40	40.19%
Aug-23	0.02	0.00	0.04	10	0	29	9	90.48%
Sep-23	0.05	0.00	0.10	30	0	63	15	50.99%
Oct-23	0.82	0.25	1.59	541	164	1,044	233	43.11%
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00%
Dec-23	0.01	0.00	0.04	9	0	28	9	96.58%
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00%
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00%

Table 3.24: Percentage of Gannets Flying per Survey Across the Bellrock Offshore Aerial Survey Area in Survey Years One and Two

Year	Season		Breeding						Autumn Passage		Spring Passage		
Year 1	*Month*	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
	Flying %	11	15	63	62	22	38	0	88	0	100	100	100
Year 2	*Month*	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
	Flying %	58	71	100	100	100	100	100	64	N/A	100	N/A	N/A

Table 3.25: Occurrence of Different Gannet Age Classes (As Determined from Plumage Characteristics) By Seasonal Period

Seasonal Period	Number aged as:		Number of unaged birds	Total number of birds recorded	Percentage of adults (from aged sample only)	Percentage of birds for which age class determined
	Adults	Sub-adults				
Breeding Season	180	5	23	208	97.3%	88.9%
Autumn Passage	63	1	1	65	98.4%	98.5%
Spring Passage	45	1	15	61	97.8%	75.4%
Total[1]	**250**	**6**	**24**	**280**	**97.7%**	**91.4%**

Notes:

[1] Total numbers differ slightly from the numbers summed across seasons because the records from the March surveys contribute to both the spring passage and breeding periods.

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Plate 3.30: Density of Gannets (Number/km²) and Number of Detections per Segment in the Bellrock Offshore Aerial Survey Area Between March and August 2022

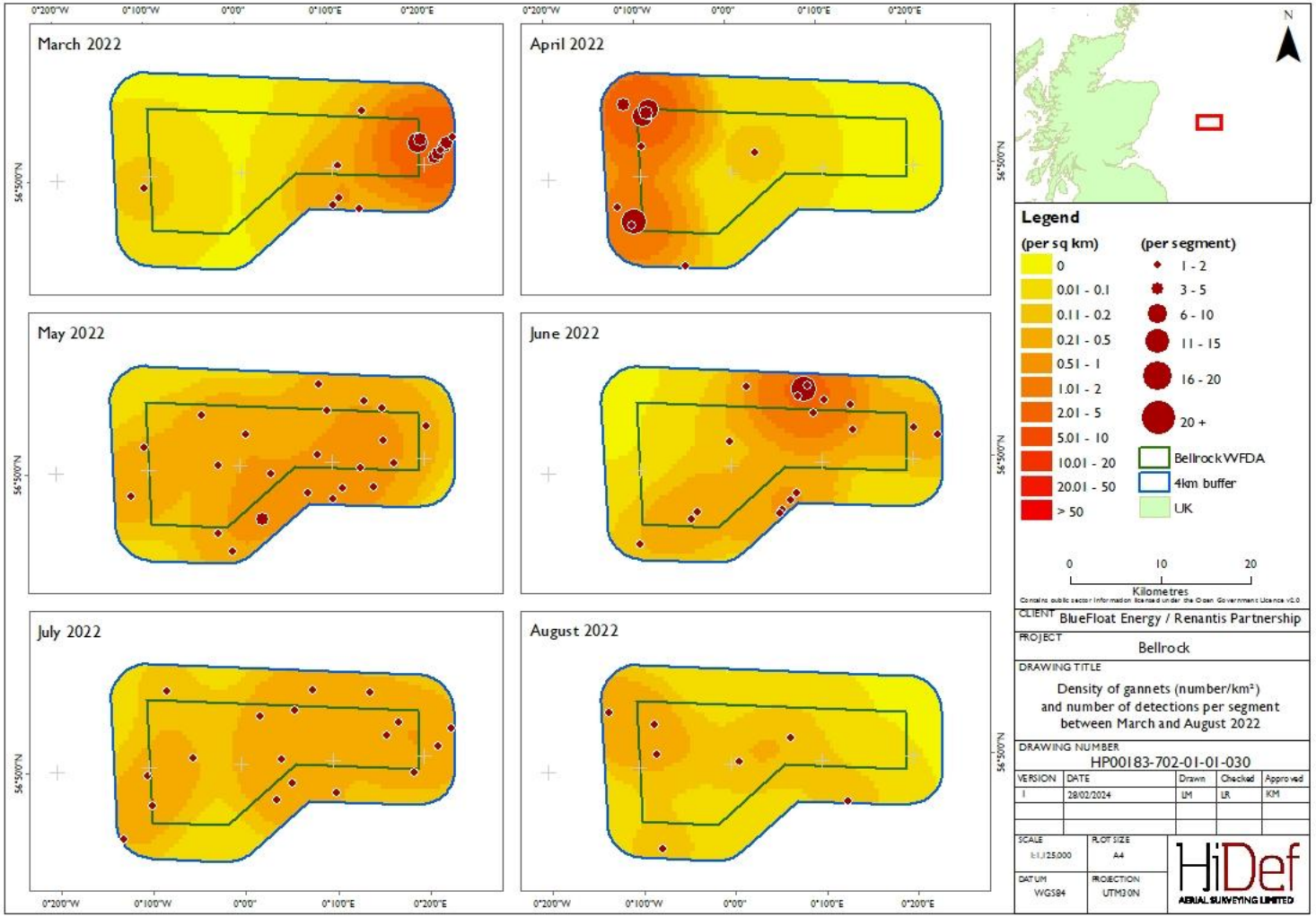


Plate 3.31: Detections, Density (Number/km²) and Number of Detections per Segment of Gannets in the Bellrock Offshore Aerial Survey Area Between September 2022 and February 2023

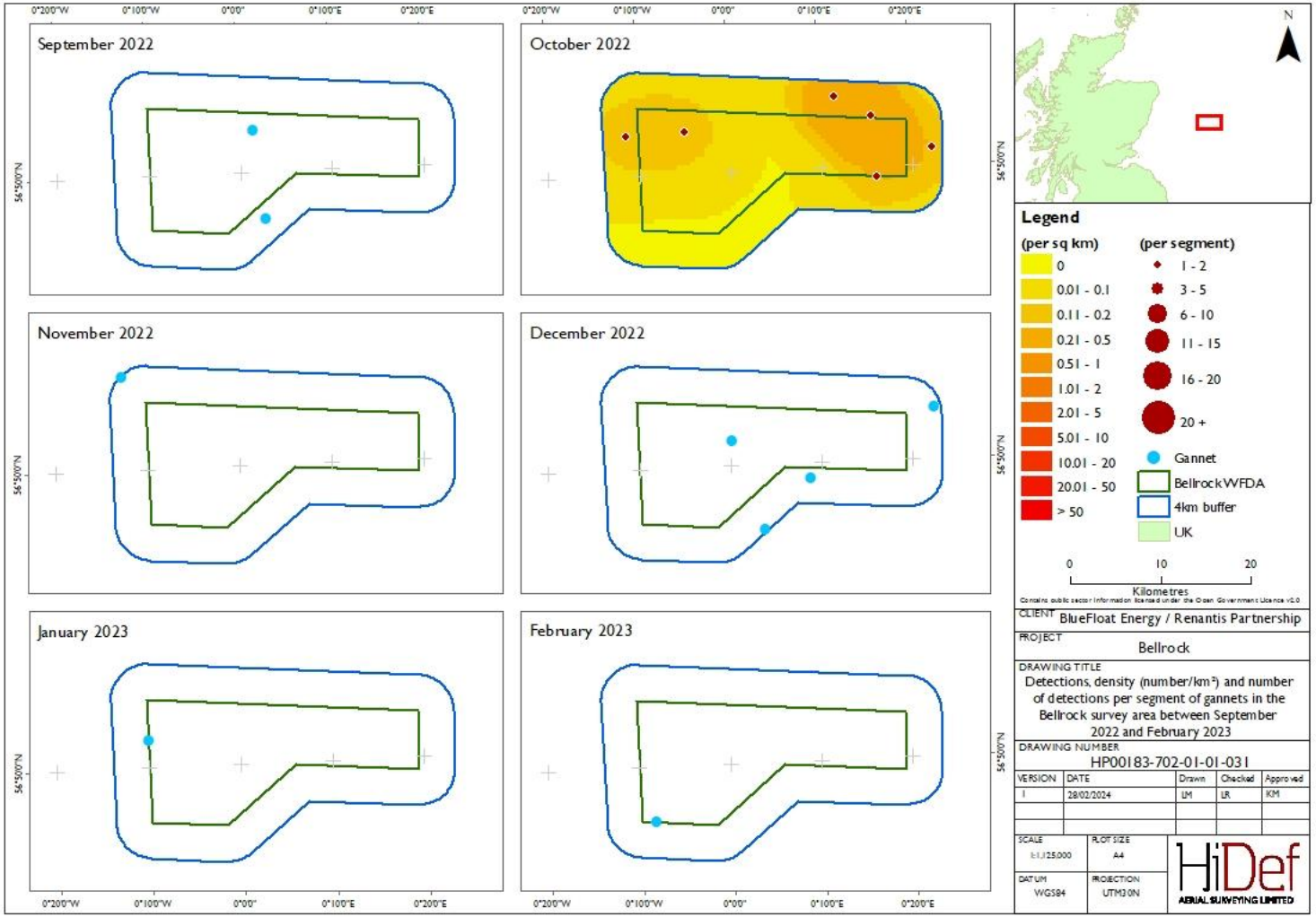


Plate 3.32: Detections, Density of Gannets (Number/km²) and Number of Detections per Segment in the Bellrock Offshore Aerial Survey Area Between March and August 2023

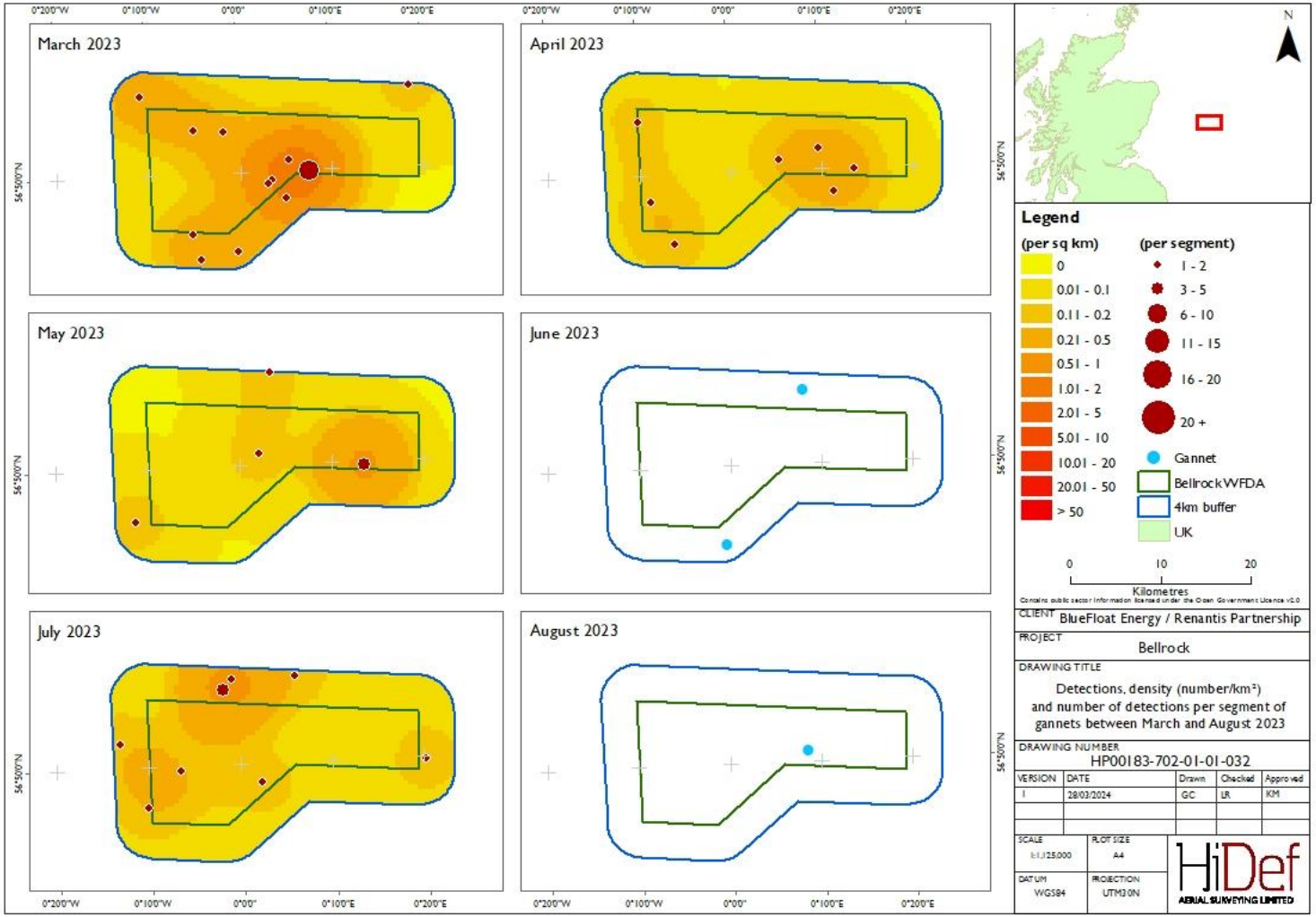
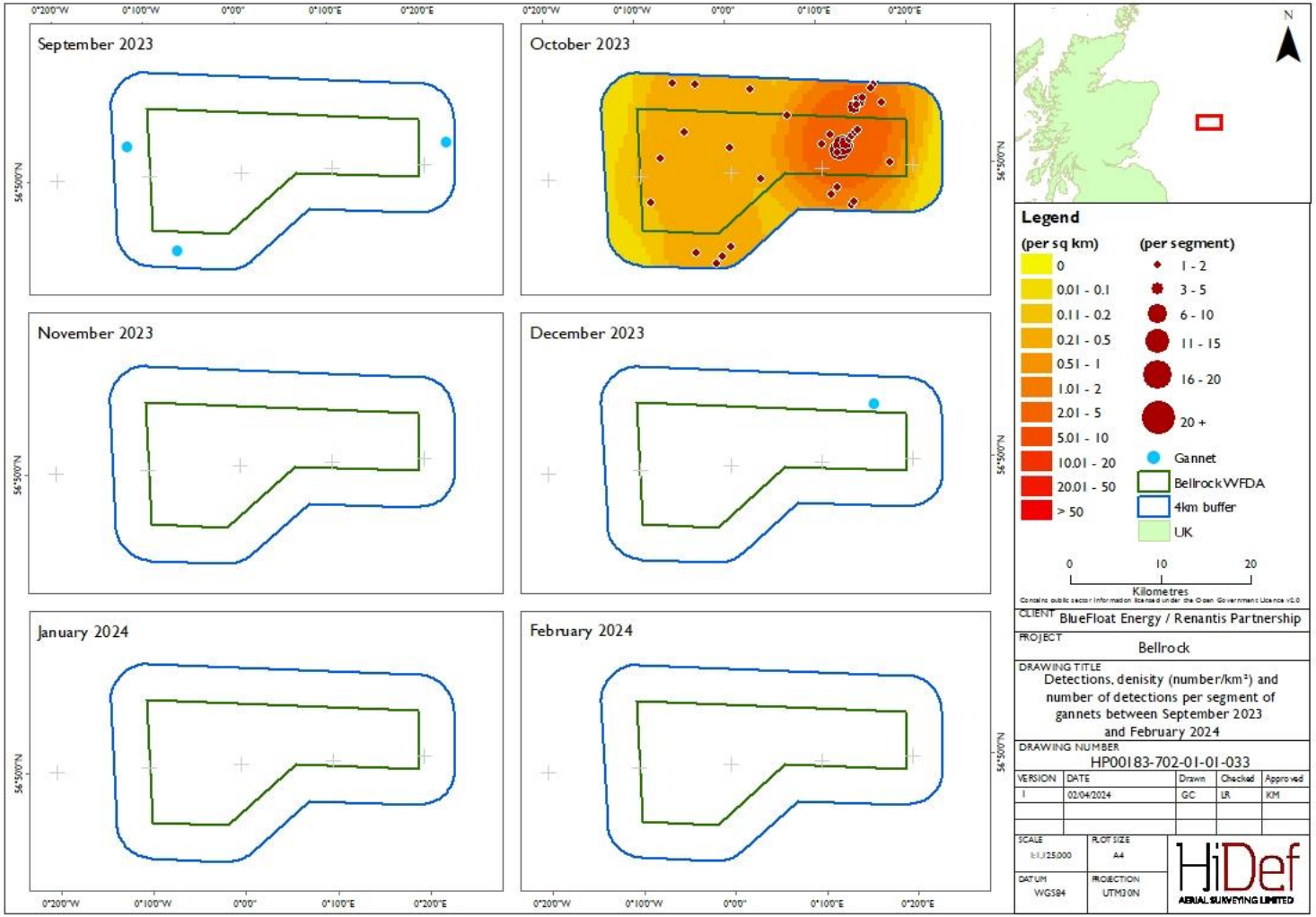


Plate 3.33: Detections, Density (Number/km²) and Number of Detections per Segment of Gannets in the Bellrock Offshore Aerial Survey Area Between September 2023 and February 2024



3.11 Other Species

83. Of the 16 species recorded within the Bellrock OASA (**Table 3.1**) during the two-year DAS programme, seven were recorded in only one to two of the 24 surveys. These species were: Eurasian oystercatcher *Haemotopus ostralegus*, Eurasian curlew *Numenius arquata*, common gull *Larus canus*, Arctic skua *Stercorarius parasiticus*, little auk *Alle alle*, red-throated diver *Gavia stellata*, and European storm petrel *Hydrobates pelagicus*.

84. A total of five oystercatcher were recorded in one survey, August 2023. All five birds were recorded in the south of the Bellrock OASA, between the 2 km and 4 km buffers. All five were recorded as flying.

85. A single curlew was recorded in August 2022. The individual was located in the south of the Bellrock OASA between the 2 km and 4 km buffers. The bird was recorded as flying.

86. Common gulls were recorded in two surveys – February and July 2023 – with a total of four birds. The peak count being three in July 2023. All observations of common gull were outside of the Bellrock WFDA. In February 2023 the single common gull was observed between the 2 km and 4 km buffers in the northeast of the Bellrock OASA, with the three in July found south of the centre of the Bellrock WFDA just within the 2 km buffer. All four birds were recorded flying.

87. A single Arctic skua was recorded in June 2022. The individual was located in the eastern half of the Bellrock OASA, inside the Bellrock WFDA. The bird was recorded as flying.

88. A single little auk was recorded in January 2023. The individual was located to the west, situated between the Bellrock WFDA and the 2 km buffer. The bird was sitting on the water.

89. A single red-throated diver was recorded in September 2023. The individual was located in the northwest of the Bellrock WFDA. The bird was recorded as flying.

90. A single European storm petrel was recorded in October 2023. The individual was located between the 2 km and 4 km buffers in the south of the Bellrock OASA. The bird was recorded flying.

91. The locations of the records of these seven species are presented in HiDef (2024).

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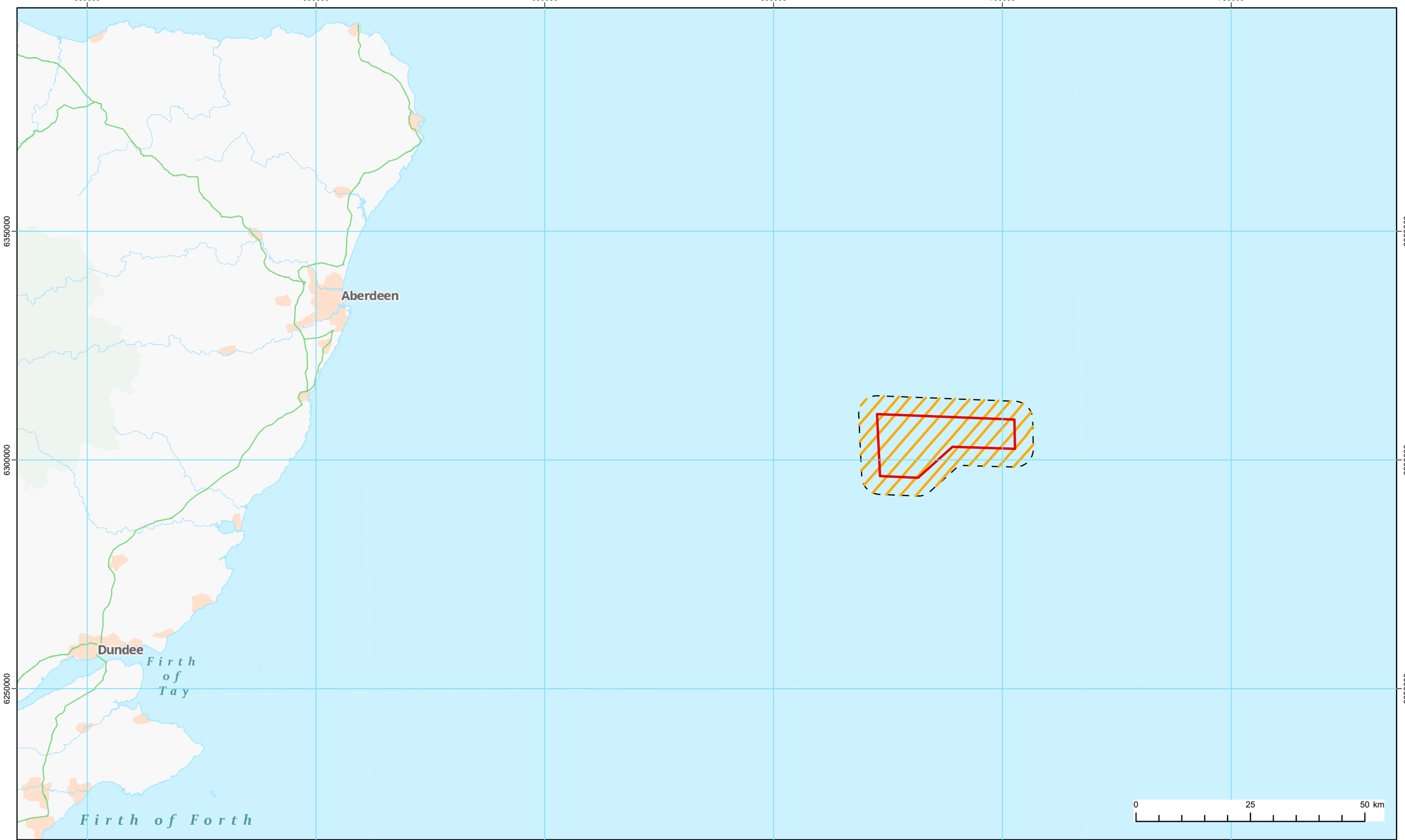
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Annex A: Figures

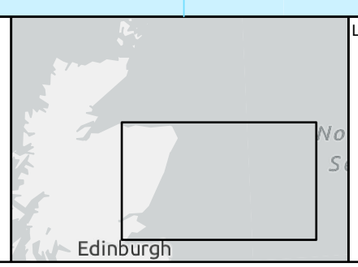
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Bellrock



Legend:
- Bellrock Wind Farm Development Area
- Bellrock Offshore Aerial Survey Area
- Digital Aerial Survey Transects

REV	DATE	STATUS	DRW	CHK	APR
1	31/03/2026	Final	DL	SA	BMcG

Coordinate System: WGS 1984 UTM Zone 30N

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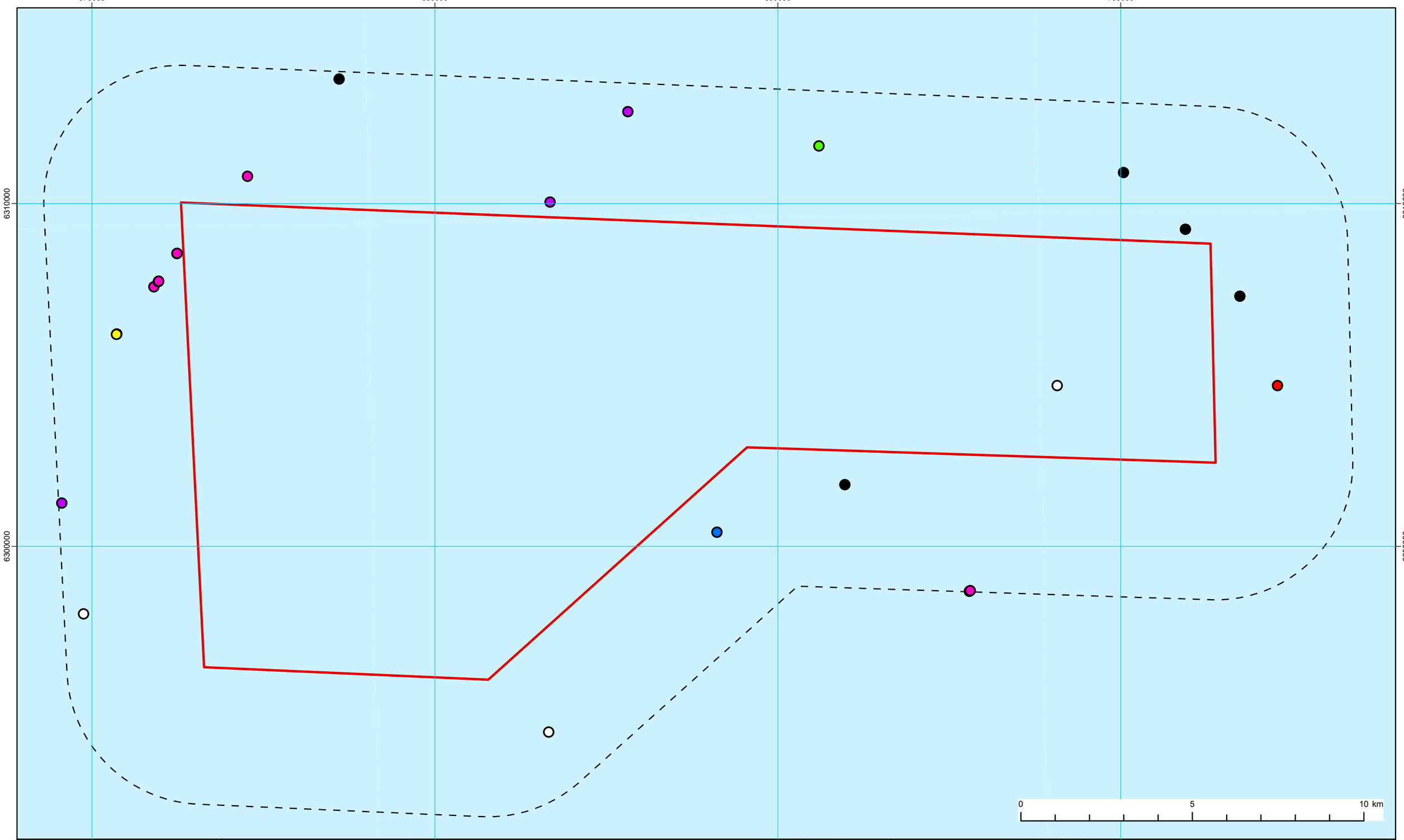
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Project:
Bellrock Wind Farm Development Area (WFDA)

Report:
Appendix 10.1: Digitial Aerial Survey Baseline Report

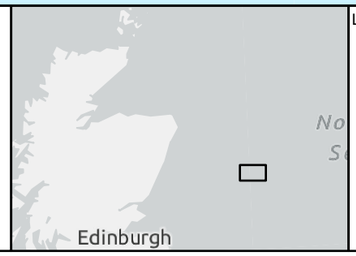
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Figure 10.1.1



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Bellrock



Legend:

- Bellrock Wind Farm Development Area
- Bellrock Offshore Aerial Survey Area

Survey Month

- November 2022
- December 2022
- January 2023
- March 2023
- November 2023
- December 2023
- January 2024
- Febuary 2024

REV	DATE	STATUS	DRW	CHK	APR
1	31/03/2026	Final	DL	SA	BMcG

Coordinate System: WGS 1984 UTM Zone 30N

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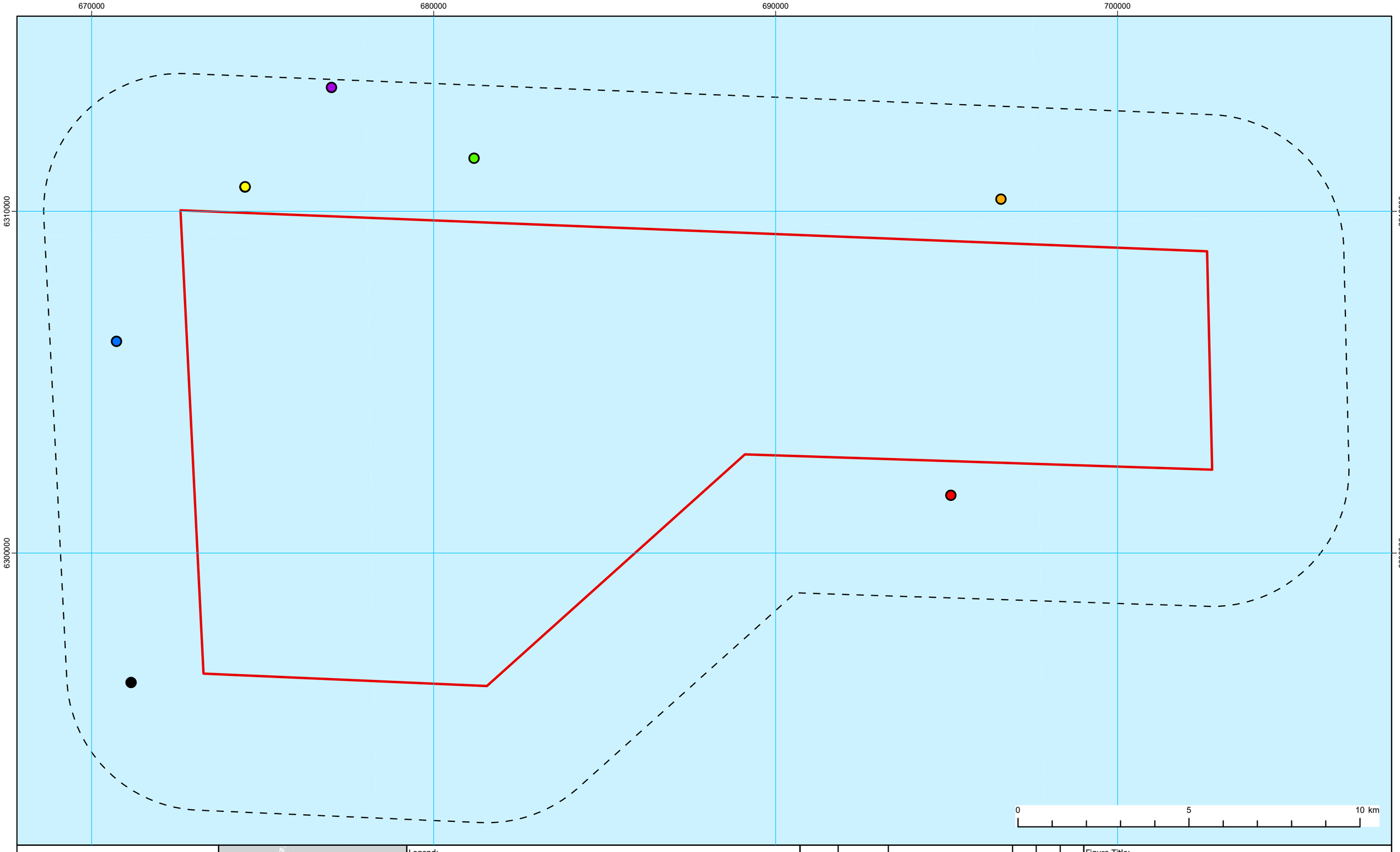
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Project:
Bellrock Wind Farm Development Area (WFDA)

Report:
Appendix 10.1: Digitial Aerial Survey Baseline Report

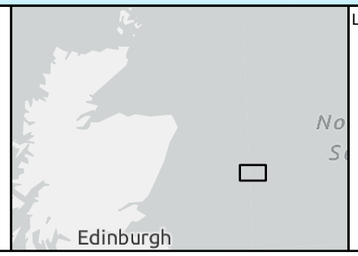
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Figure 10.1.2



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Bellrock



Legend:

- Bellrock Wind Farm Development Area
- Bellrock Offshore Aerial Survey Area

Survey Month

- August 2022
- September 2022
- January 2023
- July 2023
- October 2023
- November 2023
- December 2023

REV	DATE	STATUS	DRW	CHK	APR
1	31/03/2026	Final	DL	SA	BMcG

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Figure Title:

Detections of Herring Gulls Between March 2022 and February 2024

Project:

Bellrock Wind Farm Development Area (WFDA)

Report:

Appendix 10.1: Digitial Aerial Survey Baseline Report

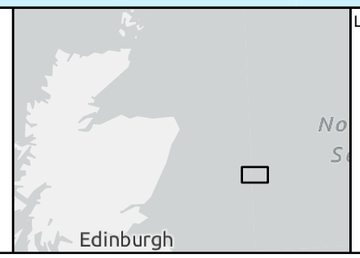
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Bellrock



Legend:
- Bellrock Wind Farm Development Area
- Bellrock Offshore Aerial Survey Area

Survey Month
- July 2022
- September 2022
- August 2023

REV	DATE	STATUS	DRW	CHK	APR
1	31/03/2026	Final	DL	SA	BMcG

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Figure Title:
Detections of Arctic Terns Between March 2022 and February 2024

Project:
Bellrock Wind Farm Development Area (WFDA)

Report:
Appendix 10.1: Digitial Aerial Survey Baseline Report

Drawing No.: RHDV_BEL_CST_REP_0003_052

Figure 10.1.4

Annex B: Density and Abundance Estimates by Survey

This annex contains the density, and abundance estimates for each species observed in the Bellrock Wind Development Area (WFDA) throughout the DAS programme. For each species, there are tables showing estimated density, and the equivalent abundance estimates in the WFDA, WFDA plus 2 km buffer and WFDA plus 4 km buffer (otherwise known as the Offshore Aerial Survey Area (OASA)) areas for 'All birds' of a species and, where relevant, separately for 'Sitting' and 'Flying' birds.

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Bellrock Offshore Wind Farm

Wind Farm Development Area

Environmental Impact Assessment Report - Volume IV

Appendix 10.1: Offshore Ornithology Digital Aerial Survey Baseline Report – Annex B: Density and Abundance Estimates By Survey

Date: April 2026

Document Number: RHDV_BEL_CST_REP_0004_005

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Revision History

Rev.	Prepared By	Checked by	Approved by	Date
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Glossary of Terminology

Term	Definition
Applicant	Bellrock Offshore Wind Farm Limited, the legal entity submitting Section 36 Consent and Marine Licence applications for Bellrock Offshore Wind Farm.
Bellrock Offshore Wind Farm (Bellrock Project)	An offshore wind farm capable of exporting around 1.8 GW of renewable energy to the National Electricity Transmission System. The Wind Farm Development Area is located 120 km east of Stonehaven and will connect to the National Electricity Transmission System at the proposed SSEN Transmission Hurlie substation, west of Stonehaven in Aberdeenshire. The Bellrock Offshore Wind Farm comprises of the following Development Areas: ▪ Wind Farm Development Area; ▪ Offshore Transmission Development Area; and ▪ Onshore Transmission Development Area.
Density	The number of individual birds per unit area (e.g. kilometre square)
SSEN Transmission Hurlie substation	The onshore substation to be developed by SSEN Transmission, which will receive renewable electricity from the Bellrock Project onshore substation and allow supply of renewable electricity from the wind farm to the National Electricity Transmission System.
Wind Farm Development Area	The boundary within which the Wind Farm Infrastructure will be constructed, operated and maintained, and decommissioned.

Glossary of Abbreviations

Term	Definition
CI	Confidence interval
CV	Coefficient of variance
OASA	Offshore Aerial Survey Area
SD	Standard deviation
WFDA	Wind Farm Development Area

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1 Kittiwake

Table 1.1: Density and Abundance Etimates of Sitting Kittiwakes (without apportionment of unidentified gulls) across the Bellrock Wind Farm Development Area (WFDA), WFDA plus 2 km, and WFDA plus 4 km (Offshore Aerial Survey Area, OASA) using Design-Based Analysis

Month	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.13	0.00	0.39	37	0	110	33	89.21
Jun-22	0.63	0.07	1.37	177	19	384	93	52.65
Jul-22	0.07	0.00	0.16	19	0	43	11	58.89
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.04	0.00	0.10	10	0	28	9	87.61
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.03	0.00	0.10	9	0	28	9	91.98
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.03	0.00	0.10	10	0	28	9	88.20
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00
Survey (WFDA + 2 km)								
Mar-22	0.11	0.00	0.27	48	0	125	34	71.34
Apr-22	0.04	0.00	0.10	19	0	47	13	65.37
May-22	0.09	0.00	0.25	40	0	115	37	92.65
Jun-22	0.68	0.24	1.17	310	112	535	110	35.45
Jul-22	0.04	0.00	0.10	20	0	46	12	59.42
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.04	0.00	0.10	19	0	46	12	60.52
Oct-22	0.02	0.00	0.06	9	0	28	8	88.73
Nov-22	0.04	0.00	0.13	19	0	58	19	99.79
Dec-22	0.02	0.00	0.06	9	0	29	9	96.22
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.06	0.00	0.16	29	0	73	20	68.79
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.02	0.00	0.06	10	0	29	9	93.11
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.02	0.00	0.06	10	0	29	9	93.36
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.16	0.03	0.32	108	18	213	50	46.78
Apr-22	0.03	0.00	0.07	20	0	48	13	66.62
May-22	0.07	0.00	0.20	49	0	130	37	76.05
Jun-22	0.72	0.33	1.13	471	216	746	133	28.34
Jul-22	0.03	0.00	0.07	19	0	47	12	65.44
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.03	0.00	0.07	19	0	46	12	62.02
Oct-22	0.01	0.00	0.04	9	0	29	9	100.87
Nov-22	0.03	0.00	0.09	19	0	58	19	98.60
Dec-22	0.01	0.00	0.04	10	0	29	9	92.54
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.01	0.00	0.04	10	0	29	9	95.49
Mar-23	0.04	0.00	0.10	29	0	68	19	67.04
Apr-23	0.01	0.00	0.05	10	0	36	10	101.25
May-23	0.01	0.00	0.04	10	0	28	9	88.46
Jun-23	0.01	0.00	0.04	9	0	28	9	91.51
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.04	0.00	0.13	28	0	87	29	101.88
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.03	0.00	0.07	20	0	46	12	59.93
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 1.2: Density and Abundance Estimates of Flying Kittiwakes (Without Apportionment of Unidentified Gulls) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-based Analysis

Flying Kittiwakes	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.14	0.03	0.30	39	9	83	20	49.96
Apr-22	0.07	0.00	0.14	19	0	38	10	54.06
May-22	0.20	0.07	0.36	57	19	101	20	34.88
Jun-22	0.58	0.31	0.88	161	86	246	41	25.47
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.03	0.00	0.10	9	0	28	8	93.70
Nov-22	0.04	0.00	0.10	10	0	29	9	90.52
Dec-22	0.14	0.03	0.30	40	9	83	20	49.68
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.03	0.00	0.10	9	0	28	8	87.35
Apr-23	0.10	0.00	0.31	29	0	86	26	89.29
May-23	0.03	0.00	0.10	9	0	29	9	97.45
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.17	0.03	0.34	47	9	94	22	46.45
Nov-23	0.03	0.00	0.10	9	0	29	9	93.79
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Kittiwakes	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.19	0.04	0.40	85	18	181	43	50.14
Apr-22	0.17	0.06	0.30	77	27	135	28	36.61
May-22	0.19	0.12	0.27	86	53	125	19	21.91
Jun-22	0.62	0.39	0.86	281	180	395	55	19.54
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.04	0.00	0.10	20	0	47	12	61.05
Nov-22	0.02	0.00	0.06	9	0	28	8	91.35
Dec-22	0.21	0.06	0.38	96	29	172	37	38.39
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.02	0.00	0.06	9	0	28	9	93.14
Mar-23	0.02	0.00	0.06	10	0	29	9	92.15
Apr-23	0.07	0.00	0.19	30	0	86	28	92.59
May-23	0.02	0.00	0.06	10	0	29	9	94.71
Jun-23	0.02	0.00	0.06	9	0	29	9	94.10
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.17	0.06	0.29	77	28	135	27	34.78
Nov-23	0.02	0.00	0.06	9	0	28	9	93.45
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Kittiwakes	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.21	0.04	0.40	136	29	261	60	43.88
Apr-22	0.13	0.04	0.22	86	29	144	29	33.36
May-22	0.21	0.12	0.29	136	77	191	29	21.41
Jun-22	0.93	0.53	1.35	612	348	889	144	23.46
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.03	0.00	0.07	19	0	45	12	62.22
Nov-22	0.07	0.01	0.15	49	9	102	23	47.00
Dec-22	0.24	0.07	0.42	156	48	276	59	38.01
Jan-23	0.01	0.00	0.06	10	0	37	10	102.43
Feb-23	0.03	0.00	0.07	19	0	45	12	61.50
Mar-23	0.02	0.00	0.04	10	0	29	9	90.14
Apr-23	0.06	0.00	0.16	40	0	104	28	70.64
May-23	0.06	0.00	0.16	40	0	106	29	72.06
Jun-23	0.03	0.00	0.07	19	0	48	13	68.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.16	0.08	0.24	106	56	157	26	24.33
Nov-23	0.05	0.01	0.09	30	9	58	14	47.98
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 1.3: Density and Abundance Estimates of Sitting and Flying Kittiwakes (Without Apportionment of Unidentified Gulls) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-based Analysis

Kittiwakes	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.14	0.03	0.29	38	9	80	19	49.18
Apr-22	0.07	0.00	0.14	19	0	38	10	53.53
May-22	0.34	0.10	0.66	96	27	185	42	43.94
Jun-22	1.22	0.49	2.20	343	136	615	125	36.35
Jul-22	0.07	0.00	0.16	20	0	44	12	59.17
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.03	0.00	0.10	9	0	28	9	93.33
Oct-22	0.03	0.00	0.10	10	0	28	8	88.35
Nov-22	0.03	0.00	0.10	9	0	28	8	93.40
Dec-22	0.14	0.00	0.29	39	0	80	19	49.85
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.07	0.00	0.20	19	0	56	17	90.46
Apr-23	0.10	0.00	0.30	29	0	85	25	85.38
May-23	0.03	0.00	0.10	10	0	29	9	96.43
Jun-23	0.03	0.00	0.10	10	0	28	9	88.78
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.17	0.03	0.33	47	9	92	22	46.59
Nov-23	0.03	0.00	0.10	10	0	28	9	92.63
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Kittiwakes	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.30	0.06	0.63	136	26	288	73	54.08
Apr-22	0.21	0.06	0.40	97	29	182	38	39.15
May-22	0.28	0.13	0.46	126	58	212	40	31.69
Jun-22	1.30	0.71	1.99	593	322	906	154	25.95
Jul-22	0.04	0.00	0.10	19	0	45	12	60.24
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.04	0.00	0.10	19	0	45	12	60.12
Oct-22	0.06	0.00	0.15	30	0	71	19	64.30
Nov-22	0.06	0.00	0.17	28	0	77	21	73.80
Dec-22	0.23	0.06	0.40	106	29	183	39	36.91
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.02	0.00	0.06	10	0	28	9	89.23
Mar-23	0.08	0.00	0.21	38	0	95	26	66.75
Apr-23	0.06	0.00	0.19	29	0	86	26	88.87
May-23	0.02	0.00	0.06	9	0	29	9	101.03
Jun-23	0.04	0.00	0.10	19	0	46	12	64.31
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.17	0.06	0.29	78	27	134	29	36.62
Nov-23	0.02	0.00	0.06	10	0	29	9	91.19
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.02	0.00	0.06	10	0	29	9	97.65
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Kittiwakes	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.37	0.10	0.71	244	66	470	103	42.38
Apr-22	0.16	0.06	0.29	107	37	192	40	37.46
May-22	0.28	0.15	0.43	185	100	285	45	24.18
Jun-22	1.69	0.97	2.50	1112	639	1646	259	23.31
Jul-22	0.03	0.00	0.07	19	0	47	12	61.74
Aug-22	0.01	0.00	0.04	9	0	29	9	95.12
Sep-22	0.03	0.00	0.07	19	0	47	12	62.48
Oct-22	0.04	0.00	0.11	29	0	75	20	67.52
Nov-22	0.10	0.03	0.20	68	19	131	28	41.58
Dec-22	0.26	0.10	0.45	169	66	294	60	35.44
Jan-23	0.01	0.00	0.05	10	0	36	10	100.83
Feb-23	0.05	0.01	0.09	30	9	57	14	46.92
Mar-23	0.06	0.00	0.14	39	0	94	25	62.64
Apr-23	0.08	0.00	0.17	50	0	111	29	58.09
May-23	0.07	0.01	0.17	48	9	110	28	59.25
Jun-23	0.04	0.00	0.10	29	0	63	15	52.51
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.16	0.09	0.24	106	57	158	25	23.81
Nov-23	0.09	0.01	0.19	58	10	125	30	51.88
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.03	0.00	0.07	20	0	46	12	59.05
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 1.4: Apportioned Density and Abundance Estimates of Sitting Kittiwakes across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Sitting Kittiwake	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.17	0.00	0.50	49	0	139	42	86.10
Jun-22	0.65	0.10	1.39	181	28	388	94	52.24
Jul-22	0.07	0.00	0.15	19	0	43	11	58.54
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.03	0.00	0.10	10	0	28	9	90.60
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.02	0.00	0.04	5	0	12	3	61.80
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.03	0.00	0.10	10	0	28	9	88.01
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.10	0.03	0.20	29	9	55	13	43.59
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Sitting Kittiwake	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.11	0.00	0.27	49	0	124	35	71.90
Apr-22	0.04	0.00	0.10	19	0	48	13	67.08
May-22	0.11	0.00	0.31	50	0	144	45	89.94
Jun-22	0.71	0.29	1.21	322	130	553	109	33.83
Jul-22	0.04	0.00	0.10	19	0	45	12	61.93
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.04	0.00	0.10	19	0	45	11	59.71
Oct-22	0.02	0.00	0.06	10	0	28	9	90.45
Nov-22	0.04	0.00	0.13	19	0	58	19	98.41
Dec-22	0.03	0.00	0.07	14	2	34	9	63.09
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.06	0.00	0.16	29	0	74	19	66.78
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.06	0.02	0.12	29	9	56	14	47.22
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.02	0.00	0.06	10	0	29	9	94.37
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Sitting Kittiwake	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.16	0.03	0.32	107	18	211	51	47.71
Apr-22	0.03	0.00	0.07	20	0	48	14	68.25
May-22	0.09	0.00	0.24	57	0	155	46	80.74
Jun-22	0.74	0.35	1.13	487	230	746	132	27.16
Jul-22	0.03	0.00	0.07	20	0	47	12	62.61
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.03	0.00	0.07	20	0	47	12	60.26
Oct-22	0.01	0.00	0.04	10	0	28	9	91.07
Nov-22	0.03	0.00	0.09	19	0	57	18	93.90
Dec-22	0.02	0.00	0.06	15	2	38	9	63.53
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.02	0.00	0.04	10	0	29	9	95.81
Mar-23	0.04	0.00	0.11	29	0	72	19	66.81
Apr-23	0.02	0.00	0.04	10	0	29	10	98.74
May-23	0.02	0.00	0.04	10	0	29	10	94.78
Jun-23	0.04	0.00	0.09	30	0	57	14	47.64
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.04	0.00	0.13	27	0	86	28	101.77
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.03	0.00	0.07	19	0	45	11	61.04
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 1.5: Apportioned Density and Abundance Estimates of Flying Kittiwakes across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-based Analysis

Flying Kittiwakes	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.14	0.03	0.30	39	9	84	20	51.35
Apr-22	0.07	0.00	0.15	19	0	42	11	54.62
May-22	0.21	0.07	0.37	57	19	102	20	34.13
Jun-22	0.58	0.30	0.89	162	85	250	42	26.16
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.03	0.00	0.10	9	0	28	8	91.71
Nov-22	0.03	0.00	0.10	10	0	28	9	90.25
Dec-22	0.14	0.03	0.28	39	9	78	19	48.59
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.03	0.00	0.10	9	0	28	8	88.66
Apr-23	0.11	0.00	0.30	30	0	84	25	84.92
May-23	0.03	0.00	0.10	9	0	28	9	99.24
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.18	0.03	0.34	49	9	96	23	47.02
Nov-23	0.03	0.00	0.10	10	0	29	9	93.93
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Kittiwakes	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.19	0.04	0.39	87	18	178	43	49.50
Apr-22	0.17	0.06	0.29	76	27	133	28	36.72
May-22	0.19	0.10	0.28	87	47	127	20	22.89
Jun-22	0.61	0.38	0.86	278	175	393	55	19.92
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.04	0.00	0.10	19	0	46	12	61.73
Nov-22	0.02	0.00	0.06	10	0	29	9	92.66
Dec-22	0.21	0.06	0.37	97	28	169	36	36.89
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.02	0.00	0.06	9	0	28	9	95.15
Mar-23	0.02	0.00	0.06	10	0	28	9	87.96
Apr-23	0.06	0.00	0.19	29	0	86	26	90.56
May-23	0.02	0.00	0.06	10	0	29	9	93.25
Jun-23	0.02	0.00	0.06	10	0	29	9	90.03
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.17	0.06	0.29	76	26	134	29	37.52
Nov-23	0.02	0.00	0.06	10	0	29	9	92.12
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Kittiwakes	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.21	0.06	0.41	136	37	270	60	44.12
Apr-22	0.13	0.04	0.22	87	29	146	29	33.29
May-22	0.20	0.11	0.29	134	75	191	28	21.14
Jun-22	0.94	0.55	1.40	618	360	920	147	23.70
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.03	0.00	0.07	19	0	47	12	65.70
Nov-22	0.07	0.01	0.14	47	9	92	22	45.82
Dec-22	0.24	0.07	0.43	157	46	280	61	38.84
Jan-23	0.02	0.00	0.06	10	0	37	10	99.03
Feb-23	0.03	0.00	0.07	19	0	44	12	59.53
Mar-23	0.02	0.00	0.04	10	0	29	9	92.60
Apr-23	0.06	0.00	0.15	38	0	100	28	72.50
May-23	0.06	0.00	0.16	39	0	109	29	73.97
Jun-23	0.03	0.00	0.07	19	0	48	13	70.51
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.16	0.10	0.24	108	64	160	25	22.65
Nov-23	0.04	0.01	0.09	29	9	57	14	46.51
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 1.6: Apportioned Density and Abundance Estimates of Sitting and Flying Kittiwakes across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-based Analysis

Kittiwakes	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.14	0.03	0.29	39	9	82	20	50.21
Apr-22	0.07	0.00	0.15	19	0	42	11	55.62
May-22	0.38	0.09	0.79	107	25	222	51	47.53
Jun-22	1.23	0.47	2.25	343	132	630	128	37.25
Jul-22	0.07	0.00	0.15	20	0	43	11	57.25
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.03	0.00	0.10	10	0	28	8	88.71
Oct-22	0.03	0.00	0.10	10	0	28	8	85.39
Nov-22	0.03	0.00	0.10	9	0	28	8	89.54
Dec-22	0.16	0.03	0.31	44	9	86	20	45.65
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.07	0.00	0.20	19	0	56	17	87.97
Apr-23	0.10	0.00	0.30	28	0	84	25	87.78
May-23	0.03	0.00	0.10	9	0	29	9	100.66
Jun-23	0.10	0.03	0.19	28	9	53	12	43.23
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.17	0.03	0.34	48	9	95	22	46.53
Nov-23	0.03	0.00	0.10	9	0	28	9	97.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Kittiwakes	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.28	0.04	0.65	129	19	299	75	57.98
Apr-22	0.21	0.06	0.37	97	29	171	37	37.78
May-22	0.30	0.13	0.55	137	58	249	49	35.48
Jun-22	1.29	0.71	2.04	591	325	932	154	26.03
Jul-22	0.04	0.00	0.10	19	0	47	12	61.67
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.04	0.00	0.10	19	0	44	12	60.77
Oct-22	0.06	0.00	0.15	28	0	67	18	64.24
Nov-22	0.06	0.00	0.16	28	0	74	20	71.14
Dec-22	0.24	0.09	0.42	112	40	192	39	34.90
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.02	0.00	0.06	9	0	28	9	90.91
Mar-23	0.09	0.00	0.20	40	0	93	25	62.57
Apr-23	0.06	0.00	0.19	29	0	86	26	89.41
May-23	0.02	0.00	0.06	9	0	28	9	94.80
Jun-23	0.08	0.02	0.18	38	9	82	19	51.16
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.17	0.06	0.28	76	28	130	26	34.38
Nov-23	0.02	0.00	0.06	10	0	29	9	90.92
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.02	0.00	0.06	10	0	29	9	97.99
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Kittiwakes	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.37	0.08	0.72	241	54	472	107	44.41
Apr-22	0.17	0.06	0.29	109	37	189	39	36.09
May-22	0.29	0.16	0.47	194	104	307	51	26.45
Jun-22	1.66	0.96	2.40	1095	629	1580	241	22.01
Jul-22	0.03	0.00	0.07	20	0	47	12	59.81
Aug-22	0.01	0.00	0.04	9	0	29	9	91.10
Sep-22	0.03	0.00	0.07	19	0	46	12	61.69
Oct-22	0.05	0.00	0.11	30	0	75	19	64.62
Nov-22	0.10	0.03	0.19	67	19	128	29	43.06
Dec-22	0.26	0.10	0.44	171	63	291	60	35.15
Jan-23	0.02	0.00	0.05	10	0	36	10	100.39
Feb-23	0.04	0.00	0.09	29	0	58	15	49.75
Mar-23	0.06	0.00	0.14	38	0	93	25	65.90
Apr-23	0.07	0.00	0.18	49	0	115	29	59.78
May-23	0.07	0.01	0.17	49	9	114	29	58.94
Jun-23	0.07	0.01	0.14	49	9	95	21	43.65
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.16	0.09	0.24	106	62	157	25	23.80
Nov-23	0.09	0.01	0.19	58	10	125	30	52.31
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.03	0.00	0.07	19	0	45	12	61.12
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

2 Great Black-backed Gull

Table 2.1: Density and Abundance Estimates of Sitting Great Black-backed Gulls (Without Apportionment of Unidentified Gulls) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Month	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.02	0.00	0.06	10	0	28	9	89.06
Jan-23	0.02	0.00	0.06	10	0	29	9	93.32
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.12	0.00	0.38	53	0	172	54	101.40
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Month	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.03	0.00	0.09	19	0	58	18	96.21
Jan-23	0.03	0.00	0.07	20	0	48	13	66.13
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.03	0.00	0.09	19	0	58	18	97.45
Dec-23	0.09	0.00	0.26	56	0	173	56	99.71
Jan-24	0.02	0.00	0.04	10	0	29	9	90.49
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 2.2: Density and Abundance Estimates of Flying Great Black-backed Gulls (Without Apportionment of Unidentified Gulls) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Flying Great Black-backed Gull	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.03	0.00	0.10	9	0	29	9	98.19
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Great Black-backed Gull	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.02	0.00	0.08	10	0	35	10	101.76
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.07	0.00	0.14	30	0	63	15	50.46
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.02	0.00	0.06	10	0	29	9	96.37
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.02	0.00	0.06	10	0	28	9	90.90

Flying Great Black-backed Gull	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.02	0.00	0.06	10	0	37	10	96.10
Dec-22	0.01	0.00	0.04	10	0	29	10	97.51
Jan-23	0.05	0.00	0.09	30	0	58	15	50.08
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.04	0.00	0.09	29	0	58	14	49.56
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.03	0.00	0.09	19	0	57	18	94.82
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.02	0.00	0.04	10	0	29	9	88.40

Table 2.3: Density and Abundance Estimates of Sitting and Flying Great Black-backed Gulls (Without Apportionment of Unidentified Gulls) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Great Black-backed Gulls	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.04	0.00	0.10	10	0	29	9	94.63
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Great Black-backed Gulls	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.02	0.00	0.08	10	0	36	10	99.80
Dec-22	0.02	0.00	0.06	10	0	29	9	87.76
Jan-23	0.09	0.00	0.19	39	0	87	22	57.20
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.02	0.00	0.06	10	0	29	9	91.55
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.13	0.00	0.47	57	0	213	59	102.59
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.02	0.00	0.06	9	0	28	9	92.68

Great Black-backed Gulls	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.01	0.00	0.04	10	0	29	9	94.07
Dec-22	0.05	0.00	0.12	31	0	79	21	67.58
Jan-23	0.07	0.01	0.14	48	9	95	23	46.95
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.04	0.00	0.09	28	0	56	13	47.92
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.03	0.00	0.09	19	0	58	19	98.67
Dec-23	0.12	0.00	0.31	76	0	206	58	76.97
Jan-24	0.01	0.00	0.04	9	0	29	9	96.51
Feb-24	0.02	0.00	0.04	10	0	29	9	89.47

Table 2.4: Apportioned Density and Abundance Estimates of Sitting Great Black-backed Gulls across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Sitting Great Black-backed Gull	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Sitting Great Black-backed Gull	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.02	0.00	0.06	10	0	28	9	92.43
Jan-23	0.02	0.00	0.06	9	0	29	9	95.81
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.13	0.00	0.38	58	0	174	57	99.45
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Sitting Great Black-backed Gull	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.03	0.00	0.09	20	0	59	19	93.23
Jan-23	0.03	0.00	0.07	19	0	47	12	65.15
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.03	0.00	0.09	20	0	58	18	93.57
Dec-23	0.08	0.00	0.26	55	0	172	57	103.94
Jan-24	0.01	0.00	0.04	10	0	29	9	91.70
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 2.5: Apportioned Density and Abundance Estimates of Flying Great Black-backed Gulls across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Flying Great Black-backed Gull	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.04	0.00	0.10	10	0	29	10	95.55
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Great Black-backed Gull	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.02	0.00	0.08	10	0	35	10	98.12
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.06	0.00	0.14	29	0	62	15	51.72
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.02	0.00	0.06	9	0	29	9	93.70
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.02	0.00	0.06	10	0	28	9	88.06

Flying Great Black-backed Gull	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.01	0.00	0.04	10	0	29	9	99.13
Dec-22	0.02	0.00	0.04	11	0	30	10	90.93
Jan-23	0.04	0.01	0.09	29	9	58	14	49.46
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.04	0.00	0.09	29	0	58	14	48.74
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.03	0.00	0.09	19	0	58	19	98.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.01	0.00	0.04	9	0	29	9	96.55

Table 2.6: Apportioned Density and Abundance Estimates of Sitting and Flying Great Black-backed Gulls across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-based Analysis

Great Black-backed Gulls	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.04	0.00	0.10	10	0	29	9	91.63
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Great Black-backed Gulls	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.02	0.00	0.08	10	0	35	10	91.96
Dec-22	0.02	0.00	0.06	10	0	29	9	94.11
Jan-23	0.09	0.00	0.20	40	0	90	22	55.54
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.02	0.00	0.06	10	0	29	9	96.09
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.13	0.00	0.48	60	0	218	59	98.60
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.02	0.00	0.06	10	0	29	9	92.45

Great Black-backed Gulls	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.01	0.00	0.04	10	0	29	10	98.68
Dec-22	0.05	0.00	0.11	31	0	73	20	65.01
Jan-23	0.07	0.01	0.15	49	9	98	22	45.18
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.04	0.00	0.09	29	0	58	15	50.75
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.03	0.00	0.09	20	0	58	19	93.25
Dec-23	0.12	0.00	0.32	77	0	212	60	77.57
Jan-24	0.01	0.00	0.04	9	0	28	9	94.13
Feb-24	0.02	0.00	0.04	10	0	29	9	90.34

3 Herring Gull

Table 3.1: Density and Abundance Estimates of Sitting Herring Gulls (Without Apportionment of Unidentified Gulls) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Month	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.02	0.00	0.06	9	0	28	9	95.51
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.07	0.00	0.19	30	0	87	29	96.64
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.01	0.00	0.04	10	0	29	9	92.18
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.05	0.00	0.13	30	0	87	29	94.78
Nov-23	0.01	0.00	0.04	10	0	29	9	92.48
Dec-23	0.01	0.00	0.04	10	0	29	10	97.15
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 3.2: Density and Abundance Estimates of Flying Herring Gulls (Without Apportionment of Unidentified Gulls) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Flying Herring Gull	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Herring Gull	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.02	0.00	0.06	10	0	28	9	90.33
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.02	0.00	0.06	10	0	29	9	93.51
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Herring Gull	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.01	0.00	0.04	10	0	28	9	88.87
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.01	0.00	0.04	9	0	29	9	97.36
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.01	0.00	0.04	10	0	28	9	88.77
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 3.3: Density and Abundance Estimates of Sitting and Flying Herring Gulls (Without Apportionment of Unidentified Gulls) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Herring Gulls	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Herring Gulls	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.02	0.00	0.06	9	0	28	9	92.29
Sep-22	0.02	0.00	0.08	10	0	35	9	94.93
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.02	0.00	0.06	10	0	28	9	91.14
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.06	0.00	0.19	28	0	87	28	101.83
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Herring Gulls	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.02	0.00	0.04	10	0	29	9	90.00
Sep-22	0.01	0.00	0.04	10	0	29	9	94.70
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.01	0.00	0.04	10	0	29	9	93.30
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.01	0.00	0.04	9	0	28	9	93.61
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.04	0.00	0.13	29	0	87	28	98.02
Nov-23	0.01	0.00	0.04	10	0	29	9	95.41
Dec-23	0.01	0.00	0.04	9	0	29	10	101.82
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 3.4: Apportioned Density and Abundance Estimates of Sitting Herring Gulls across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Sitting Herring Gulls	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Sitting Herring Gulls	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.02	0.00	0.06	10	0	29	9	95.82
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.06	0.00	0.19	28	0	87	28	100.08
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Sitting Herring Gulls	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.02	0.00	0.04	10	0	29	9	90.77
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.04	0.00	0.13	27	0	86	27	100.97
Nov-23	0.02	0.00	0.04	10	0	29	10	99.49
Dec-23	0.01	0.00	0.04	9	0	29	9	96.74
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 3.5: Apportioned Density and Abundance Estimates of Flying Herring Gulls across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Flying Herring Gull	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Herring Gull	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.02	0.00	0.06	9	0	29	9	99.13
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.02	0.00	0.06	10	0	29	9	91.64
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Herring Gull	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.01	0.00	0.04	9	0	29	9	95.95
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.01	0.00	0.04	10	0	29	9	92.78
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.01	0.00	0.04	9	0	29	9	94.41
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 3.6: Apportioned Density and Abundance Estimates of Sitting and Flying Herring Gulls across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Herring Gulls	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Herring Gulls	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.02	0.00	0.06	9	0	28	9	92.71
Sep-22	0.02	0.00	0.06	9	0	28	9	97.07
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.02	0.00	0.06	10	0	29	9	93.05
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.06	0.00	0.24	30	0	110	30	100.14
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Herring Gulls	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.02	0.00	0.04	10	0	29	9	91.01
Sep-22	0.02	0.00	0.04	10	0	29	9	95.26
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.01	0.00	0.04	10	0	29	10	100.55
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.02	0.00	0.04	10	0	29	9	91.08
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.05	0.00	0.13	30	0	87	29	99.20
Nov-23	0.01	0.00	0.04	10	0	29	9	96.39
Dec-23	0.01	0.00	0.04	9	0	29	9	98.61
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

4 Arctic Tern

Table 4.1: Density and Abundance Estimates of Sitting Arctic Terns (Without Apportionment of Unidentified Terns) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Month	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.14	0.00	0.40	38	0	113	34	89.15
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.08	0.00	0.25	38	0	113	35	92.79
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Month	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.19	0.00	0.51	128	0	334	93	73.06
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 4.2: Density and Abundance Estimates of Flying Arctic Terns (Without Apportionment of Unidentified Terns) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-based Analysis

Flying Arctic Terns	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.07	0.00	0.14	19	0	38	10	55.69
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Arctic Terns	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.04	0.00	0.08	19	0	38	11	58.02
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Arctic Terns	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.05	0.01	0.09	30	9	57	14	45.90
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.01	0.00	0.04	9	0	29	9	92.42
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.06	0.00	0.18	40	0	116	38	96.37
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 4.3: Density and Abundance Estimates of Sitting and Flying Arctic Terns (Without Apportionment of Unidentified Terns) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Arctic Terns	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.21	0.00	0.52	59	0	146	41	70.46
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Arctic Terns	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.13	0.00	0.33	58	0	152	42	72.93
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Arctic Terns	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.24	0.01	0.57	155	10	372	93	60.09
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.01	0.00	0.04	10	0	29	9	92.34
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.06	0.00	0.17	39	0	115	37	94.50
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 4.4: Apportioned Density and Abundance Estimates of Sitting Arctic Terns across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Sitting Arctic Terns	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.27	0.00	0.54	76	0	152	42	55.22
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Sitting Arctic Terns	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.32	0.00	0.64	144	0	293	71	49.43
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Sitting Arctic Terns	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.92	0.06	2.76	607	39	1816	461	75.96
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 4.5: Apportioned Density and Abundance Estimates of Flying Arctic Terns across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Flying Arctic terns	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.07	0.00	0.15	20	0	42	11	53.86
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.04	0.00	0.10	10	0	28	9	90.38
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Arctic terns	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.04	0.00	0.10	19	0	44	11	59.51
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.02	0.00	0.06	10	0	29	10	98.55
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Arctic terns	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.06	0.00	0.13	39	0	84	21	53.27
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.02	0.00	0.04	10	0	29	9	90.12
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.07	0.00	0.20	47	0	134	37	78.90
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 4.6: Apportioned Density and Abundance Estimates of Sitting and Flying Arctic Terns across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Arctic Terns	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.34	0.03	0.65	96	9	182	44	46.13
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.03	0.00	0.10	9	0	28	9	95.28
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Arctic Terns	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.36	0.06	0.67	163	29	305	73	44.88
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.02	0.00	0.06	10	0	29	9	93.11
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Arctic Terns	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	1.00	0.14	2.76	657	93	1817	454	69.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.01	0.00	0.04	10	0	29	9	90.16
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.07	0.00	0.20	49	0	134	38	77.56
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

5 Guillemot

Table 5.1: Density and Abundance Estimates of Sitting Guillemots (Without Apportionment of Unidentified Auks) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Month	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	3.29	2.36	4.29	921	660	1201	139	15.14
Apr-22	0.99	0.53	1.45	278	148	406	63	22.68
May-22	0.57	0.16	1.12	158	45	312	68	42.88
Jun-22	0.27	0.10	0.43	76	28	120	24	32.01
Jul-22	27.83	17.97	38.50	7787	5027	10771	1397	17.94
Aug-22	1.02	0.54	1.60	285	152	447	76	26.55
Sep-22	2.24	1.64	2.90	625	459	812	93	14.83
Oct-22	2.89	1.63	4.32	809	457	1209	189	23.37
Nov-22	4.17	3.15	5.30	1167	881	1482	149	12.75
Dec-22	0.90	0.64	1.21	253	178	338	40	15.74
Jan-23	1.21	0.77	1.75	338	216	490	70	20.65
Feb-23	0.27	0.07	0.52	76	19	146	32	41.45
Mar-23	0.82	0.34	1.30	229	96	364	69	30.20
Apr-23	0.20	0.00	0.48	57	0	133	35	61.18
May-23	0.86	0.40	1.35	241	112	377	68	28.38
Jun-23	0.17	0.06	0.28	47	17	79	16	34.74
Jul-23	0.20	0.07	0.34	57	18	95	20	34.95
Aug-23	0.27	0.09	0.50	75	26	139	30	39.47
Sep-23	0.10	0.03	0.21	29	8	58	14	47.54
Oct-23	0.17	0.03	0.35	48	9	99	22	46.43
Nov-23	0.38	0.21	0.54	107	58	151	23	21.60
Dec-23	0.04	0.00	0.10	10	0	28	8	84.19

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Jan-24	0.38	0.24	0.53	106	68	147	20	18.74
Feb-24	0.38	0.17	0.58	106	48	162	29	27.60
Survey (WFDA + 2 km)								
Mar-22	3.42	2.63	4.24	1562	1200	1937	194	12.41
Apr-22	1.74	0.98	2.78	794	447	1268	223	28.07
May-22	0.74	0.47	1.06	338	213	484	71	20.97
Jun-22	0.19	0.04	0.32	85	19	147	29	34.45
Jul-22	25.42	17.87	33.32	11604	8158	15210	1801	15.52
Aug-22	1.36	0.77	2.02	621	354	923	145	23.40
Sep-22	2.74	1.95	3.77	1253	892	1720	216	17.24
Oct-22	3.03	2.15	4.05	1384	982	1850	217	15.67
Nov-22	4.11	3.38	4.88	1876	1541	2230	180	9.62
Dec-22	1.02	0.78	1.29	467	356	591	58	12.42
Jan-23	1.17	0.77	1.65	535	350	751	102	19.06
Feb-23	0.53	0.29	0.77	241	132	350	57	23.81
Mar-23	0.72	0.42	1.02	327	191	464	67	20.47
Apr-23	0.28	0.10	0.45	127	48	206	40	31.95
May-23	0.96	0.49	1.50	437	226	682	112	25.67
Jun-23	0.21	0.06	0.37	96	29	169	37	38.86
Jul-23	0.19	0.08	0.31	87	36	141	28	32.31
Aug-23	0.28	0.15	0.41	127	70	187	31	24.34
Sep-23	0.23	0.10	0.37	106	45	168	32	30.32
Oct-23	0.15	0.04	0.27	67	19	123	27	40.19
Nov-23	0.32	0.17	0.48	146	76	220	36	24.81
Dec-23	0.02	0.00	0.06	10	0	29	9	90.79
Jan-24	0.38	0.26	0.51	175	119	231	29	16.29
Feb-24	0.49	0.28	0.71	223	127	323	51	22.95

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	3.68	2.97	4.50	2421	1957	2958	261	10.78
Apr-22	1.53	0.99	2.25	1008	653	1480	214	21.21
May-22	0.74	0.46	1.05	485	306	691	101	20.88
Jun-22	0.24	0.13	0.37	155	83	241	42	27.34
Jul-22	23.86	17.21	30.90	15699	11322	20332	2307	14.69
Aug-22	1.66	1.11	2.30	1094	733	1515	207	18.95
Sep-22	3.22	2.17	4.58	2121	1425	3014	409	19.27
Oct-22	2.53	1.84	3.26	1666	1210	2144	240	14.40
Nov-22	3.94	3.39	4.48	2595	2228	2948	182	7.03
Dec-22	1.01	0.81	1.24	663	531	817	75	11.31
Jan-23	1.10	0.75	1.43	721	491	938	114	15.76
Feb-23	0.52	0.29	0.78	340	193	510	77	22.72
Mar-23	0.73	0.52	0.96	483	340	632	75	15.63
Apr-23	0.30	0.15	0.45	194	96	299	52	26.58
May-23	0.86	0.53	1.22	568	347	802	114	20.14
Jun-23	0.22	0.11	0.35	146	74	228	40	27.20
Jul-23	0.15	0.07	0.23	97	46	154	29	29.63
Aug-23	0.27	0.15	0.42	176	96	275	46	26.22
Sep-23	0.32	0.14	0.54	209	90	358	69	33.02
Oct-23	0.19	0.09	0.33	128	57	217	41	32.27
Nov-23	0.30	0.19	0.41	195	125	269	37	18.95
Dec-23	0.03	0.00	0.07	19	0	47	12	65.28
Jan-24	0.38	0.31	0.46	252	206	301	24	9.42
Feb-24	0.64	0.40	0.89	419	261	583	83	19.72

Table 5.2: Density and Abundance Estimates of Flying Guillemots (Without Apportionment of Unidentified Auks) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-based Analysis

Flying Guillemots	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.03	0.00	0.10	9	0	28	8	88.62
Apr-22	1.24	0.73	1.81	347	204	507	78	22.57
May-22	0.07	0.00	0.20	19	0	55	16	85.48
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.04	0.00	0.10	10	0	28	8	83.33
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.03	0.00	0.10	9	0	28	9	97.94
Nov-22	0.21	0.03	0.39	58	10	110	25	43.10
Dec-22	0.07	0.00	0.20	19	0	56	17	88.40
Jan-23	0.04	0.00	0.12	10	0	34	10	97.79
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.07	0.00	0.17	19	0	47	12	61.32
May-23	0.65	0.16	1.28	183	44	359	80	43.74
Jun-23	0.04	0.00	0.10	10	0	29	9	92.24
Jul-23	0.07	0.00	0.17	19	0	47	12	63.41
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.03	0.00	0.10	10	0	28	8	85.81
Nov-23	0.03	0.00	0.10	10	0	29	9	93.93
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Guillemots	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.02	0.00	0.06	10	0	28	9	90.61
Apr-22	1.17	0.84	1.47	533	384	673	73	13.61
May-22	0.04	0.00	0.13	20	0	57	18	90.80
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.04	0.00	0.10	19	0	46	12	62.91
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.02	0.00	0.06	10	0	29	9	95.37
Nov-22	0.13	0.04	0.24	58	17	111	24	41.78
Dec-22	0.06	0.00	0.15	29	0	67	19	64.81
Jan-23	0.04	0.00	0.13	20	0	58	18	91.33
Feb-23	0.46	0.00	1.20	210	0	547	152	72.57
Mar-23	0.04	0.00	0.12	18	0	57	18	99.06
Apr-23	0.22	0.04	0.46	98	18	210	52	52.80
May-23	0.95	0.37	1.54	433	171	701	139	32.14
Jun-23	0.02	0.00	0.06	10	0	28	9	90.72
Jul-23	0.04	0.00	0.10	19	0	46	12	62.26
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.04	0.00	0.10	19	0	45	11	59.58
Nov-23	0.02	0.00	0.06	10	0	28	9	91.14
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Guillemots	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.01	0.00	0.04	9	0	29	9	94.81
Apr-22	1.28	0.89	1.67	843	587	1100	135	16.00
May-22	0.03	0.00	0.09	19	0	57	18	92.31
Jun-22	0.01	0.00	0.04	9	0	29	10	105.65
Jul-22	0.04	0.00	0.09	29	0	58	15	52.09
Aug-22	0.02	0.00	0.06	10	0	37	10	97.84
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.03	0.00	0.07	19	0	47	12	64.21
Nov-22	0.10	0.04	0.18	68	26	122	25	36.53
Dec-22	0.09	0.03	0.16	59	19	105	23	38.18
Jan-23	0.16	0.01	0.36	108	10	237	58	53.02
Feb-23	0.62	0.12	1.30	405	76	852	198	48.89
Mar-23	0.05	0.00	0.11	30	0	72	19	64.62
Apr-23	0.24	0.07	0.44	156	45	292	65	41.78
May-23	1.15	0.54	1.95	756	353	1283	245	32.43
Jun-23	0.06	0.00	0.13	38	0	83	20	53.76
Jul-23	0.04	0.00	0.10	29	0	65	16	53.45
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.02	0.00	0.04	10	0	29	9	94.47
Oct-23	0.03	0.00	0.07	20	0	46	12	60.57
Nov-23	0.01	0.00	0.04	9	0	29	9	98.68
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 5.3: Density and Abundance Estimates of Sitting and Flying Guillemots (Without Apportionment of Unidentified Auks) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Guillemots	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	3.32	2.41	4.27	930	673	1194	138	14.79
Apr-22	2.22	1.62	2.89	622	453	808	93	15.00
May-22	0.62	0.13	1.17	173	37	327	72	41.85
Jun-22	0.27	0.10	0.44	76	28	123	25	33.00
Jul-22	27.94	18.16	38.42	7818	5080	10749	1459	18.66
Aug-22	1.04	0.53	1.63	290	147	456	81	27.91
Sep-22	2.23	1.63	2.90	624	457	810	91	14.58
Oct-22	2.89	1.61	4.30	809	452	1202	193	23.87
Nov-22	4.39	3.46	5.53	1229	967	1547	148	12.00
Dec-22	0.97	0.70	1.27	273	196	356	42	15.39
Jan-23	1.24	0.76	1.77	346	213	495	71	20.64
Feb-23	0.28	0.07	0.51	77	19	143	31	40.90
Mar-23	0.82	0.31	1.29	229	86	361	68	29.64
Apr-23	0.28	0.03	0.62	77	9	173	43	56.22
May-23	1.50	0.75	2.20	420	210	616	102	24.23
Jun-23	0.20	0.10	0.32	56	27	90	16	28.60
Jul-23	0.28	0.13	0.41	78	36	113	20	26.37
Aug-23	0.27	0.07	0.51	76	18	142	31	40.70
Sep-23	0.10	0.00	0.20	29	0	56	14	49.91
Oct-23	0.21	0.06	0.40	59	17	111	25	42.86
Nov-23	0.42	0.26	0.57	117	72	160	23	19.31
Dec-23	0.03	0.00	0.10	10	0	28	9	88.63
Jan-24	0.41	0.27	0.56	116	77	156	20	17.57
Feb-24	0.38	0.17	0.59	106	47	164	30	28.57

Guillemots	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	3.46	2.61	4.42	1580	1190	2018	213	13.46
Apr-22	2.88	2.02	3.98	1316	922	1816	239	18.14
May-22	0.80	0.50	1.12	367	227	513	74	20.16
Jun-22	0.19	0.06	0.32	88	28	147	30	33.96
Jul-22	25.34	18.08	33.94	11566	8252	15491	1868	16.15
Aug-22	1.34	0.78	1.98	611	354	904	143	23.44
Sep-22	2.76	1.93	3.93	1258	881	1796	230	18.26
Oct-22	3.02	2.07	3.97	1379	945	1810	217	15.76
Nov-22	4.22	3.47	5.01	1926	1583	2285	174	9.05
Dec-22	1.11	0.83	1.44	506	377	658	72	14.21
Jan-23	1.21	0.73	1.68	552	334	767	114	20.63
Feb-23	1.04	0.41	1.92	473	189	878	189	40.05
Mar-23	0.76	0.49	1.05	348	225	479	64	18.36
Apr-23	0.49	0.25	0.72	225	116	328	53	23.56
May-23	1.93	1.07	2.84	879	486	1295	204	23.22
Jun-23	0.23	0.10	0.40	107	46	185	36	33.76
Jul-23	0.23	0.08	0.38	105	37	173	34	32.77
Aug-23	0.27	0.15	0.43	125	67	194	32	25.61
Sep-23	0.23	0.10	0.39	106	47	178	33	30.94
Oct-23	0.19	0.06	0.34	87	28	156	33	37.91
Nov-23	0.34	0.19	0.50	157	89	229	35	22.43
Dec-23	0.02	0.00	0.06	10	0	28	9	89.77
Jan-24	0.40	0.29	0.51	183	134	232	25	13.82
Feb-24	0.48	0.27	0.69	220	124	315	49	22.25

Guillemots	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	3.68	2.93	4.46	2418	1928	2937	261	10.80
Apr-22	2.78	2.11	3.58	1830	1386	2355	245	13.39
May-22	0.78	0.50	1.10	516	330	721	102	19.75
Jun-22	0.24	0.13	0.37	161	86	241	39	24.25
Jul-22	23.56	16.91	31.00	15501	11128	20398	2395	15.45
Aug-22	1.67	1.05	2.37	1098	693	1560	217	19.79
Sep-22	3.21	2.10	4.57	2115	1382	3004	404	19.11
Oct-22	2.55	1.92	3.27	1678	1260	2150	227	13.55
Nov-22	4.05	3.51	4.61	2663	2310	3032	184	6.91
Dec-22	1.10	0.87	1.42	727	574	935	95	13.07
Jan-23	1.25	0.86	1.67	822	563	1097	136	16.56
Feb-23	1.13	0.54	1.91	745	354	1259	230	30.81
Mar-23	0.78	0.58	0.97	514	382	640	67	13.04
Apr-23	0.53	0.33	0.73	348	217	484	70	20.00
May-23	2.02	1.23	2.98	1330	807	1960	288	21.69
Jun-23	0.28	0.15	0.43	186	97	280	49	26.29
Jul-23	0.19	0.09	0.30	127	58	194	34	26.48
Aug-23	0.27	0.14	0.42	175	95	279	47	27.20
Sep-23	0.32	0.13	0.57	212	87	372	71	33.57
Oct-23	0.22	0.09	0.37	146	58	244	47	31.90
Nov-23	0.31	0.21	0.42	205	137	274	35	17.32
Dec-23	0.03	0.00	0.07	19	0	47	12	65.17
Jan-24	0.40	0.31	0.50	264	205	330	31	11.88
Feb-24	0.63	0.39	0.88	415	259	580	81	19.63

Table 5.4: Apportioned Density and Abundance Estimates of Sitting Guillemots (Without Correction for Availability Bias) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Sitting Guillemots	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	3.54	2.66	4.56	991	744	1276	139	14.03
Apr-22	1.01	0.57	1.46	282	160	408	65	22.99
May-22	0.58	0.18	1.08	163	50	303	65	39.58
Jun-22	0.27	0.10	0.43	76	27	121	25	32.48
Jul-22	30.06	21.25	39.95	8410	5945	11177	1421	16.89
Aug-22	1.07	0.59	1.63	298	165	455	78	26.10
Sep-22	2.23	1.66	2.88	623	465	807	88	14.18
Oct-22	2.92	1.63	4.32	818	456	1208	192	23.50
Nov-22	4.35	3.25	5.53	1217	909	1547	159	13.07
Dec-22	0.96	0.75	1.23	270	209	345	36	13.51
Jan-23	1.20	0.75	1.73	336	211	484	68	20.40
Feb-23	0.28	0.07	0.49	77	19	138	31	40.06
Mar-23	0.85	0.37	1.31	237	103	367	68	28.71
Apr-23	0.21	0.03	0.51	58	9	143	36	62.09
May-23	0.86	0.38	1.36	240	106	380	71	29.76
Jun-23	0.17	0.06	0.30	48	18	85	17	34.67
Jul-23	0.21	0.07	0.34	58	19	96	20	34.80
Aug-23	0.27	0.10	0.50	76	27	141	31	39.96
Sep-23	0.10	0.00	0.21	28	0	58	14	48.81
Oct-23	0.17	0.03	0.34	48	9	96	23	46.86
Nov-23	0.38	0.20	0.55	107	57	153	23	21.81
Dec-23	0.04	0.00	0.10	10	0	28	8	84.22
Jan-24	0.42	0.30	0.54	117	84	150	18	14.97
Feb-24	0.39	0.18	0.58	108	51	162	29	26.89

Sitting Guillemots	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	3.77	2.97	4.65	1720	1357	2123	195	11.32
Apr-22	1.73	0.99	2.78	789	452	1269	217	27.48
May-22	0.77	0.50	1.08	352	227	491	67	18.90
Jun-22	0.22	0.08	0.36	100	37	162	32	31.92
Jul-22	27.25	19.39	35.73	12436	8849	16308	1908	15.34
Aug-22	1.38	0.85	1.99	629	386	910	136	21.55
Sep-22	2.77	1.93	3.80	1262	880	1735	224	17.78
Oct-22	3.12	2.21	4.13	1423	1008	1887	230	16.13
Nov-22	4.22	3.47	4.98	1927	1585	2272	181	9.40
Dec-22	1.10	0.88	1.35	500	401	615	55	11.08
Jan-23	1.18	0.76	1.62	539	348	740	103	19.18
Feb-23	0.53	0.28	0.77	242	129	352	57	23.75
Mar-23	0.74	0.45	1.03	338	207	469	67	19.90
Apr-23	0.27	0.10	0.46	124	46	211	42	34.03
May-23	0.95	0.50	1.46	432	227	668	115	26.56
Jun-23	0.21	0.06	0.38	94	28	173	36	38.42
Jul-23	0.19	0.06	0.31	87	28	143	29	33.63
Aug-23	0.27	0.15	0.41	125	67	189	31	24.99
Sep-23	0.23	0.11	0.38	107	48	173	31	29.20
Oct-23	0.14	0.04	0.27	66	19	124	26	39.98
Nov-23	0.32	0.16	0.48	144	75	221	36	24.88
Dec-23	0.02	0.00	0.06	10	0	28	9	90.45
Jan-24	0.41	0.31	0.52	188	140	235	25	13.39
Feb-24	0.49	0.27	0.72	224	125	327	52	23.13

Sitting Guillemots	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	3.99	3.21	4.80	2627	2113	3160	278	10.60
Apr-22	1.52	1.01	2.21	998	667	1454	208	20.86
May-22	0.75	0.50	1.04	490	326	682	95	19.31
Jun-22	0.25	0.13	0.39	167	86	259	43	25.80
Jul-22	25.43	18.16	33.15	16732	11949	21812	2467	14.74
Aug-22	1.66	1.11	2.34	1092	729	1540	204	18.72
Sep-22	3.22	2.15	4.71	2118	1413	3097	408	19.29
Oct-22	2.65	2.00	3.36	1744	1318	2212	240	13.74
Nov-22	4.03	3.42	4.61	2650	2251	3034	198	7.45
Dec-22	1.08	0.89	1.34	710	588	879	76	10.75
Jan-23	1.12	0.77	1.50	736	505	985	122	16.59
Feb-23	0.51	0.31	0.74	339	204	484	72	21.24
Mar-23	0.76	0.55	0.97	500	359	638	72	14.42
Apr-23	0.31	0.16	0.47	205	104	309	53	25.68
May-23	0.87	0.54	1.22	575	355	805	117	20.40
Jun-23	0.24	0.13	0.36	158	85	237	39	24.83
Jul-23	0.15	0.06	0.23	96	38	153	29	30.01
Aug-23	0.26	0.14	0.41	173	95	273	45	25.98
Sep-23	0.33	0.14	0.56	215	89	370	73	34.08
Oct-23	0.19	0.08	0.32	127	53	213	41	32.04
Nov-23	0.30	0.19	0.40	195	126	266	36	18.30
Dec-23	0.03	0.00	0.07	19	0	47	12	64.13
Jan-24	0.40	0.33	0.47	264	219	308	24	8.98
Feb-24	0.64	0.39	0.90	423	257	593	87	20.46

Table 5.5: Apportioned Density and Abundance Estimates of Sitting Guillemots (Corrected for Availability Bias) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Sitting Guillemots	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	4.66	3.50	6.00	1305	979	1680	183	14.03
Apr-22	1.33	0.75	1.92	371	211	537	85	22.99
May-22	0.77	0.24	1.43	215	66	399	85	39.58
Jun-22	0.36	0.13	0.57	101	35	160	33	32.48
Jul-22	39.58	27.98	52.60	11073	7828	14716	1871	16.89
Aug-22	1.40	0.78	2.14	392	217	600	102	26.10
Sep-22	2.93	2.19	3.80	820	613	1062	116	14.18
Oct-22	3.85	2.14	5.68	1077	600	1590	253	23.50
Nov-22	5.73	4.28	7.28	1603	1197	2036	210	13.07
Dec-22	1.27	0.98	1.62	355	275	454	48	13.51
Jan-23	1.58	0.99	2.28	442	278	637	90	20.40
Feb-23	0.36	0.09	0.65	102	25	181	41	40.06
Mar-23	1.12	0.48	1.73	313	135	484	90	28.71
Apr-23	0.27	0.04	0.67	76	12	188	47	62.09
May-23	1.13	0.50	1.79	316	139	501	94	29.76
Jun-23	0.23	0.09	0.40	64	24	111	22	34.67
Jul-23	0.27	0.09	0.45	76	25	127	26	34.80
Aug-23	0.36	0.13	0.66	101	35	185	40	39.96
Sep-23	0.13	0.00	0.27	37	0	77	18	48.81
Oct-23	0.23	0.04	0.45	64	12	126	30	46.86
Nov-23	0.50	0.27	0.72	140	75	201	31	21.81
Dec-23	0.05	0.00	0.13	13	0	37	11	84.22
Jan-24	0.55	0.39	0.71	154	110	198	23	14.97
Feb-24	0.51	0.24	0.76	142	67	213	38	26.89

Sitting Guillemots	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	4.96	3.92	6.12	2265	1787	2795	256	11.32
Apr-22	2.27	1.30	3.66	1038	595	1671	285	27.48
May-22	1.02	0.65	1.42	464	299	647	88	18.90
Jun-22	0.29	0.11	0.47	132	49	213	42	31.92
Jul-22	35.87	25.53	47.04	16374	11652	21472	2512	15.34
Aug-22	1.82	1.11	2.63	828	508	1198	178	21.55
Sep-22	3.64	2.54	5.00	1662	1159	2284	295	17.78
Oct-22	4.11	2.91	5.44	1874	1327	2485	302	16.13
Nov-22	5.56	4.57	6.55	2537	2086	2991	238	9.40
Dec-22	1.44	1.16	1.77	658	527	810	73	11.08
Jan-23	1.55	1.00	2.13	709	458	974	136	19.18
Feb-23	0.70	0.37	1.02	318	170	464	76	23.75
Mar-23	0.98	0.60	1.35	445	273	618	89	19.90
Apr-23	0.36	0.13	0.61	164	60	278	56	34.03
May-23	1.25	0.65	1.93	569	298	880	151	26.56
Jun-23	0.27	0.08	0.50	124	37	227	48	38.42
Jul-23	0.25	0.08	0.41	114	37	188	38	33.63
Aug-23	0.36	0.19	0.55	165	88	249	41	24.99
Sep-23	0.31	0.14	0.50	141	63	228	41	29.20
Oct-23	0.19	0.05	0.36	86	25	163	35	39.98
Nov-23	0.42	0.22	0.64	190	98	290	47	24.88
Dec-23	0.03	0.00	0.08	13	0	37	11	90.45
Jan-24	0.54	0.40	0.68	247	184	310	33	13.39
Feb-24	0.65	0.36	0.94	295	164	431	68	23.13

Sitting Guillemots	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	5.26	4.23	6.32	3459	2783	4160	367	10.60
Apr-22	2.00	1.33	2.91	1314	878	1915	274	20.86
May-22	0.98	0.65	1.36	646	429	898	125	19.31
Jun-22	0.33	0.17	0.52	220	114	340	57	25.80
Jul-22	33.48	23.91	43.65	22030	15733	28719	3248	14.74
Aug-22	2.18	1.46	3.08	1437	960	2028	269	18.72
Sep-22	4.24	2.83	6.20	2789	1861	4078	538	19.29
Oct-22	3.49	2.64	4.43	2296	1736	2912	315	13.74
Nov-22	5.30	4.51	6.07	3489	2964	3995	260	7.45
Dec-22	1.42	1.18	1.76	935	775	1158	100	10.75
Jan-23	1.47	1.01	1.97	970	665	1297	161	16.59
Feb-23	0.68	0.41	0.97	446	269	637	95	21.24
Mar-23	1.00	0.72	1.28	659	473	840	95	14.42
Apr-23	0.41	0.21	0.62	270	137	407	69	25.68
May-23	1.15	0.71	1.61	758	467	1060	155	20.40
Jun-23	0.32	0.17	0.47	208	112	312	52	24.83
Jul-23	0.19	0.08	0.31	126	51	201	38	30.01
Aug-23	0.35	0.19	0.55	227	125	359	59	25.98
Sep-23	0.43	0.18	0.74	283	118	488	96	34.08
Oct-23	0.25	0.11	0.43	167	70	281	53	32.04
Nov-23	0.39	0.25	0.53	256	166	351	47	18.30
Dec-23	0.04	0.00	0.09	26	0	62	16	64.13
Jan-24	0.53	0.44	0.62	347	288	406	31	8.98
Feb-24	0.85	0.51	1.19	557	338	780	114	20.46

Table 5.6: Apportioned Density and Abundance Estimates of Flying Guillemots across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Flying Guillemots	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.04	0.00	0.10	10	0	28	9	87.57
Apr-22	1.24	0.71	1.78	348	200	499	74	21.36
May-22	0.07	0.00	0.20	21	0	56	17	82.78
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.03	0.00	0.10	10	0	28	8	85.11
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.03	0.00	0.13	10	0	35	10	100.29
Nov-22	0.21	0.06	0.40	58	18	111	24	41.82
Dec-22	0.07	0.00	0.20	20	0	57	17	85.67
Jan-23	0.04	0.00	0.10	10	0	29	9	92.94
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.07	0.00	0.17	20	0	47	12	63.04
May-23	0.65	0.17	1.21	182	46	338	77	42.19
Jun-23	0.03	0.00	0.12	9	0	35	9	100.10
Jul-23	0.07	0.00	0.16	19	0	46	12	61.90
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.04	0.00	0.10	10	0	28	8	83.81
Nov-23	0.03	0.00	0.10	10	0	29	9	88.83
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Guillemots	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.02	0.00	0.06	9	0	28	9	94.26
Apr-22	1.18	0.83	1.47	538	380	669	75	13.86
May-22	0.04	0.00	0.12	20	0	57	18	89.51
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.04	0.00	0.10	19	0	47	12	64.21
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.02	0.00	0.06	10	0	29	9	97.56
Nov-22	0.13	0.04	0.23	57	18	106	24	42.30
Dec-22	0.06	0.00	0.15	28	0	66	18	65.01
Jan-23	0.04	0.00	0.12	19	0	56	17	88.70
Feb-23	0.48	0.00	1.19	218	0	542	150	68.98
Mar-23	0.04	0.00	0.13	20	0	58	19	94.88
Apr-23	0.21	0.04	0.45	97	18	206	50	51.28
May-23	0.95	0.36	1.55	433	166	709	139	32.16
Jun-23	0.02	0.00	0.06	10	0	28	9	86.69
Jul-23	0.04	0.00	0.10	19	0	46	12	61.67
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.04	0.00	0.10	19	0	44	11	58.53
Nov-23	0.02	0.00	0.06	10	0	29	9	92.44
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Guillemots	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.01	0.00	0.04	10	0	29	9	90.99
Apr-22	1.29	0.89	1.70	846	588	1117	136	16.06
May-22	0.03	0.00	0.09	19	0	57	17	89.51
Jun-22	0.02	0.00	0.06	10	0	37	10	96.74
Jul-22	0.08	0.01	0.14	50	9	94	21	41.72
Aug-22	0.01	0.00	0.04	10	0	29	9	96.59
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.03	0.00	0.07	20	0	47	12	62.58
Nov-22	0.10	0.03	0.18	68	19	119	25	36.60
Dec-22	0.09	0.03	0.16	61	19	107	23	37.51
Jan-23	0.16	0.01	0.34	105	10	224	55	52.08
Feb-23	0.61	0.13	1.24	400	84	815	188	47.11
Mar-23	0.04	0.00	0.11	29	0	75	20	69.13
Apr-23	0.23	0.07	0.43	154	46	281	62	40.03
May-23	1.14	0.52	1.99	749	339	1309	243	32.50
Jun-23	0.06	0.00	0.13	38	0	84	21	53.88
Jul-23	0.04	0.00	0.10	29	0	64	15	50.55
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.02	0.00	0.04	10	0	29	9	91.92
Oct-23	0.03	0.00	0.07	20	0	46	12	58.48
Nov-23	0.01	0.00	0.04	9	0	28	9	99.04
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 5.7: Apportioned Density and Abundance Estimates of Sitting and Flying Guillemots (Without Correction for Availability Bias) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Guillemots	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	3.58	2.71	4.62	1001	758	1292	140	13.98
Apr-22	2.25	1.57	2.95	630	440	827	98	15.52
May-22	0.66	0.23	1.17	184	66	329	67	36.21
Jun-22	0.27	0.10	0.43	76	27	121	25	32.48
Jul-22	30.09	21.28	39.95	8420	5955	11177	1421	16.88
Aug-22	1.07	0.59	1.63	298	165	455	78	26.10
Sep-22	2.23	1.66	2.88	623	465	807	88	14.18
Oct-22	2.96	1.66	4.35	828	465	1218	193	23.28
Nov-22	4.56	3.48	5.75	1276	974	1610	161	12.64
Dec-22	1.03	0.78	1.32	289	218	369	40	13.77
Jan-23	1.24	0.77	1.79	346	217	502	70	20.16
Feb-23	0.28	0.07	0.49	77	19	138	31	40.06
Mar-23	0.85	0.37	1.31	237	103	367	68	28.71
Apr-23	0.28	0.07	0.58	77	18	162	38	48.85
May-23	1.51	0.83	2.25	422	231	631	103	24.44
Jun-23	0.21	0.09	0.36	58	26	100	20	33.97
Jul-23	0.27	0.10	0.44	77	28	123	23	30.22
Aug-23	0.27	0.10	0.50	76	27	141	31	39.96
Sep-23	0.10	0.00	0.21	28	0	58	14	48.81
Oct-23	0.21	0.06	0.39	58	18	110	24	41.60
Nov-23	0.42	0.24	0.59	116	66	164	25	21.31
Dec-23	0.04	0.00	0.10	10	0	28	8	84.22
Jan-24	0.42	0.30	0.54	117	84	150	18	14.97
Feb-24	0.39	0.18	0.58	108	51	162	29	26.89

Guillemots	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	3.79	2.99	4.68	1729	1364	2138	196	11.31
Apr-22	2.91	2.06	4.05	1327	938	1847	233	17.53
May-22	0.81	0.52	1.12	372	237	512	69	18.58
Jun-22	0.22	0.08	0.36	100	37	162	32	31.92
Jul-22	27.29	19.45	35.77	12455	8879	16327	1908	15.32
Aug-22	1.38	0.85	1.99	629	386	910	136	21.55
Sep-22	2.77	1.93	3.80	1262	880	1735	224	17.78
Oct-22	3.14	2.21	4.17	1433	1010	1905	230	16.05
Nov-22	4.35	3.62	5.11	1984	1651	2334	183	9.24
Dec-22	1.16	0.93	1.43	528	425	653	59	11.16
Jan-23	1.22	0.78	1.67	558	354	760	105	18.75
Feb-23	1.01	0.41	1.75	459	189	798	159	34.60
Mar-23	0.78	0.49	1.07	358	221	490	70	19.48
Apr-23	0.48	0.22	0.78	221	101	355	64	28.84
May-23	1.90	1.13	2.72	866	517	1242	184	21.30
Jun-23	0.23	0.08	0.41	104	36	186	38	36.01
Jul-23	0.23	0.10	0.36	106	46	165	31	29.68
Aug-23	0.27	0.15	0.41	125	67	189	31	24.99
Sep-23	0.23	0.11	0.38	107	48	173	31	29.20
Oct-23	0.19	0.08	0.32	85	37	147	29	33.75
Nov-23	0.34	0.18	0.51	154	82	233	37	24.19
Dec-23	0.02	0.00	0.06	10	0	28	9	90.45
Jan-24	0.41	0.31	0.52	188	140	235	25	13.39
Feb-24	0.49	0.27	0.72	224	125	327	52	23.13

Guillemots	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	4.01	3.22	4.82	2637	2120	3169	279	10.57
Apr-22	2.80	2.12	3.57	1844	1392	2348	248	13.43
May-22	0.77	0.52	1.07	510	344	705	96	18.86
Jun-22	0.27	0.14	0.41	178	95	271	44	24.72
Jul-22	25.51	18.26	33.24	16782	12014	21868	2466	14.70
Aug-22	1.67	1.12	2.35	1101	738	1548	205	18.58
Sep-22	3.22	2.15	4.71	2118	1413	3097	408	19.29
Oct-22	2.68	2.03	3.40	1763	1338	2239	240	13.60
Nov-22	4.13	3.52	4.72	2718	2319	3104	198	7.28
Dec-22	1.17	0.97	1.44	771	636	945	80	10.34
Jan-23	1.28	0.87	1.67	842	575	1101	134	15.88
Feb-23	1.12	0.59	1.81	738	389	1188	203	27.47
Mar-23	0.81	0.57	1.02	530	377	674	75	14.22
Apr-23	0.55	0.30	0.80	359	201	526	82	22.89
May-23	2.01	1.30	3.04	1325	857	1999	271	20.49
Jun-23	0.30	0.18	0.43	196	119	285	44	22.44
Jul-23	0.19	0.10	0.29	125	65	191	32	25.92
Aug-23	0.26	0.14	0.41	173	95	273	45	25.98
Sep-23	0.34	0.15	0.58	225	96	380	73	32.54
Oct-23	0.22	0.10	0.36	146	66	234	42	28.72
Nov-23	0.31	0.20	0.42	204	133	275	37	17.98
Dec-23	0.03	0.00	0.07	19	0	47	12	64.13
Jan-24	0.40	0.33	0.47	264	219	308	24	8.98
Feb-24	0.64	0.39	0.90	423	257	593	87	20.46

Table 5.8: Apportioned Density and Abundance Estimates of Sitting and Flying Guillemots (Corrected for Availability Bias) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Guillemots	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	4.70	3.57	6.07	1315	998	1698	184	13.99
Apr-22	2.57	1.78	3.36	719	498	941	112	15.60
May-22	0.84	0.29	1.52	235	82	425	86	36.72
Jun-22	0.36	0.13	0.57	101	35	160	33	32.48
Jul-22	39.61	28.01	52.60	11083	7838	14716	1871	16.88
Aug-22	1.40	0.78	2.14	392	217	600	102	26.10
Sep-22	2.93	2.19	3.80	820	613	1062	116	14.18
Oct-22	3.88	2.18	5.71	1087	610	1599	253	23.32
Nov-22	5.94	4.51	7.49	1661	1261	2097	211	12.71
Dec-22	1.34	1.02	1.70	375	285	475	51	13.49
Jan-23	1.62	1.01	2.34	452	284	655	91	20.19
Feb-23	0.36	0.09	0.65	102	25	181	41	40.06
Mar-23	1.12	0.48	1.73	313	135	484	90	28.71
Apr-23	0.34	0.08	0.73	96	21	204	49	50.88
May-23	1.78	0.97	2.60	498	272	727	119	23.98
Jun-23	0.26	0.12	0.45	73	32	127	24	33.40
Jul-23	0.34	0.13	0.55	95	37	153	29	30.37
Aug-23	0.36	0.13	0.66	101	35	185	40	39.96
Sep-23	0.13	0.00	0.27	37	0	77	18	48.81
Oct-23	0.26	0.08	0.50	74	22	140	31	42.24
Nov-23	0.54	0.31	0.76	150	87	212	32	21.19
Dec-23	0.05	0.00	0.13	13	0	37	11	84.22
Jan-24	0.55	0.39	0.71	154	110	198	23	14.97
Feb-24	0.51	0.24	0.76	142	67	213	38	26.89

Guillemots	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	4.98	3.93	6.15	2274	1794	2805	257	11.31
Apr-22	3.45	2.38	4.92	1576	1087	2245	298	18.93
May-22	1.06	0.68	1.46	483	308	668	90	18.55
Jun-22	0.29	0.11	0.47	132	49	213	42	31.92
Jul-22	35.92	25.58	47.08	16393	11676	21491	2512	15.32
Aug-22	1.82	1.11	2.63	828	508	1198	178	21.55
Sep-22	3.64	2.54	5.00	1662	1159	2284	295	17.78
Oct-22	4.13	2.91	5.48	1883	1330	2502	303	16.07
Nov-22	5.68	4.72	6.71	2594	2155	3061	240	9.26
Dec-22	1.50	1.22	1.86	687	557	847	76	11.04
Jan-23	1.60	1.02	2.17	728	466	992	137	18.80
Feb-23	1.17	0.54	1.93	536	245	881	166	30.94
Mar-23	1.02	0.63	1.40	465	286	639	90	19.45
Apr-23	0.57	0.26	0.89	260	120	407	73	28.00
May-23	2.20	1.35	3.13	1003	617	1431	210	20.95
Jun-23	0.29	0.10	0.52	134	46	239	49	36.37
Jul-23	0.29	0.12	0.46	133	55	210	40	30.10
Aug-23	0.36	0.19	0.55	165	88	249	41	24.99
Sep-23	0.31	0.14	0.50	141	63	228	41	29.20
Oct-23	0.23	0.10	0.41	106	44	185	36	34.49
Nov-23	0.44	0.23	0.67	200	105	304	48	24.21
Dec-23	0.03	0.00	0.08	13	0	37	11	90.45
Jan-24	0.54	0.40	0.68	247	184	310	33	13.39
Feb-24	0.65	0.36	0.94	295	164	431	68	23.13

Guillemots	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	5.27	4.24	6.34	3468	2792	4170	367	10.57
Apr-22	3.28	2.48	4.25	2160	1629	2799	305	14.12
May-22	1.01	0.68	1.39	665	451	917	126	18.91
Jun-22	0.35	0.19	0.54	231	124	352	57	24.85
Jul-22	33.56	24.01	43.73	22080	15798	28775	3247	14.71
Aug-22	2.20	1.47	3.09	1447	970	2035	269	18.61
Sep-22	4.24	2.83	6.20	2789	1861	4078	538	19.29
Oct-22	3.52	2.66	4.48	2316	1753	2947	316	13.63
Nov-22	5.41	4.60	6.18	3557	3029	4068	260	7.31
Dec-22	1.51	1.25	1.86	996	825	1227	103	10.35
Jan-23	1.63	1.13	2.14	1075	742	1408	170	15.79
Feb-23	1.29	0.72	2.02	846	474	1327	212	25.11
Mar-23	1.05	0.75	1.33	688	492	877	98	14.17
Apr-23	0.64	0.37	0.93	424	244	615	94	22.18
May-23	2.29	1.50	3.33	1507	986	2194	290	19.23
Jun-23	0.37	0.22	0.54	246	146	355	55	22.46
Jul-23	0.24	0.12	0.36	155	79	238	41	26.22
Aug-23	0.35	0.19	0.55	227	125	359	59	25.98
Sep-23	0.45	0.19	0.76	293	125	499	96	32.85
Oct-23	0.28	0.13	0.46	187	84	300	55	29.23
Nov-23	0.40	0.26	0.54	265	174	357	48	17.96
Dec-23	0.04	0.00	0.09	26	0	62	16	64.13
Jan-24	0.53	0.44	0.62	347	288	406	31	8.98
Feb-24	0.85	0.51	1.19	557	338	780	114	20.46

6 Razorbill

Table 6.1: Density and Abundance Estimates of Sitting Razorbills (Without Apportionment of Unidentified Auks) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Month	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.21	0.00	0.49	57	0	138	35	60.82
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.10	0.00	0.23	29	0	66	18	62.64
Jul-22	3.61	2.53	4.71	1010	709	1318	155	15.39
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.03	0.00	0.10	9	0	29	9	98.93
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Jan-24	0.03	0.00	0.10	9	0	28	8	88.90
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00
Survey (WFDA + 2 km)								
Mar-22	0.23	0.06	0.44	105	29	199	42	40.29
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.08	0.00	0.20	38	0	93	25	65.74
Jul-22	4.16	3.26	5.10	1899	1489	2329	217	11.45
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.04	0.00	0.12	19	0	57	17	92.92
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.02	0.00	0.06	10	0	29	9	95.26
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.02	0.00	0.06	9	0	28	8	90.49
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.20	0.08	0.33	129	54	216	42	32.29
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.15	0.04	0.28	97	27	182	40	41.48
Jul-22	3.86	3.02	4.74	2540	1990	3120	285	11.23
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.03	0.00	0.09	19	0	57	17	91.39
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.01	0.00	0.04	9	0	29	9	99.29
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.01	0.00	0.04	10	0	29	9	92.83
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 6.2: Density and Abundance Estimates of Flying Razorbills (Without Apportionment of Unidentified Auks) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Flying Razorbills	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Razorbills	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.02	0.00	0.06	10	0	29	9	96.33
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.13	0.00	0.33	57	0	151	44	77.04
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Razorbills	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.02	0.00	0.06	10	0	36	10	99.76
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.09	0.00	0.25	59	0	163	46	78.25
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 6.3: Density and Abundance Estimates of Sitting and Flying Razorbills (Without Apportionment of Unidentified Auks) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Razorbills	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.21	0.00	0.48	58	0	134	34	59.33
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.10	0.00	0.24	28	0	67	18	62.47
Jul-22	3.62	2.59	4.80	1012	723	1342	164	16.18
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.04	0.00	0.10	10	0	29	9	91.86
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.03	0.00	0.10	9	0	28	8	86.25
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Razorbills	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.24	0.08	0.43	108	36	198	42	39.27
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.10	0.00	0.23	47	0	105	26	55.51
Jul-22	4.15	3.21	5.05	1895	1465	2305	219	11.56
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.13	0.00	0.35	59	0	158	43	73.13
Mar-23	0.04	0.00	0.12	20	0	57	17	87.75
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.02	0.00	0.06	10	0	29	9	93.16
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.02	0.00	0.06	9	0	28	9	92.10
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Razorbills	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.19	0.07	0.32	127	49	211	41	32.14
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.16	0.04	0.29	107	29	189	41	38.48
Jul-22	3.84	3.00	4.66	2526	1975	3065	285	11.27
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.09	0.00	0.24	58	0	157	44	77.00
Mar-23	0.03	0.00	0.09	20	0	57	18	90.41
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.01	0.00	0.04	9	0	29	9	99.68
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.01	0.00	0.04	9	0	29	9	97.91
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 6.4: Apportioned Density and Abundance Estimates of Sitting Razorbills (Without Correction for Availability Bias) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Sitting Razorbills	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.22	0.01	0.49	62	4	137	34	55.12
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.10	0.00	0.24	28	0	66	18	64.92
Jul-22	4.17	2.98	5.45	1166	833	1524	182	15.59
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.03	0.00	0.10	9	0	28	9	94.86
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.04	0.00	0.10	10	0	28	8	83.81
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Sitting Razorbills	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.25	0.08	0.45	115	36	204	42	36.77
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.10	0.00	0.22	44	0	102	28	62.84
Jul-22	4.66	3.64	5.66	2128	1661	2584	235	11.02
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.04	0.00	0.12	20	0	57	17	87.98
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.02	0.00	0.06	10	0	29	9	96.24
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.02	0.00	0.06	10	0	29	9	85.50
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Sitting Razorbills	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.21	0.09	0.35	140	60	227	44	31.51
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.16	0.03	0.29	104	19	192	44	42.57
Jul-22	4.35	3.42	5.22	2859	2247	3434	295	10.30
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.03	0.00	0.09	20	0	58	18	88.90
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.01	0.00	0.04	10	0	29	9	95.92
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.02	0.00	0.04	10	0	29	9	89.83
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 6.5: Apportioned Density and Abundance Estimates of Sitting Razorbills (Corrected for Availability Bias) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Sitting Razorbills	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.27	0.02	0.60	76	5	168	42	55.12
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.12	0.00	0.29	34	0	81	22	64.92
Jul-22	5.09	3.64	6.66	1425	1018	1862	222	15.59
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.04	0.00	0.12	12	0	35	11	94.86
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.04	0.00	0.12	12	0	34	10	83.81
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Sitting Razorbills	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.31	0.10	0.55	140	44	249	52	36.77
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.12	0.00	0.27	54	0	125	34	62.84
Jul-22	5.70	4.45	6.92	2600	2030	3158	287	11.02
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.05	0.00	0.15	24	0	69	21	87.98
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.03	0.00	0.08	12	0	35	12	96.24
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.03	0.00	0.08	13	0	35	11	85.50
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Sitting Razorbills	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.26	0.11	0.42	171	73	278	54	31.51
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.19	0.04	0.36	127	23	235	54	42.57
Jul-22	5.31	4.17	6.38	3495	2747	4197	360	10.30
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.04	0.00	0.11	24	0	70	22	88.90
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.02	0.00	0.05	12	0	35	11	95.92
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.02	0.00	0.05	12	0	35	11	89.83
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 6.6: Apportioned Density and Abundance Estimates of Flying Razorbills across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Flying Razorbills	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Razorbills	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.02	0.00	0.06	9	0	29	9	101.02
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.13	0.00	0.35	59	0	159	45	76.18
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Razorbills	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.01	0.00	0.04	10	0	29	9	98.05
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.09	0.00	0.24	57	0	155	45	78.08
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 6.7: Apportioned Density and Abundance Estimates of Sitting and Flying Razorbills (Without Correction for Availability Bias) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Razorbills	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.22	0.01	0.49	62	4	137	34	55.12
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.10	0.00	0.24	28	0	66	18	64.92
Jul-22	4.17	2.98	5.45	1166	833	1524	182	15.59
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.03	0.00	0.10	9	0	28	9	94.86
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.04	0.00	0.10	10	0	28	8	83.81
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Razorbills	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.25	0.08	0.45	115	36	204	42	36.77
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.12	0.00	0.25	54	0	114	29	54.52
Jul-22	4.66	3.64	5.66	2128	1661	2584	235	11.02
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.13	0.00	0.35	59	0	159	45	76.18
Mar-23	0.04	0.00	0.12	20	0	57	17	87.98
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.02	0.00	0.06	10	0	29	9	96.24
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.02	0.00	0.06	10	0	29	9	85.50
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Razorbills	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.21	0.09	0.35	140	60	227	44	31.51
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.17	0.04	0.31	113	28	203	45	39.49
Jul-22	4.35	3.42	5.22	2859	2247	3434	295	10.30
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.09	0.00	0.24	57	0	155	45	78.08
Mar-23	0.03	0.00	0.09	20	0	58	18	88.90
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.01	0.00	0.04	10	0	29	9	95.92
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.02	0.00	0.04	10	0	29	9	89.83
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 6.8: Apportioned Density and Abundance Estimates of Sitting and Flying Razorbills (Corrected for Availability Bias) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Razorbills	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.27	0.02	0.60	76	5	168	42	55.12
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.12	0.00	0.29	34	0	81	22	64.92
Jul-22	5.09	3.64	6.66	1425	1018	1862	222	15.59
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.04	0.00	0.12	12	0	35	11	94.86
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.04	0.00	0.12	12	0	34	10	83.81
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Razorbills	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.31	0.10	0.55	140	44	249	52	36.77
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.14	0.00	0.30	63	0	137	35	55.39
Jul-22	5.70	4.45	6.92	2600	2030	3158	287	11.02
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.13	0.00	0.35	59	0	159	45	76.18
Mar-23	0.05	0.00	0.15	24	0	69	21	87.98
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.03	0.00	0.08	12	0	35	12	96.24
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.03	0.00	0.08	13	0	35	11	85.50
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Razorbills	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.26	0.11	0.42	171	73	278	54	31.51
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.21	0.05	0.37	136	31	247	54	39.88
Jul-22	5.31	4.17	6.38	3495	2747	4197	360	10.30
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.09	0.00	0.24	57	0	155	45	78.08
Mar-23	0.04	0.00	0.11	24	0	70	22	88.90
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.02	0.00	0.05	12	0	35	11	95.92
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.02	0.00	0.05	12	0	35	11	89.83
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

7 Puffin

Table 7.1: Density and Abundance Estimates of Sitting Puffins (Without Apportionment of Unidentified Auks) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Month	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.65	0.32	1.04	183	91	292	52	28.31
Apr-22	0.14	0.03	0.30	39	8	83	20	52.29
May-22	0.57	0.33	0.86	160	93	241	37	23.06
Jun-22	0.07	0.00	0.14	19	0	38	11	55.93
Jul-22	0.58	0.17	1.05	162	47	294	63	38.69
Aug-22	0.03	0.00	0.10	10	0	28	8	86.63
Sep-22	0.40	0.10	0.86	113	27	241	56	49.68
Oct-22	0.07	0.00	0.13	19	0	38	10	53.75
Nov-22	0.03	0.00	0.10	9	0	28	8	90.56
Dec-22	0.03	0.00	0.10	9	0	28	8	86.33
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.07	0.00	0.16	19	0	44	12	61.38
Apr-23	0.04	0.00	0.10	10	0	29	9	93.68
May-23	0.10	0.00	0.24	29	0	67	18	62.41
Jun-23	0.07	0.00	0.15	19	0	42	11	54.41
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.03	0.00	0.10	10	0	29	9	93.98
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.14	0.03	0.24	38	9	67	15	38.65
Survey (WFDA + 2 km)								
Mar-22	0.80	0.45	1.20	365	207	550	90	24.54
Apr-22	0.09	0.02	0.18	40	9	83	20	50.49
May-22	0.63	0.47	0.83	289	217	381	42	14.59
Jun-22	0.04	0.00	0.10	20	0	44	11	58.18
Jul-22	0.51	0.18	0.84	231	83	384	79	34.10
Aug-22	0.02	0.00	0.06	10	0	28	9	91.63
Sep-22	0.34	0.12	0.65	157	53	298	66	42.29
Oct-22	0.11	0.04	0.20	49	18	92	20	40.49
Nov-22	0.02	0.00	0.06	10	0	29	9	88.16
Dec-22	0.02	0.00	0.06	10	0	28	8	87.09
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.04	0.00	0.10	20	0	45	12	60.73
Apr-23	0.02	0.00	0.06	10	0	29	9	93.00
May-23	0.06	0.00	0.15	28	0	70	19	67.69
Jun-23	0.09	0.04	0.14	39	18	64	13	31.89
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.02	0.00	0.08	10	0	36	10	100.47
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.02	0.00	0.06	10	0	29	9	96.73
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.02	0.00	0.06	10	0	29	9	97.90
Feb-24	0.10	0.04	0.18	48	18	82	17	34.80

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.90	0.64	1.18	592	423	779	93	15.66
Apr-22	0.09	0.03	0.15	59	19	101	21	35.78
May-22	0.56	0.43	0.72	367	282	472	47	12.90
Jun-22	0.03	0.00	0.07	20	0	46	12	59.90
Jul-22	0.42	0.19	0.67	279	125	441	82	29.58
Aug-22	0.03	0.00	0.07	18	0	47	12	67.32
Sep-22	0.36	0.16	0.57	235	106	378	70	29.64
Oct-22	0.12	0.06	0.20	79	36	131	25	31.72
Nov-22	0.04	0.01	0.09	29	9	56	14	46.75
Dec-22	0.01	0.00	0.04	10	0	29	9	91.82
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.06	0.01	0.12	37	9	77	19	49.94
Apr-23	0.01	0.00	0.04	10	0	29	9	89.25
May-23	0.08	0.01	0.14	49	10	92	20	40.96
Jun-23	0.07	0.03	0.13	49	18	87	19	39.44
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.01	0.00	0.04	10	0	29	9	95.93
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.02	0.00	0.06	10	0	37	10	99.78
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.01	0.00	0.04	10	0	29	10	99.74
Feb-24	0.13	0.07	0.20	88	46	129	22	24.77

Table 7.2: Density and Abundance Estimates of Flying Puffins (Without Apportionment of Unidentified Auks) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Flying Puffins	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Puffins	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Puffins	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 7.3: Density and Abundance Estimates of Sitting and Flying Puffins (Without Apportionment of Unidentified Auks) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Puffins	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.65	0.31	1.03	183	88	287	51	28.05
Apr-22	0.14	0.00	0.31	39	0	86	21	54.80
May-22	0.58	0.34	0.87	162	95	242	39	23.88
Jun-22	0.07	0.00	0.13	19	0	38	10	52.85
Jul-22	0.58	0.20	1.06	162	55	296	62	38.45
Aug-22	0.03	0.00	0.10	9	0	28	9	91.75
Sep-22	0.41	0.09	0.82	115	25	230	55	48.03
Oct-22	0.07	0.00	0.14	19	0	38	11	56.72
Nov-22	0.03	0.00	0.10	9	0	28	8	89.47
Dec-22	0.04	0.00	0.10	10	0	28	8	84.97
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.07	0.00	0.16	19	0	44	11	57.69
Apr-23	0.03	0.00	0.10	10	0	29	9	95.05
May-23	0.10	0.00	0.25	29	0	69	19	63.62
Jun-23	0.07	0.00	0.15	19	0	42	10	53.14
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.04	0.00	0.10	10	0	29	9	92.08
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.14	0.03	0.24	39	9	68	15	38.53

Puffins	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.79	0.44	1.17	363	201	535	87	24.01
Apr-22	0.08	0.02	0.18	39	9	82	20	50.70
May-22	0.64	0.46	0.84	291	212	383	43	14.68
Jun-22	0.04	0.00	0.10	19	0	45	12	60.72
Jul-22	0.50	0.20	0.85	229	89	390	79	34.51
Aug-22	0.02	0.00	0.06	9	0	28	9	91.74
Sep-22	0.33	0.10	0.67	150	44	305	67	44.94
Oct-22	0.10	0.04	0.20	48	17	90	19	38.97
Nov-22	0.02	0.00	0.06	10	0	28	8	86.06
Dec-22	0.02	0.00	0.06	10	0	28	9	90.05
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.04	0.00	0.10	19	0	46	12	60.10
Apr-23	0.02	0.00	0.06	10	0	29	9	89.45
May-23	0.06	0.00	0.15	28	0	67	19	66.66
Jun-23	0.08	0.04	0.14	38	18	62	12	31.45
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.02	0.00	0.06	10	0	29	9	96.88
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.02	0.00	0.06	10	0	29	9	94.17
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.02	0.00	0.08	9	0	36	10	105.93
Feb-24	0.11	0.04	0.18	49	19	81	15	31.03

Puffins	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.91	0.63	1.20	598	416	791	97	16.21
Apr-22	0.09	0.03	0.16	58	19	104	21	36.65
May-22	0.56	0.43	0.72	369	280	472	48	12.89
Jun-22	0.03	0.00	0.07	19	0	45	12	61.31
Jul-22	0.42	0.19	0.68	277	126	448	83	29.80
Aug-22	0.03	0.00	0.07	20	0	47	12	63.19
Sep-22	0.36	0.17	0.59	234	113	385	70	30.11
Oct-22	0.12	0.06	0.20	80	37	132	24	30.02
Nov-22	0.05	0.01	0.09	30	9	57	13	43.83
Dec-22	0.02	0.00	0.04	10	0	29	9	88.65
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.06	0.00	0.12	38	0	81	19	50.37
Apr-23	0.02	0.00	0.04	10	0	29	9	89.69
May-23	0.07	0.01	0.14	49	9	90	20	41.68
Jun-23	0.07	0.03	0.13	49	18	88	19	38.41
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.01	0.00	0.04	10	0	29	9	93.80
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.01	0.00	0.04	10	0	29	9	93.64
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.01	0.00	0.04	10	0	29	9	95.26
Feb-24	0.13	0.07	0.20	87	44	131	23	26.01

Table 7.4: Apportioned Density and Abundance Estimates of Sitting Puffins (Without Correction for Availability Bias) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Sitting Puffins	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.90	0.53	1.33	252	148	371	57	22.62
Apr-22	0.28	0.10	0.46	78	28	130	26	33.58
May-22	0.65	0.36	0.98	183	102	275	44	23.85
Jun-22	0.07	0.00	0.15	20	0	42	11	55.90
Jul-22	1.28	0.81	1.79	358	227	500	71	19.79
Aug-22	0.13	0.00	0.29	36	0	82	22	60.19
Sep-22	0.48	0.10	0.93	135	29	260	59	43.77
Oct-22	0.17	0.06	0.29	47	17	80	17	35.24
Nov-22	0.07	0.00	0.14	19	0	38	10	53.59
Dec-22	0.04	0.00	0.11	12	0	30	8	69.73
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.12	0.03	0.23	35	9	64	15	42.22
Apr-23	0.03	0.00	0.10	9	0	29	10	102.41
May-23	0.10	0.00	0.24	29	0	67	18	64.34
Jun-23	0.14	0.03	0.25	39	9	71	16	41.56
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.04	0.00	0.10	10	0	29	10	95.39
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.01	0.00	0.03	3	0	10	3	94.09
Feb-24	0.20	0.06	0.38	55	17	107	23	40.74

Sitting Puffins	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	1.15	0.75	1.59	525	343	725	100	19.11
Apr-22	0.21	0.06	0.37	95	29	170	36	37.79
May-22	0.70	0.51	0.92	321	232	422	49	15.12
Jun-22	0.04	0.00	0.10	19	0	44	11	58.67
Jul-22	1.18	0.77	1.59	540	354	727	94	17.36
Aug-22	0.08	0.00	0.18	36	0	82	23	64.62
Sep-22	0.37	0.12	0.70	169	56	321	68	40.22
Oct-22	0.28	0.16	0.41	127	72	189	30	23.50
Nov-22	0.09	0.02	0.15	39	9	67	15	38.26
Dec-22	0.03	0.00	0.07	14	0	33	9	66.31
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.11	0.04	0.19	51	16	89	19	36.72
Apr-23	0.02	0.00	0.06	9	0	29	9	92.09
May-23	0.17	0.06	0.27	78	28	124	25	31.97
Jun-23	0.13	0.04	0.24	58	18	111	25	43.50
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.02	0.00	0.06	10	0	29	10	99.54
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.02	0.00	0.06	10	0	29	9	94.23
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.03	0.00	0.07	13	0	34	10	76.02
Feb-24	0.14	0.06	0.24	65	25	110	22	33.55

Sitting Puffins	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	1.34	1.04	1.63	884	685	1075	100	11.35
Apr-22	0.19	0.10	0.29	126	65	193	34	26.79
May-22	0.62	0.46	0.79	409	303	520	58	14.06
Jun-22	0.03	0.00	0.07	20	0	46	12	59.95
Jul-22	1.02	0.69	1.34	674	456	882	109	16.12
Aug-22	0.08	0.02	0.15	53	12	100	24	44.74
Sep-22	0.42	0.24	0.64	278	160	422	67	24.17
Oct-22	0.25	0.16	0.35	164	106	233	33	19.86
Nov-22	0.10	0.06	0.16	67	36	104	18	26.31
Dec-22	0.03	0.00	0.06	18	2	39	10	54.43
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.12	0.06	0.18	77	38	120	22	28.01
Apr-23	0.01	0.00	0.04	9	0	29	9	95.67
May-23	0.22	0.10	0.36	147	65	240	45	30.85
Jun-23	0.10	0.03	0.20	68	19	129	29	43.59
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.03	0.00	0.07	20	0	48	13	68.07
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.01	0.00	0.04	10	0	29	9	94.66
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.02	0.00	0.05	13	0	32	9	72.68
Feb-24	0.17	0.09	0.28	114	56	183	32	28.31

Table 7.5: Apportioned Density and Abundance Estimates of Sitting Puffins (Corrected for Availability Bias) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Sitting Puffins	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	1.05	0.62	1.54	294	173	432	66	22.62
Apr-22	0.32	0.12	0.54	91	33	152	31	33.58
May-22	0.76	0.42	1.14	213	119	320	51	23.85
Jun-22	0.08	0.00	0.18	23	0	49	13	55.90
Jul-22	1.49	0.94	2.08	417	264	583	83	19.79
Aug-22	0.15	0.00	0.34	42	0	95	25	60.19
Sep-22	0.56	0.12	1.08	157	33	303	69	43.77
Oct-22	0.20	0.07	0.33	55	20	93	19	35.24
Nov-22	0.08	0.00	0.16	22	0	45	12	53.59
Dec-22	0.05	0.00	0.12	14	0	35	10	69.73
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.15	0.04	0.27	41	10	74	17	42.22
Apr-23	0.04	0.00	0.12	11	0	34	11	102.41
May-23	0.12	0.00	0.28	33	0	78	21	64.34
Jun-23	0.16	0.04	0.29	45	11	83	19	41.56
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.04	0.00	0.12	12	0	34	11	95.39
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.01	0.00	0.04	4	0	11	4	94.09
Feb-24	0.23	0.07	0.45	64	20	125	26	40.74

Sitting Puffins	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	1.34	0.88	1.85	612	400	845	117	19.11
Apr-22	0.24	0.07	0.43	111	33	198	42	37.79
May-22	0.82	0.59	1.08	374	270	492	57	15.12
Jun-22	0.05	0.00	0.11	22	0	51	13	58.67
Jul-22	1.38	0.90	1.86	629	412	847	109	17.36
Aug-22	0.09	0.00	0.21	41	0	95	27	64.62
Sep-22	0.43	0.14	0.82	197	65	374	79	40.22
Oct-22	0.32	0.18	0.48	147	83	221	35	23.50
Nov-22	0.10	0.02	0.17	46	11	78	17	38.26
Dec-22	0.04	0.00	0.08	16	0	38	11	66.31
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.13	0.04	0.23	60	19	104	22	36.72
Apr-23	0.02	0.00	0.07	11	0	33	10	92.09
May-23	0.20	0.07	0.32	90	32	145	29	31.97
Jun-23	0.15	0.05	0.28	68	21	129	29	43.50
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.02	0.00	0.07	11	0	34	11	99.54
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.02	0.00	0.07	11	0	33	11	94.23
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.03	0.00	0.09	15	0	39	11	76.02
Feb-24	0.17	0.06	0.28	76	30	128	26	33.55

Sitting Puffins	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	1.57	1.21	1.90	1030	798	1252	117	11.35
Apr-22	0.22	0.12	0.34	147	76	224	39	26.79
May-22	0.72	0.54	0.92	477	353	606	67	14.06
Jun-22	0.04	0.00	0.08	24	0	54	14	59.95
Jul-22	1.19	0.81	1.56	785	531	1028	126	16.12
Aug-22	0.09	0.02	0.18	62	14	117	28	44.74
Sep-22	0.49	0.28	0.75	324	186	492	78	24.17
Oct-22	0.29	0.19	0.41	191	123	271	38	19.86
Nov-22	0.12	0.06	0.18	78	42	121	21	26.31
Dec-22	0.03	0.00	0.07	20	3	45	11	54.43
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.14	0.07	0.21	90	44	140	25	28.01
Apr-23	0.02	0.00	0.05	11	0	33	10	95.67
May-23	0.26	0.11	0.42	172	75	279	53	30.85
Jun-23	0.12	0.03	0.23	79	22	150	34	43.59
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.03	0.00	0.09	23	0	56	16	68.07
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.02	0.00	0.05	11	0	33	11	94.66
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.02	0.00	0.06	15	0	38	11	72.68
Feb-24	0.20	0.10	0.32	133	66	213	38	28.31

Table 7.6: Apportioned Density and Abundance Estimates of Flying Puffins across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Flying Puffin	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Puffin	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Puffin	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 7.7: Apportioned Density and Abundance Estimates of Sitting and Flying Puffins (Without Correction for Availability Bias) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-based Analysis

Puffins	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.90	0.53	1.33	252	148	371	57	22.62
Apr-22	0.28	0.10	0.46	78	28	130	26	33.58
May-22	0.65	0.36	0.98	183	102	275	44	23.85
Jun-22	0.07	0.00	0.15	20	0	42	11	55.90
Jul-22	1.28	0.81	1.79	358	227	500	71	19.79
Aug-22	0.13	0.00	0.29	36	0	82	22	60.19
Sep-22	0.48	0.10	0.93	135	29	260	59	43.77
Oct-22	0.17	0.06	0.29	47	17	80	17	35.24
Nov-22	0.07	0.00	0.14	19	0	38	10	53.59
Dec-22	0.04	0.00	0.11	12	0	30	8	69.73
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.12	0.03	0.23	35	9	64	15	42.22
Apr-23	0.03	0.00	0.10	9	0	29	10	102.41
May-23	0.10	0.00	0.24	29	0	67	18	64.34
Jun-23	0.14	0.03	0.25	39	9	71	16	41.56
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.04	0.00	0.10	10	0	29	10	95.39
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.01	0.00	0.03	3	0	10	3	94.09
Feb-24	0.20	0.06	0.38	55	17	107	23	40.74

Puffins	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	1.15	0.75	1.59	525	343	725	100	19.11
Apr-22	0.21	0.06	0.37	95	29	170	36	37.79
May-22	0.70	0.51	0.92	321	232	422	49	15.12
Jun-22	0.04	0.00	0.10	19	0	44	11	58.67
Jul-22	1.18	0.77	1.59	540	354	727	94	17.36
Aug-22	0.08	0.00	0.18	36	0	82	23	64.62
Sep-22	0.37	0.12	0.70	169	56	321	68	40.22
Oct-22	0.28	0.16	0.41	127	72	189	30	23.50
Nov-22	0.09	0.02	0.15	39	9	67	15	38.26
Dec-22	0.03	0.00	0.07	14	0	33	9	66.31
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.11	0.04	0.19	51	16	89	19	36.72
Apr-23	0.02	0.00	0.06	9	0	29	9	92.09
May-23	0.17	0.06	0.27	78	28	124	25	31.97
Jun-23	0.13	0.04	0.24	58	18	111	25	43.50
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.02	0.00	0.06	10	0	29	10	99.54
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.02	0.00	0.06	10	0	29	9	94.23
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.03	0.00	0.07	13	0	34	10	76.02
Feb-24	0.14	0.06	0.24	65	25	110	22	33.55

Puffins	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	1.34	1.04	1.63	884	685	1075	100	11.35
Apr-22	0.19	0.10	0.29	126	65	193	34	26.79
May-22	0.62	0.46	0.79	409	303	520	58	14.06
Jun-22	0.03	0.00	0.07	20	0	46	12	59.95
Jul-22	1.02	0.69	1.34	674	456	882	109	16.12
Aug-22	0.08	0.02	0.15	53	12	100	24	44.74
Sep-22	0.42	0.24	0.64	278	160	422	67	24.17
Oct-22	0.25	0.16	0.35	164	106	233	33	19.86
Nov-22	0.10	0.06	0.16	67	36	104	18	26.31
Dec-22	0.03	0.00	0.06	18	2	39	10	54.43
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.12	0.06	0.18	77	38	120	22	28.01
Apr-23	0.01	0.00	0.04	9	0	29	9	95.67
May-23	0.22	0.10	0.36	147	65	240	45	30.85
Jun-23	0.10	0.03	0.20	68	19	129	29	43.59
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.03	0.00	0.07	20	0	48	13	68.07
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.01	0.00	0.04	10	0	29	9	94.66
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.02	0.00	0.05	13	0	32	9	72.68
Feb-24	0.17	0.09	0.28	114	56	183	32	28.31

Table 7.8: Apportioned Density and Abundance Estimates of Sitting and Flying Puffins (Corrected for Availability Bias) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Puffins	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	1.05	0.62	1.54	294	173	432	66	22.62
Apr-22	0.32	0.12	0.54	91	33	152	31	33.58
May-22	0.76	0.42	1.14	213	119	320	51	23.85
Jun-22	0.08	0.00	0.18	23	0	49	13	55.90
Jul-22	1.49	0.94	2.08	417	262	583	83	19.96
Aug-22	0.15	0.00	0.34	42	0	95	25	60.19
Sep-22	0.56	0.12	1.08	157	33	303	69	43.77
Oct-22	0.20	0.07	0.33	55	20	93	19	35.24
Nov-22	0.08	0.00	0.16	22	0	45	12	53.59
Dec-22	0.05	0.00	0.12	14	0	35	10	69.73
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.15	0.04	0.27	41	10	74	17	42.22
Apr-23	0.04	0.00	0.12	11	0	34	11	102.41
May-23	0.12	0.00	0.28	33	0	78	21	64.34
Jun-23	0.16	0.04	0.29	45	11	83	19	41.53
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.04	0.00	0.12	12	0	34	11	95.58
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.01	0.00	0.04	4	0	11	4	94.09
Feb-24	0.23	0.07	0.45	64	20	125	26	40.74

Puffins	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	1.34	0.88	1.85	612	400	845	117	19.11
Apr-22	0.24	0.07	0.43	111	33	198	42	37.79
May-22	0.82	0.59	1.08	374	270	492	57	15.12
Jun-22	0.05	0.00	0.11	22	0	51	13	58.67
Jul-22	1.38	0.90	1.86	629	412	847	109	17.36
Aug-22	0.09	0.00	0.21	41	0	95	27	64.62
Sep-22	0.43	0.14	0.82	197	65	374	79	40.22
Oct-22	0.32	0.18	0.48	147	83	221	35	23.50
Nov-22	0.10	0.02	0.17	46	11	78	17	38.26
Dec-22	0.04	0.00	0.08	16	0	38	11	66.31
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.13	0.04	0.23	60	19	104	22	36.72
Apr-23	0.02	0.00	0.07	11	0	33	10	92.09
May-23	0.20	0.07	0.32	90	32	145	29	31.97
Jun-23	0.15	0.05	0.28	68	21	129	29	43.50
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.02	0.00	0.07	11	0	34	11	99.54
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.02	0.00	0.07	11	0	33	11	94.23
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.03	0.00	0.09	15	0	39	11	76.02
Feb-24	0.17	0.06	0.28	76	30	128	26	33.55

Puffins	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	1.57	1.21	1.90	1030	798	1252	117	11.35
Apr-22	0.22	0.12	0.34	147	76	224	39	26.79
May-22	0.72	0.54	0.92	477	353	606	67	14.06
Jun-22	0.04	0.00	0.08	24	0	54	14	59.95
Jul-22	1.19	0.81	1.56	785	531	1028	126	16.12
Aug-22	0.09	0.02	0.18	62	14	117	28	44.74
Sep-22	0.49	0.28	0.75	324	186	492	78	24.17
Oct-22	0.29	0.19	0.41	191	123	271	38	19.86
Nov-22	0.12	0.06	0.18	78	42	121	21	26.31
Dec-22	0.03	0.00	0.07	20	3	45	11	54.43
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.14	0.07	0.21	90	44	140	25	28.01
Apr-23	0.02	0.00	0.05	11	0	33	10	95.67
May-23	0.26	0.11	0.42	172	75	279	53	30.85
Jun-23	0.12	0.03	0.23	79	22	150	34	43.59
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.03	0.00	0.09	23	0	56	16	68.07
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.02	0.00	0.05	11	0	33	11	94.66
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.02	0.00	0.06	15	0	38	11	72.68
Feb-24	0.20	0.10	0.32	133	66	213	38	28.31

8 Fulmar

Table 8.1: Density and Abundance Estimates of Sitting Fulmars (Without Apportionment of Unidentified Birds) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Month	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.07	0.00	0.20	20	0	57	18	94.21
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.11	0.00	0.25	30	0	70	18	60.93
Aug-22	0.14	0.00	0.28	39	0	80	19	49.78
Sep-22	0.27	0.13	0.44	76	35	122	23	29.51
Oct-22	0.07	0.00	0.20	18	0	56	16	89.10
Nov-22	0.17	0.07	0.27	48	19	77	15	30.77
Dec-22	0.07	0.00	0.24	20	0	68	19	97.10
Jan-23	0.17	0.06	0.32	48	17	89	20	40.45
Feb-23	0.04	0.00	0.13	10	0	36	10	100.78
Mar-23	0.21	0.06	0.36	58	18	101	22	37.78
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.10	0.00	0.27	29	0	76	20	69.13
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.38	0.20	0.56	106	57	156	25	23.39
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	3.93	0.17	10.65	1099	47	2980	907	82.60
Nov-23	0.03	0.00	0.10	10	0	28	8	86.96
Dec-23	0.03	0.00	0.10	9	0	29	9	97.68

Month	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Jan-24	0.07	0.00	0.17	19	0	47	13	66.87
Feb-24	0.07	0.00	0.19	20	0	52	14	67.09
Survey (WFDA + 2 km)								
Mar-22	0.02	0.00	0.06	10	0	29	9	89.25
Apr-22	0.06	0.00	0.16	29	0	74	21	70.86
May-22	0.02	0.00	0.06	10	0	29	9	91.40
Jun-22	0.06	0.02	0.12	29	9	57	14	47.42
Jul-22	0.08	0.00	0.18	38	0	82	20	52.34
Aug-22	0.12	0.02	0.23	56	10	107	25	44.23
Sep-22	0.33	0.20	0.49	152	90	225	35	22.93
Oct-22	0.04	0.00	0.13	19	0	58	18	92.95
Nov-22	0.15	0.06	0.24	67	28	110	21	30.85
Dec-22	0.04	0.00	0.13	20	0	57	18	91.08
Jan-23	0.29	0.06	0.70	134	27	319	84	62.60
Feb-23	0.06	0.00	0.14	28	0	64	16	54.71
Mar-23	0.19	0.08	0.29	87	38	132	23	26.25
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.06	0.00	0.16	29	0	73	19	65.44
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.29	0.17	0.43	134	79	195	29	21.83
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	3.03	0.61	7.10	1385	277	3242	867	62.58
Nov-23	0.04	0.00	0.10	20	0	47	12	62.72
Dec-23	0.04	0.00	0.10	20	0	48	13	65.44
Jan-24	0.07	0.02	0.14	30	9	62	15	48.92
Feb-24	0.15	0.06	0.23	68	29	105	18	27.04

Month	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.03	0.00	0.07	19	0	46	12	62.85
Apr-22	0.04	0.00	0.10	28	0	67	18	64.90
May-22	0.01	0.00	0.04	9	0	29	9	93.97
Jun-22	0.14	0.03	0.28	90	19	182	45	50.73
Jul-22	0.06	0.00	0.13	39	0	83	21	54.30
Aug-22	0.13	0.06	0.22	87	37	145	28	32.47
Sep-22	0.32	0.19	0.47	214	125	311	48	22.65
Oct-22	0.03	0.00	0.09	19	0	57	17	92.62
Nov-22	0.18	0.10	0.27	117	65	175	29	24.39
Dec-22	0.04	0.00	0.13	30	0	88	27	90.70
Jan-23	0.24	0.06	0.52	159	37	345	83	51.93
Feb-23	0.04	0.00	0.09	28	0	62	15	53.26
Mar-23	0.16	0.09	0.23	108	56	153	25	23.21
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.06	0.00	0.13	40	0	84	21	51.95
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.20	0.11	0.31	134	74	201	33	24.82
Sep-23	0.03	0.00	0.07	20	0	47	13	65.00
Oct-23	2.43	0.68	5.18	1596	447	3410	826	51.76
Nov-23	0.03	0.00	0.07	19	0	46	12	64.70
Dec-23	0.04	0.00	0.09	29	0	58	15	50.79
Jan-24	0.04	0.01	0.09	29	9	58	15	49.72
Feb-24	0.12	0.06	0.19	77	37	122	22	28.70

Table 8.2: Density and Abundance Estimates of Flying Fulmars (Without Apportionment of Unidentified Birds) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Flying Fulmars	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.03	0.00	0.10	10	0	28	8	86.82
Apr-22	0.04	0.00	0.10	10	0	28	9	86.58
May-22	0.10	0.00	0.23	28	0	66	17	60.27
Jun-22	0.20	0.03	0.41	57	9	114	28	49.52
Jul-22	0.07	0.00	0.16	19	0	45	11	59.85
Aug-22	0.14	0.03	0.27	38	9	76	19	49.18
Sep-22	0.04	0.00	0.12	10	0	34	10	98.26
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.20	0.07	0.34	56	19	94	19	33.35
Dec-22	0.10	0.03	0.18	28	9	52	11	39.49
Jan-23	0.34	0.16	0.57	96	46	159	30	31.64
Feb-23	0.55	0.20	0.99	155	56	278	57	36.99
Mar-23	0.24	0.12	0.37	68	35	104	18	26.68
Apr-23	0.04	0.00	0.10	10	0	29	10	99.09
May-23	0.03	0.00	0.10	10	0	29	9	93.04
Jun-23	0.03	0.00	0.10	10	0	29	9	98.76
Jul-23	0.03	0.00	0.10	9	0	28	8	92.94
Aug-23	0.13	0.03	0.24	38	9	66	14	37.34
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	4.28	0.13	11.42	1197	37	3195	862	72.00
Nov-23	0.14	0.00	0.30	38	0	84	21	54.46
Dec-23	0.07	0.00	0.17	19	0	46	12	64.23
Jan-24	0.10	0.00	0.23	29	0	64	17	59.42
Feb-24	0.10	0.03	0.17	29	9	47	10	35.28

Flying Fulmars	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.02	0.00	0.06	9	0	28	8	94.44
Apr-22	0.04	0.00	0.08	19	0	39	11	60.24
May-22	0.06	0.00	0.16	30	0	71	19	63.60
Jun-22	0.30	0.12	0.49	136	57	223	42	31.03
Jul-22	0.10	0.04	0.19	48	18	84	18	37.11
Aug-22	0.08	0.02	0.17	38	9	77	19	49.74
Sep-22	0.02	0.00	0.06	10	0	29	9	94.54
Oct-22	0.04	0.00	0.13	20	0	58	18	92.39
Nov-22	0.15	0.06	0.22	67	29	103	18	27.54
Dec-22	0.17	0.12	0.22	77	55	99	11	14.71
Jan-23	0.30	0.18	0.43	137	83	198	29	21.27
Feb-23	0.49	0.25	0.74	222	114	338	58	26.21
Mar-23	0.23	0.10	0.38	107	46	174	33	30.46
Apr-23	0.04	0.00	0.10	20	0	47	13	64.18
May-23	0.08	0.02	0.16	38	9	75	16	42.79
Jun-23	0.02	0.00	0.06	9	0	28	9	94.00
Jul-23	0.04	0.00	0.10	19	0	48	13	67.47
Aug-23	0.15	0.08	0.22	68	38	98	16	23.78
Sep-23	0.02	0.00	0.06	10	0	29	9	95.23
Oct-23	5.38	0.37	11.59	2454	169	5288	1293	52.69
Nov-23	0.13	0.00	0.27	60	0	122	29	48.92
Dec-23	0.06	0.02	0.12	29	9	57	14	46.39
Jan-24	0.15	0.04	0.28	68	19	127	27	40.43
Feb-24	0.13	0.06	0.20	58	28	91	17	28.90

Flying Fulmars	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.04	0.00	0.09	29	0	57	14	49.54
Apr-22	0.05	0.01	0.09	30	9	57	14	44.75
May-22	0.04	0.00	0.10	29	0	67	19	65.36
Jun-22	0.22	0.11	0.35	145	73	233	41	28.35
Jul-22	0.09	0.03	0.16	58	19	103	21	36.98
Aug-22	0.10	0.03	0.20	68	18	131	31	45.41
Sep-22	0.03	0.00	0.07	20	0	47	13	63.87
Oct-22	0.04	0.00	0.10	29	0	67	19	67.48
Nov-22	0.12	0.04	0.20	77	28	132	27	34.83
Dec-22	0.12	0.07	0.16	79	48	103	13	16.91
Jan-23	0.34	0.23	0.47	226	151	312	42	18.44
Feb-23	0.47	0.26	0.68	308	173	448	69	22.44
Mar-23	0.21	0.11	0.32	136	75	210	34	24.94
Apr-23	0.03	0.00	0.07	19	0	47	12	63.37
May-23	0.10	0.04	0.16	69	28	105	19	28.05
Jun-23	0.03	0.00	0.07	20	0	48	13	67.77
Jul-23	0.03	0.00	0.07	19	0	47	13	65.29
Aug-23	0.15	0.10	0.19	97	66	127	16	16.10
Sep-23	0.01	0.00	0.04	10	0	29	9	89.78
Oct-23	3.80	0.34	8.06	2502	226	5306	1275	50.96
Nov-23	0.10	0.03	0.20	68	18	131	29	42.90
Dec-23	0.06	0.01	0.10	39	9	67	15	39.33
Jan-24	0.12	0.03	0.22	77	18	143	34	43.92
Feb-24	0.10	0.06	0.15	68	36	102	17	24.86

Table 8.3: Density and Abundance Estimates of Sitting and Flying Fulmars (Without Apportionment of Unidentified Birds) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Fulmars	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.03	0.00	0.10	10	0	28	8	82.79
Apr-22	0.10	0.00	0.26	29	0	73	19	65.94
May-22	0.10	0.00	0.23	29	0	65	17	59.95
Jun-22	0.20	0.00	0.42	57	0	118	29	50.98
Jul-22	0.17	0.06	0.29	48	17	83	18	36.59
Aug-22	0.27	0.06	0.53	76	17	149	37	47.97
Sep-22	0.31	0.15	0.48	87	42	134	24	27.63
Oct-22	0.07	0.00	0.20	19	0	56	17	90.20
Nov-22	0.38	0.20	0.56	105	56	156	26	24.95
Dec-22	0.17	0.06	0.31	48	18	87	19	39.18
Jan-23	0.52	0.27	0.80	145	75	225	38	26.14
Feb-23	0.58	0.27	1.01	163	75	284	55	33.51
Mar-23	0.44	0.23	0.66	122	65	184	31	25.82
Apr-23	0.03	0.00	0.10	10	0	29	9	99.42
May-23	0.14	0.00	0.29	39	0	82	20	52.45
Jun-23	0.03	0.00	0.10	9	0	28	9	99.54
Jul-23	0.03	0.00	0.10	9	0	28	8	91.94
Aug-23	0.51	0.30	0.76	142	85	213	32	22.54
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	8.21	0.54	21.19	2298	152	5928	1631	70.99
Nov-23	0.17	0.03	0.34	48	9	96	24	49.66
Dec-23	0.11	0.03	0.21	29	9	58	14	46.63
Jan-24	0.17	0.03	0.31	48	10	86	20	40.94
Feb-24	0.17	0.09	0.27	48	25	74	13	26.75

Fulmars	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.04	0.00	0.10	20	0	46	12	60.66
Apr-22	0.11	0.02	0.23	49	9	104	25	51.20
May-22	0.09	0.02	0.17	39	9	77	19	48.03
Jun-22	0.36	0.19	0.54	164	88	248	41	25.09
Jul-22	0.19	0.10	0.28	87	46	128	21	24.46
Aug-22	0.21	0.04	0.41	97	19	185	41	42.62
Sep-22	0.36	0.22	0.50	164	100	230	35	21.06
Oct-22	0.08	0.00	0.20	38	0	93	24	63.94
Nov-22	0.30	0.16	0.43	135	74	198	31	22.68
Dec-22	0.21	0.12	0.31	96	57	142	21	22.07
Jan-23	0.63	0.31	1.14	286	139	521	100	34.93
Feb-23	0.57	0.32	0.84	262	148	384	61	23.43
Mar-23	0.42	0.22	0.60	191	101	273	45	23.46
Apr-23	0.04	0.00	0.10	20	0	47	12	62.85
May-23	0.15	0.06	0.25	68	27	112	22	31.77
Jun-23	0.02	0.00	0.06	10	0	29	9	93.56
Jul-23	0.04	0.00	0.10	20	0	47	13	63.39
Aug-23	0.44	0.30	0.59	202	138	270	34	16.66
Sep-23	0.02	0.00	0.06	9	0	28	9	94.62
Oct-23	8.81	1.54	19.03	4019	704	8685	2077	51.69
Nov-23	0.17	0.04	0.34	77	18	154	37	47.47
Dec-23	0.11	0.02	0.20	48	9	92	21	42.84
Jan-24	0.22	0.08	0.37	98	38	168	34	34.42
Feb-24	0.28	0.18	0.40	126	82	182	26	20.56

Fulmars	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.07	0.01	0.14	49	10	91	20	41.70
Apr-22	0.09	0.01	0.16	57	10	106	24	42.23
May-22	0.06	0.01	0.12	39	9	81	20	49.99
Jun-22	0.35	0.20	0.52	231	134	339	52	22.70
Jul-22	0.15	0.07	0.22	97	49	145	23	23.76
Aug-22	0.24	0.10	0.40	155	67	261	51	33.11
Sep-22	0.35	0.20	0.53	231	134	346	54	23.56
Oct-22	0.07	0.00	0.15	47	0	96	24	51.58
Nov-22	0.29	0.17	0.40	193	113	265	39	20.29
Dec-22	0.16	0.09	0.27	108	57	179	32	29.10
Jan-23	0.61	0.33	1.05	402	220	694	118	29.45
Feb-23	0.54	0.33	0.77	353	220	508	74	20.90
Mar-23	0.37	0.23	0.50	240	152	328	43	17.92
Apr-23	0.03	0.00	0.07	20	0	48	13	64.75
May-23	0.16	0.10	0.22	107	66	146	21	19.76
Jun-23	0.03	0.00	0.07	20	0	48	13	64.55
Jul-23	0.03	0.00	0.07	19	0	47	13	66.41
Aug-23	0.35	0.25	0.47	233	164	309	36	15.52
Sep-23	0.04	0.00	0.09	29	0	58	14	47.16
Oct-23	6.48	1.39	13.34	4263	915	8777	2001	46.94
Nov-23	0.13	0.04	0.26	87	27	169	37	42.41
Dec-23	0.10	0.04	0.17	68	28	111	21	30.75
Jan-24	0.16	0.07	0.28	105	44	181	36	33.99
Feb-24	0.22	0.16	0.30	146	103	200	24	16.60

Table 8.4: Apportioned Density and Abundance Estimates of Sitting Fulmars across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Sitting Fulmars	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.07	0.00	0.20	20	0	57	18	90.93
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.10	0.00	0.24	28	0	67	18	65.16
Aug-22	0.14	0.03	0.27	38	9	75	18	48.28
Sep-22	0.28	0.13	0.44	78	35	124	23	29.43
Oct-22	0.07	0.00	0.20	19	0	56	17	88.71
Nov-22	0.17	0.07	0.27	47	19	76	15	30.74
Dec-22	0.12	0.00	0.30	33	0	85	25	74.00
Jan-23	0.17	0.06	0.30	48	18	85	18	37.78
Feb-23	0.04	0.00	0.12	10	0	35	10	99.06
Mar-23	0.21	0.06	0.35	57	17	99	22	38.32
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.10	0.00	0.26	29	0	73	19	64.57
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.38	0.22	0.57	105	63	159	25	23.98
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	3.94	0.20	12.58	1103	56	3520	917	83.20
Nov-23	0.03	0.00	0.10	10	0	28	8	86.11
Dec-23	0.04	0.00	0.10	10	0	29	9	92.04
Jan-24	0.07	0.00	0.17	20	0	47	13	66.47
Feb-24	0.07	0.00	0.17	19	0	48	13	69.93

Sitting Fulmars	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.02	0.00	0.06	10	0	29	9	97.02
Apr-22	0.06	0.00	0.17	29	0	76	20	71.42
May-22	0.02	0.00	0.06	10	0	29	9	89.15
Jun-22	0.06	0.00	0.12	29	0	57	14	47.34
Jul-22	0.08	0.00	0.18	39	0	84	21	55.51
Aug-22	0.13	0.04	0.24	58	17	109	24	42.33
Sep-22	0.33	0.20	0.48	151	91	221	34	22.17
Oct-22	0.04	0.00	0.12	19	0	56	17	90.08
Nov-22	0.15	0.06	0.25	67	28	112	21	31.18
Dec-22	0.07	0.00	0.19	34	0	86	23	69.76
Jan-23	0.29	0.06	0.69	133	27	315	82	61.69
Feb-23	0.06	0.00	0.14	29	0	65	16	54.85
Mar-23	0.19	0.08	0.28	87	38	127	22	25.29
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.06	0.00	0.16	29	0	74	19	66.05
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.30	0.17	0.42	137	76	194	29	21.02
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	3.20	0.60	7.27	1461	273	3318	869	59.45
Nov-23	0.04	0.00	0.10	19	0	46	12	62.91
Dec-23	0.04	0.00	0.10	20	0	47	12	59.80
Jan-24	0.06	0.00	0.14	29	0	64	16	53.62
Feb-24	0.17	0.08	0.27	78	36	124	23	29.34

Sitting Fulmars	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.03	0.00	0.07	20	0	46	12	62.39
Apr-22	0.04	0.00	0.11	28	0	73	19	68.31
May-22	0.01	0.00	0.04	10	0	29	9	93.47
Jun-22	0.18	0.04	0.35	116	29	232	53	45.62
Jul-22	0.06	0.00	0.13	40	0	85	21	52.77
Aug-22	0.13	0.05	0.22	88	36	146	29	33.27
Sep-22	0.33	0.19	0.51	215	126	334	53	24.39
Oct-22	0.03	0.00	0.09	19	0	57	17	91.02
Nov-22	0.18	0.10	0.27	115	65	177	28	24.53
Dec-22	0.07	0.00	0.19	45	0	123	34	76.50
Jan-23	0.23	0.06	0.51	154	36	337	81	52.68
Feb-23	0.05	0.00	0.10	30	0	65	15	51.56
Mar-23	0.16	0.08	0.24	105	55	155	26	24.79
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.06	0.01	0.13	39	9	84	20	51.22
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.20	0.11	0.31	134	72	202	34	25.15
Sep-23	0.03	0.00	0.07	19	0	47	12	63.91
Oct-23	2.39	0.69	5.21	1573	451	3427	839	53.31
Nov-23	0.03	0.00	0.07	20	0	46	12	59.88
Dec-23	0.04	0.01	0.09	29	9	57	14	48.06
Jan-24	0.04	0.00	0.09	29	0	58	15	51.76
Feb-24	0.13	0.06	0.21	86	37	138	25	28.53

Table 8.5: Apportioned Density and Abundance Estimates of Flying Fulmars across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Flying Fulmars	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.03	0.00	0.10	9	0	28	8	88.93
Apr-22	0.03	0.00	0.10	10	0	28	8	84.47
May-22	0.10	0.00	0.24	28	0	66	17	60.34
Jun-22	0.21	0.03	0.41	58	9	114	28	48.43
Jul-22	0.07	0.00	0.16	19	0	45	11	58.95
Aug-22	0.14	0.03	0.27	39	9	76	19	47.79
Sep-22	0.03	0.00	0.10	9	0	29	9	100.65
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.20	0.07	0.33	56	19	93	18	32.06
Dec-22	0.10	0.03	0.18	29	9	51	11	38.62
Jan-23	0.34	0.16	0.57	95	45	159	30	31.24
Feb-23	0.55	0.20	0.99	153	57	276	55	35.73
Mar-23	0.24	0.12	0.36	67	35	102	18	26.09
Apr-23	0.03	0.00	0.12	10	0	35	10	99.41
May-23	0.04	0.00	0.10	10	0	29	9	92.07
Jun-23	0.03	0.00	0.10	9	0	29	9	98.05
Jul-23	0.03	0.00	0.10	10	0	28	8	86.49
Aug-23	0.13	0.03	0.23	37	9	65	14	37.24
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	4.15	0.13	11.30	1161	37	3161	847	72.95
Nov-23	0.14	0.00	0.30	40	0	85	20	51.00
Dec-23	0.07	0.00	0.16	19	0	45	12	59.53
Jan-24	0.10	0.00	0.23	28	0	64	16	58.46
Feb-24	0.10	0.03	0.17	28	9	47	11	37.81

Flying Fulmars	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.02	0.00	0.06	9	0	28	9	91.94
Apr-22	0.04	0.00	0.10	19	0	46	12	61.29
May-22	0.06	0.00	0.14	29	0	66	19	65.00
Jun-22	0.30	0.13	0.49	137	57	225	43	31.40
Jul-22	0.11	0.04	0.18	48	18	84	18	36.13
Aug-22	0.08	0.00	0.17	37	0	76	19	51.98
Sep-22	0.02	0.00	0.08	10	0	36	10	99.81
Oct-22	0.04	0.00	0.13	19	0	58	18	95.08
Nov-22	0.15	0.08	0.23	68	36	106	19	27.74
Dec-22	0.17	0.12	0.22	77	55	98	11	14.49
Jan-23	0.30	0.18	0.43	135	82	198	30	21.82
Feb-23	0.51	0.24	0.80	232	110	364	64	27.36
Mar-23	0.23	0.10	0.37	105	46	167	32	30.47
Apr-23	0.04	0.00	0.10	20	0	47	13	63.11
May-23	0.08	0.02	0.16	39	9	75	17	43.68
Jun-23	0.02	0.00	0.06	9	0	29	9	96.18
Jul-23	0.04	0.00	0.10	19	0	47	13	66.71
Aug-23	0.15	0.08	0.22	68	36	100	17	24.71
Sep-23	0.02	0.00	0.06	10	0	29	9	92.81
Oct-23	5.22	0.29	11.22	2383	131	5122	1235	51.85
Nov-23	0.13	0.02	0.26	58	9	118	29	50.13
Dec-23	0.06	0.00	0.12	29	0	56	14	47.28
Jan-24	0.15	0.04	0.27	68	18	125	28	41.64
Feb-24	0.13	0.06	0.20	58	28	90	16	28.12

Flying Fulmars	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.06	0.01	0.10	39	10	67	15	38.02
Apr-22	0.04	0.00	0.08	29	0	55	13	45.98
May-22	0.04	0.00	0.11	29	0	71	19	65.34
Jun-22	0.22	0.11	0.35	146	75	231	40	27.67
Jul-22	0.09	0.03	0.15	59	19	97	20	34.71
Aug-22	0.10	0.03	0.20	68	18	129	30	44.30
Sep-22	0.03	0.00	0.07	19	0	47	12	64.73
Oct-22	0.05	0.00	0.11	30	0	72	20	66.10
Nov-22	0.12	0.04	0.21	77	29	138	27	34.34
Dec-22	0.12	0.07	0.16	78	49	103	14	17.29
Jan-23	0.34	0.22	0.46	224	146	301	40	17.61
Feb-23	0.50	0.31	0.75	331	203	493	74	22.29
Mar-23	0.21	0.11	0.31	137	73	201	33	23.86
Apr-23	0.03	0.00	0.07	19	0	46	12	64.31
May-23	0.10	0.04	0.17	69	29	111	20	29.71
Jun-23	0.03	0.00	0.07	20	0	48	13	66.35
Jul-23	0.03	0.00	0.07	19	0	46	13	68.12
Aug-23	0.15	0.10	0.19	97	65	126	16	16.18
Sep-23	0.02	0.00	0.04	10	0	29	9	91.18
Oct-23	3.84	0.42	7.80	2528	276	5129	1223	48.37
Nov-23	0.10	0.03	0.21	69	18	139	31	44.75
Dec-23	0.06	0.01	0.10	39	9	67	15	39.12
Jan-24	0.12	0.03	0.21	79	19	140	32	40.69
Feb-24	0.10	0.05	0.15	68	36	102	17	24.97

Table 8.6: Apportioned Density and Abundance Estimates of Sitting and Flying Fulmars across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Fulmars	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.03	0.00	0.10	16	0	46	13	85.69
Apr-22	0.10	0.00	0.26	47	0	119	32	67.62
May-22	0.10	0.00	0.23	48	0	106	28	59.04
Jun-22	0.20	0.00	0.43	94	0	194	48	51.44
Jul-22	0.17	0.06	0.30	78	28	136	30	37.97
Aug-22	0.28	0.06	0.57	127	28	259	63	49.31
Sep-22	0.31	0.15	0.47	141	69	217	38	27.12
Oct-22	0.07	0.00	0.20	32	0	92	28	87.36
Nov-22	0.37	0.20	0.56	171	91	254	43	25.06
Dec-22	0.23	0.09	0.42	104	42	190	38	37.04
Jan-23	0.51	0.27	0.84	235	122	385	66	28.26
Feb-23	0.57	0.23	1.01	262	107	461	93	35.31
Mar-23	0.44	0.23	0.67	203	107	305	51	25.31
Apr-23	0.04	0.00	0.10	16	0	47	16	95.75
May-23	0.14	0.00	0.30	63	0	137	33	52.56
Jun-23	0.03	0.00	0.10	16	0	47	15	96.56
Jul-23	0.03	0.00	0.10	15	0	45	13	88.89
Aug-23	0.51	0.33	0.78	234	149	355	53	22.52
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	8.48	0.55	21.44	3869	251	9787	2880	74.44
Nov-23	0.17	0.00	0.35	79	0	157	39	49.60
Dec-23	0.10	0.00	0.20	47	0	93	22	46.71
Jan-24	0.17	0.03	0.31	78	15	140	31	39.80
Feb-24	0.17	0.09	0.27	79	42	123	22	27.36

Fulmars	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.04	0.00	0.10	19	0	46	12	64.04
Apr-22	0.10	0.02	0.23	47	9	105	25	53.24
May-22	0.08	0.02	0.18	39	9	80	19	49.17
Jun-22	0.36	0.20	0.54	164	92	247	40	24.17
Jul-22	0.19	0.10	0.28	87	46	128	21	24.05
Aug-22	0.22	0.08	0.40	99	35	183	40	40.58
Sep-22	0.36	0.22	0.50	164	102	230	34	20.71
Oct-22	0.08	0.00	0.20	38	0	89	23	62.15
Nov-22	0.30	0.17	0.43	136	79	195	30	22.16
Dec-22	0.24	0.14	0.38	112	64	174	29	25.52
Jan-23	0.63	0.30	1.13	289	135	516	98	34.00
Feb-23	0.59	0.31	0.90	271	141	411	69	25.63
Mar-23	0.42	0.24	0.60	192	110	276	44	23.09
Apr-23	0.04	0.00	0.10	19	0	46	12	63.57
May-23	0.15	0.06	0.25	67	27	116	23	34.01
Jun-23	0.02	0.00	0.06	10	0	29	9	96.86
Jul-23	0.06	0.00	0.13	29	0	58	14	49.51
Aug-23	0.44	0.31	0.60	202	141	273	33	16.48
Sep-23	0.02	0.00	0.06	9	0	29	9	92.93
Oct-23	8.57	1.57	18.33	3914	717	8368	2014	51.46
Nov-23	0.17	0.02	0.35	76	10	161	38	49.25
Dec-23	0.11	0.02	0.21	49	10	94	21	42.59
Jan-24	0.21	0.08	0.38	97	37	174	35	35.98
Feb-24	0.29	0.20	0.41	134	92	185	24	18.28

Fulmars	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.09	0.03	0.16	60	19	107	22	36.12
Apr-22	0.09	0.03	0.16	58	18	106	23	40.66
May-22	0.06	0.01	0.12	39	9	80	19	50.47
Jun-22	0.40	0.23	0.58	263	153	382	59	22.28
Jul-22	0.15	0.08	0.22	98	54	142	23	23.19
Aug-22	0.24	0.10	0.40	157	66	265	51	32.26
Sep-22	0.35	0.21	0.53	233	138	349	54	23.22
Oct-22	0.07	0.00	0.15	48	0	98	25	51.72
Nov-22	0.30	0.18	0.41	195	120	267	37	19.20
Dec-22	0.19	0.09	0.31	123	59	206	38	31.10
Jan-23	0.60	0.31	0.97	394	206	638	113	28.65
Feb-23	0.56	0.34	0.79	366	226	521	75	20.56
Mar-23	0.37	0.25	0.49	244	163	325	42	17.20
Apr-23	0.03	0.00	0.07	20	0	46	12	62.13
May-23	0.16	0.10	0.22	106	66	144	20	18.72
Jun-23	0.03	0.00	0.07	19	0	48	13	68.71
Jul-23	0.04	0.00	0.09	29	0	58	14	48.64
Aug-23	0.35	0.25	0.47	233	165	310	37	16.08
Sep-23	0.04	0.01	0.09	29	9	57	13	45.04
Oct-23	6.40	1.45	12.70	4212	951	8357	1910	45.34
Nov-23	0.13	0.03	0.26	89	19	170	37	42.31
Dec-23	0.10	0.04	0.17	66	27	110	22	32.53
Jan-24	0.16	0.06	0.28	106	38	184	37	34.56
Feb-24	0.24	0.18	0.32	156	115	209	24	15.38

9 Gannet

Table 9.1: Density and Abundance Estimates of Sitting Gannets (Without Apportionment of Unidentified Birds) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Month	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.20	0.00	0.62	55	0	172	57	103.17
Apr-22	0.62	0.00	2.33	174	0	652	179	102.38
May-22	0.10	0.00	0.20	29	0	57	14	48.63
Jun-22	0.07	0.00	0.16	19	0	44	12	60.49
Jul-22	0.18	0.03	0.36	50	9	100	24	47.04
Aug-22	0.10	0.03	0.20	29	9	55	13	42.92
Sep-22	0.03	0.00	0.10	10	0	28	8	86.84
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.15	0.00	0.41	41	0	115	38	93.25
Apr-23	0.07	0.00	0.17	20	0	47	13	61.77
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.46	0.03	1.37	129	9	382	105	81.12
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00
Survey (WFDA + 2 km)								
Mar-22	0.31	0.00	0.86	142	0	392	102	72.15
Apr-22	0.69	0.00	1.64	317	0	747	193	61.05
May-22	0.13	0.04	0.23	59	18	106	23	39.67
Jun-22	0.04	0.00	0.10	19	0	47	12	62.61
Jul-22	0.23	0.10	0.37	106	44	168	32	29.93
Aug-22	0.06	0.02	0.12	29	9	55	13	44.25
Sep-22	0.04	0.00	0.10	19	0	46	12	59.92
Oct-22	0.02	0.00	0.08	10	0	36	10	100.24
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.13	0.00	0.34	58	0	153	44	75.98
Apr-23	0.04	0.00	0.10	20	0	46	12	61.01
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.39	0.04	0.92	177	18	420	106	59.51
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.45	0.01	1.17	299	10	772	201	67.09
Apr-22	0.52	0.01	1.22	341	9	805	204	59.92
May-22	0.15	0.04	0.29	97	29	191	41	42.84
Jun-22	0.15	0.04	0.28	99	29	185	40	40.88
Jul-22	0.21	0.08	0.34	136	55	224	45	32.92
Aug-22	0.07	0.01	0.14	48	10	92	21	42.92
Sep-22	0.03	0.00	0.07	19	0	46	12	59.49
Oct-22	0.01	0.00	0.04	10	0	29	9	97.13
Nov-22	0.01	0.00	0.05	10	0	35	10	105.52
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.12	0.01	0.29	78	9	190	52	66.59
Apr-23	0.03	0.00	0.07	20	0	47	12	62.70
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.29	0.04	0.63	190	29	414	98	51.79
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 9.2: Density and Abundance Estimates of Flying Gannets (Without Apportionment of Unidentified Birds) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Flying Gannets	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.03	0.00	0.10	10	0	29	9	96.69
Apr-22	0.10	0.03	0.22	29	9	62	15	51.24
May-22	0.24	0.06	0.44	67	18	123	26	38.86
Jun-22	0.10	0.00	0.23	28	0	65	17	60.11
Jul-22	0.07	0.00	0.14	19	0	38	10	53.10
Aug-22	0.03	0.00	0.10	10	0	29	10	99.88
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.03	0.00	0.10	10	0	28	9	95.24
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.03	0.00	0.10	10	0	28	9	89.11
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.28	0.06	0.53	78	17	149	36	46.00
Apr-23	0.07	0.00	0.17	20	0	46	12	59.45
May-23	0.17	0.00	0.48	47	0	135	37	79.01
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.07	0.00	0.15	19	0	42	11	55.97
Aug-23	0.03	0.00	0.10	10	0	29	9	94.53
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.63	0.13	1.49	176	38	416	104	59.26
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Gannets	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.06	0.00	0.15	29	0	66	16	55.71
Apr-22	0.09	0.02	0.16	39	9	72	16	39.95
May-22	0.28	0.10	0.48	126	45	217	45	35.89
Jun-22	0.15	0.06	0.27	69	28	122	25	36.47
Jul-22	0.06	0.00	0.15	28	0	67	18	62.70
Aug-22	0.02	0.00	0.06	10	0	29	9	96.74
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.08	0.00	0.18	38	0	84	22	56.28
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.04	0.00	0.10	19	0	46	12	61.85
Jan-23	0.02	0.00	0.06	10	0	29	9	96.29
Feb-23	0.02	0.00	0.06	10	0	28	9	88.25
Mar-23	0.21	0.06	0.39	96	28	179	38	39.84
Apr-23	0.11	0.04	0.17	48	19	78	16	32.91
May-23	0.13	0.00	0.32	58	0	144	38	64.23
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.15	0.02	0.29	69	10	131	31	44.66
Aug-23	0.02	0.00	0.06	10	0	29	9	92.01
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.51	0.12	1.15	234	55	525	118	50.67
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.02	0.00	0.06	9	0	29	9	101.61
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Gannets	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.06	0.01	0.11	38	9	73	16	41.89
Apr-22	0.07	0.03	0.13	49	18	84	17	35.33
May-22	0.25	0.11	0.42	166	73	278	52	31.18
Jun-22	0.27	0.08	0.56	176	53	368	92	52.23
Jul-22	0.06	0.00	0.12	37	0	77	19	50.02
Aug-22	0.05	0.00	0.12	30	0	82	22	75.04
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.10	0.03	0.19	68	19	124	25	37.28
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.06	0.00	0.13	39	0	88	21	54.29
Jan-23	0.01	0.00	0.04	9	0	29	9	92.74
Feb-23	0.01	0.00	0.04	9	0	29	9	92.04
Mar-23	0.16	0.04	0.33	107	27	214	49	45.53
Apr-23	0.07	0.03	0.12	48	19	80	16	33.13
May-23	0.10	0.00	0.23	67	0	152	39	58.04
Jun-23	0.03	0.00	0.07	19	0	46	12	61.89
Jul-23	0.14	0.04	0.28	95	29	183	38	39.99
Aug-23	0.01	0.00	0.04	10	0	29	9	90.43
Sep-23	0.04	0.00	0.09	30	0	58	15	51.20
Oct-23	0.53	0.19	0.94	351	128	619	128	36.56
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.01	0.00	0.04	9	0	28	9	95.58
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 9.3: Density and Abundance Estimates of Sitting and Flying Gannets (Without Apportionment of Unidentified Birds) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Gannets	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.24	0.00	0.71	68	0	198	58	85.33
Apr-22	0.76	0.00	2.48	212	0	695	193	91.17
May-22	0.34	0.16	0.53	96	45	147	28	29.11
Jun-22	0.17	0.06	0.29	47	18	82	16	33.80
Jul-22	0.24	0.10	0.40	66	29	111	20	30.63
Aug-22	0.14	0.03	0.24	39	9	66	14	36.27
Sep-22	0.03	0.00	0.10	9	0	28	8	91.31
Oct-22	0.03	0.00	0.10	10	0	28	9	93.95
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.04	0.00	0.10	10	0	28	9	86.29
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.41	0.06	0.84	116	17	236	60	51.74
Apr-23	0.14	0.03	0.24	39	9	67	14	36.65
May-23	0.17	0.00	0.47	48	0	133	37	77.55
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.07	0.00	0.14	19	0	38	11	55.11
Aug-23	0.03	0.00	0.10	10	0	28	9	95.22
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	1.15	0.22	2.76	321	62	772	216	67.25
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Gannets	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.36	0.04	0.86	166	18	393	101	60.89
Apr-22	0.80	0.04	1.85	364	19	845	208	57.15
May-22	0.40	0.19	0.61	183	89	276	48	26.32
Jun-22	0.19	0.08	0.31	87	38	141	26	29.81
Jul-22	0.30	0.19	0.41	135	86	186	26	19.20
Aug-22	0.08	0.02	0.15	38	9	71	15	39.74
Sep-22	0.04	0.00	0.10	19	0	44	11	59.96
Oct-22	0.11	0.02	0.22	50	9	101	24	49.19
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.04	0.00	0.10	19	0	46	12	63.91
Jan-23	0.02	0.00	0.06	10	0	29	9	92.75
Feb-23	0.02	0.00	0.06	10	0	28	8	88.86
Mar-23	0.34	0.10	0.64	153	48	290	63	40.97
Apr-23	0.15	0.06	0.25	69	29	113	21	30.44
May-23	0.13	0.02	0.29	57	9	132	36	62.32
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.15	0.02	0.29	68	9	134	31	45.71
Aug-23	0.02	0.00	0.06	10	0	28	8	86.96
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.90	0.18	2.06	410	83	940	230	56.17
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.02	0.00	0.06	10	0	28	9	91.52
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Gannets	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.51	0.06	1.21	339	37	797	207	61.28
Apr-22	0.59	0.09	1.26	385	56	827	202	52.48
May-22	0.40	0.22	0.57	262	145	378	60	22.78
Jun-22	0.42	0.13	0.84	280	85	554	129	46.02
Jul-22	0.27	0.16	0.39	176	103	254	40	22.64
Aug-22	0.12	0.04	0.21	78	29	136	28	35.27
Sep-22	0.03	0.00	0.07	20	0	47	12	59.85
Oct-22	0.12	0.04	0.20	78	28	133	26	34.01
Nov-22	0.01	0.00	0.05	10	0	36	10	98.79
Dec-22	0.06	0.00	0.13	40	0	86	21	52.78
Jan-23	0.01	0.00	0.04	10	0	29	9	95.80
Feb-23	0.02	0.00	0.04	10	0	28	9	83.46
Mar-23	0.28	0.08	0.52	184	53	341	74	40.38
Apr-23	0.10	0.04	0.17	68	29	110	20	29.94
May-23	0.11	0.00	0.24	69	0	156	39	56.81
Jun-23	0.03	0.00	0.07	20	0	47	12	60.00
Jul-23	0.15	0.04	0.28	98	29	184	39	39.58
Aug-23	0.01	0.00	0.04	10	0	29	9	89.89
Sep-23	0.04	0.00	0.09	29	0	58	15	51.15
Oct-23	0.83	0.26	1.64	544	168	1078	234	43.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.02	0.00	0.04	10	0	29	9	90.92
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 9.4: Apportioned Density and Abundance Estimates of Sitting Gannets across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Sitting Gannets	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.21	0.00	0.61	58	0	171	56	96.57
Apr-22	0.61	0.00	2.23	172	0	625	172	99.91
May-22	0.10	0.03	0.20	29	9	55	13	44.92
Jun-22	0.07	0.00	0.16	19	0	46	12	61.93
Jul-22	0.17	0.03	0.35	47	8	99	24	50.49
Aug-22	0.10	0.03	0.20	28	9	55	12	43.10
Sep-22	0.04	0.00	0.10	10	0	28	8	82.22
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.14	0.00	0.51	40	0	143	39	96.90
Apr-23	0.07	0.00	0.16	19	0	45	12	63.47
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.44	0.03	1.24	124	9	346	102	82.09
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Sitting Gannets	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.29	0.00	0.80	134	0	367	96	71.82
Apr-22	0.71	0.00	1.66	323	0	756	195	60.43
May-22	0.13	0.04	0.23	58	18	107	23	39.94
Jun-22	0.04	0.00	0.10	19	0	44	11	58.50
Jul-22	0.23	0.10	0.37	104	47	169	31	29.66
Aug-22	0.06	0.02	0.12	29	9	55	13	43.79
Sep-22	0.04	0.00	0.10	20	0	45	11	58.12
Oct-22	0.02	0.00	0.06	10	0	29	9	94.82
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.13	0.00	0.36	60	0	163	45	75.71
Apr-23	0.04	0.00	0.10	19	0	47	12	63.57
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.39	0.02	0.93	178	10	426	110	61.58
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Sitting Gannets	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.48	0.03	1.23	316	18	809	204	64.73
Apr-22	0.52	0.01	1.17	340	10	768	202	59.44
May-22	0.15	0.05	0.27	97	36	179	39	39.81
Jun-22	0.15	0.04	0.28	99	28	184	40	40.97
Jul-22	0.21	0.09	0.34	136	62	226	43	31.60
Aug-22	0.08	0.01	0.14	49	9	95	21	42.84
Sep-22	0.03	0.00	0.07	20	0	46	12	56.65
Oct-22	0.02	0.00	0.06	10	0	36	9	93.50
Nov-22	0.01	0.00	0.04	9	0	29	9	99.94
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.12	0.01	0.29	79	9	191	51	64.09
Apr-23	0.03	0.00	0.07	20	0	48	13	65.47
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.29	0.04	0.62	189	29	409	99	52.46
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 9.5: Apportioned Density and Abundance Estimates of Flying Gannets across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Flying Gannets	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.03	0.00	0.10	9	0	29	9	98.93
Apr-22	0.10	0.00	0.22	29	0	61	16	54.54
May-22	0.24	0.07	0.41	66	18	115	25	38.13
Jun-22	0.10	0.00	0.23	28	0	64	17	59.98
Jul-22	0.07	0.00	0.14	19	0	38	10	54.44
Aug-22	0.03	0.00	0.12	10	0	35	10	99.65
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.04	0.00	0.10	10	0	28	9	90.16
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.03	0.00	0.10	10	0	28	8	88.41
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.27	0.06	0.53	75	17	149	34	45.49
Apr-23	0.07	0.00	0.17	19	0	46	12	62.36
May-23	0.18	0.00	0.53	49	0	149	39	79.41
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.07	0.00	0.15	19	0	43	11	55.91
Aug-23	0.04	0.00	0.13	10	0	35	9	93.23
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.67	0.13	1.54	188	38	432	112	59.59
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Gannets	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.06	0.00	0.14	29	0	63	15	52.17
Apr-22	0.08	0.02	0.16	38	9	72	17	43.50
May-22	0.28	0.10	0.48	127	47	217	45	35.24
Jun-22	0.15	0.06	0.27	67	27	122	24	36.62
Jul-22	0.06	0.00	0.15	29	0	67	18	62.35
Aug-22	0.02	0.00	0.06	10	0	29	10	96.21
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.08	0.00	0.19	38	0	85	22	57.04
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.04	0.00	0.10	19	0	46	12	64.65
Jan-23	0.02	0.00	0.06	9	0	29	9	102.70
Feb-23	0.02	0.00	0.06	10	0	28	9	88.33
Mar-23	0.21	0.06	0.39	96	28	179	39	40.72
Apr-23	0.10	0.04	0.17	48	19	78	15	32.40
May-23	0.12	0.02	0.31	57	9	139	36	63.52
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.15	0.04	0.28	67	17	130	30	45.17
Aug-23	0.02	0.00	0.06	10	0	28	9	89.51
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.52	0.12	1.12	235	54	510	119	50.76
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.02	0.00	0.06	10	0	29	9	93.14
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Gannets	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.06	0.01	0.11	39	9	75	17	42.70
Apr-22	0.07	0.03	0.13	48	18	83	18	36.91
May-22	0.25	0.11	0.40	165	75	265	49	29.54
Jun-22	0.26	0.07	0.57	174	47	373	94	54.14
Jul-22	0.06	0.01	0.13	39	9	83	19	48.67
Aug-22	0.04	0.00	0.12	30	0	77	21	72.63
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.10	0.03	0.18	67	19	119	26	38.32
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.06	0.00	0.13	40	0	85	21	53.64
Jan-23	0.01	0.00	0.04	10	0	29	9	97.31
Feb-23	0.01	0.00	0.04	10	0	28	9	87.81
Mar-23	0.16	0.04	0.32	107	28	213	48	44.66
Apr-23	0.07	0.03	0.12	49	19	80	16	32.78
May-23	0.11	0.01	0.25	69	9	163	41	58.64
Jun-23	0.03	0.00	0.07	20	0	45	11	58.46
Jul-23	0.15	0.06	0.28	99	36	185	39	38.73
Aug-23	0.01	0.00	0.04	10	0	29	9	92.58
Sep-23	0.04	0.00	0.10	29	0	64	15	52.19
Oct-23	0.53	0.19	0.92	348	125	603	126	36.07
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.01	0.00	0.04	10	0	29	9	89.25
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 9.6: Apportioned Density and Abundance Estimates of Sitting and Flying Gannets across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Gannets	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.24	0.00	0.69	66	0	193	57	85.15
Apr-22	0.70	0.00	2.35	196	0	659	175	89.40
May-22	0.34	0.14	0.54	95	38	152	29	30.26
Jun-22	0.17	0.06	0.29	49	18	82	17	34.16
Jul-22	0.25	0.13	0.41	69	35	113	21	30.18
Aug-22	0.14	0.03	0.24	38	9	67	14	36.63
Sep-22	0.03	0.00	0.10	9	0	28	8	89.26
Oct-22	0.03	0.00	0.10	9	0	28	9	94.60
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.04	0.00	0.10	10	0	28	9	87.14
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.41	0.06	0.88	113	18	247	59	51.60
Apr-23	0.14	0.03	0.24	39	10	67	14	36.74
May-23	0.17	0.00	0.44	49	0	123	35	71.38
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.07	0.00	0.14	19	0	38	11	55.20
Aug-23	0.03	0.00	0.10	10	0	28	9	94.08
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	1.13	0.23	2.80	317	64	784	221	69.89
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Gannets	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.36	0.04	0.82	163	17	374	99	60.45
Apr-22	0.79	0.08	1.82	361	36	828	203	56.08
May-22	0.41	0.20	0.61	185	91	279	48	25.87
Jun-22	0.19	0.08	0.31	88	38	141	25	28.84
Jul-22	0.29	0.19	0.41	134	85	185	25	18.88
Aug-22	0.09	0.02	0.15	39	9	67	15	37.31
Sep-22	0.04	0.00	0.10	19	0	44	11	57.02
Oct-22	0.11	0.02	0.21	48	9	96	24	49.79
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.04	0.00	0.10	19	0	45	12	60.88
Jan-23	0.02	0.00	0.06	10	0	29	9	93.39
Feb-23	0.02	0.00	0.06	10	0	29	9	91.47
Mar-23	0.34	0.10	0.63	156	45	290	63	40.77
Apr-23	0.15	0.06	0.24	67	28	112	21	31.27
May-23	0.13	0.02	0.30	57	9	135	36	63.12
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.15	0.04	0.30	68	17	137	32	47.34
Aug-23	0.02	0.00	0.06	10	0	29	9	89.85
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.87	0.18	1.97	399	81	897	221	55.46
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.02	0.00	0.06	10	0	29	9	93.22
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Gannets	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.52	0.04	1.23	340	29	808	205	60.18
Apr-22	0.60	0.09	1.30	395	58	855	205	51.90
May-22	0.40	0.22	0.60	263	148	396	60	23.00
Jun-22	0.41	0.13	0.88	272	83	581	134	49.38
Jul-22	0.27	0.15	0.39	175	97	256	40	22.71
Aug-22	0.12	0.04	0.21	79	28	136	28	35.13
Sep-22	0.03	0.00	0.07	19	0	45	12	60.61
Oct-22	0.12	0.04	0.20	78	28	134	27	34.55
Nov-22	0.01	0.00	0.04	9	0	29	10	101.86
Dec-22	0.06	0.01	0.13	40	9	86	21	52.40
Jan-23	0.01	0.00	0.04	10	0	29	9	95.22
Feb-23	0.01	0.00	0.04	10	0	29	9	93.27
Mar-23	0.28	0.09	0.51	186	57	335	70	37.73
Apr-23	0.10	0.04	0.17	67	28	115	21	31.41
May-23	0.11	0.01	0.24	70	9	155	40	57.07
Jun-23	0.03	0.00	0.07	20	0	47	12	58.28
Jul-23	0.15	0.05	0.28	99	36	186	40	40.19
Aug-23	0.02	0.00	0.04	10	0	29	9	90.48
Sep-23	0.05	0.00	0.10	30	0	63	15	50.99
Oct-23	0.82	0.25	1.59	541	164	1044	233	43.11
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.01	0.00	0.04	9	0	28	9	96.58
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

10 Oystercatcher

Table 10.1: Density and Abundance Estimates of Oystercatcher (Without Apportionment of Unidentified Waders) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Month	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.17	0.00	0.63	49	0	178	46	94.82
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.10	0.00	0.31	47	0	143	45	95.63
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Month	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.07	0.00	0.22	49	0	143	45	93.63
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 10.2: Apportioned Density and Abundance Estimates of Oystercatcher across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Oystercatcher	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.18	0.00	0.62	50	0	173	47	94.35
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Oystercatcher	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.10	0.00	0.32	48	0	144	48	99.88
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Oystercatcher	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.08	0.00	0.22	50	0	144	47	93.59
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

11 Curlew

Table 11.1: Density and Abundance Estimates of Curlew (Without Apportionment of Unidentified Waders) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Month	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.02	0.00	0.06	9	0	28	9	91.17
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.02	0.00	0.04	10	0	29	9	89.90
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 11.2: Apportioned Density and Abundance Estimates of Curlew across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Curlew	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Curlew	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.02	0.00	0.06	10	0	29	9	89.78
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Curlew	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.01	0.00	0.04	9	0	29	9	96.89
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

12 Common Gull

Table 12.1: Density and Abundance Estimates of Sitting Common Gulls (Without Apportionment of Unidentified Gulls) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Month	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Month	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 12.2: Density and Abundance Estimates of Flying Common Gulls (Without Apportionment of Unidentified Gulls) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-based Analysis

Flying Common Gulls	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Common Gulls	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Common Gulls	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.02	0.00	0.04	10	0	29	9	89.86
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.04	0.00	0.13	29	0	85	26	88.99
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 12.3: Density and Abundance Estimates of Sitting and Flying Common Gulls (Without Apportionment of Unidentified Gulls) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Common Gulls	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Common Gulls	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Common Gulls	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.01	0.00	0.04	9	0	29	9	98.20
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.05	0.00	0.13	31	0	86	27	88.70
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 12.4: Apportioned Density and Abundance Estimates of Sitting Common Gulls across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Sitting Common Gulls	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Sitting Common Gulls	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Sitting Common Gulls	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 12.5: Apportioned Density and Abundance Estimates of Flying Common Gulls across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Flying Common Gulls	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Common Gulls	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.06	0.00	0.19	28	0	85	26	93.15
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Common Gulls	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.01	0.00	0.04	10	0	29	9	94.56
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.04	0.00	0.13	28	0	86	27	94.83
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 12.6: Apportioned Density and Abundance Estimates of Sitting and Flying Common Gulls across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Common Gulls	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Common Gulls	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.06	0.00	0.19	29	0	86	27	94.99
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Common Gulls	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.02	0.00	0.04	10	0	29	9	93.50
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.04	0.00	0.13	28	0	86	26	94.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

13 Arctic Skua

Table 13.1: Density and Abundance Estimates of Sitting Arctic Skuas (Without Apportionment of Unidentified Birds) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Month	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Month	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 13.2: Density and Abundance Estimates of Flying Arctic Skuas (Without Apportionment of Unidentified Birds) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Flying Arctic Skuas	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.03	0.00	0.10	9	0	28	9	94.90
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Arctic Skuas	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.02	0.00	0.08	10	0	35	10	98.66
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Arctic Skuas	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.01	0.00	0.04	9	0	29	9	95.36
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 13.3: Density and Abundance Estimates of Sitting and Flying Arctic Skuas (Without Apportionment of Unidentified Birds) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Arctic Skuas	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.04	0.00	0.10	10	0	28	9	93.09
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Arctic Skuas	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.02	0.00	0.08	10	0	35	10	98.18
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Arctic Skuas	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.02	0.00	0.04	10	0	29	9	88.91
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 13.4: Apportioned Density and Abundance Estimates of Sitting Arctic Skuas across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Sitting Arctic Skuas	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Sitting Arctic Skuas	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Sitting Arctic Skuas	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 13.5: Apportioned Density and Abundance Estimates of Flying Arctic Skuas across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Flying Arctic Skuas	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.03	0.00	0.10	9	0	29	9	98.53
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Arctic Skuas	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.02	0.00	0.06	9	0	29	9	100.81
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Arctic Skuas	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.01	0.00	0.04	10	0	29	9	93.27
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 13.6: Apportioned Density and Abundance Estimates of Sitting and Flying Arctic Skuas across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Arctic Skuas	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.03	0.00	0.10	9	0	28	9	95.12
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Arctic Skuas	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.02	0.00	0.06	9	0	28	9	95.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Arctic Skuas	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.01	0.00	0.04	9	0	29	9	95.21
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

14 Little Auk

Table 14.1: Density and Abundance Estimates of Sitting Little Auks (Without Apportionment of Unidentified Auks) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Month	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.02	0.00	0.06	10	0	29	10	98.29
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Month	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.02	0.00	0.04	10	0	29	9	93.58
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 14.2: Density and Abundance Estimates of Flying Little Auks (Without Apportionment of Unidentified Auks) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Flying Little Auks	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Little Auks	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.02	0.00	0.06	10	0	29	10	98.29
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Little Auks	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.02	0.00	0.04	10	0	29	9	93.58
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 14.3: Density and Abundance Estimates of Sitting and Flying Little Auks (Without Apportionment of Unidentified Auks) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Little Auks	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Little Auks	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.02	0.00	0.08	10	0	36	10	97.08
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Little Auks	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.01	0.00	0.04	9	0	29	9	95.43
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 14.4: Apportioned Density and Abundance Estimates of Sitting Little Auks across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Sitting Little Auks	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.01	0.00	0.03	3	0	10	3	97.02
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Sitting Little Auks	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.03	0.00	0.08	13	0	36	10	77.03
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Sitting Little Auks	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.02	0.00	0.06	13	0	38	10	77.02
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 14.5: Apportioned Density and Abundance Estimates of Flying Little Auks across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Flying Little Auks	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Little Auks	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Little Auks	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 14.6: Apportioned Density and Abundance Estimates of Sitting and Flying Little Auks across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Little Auks	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.01	0.00	0.03	3	0	10	3	92.08
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Little Auks	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.03	0.00	0.08	13	0	36	10	78.68
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Little Auks	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.02	0.00	0.06	13	0	38	10	76.49
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

15 Red-throated Diver

Table 15.1: Density and Abundance Estimates of Sitting Red-throated Divers (Without Apportionment of Unidentified Birds) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Month	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Month	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 15.2: Density and Abundance Estimates of Flying Red-throated Divers (Without Apportionment of Unidentified Birds) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Flying Red-throated Divers	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.03	0.00	0.10	10	0	28	9	92.78
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Red-throated Divers	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.02	0.00	0.06	9	0	29	9	98.29
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Red-throated Divers	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.02	0.00	0.04	10	0	29	9	93.87
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 15.3: Density and Abundance Estimates of Sitting and Flying Red-throated Divers (Without Apportionment of Unidentified Birds) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Sitting and Ftting and Flying Red-throated Divers	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.03	0.00	0.10	9	0	28	9	94.47
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Sitting and Ftting and Flying Red-throated Divers	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.02	0.00	0.06	10	0	29	9	90.06
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Sitting and Ftting and Flying Red-throated Divers	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.01	0.00	0.04	9	0	29	9	96.80
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 15.4: Apportioned Density and Abundance Estimates of Sitting Red-throated Divers across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Sitting Red-throated Divers	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Sitting Red-throated Divers	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Sitting Red-throated Divers	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 15.5: Apportioned Density and Abundance Estimates of Flying Red-throated Divers across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-based Analysis

Flying Red-throated Divers	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.03	0.00	0.10	10	0	28	9	92.39
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Red-throated Divers	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.02	0.00	0.08	10	0	35	9	93.14
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying Red-throated Divers	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.01	0.00	0.04	10	0	29	9	94.98
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 15.6: Apportioned Density and Abundance Estimates of Sitting and Flying Red-throated Divers across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Red-throated Divers	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.03	0.00	0.10	10	0	28	9	93.70
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Red-throated Divers	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.02	0.00	0.06	10	0	29	9	96.50
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Red-throated Divers	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.01	0.00	0.04	10	0	29	9	96.94
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

16 European Storm-petrel

Table 16.1: Density and Abundance Estimates of Sitting European Storm-petrels (Without Apportionment of Unidentified Birds) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-based Analysis

Month	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00

Month	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Month	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 16.2: Density and Abundance Estimates of Flying European Storm-petrels (Without Apportionment of Unidentified Birds) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Flying European Storm-petrels	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying European Storm-petrels	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.	0.00	0.00	0	0	0	0	0.00

Flying European Storm-petrels	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.02	0.00	0.04	10	0	29	9	87.84
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 16.3: Density and Abundance Estimates of Sitting and Flying European Storm-petrels (Without Apportionment of Unidentified Birds) across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

European Storm-petrels	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

European Storm-petrels	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

European Storm-petrels	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.02	0.00	0.04	10	0	29	9	89.70
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 16.4: Apportioned Density and Abundance Estimates of Sitting European Storm-petrels across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Sitting European Storm-petrels	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Sitting European Storm-petrels	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Sitting European Storm-petrels	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 16.5: Density and Abundance Estimates of Flying European Storm-petrels across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

Flying European Storm-petrels	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying European Storm-petrels	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Flying European Storm-petrels	Density Estimate (birds/km²)	Lower 95% CI (birds/km²)	Upper 95% CI (birds/km²)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.01	0.00	0.04	10	0	29	9	94.52
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Table 16.6: Apportioned Density and Abundance Estimates of Sitting and Flying European Storm-petrels across the Bellrock WFDA, WFDA plus 2 km, and WFDA plus 4 km (OASA) using Design-Based Analysis

European Storm-petrels	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA only)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

European Storm-petrels	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 2 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.00	0.00	0.00	0	0	0	0	0.00
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

European Storm-petrels	Density Estimate (birds/km^2)	Lower 95% CI (birds/km^2)	Upper 95% CI (birds/km^2)	Abundance Estimate	Lower 95% CI	Upper 95% CI	SD	CV (%)
Survey (WFDA + 4 km)								
Mar-22	0.00	0.00	0.00	0	0	0	0	0.00
Apr-22	0.00	0.00	0.00	0	0	0	0	0.00
May-22	0.00	0.00	0.00	0	0	0	0	0.00
Jun-22	0.00	0.00	0.00	0	0	0	0	0.00
Jul-22	0.00	0.00	0.00	0	0	0	0	0.00
Aug-22	0.00	0.00	0.00	0	0	0	0	0.00
Sep-22	0.00	0.00	0.00	0	0	0	0	0.00
Oct-22	0.00	0.00	0.00	0	0	0	0	0.00
Nov-22	0.00	0.00	0.00	0	0	0	0	0.00
Dec-22	0.00	0.00	0.00	0	0	0	0	0.00
Jan-23	0.00	0.00	0.00	0	0	0	0	0.00
Feb-23	0.00	0.00	0.00	0	0	0	0	0.00
Mar-23	0.00	0.00	0.00	0	0	0	0	0.00
Apr-23	0.00	0.00	0.00	0	0	0	0	0.00
May-23	0.00	0.00	0.00	0	0	0	0	0.00
Jun-23	0.00	0.00	0.00	0	0	0	0	0.00
Jul-23	0.00	0.00	0.00	0	0	0	0	0.00
Aug-23	0.00	0.00	0.00	0	0	0	0	0.00
Sep-23	0.00	0.00	0.00	0	0	0	0	0.00
Oct-23	0.01	0.00	0.04	9	0	29	9	94.48
Nov-23	0.00	0.00	0.00	0	0	0	0	0.00
Dec-23	0.00	0.00	0.00	0	0	0	0	0.00
Jan-24	0.00	0.00	0.00	0	0	0	0	0.00
Feb-24	0.00	0.00	0.00	0	0	0	0	0.00

Annex C: Ornithology MRSea Modelling and Reporting

This annex contains the MRSea modelling parameters and accompanying report on guillemot within the Bellrock WFDA plus 4 km buffer.

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Bellrock Offshore Wind Farm: Ornithology MRSea Modelling and Reporting

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Executive Summary

In March 2022, HiDef Aerial Surveying Limited (HiDef) were commissioned to undertake a programme of high-resolution digital video aerial surveys for marine megafauna, ornithological and human activity over the proposed Bellrock Offshore Wind Farm's Wind Farm Development Area (WFDA). The Bellrock WFDA is located 120km east of Stonehaven, in the northern North Sea.

A total of 24 monthly surveys were flown between March 2022 and February 2024. HiDef designed a survey that placed 2.5km-spaced transects across the WFDA plus a 4km surrounding buffer. The total survey area was 658km^2.

The Marine Renewables Strategic Environmental Assessment (MRSea) tool in R (Scott-Hayward *et al.*, 2014) was used to generate density surface layers for the most abundant seabird species recorded during surveys, the common guillemot (*Uria aalge*). MRSea was used to generate behaviour-specific (all, flying and sitting) density estimates. In addition to aggregated count data, environmental (covariate) data ("predictors") were collated in line with NatureScot guidance (NatureScot, 2023) and included within models when appropriate. Density surfaces were modelled using the aggregated data and predictors for the breeding and non-breeding season separately, to allow for season-specific drivers of distribution.

Only surveys which had ten or more observations within the full survey area were taken forward for modelling and MRSea outputs were validated against design-based estimates calculated using strip transect analysis. In total, 23 surveys were included in models for both all and sitting birds. Five surveys were modelled for flying birds. Density estimates and density surface layers were produced for the WFDA, WFDA plus a 2km buffer and the full survey area (WFDA plus 4km buffer).

Distance to coast was a significant driver of change in density during the breeding season across all models (all, flying and sitting), but was not significant in the non-breeding season. Environmental covariates also tended to have significant effects during the breeding season but less so the non-breeding season; significant covariates varied by behaviour and included bathymetry, sea surface temperature gradient and slope.

1 Introduction

1 Bellrock Offshore Wind Farm (hereafter 'Bellrock') is a proposed offshore wind farm, located 120km east of Stonehaven, in the northern North Sea. The full Bellrock Wind Farm Development Area (WFDA, hereafter 'WFDA') covers an area of 280km^2.

2 In March 2022, HiDef Aerial Surveying Limited ('HiDef') were commissioned to undertake a programme of high-resolution Digital Aerial Surveys (DAS) of ornithological, marine megafauna and human activity in support of the development proposal. Flights were flown monthly over a two-year period with a survey design consisting of 2.5km-spaced transects across the Bellrock WFDA plus a 4km surrounding buffer, hereafter referred to as the 'survey area'. In total, the survey area covered 658km^2.

3 HiDef designed the survey methodology to provide baseline surveys and an accurate assessment of abundance and distribution of seabirds and marine mammals to inform the WFDA Environmental Impact Assessment (EIA). Of the seabirds recorded, the most abundant species was the common guillemot (*Uria aalge*, hereafter 'guillemot') which was observed within the WFDA in relatively high numbers in both breeding (April to mid-August) and non-breeding (mid-August to March) seasons.

4 The WFDA is located offshore from several notable sites protected by legislation within the UK. A number of these sites are classified as Special Protection Areas (SPA), designated for guillemot, although none of these have connectivity with the WFDA (distance is greater than breeding season mean-max foraging range plus 1 standard deviation (Bellrock HRA Screening Report (2024), Woodward *et al.* 2019), agreed by NatureScot (K. Taylor (personal communication, 8th October, 2024)). Following the UK's exit from the EU, the legislation transposing the EU Habitats Directive and the Wild Birds Directive has been amended so that the strict protections afforded to sites, habitats and species continues. The suite of legislative instruments is collectively termed the 'Habitat Regulations'. The Habitat Regulations were amended in 2019 as a result of the UK leaving the EU within the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019.

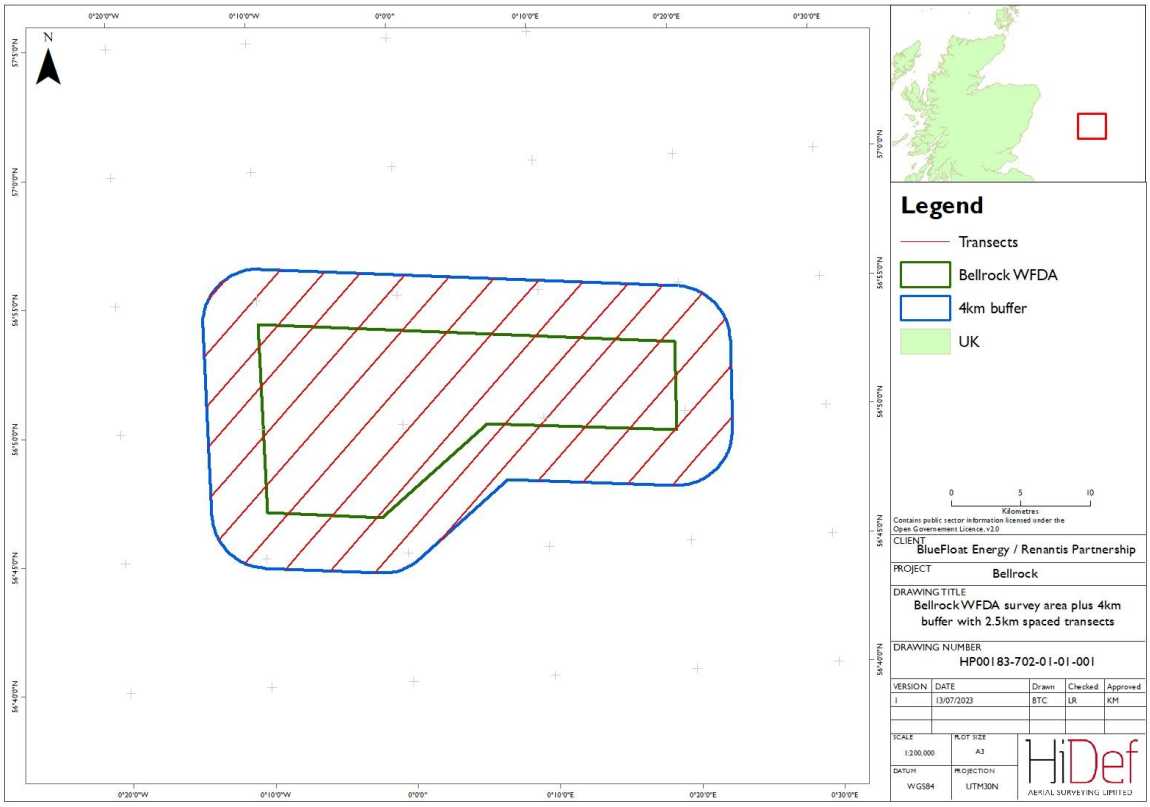
5 This report provides behaviour-specific density estimates and density surface layers following guidance from NatureScot (NatureScot, 2023) using the Marine Renewables Strategic Environmental Assessment (MRSea) tool in R (Scott-Hayward *et al.*, 2013, Scott-Hayward *et al.*, 2014) for Bellrock WFDA, WFDA plus a 2km buffer and the full survey area (WFDA plus a 4km buffer).

2 Methods

2.1 Digital aerial surveys

6 DAS took place between March 2022 and February 2024, following the protocol agreed in March 2022 (HP00183-001). The survey design consisted of 2.5km-spaced transects across the Bellrock WFDA (280km^2) and a surrounding 4km buffer (Figure 1). This created an overall survey area of 658km^2 (Figure 1)). A total of 15 strip transects were flown extending roughly north-east to south-west, perpendicular to the depth contours along the coast; full details can be found within the HiDef 2-year Annual Report (HiDef, 2024).

Figure 1 Bellrock WFDA survey design with 4km buffer with 2.5km-spaced transects, flown between March 2022 and February 2024.



2.2 Data processing

7 All relevant species observations, trimmed to the specified survey areas, are available within the data pack associated with this report.

8 Alongside species and season definitions, data were also defined by behaviour for the analysis. Three behaviour definitions were used: 1) all birds (excluding dead birds); 2) flying birds; 3) sitting birds. Too few dead birds were present for analysis (2 guillemot with a positive ID); full details of dead birds by survey and location can be found in the trimmed observations file accompanying this report, as well as in the two-year DAS report (HiDef, 2024).

9 Prior to aggregating observations for modelling, apportioning of 'unidentified' birds to species level was performed. The number of unidentified birds in each species group were assigned to species where appropriate, based on their respective abundance ratios. For example, if identified guillemots and

razorbills occurred in a 4:1 ratio, then 80% of unidentified birds considered to be possibly either of those species would be assigned to guillemot and 20% assigned to razorbill. This apportioning is undertaken at the per bird level (i.e. in this case, each unidentified bird would be assigned a 0.8 count to guillemot and a 0.2 count to razorbill), to prevent changes to bird distribution due to allocation of specific individuals to specific species. Following this apportioning, observations within each transect in each survey were aggregated to ~500 metre bins (total transect length/(total transect length/500)) in preparation for density surface modelling.

2.3 Design-based estimates

10 Prior to density surface modelling, densities of relevant seabird species were estimated using a design-based approach: each transect within a survey was treated as a statistically independent random sample from the site. The length and breadth (i.e. the width of the field of view of the camera) of each transect were multiplied to give the transect area; dividing the number of observations for each species within each transect by the transect area gave a point estimate of the density of that species for the transect. The density of birds at the site were then estimated from these transect point estimates using a non-parametric block bootstrap method with replacement (Buckland *et al.*, 2001), to ensure equal transect effort was sampled across each bootstrap iteration. Within each iteration, the mean density estimate was weighted by transect area.

11 For each survey, species and behaviour combination, 1,000 bootstrap iterations were run, from which mean density and population (density multiplied by survey area) estimates were generated, along with standard errors (SE), coefficient of variation based on SE (CV_{SE}), lower and upper confidence levels (CLs). Data were processed in the R programming language (version 4.3.0; R Core team, 2023) and code can be provided on request.

12 There were some surveys with no observations by species and behaviour combination, and density estimates calculated through design- or model-based approaches will be zero. In these cases, the lower CL is presented as zero and the upper CL, SE and CV_{SE} are presented as not applicable (NA), as no upper bound for density estimates could be calculated.

13 Design-based density estimates produced for this report may differ slightly (< 5%) from those reported in the 2-year Annual Report (HiDef, 2024); to allow an automated data pipeline for the modelling process here, the bootstrap process was re-run here, resulting in different random sampling as part of the bootstrap process.

2.4 Model-based estimates

14 Density surface modelling was undertaken using the MRSea tool in R (Scott-Hayward *et al.*, 2014), as advised in the NatureScot guidance (NatureScot, 2023). This is a model-based approach to density estimation and was used to generate behaviour-specific density estimates and density surfaces using the aggregated data for the breeding and non-breeding season.

15 In addition to aggregated count data, environmental (covariate) data ("predictors") were collated in line with NatureScot guidance (NatureScot, 2023). Covariate data were included for bathymetry (sea floor depth, metres), slope (rate of change in sea floor depth, degrees), aspect (direction that the slope faces, degrees), sea surface temperature and sea surface temperature gradient (degrees Celsius). Distance to the coast was also included as a covariate in the modelling, with other distances (e.g. distance to windfarm) excluded due to the high level of correlation with the former. Mixed layer depth, chlorophyll-*a* and wind speed data were not available at sufficient resolution for inclusion here (e.g. chlorophyll-*a* data were available at a maximum 4km^2 resolution). Bathymetry, slope and aspect data were obtained

from General Bathymetric Chart of the Oceans gridded bathymetry data (GEBCO, 2019) while sea surface temperature data were extracted from Multi-scale Ultra-high-Resolution data via ERDDAP (ERDDAP, 2023). Values of covariates were assigned to the mid-point co-ordinates of the 500 metre transect segments.

16 Having defined counts and covariates, prediction grids were estimated for the relevant survey areas at 1km resolution. The prediction grid area was clipped to the relevant analysis areas, and covariate values interpolated using the extract() function within the "raster" package in R (Hijmans, 2023). Covariate estimates for prediction grids are shown in Appendix 3.

17 Modelling in MRSea was conducted for guillemot for each of the three behaviours and for breeding/non-breeding surveys, resulting in a maximum of six MRSea modelling scenarios (each containing multiple surveys; i.e. each "breeding" model contains all surveys from the breeding season, with survey being a factor in the model). Previous analysis using MRSea across multiple projects by HiDef has indicated poor model convergence and CVs exceeding 100% when total counts per survey are below ten, therefore all data sets were filtered to exclude surveys with fewer than ten observations. The number of observations per survey and behaviour are shown in Table 1. For each behaviour/season combination, an initial Generalised Linear Model (GLM) with log link function and quasi-Poisson errors (to account for over-dispersion) was applied to the data. The scaled covariates listed above, specific individual survey and the offset log area (to correct for differences in the aggregated areas due to small differences in bin lengths approximating 500m) were used as predictors and aggregated counts as the response.

Table 1 Number of guillemot observations per survey and behaviour.

Survey	All excludes dead	Flying	Sitting
15 March 2022	263	1	262
17 April 2022	190	86	104
14 May 2022	59	2	57
06 June 2022	17	1	16
19 July 2022	1,654	3	1,645
07 August 2022	113	1	112
07 September 2022	223	0	223
02 October 2022	178	2	176
03 November 2022	302	7	295
20 December 2022	75	6	69
20 January 2023	88	11	77
04 February 2023	77	42	35
04 March 2023	56	3	53
03 April 2023	37	17	20
04 May 2023	135	77	58
13 June 2023	22	4	18
07 July 2023	13	3	10

Survey	All excludes dead	Flying	Sitting
17 August 2023	19	0	19
04 September 2023	23	1	22
13 October 2023	15	2	13
14 November 2023	22	1	21
10 December 2023	2	0	2
30 January 2024	27	0	26
08 February 2024	45	0	45

18 Residual plots were used to assess the linearity of responses by predictor, and where non-linearity existed, model-selected natural splines were applied to the relevant predictors. Variance inflation factors (VIF) were determined, and predictors removed where VIF exceeded five; this process resulted in sea surface temperature being excluded across all models, due to its high collinearity with specific survey. The tweedie.check() function from the tweedie package (Dunn, 2022) was used to assess the fit of the quasi-Poisson model versus a variance power of greater than one, with the best fit chosen for use in the initial model.

19 A one-dimensional smooth was fitted to the covariate data using the initial model via SALSA (Spatially Adaptive Local Smoothing Algorithm) using the runSALSA1D() function in the MRSea package (Mackenzie *et al.*, 2013), setting a minimum of one and maximum of three knots per covariate and testing both b-splines and natural splines. Quasi-Bayesian Information Criterion (QBIC) was used as the fitness measure, and the best fit of the two spline types selected. The best one-dimensional model was extracted from the output and further refined to include only covariates with a significant effect based on analysis of variance outputs (with inclusion based on a significance threshold of $p<0.01$).

20 To allow for flexible spatial surfaces within the models, knot grids and distances between knots were generated per survey, with 300 knots per survey. Spatially adaptive two-dimensional smooths of spatial coordinates were applied to the best one-dimensional model using the runSALSA2D() function in the MRSea package (Mackenzie *et al.*, 2013), with the knot grids applied as generated per survey, with a maximum of two knots x number of surveys (e.g. 24 knots if 12 surveys in the data set) and a minimum of two knots with a minimum 1km gap between individual knots. Start knots were set at five and adjusted down to a minimum of two where models generated poor convergence or fit. Transect ID (unique integer values per survey and transect combination) was included as a blocking effect in the modelling. A second two-dimensional model was fitted to the data excluding all covariates.

21 Model fit was assessed for two-dimensional models with or without covariates using a ten-fold cross-validation, and the best fit model chosen in each case. Analysis of variance was applied to the final model to test significance of predictors. Final model fit was assessed in line with NatureScot guidance (NatureScot, 2023), with predicted versus observed values, scaled Pearson residuals, partial plots and cumulative residual plots (for significant covariates) outputted. The predict() function was used to predict densities for the prediction grid, followed by bootstrap estimates derived via the do.bootstrap.cress.robust() function in MRSea (Mackenzie *et al.*, 2013), with 1,000 bootstraps per grid cell.

22 Bootstrap outputs were used to generate mean, standard error, lower 2.5% and upper 97.5% estimated densities per prediction grid 1 km x 1 km cell. Poorly converged bootstrap estimates per grid cell were excluded where the estimated grid cell value exceeded twice that of the cell-based prediction obtained

via the predict() function. Summed predictions by individual bootstrap were used to generate abundance estimates and similar metric estimates. Poorly converged abundance estimates were removed based on a threshold equivalent to every cell having a density equal to the upper 95th percentile prediction of the 97.5th percentile bootstrap density estimate.

23 Where MRSea model outputs were not available due to fewer than ten observations for the survey, design-based densities were substituted (see below). Where design-based density and abundance estimates have been used, these are clearly marked in the figures and output tables.

2.5 Availability bias

24 In wildlife surveys, a proportion of seabirds that spend any time underwater, especially while feeding, will not be detectable at the surface. This 'availability bias' leads to an under-estimate of their abundance from survey data. For completeness, and to align with standard HiDef analysis outputs, availability bias corrections were also undertaken here. Availability bias corrections are only applied to observations of auks (guillemot, razorbill and puffin) due to lack of available dive duration data for other species. The probability that an animal is available at the surface is calculated as:

$$P(\text{being visible}) = \frac{s + t}{s + d}$$

25 Where *s* is the average time spent at the surface, *t* is the window of time that the animal is within view and *d* is the average time below the surface. In the case of DAS, the value of t is negligibly small and is treated as zero.

26 For guillemot, data obtained from data loggers during the breeding season were used to estimate availability bias. Thaxter *et al.* (2010) gives mean times for these species engaged in flying, feeding and underwater behaviour per trip, during the chick-rearing period. Thus, the proportion of time that guillemot were available at the surface (*P*(being visible)) was estimated at 0.7595.

27 For all estimates, availability bias corrections were applied post-modelling to the density and population estimates for birds sitting on the water, added to the estimate of non-sitting birds. Availability bias-corrected estimates are presented in Appendix 2 as "absolute" density and population estimates (versus "relative").

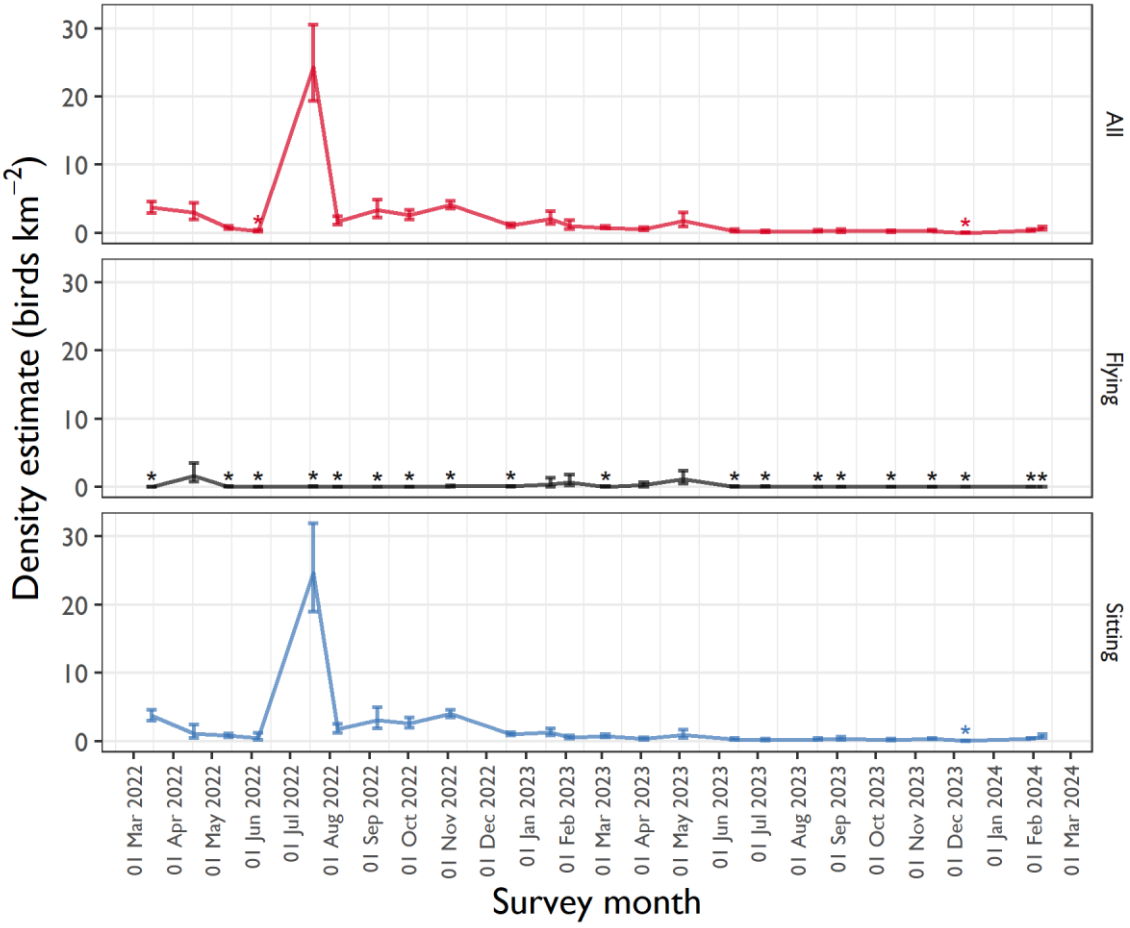
3 Results

3.1 Guillemot

3.1.1 Density estimates

28 Figure 2 shows the relative density estimates of guillemot across the survey period for the 4km buffer area (relative densities shown to align with maps in results which use relative densities for density surface modelling). Densities of guillemot for all three behaviours peaked in the 2022 breeding season, with the highest densities for flying birds estimated in April 2022 and the highest all and sitting bird densities occurring in July 2022. In the second year of surveys density estimates peaked in May 2023 for all three behaviours. Full density estimates (relative/absolute and across the different survey areas) can be found in Appendix 2. Except in a small number of the surveys, densities of sitting birds were higher (often substantially) than those of flying birds.

Figure 2 Guillemot relative density estimates for each survey for 'All' (excluding dead), 'Flying' and 'Sitting' birds. Error bars show 95% confidence levels and '*' denote design-based estimates.



3.1.2 All birds density surfaces

29 Figure 3 and Figure 4 show the breeding and non-breeding density surfaces for guillemot, with weak significant effects of sea surface temperature gradient (increasing density with decreasing gradient) and strong significant effects of distance to coast during the breeding season (see Appendices 3 and 4), with densities decreasing as distance to coast increased.

30 The density estimate for June 2022 from the MRSea modelling was inconsistent when compared to design-based density estimation (non-overlapping confidence levels) and was notably higher than April and May 2022 estimates (where number of observations were far higher, see Figure 3); this was driven by an erroneous knot location within the modelling. Density estimates for this month were therefore replaced with design-based estimates.

31 There were no significant covariate effects during the non-breeding season (see Appendix 3).

Figure 3 Guillemot (all birds) density surfaces from MRSea outputs for surveys during the breeding season.

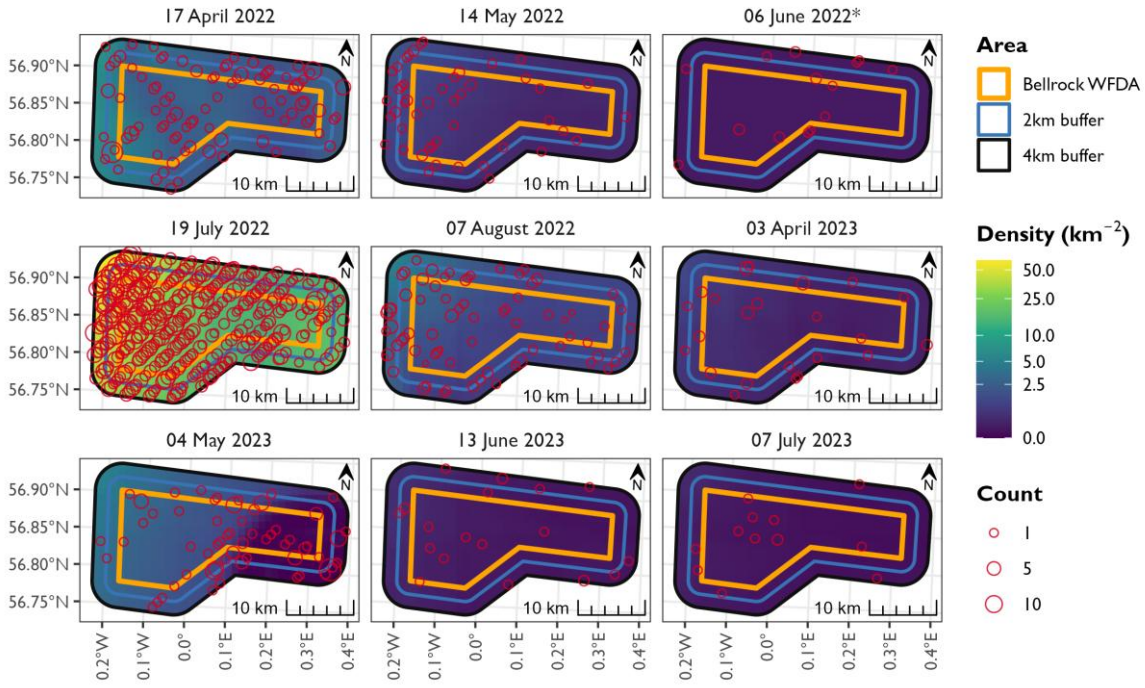


*Figure note: *Design-based estimates substituted in as flat density surface for June 2022 as MRSea outputs produced inconsistent estimates when compared to design-based estimates.*

Red unfilled circles show apportioned bird observations, aggregated to 500 metre transect bins.

Note log10 colour scales.

Figure 4 Guillemot (all birds) density surfaces from MRSea outputs for surveys during the non-breeding season.

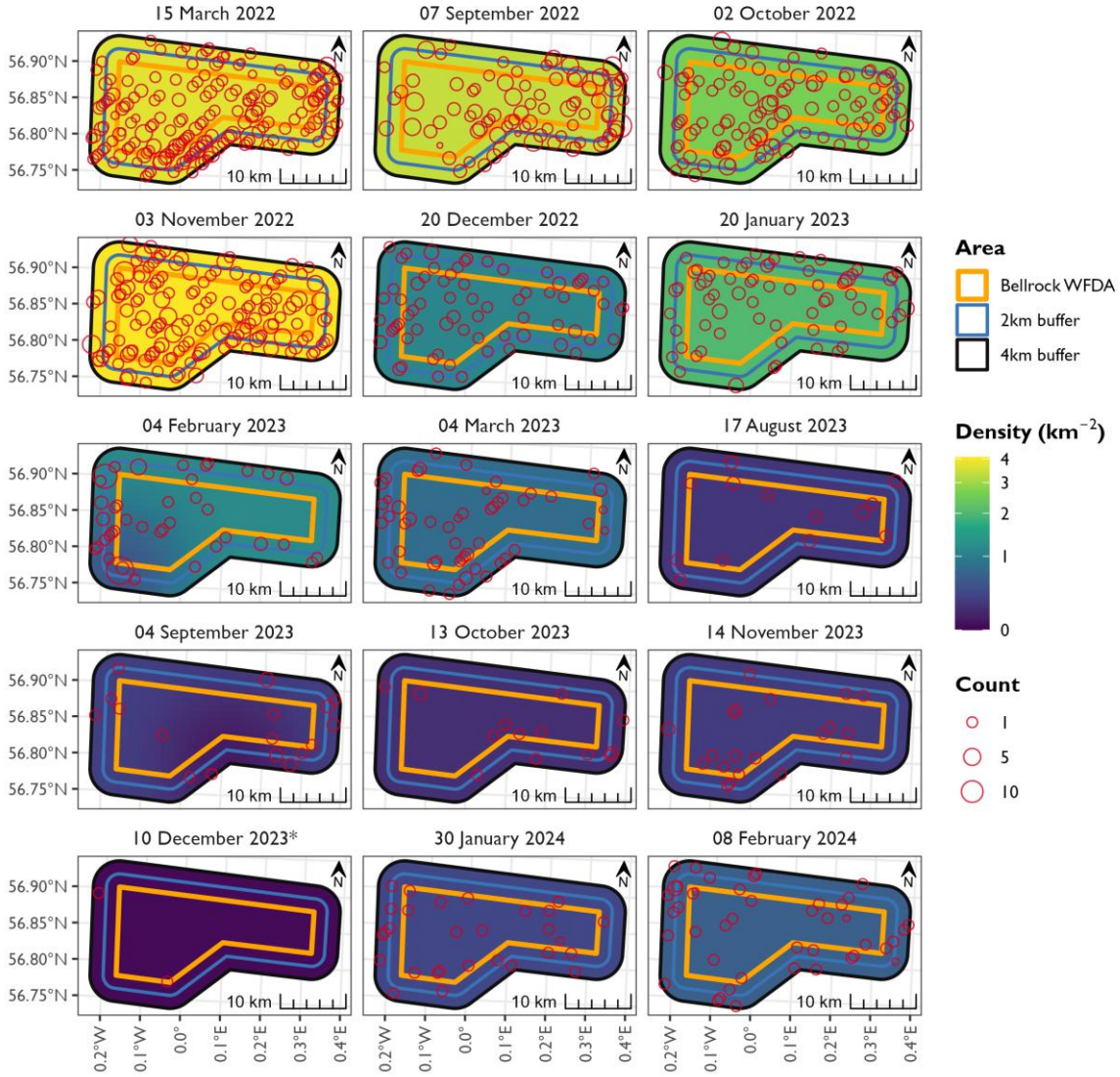


*Figure note: *Design-based estimates substituted in as flat density surface where <10 observations.*

Red unfilled circles show apportioned bird observations, aggregated to 500 metre transect bins.

Note log10 colour scales.

3.1.3 Flying birds density surfaces

32 Figure 5 and Figure 6 show the breeding and non-breeding density surfaces for flying guillemot, with a weakly significant non-linear effect of sea surface temperature gradient and significant effect of distance to coast during the breeding season (increasing flying bird density with increased distance to coast) for the two surveys to which the MRSea modelling was applied (see Appendix 3).

33 Bathymetry was found to have a significant effect during the non-breeding season for the two surveys to which the MRSea modelling was applied (see Appendix 3), with increasing flying bird density with decreased sea depth.

Figure 5 Guillemot (flying) density surfaces from MRSea outputs for surveys during the breeding season.

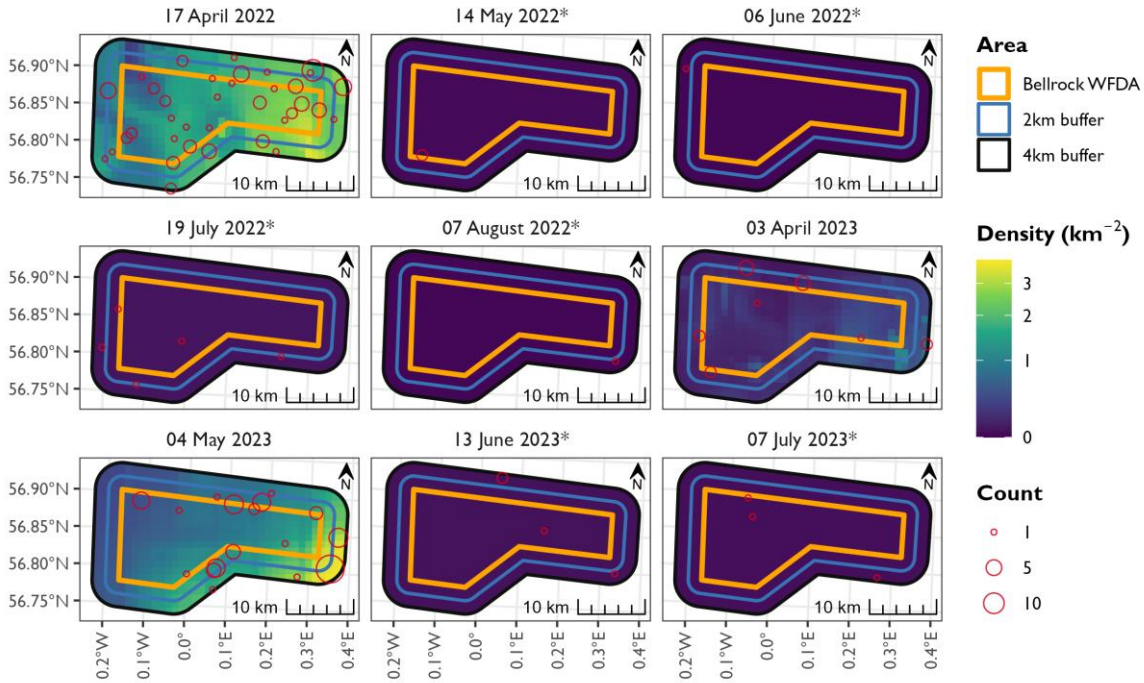


*Figure note: *Design-based estimates substituted in as flat density surface where <10 observations.*

Red unfilled circles show apportioned bird observations, aggregated to 500 metre transect bins.

Note log10 colour scales.

Figure 6 Guillemot (flying) density surfaces from MRSea outputs for surveys during the non-breeding season.

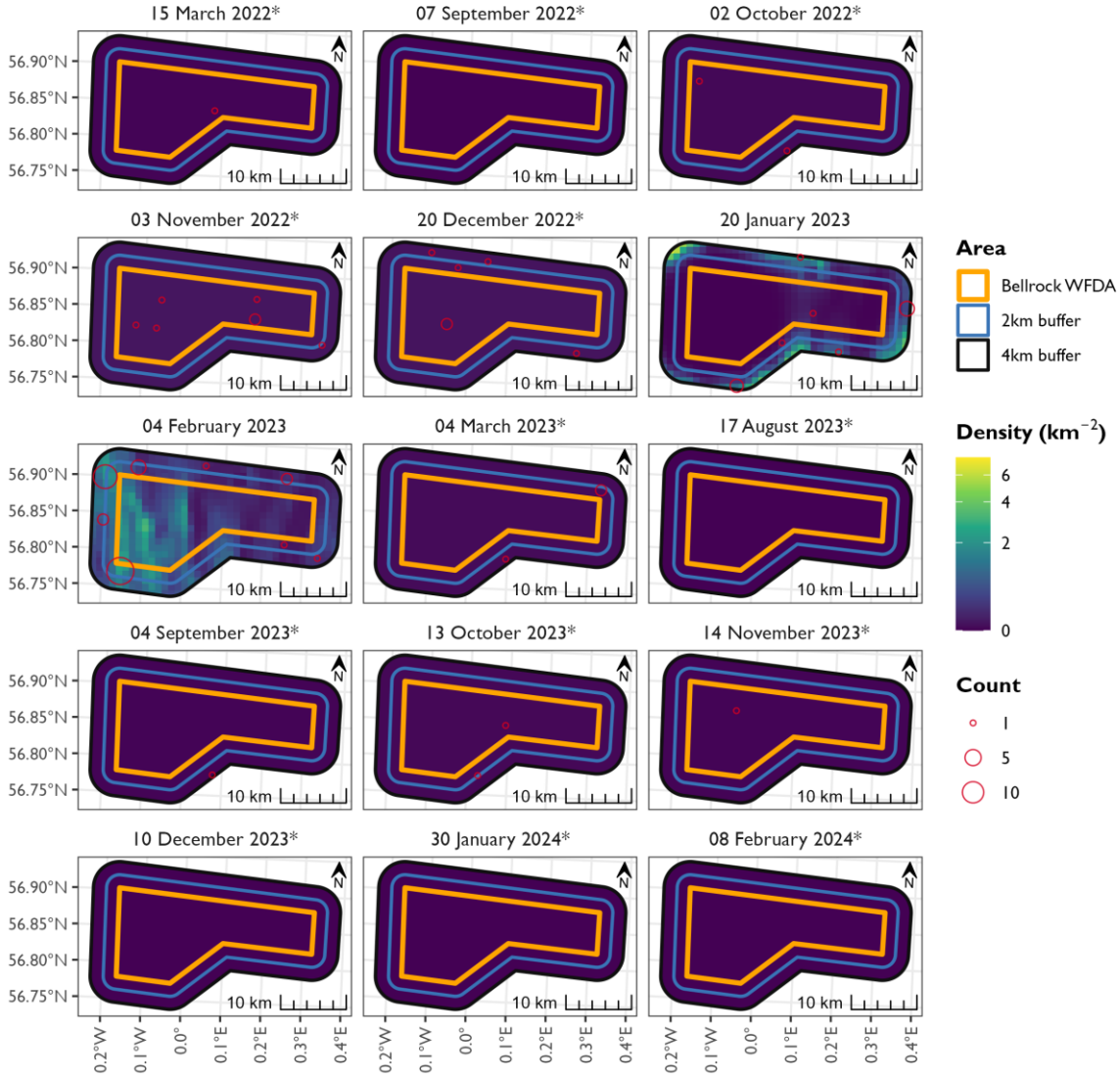


*Figure note: *Design-based estimates substituted in as flat density surface where <10 observations.*

Red unfilled circles show apportioned bird observations, aggregated to 500 metre transect bins.

Note log10 colour scales.

3.1.4 Sitting birds density surfaces

34 Figure 7 and Figure 8 show the breeding and non-breeding density surfaces for sitting guillemot, with strong significant effects of bathymetry (increasing sitting bird densities with decreased sea depth), slope (non-linear effects), and distance to coast (decreasing sitting bird densities with increased distance to coast) during the breeding season (see Appendix 3). There were no significant covariate effects during the non-breeding season (see Appendix 3).

Figure 7 Guillemot (sitting) density surfaces from MRSea outputs for surveys during the breeding season.

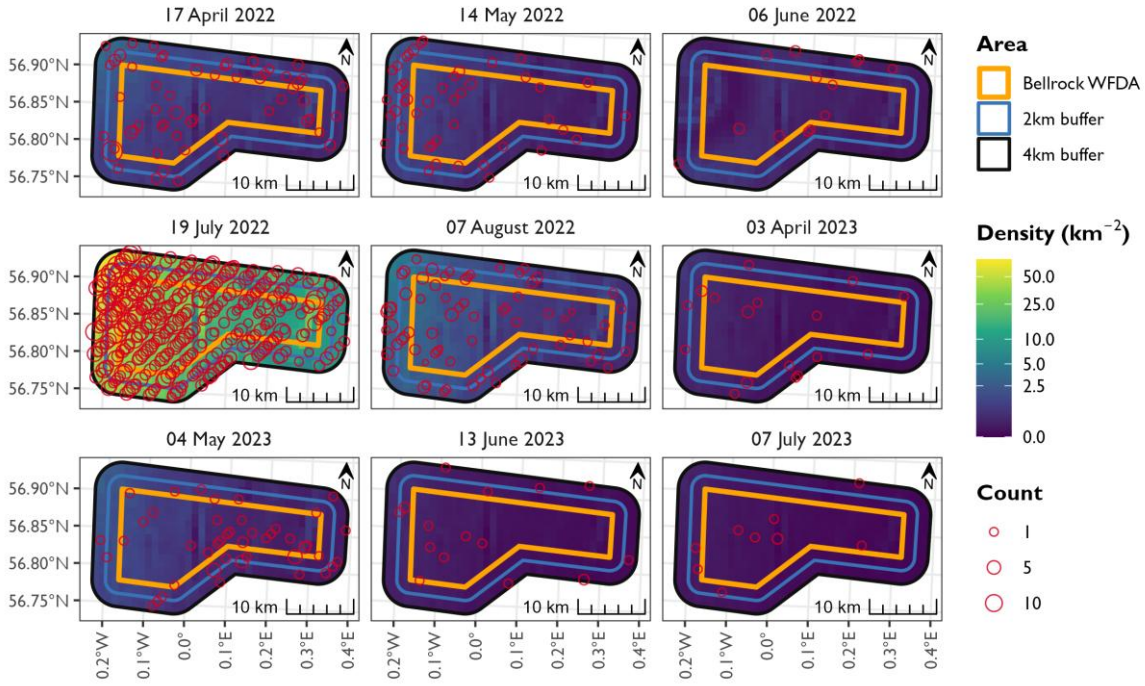


Figure note: Red unfilled circles show apportioned bird observations, aggregated to 500 metre transect bins.

Note log10 colour scales.

Figure 8 Guillemot (sitting) density surfaces from MRSea outputs for surveys during the non-breeding season.

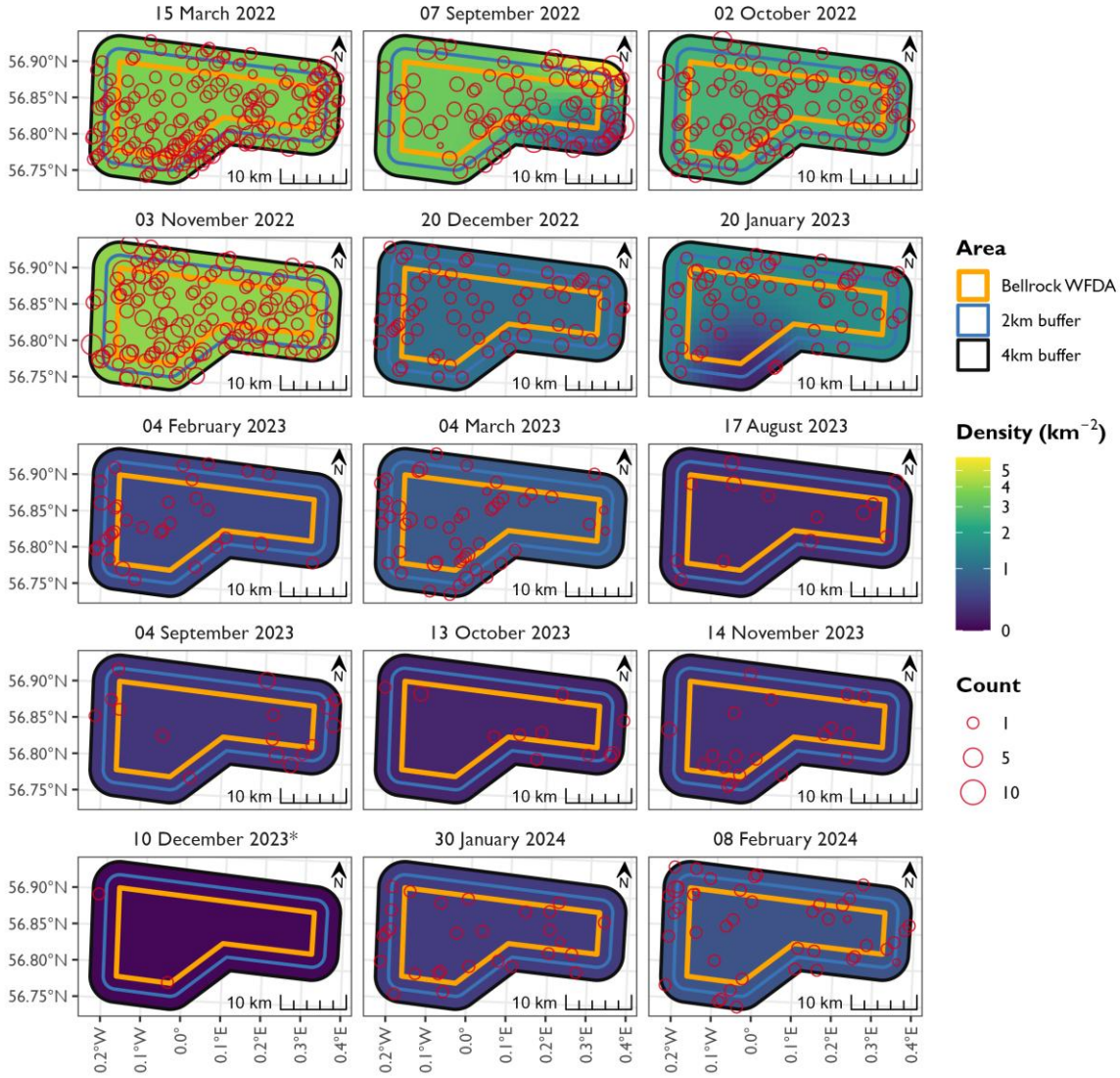


*Figure note: *Design-based estimates substituted in as flat density surface where <10 observations.*

Red unfilled circles show apportioned bird observations, aggregated to 500 metre transect bins.

Note log10 colour scales.

4 Discussion

35 All surveys, other than December 2023, were found to have large enough sample sizes within the survey area to be taken forward for MRSea modelling for all and sitting birds; for flying birds only five surveys (three breeding and two non-breeding) had large enough sample sizes.

36 There were consistent significant effects of distance to coast across all behaviours during the breeding season, with notably higher densities of all and sitting guillemot predicted on the western side of WFDA plus 4km buffer (see Figures 3 and 7) (although the trend was reversed in the limited number of flying bird surveys that were analysed, Figure 5. These trends are likely driven by a general movement of dispersing birds away from east coast of Scotland.

37 There were no other consistent environmental covariate effects during the breeding season. Sea surface temperature gradient was found to have a weak significant effect for all and flying birds, whereas bathymetry and slope were significant for sitting birds. This may be driven by an interaction between sea floor depth/slope and prey availability; for example, lesser sandeel (*Ammodytes marinus*) show a preferred depth range of 30-50 metres (Langton *et al.,* 2021), and birds may be less likely to be sitting over areas where depths markedly exceed this range.

38 The density distributions for non-breeding tended to show little spatial variation, with the majority of density surfaces being flat, even where numbers of observations were relatively high for all and sitting birds (see Figures 4 and 8). There was a significant effect of bathymetry for flying birds, although this was limited to two surveys only; this again may be driven by an interaction between the sea floor and prey availability.

39 The overall results point to more defined spatial patterns in guillemot distribution during the breeding versus non-breeding season, with notably higher overall densities of birds to the west side of WFDA plus 4km buffer that is closer to the coast.

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6 Appendix 1 - Covariate estimates across prediction grid

Figure 9 Covariate estimates for distance to coast (km) across the prediction grid area

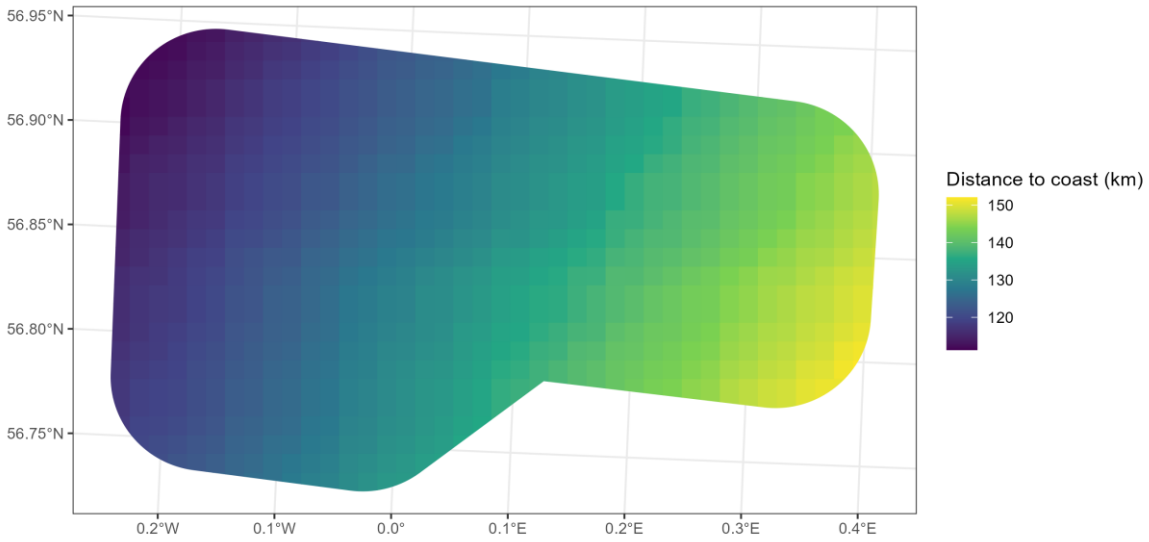


Figure 10 Covariate estimates for aspect (degrees) across the prediction grid area

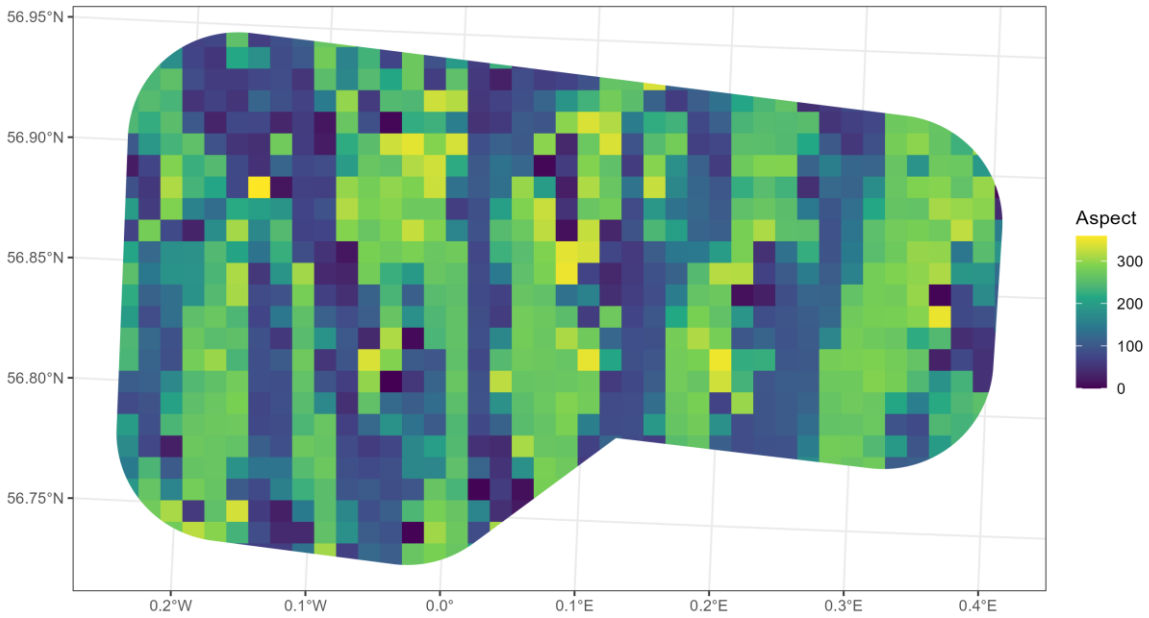


Figure 11 Covariate estimates for bathymetry (metres) across the prediction grid area

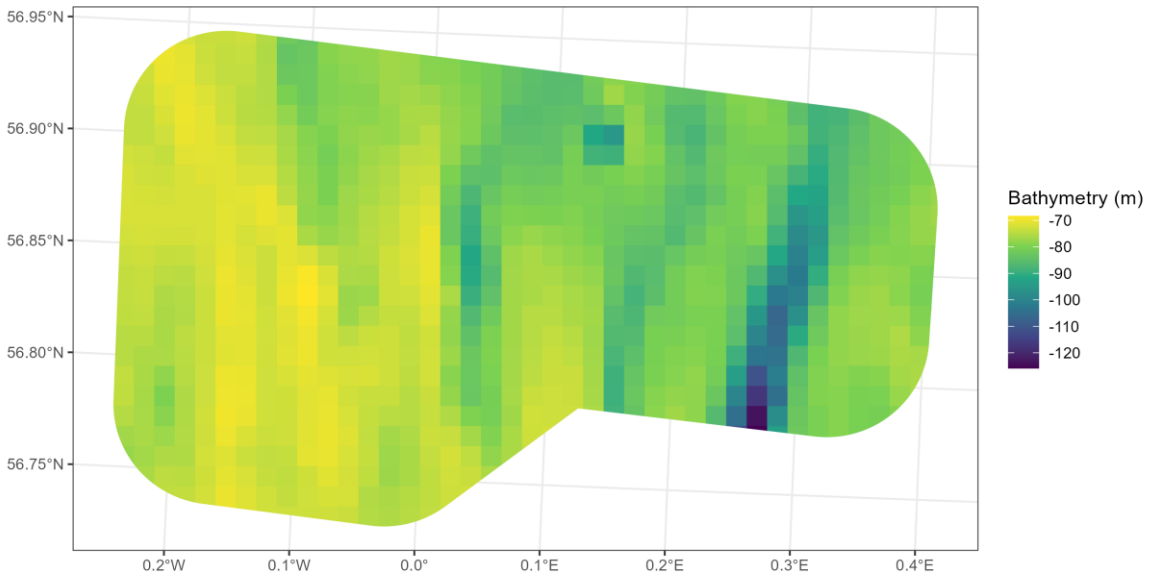


Figure 12 Covariate estimates for slope (degrees) across the prediction grid area

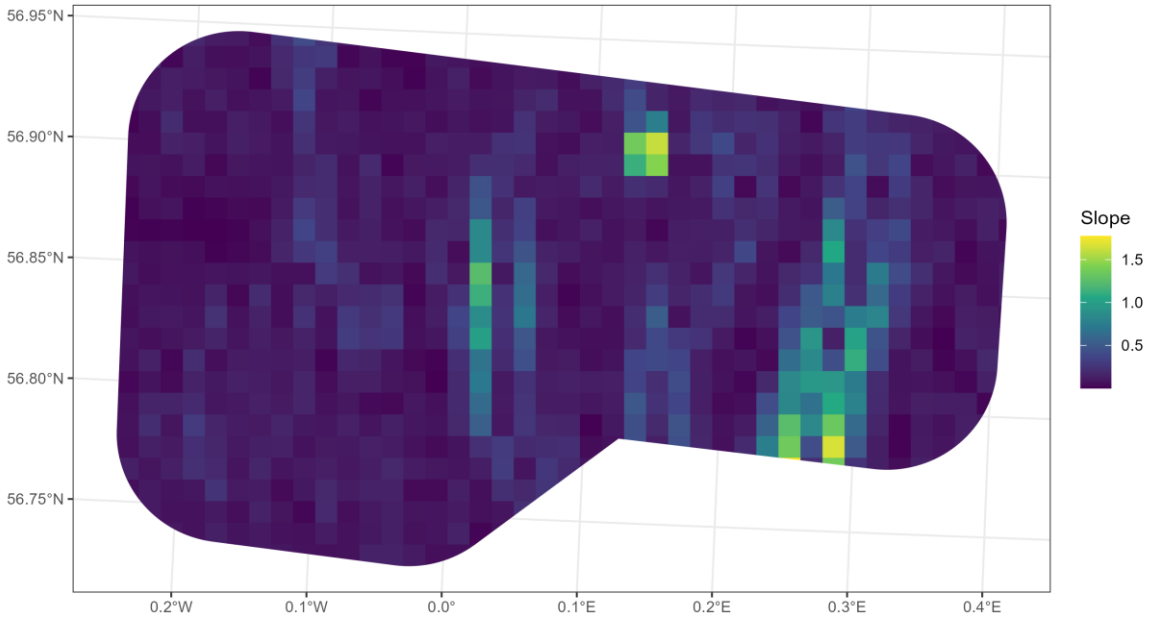
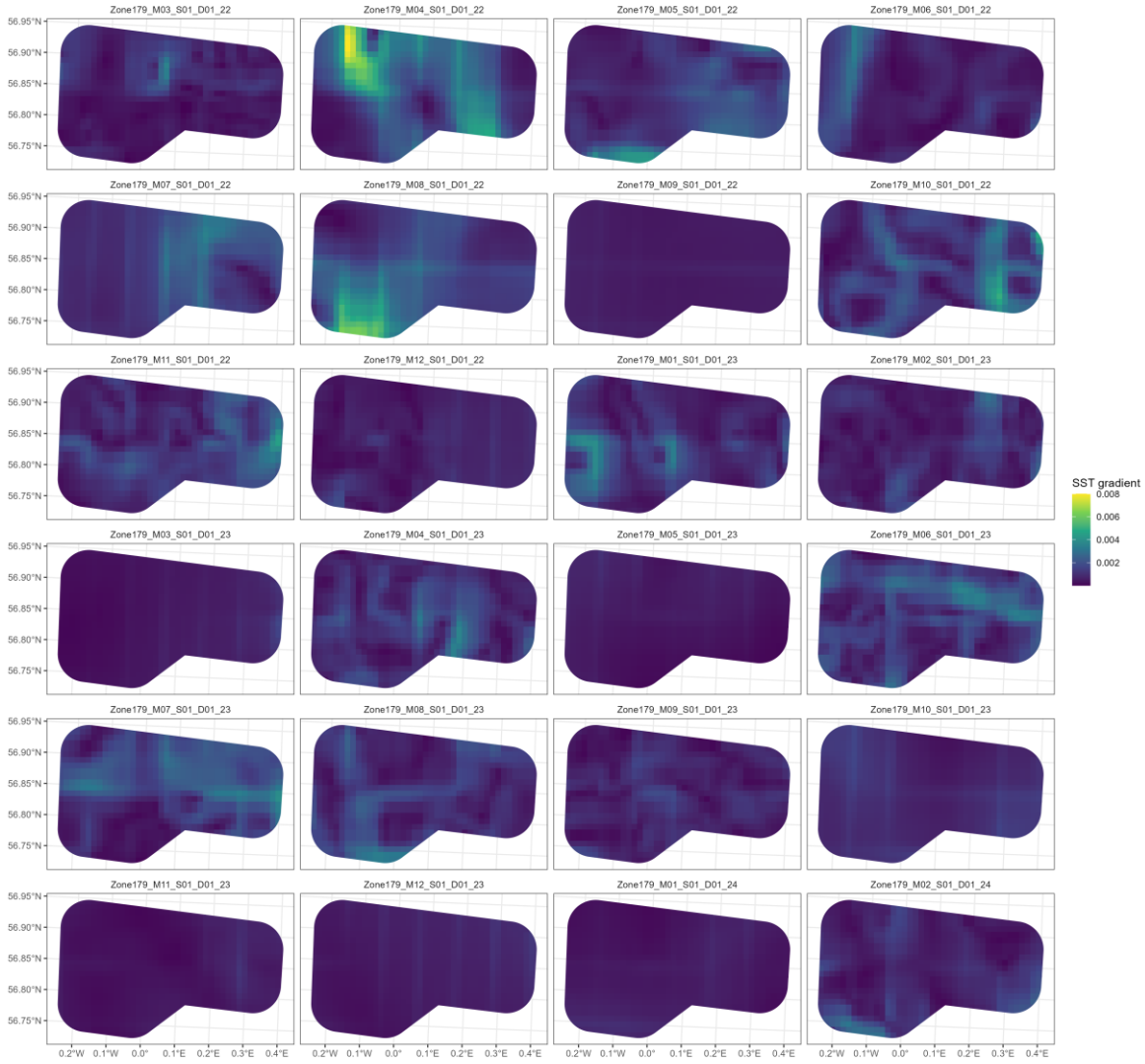


Figure 13 Covariate estimates for sea surface temperature (celsius) across the prediction grid area



Figure 14 Covariate estimates for sea surface temperature gradient (celsius) across the prediction grid area



7 Appendix 2 - Tables of all densities (km^{-2}) and populations

Table A2.1 Relative density and population estimates for guillemot - all birds

Survey Date	Season	Area	Modelling	Density	Density (LCL)	Density (UCL)	Density (SE)	Density (CV)	Population	Population (LCL)	Population (UCL)	Population (SE)	Population (CV)
15 March 2022	Non-breeding	4km buffer	MRSea	3.74	2.95	4.59	0.42	0.11	2,441	1,942	3,022	279	0.11
17 April 2022	Breeding	4km buffer	MRSea	3.00	1.97	4.38	0.50	0.17	1,945	1,412	2,625	310	0.16
14 May 2022	Breeding	4km buffer	MRSea	0.78	0.56	1.05	0.11	0.14	504	395	644	65	0.13
06 June 2022	Breeding	4km buffer	Design-based	0.28	0.14	0.42	0.07	0.25	181	89	274	45	0.25
19 July 2022	Breeding	4km buffer	MRSea	24.35	19.35	30.52	2.34	0.10	15,975	13,924	18,275	1,108	0.07
07 August 2022	Breeding	4km buffer	MRSea	1.72	1.22	2.39	0.26	0.15	1,113	873	1,445	144	0.13
07 September 2022	Non-breeding	4km buffer	MRSea	3.37	2.22	4.91	0.70	0.21	2,165	1,460	3,231	460	0.21
02 October 2022	Non-breeding	4km buffer	MRSea	2.61	1.99	3.41	0.37	0.14	1,700	1,308	2,249	241	0.14
03 November 2022	Non-breeding	4km buffer	MRSea	4.08	3.56	4.66	0.29	0.07	2,678	2,342	3,067	190	0.07
20 December 2022	Non-breeding	4km buffer	MRSea	1.12	0.85	1.44	0.15	0.14	730	557	948	99	0.14
20 January 2023	Non-breeding	4km buffer	MRSea	2.03	1.27	3.15	0.49	0.24	1,305	836	2,074	323	0.24
04 February 2023	Non-breeding	4km buffer	MRSea	1.03	0.51	1.89	0.37	0.36	635	345	1,200	222	0.33
04 March 2023	Non-breeding	4km buffer	MRSea	0.79	0.61	1.02	0.11	0.14	513	400	675	71	0.14
03 April 2023	Breeding	4km buffer	MRSea	0.57	0.37	0.83	0.11	0.19	366	252	512	67	0.18
04 May 2023	Breeding	4km buffer	MRSea	1.78	0.97	2.99	0.55	0.31	1,126	658	1,915	322	0.27
13 June 2023	Breeding	4km buffer	MRSea	0.32	0.18	0.54	0.08	0.25	198	120	341	57	0.27
07 July 2023	Breeding	4km buffer	MRSea	0.21	0.12	0.36	0.06	0.27	135	79	231	39	0.28

Survey Date	Season	Area	Modelling	Density	Density (LCL)	Density (UCL)	Density (SE)	Density (CV)	Population	Population (LCL)	Population (UCL)	Population (SE)	Population (CV)
17 August 2023	Non-breeding	4km buffer	MRSea	0.27	0.16	0.45	0.08	0.28	174	105	297	50	0.28
04 September 2023	Non-breeding	4km buffer	MRSea	0.27	0.13	0.51	0.11	0.39	164	84	325	64	0.36
13 October 2023	Non-breeding	4km buffer	MRSea	0.23	0.12	0.40	0.07	0.32	145	77	265	48	0.32
14 November 2023	Non-breeding	4km buffer	MRSea	0.32	0.23	0.43	0.05	0.17	206	150	283	35	0.17
10 December 2023	Non-breeding	4km buffer	Design-based	0.03	0.00	0.07	0.02	0.68	19	0	47	13	0.68
30 January 2024	Non-breeding	4km buffer	MRSea	0.41	0.31	0.52	0.05	0.12	268	206	339	33	0.12
08 February 2024	Non-breeding	4km buffer	MRSea	0.65	0.42	0.96	0.14	0.21	419	274	632	89	0.21
15 March 2022	Non-breeding	2km buffer	MRSea	3.74	2.95	4.59	0.42	0.11	1,654	1,316	2,047	189	0.11
17 April 2022	Breeding	2km buffer	MRSea	2.83	1.89	4.04	0.47	0.17	1,244	919	1,664	193	0.15
14 May 2022	Breeding	2km buffer	MRSea	0.76	0.56	1.01	0.11	0.14	333	263	427	43	0.13
06 June 2022	Breeding	2km buffer	Design-based	0.28	0.14	0.42	0.07	0.25	125	62	190	32	0.25
19 July 2022	Breeding	2km buffer	MRSea	23.55	19.09	28.88	2.19	0.09	10,428	9,127	11,951	700	0.07
07 August 2022	Breeding	2km buffer	MRSea	1.64	1.18	2.24	0.24	0.15	720	560	921	93	0.13
07 September 2022	Non-breeding	2km buffer	MRSea	3.37	2.22	4.91	0.70	0.21	1,467	989	2,189	311	0.21
02 October 2022	Non-breeding	2km buffer	MRSea	2.61	1.99	3.42	0.37	0.14	1,152	886	1,524	163	0.14
03 November 2022	Non-breeding	2km buffer	MRSea	4.08	3.56	4.66	0.29	0.07	1,814	1,587	2,078	129	0.07
20 December 2022	Non-breeding	2km buffer	MRSea	1.12	0.85	1.44	0.15	0.14	494	377	642	67	0.14
20 January 2023	Non-breeding	2km buffer	MRSea	2.04	1.27	3.15	0.49	0.24	884	566	1,405	219	0.24
04 February 2023	Non-breeding	2km buffer	MRSea	1.02	0.51	1.88	0.36	0.35	427	232	805	150	0.33

Survey Date	Season	Area	Modelling	Density	Density (LCL)	Density (UCL)	Density (SE)	Density (CV)	Population	Population (LCL)	Population (UCL)	Population (SE)	Population (CV)
04 March 2023	Non-breeding	2km buffer	MRSea	0.79	0.61	1.03	0.11	0.14	348	271	457	48	0.14
03 April 2023	Breeding	2km buffer	MRSea	0.54	0.35	0.78	0.10	0.19	237	162	332	43	0.18
04 May 2023	Breeding	2km buffer	MRSea	1.74	0.96	2.91	0.55	0.32	745	431	1,274	210	0.27
13 June 2023	Breeding	2km buffer	MRSea	0.30	0.17	0.52	0.08	0.26	130	79	224	37	0.27
07 July 2023	Breeding	2km buffer	MRSea	0.20	0.11	0.34	0.06	0.28	87	51	151	25	0.28
17 August 2023	Non-breeding	2km buffer	MRSea	0.27	0.16	0.45	0.08	0.28	118	71	201	34	0.28
04 September 2023	Non-breeding	2km buffer	MRSea	0.26	0.12	0.49	0.10	0.38	107	54	211	42	0.37
13 October 2023	Non-breeding	2km buffer	MRSea	0.23	0.12	0.40	0.07	0.32	98	52	180	33	0.32
14 November 2023	Non-breeding	2km buffer	MRSea	0.32	0.23	0.43	0.05	0.17	139	102	192	24	0.17
10 December 2023	Non-breeding	2km buffer	Design-based	0.03	0.00	0.07	0.02	0.68	13	0	33	9	0.68
30 January 2024	Non-breeding	2km buffer	MRSea	0.41	0.31	0.52	0.05	0.12	181	140	230	22	0.12
08 February 2024	Non-breeding	2km buffer	MRSea	0.65	0.42	0.96	0.14	0.21	284	186	428	61	0.21
15 March 2022	Non-breeding	Bellrock WFDA	MRSea	3.74	2.95	4.59	0.42	0.11	1,006	800	1,245	115	0.11
17 April 2022	Breeding	Bellrock WFDA	MRSea	2.68	1.82	3.78	0.46	0.17	720	536	955	109	0.15
14 May 2022	Breeding	Bellrock WFDA	MRSea	0.74	0.55	0.98	0.10	0.14	198	156	255	26	0.13
06 June 2022	Breeding	Bellrock WFDA	Design-based	0.28	0.14	0.42	0.07	0.25	77	38	117	19	0.25
19 July 2022	Breeding	Bellrock WFDA	MRSea	22.92	18.80	27.74	2.12	0.09	6,160	5,406	7,053	427	0.07
07 August 2022	Breeding	Bellrock WFDA	MRSea	1.58	1.15	2.13	0.24	0.15	421	325	546	56	0.13
07 September 2022	Non-breeding	Bellrock WFDA	MRSea	3.37	2.22	4.91	0.70	0.21	892	602	1,332	189	0.21

Survey Date	Season	Area	Modelling	Density	Density (LCL)	Density (UCL)	Density (SE)	Density (CV)	Population	Population (LCL)	Population (UCL)	Population (SE)	Population (CV)
02 October 2022	Non-breeding	Bellrock WFDA	MRSea	2.61	1.99	3.42	0.37	0.14	701	539	927	99	0.14
03 November 2022	Non-breeding	Bellrock WFDA	MRSea	4.08	3.56	4.66	0.29	0.07	1,104	965	1,264	78	0.07
20 December 2022	Non-breeding	Bellrock WFDA	MRSea	1.12	0.85	1.44	0.15	0.14	301	230	391	41	0.14
20 January 2023	Non-breeding	Bellrock WFDA	MRSea	2.04	1.27	3.15	0.49	0.24	538	344	855	133	0.24
04 February 2023	Non-breeding	Bellrock WFDA	MRSea	1.01	0.50	1.86	0.35	0.35	258	139	488	91	0.33
04 March 2023	Non-breeding	Bellrock WFDA	MRSea	0.79	0.61	1.03	0.11	0.14	211	165	278	29	0.14
03 April 2023	Breeding	Bellrock WFDA	MRSea	0.52	0.35	0.75	0.10	0.19	139	96	196	26	0.18
04 May 2023	Breeding	Bellrock WFDA	MRSea	1.74	0.97	2.89	0.56	0.32	453	265	782	127	0.27
13 June 2023	Breeding	Bellrock WFDA	MRSea	0.30	0.17	0.51	0.08	0.27	78	47	134	22	0.27
07 July 2023	Breeding	Bellrock WFDA	MRSea	0.20	0.11	0.33	0.06	0.30	51	30	88	15	0.28
17 August 2023	Non-breeding	Bellrock WFDA	MRSea	0.27	0.16	0.45	0.08	0.28	72	43	122	20	0.28
04 September 2023	Non-breeding	Bellrock WFDA	MRSea	0.25	0.11	0.47	0.09	0.38	62	32	125	25	0.37
13 October 2023	Non-breeding	Bellrock WFDA	MRSea	0.23	0.12	0.40	0.07	0.32	60	32	109	20	0.32
14 November 2023	Non-breeding	Bellrock WFDA	MRSea	0.32	0.23	0.43	0.05	0.17	85	62	117	14	0.17
10 December 2023	Non-breeding	Bellrock WFDA	Design-based	0.03	0.00	0.07	0.02	0.68	8	0	20	5	0.68
30 January 2024	Non-breeding	Bellrock WFDA	MRSea	0.41	0.31	0.52	0.05	0.12	110	85	140	14	0.12
08 February 2024	Non-breeding	Bellrock WFDA	MRSea	0.65	0.42	0.96	0.14	0.21	173	113	261	37	0.21

Table A2.2 Absolute density and population estimates for guillemot - all birds

Survey Date	Season	Area	Modelling	Density	Density (LCL)	Density (UCL)	Density (SE)	Density (CV)	Population	Population (LCL)	Population (UCL)	Population (SE)	Population (CV)
15 March 2022	Non-breeding	4km buffer	MRSea	4.92	3.88	6.03	0.56	0.11	3,211	2,555	3,973	364	0.11
17 April 2022	Breeding	4km buffer	MRSea	3.36	2.11	5.16	0.55	0.17	2,154	1,517	3,103	341	0.16
14 May 2022	Breeding	4km buffer	MRSea	1.02	0.73	1.40	0.14	0.14	665	522	849	85	0.13
06 June 2022	Breeding	4km buffer	Design-based	0.36	0.18	0.54	0.09	0.25	234	116	356	59	0.25
19 July 2022	Breeding	4km buffer	MRSea	32.16	25.35	40.62	3.09	0.10	21,108	18,584	23,949	1,465	0.07
07 August 2022	Breeding	4km buffer	MRSea	2.27	1.59	3.17	0.34	0.15	1,472	1,149	1,907	188	0.13
07 September 2022	Non-breeding	4km buffer	MRSea	4.35	2.80	6.46	0.90	0.21	2,794	1,871	4,180	578	0.21
02 October 2022	Non-breeding	4km buffer	MRSea	3.42	2.60	4.49	0.48	0.14	2,233	1,711	2,959	314	0.14
03 November 2022	Non-breeding	4km buffer	MRSea	5.34	4.65	6.11	0.38	0.07	3,505	3,062	4,021	247	0.07
20 December 2022	Non-breeding	4km buffer	MRSea	1.44	1.09	1.86	0.19	0.14	942	719	1,222	127	0.14
20 January 2023	Non-breeding	4km buffer	MRSea	2.43	1.54	3.75	0.59	0.24	1,566	1,026	2,434	378	0.24
04 February 2023	Non-breeding	4km buffer	MRSea	1.20	0.62	2.15	0.43	0.36	741	415	1,365	244	0.33
04 March 2023	Non-breeding	4km buffer	MRSea	1.03	0.78	1.35	0.14	0.14	667	514	888	91	0.14
03 April 2023	Breeding	4km buffer	MRSea	0.67	0.42	1.00	0.13	0.19	430	289	620	78	0.18
04 May 2023	Breeding	4km buffer	MRSea	2.07	1.11	3.53	0.64	0.31	1,308	756	2,248	360	0.27
13 June 2023	Breeding	4km buffer	MRSea	0.40	0.22	0.69	0.10	0.25	249	150	431	68	0.27
07 July 2023	Breeding	4km buffer	MRSea	0.27	0.14	0.46	0.07	0.27	168	97	292	46	0.28
17 August 2023	Non-breeding	4km buffer	MRSea	0.36	0.21	0.59	0.10	0.28	229	138	390	63	0.28

Survey Date	Season	Area	Modelling	Density	Density (LCL)	Density (UCL)	Density (SE)	Density (CV)	Population	Population (LCL)	Population (UCL)	Population (SE)	Population (CV)
04 September 2023	Non-breeding	4km buffer	MRSea	0.38	0.18	0.71	0.15	0.39	230	117	460	84	0.36
13 October 2023	Non-breeding	4km buffer	MRSea	0.30	0.15	0.52	0.09	0.32	185	98	341	59	0.32
14 November 2023	Non-breeding	4km buffer	MRSea	0.41	0.30	0.56	0.07	0.17	268	194	371	45	0.17
10 December 2023	Non-breeding	4km buffer	Design-based	0.04	0.00	0.09	0.03	0.68	25	0	62	17	0.68
30 January 2024	Non-breeding	4km buffer	MRSea	0.53	0.41	0.67	0.07	0.12	349	272	439	43	0.12
08 February 2024	Non-breeding	4km buffer	MRSea	0.86	0.55	1.27	0.18	0.21	552	361	834	115	0.21
15 March 2022	Non-breeding	2km buffer	MRSea	4.92	3.88	6.04	0.56	0.11	2,175	1,731	2,692	247	0.11
17 April 2022	Breeding	2km buffer	MRSea	3.17	2.02	4.81	0.53	0.17	1,381	985	1,985	212	0.15
14 May 2022	Breeding	2km buffer	MRSea	1.01	0.73	1.35	0.14	0.14	441	347	565	56	0.13
06 June 2022	Breeding	2km buffer	Design-based	0.36	0.18	0.54	0.09	0.25	163	80	247	41	0.25
19 July 2022	Breeding	2km buffer	MRSea	31.30	25.11	38.78	2.91	0.09	13,859	12,226	15,739	929	0.07
07 August 2022	Breeding	2km buffer	MRSea	2.18	1.56	3.00	0.32	0.15	960	745	1,231	123	0.13
07 September 2022	Non-breeding	2km buffer	MRSea	4.35	2.82	6.43	0.90	0.21	1,889	1,268	2,835	391	0.21
02 October 2022	Non-breeding	2km buffer	MRSea	3.42	2.60	4.50	0.48	0.14	1,513	1,159	2,005	213	0.14
03 November 2022	Non-breeding	2km buffer	MRSea	5.35	4.65	6.11	0.38	0.07	2,374	2,074	2,724	168	0.07
20 December 2022	Non-breeding	2km buffer	MRSea	1.44	1.09	1.86	0.19	0.14	638	487	828	86	0.14
20 January 2023	Non-breeding	2km buffer	MRSea	2.43	1.53	3.73	0.59	0.24	1,057	693	1,642	255	0.24
04 February 2023	Non-breeding	2km buffer	MRSea	1.19	0.61	2.13	0.42	0.35	499	279	917	164	0.33
04 March 2023	Non-breeding	2km buffer	MRSea	1.03	0.78	1.35	0.14	0.14	452	348	601	62	0.14

Survey Date	Season	Area	Modelling	Density	Density (LCL)	Density (UCL)	Density (SE)	Density (CV)	Population	Population (LCL)	Population (UCL)	Population (SE)	Population (CV)
03 April 2023	Breeding	2km buffer	MRSea	0.64	0.41	0.95	0.12	0.19	280	187	404	51	0.18
04 May 2023	Breeding	2km buffer	MRSea	2.03	1.10	3.44	0.64	0.32	867	496	1,501	237	0.27
13 June 2023	Breeding	2km buffer	MRSea	0.39	0.22	0.66	0.10	0.26	164	99	283	45	0.27
07 July 2023	Breeding	2km buffer	MRSea	0.26	0.14	0.44	0.07	0.28	109	63	191	30	0.28
17 August 2023	Non-breeding	2km buffer	MRSea	0.36	0.21	0.59	0.10	0.28	155	93	264	43	0.28
04 September 2023	Non-breeding	2km buffer	MRSea	0.36	0.17	0.69	0.14	0.38	151	77	303	55	0.37
13 October 2023	Non-breeding	2km buffer	MRSea	0.30	0.15	0.52	0.09	0.32	125	66	231	40	0.32
14 November 2023	Non-breeding	2km buffer	MRSea	0.41	0.30	0.56	0.07	0.17	182	132	252	30	0.17
10 December 2023	Non-breeding	2km buffer	Design-based	0.04	0.00	0.09	0.03	0.68	17	0	43	12	0.68
30 January 2024	Non-breeding	2km buffer	MRSea	0.53	0.41	0.67	0.07	0.12	237	184	297	29	0.12
08 February 2024	Non-breeding	2km buffer	MRSea	0.86	0.55	1.27	0.18	0.21	374	245	565	78	0.21
15 March 2022	Non-breeding	Bellrock WFDA	MRSea	4.92	3.88	6.04	0.56	0.11	1,323	1,053	1,637	150	0.11
17 April 2022	Breeding	Bellrock WFDA	MRSea	3.02	1.95	4.54	0.52	0.17	802	574	1,150	121	0.15
14 May 2022	Breeding	Bellrock WFDA	MRSea	0.99	0.72	1.32	0.14	0.14	263	207	339	34	0.13
06 June 2022	Breeding	Bellrock WFDA	Design-based	0.36	0.18	0.54	0.09	0.25	100	49	151	25	0.25
19 July 2022	Breeding	Bellrock WFDA	MRSea	30.61	24.74	37.61	2.82	0.09	8,229	7,262	9,365	569	0.07
07 August 2022	Breeding	Bellrock WFDA	MRSea	2.12	1.52	2.89	0.32	0.15	565	437	734	74	0.13
07 September 2022	Non-breeding	Bellrock WFDA	MRSea	4.35	2.83	6.40	0.90	0.21	1,151	773	1,729	238	0.21
02 October 2022	Non-breeding	Bellrock WFDA	MRSea	3.42	2.60	4.50	0.48	0.14	920	705	1,219	129	0.14

Survey Date	Season	Area	Modelling	Density	Density (LCL)	Density (UCL)	Density (SE)	Density (CV)	Population	Population (LCL)	Population (UCL)	Population (SE)	Population (CV)
03 November 2022	Non-breeding	Bellrock WFDA	MRSea	5.35	4.65	6.11	0.38	0.07	1,444	1,262	1,657	102	0.07
20 December 2022	Non-breeding	Bellrock WFDA	MRSea	1.44	1.09	1.86	0.19	0.14	388	296	504	52	0.14
20 January 2023	Non-breeding	Bellrock WFDA	MRSea	2.42	1.53	3.71	0.58	0.24	640	419	993	155	0.24
04 February 2023	Non-breeding	Bellrock WFDA	MRSea	1.18	0.61	2.11	0.41	0.35	302	168	556	100	0.33
04 March 2023	Non-breeding	Bellrock WFDA	MRSea	1.03	0.78	1.35	0.14	0.14	275	212	366	38	0.14
03 April 2023	Breeding	Bellrock WFDA	MRSea	0.62	0.40	0.92	0.12	0.19	165	111	240	30	0.18
04 May 2023	Breeding	Bellrock WFDA	MRSea	2.03	1.11	3.42	0.65	0.32	526	304	921	143	0.27
13 June 2023	Breeding	Bellrock WFDA	MRSea	0.38	0.21	0.65	0.10	0.27	98	59	170	27	0.27
07 July 2023	Breeding	Bellrock WFDA	MRSea	0.25	0.13	0.42	0.07	0.30	64	38	113	18	0.28
17 August 2023	Non-breeding	Bellrock WFDA	MRSea	0.36	0.21	0.59	0.10	0.28	94	57	161	26	0.28
04 September 2023	Non-breeding	Bellrock WFDA	MRSea	0.35	0.16	0.67	0.13	0.38	89	45	181	33	0.37
13 October 2023	Non-breeding	Bellrock WFDA	MRSea	0.30	0.15	0.52	0.09	0.32	76	40	141	24	0.32
14 November 2023	Non-breeding	Bellrock WFDA	MRSea	0.41	0.30	0.56	0.07	0.17	110	80	153	19	0.17
10 December 2023	Non-breeding	Bellrock WFDA	Design-based	0.04	0.00	0.09	0.03	0.68	11	0	26	7	0.68
30 January 2024	Non-breeding	Bellrock WFDA	MRSea	0.53	0.41	0.67	0.07	0.12	144	112	181	18	0.12
08 February 2024	Non-breeding	Bellrock WFDA	MRSea	0.86	0.55	1.27	0.18	0.21	228	149	344	48	0.21

Table A2.3 Relative density and population estimates for guillemot - flying birds

Survey Date	Season	Area	Modelling	Density	Density (LCL)	Density (UCL)	Density (SE)	Density (CV)	Population	Population (LCL)	Population (UCL)	Population (SE)	Population (CV)
15 March 2022	Non-breeding	4km buffer	Design-based	0.02	0.00	0.04	0.01	0.94	10	0	29	9	0.94
17 April 2022	Breeding	4km buffer	MRSea	1.66	0.75	3.46	0.61	0.37	1,061	703	1,601	239	0.22
14 May 2022	Breeding	4km buffer	Design-based	0.03	0.00	0.09	0.03	0.90	20	0	57	18	0.90
06 June 2022	Breeding	4km buffer	Design-based	0.02	0.00	0.05	0.01	0.93	10	0	30	10	0.93
19 July 2022	Breeding	4km buffer	Design-based	0.07	0.01	0.14	0.03	0.45	49	9	94	22	0.45
07 August 2022	Breeding	4km buffer	Design-based	0.02	0.00	0.04	0.02	0.98	10	0	29	10	0.98
07 September 2022	Non-breeding	4km buffer	Design-based	0.00	0.00	N/A	N/A	N/A	0	0	N/A	N/A	N/A
02 October 2022	Non-breeding	4km buffer	Design-based	0.03	0.00	0.07	0.02	0.65	19	0	47	13	0.65
03 November 2022	Non-breeding	4km buffer	Design-based	0.10	0.03	0.18	0.04	0.37	66	19	116	25	0.37
20 December 2022	Non-breeding	4km buffer	Design-based	0.09	0.03	0.16	0.03	0.37	60	19	104	22	0.37
20 January 2023	Non-breeding	4km buffer	MRSea	0.41	0.07	1.37	0.07	0.16	160	49	504	118	0.63
04 February 2023	Non-breeding	4km buffer	MRSea	0.68	0.21	1.78	0.19	0.28	409	189	1,021	209	0.46
04 March 2023	Non-breeding	4km buffer	Design-based	0.04	0.00	0.11	0.03	0.73	28	0	75	21	0.73
03 April 2023	Breeding	4km buffer	MRSea	0.27	0.07	0.71	0.14	0.53	163	65	371	83	0.47
04 May 2023	Breeding	4km buffer	MRSea	1.17	0.48	2.40	0.32	0.28	725	429	1,171	188	0.25
13 June 2023	Breeding	4km buffer	Design-based	0.06	0.00	0.12	0.03	0.54	37	0	78	20	0.54
07 July 2023	Breeding	4km buffer	Design-based	0.05	0.00	0.10	0.02	0.52	30	0	66	16	0.52
17 August 2023	Non-breeding	4km buffer	Design-based	0.00	0.00	N/A	N/A	N/A	0	0	N/A	N/A	N/A

Survey Date	Season	Area	Modelling	Density	Density (LCL)	Density (UCL)	Density (SE)	Density (CV)	Population	Population (LCL)	Population (UCL)	Population (SE)	Population (CV)
04 September 2023	Non-breeding	4km buffer	Design-based	0.01	0.00	0.04	0.01	0.95	9	0	29	9	0.95
13 October 2023	Non-breeding	4km buffer	Design-based	0.03	0.00	0.07	0.02	0.58	20	0	46	11	0.58
14 November 2023	Non-breeding	4km buffer	Design-based	0.02	0.00	0.04	0.01	0.91	10	0	29	9	0.91
10 December 2023	Non-breeding	4km buffer	Design-based	0.00	0.00	N/A	N/A	N/A	0	0	N/A	N/A	N/A
30 January 2024	Non-breeding	4km buffer	Design-based	0.00	0.00	N/A	N/A	N/A	0	0	N/A	N/A	N/A
08 February 2024	Non-breeding	4km buffer	Design-based	0.00	0.00	N/A	N/A	N/A	0	0	N/A	N/A	N/A
15 March 2022	Non-breeding	2km buffer	Design-based	0.02	0.00	0.04	0.01	0.94	7	0	20	6	0.94
17 April 2022	Breeding	2km buffer	MRSea	1.63	0.77	3.28	0.59	0.36	708	473	1,106	163	0.22
14 May 2022	Breeding	2km buffer	Design-based	0.03	0.00	0.09	0.03	0.90	14	0	40	12	0.90
06 June 2022	Breeding	2km buffer	Design-based	0.02	0.00	0.05	0.01	0.93	7	0	21	7	0.93
19 July 2022	Breeding	2km buffer	Design-based	0.07	0.01	0.14	0.03	0.45	34	7	66	15	0.45
07 August 2022	Breeding	2km buffer	Design-based	0.02	0.00	0.04	0.02	0.98	7	0	20	7	0.98
07 September 2022	Non-breeding	2km buffer	Design-based	0.00	0.00	N/A	N/A	N/A	0	0	N/A	N/A	N/A
02 October 2022	Non-breeding	2km buffer	Design-based	0.03	0.00	0.07	0.02	0.65	13	0	33	9	0.65
03 November 2022	Non-breeding	2km buffer	Design-based	0.10	0.03	0.18	0.04	0.37	46	13	81	17	0.37
20 December 2022	Non-breeding	2km buffer	Design-based	0.09	0.03	0.16	0.03	0.37	41	13	72	15	0.37
20 January 2023	Non-breeding	2km buffer	MRSea	0.07	0.01	0.22	0.02	0.34	24	8	80	19	0.66
04 February 2023	Non-breeding	2km buffer	MRSea	0.73	0.21	1.97	0.20	0.27	288	131	770	159	0.49
04 March 2023	Non-breeding	2km buffer	Design-based	0.04	0.00	0.11	0.03	0.73	20	0	52	14	0.73

Survey Date	Season	Area	Modelling	Density	Density (LCL)	Density (UCL)	Density (SE)	Density (CV)	Population	Population (LCL)	Population (UCL)	Population (SE)	Population (CV)
03 April 2023	Breeding	2km buffer	MRSea	0.27	0.07	0.73	0.16	0.58	110	43	254	58	0.48
04 May 2023	Breeding	2km buffer	MRSea	1.04	0.47	2.05	0.30	0.29	450	273	747	120	0.26
13 June 2023	Breeding	2km buffer	Design-based	0.06	0.00	0.12	0.03	0.54	26	0	54	14	0.54
07 July 2023	Breeding	2km buffer	Design-based	0.05	0.00	0.10	0.02	0.52	21	0	45	11	0.52
17 August 2023	Non-breeding	2km buffer	Design-based	0.00	0.00	N/A	N/A	N/A	0	0	N/A	N/A	N/A
04 September 2023	Non-breeding	2km buffer	Design-based	0.01	0.00	0.04	0.01	0.95	6	0	20	6	0.95
13 October 2023	Non-breeding	2km buffer	Design-based	0.03	0.00	0.07	0.02	0.58	14	0	32	8	0.58
14 November 2023	Non-breeding	2km buffer	Design-based	0.02	0.00	0.04	0.01	0.91	7	0	20	6	0.91
10 December 2023	Non-breeding	2km buffer	Design-based	0.00	0.00	N/A	N/A	N/A	0	0	N/A	N/A	N/A
30 January 2024	Non-breeding	2km buffer	Design-based	0.00	0.00	N/A	N/A	N/A	0	0	N/A	N/A	N/A
08 February 2024	Non-breeding	2km buffer	Design-based	0.00	0.00	N/A	N/A	N/A	0	0	N/A	N/A	N/A
15 March 2022	Non-breeding	Bellrock WFDA	Design-based	0.02	0.00	0.04	0.01	0.94	4	0	12	4	0.94
17 April 2022	Breeding	Bellrock WFDA	MRSea	1.60	0.78	3.13	0.58	0.36	420	277	666	101	0.23
14 May 2022	Breeding	Bellrock WFDA	Design-based	0.03	0.00	0.09	0.03	0.90	8	0	24	7	0.90
06 June 2022	Breeding	Bellrock WFDA	Design-based	0.02	0.00	0.05	0.01	0.93	4	0	13	4	0.93
19 July 2022	Breeding	Bellrock WFDA	Design-based	0.07	0.01	0.14	0.03	0.45	21	4	40	9	0.45
07 August 2022	Breeding	Bellrock WFDA	Design-based	0.02	0.00	0.04	0.02	0.98	4	0	12	4	0.98
07 September 2022	Non-breeding	Bellrock WFDA	Design-based	0.00	0.00	N/A	N/A	N/A	0	0	N/A	N/A	N/A
02 October 2022	Non-breeding	Bellrock WFDA	Design-based	0.03	0.00	0.07	0.02	0.65	8	0	20	5	0.65

Survey Date	Season	Area	Modelling	Density	Density (LCL)	Density (UCL)	Density (SE)	Density (CV)	Population	Population (LCL)	Population (UCL)	Population (SE)	Population (CV)
03 November 2022	Non-breeding	Bellrock WFDA	Design-based	0.10	0.03	0.18	0.04	0.37	28	8	49	10	0.37
20 December 2022	Non-breeding	Bellrock WFDA	Design-based	0.09	0.03	0.16	0.03	0.37	25	8	44	9	0.37
20 January 2023	Non-breeding	Bellrock WFDA	MRSea	0.03	0.01	0.09	0.00	0.17	6	2	22	5	0.66
04 February 2023	Non-breeding	Bellrock WFDA	MRSea	0.79	0.22	2.19	0.21	0.26	186	84	526	110	0.52
04 March 2023	Non-breeding	Bellrock WFDA	Design-based	0.04	0.00	0.11	0.03	0.73	12	0	32	9	0.73
03 April 2023	Breeding	Bellrock WFDA	MRSea	0.27	0.07	0.72	0.16	0.62	65	25	156	35	0.49
04 May 2023	Breeding	Bellrock WFDA	MRSea	0.95	0.45	1.79	0.28	0.30	247	149	427	69	0.27
13 June 2023	Breeding	Bellrock WFDA	Design-based	0.06	0.00	0.12	0.03	0.54	16	0	33	8	0.54
07 July 2023	Breeding	Bellrock WFDA	Design-based	0.05	0.00	0.10	0.02	0.52	13	0	28	7	0.52
17 August 2023	Non-breeding	Bellrock WFDA	Design-based	0.00	0.00	N/A	N/A	N/A	0	0	N/A	N/A	N/A
04 September 2023	Non-breeding	Bellrock WFDA	Design-based	0.01	0.00	0.04	0.01	0.95	4	0	12	4	0.95
13 October 2023	Non-breeding	Bellrock WFDA	Design-based	0.03	0.00	0.07	0.02	0.58	8	0	20	5	0.58
14 November 2023	Non-breeding	Bellrock WFDA	Design-based	0.02	0.00	0.04	0.01	0.91	4	0	12	4	0.91
10 December 2023	Non-breeding	Bellrock WFDA	Design-based	0.00	0.00	N/A	N/A	N/A	0	0	N/A	N/A	N/A
30 January 2024	Non-breeding	Bellrock WFDA	Design-based	0.00	0.00	N/A	N/A	N/A	0	0	N/A	N/A	N/A
08 February 2024	Non-breeding	Bellrock WFDA	Design-based	0.00	0.00	N/A	N/A	N/A	0	0	N/A	N/A	N/A

Table A2.4 Relative density and population estimates for guillemot - sitting birds

Survey Date	Season	Area	Modelling	Density	Density (LCL)	Density (UCL)	Density (SE)	Density (CV)	Population	Population (LCL)	Population (UCL)	Population (SE)	Population (CV)
15 March 2022	Non-breeding	4km buffer	MRSea	3.72	2.94	4.56	0.42	0.11	2,431	1,935	3,004	275	0.11
17 April 2022	Breeding	4km buffer	MRSea	1.12	0.45	2.45	0.42	0.37	661	330	1,509	304	0.41
14 May 2022	Breeding	4km buffer	MRSea	0.78	0.55	1.10	0.12	0.16	510	401	649	64	0.12
06 June 2022	Breeding	4km buffer	MRSea	0.48	0.15	1.24	0.24	0.50	247	117	853	333	1.06
19 July 2022	Breeding	4km buffer	MRSea	24.65	18.97	31.90	2.80	0.11	16,211	14,718	17,916	823	0.05
07 August 2022	Breeding	4km buffer	MRSea	1.73	1.19	2.47	0.29	0.17	1,132	872	1,461	158	0.14
07 September 2022	Non-breeding	4km buffer	MRSea	3.10	1.86	4.91	0.70	0.23	1,984	1,298	2,996	434	0.21
02 October 2022	Non-breeding	4km buffer	MRSea	2.58	1.93	3.41	0.38	0.15	1,681	1,274	2,243	248	0.15
03 November 2022	Non-breeding	4km buffer	MRSea	3.98	3.45	4.58	0.29	0.07	2,611	2,273	3,013	193	0.07
20 December 2022	Non-breeding	4km buffer	MRSea	1.02	0.78	1.31	0.14	0.14	670	511	866	91	0.14
20 January 2023	Non-breeding	4km buffer	MRSea	1.27	0.84	1.88	0.28	0.22	823	601	1,136	140	0.17
04 February 2023	Non-breeding	4km buffer	MRSea	0.53	0.34	0.79	0.12	0.22	334	222	521	78	0.22
04 March 2023	Non-breeding	4km buffer	MRSea	0.75	0.55	1.02	0.12	0.16	486	359	672	81	0.16
03 April 2023	Breeding	4km buffer	MRSea	0.32	0.17	0.55	0.09	0.27	203	117	339	59	0.28
04 May 2023	Breeding	4km buffer	MRSea	0.92	0.44	1.69	0.28	0.31	575	309	1,054	194	0.32
13 June 2023	Breeding	4km buffer	MRSea	0.26	0.14	0.45	0.07	0.29	162	95	285	49	0.29
07 July 2023	Breeding	4km buffer	MRSea	0.16	0.08	0.30	0.05	0.31	102	57	190	35	0.32
17 August 2023	Non-breeding	4km buffer	MRSea	0.27	0.16	0.45	0.08	0.28	174	104	296	50	0.28

Survey Date	Season	Area	Modelling	Density	Density (LCL)	Density (UCL)	Density (SE)	Density (CV)	Population	Population (LCL)	Population (UCL)	Population (SE)	Population (CV)
04 September 2023	Non-breeding	4km buffer	MRSea	0.34	0.16	0.65	0.12	0.37	207	104	425	82	0.37
13 October 2023	Non-breeding	4km buffer	MRSea	0.20	0.10	0.36	0.07	0.34	126	65	240	45	0.34
14 November 2023	Non-breeding	4km buffer	MRSea	0.30	0.21	0.42	0.06	0.18	196	139	278	37	0.18
10 December 2023	Non-breeding	4km buffer	Design-based	0.03	0.00	0.07	0.02	0.68	19	0	47	13	0.68
30 January 2024	Non-breeding	4km buffer	MRSea	0.39	0.32	0.48	0.04	0.10	258	208	314	26	0.10
08 February 2024	Non-breeding	4km buffer	MRSea	0.65	0.42	0.97	0.14	0.21	420	275	636	89	0.21
15 March 2022	Non-breeding	2km buffer	MRSea	3.72	2.94	4.56	0.42	0.11	1,647	1,311	2,035	186	0.11
17 April 2022	Breeding	2km buffer	MRSea	1.09	0.42	2.42	0.47	0.43	432	208	1,017	208	0.43
14 May 2022	Breeding	2km buffer	MRSea	0.78	0.55	1.08	0.13	0.16	341	267	436	43	0.12
06 June 2022	Breeding	2km buffer	MRSea	0.48	0.15	1.22	0.24	0.50	167	79	571	225	1.06
19 July 2022	Breeding	2km buffer	MRSea	24.47	19.03	31.28	2.73	0.11	10,832	9,787	11,962	570	0.05
07 August 2022	Breeding	2km buffer	MRSea	1.72	1.19	2.42	0.30	0.17	756	586	982	104	0.14
07 September 2022	Non-breeding	2km buffer	MRSea	3.08	1.89	4.79	0.70	0.23	1,334	883	2,039	296	0.22
02 October 2022	Non-breeding	2km buffer	MRSea	2.58	1.94	3.41	0.38	0.15	1,139	863	1,519	168	0.15
03 November 2022	Non-breeding	2km buffer	MRSea	3.98	3.45	4.58	0.29	0.07	1,769	1,540	2,041	131	0.07
20 December 2022	Non-breeding	2km buffer	MRSea	1.03	0.78	1.32	0.14	0.14	454	346	587	62	0.14
20 January 2023	Non-breeding	2km buffer	MRSea	1.24	0.83	1.83	0.27	0.22	545	399	748	91	0.17
04 February 2023	Non-breeding	2km buffer	MRSea	0.53	0.34	0.79	0.12	0.22	226	150	353	53	0.22
04 March 2023	Non-breeding	2km buffer	MRSea	0.75	0.55	1.02	0.12	0.16	329	243	455	55	0.16

Survey Date	Season	Area	Modelling	Density	Density (LCL)	Density (UCL)	Density (SE)	Density (CV)	Population	Population (LCL)	Population (UCL)	Population (SE)	Population (CV)
03 April 2023	Breeding	2km buffer	MRSea	0.32	0.17	0.55	0.09	0.30	136	78	228	39	0.28
04 May 2023	Breeding	2km buffer	MRSea	0.91	0.44	1.67	0.31	0.33	385	205	715	130	0.32
13 June 2023	Breeding	2km buffer	MRSea	0.25	0.14	0.45	0.08	0.30	108	63	188	33	0.29
07 July 2023	Breeding	2km buffer	MRSea	0.16	0.08	0.30	0.06	0.34	68	38	128	24	0.33
17 August 2023	Non-breeding	2km buffer	MRSea	0.27	0.16	0.45	0.08	0.28	118	70	200	34	0.28
04 September 2023	Non-breeding	2km buffer	MRSea	0.34	0.16	0.65	0.12	0.37	140	70	288	56	0.37
13 October 2023	Non-breeding	2km buffer	MRSea	0.20	0.10	0.36	0.07	0.34	85	44	163	30	0.34
14 November 2023	Non-breeding	2km buffer	MRSea	0.30	0.21	0.42	0.06	0.18	133	94	188	25	0.18
10 December 2023	Non-breeding	2km buffer	Design-based	0.03	0.00	0.07	0.02	0.68	13	0	33	9	0.68
30 January 2024	Non-breeding	2km buffer	MRSea	0.39	0.32	0.48	0.04	0.10	174	141	212	18	0.10
08 February 2024	Non-breeding	2km buffer	MRSea	0.65	0.42	0.97	0.14	0.21	284	186	431	61	0.21
15 March 2022	Non-breeding	Bellrock WFDA	MRSea	3.72	2.94	4.56	0.42	0.11	1,002	797	1,238	113	0.11
17 April 2022	Breeding	Bellrock WFDA	MRSea	1.06	0.40	2.39	0.53	0.50	256	120	616	127	0.44
14 May 2022	Breeding	Bellrock WFDA	MRSea	0.77	0.54	1.07	0.13	0.17	206	161	265	26	0.13
06 June 2022	Breeding	Bellrock WFDA	MRSea	0.47	0.15	1.21	0.24	0.51	103	49	298	124	0.98
19 July 2022	Breeding	Bellrock WFDA	MRSea	24.27	18.78	31.17	2.81	0.12	6,535	5,860	7,299	378	0.06
07 August 2022	Breeding	Bellrock WFDA	MRSea	1.71	1.18	2.40	0.30	0.18	455	354	595	63	0.14
07 September 2022	Non-breeding	Bellrock WFDA	MRSea	3.09	1.94	4.72	0.70	0.23	817	543	1,255	180	0.21
02 October 2022	Non-breeding	Bellrock WFDA	MRSea	2.58	1.94	3.41	0.38	0.15	693	525	924	102	0.15

Survey Date	Season	Area	Modelling	Density	Density (LCL)	Density (UCL)	Density (SE)	Density (CV)	Population	Population (LCL)	Population (UCL)	Population (SE)	Population (CV)
03 November 2022	Non-breeding	Bellrock WFDA	MRSea	3.98	3.45	4.58	0.29	0.07	1,076	937	1,242	80	0.07
20 December 2022	Non-breeding	Bellrock WFDA	MRSea	1.03	0.78	1.32	0.14	0.14	276	210	357	38	0.14
20 January 2023	Non-breeding	Bellrock WFDA	MRSea	1.20	0.81	1.77	0.26	0.21	323	236	435	53	0.16
04 February 2023	Non-breeding	Bellrock WFDA	MRSea	0.53	0.34	0.79	0.12	0.22	138	91	215	32	0.22
04 March 2023	Non-breeding	Bellrock WFDA	MRSea	0.75	0.55	1.02	0.12	0.16	200	148	277	33	0.16
03 April 2023	Breeding	Bellrock WFDA	MRSea	0.31	0.16	0.54	0.10	0.32	82	47	139	24	0.28
04 May 2023	Breeding	Bellrock WFDA	MRSea	0.91	0.43	1.66	0.32	0.35	232	123	438	79	0.32
13 June 2023	Breeding	Bellrock WFDA	MRSea	0.25	0.13	0.44	0.08	0.32	65	38	113	20	0.29
07 July 2023	Breeding	Bellrock WFDA	MRSea	0.16	0.08	0.30	0.06	0.36	41	23	78	14	0.33
17 August 2023	Non-breeding	Bellrock WFDA	MRSea	0.27	0.16	0.45	0.08	0.28	72	43	122	20	0.28
04 September 2023	Non-breeding	Bellrock WFDA	MRSea	0.34	0.16	0.65	0.12	0.37	85	43	175	34	0.37
13 October 2023	Non-breeding	Bellrock WFDA	MRSea	0.20	0.10	0.36	0.07	0.34	52	27	99	19	0.34
14 November 2023	Non-breeding	Bellrock WFDA	MRSea	0.30	0.21	0.42	0.06	0.18	81	57	115	15	0.18
10 December 2023	Non-breeding	Bellrock WFDA	Design-based	0.03	0.00	0.07	0.02	0.68	8	0	20	5	0.68
30 January 2024	Non-breeding	Bellrock WFDA	MRSea	0.39	0.32	0.48	0.04	0.10	106	86	129	11	0.10
08 February 2024	Non-breeding	Bellrock WFDA	MRSea	0.65	0.42	0.97	0.14	0.21	173	113	262	37	0.21

Table A2.5 Absolute density and population estimates for guillemot - sitting birds

Survey Date	Season	Area	Modelling	Density	Density (LCL)	Density (UCL)	Density (SE)	Density (CV)	Population	Population (LCL)	Population (UCL)	Population (SE)	Population (CV)
15 March 2022	Non-breeding	4km buffer	MRSea	4.90	3.87	6.01	0.55	0.11	3,201	2,548	3,956	359	0.11
17 April 2022	Breeding	4km buffer	MRSea	1.48	0.59	3.22	0.55	0.37	870	434	1,987	360	0.41
14 May 2022	Breeding	4km buffer	MRSea	1.03	0.72	1.45	0.16	0.16	671	528	855	84	0.12
06 June 2022	Breeding	4km buffer	MRSea	0.63	0.19	1.63	0.31	0.50	325	154	1,123	344	1.06
19 July 2022	Breeding	4km buffer	MRSea	32.45	24.97	42.00	3.69	0.11	21,344	19,378	23,589	1,082	0.05
07 August 2022	Breeding	4km buffer	MRSea	2.28	1.56	3.25	0.38	0.17	1,491	1,148	1,924	206	0.14
07 September 2022	Non-breeding	4km buffer	MRSea	4.08	2.44	6.46	0.92	0.23	2,613	1,709	3,944	557	0.21
02 October 2022	Non-breeding	4km buffer	MRSea	3.39	2.55	4.48	0.50	0.15	2,214	1,677	2,953	323	0.15
03 November 2022	Non-breeding	4km buffer	MRSea	5.24	4.54	6.02	0.39	0.07	3,437	2,992	3,968	254	0.07
20 December 2022	Non-breeding	4km buffer	MRSea	1.35	1.02	1.73	0.18	0.14	882	672	1,140	119	0.14
20 January 2023	Non-breeding	4km buffer	MRSea	1.67	1.11	2.48	0.38	0.22	1,084	791	1,496	182	0.17
04 February 2023	Non-breeding	4km buffer	MRSea	0.69	0.44	1.04	0.16	0.22	440	292	686	98	0.22
04 March 2023	Non-breeding	4km buffer	MRSea	0.99	0.72	1.34	0.16	0.16	639	473	885	105	0.16
03 April 2023	Breeding	4km buffer	MRSea	0.42	0.22	0.73	0.11	0.27	267	154	446	75	0.28
04 May 2023	Breeding	4km buffer	MRSea	1.21	0.58	2.22	0.37	0.31	757	407	1,388	242	0.32
13 June 2023	Breeding	4km buffer	MRSea	0.34	0.18	0.60	0.10	0.29	213	125	375	62	0.29
07 July 2023	Breeding	4km buffer	MRSea	0.22	0.11	0.40	0.07	0.31	135	75	250	44	0.32
17 August 2023	Non-breeding	4km buffer	MRSea	0.36	0.21	0.59	0.10	0.28	229	137	390	63	0.28

Survey Date	Season	Area	Modelling	Density	Density (LCL)	Density (UCL)	Density (SE)	Density (CV)	Population	Population (LCL)	Population (UCL)	Population (SE)	Population (CV)
04 September 2023	Non-breeding	4km buffer	MRSea	0.44	0.21	0.85	0.16	0.37	272	137	559	101	0.37
13 October 2023	Non-breeding	4km buffer	MRSea	0.27	0.13	0.48	0.09	0.34	166	85	316	56	0.34
14 November 2023	Non-breeding	4km buffer	MRSea	0.40	0.28	0.56	0.07	0.18	259	183	366	48	0.18
10 December 2023	Non-breeding	4km buffer	Design-based	0.04	0.00	0.09	0.03	0.68	25	0	62	17	0.68
30 January 2024	Non-breeding	4km buffer	MRSea	0.52	0.42	0.63	0.05	0.10	339	274	413	34	0.10
08 February 2024	Non-breeding	4km buffer	MRSea	0.86	0.55	1.27	0.18	0.21	553	362	837	115	0.21
15 March 2022	Non-breeding	2km buffer	MRSea	4.90	3.87	6.01	0.55	0.11	2,169	1,726	2,680	243	0.11
17 April 2022	Breeding	2km buffer	MRSea	1.43	0.55	3.18	0.61	0.43	569	273	1,339	245	0.43
14 May 2022	Breeding	2km buffer	MRSea	1.02	0.72	1.42	0.17	0.16	449	352	575	56	0.12
06 June 2022	Breeding	2km buffer	MRSea	0.63	0.19	1.61	0.31	0.50	219	104	752	233	1.06
19 July 2022	Breeding	2km buffer	MRSea	32.22	25.05	41.18	3.60	0.11	14,263	12,886	15,749	750	0.05
07 August 2022	Breeding	2km buffer	MRSea	2.27	1.57	3.19	0.39	0.17	996	771	1,293	136	0.14
07 September 2022	Non-breeding	2km buffer	MRSea	4.06	2.49	6.30	0.92	0.23	1,757	1,163	2,684	379	0.22
02 October 2022	Non-breeding	2km buffer	MRSea	3.40	2.55	4.49	0.50	0.15	1,500	1,136	2,001	219	0.15
03 November 2022	Non-breeding	2km buffer	MRSea	5.24	4.55	6.03	0.39	0.07	2,329	2,027	2,688	172	0.07
20 December 2022	Non-breeding	2km buffer	MRSea	1.35	1.02	1.73	0.18	0.14	597	455	772	81	0.14
20 January 2023	Non-breeding	2km buffer	MRSea	1.63	1.09	2.41	0.36	0.22	718	526	985	119	0.17
04 February 2023	Non-breeding	2km buffer	MRSea	0.69	0.44	1.04	0.16	0.22	298	198	465	67	0.22
04 March 2023	Non-breeding	2km buffer	MRSea	0.99	0.72	1.34	0.16	0.16	433	320	600	71	0.16

Survey Date	Season	Area	Modelling	Density	Density (LCL)	Density (UCL)	Density (SE)	Density (CV)	Population	Population (LCL)	Population (UCL)	Population (SE)	Population (CV)
03 April 2023	Breeding	2km buffer	MRSea	0.42	0.22	0.72	0.12	0.30	179	103	301	50	0.28
04 May 2023	Breeding	2km buffer	MRSea	1.20	0.58	2.20	0.40	0.33	507	270	941	162	0.32
13 June 2023	Breeding	2km buffer	MRSea	0.34	0.18	0.59	0.10	0.30	143	83	248	41	0.29
07 July 2023	Breeding	2km buffer	MRSea	0.21	0.11	0.40	0.07	0.34	90	50	168	29	0.33
17 August 2023	Non-breeding	2km buffer	MRSea	0.36	0.21	0.59	0.10	0.28	155	93	264	43	0.28
04 September 2023	Non-breeding	2km buffer	MRSea	0.44	0.21	0.85	0.16	0.37	184	93	379	68	0.37
13 October 2023	Non-breeding	2km buffer	MRSea	0.27	0.13	0.48	0.09	0.34	112	58	214	38	0.34
14 November 2023	Non-breeding	2km buffer	MRSea	0.40	0.28	0.56	0.07	0.18	175	124	248	32	0.18
10 December 2023	Non-breeding	2km buffer	Design-based	0.04	0.00	0.09	0.03	0.68	17	0	43	12	0.68
30 January 2024	Non-breeding	2km buffer	MRSea	0.52	0.42	0.63	0.05	0.10	230	186	280	23	0.10
08 February 2024	Non-breeding	2km buffer	MRSea	0.86	0.55	1.27	0.18	0.21	374	245	567	78	0.21
15 March 2022	Non-breeding	Bellrock WFDA	MRSea	4.90	3.87	6.01	0.55	0.11	1,319	1,050	1,630	148	0.11
17 April 2022	Breeding	Bellrock WFDA	MRSea	1.40	0.53	3.14	0.69	0.50	337	158	811	149	0.44
14 May 2022	Breeding	Bellrock WFDA	MRSea	1.01	0.72	1.41	0.17	0.17	271	211	348	34	0.13
06 June 2022	Breeding	Bellrock WFDA	MRSea	0.62	0.19	1.60	0.32	0.51	136	64	392	133	0.98
19 July 2022	Breeding	Bellrock WFDA	MRSea	31.95	24.73	41.04	3.70	0.12	8,604	7,715	9,611	497	0.06
07 August 2022	Breeding	Bellrock WFDA	MRSea	2.25	1.55	3.17	0.40	0.18	599	466	783	82	0.14
07 September 2022	Non-breeding	Bellrock WFDA	MRSea	4.07	2.56	6.22	0.92	0.23	1,075	715	1,653	231	0.21
02 October 2022	Non-breeding	Bellrock WFDA	MRSea	3.40	2.55	4.49	0.50	0.15	912	691	1,217	133	0.15

Survey Date	Season	Area	Modelling	Density	Density (LCL)	Density (UCL)	Density (SE)	Density (CV)	Population	Population (LCL)	Population (UCL)	Population (SE)	Population (CV)
03 November 2022	Non-breeding	Bellrock WFDA	MRSea	5.24	4.55	6.03	0.39	0.07	1,417	1,233	1,635	105	0.07
20 December 2022	Non-breeding	Bellrock WFDA	MRSea	1.35	1.02	1.73	0.18	0.14	363	277	470	49	0.14
20 January 2023	Non-breeding	Bellrock WFDA	MRSea	1.58	1.06	2.34	0.34	0.21	425	311	573	70	0.16
04 February 2023	Non-breeding	Bellrock WFDA	MRSea	0.69	0.44	1.04	0.16	0.22	181	120	283	41	0.22
04 March 2023	Non-breeding	Bellrock WFDA	MRSea	0.99	0.72	1.34	0.16	0.16	264	195	365	43	0.16
03 April 2023	Breeding	Bellrock WFDA	MRSea	0.41	0.22	0.72	0.13	0.32	108	62	183	31	0.28
04 May 2023	Breeding	Bellrock WFDA	MRSea	1.19	0.57	2.19	0.42	0.35	305	162	576	98	0.32
13 June 2023	Breeding	Bellrock WFDA	MRSea	0.33	0.18	0.59	0.11	0.32	86	50	149	25	0.29
07 July 2023	Breeding	Bellrock WFDA	MRSea	0.21	0.10	0.39	0.08	0.36	55	30	102	18	0.33
17 August 2023	Non-breeding	Bellrock WFDA	MRSea	0.36	0.21	0.59	0.10	0.28	94	56	161	26	0.28
04 September 2023	Non-breeding	Bellrock WFDA	MRSea	0.44	0.21	0.85	0.16	0.37	112	56	231	42	0.37
13 October 2023	Non-breeding	Bellrock WFDA	MRSea	0.27	0.13	0.48	0.09	0.34	68	35	130	23	0.34
14 November 2023	Non-breeding	Bellrock WFDA	MRSea	0.40	0.28	0.56	0.07	0.18	107	76	151	20	0.18
10 December 2023	Non-breeding	Bellrock WFDA	Design-based	0.04	0.00	0.09	0.03	0.68	11	0	26	7	0.68
30 January 2024	Non-breeding	Bellrock WFDA	MRSea	0.52	0.42	0.63	0.05	0.10	140	113	170	14	0.10
08 February 2024	Non-breeding	Bellrock WFDA	MRSea	0.86	0.55	1.27	0.18	0.21	228	149	345	48	0.21

8 Appendix 3 - ANOVA tables

Table A3.1 ANOVA outputs for all (excluding dead) guillemot (breeding season)

Model term	X2	Degrees of freedom	p-value	R-squared value	Root mean square error (RMSE)	Best 2D model
Survey	1,679.9287	8	0.0000	0.2957	1.4654	1D2D Model
Sea surface temperature gradient	6.4192	1	0.0113	0.2957	1.4654	1D2D Model
Distance to coast	33.0002	2	0.0000	0.2957	1.4654	1D2D Model
x.pos, y.pos	51.0758	2	0.0000	0.2957	1.4654	1D2D Model

Table A3.2 ANOVA outputs for all (excluding dead) guillemot (nonbreeding season)

Model term	X2	Degrees of freedom	p-value	R-squared value	Root mean square error (RMSE)	Best 2D model
Survey	640.6624	13	0.0000	0.0579	0.6705	2D Only
x.pos, y.pos	9.5749	2	0.0083	0.0579	0.6705	2D Only

Table A3.3 ANOVA outputs for flying guillemot (breeding season)

Model term	X2	Degrees of freedom	p-value	R-squared value	Root mean square error (RMSE)	Best 2D model
Survey	81.6458	2	0.0000	0.0117	0.8327	1D2D Model
Sea surface temperature gradient	10.2056	3	0.0169	0.0117	0.8327	1D2D Model
Distance to coast	16.0067	1	0.0001	0.0117	0.8327	1D2D Model
x.pos, y.pos	6.2360	2	0.0442	0.0117	0.8327	1D2D Model

Table A3.4 ANOVA outputs for flying guillemot (nonbreeding season)

Model term	X2	Degrees of freedom	p-value	R-squared value	Root mean square error (RMSE)	Best 2D model
Survey	152.5013	1	0	0.0058	0.7063	1D2D Model
Bathymetry	25.7595	1	0	0.0058	0.7063	1D2D Model
x.pos, y.pos	362.4478	2	0	0.0058	0.7063	1D2D Model

Table A3.5 ANOVA outputs for sitting guillemot (breeding season)

Model term	X2	Degrees of freedom	p-value	R-squared value	Root mean square error (RMSE)	Best 2D model
Survey	1,592.7230	8	0.0000	0.4101	1.3576	1D2D Model
Bathymetry	24.7951	4	0.0001	0.4101	1.3576	1D2D Model
Slope	18.2834	3	0.0004	0.4101	1.3576	1D2D Model
Distance to coast	59.6024	3	0.0000	0.4101	1.3576	1D2D Model
x.pos, y.pos	4.0865	2	0.1296	0.4101	1.3576	1D2D Model

Table A3.6 ANOVA outputs for sitting guillemot (nonbreeding season)

Model term	X2	Degrees of freedom	p-value	R-squared value	Root mean square error (RMSE)	Best 2D model
Survey	691.6635	13	0.0000	0.07	0.6111	2D Only
x.pos, y.pos	13.4168	3	0.0038	0.07	0.6111	2D Only

9 Appendix 4 - Model coefficients tables

9.1 Guillemot, breeding, all excludes dead

Table A4.1 Model coefficients for guillemot, breeding, all excludes dead best fit MRSea model.

Predictor	Estimate	Std. Error	Robust S.E.
(Intercept)	-11.552	0.200	0.267
as.factor(Survey)Zone179_M04_S01_D01_23	-1.840	0.292	0.263
as.factor(Survey)Zone179_M05_S01_D01_22	-1.504	0.265	0.227
as.factor(Survey)Zone179_M05_S01_D01_23	-0.554	0.220	0.346
as.factor(Survey)Zone179_M06_S01_D01_22	0.156	0.993	0.683
as.factor(Survey)Zone179_M06_S01_D01_23	-2.400	0.350	0.313
as.factor(Survey)Zone179_M07_S01_D01_22	1.974	0.151	0.192
as.factor(Survey)Zone179_M07_S01_D01_23	-2.788	0.403	0.315
as.factor(Survey)Zone179_M08_S01_D01_22	-0.621	0.210	0.210
s(SST.grad)	-136.889	56.375	59.262
s(dist2coast)1	-2.205	0.309	0.359
s(dist2coast)2	-0.729	0.220	0.422
s(x,y)b1	-4.068	1.567	1.120
s(x,y)b2	-304.527	237.615	100.851

9.2 Guillemot, breeding, flying

Table A4.2 Model coefficients for guillemot, breeding, flying best fit MRSea model

Predictor	Estimate	Std. Error	Robust S.E.
(Intercept)	-18.214	3.428	2.944
as.factor(Survey)Zone179_M04_S01_D01_23	-1.644	0.591	0.573
as.factor(Survey)Zone179_M05_S01_D01_23	-0.290	0.621	0.568
s(SST.grad)1	-1.228	0.990	1.189
s(SST.grad)2	1.160	1.732	1.411
s(SST.grad)3	-3.970	3.678	3.076
s(dist2coast)	0.041	0.023	0.021

Predictor	Estimate	Std. Error	Robust S.E.
s(x,y)b1	-3.886	4.597	3.431
s(x,y)b2	3.894	4.802	3.682

9.3 Guillemot, breeding, sitting

Table A4.3 Model coefficients for guillemot, breeding, sitting best fit MRSea model

Predictor	Estimate	Std. Error	Robust S.E.
(Intercept)	-13.460	1.213	1.277
as.factor(Survey)Zone179_M04_S01_D01_23	-1.638	0.370	0.354
as.factor(Survey)Zone179_M05_S01_D01_22	-0.700	0.259	0.256
as.factor(Survey)Zone179_M05_S01_D01_23	-0.575	0.249	0.381
as.factor(Survey)Zone179_M06_S01_D01_22	-0.909	0.552	0.478
as.factor(Survey)Zone179_M06_S01_D01_23	-1.851	0.407	0.354
as.factor(Survey)Zone179_M07_S01_D01_22	2.755	0.154	0.229
as.factor(Survey)Zone179_M07_S01_D01_23	-2.316	0.501	0.379
as.factor(Survey)Zone179_M08_S01_D01_22	0.089	0.207	0.262
s(bathymetry)1	2.791	1.499	1.691
s(bathymetry)2	0.347	1.153	1.207
s(bathymetry)3	1.258	1.218	1.245
s(bathymetry)4	0.432	1.192	1.277
s(slope)1	0.360	0.177	0.216
s(slope)2	-0.662	0.469	0.587
s(slope)3	-1.840	1.126	0.859
s(dist2coast)1	-0.537	0.252	0.297
s(dist2coast)2	-1.819	0.204	0.285
s(dist2coast)3	-1.790	0.390	0.448
s(x,y)b1	-15.479	16.485	9.168
s(x,y)b2	-0.991	1.328	0.821

9.4 Guillemot, non-breeding, all excludes dead

Table A4.4 Model coefficients for guillemot, non-breeding, all excludes dead best fit MRSea model

Predictor	Estimate	Std. Error	Robust S.E.
(Intercept)	-13.127	0.238	0.233
as.factor(Survey)Zone179_M01_S01_D01_24	-1.589	0.364	0.263
as.factor(Survey)Zone179_M02_S01_D01_23	-0.557	0.288	0.394
as.factor(Survey)Zone179_M02_S01_D01_24	-1.136	0.323	0.310
as.factor(Survey)Zone179_M03_S01_D01_22	0.622	0.254	0.259
as.factor(Survey)Zone179_M03_S01_D01_23	-0.932	0.308	0.268
as.factor(Survey)Zone179_M08_S01_D01_23	-2.008	0.412	0.354
as.factor(Survey)Zone179_M09_S01_D01_22	0.501	0.256	0.306
as.factor(Survey)Zone179_M09_S01_D01_23	-1.802	0.387	0.416
as.factor(Survey)Zone179_M10_S01_D01_22	0.262	0.261	0.272
as.factor(Survey)Zone179_M10_S01_D01_23	-2.192	0.439	0.391
as.factor(Survey)Zone179_M11_S01_D01_22	0.716	0.253	0.244
as.factor(Survey)Zone179_M11_S01_D01_23	-1.854	0.392	0.292
as.factor(Survey)Zone179_M12_S01_D01_22	-0.582	0.290	0.270
LRF.g(radiusIndices, dists, radii, aR)b1	-1.290	0.696	0.419
LRF.g(radiusIndices, dists, radii, aR)b2	-0.880	0.635	0.457

9.5 Guillemot, non-breeding, flying

Table A4.5 Model coefficients for guillemot, non-=breeding, flying best fit MRSea model

Predictor	Estimate	Std. Error	Robust S.E.
(Intercept)	6.286	5.607	7.818
as.factor(Survey)Zone179_M02_S01_D01_23	-6.329	2.645	1.035
s(bathymetry)	0.189	0.063	0.098
s(x,y)b1	-8.592	3.929	1.111
s(x,y)b2	-26.724	9.746	4.523

9.6 Guillemot, non-breeding, sitting

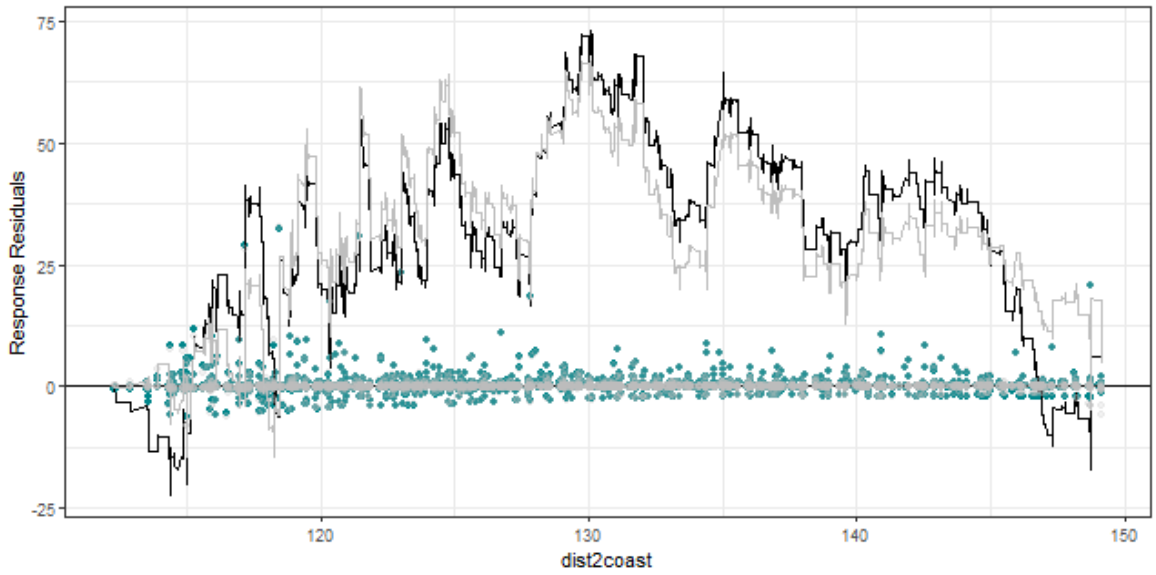
Table A4.6 Model coefficients for guillemot, non-breeding, sitting best fit MRSea model

Predictor	Estimate	Std. Error	Robust S.E.
(Intercept)	-13.361	0.209	0.193
as.factor(Survey)Zone179_M01_S01_D01_24	-1.394	0.325	0.217
as.factor(Survey)Zone179_M02_S01_D01_23	-1.111	0.299	0.296
as.factor(Survey)Zone179_M02_S01_D01_24	-0.902	0.285	0.281
as.factor(Survey)Zone179_M03_S01_D01_22	0.852	0.224	0.223
as.factor(Survey)Zone179_M03_S01_D01_23	-0.756	0.275	0.249
as.factor(Survey)Zone179_M08_S01_D01_23	-1.774	0.365	0.328
as.factor(Survey)Zone179_M09_S01_D01_22	0.735	0.226	0.276
as.factor(Survey)Zone179_M09_S01_D01_23	-1.615	0.347	0.409
as.factor(Survey)Zone179_M10_S01_D01_22	0.484	0.230	0.241
as.factor(Survey)Zone179_M10_S01_D01_23	-2.101	0.409	0.386
as.factor(Survey)Zone179_M11_S01_D01_22	0.924	0.223	0.207
as.factor(Survey)Zone179_M11_S01_D01_23	-1.669	0.352	0.272
as.factor(Survey)Zone179_M12_S01_D01_22	-0.433	0.259	0.236
LRF.g(radiusIndices, dists, radii, aR)b1	-4.439	2.225	1.476
LRF.g(radiusIndices, dists, radii, aR)b2	-2.453	1.113	1.083
LRF.g(radiusIndices, dists, radii, aR)b3	3.338	1.842	1.451

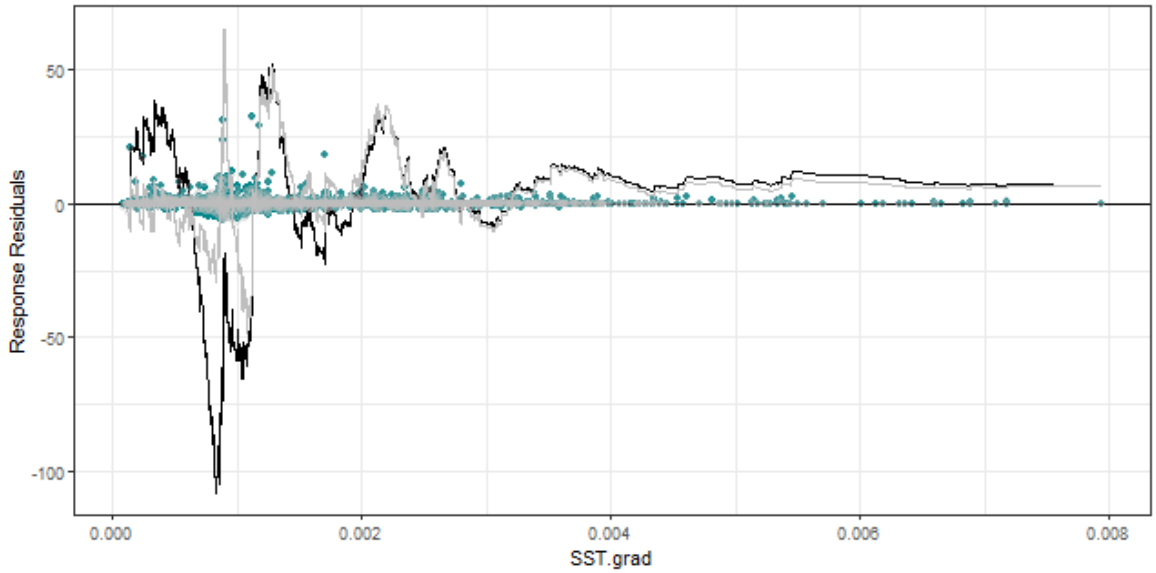
10 Appendix 5 - MRSea modelling plots

10.1 MRSea modelling outputs: Guillemot, breeding, all excludes dead

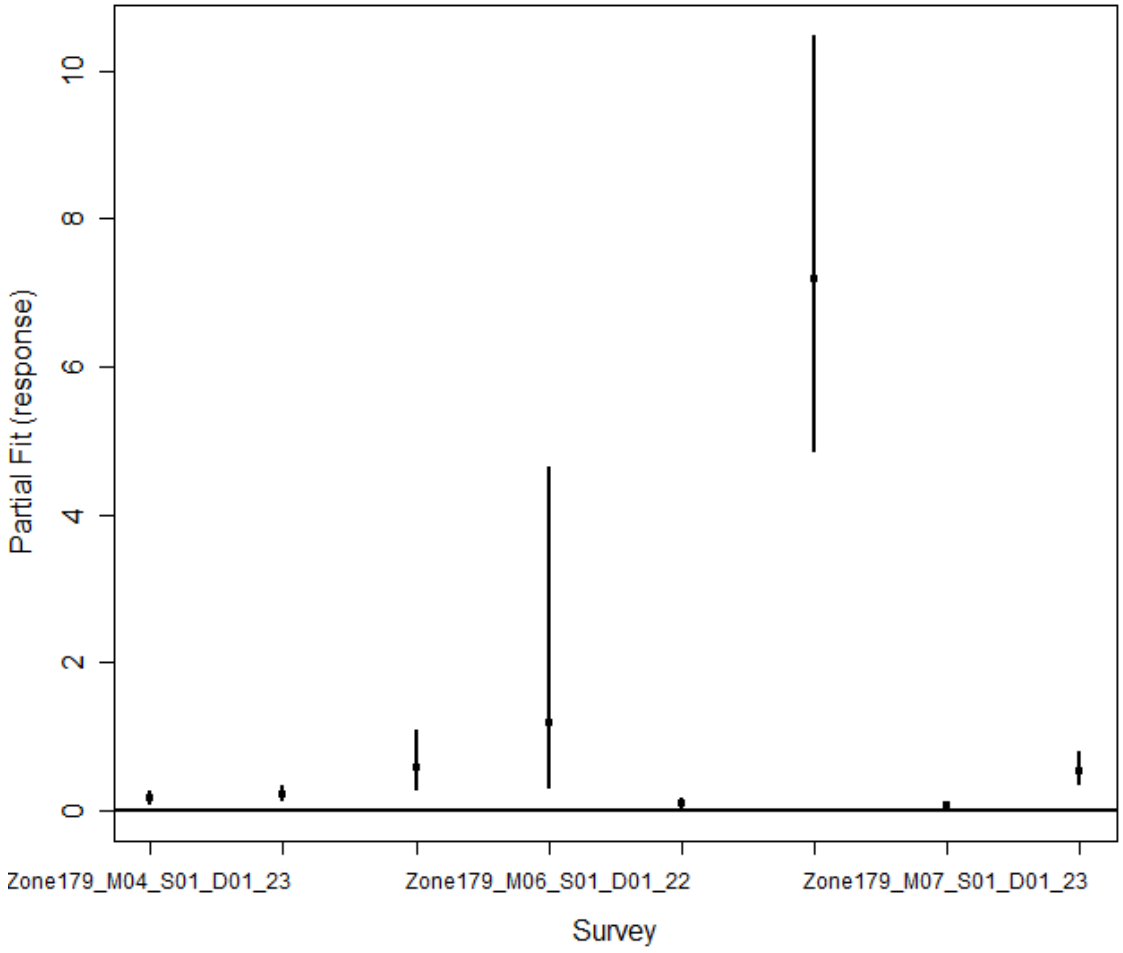
10.1.1 All excludes dead guillemot (breeding season): cumulative residual plot of distance to coast (km)



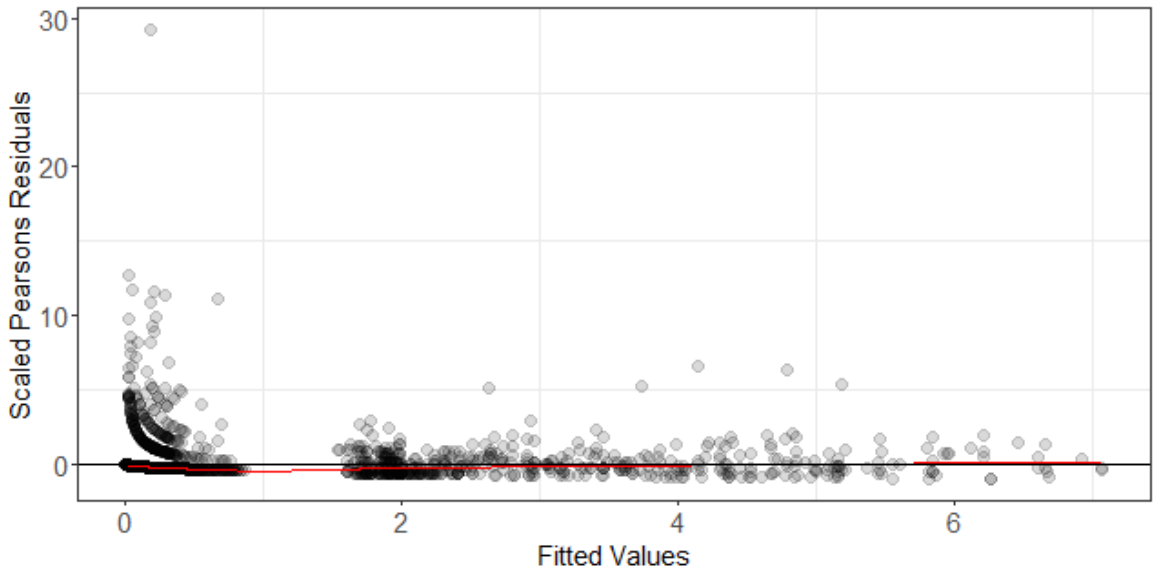
10.1.2 All excludes dead guillemot (breeding season): cumulative residual plot of sea surface temperature gradient



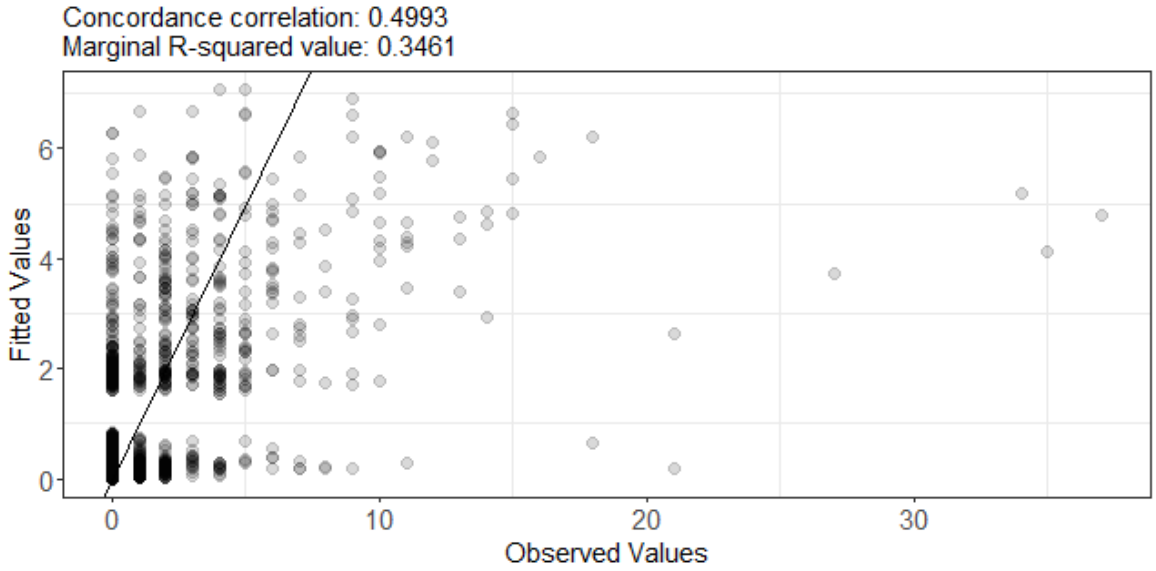
10.1.3 All excludes dead guillemot (breeding season): partial dependents plot



10.1.4 All excludes dead guillemot (breeding season): scaled Pearson residuals plot

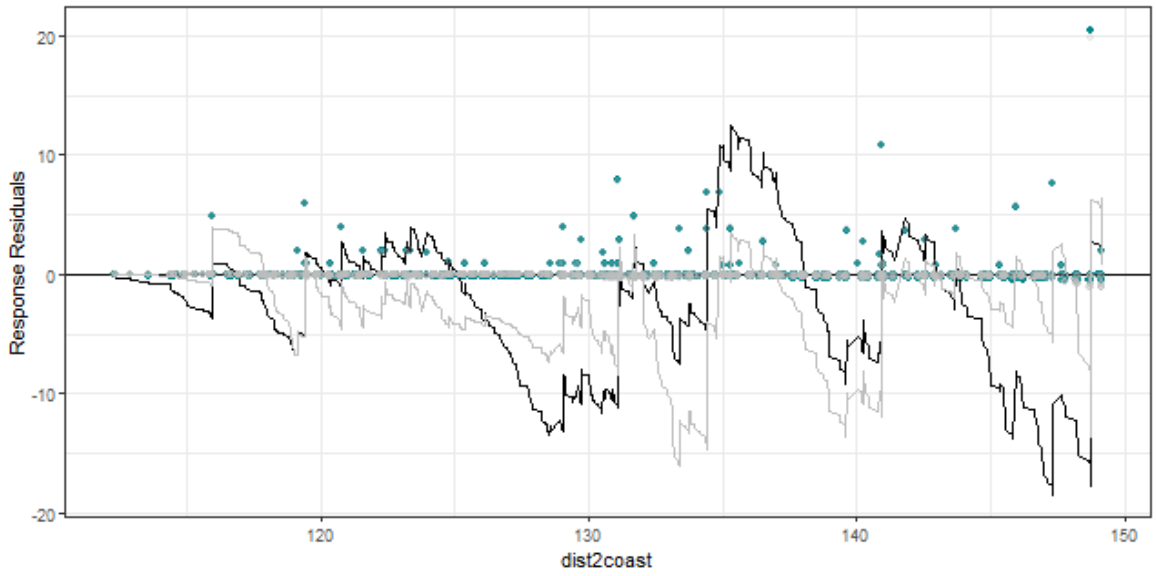


10.1.5 All excludes dead guillemot (breeding season): predicted versus observed plot

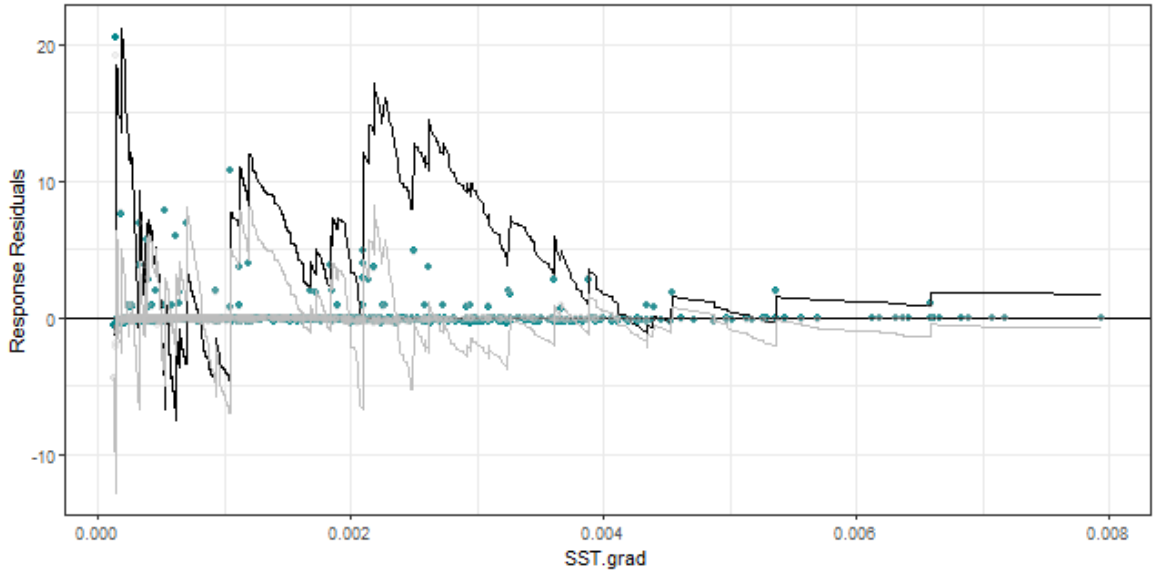


10.2 MRSea modelling outputs: Guillemot, breeding, flying

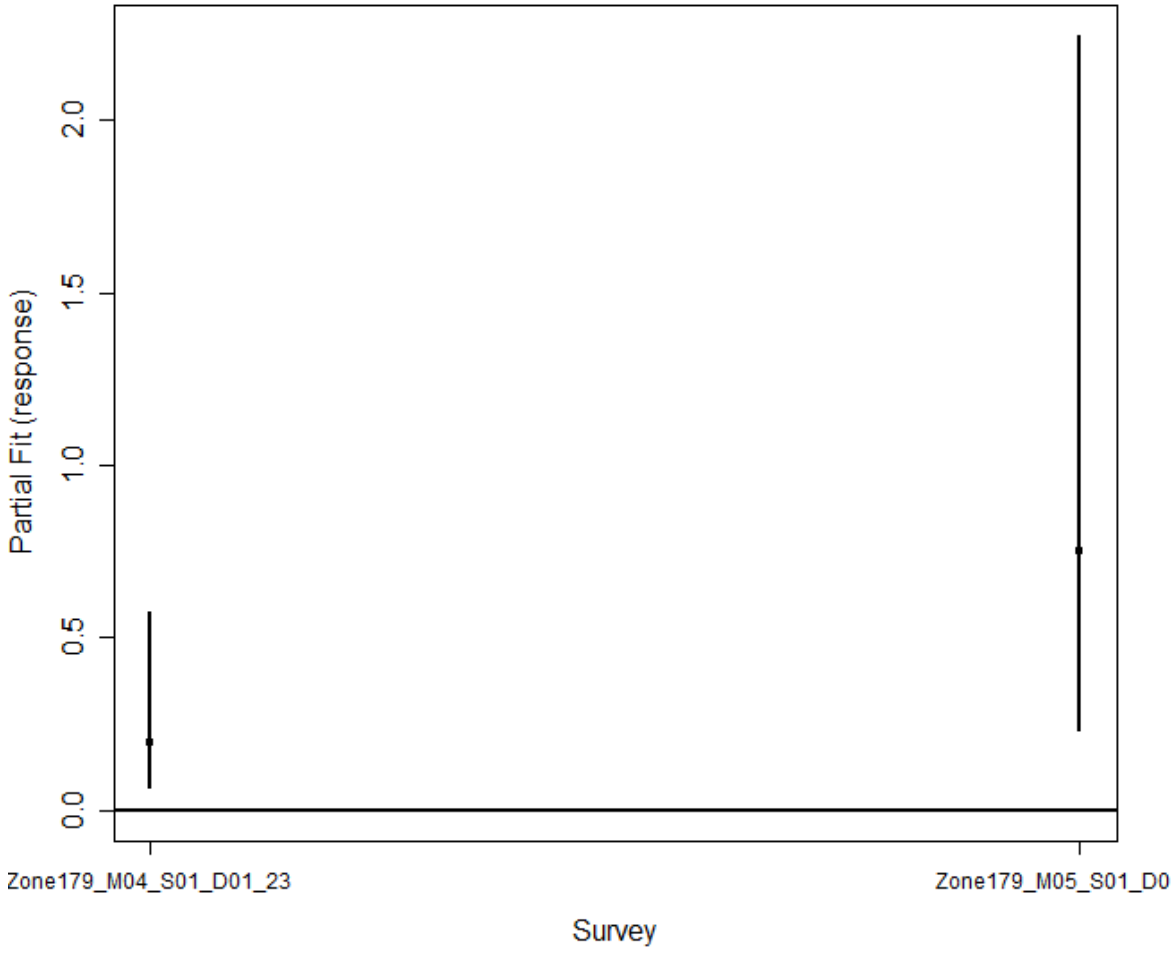
10.2.1 Flying guillemot (breeding season): cumulative residual plot of distance to coast (km)



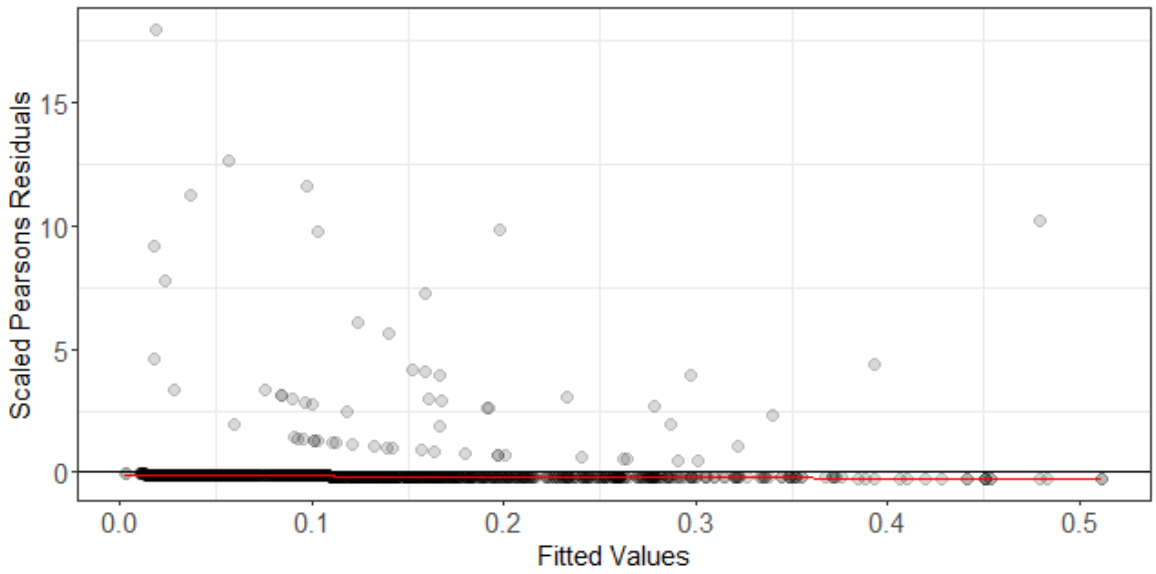
10.2.2 Flying guillemot (breeding season): cumulative residual plot of sea surface temperature gradient



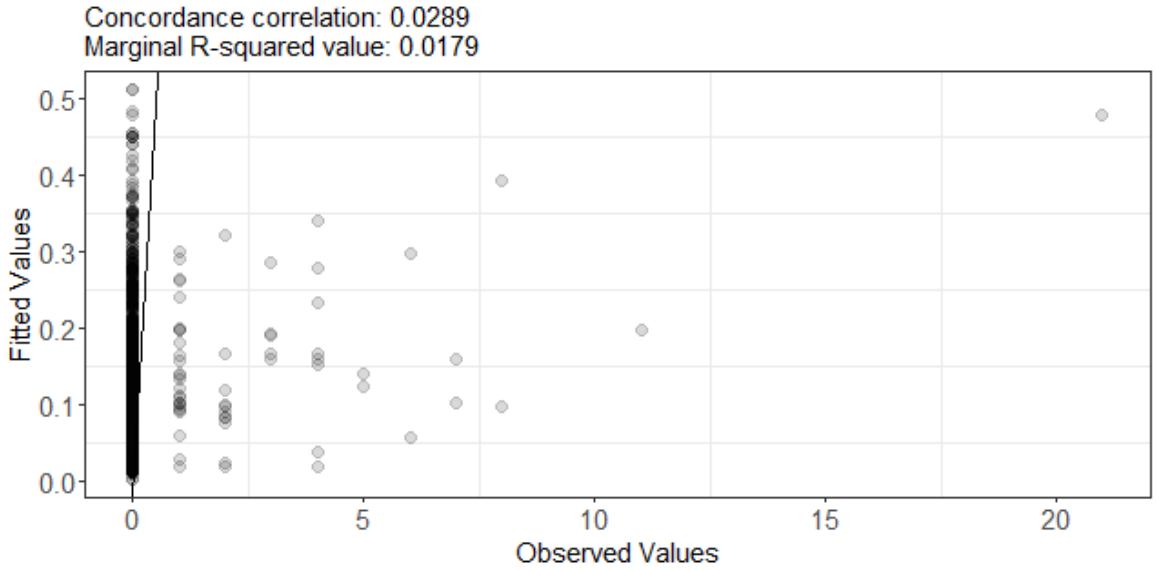
10.2.3 Flying guillemot (breeding season): partial dependents plot



10.2.4 Flying guillemot (breeding season): scaled Pearson residuals plot

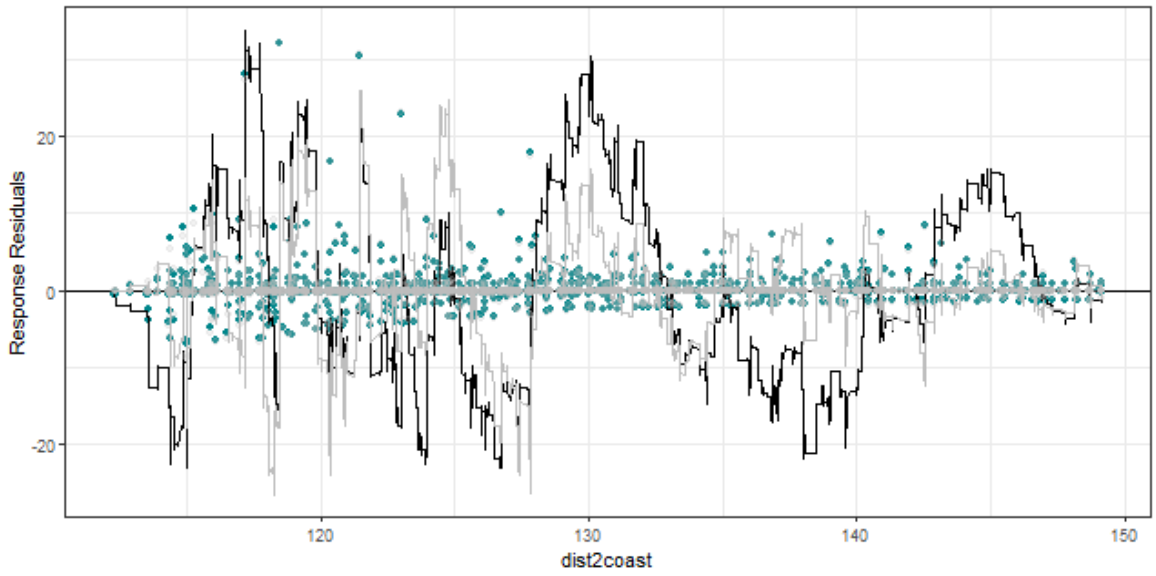


10.2.5 Flying guillemot (breeding season): predicted versus observed plot

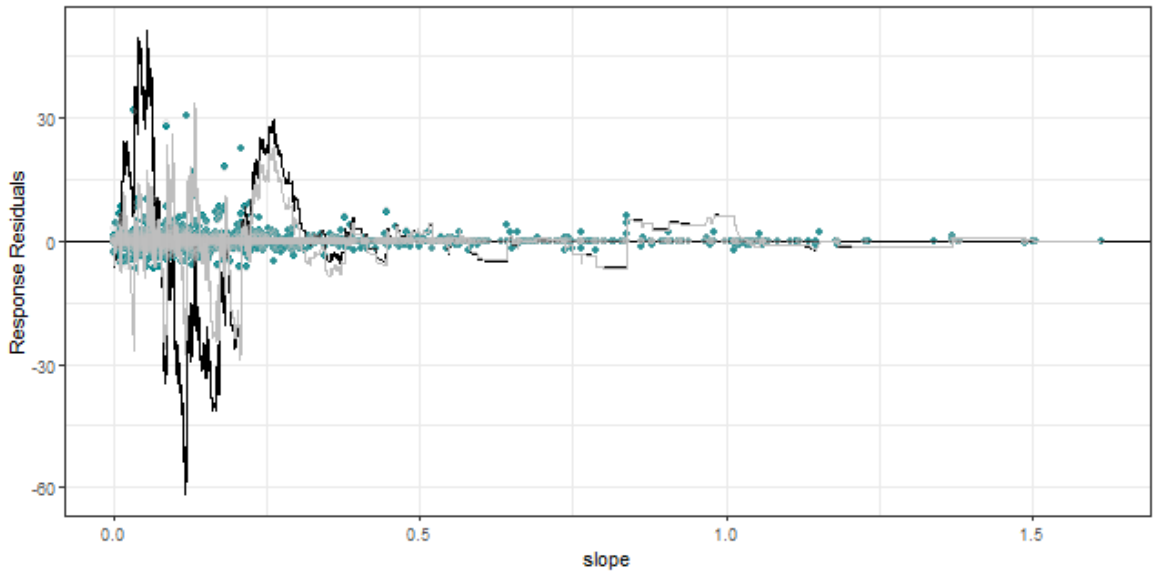


10.3 MRSea modelling outputs: Guillemot, breeding, sitting

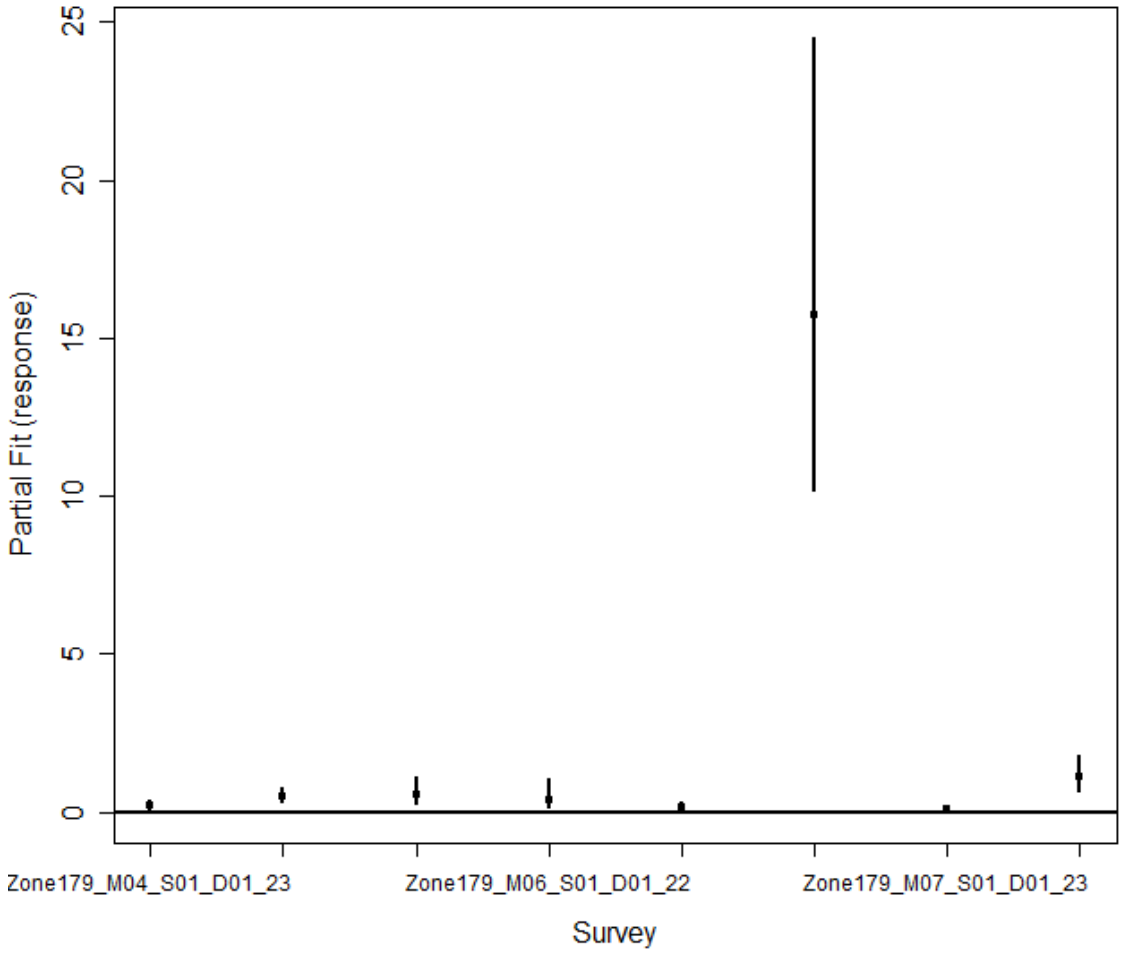
10.3.1 Sitting guillemot (breeding season): cumulative residual plot of distance to coast (km)



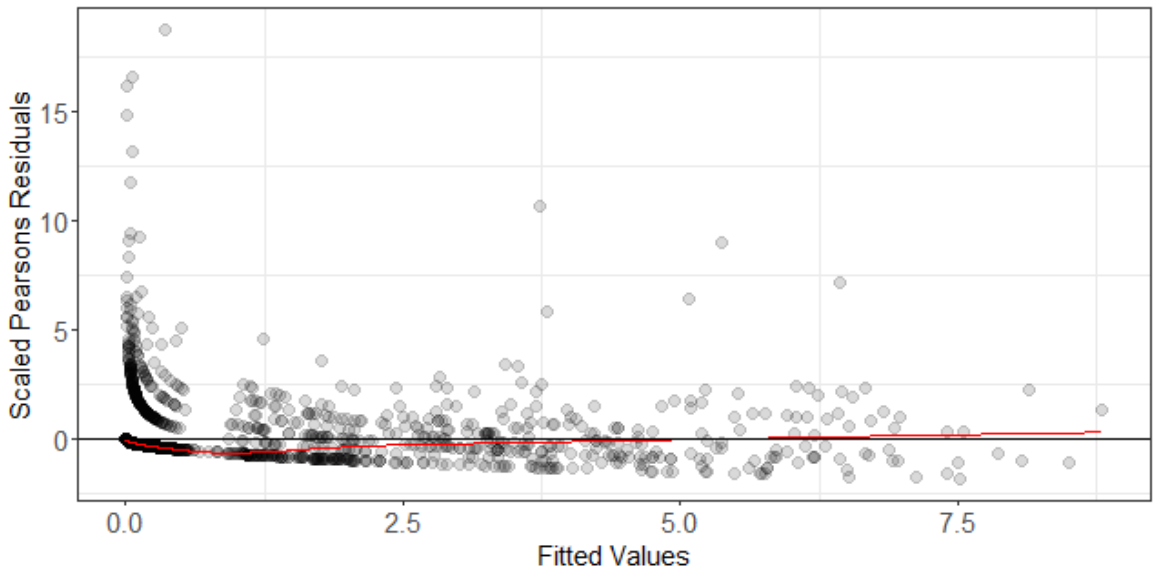
10.3.2 Sitting guillemot (breeding season): cumulative residual plot of slope



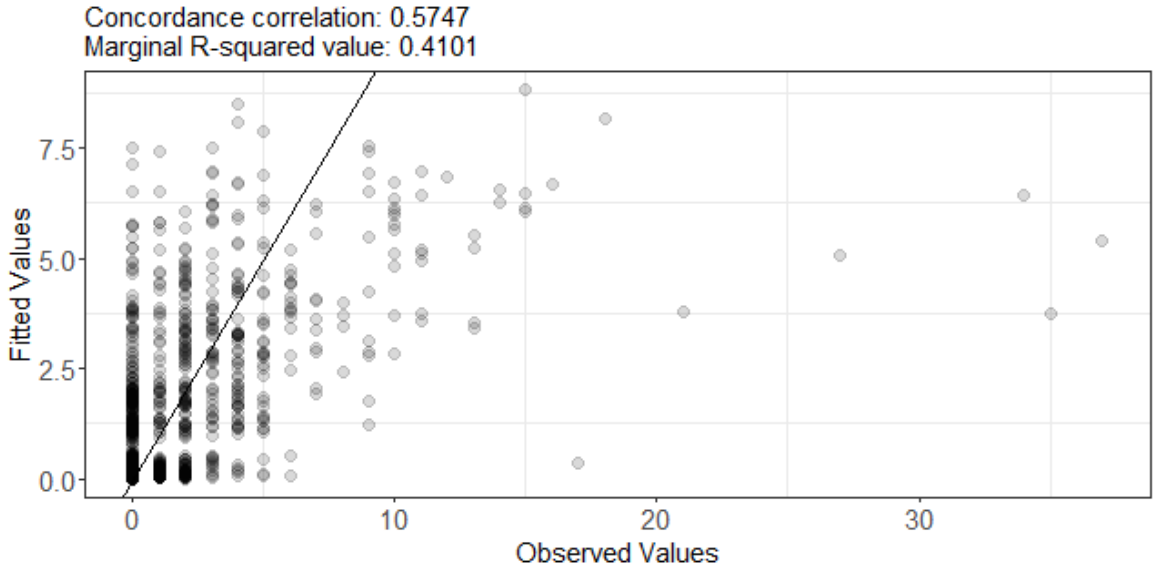
10.3.3 Sitting guillemot (breeding season): partial dependents plot



10.3.4 Sitting guillemot (breeding season): scaled Pearson residuals plot

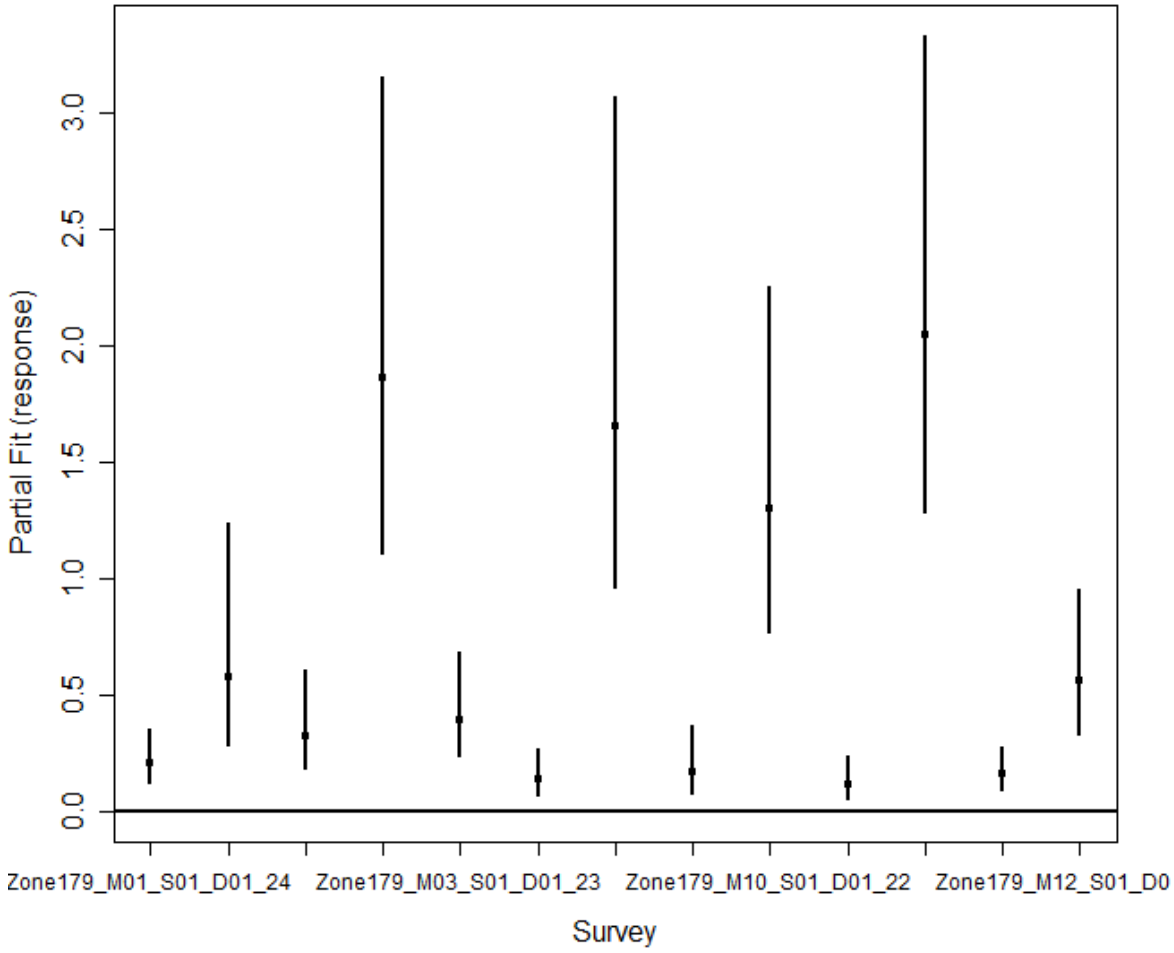


10.3.5 Sitting guillemot (breeding season): predicted versus observed plot

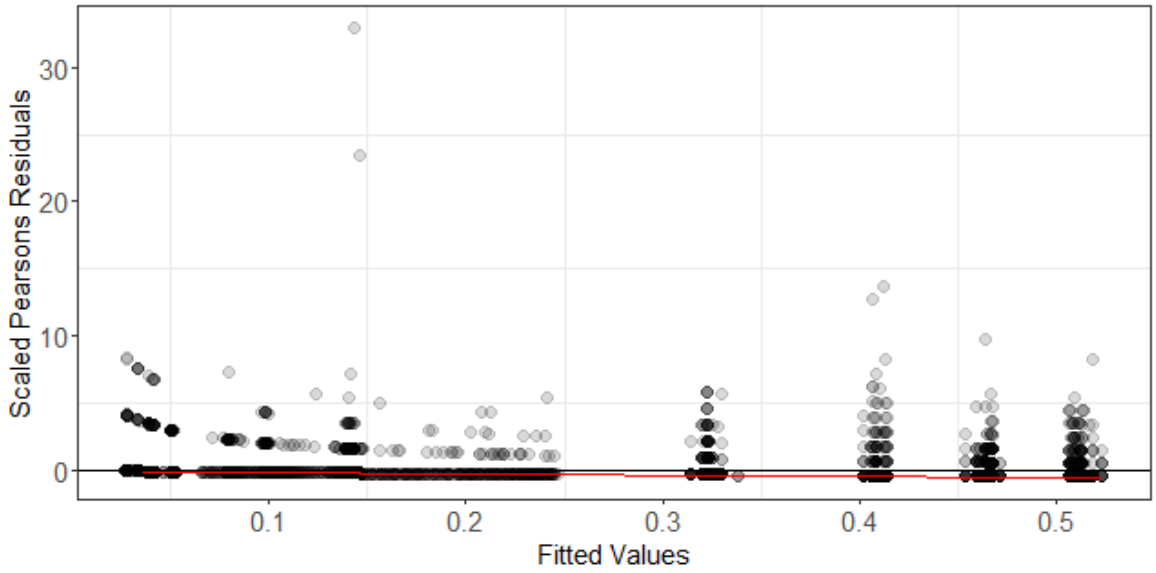


10.4 MRSea modelling outputs: Guillemot, non-breeding, all excludes dead

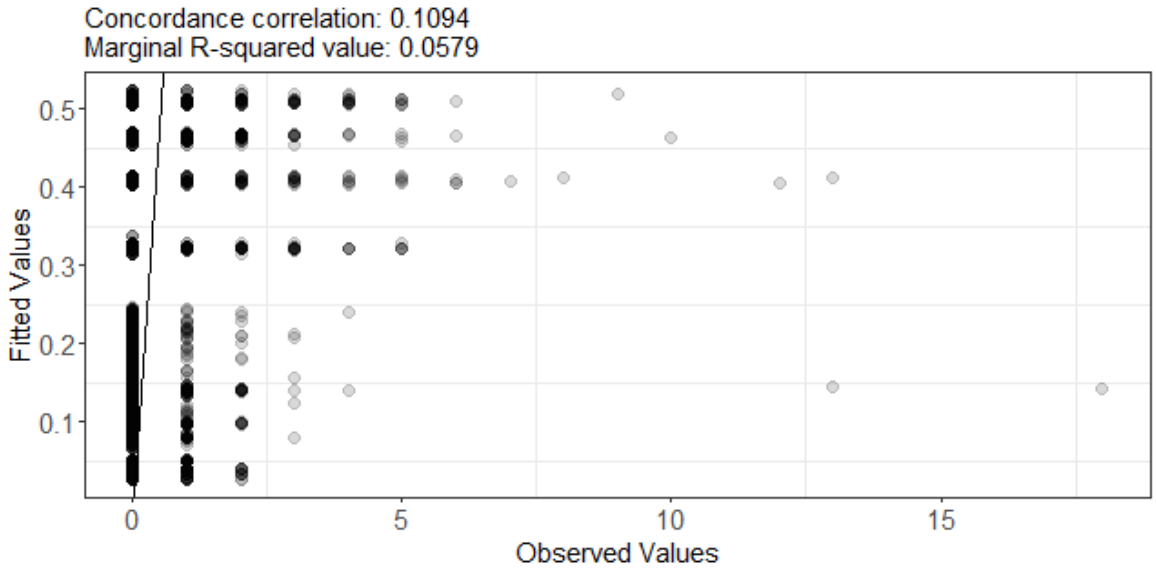
10.4.1 All excludes dead guillemot (non-breeding season): partial dependents plot



10.4.2 All excludes dead guillemot (non-breeding season): scaled Pearson residuals plot

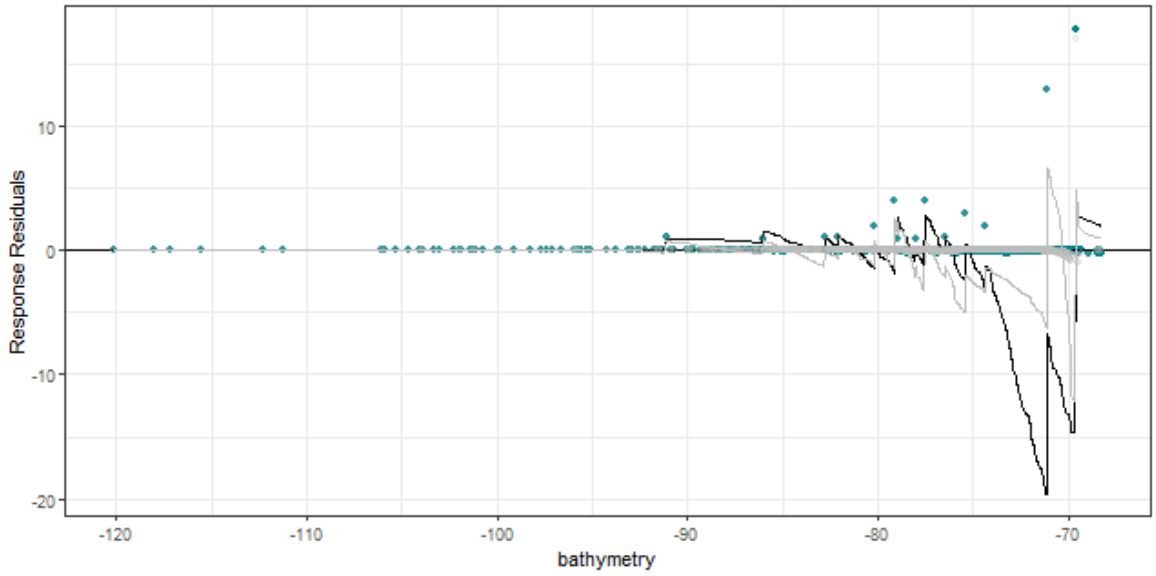


10.4.3 All excludes dead guillemot (non-breeding season): predicted versus observed plot

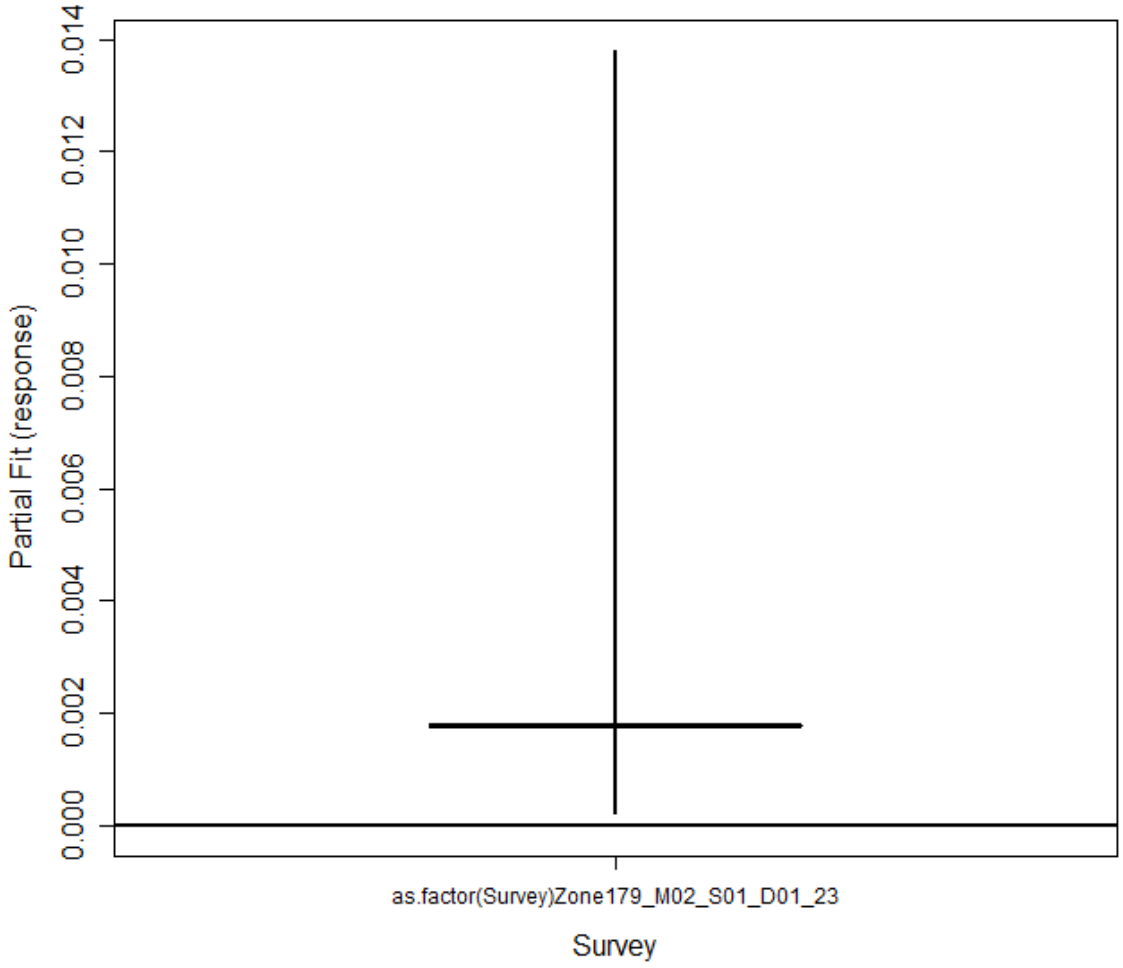


10.5 MRSea modelling outputs: Guillemot, non-breeding, flying

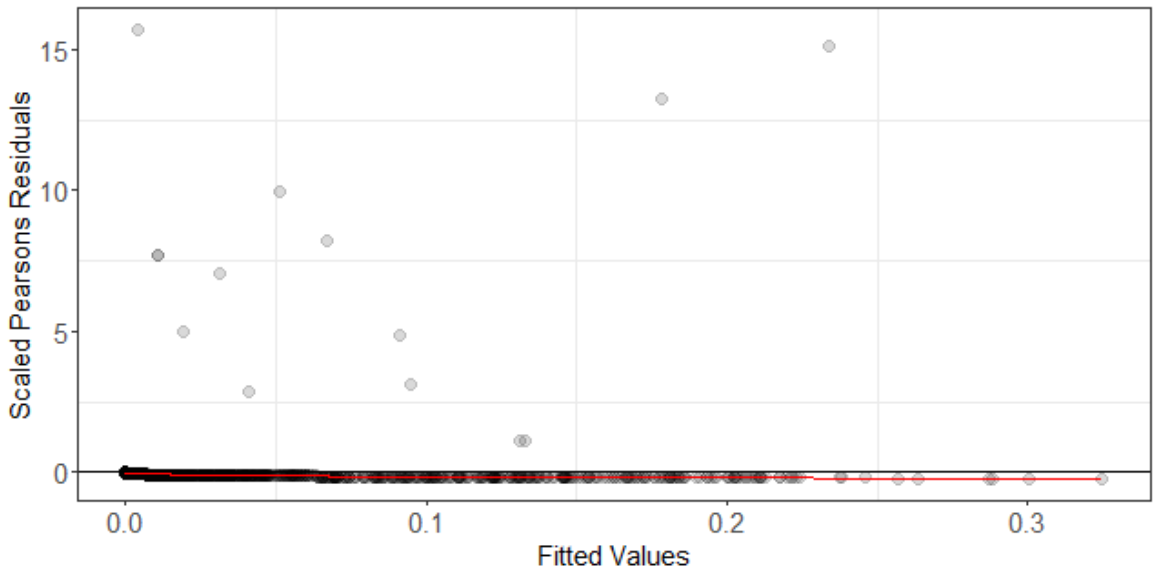
10.5.1 Flying guillemot (non-breeding season): cumulative residual plot of bathymetry



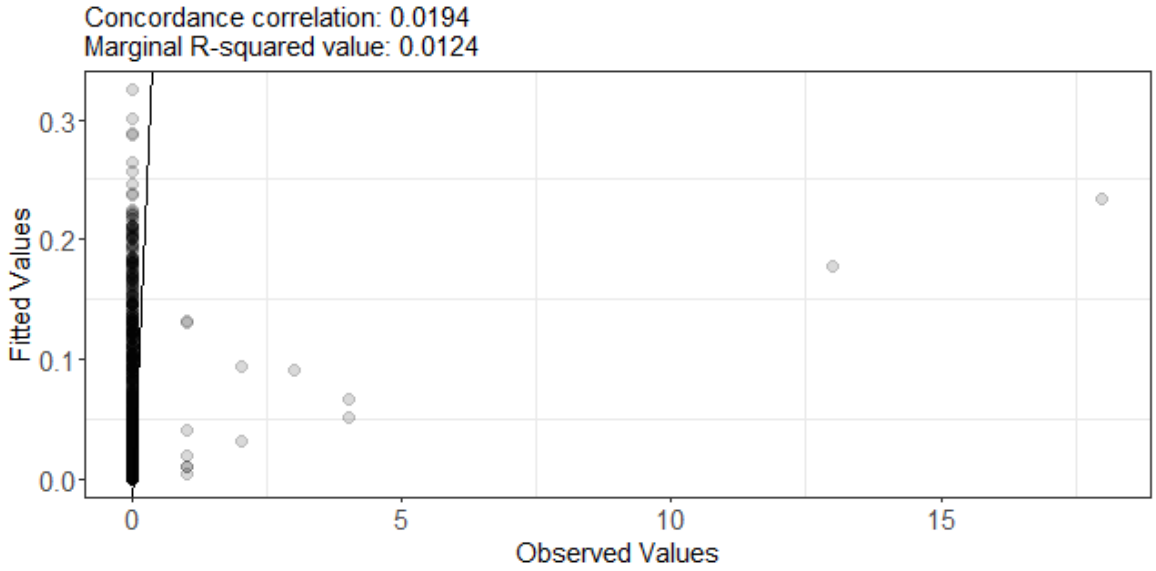
10.5.2 Flying guillemot (non-breeding season): partial dependents plot



10.5.3 Flying guillemot (non-breeding season): scaled Pearson residuals plot

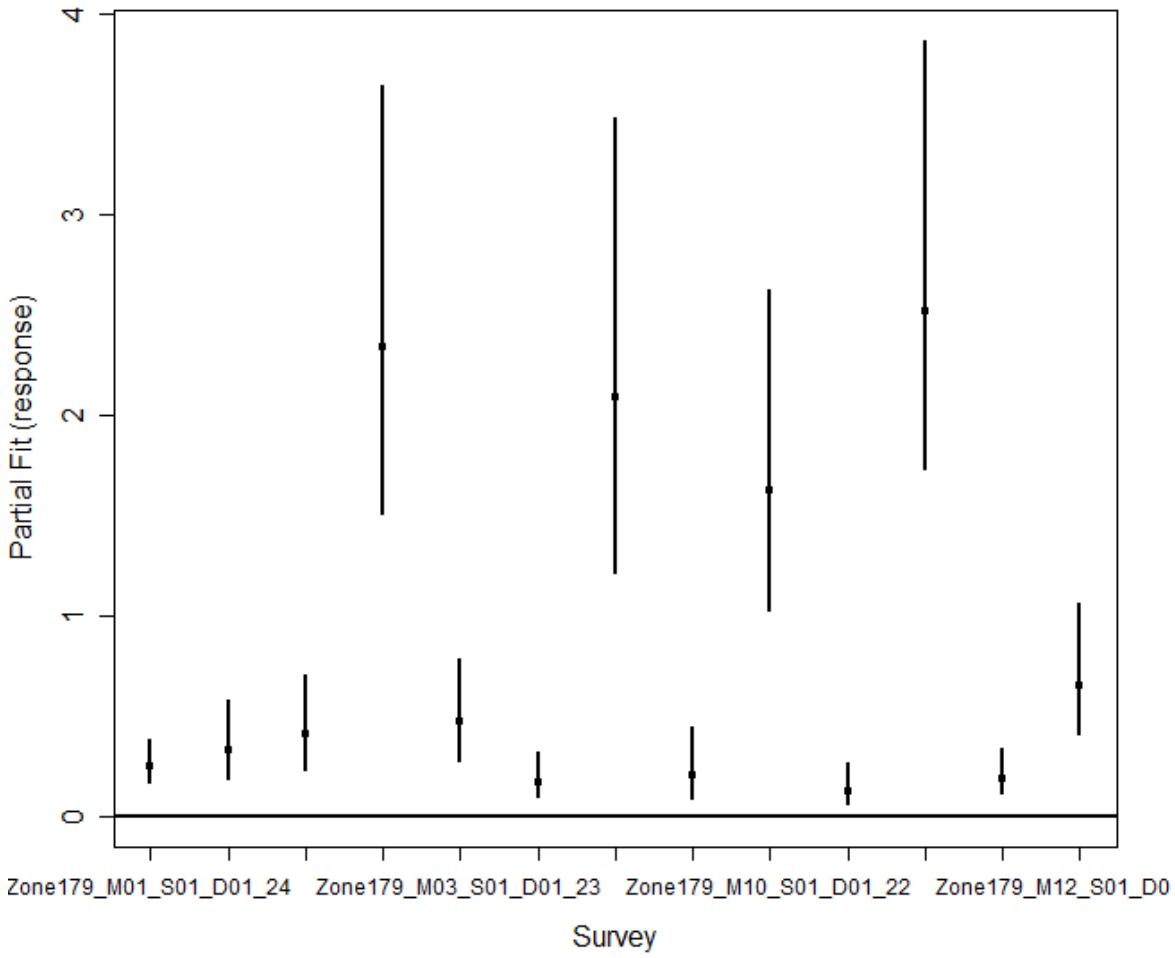


10.5.4 Flying guillemot (non-breeding season): predicted versus observed plot

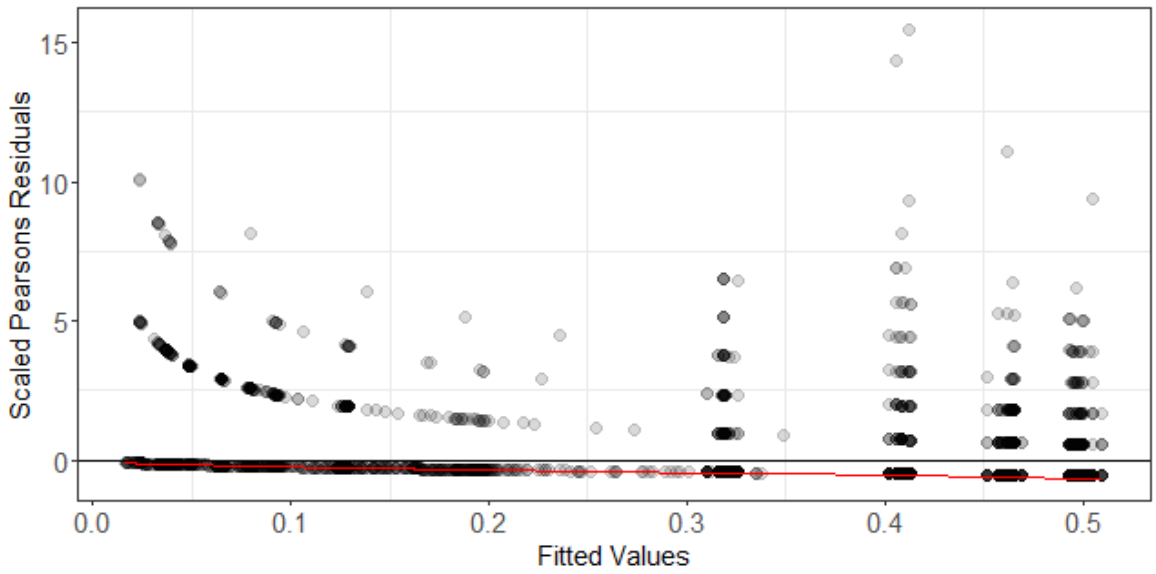


10.6 MRSea modelling outputs: Guillemot, non-breeding, sitting

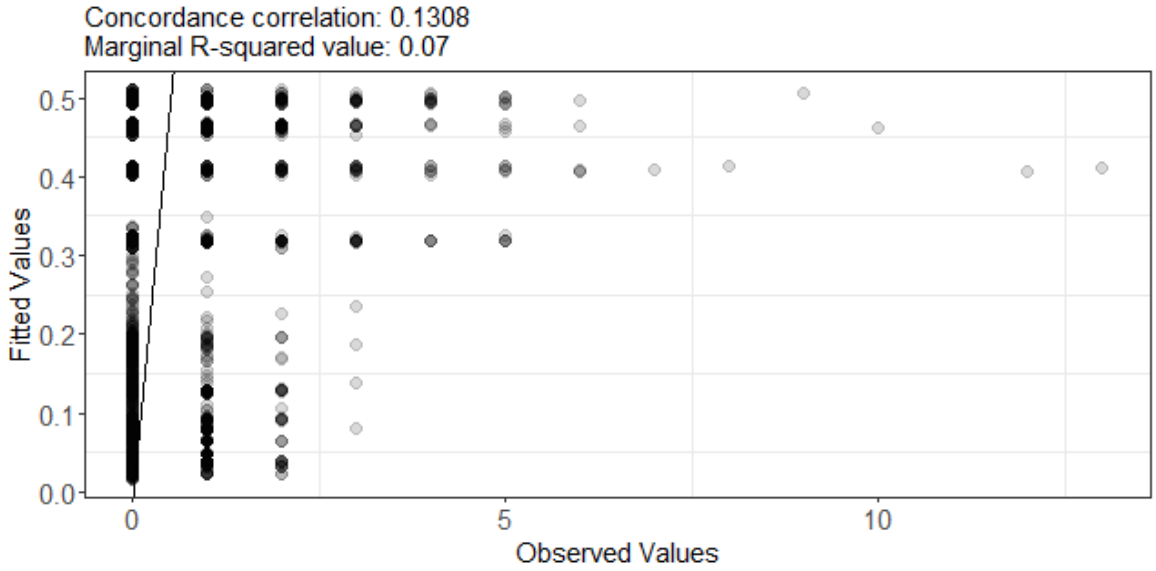
10.6.1 Sitting guillemot (non-breeding season): partial dependents plot



10.6.2 Sitting guillemot (non-breeding season): scaled Pearson residuals plot



10.6.3 Sitting guillemot (non-breeding season): predicted versus observed plot



11 Appendix 6 - Additional MRSea maps

11.1 Guillemot

11.1.1 All birds density surfaces - lower confidence level

Figure 15 Guillemot (all birds) lower confidence level density surfaces from MRSea outputs for surveys during the breeding season.

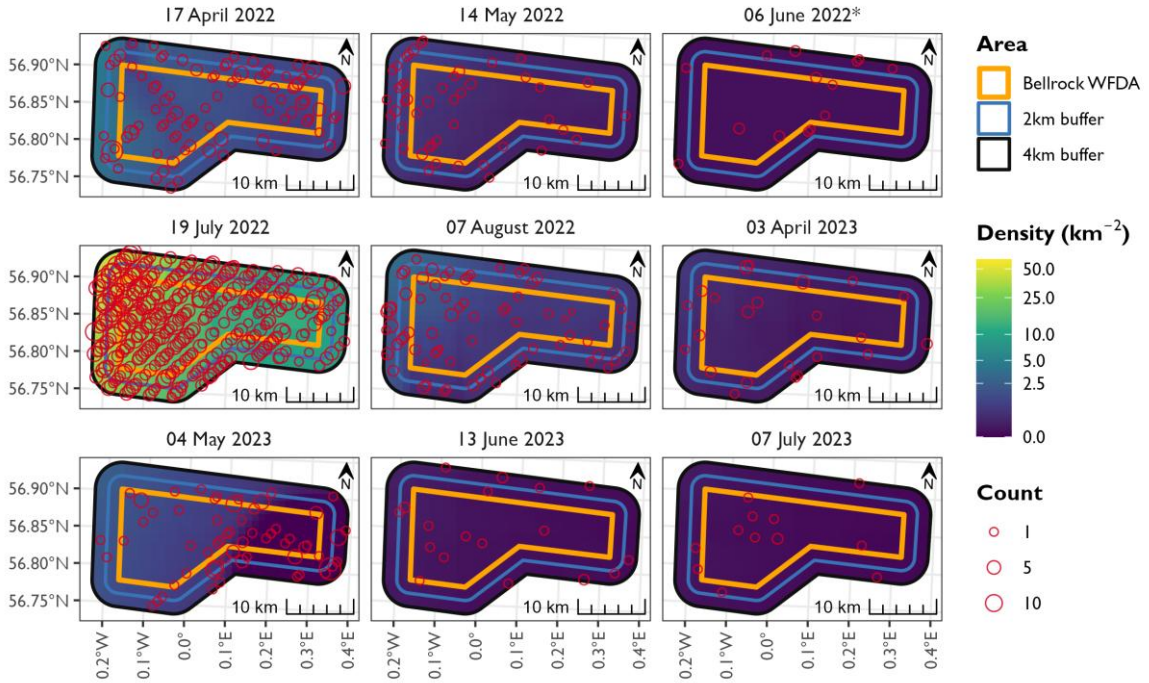


*Figure note: *Design-based estimates substituted in as flat density surface for June 2022 as MRSea outputs produced inconsistent estimates when compared to design-based estimates.*

Red unfilled circles show apportioned bird observations, aggregated to 500 metre transect bins.

Note log10 colour scales.

Figure 16 Guillemot (all birds) lower confidence level density surfaces from MRSea outputs for surveys during the non-breeding season.

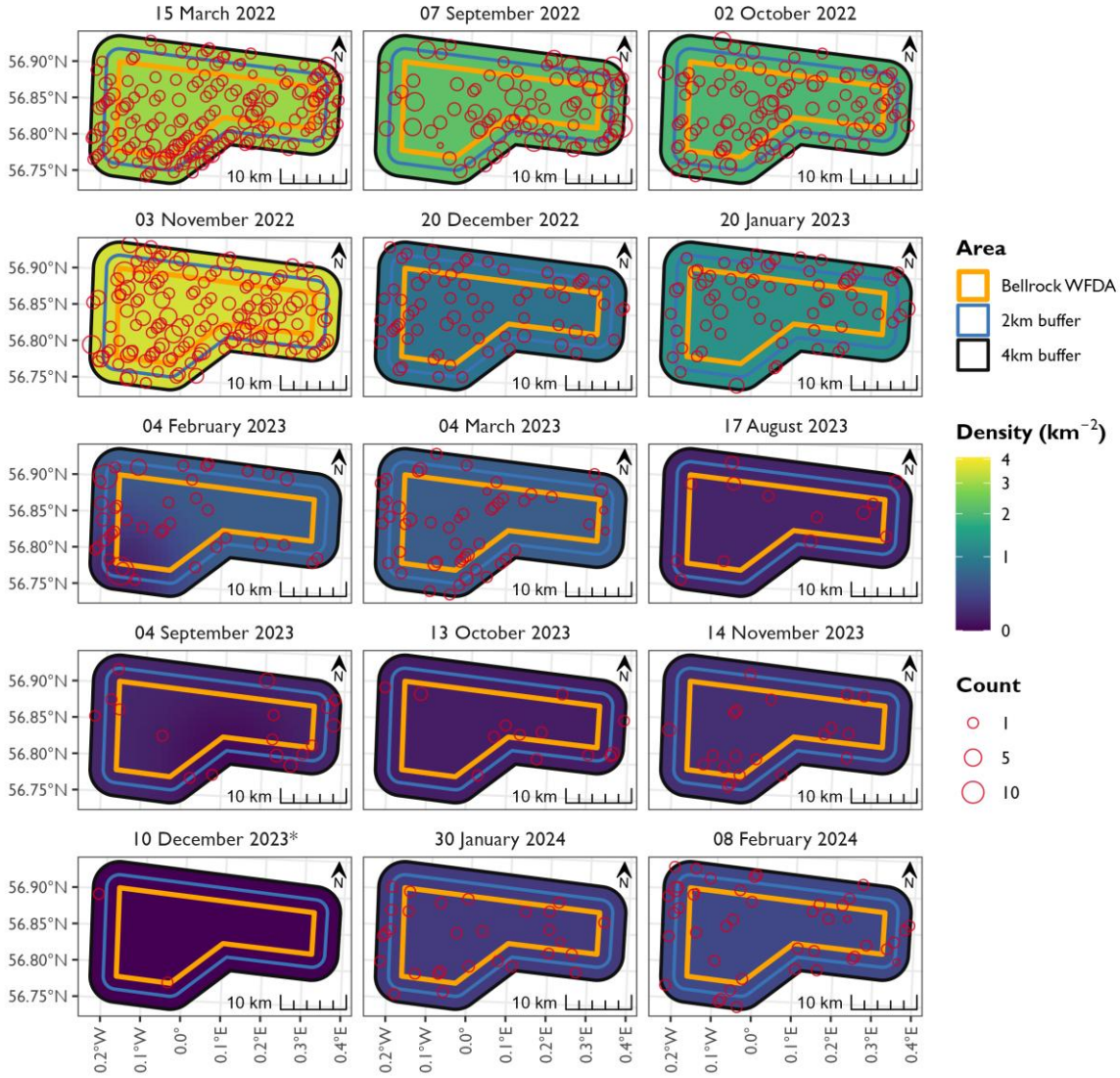


*Figure note: *Design-based estimates substituted in as flat density surface where <10 observations.*

Red unfilled circles show apportioned bird observations, aggregated to 500 metre transect bins.

Note log10 colour scales.

11.1.2 All birds density surfaces - upper confidence level

Figure 17 Guillemot (all birds) upper confidence level density surfaces from MRSea outputs for surveys during the breeding season.

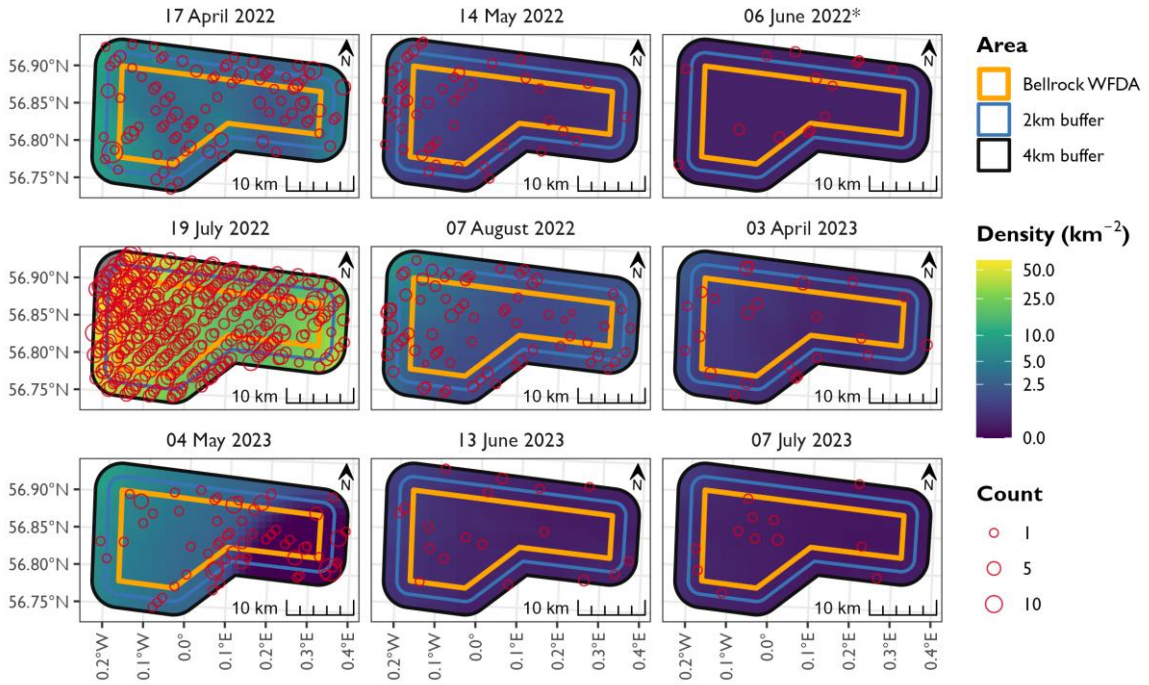


*Figure note: *Design-based estimates substituted in as flat density surface for June 2022 as MRSea outputs produced inconsistent estimates when compared to design-based estimates.*

Red unfilled circles show apportioned bird observations, aggregated to 500 metre transect bins.

Note log10 colour scales.

Figure 18 Guillemot (all birds) upper confidence level density surfaces from MRSea outputs for surveys during the non-breeding season.

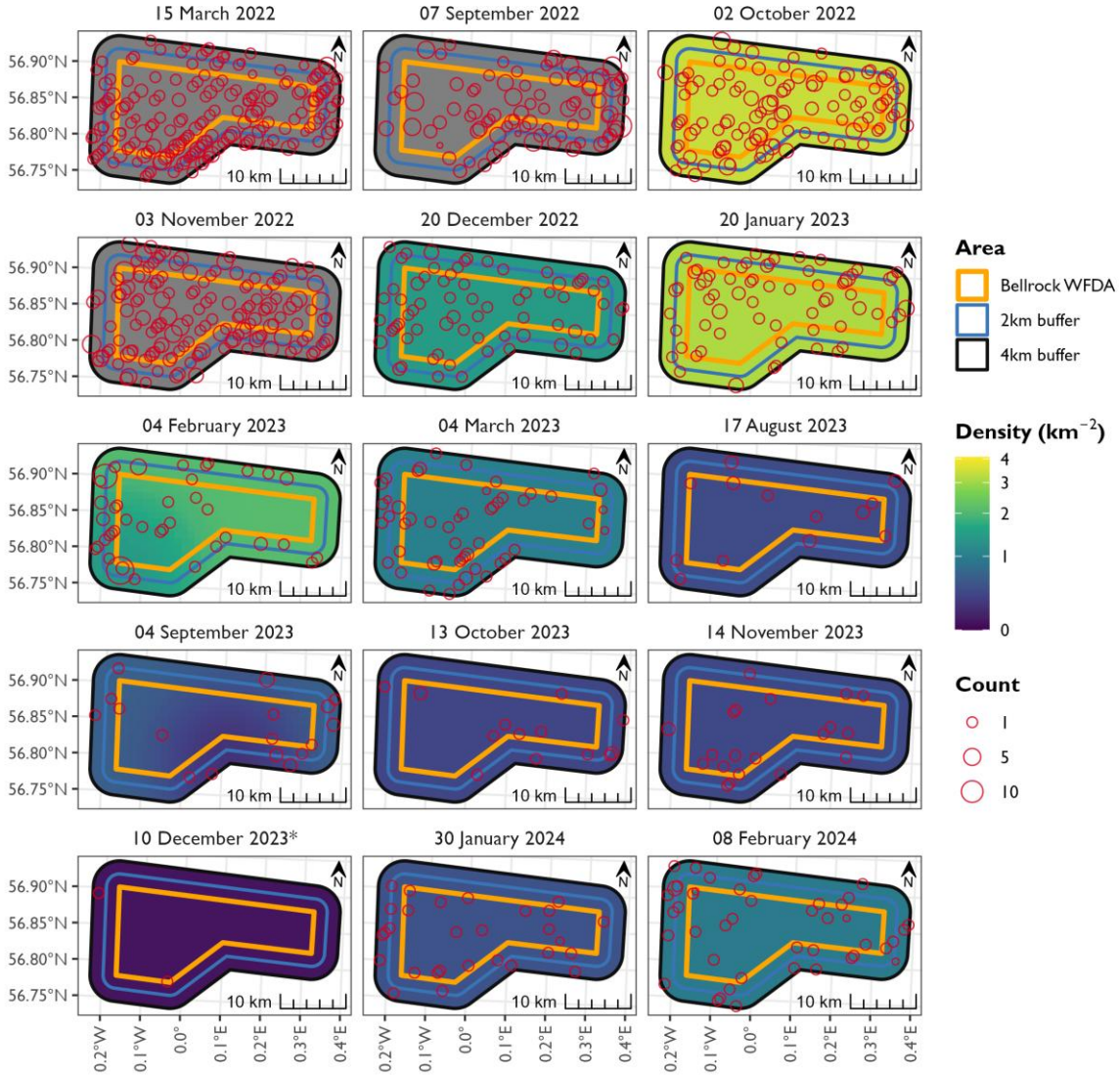


*Figure note: *Design-based estimates substituted in as flat density surface where <10 observations.*

Red unfilled circles show apportioned bird observations, aggregated to 500 metre transect bins.

Note log10 colour scales.

11.1.3 All birds density surfaces - coefficient of variation

Figure 19 Guillemot (all birds) coefficient of variation density surfaces from MRSea outputs for surveys during the breeding season.

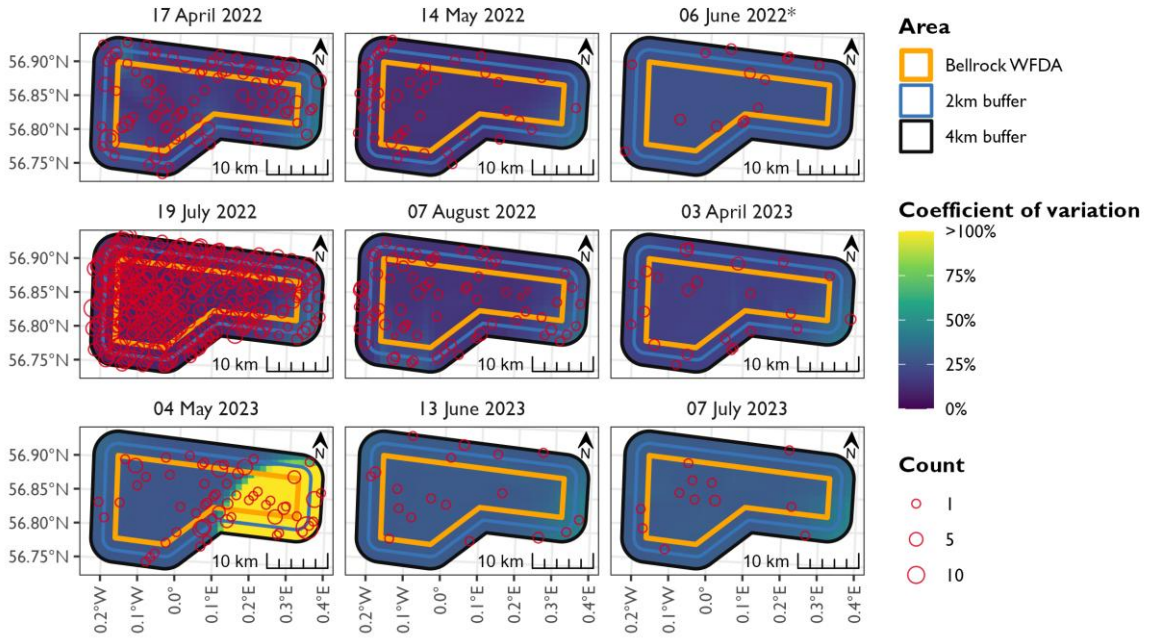


*Figure note: *Design-based estimates substituted in as flat density surface for June 2022 as MRSea outputs produced inconsistent estimates when compared to design-based estimates.*

Red unfilled circles show apportioned bird observations, aggregated to 500 metre transect bins.

Figure 20 Guillemot (all birds) coefficient of variation density surfaces from MRSea outputs for surveys during the non-breeding season.

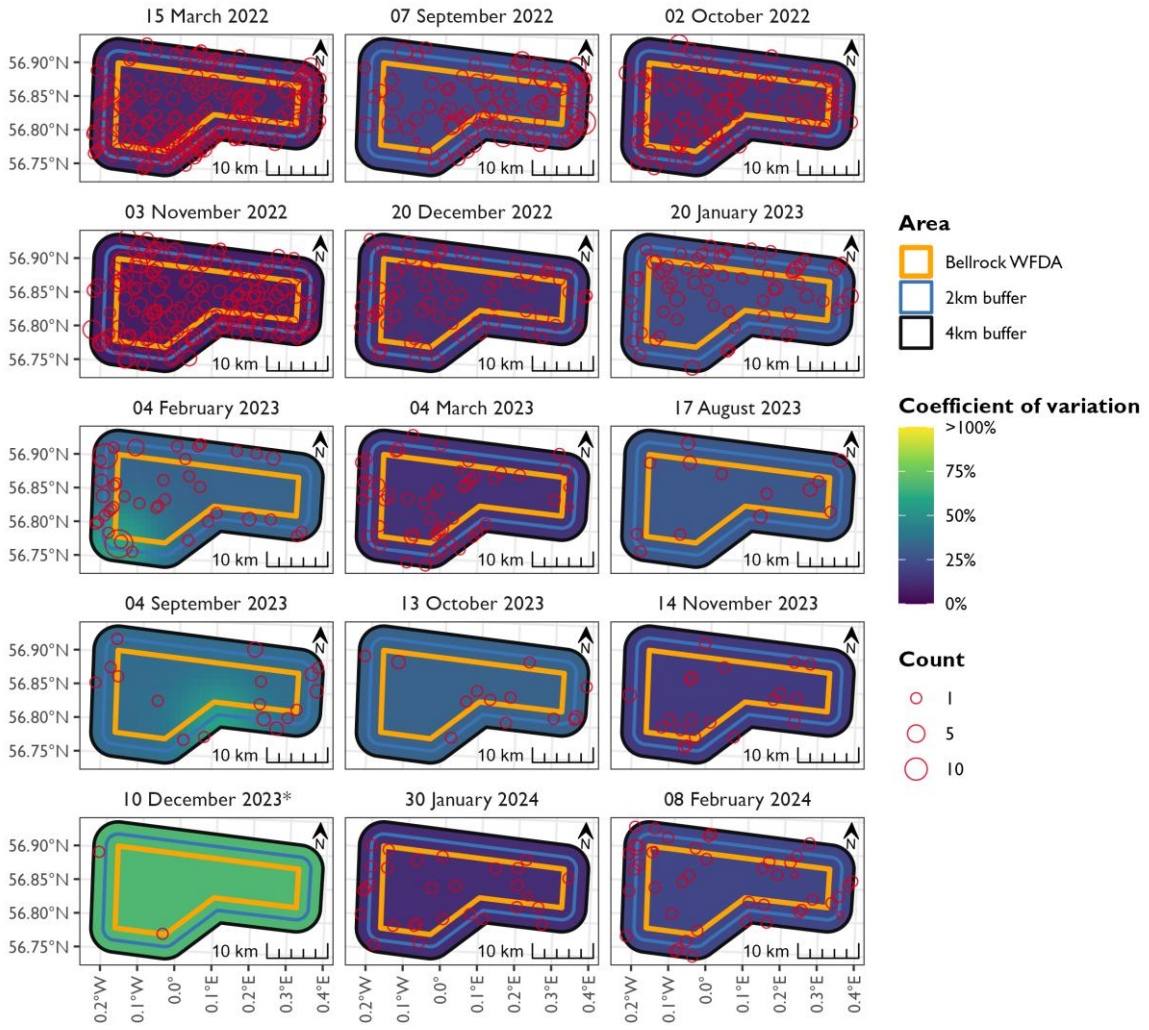


*Figure note: *Design-based estimates substituted in as flat density surface where <10 observations.*

Red unfilled circles show apportioned bird observations, aggregated to 500 metre transect bins.

11.1.4 Flying bird density surfaces - lower confidence level

Figure 21 Guillemot (flying) lower confidence level density surfaces from MRSea outputs for surveys during the breeding season.

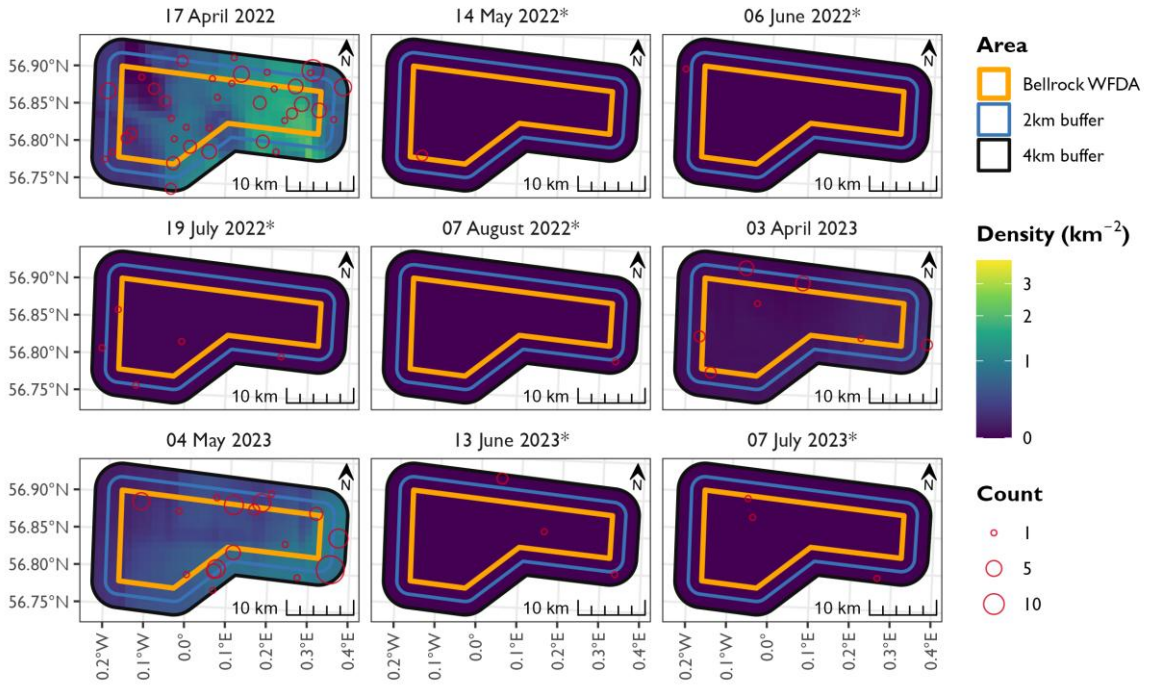


*Figure note: *Design-based estimates substituted in as flat density surface where <10 observations.*

Red unfilled circles show apportioned bird observations, aggregated to 500 metre transect bins.

Note log10 colour scales.

Figure 22 Guillemot (flying) lower confidence level density surfaces from MRSea outputs for surveys during the non-breeding season.

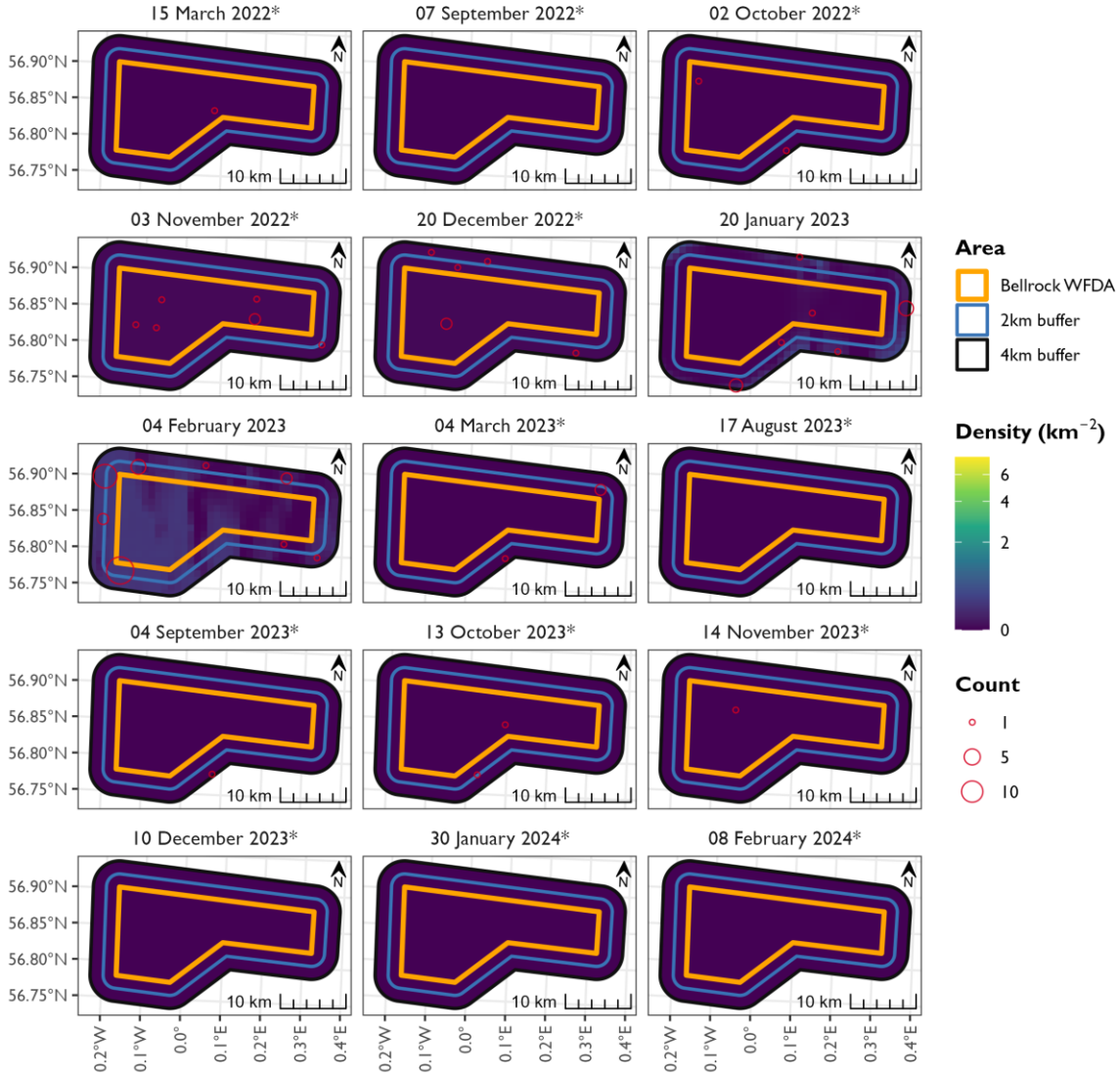


*Figure note: *Design-based estimates substituted in as flat density surface where <10 observations.*

Red unfilled circles show apportioned bird observations, aggregated to 500 metre transect bins.

Note log10 colour scales.

11.1.5 Flying bird density surfaces - upper confidence level

Figure 23 Guillemot (flying) upper confidence level density surfaces from MRSea outputs for surveys during the breeding season.

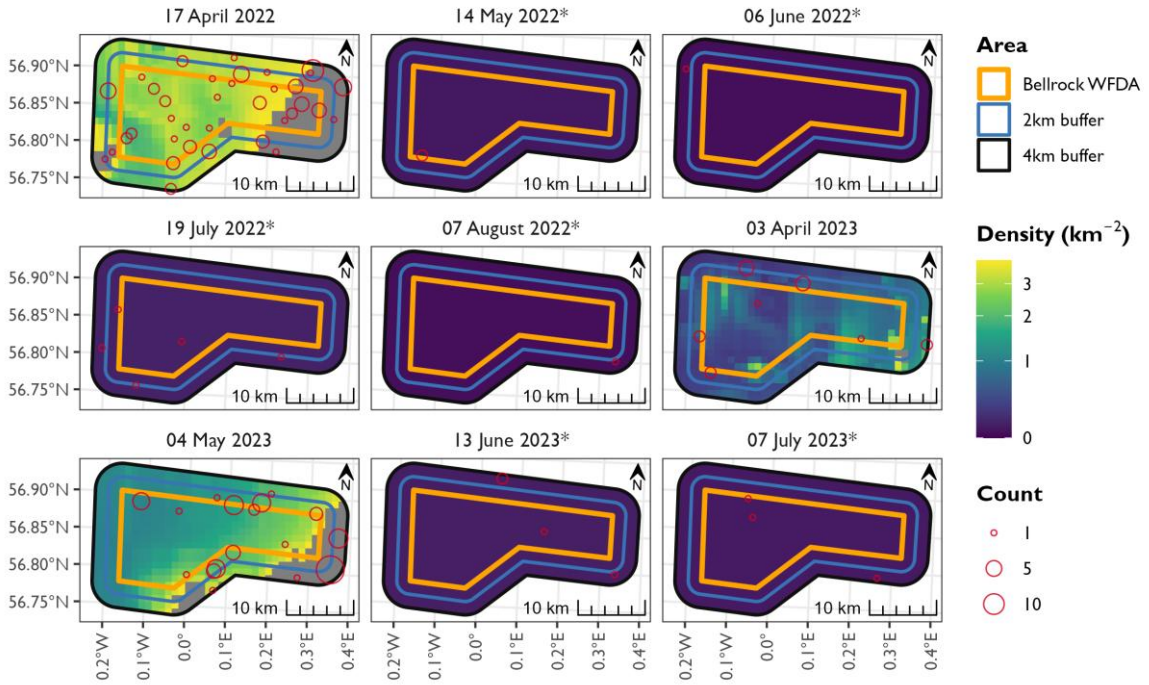


*Figure note: *Design-based estimates substituted in as flat density surface where <10 observations.*

Red unfilled circles show apportioned bird observations, aggregated to 500 metre transect bins.

Note log10 colour scales.

Figure 24 Guillemot (flying) upper confidence level density surfaces from MRSea outputs for surveys during the non-breeding season.

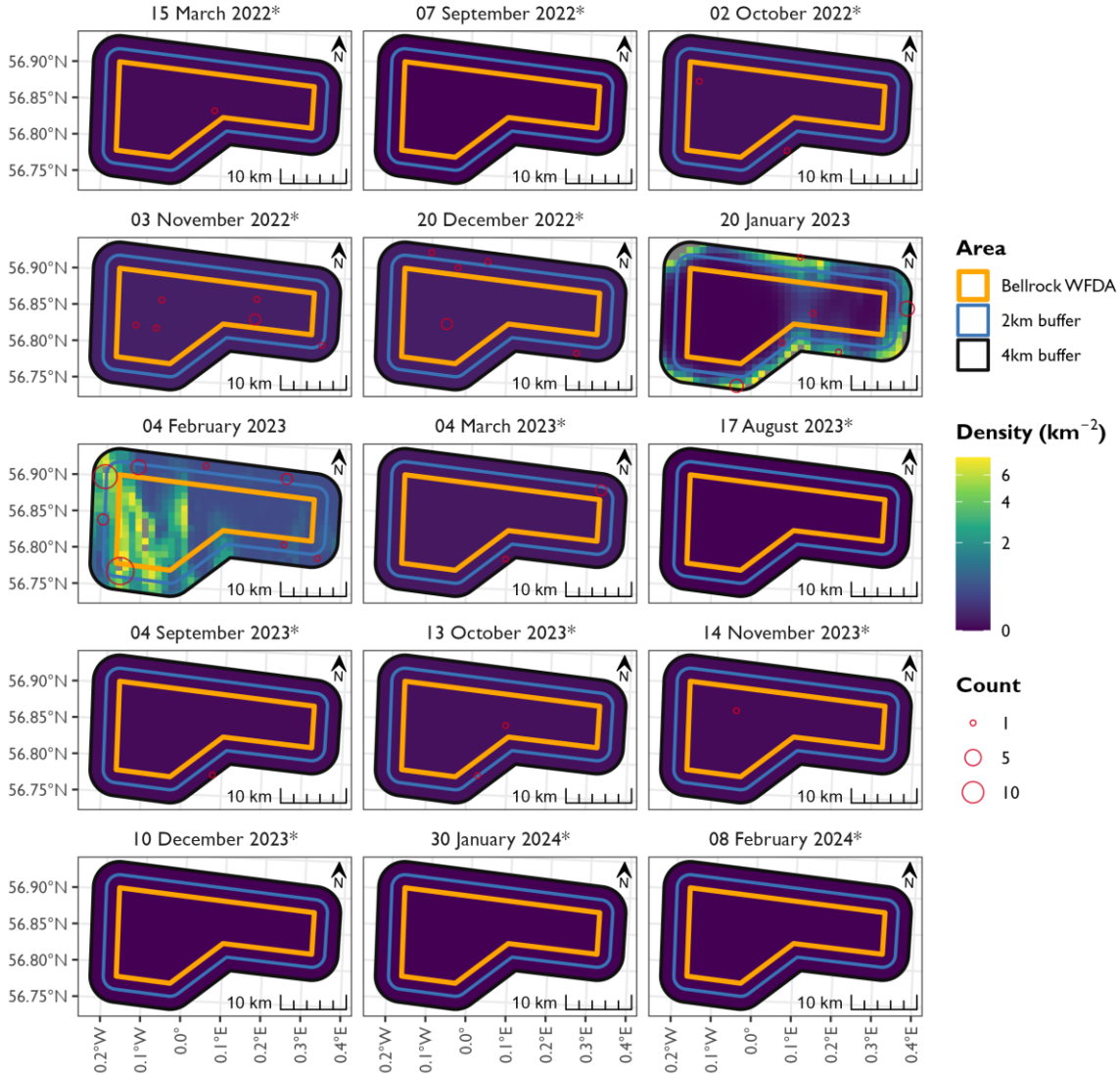


*Figure note: *Design-based estimates substituted in as flat density surface where <10 observations.*

Red unfilled circles show apportioned bird observations, aggregated to 500 metre transect bins.

Note log10 colour scales.

11.1.6 Flying bird density surfaces - coefficient of variation

Figure 25 Guillemot (flying) coefficient of variation density surfaces from MRSea outputs for surveys during the breeding season.

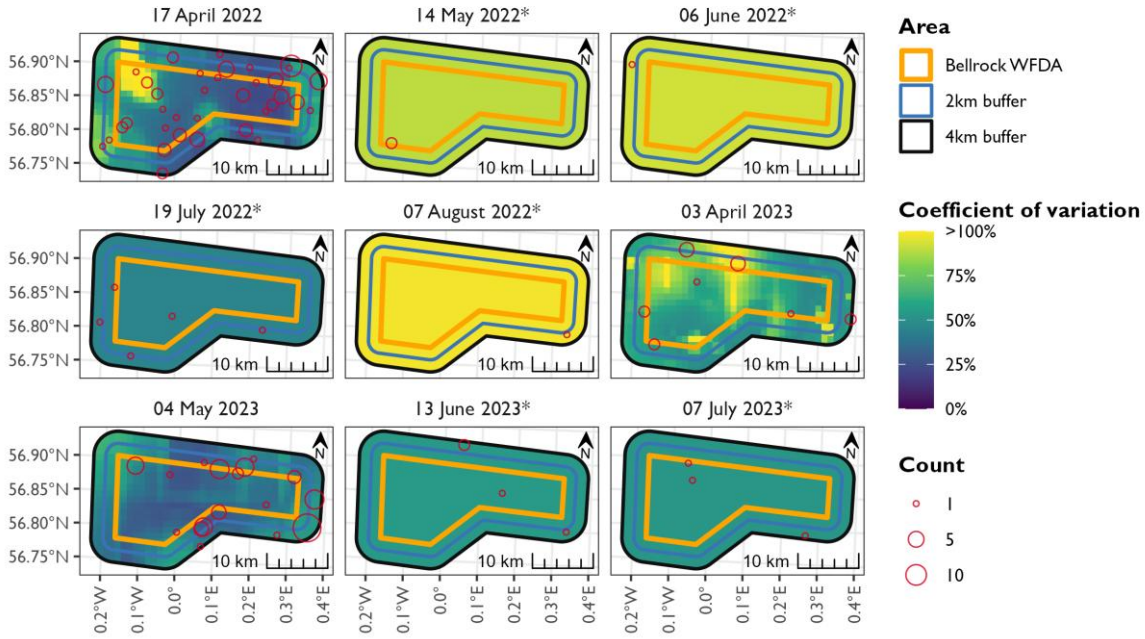


*Figure note: *Design-based estimates substituted in as flat density surface where <10 observations.*

Red unfilled circles show apportioned bird observations, aggregated to 500 metre transect bins.

Figure 26 Guillemot (flying) coefficient of variation density surfaces from MRSea outputs for surveys during the non-breeding season.

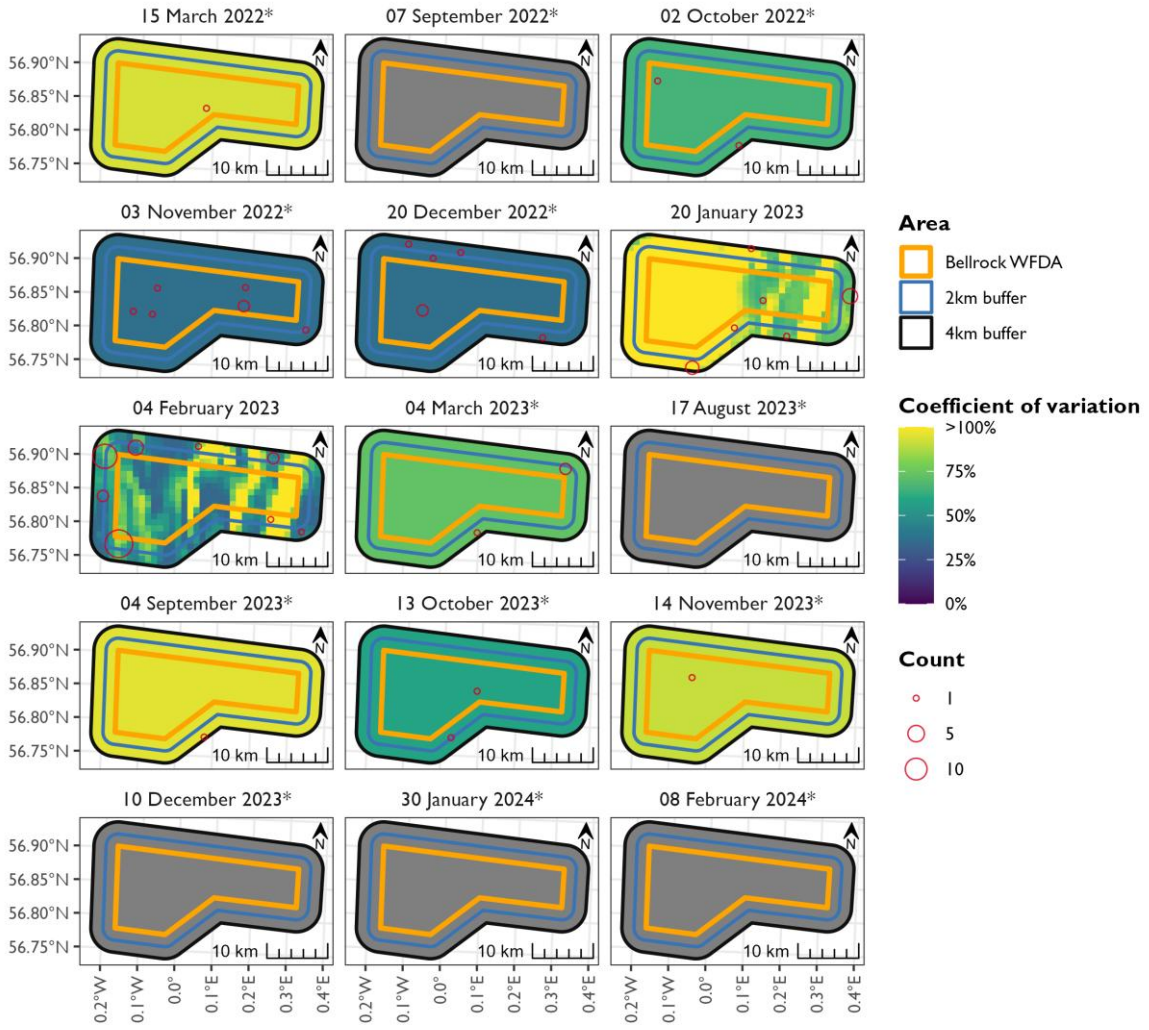


*Figure note: *Design-based estimates substituted in as flat density surface where <10 observations.*

Red unfilled circles show apportioned bird observations, aggregated to 500 metre transect bins.

11.1.7 Sitting bird density surfaces - lower confidence level

Figure 27 Guillemot (sitting) lower confidence level density surfaces from MRSea outputs for surveys during the breeding season.

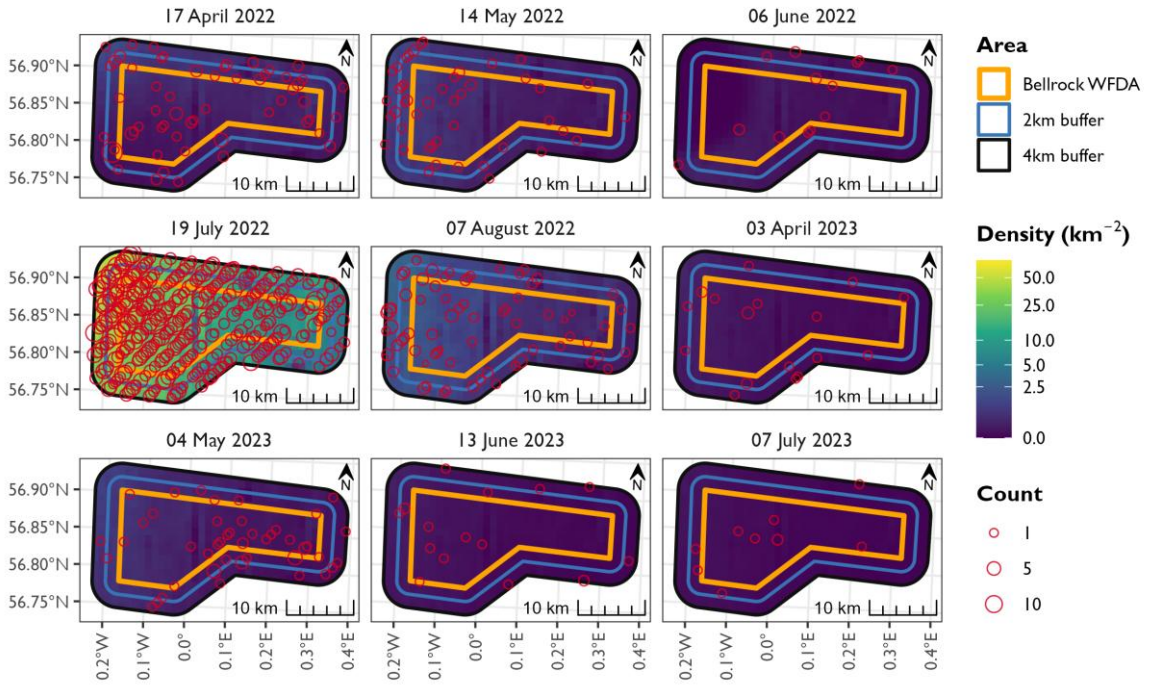


Figure note: Red unfilled circles show apportioned bird observations, aggregated to 500 metre transect bins.

Note log10 colour scales.

Figure 28 Guillemot (sitting) lower confidence level density surfaces from MRSea outputs for surveys during the non-breeding season.

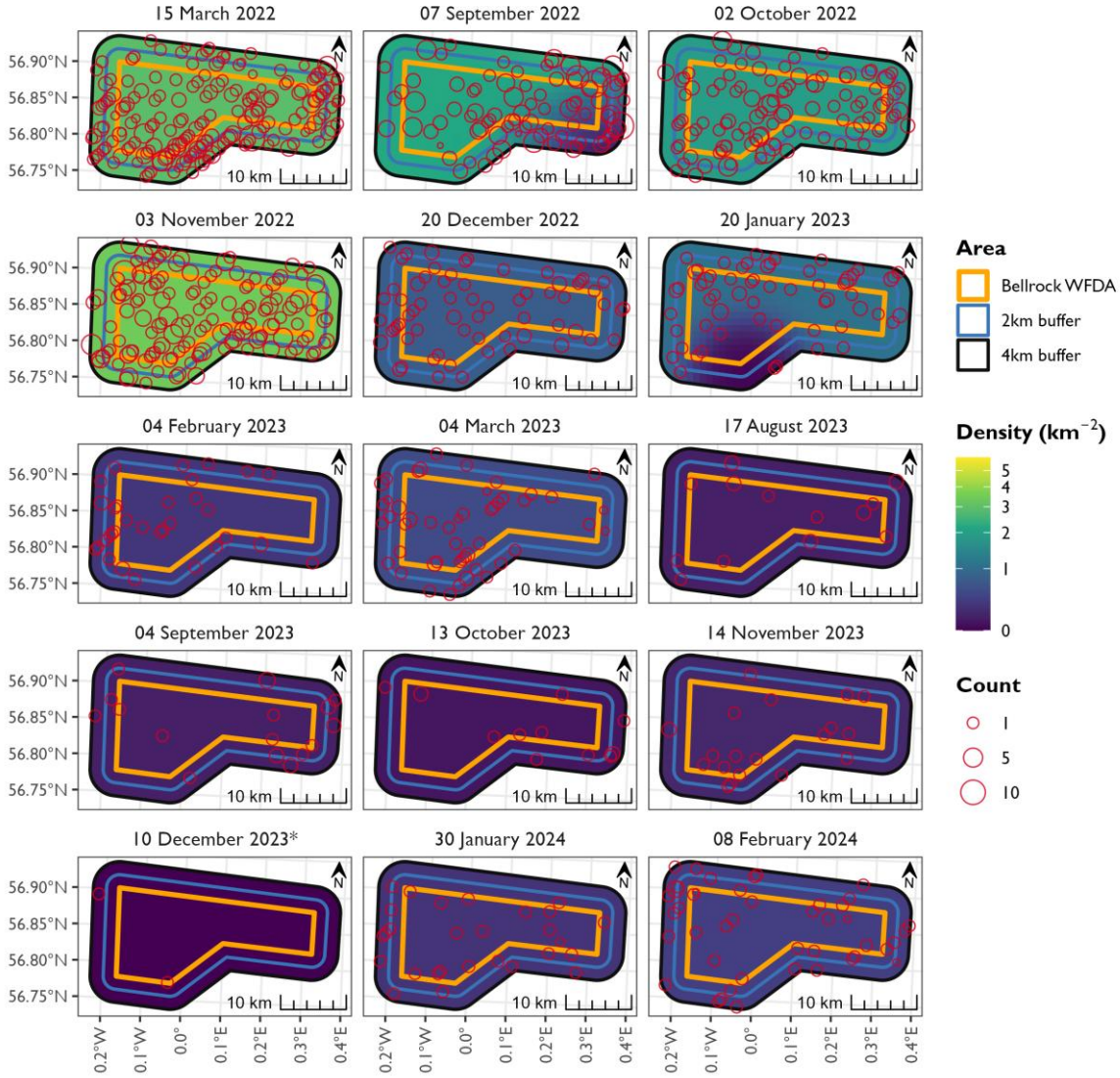


*Figure note: *Design-based estimates substituted in as flat density surface where <10 observations.*

Red unfilled circles show apportioned bird observations, aggregated to 500 metre transect bins.

Note log10 colour scales.

11.1.8 Sitting bird density surfaces - upper confidence level

Figure 29 Guillemot (sitting) upper confidence level density surfaces from MRSea outputs for surveys during the breeding season.

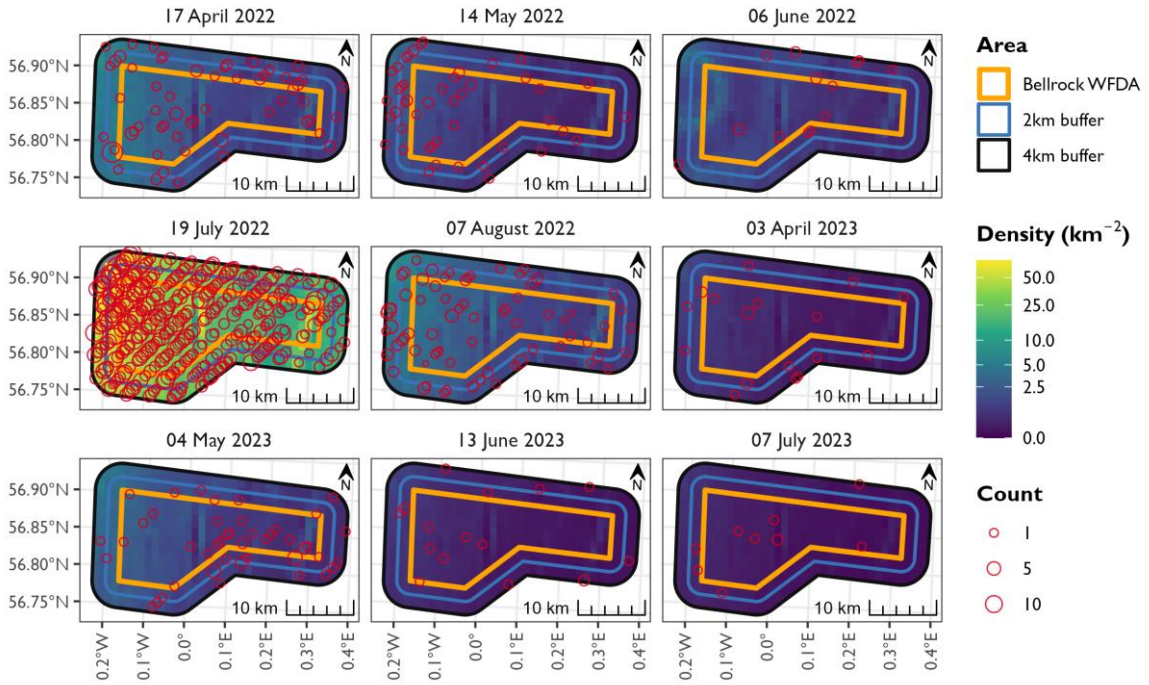


Figure note: Red unfilled circles show apportioned bird observations, aggregated to 500 metre transect bins.

Note log10 colour scales.

Figure 30 Guillemot (sitting) upper confidence level density surfaces from MRSea outputs for surveys during the non-breeding season.

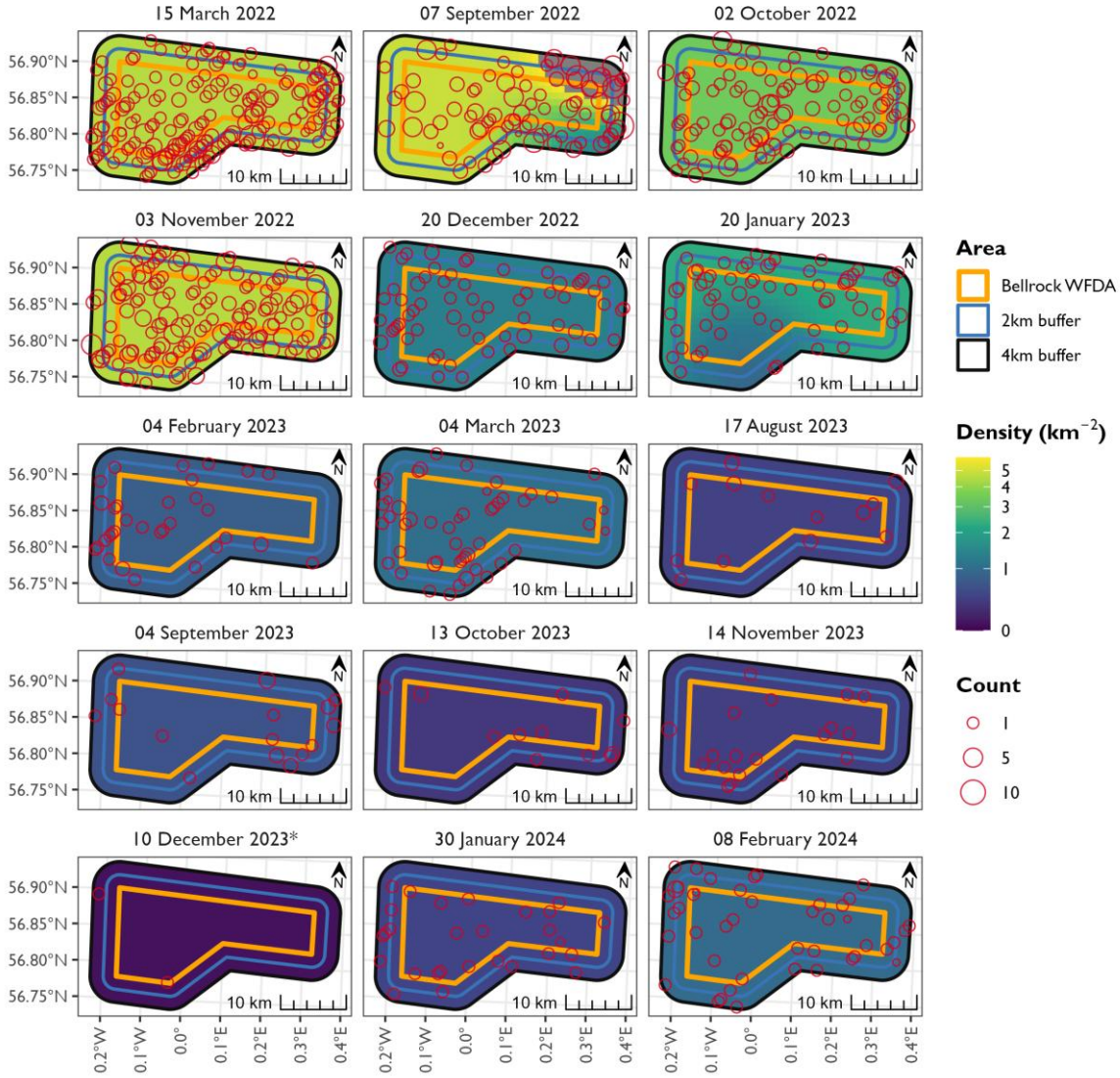


*Figure note: *Design-based estimates substituted in as flat density surface where <10 observations.*

Red unfilled circles show apportioned bird observations, aggregated to 500 metre transect bins.

Note log10 colour scales.

11.1.9 Sitting bird density surfaces - coefficient of variation

Figure 31 Guillemot (sitting) coefficient of variation density surfaces from MRSea outputs for surveys during the breeding season.

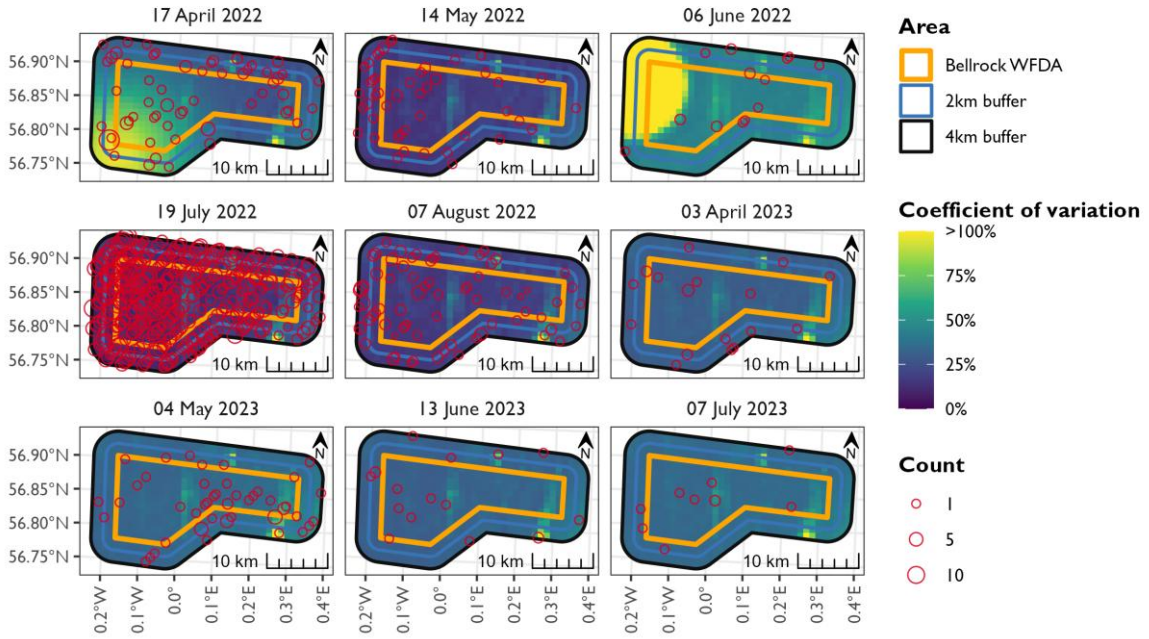


Figure note: Red unfilled circles show apportioned bird observations, aggregated to 500 metre transect bins.

Figure 32 Guillemot (sitting) coefficient of variation density surfaces from MRSea outputs for surveys during the non-breeding season.

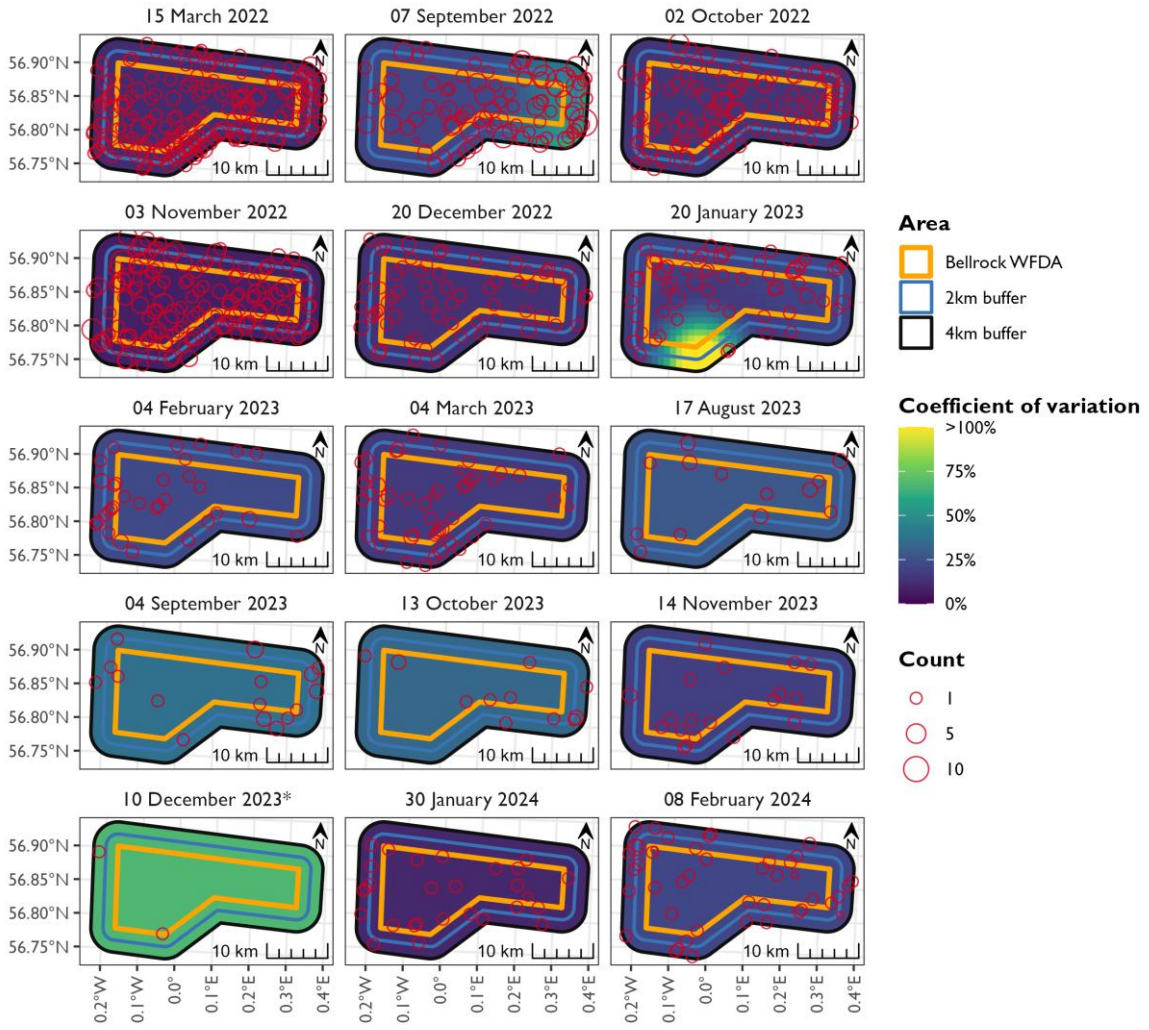


*Figure note: *Design-based estimates substituted in as flat density surface where <10 observations.*

Red unfilled circles show apportioned bird observations, aggregated to 500 metre transect bins.

Annex D: MRSea Modelling Data Pack

This annex contains all the files required for input into the MRSea model, and the resulting outputs of the modelling itself. The folder structure of the Data Pack can be found on the Annex Cover Page. There is a separate document (Design-based vs model-based estimates comparisons.xlsx) that demonstrates the comparison of results from design-based and model-based (MRSea) population estimates, as alluded to in the chapter.

See zip folder (**Annex D: MRSea Modelling Data Pack.zip (RHDV_BEL_CST_REP_0004_007)**) of the digital version of this document for the associated csv and excel spreadsheets. Print outs of the csv and excel files are included in hard copy.

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Annex E: Ornithological & Mammal Survey Report

This annex is a copy of the full report of the 24-month DAS programme provided to the Applicant by the survey provider (HiDEF Aerial Surveying Ltd.).

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Digital Video Aerial Surveys of Seabirds and Marine Megafauna at the BlueFloat Energy and Nadara Partnership Bellrock Offshore Wind Farm: 2-year Annual Report March 2022 to February 2024

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Executive summary

In March 2022, HiDef Aerial Surveying Limited (HiDef) were commissioned to undertake a programme of high-resolution digital video aerial surveys for marine megafauna, ornithological and human activity over the proposed Bellrock Offshore Wind Farm's Wind Farm Development Area (WFDA). The Bellrock WFDA is located 120km east of Stonehaven, in the northern North Sea.

A total of 24 monthly surveys were flown between March 2022 and February 2024. HiDef designed a survey that placed 2.5km-spaced transects across the WFDA plus a 4km surrounding buffer ('the survey area'). The total survey area was 658km^2.

Surveys were undertaken using an aircraft equipped with four bespoke HiDef cameras with sensors set to a resolution of 2cm Ground Sample Distance (GSD). Each camera sampled a strip of 125m in width, separated from the next camera by approximately 25m, to provide a combined sampled width of 500m within a 575m overall strip. Two of the four cameras were analysed, achieving approximately 10% coverage of the survey area in each flight. The remaining footage is available for analysis at a later stage if required.

Data analysis followed a two-stage process in which video footage was reviewed (with a 20% random sample used for audit) and detected objects were identified to species or species group level (again with 20% selected at random for audit). The audit of both stages requires 90% agreement to be achieved.

Density and abundance estimates were calculated using strip transect analysis and kernel density estimation (KDE) was used to create density surface maps. In addition, known diving rates of four species were used to estimate the proportion of diving animals that would be underwater at the time of survey for the correction of abundance and density estimates.

The surveys recorded a total of 5,363 birds of 16 species and 133 marine mammals of five species. A further 437 birds and 11 non-avian animals were recorded which were not assigned to a species. An identification rate to species level of 92.46% was achieved throughout the 24-month period.

Over the survey period a total of 165 dead birds were recorded. There were 108 dead birds identified to species level and an additional 57 dead birds were identified to species group The dead birds were removed from data analysis and presentation unless expressly stated.

The primary observations from the surveys were:

- Black-legged kittiwake (*Rissa tridactyla*) was present in 18 of the 24 surveys with a marked peak in June 2022 (peak density of 1.66 birds/km^2 (95% CI 0.97 – 2.40)). Sitting and flying birds were both recorded in this month suggesting the area may be used for both passage and foraging;
- Common guillemot (*Uria aalge*) was the most abundant species, peaking in July 2022 towards the end of the breeding season (absolute peak density 33.56 birds/km^2 (95% CI 24.03 – 43.80));
- Razorbill (*Alca torda)* was recorded in seven months across the survey period, with a marked absolute peak density of 5.32 birds/km^2 (95% CI 4.19 – 6.38) in July 2022;
- Atlantic puffin (*Fratercula arctica*) was observed higher numbers during the return migration period and at the beginning of the breeding season with a peak in March 2022, with absolute densities of 1.56 birds/km^2 (95% CI 1.21 – 1.90);

- Northern fulmar (*Fulmarus glacialis*) the second most abundant species recorded across the survey period, peaking in October 2023 (6.40 birds/km^2 (95% CI 1.46 – 12.70)) during the post-breeding migration;
- Northern gannet (*Morus bassanus*) was typically recorded in higher numbers during the breeding season. Records peaked in October 2023 (0.82 birds/km^2 (95% CI 0.25 – 1.59));
- Harbour porpoise (*Phocoena phocoena*) was the most abundant non-avian species peaking in June 2022 with 3.23 animals/km^2 (95% CI 1.36 – 5.42);
- A total of 165 dead birds were recorded across the survey period, of which 101 were dead gannets.

The density of birds varied, with birds distributed across the survey area differently between species and months. The distribution of non-avian animals was also widespread.

The work undertaken by HiDef collected 24 months of data.

1 Introduction

1 Bellrock Offshore Wind Farm (Bellrock Project) is a proposed offshore wind farm, located 120km east of Stonehaven, in the northern North Sea. The Bellrock Wind Farm Development Area (WFDA) covers an area of 280km^2.

2 In March 2022, HiDef Aerial Surveying Limited ('HiDef') were commissioned to undertake a programme of high-resolution digital video aerial surveys of ornithological and marine mammals in support of the development proposal. The survey design consisted of 2.5km-spaced transects within the Bellrock WFDA plus a 4km surrounding buffer, together referred to as the 'survey area'. The total survey area was 658km^2.

3 HiDef designed the survey methodology to provide baseline surveys and an accurate assessment of abundance and distribution of seabirds and marine mammals to inform the WFDA Environmental Impact Assessment (EIA).

4 Multiple important bird sites classified as Special Protection Areas (SPA) are located within breeding season mean-max foraging range plus 1 Standard Deviation (SD) of the survey area, as described by Woodward *et al.* (2019). The legislation transposing the EU Habitats Directive and the Wild Birds Directive has been amended so that the strict protections afforded to sites, habitats and species continues following EU Exit. The suite of legislative instruments is collectively termed the 'Habitat Regulations'. The Habitat Regulations were amended in 2019 as a result of the UK leaving the EU within the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019.

5 The Buchan Ness to Collieston Coast SPA, Fowlsheugh SPA and the Troup, Pennan and Lion's Heads SPA are located approximately 128km, 135km and 170km west and north-west of the WFDA, respectively. These SPAs are designated to protect the following breeding seabirds: northern fulmar (*Fulmarus glacialis*, hereafter 'fulmar'), herring gull (*Larus argentatus*), black-legged kittiwake (*Rissa tridactyla*, hereafter 'kittiwake'), and common guillemot (*Uria aalge*, hereafter 'guillemot'). Buchan Ness to Collieston Coast also protects shag (*Gulosus aristotelis*), and Troup, Pennan and Lion's Head SPA also protects razorbill (*Alca torda*) (JNCC, 2015a; 2019b).

6 The Loch of Strathbeg and the Ythan Estuary, Sands of Forvie and Meikle Loch SPAs (located approximately 142km and 130km north-west and west of Bellrock WFDA, respectively) are designated for the protection of Sandwich tern (*Thalasseus sandvicensis*) and several duck and goose species. Ythan Estuary, Sands of Forvie and Meikle Loch SPA is also designated for little tern (*Sternula albifrons*) and common tern (*Sterna hirundo*) (JNCC, 2019a; 2020). The WFDA is beyond breeding season mean-max foraging range plus 1SD for these species, however the area may be utilised for passage out with the breeding season.

7 The foraging ranges of birds located at SPA colonies further afield may overlap with the WFDA, such as those at the East Caithness Cliffs SPA (~250km north-west; designated to support a range of species, including nationally important breeding populations of guillemot, razorbill, fulmar and kittiwake); and the Forth Islands and Fair Isle SPAs (~230km and 310km south-west and north, respectively; designated to support nationally important breeding populations of multiple seabird species and hosting important Northern gannet (*Morus bassanus; hereafter 'gannet'*) populations) (JNCC, 2015b; 2018a; 2018b). As examples, the mean max foraging ranges of guillemot, kittiwake, gannet, and fulmar are 73.2km ± 80.5 SD; 156.1km ± 144.5 SD; 315.2km ± 194.2 SD and 542.3km ± 657.9 SD, respectively (Woodward *et al.,* 2019), meaning the WFDA is within the generic foraging ranges of these species from the relevant

SPAs, when the generic foraging range is defined by the mean maximum value plus 1 SD. Other migratory and transient bird species are also known to occur in the area, requiring year-round surveys to be carried out to characterise their abundance.

8 Marine mammals are also likely to occur year-round within the survey area, with harbour porpoise (*Phocoena phocoena*) being the most numerous. The Southern Trench Marine Protected Area (MPA), located approximately 180km north-west of the WFDA, is designated to protect minke whales (*Balaenoptera acutorostrata*) (NatureScot, 2020a). Grey seals (*Halichoerus grypus*) and harbour seals (*Phoca vitulina*) are commonly observed along the northeast coast of Scotland and are likely to be present within the survey area.

9 This report ('the 2-year annual report') provides the results from 24 surveys undertaken between March 2022 and February 2024. Observations and survey effort are summarised, and results presented as density surface distribution maps, density estimates with 95% confidence intervals (CIs) and summarised data on behaviour and age. A discussion is provided as to the representativeness of the results in relation to the wider region.

2 Methods

2.1 Survey flights

10 A series of strip transects were flown on a monthly basis between March 2022 and February 2024, following the protocol agreed in March 2022 (HP00183-001).

11 The survey design consisted of 2.5km-spaced transects across the Bellrock WFDA (280km^2) and a surrounding 4km buffer (Figure 1). This created an overall survey area of 658km^2. The metadata of the shapefile is found in Table 1.

12 A total of 15 strip transects were flown extending roughly north-east to south-west, perpendicular to the depth contours along the coast. Such a design ensures that each transect samples a similar range of habitats (primarily relating to water depth) and will reduce the variation in bird and mammal abundance estimates between transects.

13 Surveys were undertaken using an aircraft equipped with four bespoke HiDef cameras with sensors set to a resolution of 2cm Ground Sample Distance (GSD). Each camera sampled a strip of 125m width, separated from the next camera by approximately 25m, thus providing a combined sampled width of 500m within a 575m overall strip.

14 A minimum target of 10% site coverage was contracted, with data from two out of the four cameras being processed. This ensured a survey with sufficient coverage and number of transects for precise abundance estimation, with the remaining unprocessed data archived.

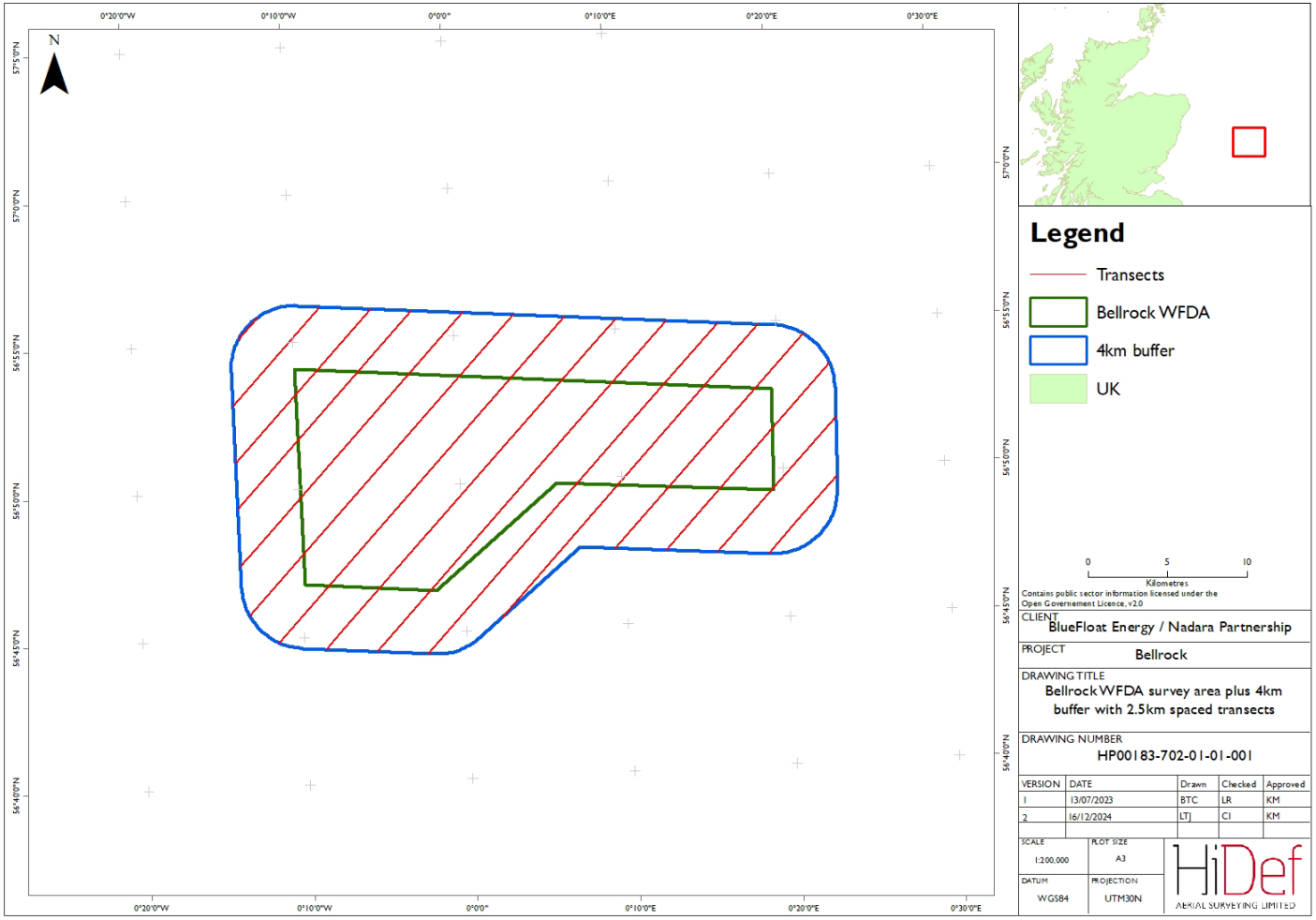
15 The surveys were flown along the transect pattern shown in Figure 1 at a height of approximately 550m above sea level (ASL). Flying at this height ensures that there is no risk of flushing species that are easily disturbed by aircraft noise. Thaxter *et al.* (2016) recommends a minimum flight altitude of 460 – 500m ASL. Hammond *et al.* (2013) also highlight that an aerial survey flown at an altitude of at least 183m is not likely to result in a responsive reaction from any marine mammal.

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

Table 1 Bellrock WFDA metadata - BFR_BEL_CST_DAT_0001_Rev_2

Point	XCoord DMS	YCoord DMS
0	0°09'56.9402"W	56°54'06.4365"N
1	0°19'31.1369"E	56°52'43.9301"N
2	0°19'21.6883"E	56°49'17.4321"N
3	0°05'58.1521"E	56°49'52.6410"N
4	0°01'43.7101"W	56°46'24.6090"N
5	0°09'50.3431"W	56°46'47.6908"N
6	0°09'56.9402"W	56°54'06.4365"N

Figure 1 Bellrock WFDA survey design with 4km buffer and 2.5km-spaced transects flown between March 2022 and February 2024



2.2 Data review and object detection

17 Data were viewed by trained reviewers who marked any objects in the footage as requiring further analysis, as well as determining which were birds, marine megafauna (defined within this report as cetaceans, pinnipeds or other large, non-avian marine fauna) or anthropogenic objects such as ships or buoys.

18 As part of HiDef's quality assurance (QA) process, an audit (or 'blind' review) of 20% of the raw data (video footage) was performed and the results compared with those of the original review. If 90% agreement was not attained during the QA process, then corrective action is initiated: the remaining data set was reviewed and where appropriate, the failed reviewer's data discarded and all data re-reviewed.

19 Objects were only recorded where they reached a reference line (known as 'the red line') which defined the true transect width of 125m for each camera. By excluding objects that did not cross the red line, biases to abundance estimates caused by flux (movement of objects in the video footage relative to the aircraft, such as where the survey craft is buffeted by airflow) were eliminated.

2.3 Object identification

20 Images marked as requiring further analysis were reviewed by the ID Team; ornithologists[1] and marine mammal specialists[2] for identification to the lowest taxonomic level possible and for assessment of the approximate age and the sex of each animal, as well as any behaviour traits visible from the imagery.

21 At least 20% of all objects were selected at random and subjected to a separate audit (or 'blind') QA process. If less than 90% agreement was attained for any individual camera, then corrective action was initiated: if appropriate, the failed identifier's data were discarded, and the data re-identified. Any disputed identifications were passed to a third-party expert ornithologist/marine mammal specialist for a final decision. The level of agreement within the QA process was calculated as the final number of agreements as a percentage of all identifications subjected for QA for the entire survey.

22 All objects were assigned to a species group and where possible, each of these then further identified to species level.

23 It is important to note that confidence ratings are not standardised. The likelihood of achieving a definite or probable identification is not consistent for all component members of a species group. For example, someone undertaking identification of a large auk will find it easier to be confident of guillemot identification than razorbill. Confidence scores should not be used to filter or weight the probability of 'large auk' being one species or another in any analysis, as this will lead to biased results, particularly if the identification rate is low.

24 Any animals that could not be identified to species level were assigned to a category 'No ID' and only identified to group level. If, on occasion, it is considered that the unidentified bird could belong to one of two possible genera, then a broader group category may be used. For example, a bird would usually

[1] HiDef currently employs three current and former members of the British Birds Rarities Committee ('BBRC') as expert ornithologists.

[2] HiDef staff have long-standing experience in marine mammal identification, regularly undertaking boat surveys as part of ESAS (European Seabirds at Sea Partnership), SCANS and other programmes. They process thousands of cetacean images, hold regular internal training sessions and have access to marine specialists within our wider company BioConsult SH.

be assigned to the group category 'Shearwater species' if identified as a Manx shearwater (*Puffinus puffinus*), or to 'Large Auk species' if identified as a guillemot. However, if the bird has the potential to be either, then it would be assigned to a wider group category 'Shearwater / Auk species' and the species level recorded as 'No ID'.

25 In the case of birds, additional information was recorded on basic behaviour (i.e., whether the bird was sitting; loafing on land or other objects; flight direction; diving or taking off). Detail was recorded where possible on foraging behaviour, approximate age, sex and any other details of interest. Aging of birds was based on moults and was conducted where possible on species which show seasonal variation in plumage.

26 In the case of marine mammals, surfacing behaviour was also recorded as either 'surfacing', 'surfacing at red line', 'submerged' or 'unknown'. 'Surfacing at red line' (or snapshot surfacing) was defined as the animal's dorsal fin being above the water in the frame nearest to the 'red line' on the operator's screen and is required for calculation of availability bias (Section 2.5.3). 'Surfacing' was defined as any other surfacing behaviour that was not snapshot surfacing and included any part of the animal's body breaking the surface of the water in any frame. Sexing and aging of marine mammals was carried out where possible.

27 Anthropogenic activity was recorded as either 'man-made object', 'fishing boat' or 'other boat'. Further details were noted, including further specifying the type of object (e.g., 'fishing buoy', 'marker buoy', 'wind turbine').

2.4 Final processing

28 All data were geo-referenced, taking into account the offset from the transect line of the cameras, and compiled into a single output; Geographical Information System (GIS) files for the Observation and Track data are issued in ArcGIS shapefile format, using UTM30N projection, WGS84 datum.

2.5 Data analysis

2.5.1 Data treatment

29 Raw count data were trimmed to the survey area and dead birds were removed prior to data analysis. Dead birds are only included where expressly stated in this report. After basic presentation, data were processed to estimate density, abundance and distribution of key species and species groups.

30 Records identified to species level were separated out from records of individuals identified to group level, and the following analyses undertaken on both datasets. All confidence levels of species identifications were used in the analysis.

31 Apportioning of 'unidentified' birds to species level was also undertaken for the purposes of calculating population estimates. The number of unidentified birds in each species group were assigned to species where appropriate, based on their respective abundance ratios. For example, if identified guillemots and razorbills occurred in a 4:1 in a survey ratio, then 80% of unidentified birds in the species group category (e.g. large auk) would be assigned to guillemot and 20% assigned to razorbill. For marine mammals unapportioned values are presented, apportioned values are available in Appendix 1.

2.5.2 Population estimates

32 Population estimates were calculated for the Bellrock survey area (WFDA plus a 4km buffer).

33 Each strip transect was treated as a statistically independent random sample from the site. The length and breadth (i.e. the width of the field of view of the camera) of each transect were multiplied to give the transect area; dividing the number of observations for each species on each transect by the transect area gives a point estimate of the density of that species for the transect. The estimated mean density of animals at the site (and hence the population size by multiplying by the area of the site), the standard deviation of the means (standard errors, SE), the 95% CIs and coefficient of variance (CV_{SE}) were then estimated using a non-parametric block bootstrap method with replacement (Buckland *et al.,* 2001), to ensure equal transect effort was sampled across each bootstrap iteration. A total of 1,000 bootstrap iterations were performed using transect ID as the sampling unit with replacement. A group of transects were randomly sampled until their total length equalled approximately the same length as the total survey length. Data were processed in the R programming language (version 4.3.2) and code can be provided on request.

34 The density estimate is expressed as the average number of animals per square km in the whole survey area. The population estimate is expressed as the estimated number of animals within the whole survey area. The upper and lower confidence limits (CLs) define the range that the population estimate falls within with 95% certainty. The CV is a measure of the precision of the population and density estimates.

35 For most species these abundance estimates relate to absolute abundance, but for diving species such as auks, the abundance relates to relative abundance due to a proportion of animals being submerged at the time of survey. In Section 2.5.3 we describe our method for taking account of species availability to generate estimates of absolute abundance for auks and harbour porpoise.

2.5.3 Availability bias

36 In wildlife surveys, a proportion of seabirds or marine mammals that spend any time underwater, especially while feeding, will not be detectable at the surface. This 'availability bias' leads to an under-estimate of their abundance during surveys. For species that make long dives underwater, this bias might be significant (for example, guillemot).

37 There are two main approaches to account for availability bias: by using double platform surveys (for example Borchers *et al.,* 2002) which can be logistically difficult to achieve and relatively expensive; and by using known data on time spent underwater to apply correction factors to abundance estimates (for example Barlow *et al.,* 1988).

38 Following Barlow *et al.* (1988) the probability that an animal is available at the surface is calculated as:

$$\Pr(being\ visible) = \frac{(s+t)}{(s+d)}$$

Where s is the average time spent at the surface, t is the window of time that the animal is within view and d is the average time below the surface. In the case of digital video surveys, the value of t is negligibly small and is treated as 0.

39 Due to a lack of diving rate data for many species, availability bias corrections were only conducted on four species: guillemots, razorbills, Atlantic puffins (*Fratercula arctica* hereafter 'puffin') and harbour porpoise. When considering population estimates calculated for other diving species, it should be noted that population estimates for the survey area are likely to be underestimated.

2.5.3.1 Seabirds

40 Using Barlow's method, the proportion of time that an animal was available at the surface was calculated (Pr (visible)) for guillemot and razorbill. Absolute density, corrected for availability, was then obtained by dividing the density of birds observed by Pr(visible).

41 For guillemots and razorbills, data obtained during the breeding season using data loggers were used to estimate availability bias. Thaxter *et al.* (2010) give mean times for these species engaged in flying, feeding and underwater per trip during the chick-rearing period.

42 Thus, the proportion of time that guillemots and razorbills are available at the surface (Pr(visible)) was estimated at 0.7595 and 0.8182, respectively.

43 For puffins, the results from a study using data loggers reported in Spencer (2012) were used. The results show that puffins spend 14.16% of daylight time underwater. This infers that the proportion of time that puffins were available at the surface (Pr(visible)) was 0.8584.

44 The estimates of Pr(visible) for guillemots, razorbills and puffins were used to correct relative abundance estimates of birds sitting on the sea. These corrected abundance estimates for sitting birds were then added to the abundance estimate of flying birds to give an overall absolute abundance for the species.

2.5.3.2 Marine mammals

45 Harbour porpoise abundance is also affected by availability bias, and further complicated because detections of animals are possible while they are submerged. The approach to correct for availability bias for this species applies a correction factor to the density of animals that were recorded surfacing only using data on the surfacing rates from tagged animals.

46 Teilmann *et al.* (2013) provides detailed information which accommodates variation in time of year, geographical location and time of day in the proportion of time spent breaking the surface. All of these metrics relate to model outputs in Teilmann *et al.* (2013) and are used to refine the predicted amount of time that harbour porpoise spend surfacing in the outputs.

47 The tagging study of Teilmann *et al.* (2013) did not extend to the area of North Sea surrounding this project, but no other data are available on surfacing behaviour for this species in the relevant area. For our analysis, we therefore assumed that diving behaviour in the survey area was comparable to that of the North Sea data collection area of Teilmann *et al.* (2013).

48 To estimate the density of surfacing harbour porpoise, we first calculated the proportion of animals snapshot surfacing. Snapshot surfacing indicates where the dorsal fin is clear of the water surface in the middle frame of the sequence in which the animal is present. By using the snapshot surfacing detections, we subsample the data to mimic the surfacing behaviour category in Teilmann *et al.* (2013) which corresponds to periods when the transmitter on the dorsal fin of tagged animals is completely clear of the water. This was done using data from all months combined because sample sizes were too small to be accurate when calculating the surfacing proportions in individual months. We then multiplied the calculated density of all harbour porpoise by the proportion of snapshot surfacing encounters in our surveys to estimate the density of surfacing harbour porpoises. Finally, this was then divided by the proportion surfacing from Teilmann *et al.* (2013) in Table 2, to derive the estimates of absolute density and abundance.

Table 2 Correction factors used to account for availability bias for harbour porpoise at different times of the year and at different times of the day (after Teilmann *et al.*, 2013)

Month	Surface behaviour	
	09:00 – 15:00	15:00 – 21:00
January	0.0490	0.0476
February	0.0398	0.0384
March	0.0543	0.0529
April	0.0646	0.0632
May	0.0563	0.0549
June	0.0518	0.0503
July	0.0493	0.0479
August	0.0530	0.0516
September	0.0420	0.0406
October	0.0413	0.0399
November	0.0406	0.0392
December	0.0429	0.0415

2.5.4 Distribution mapping

49 Maps of the distribution of key species only, selected on the basis of their relatively high abundance or their significance at nearby SPAs were generated using a Watson-Nadaraya type kernel density estimation (KDE) technique (Simonoff, 1996). For diving species (guillemot, razorbill, puffin and harbour porpoise), the KDE mapping represents a relative estimate of density only and does not take account of availability bias.

50 In KDE, a small 'window' function (the kernel) was used to calculate a local density at each point in the survey area. To evaluate the density at a given point, the kernel was centred on that point and all the observations within the window were summed to obtain a local count. The total area of the transect(s) intersecting the window was then summed to obtain a local measure of effort. By dividing the local count by the local effort, a local density estimate was obtained. To build a density map, the study area was covered with a fine mesh of study points and the density was calculated at each point in the mesh in turn.

51 Kernel techniques are robust and not as complex as other density estimation techniques because they have few parameters; as a result, they are arguably the easiest density surface technique to reproduce independently. The only variables are the size and shape of the kernel or window function. For these analyses, we have used a Gaussian window function, which has the advantages of being smooth,

rotationally symmetric and easy to compute. The shape of the Gaussian is determined by a single width parameter; the selection of this parameter is the only variable in the computation of the density maps.

52 Rather than set the width parameter arbitrarily, we have used a leave-one-out cross validation method. Cross validation estimates the predictive power of a model by removing some of the data from the data set and using the remainder of the data and the model to predict the values for the data that was removed. The closer the predicted values represent the removed data, the better the model performance and the width parameter used in the model.

53 To apply cross validation to the survey area, each transect was subdivided into 500m segments. To evaluate a particular choice of kernel width, each segment was removed in turn, using the kernel and the remaining data to predict the density of the missing segment and subtract the known value from the prediction to obtain an error score. This process was repeated for every segment and the error scores for all segments were squared and summed to give a total performance score for that particular choice of kernel width. The kernel width was then varied, and the process repeated; if the new score was lower than the old, the new kernel width was a better choice than the previous value. An exhaustive search over all kernel widths was then used to identify the best global choice. The result of the process was a smooth density estimate which has been derived without any manual parameter selection. The whole process was repeated from scratch for each map, as different kernel sizes are appropriate for different species.

54 It should be noted that several of the KDE maps are effectively 'flat' (i.e., they appear uniform in colour). These correspond to distributions where the density surface as obtained from a small local kernel was not effective at predicting missing data; this can happen with evenly distributed birds but can also happen for very sparse distributions. In the case of sparse distributions, the 'flat' map does not necessarily mean that the true underlying distribution is 'flat'; it could mean that the data doesn't contain enough evidence to determine what the underlying distribution is. It is, therefore, useful to refer back to the population estimates for the corresponding map when looking at these 'flat' densities; we have also overlaid aggregated observations per 500m segment of transect ("centroid") represented by "dots" at the centroid of each segment, to help with interpretation of the maps. In extreme cases, the KDE maps were not included in the results section, and the data were presented as dot maps instead.

55 For less abundant bird and non-avian species, as well as those identified to group level, distribution is illustrated by dot maps only.

2.5.5 Flight direction of seabirds

56 Wind rose diagrams were created to present the flying direction of seabirds, where each cardinal point (N, E, S, W) and intercardinal point (NE, SE, SW, NW) indicates the total number of birds recorded flying in that direction in a given survey.

3 Results

3.1 Survey effort

58 The date, number of transects and survey effort (i.e., length of transects) undertaken between March 2022 and February 2024 are shown in Table 3. The number of transects and the total length of transects are those used in subsequent analysis (see Figure 2 to Figure 5 for the aircraft flight pattern). Variation in presentation of track data is due to differing GPS records in the equipment, frequency of the GPS records can occasionally vary for the flight pattern. This does not affect location data for the observations recorded.

59 Due to inevitable imprecision in the aircraft's flight path at high speed, one transect in the north-west part of the survey area fell just outside the survey area in two instances (March 2022 and June 2023; Figure 2 and Figure 4). Consequently, 15 transects were flown, however only data from 14 transects were used in the analysis as all data were cropped to the Bellrock survey area prior to analysis. Due to the position of these transects at the far north-west edge of the survey area, they are much shorter than others (approximately 1.5km) so the level of potential data loss is minimal.

60 The single removed transect in the two surveys are not considered to affect the analysis as the minimum 10% coverage was still reached and is comparable with the other months with 15 transects. Furthermore, a total of three sitting guillemots were recorded on the removed transects for the month of March 2022, all of which were evidently outside of the survey area and would have been removed for the analysis regardless of the transect being included or not. No objects were recorded in the removed transect for June 2023. The removal of the two transects has therefore not affected the total number of observations for the Bellrock survey area.

61

Table 3 Survey effort across the Bellrock survey area between March 2022 and February 2024 inclusive

Survey date	Survey number	Number of transects analysed	Total length of transects analysed (km)	Area covered (km²)	Area covered (% of survey area)
15 March 2022	1	14*	270.15	67.54	10.26
17 April 2022	2	15	270.68	67.67	10.28
14 May 2022	3	15	271.54	67.88	10.31
06 June 2022	4	15	270.96	67.74	10.29
19 July 2022	5	15	270.46	67.52	10.27
07 August 2022	6	15	269.91	67.48	10.25
07 September 2022	7	15	271.26	67.81	10.30
02 October 2022	8	15	271.43	67.86	10.31
03 November 2022	9	15	271.64	67.91	10.32

Survey date	Survey number	Number of transects analysed	Total length of transects analysed (km)	Area covered (km²)	Area covered (% of survey area)
20 December 2022	10	15	266.90	66.72	10.14
20 January 2023	11	15	270.61	67.65	10.28
04 February 2023	12	15	271.80	67.95	10.32
04 March 2023	13	15	272.16	68.04	10.34
03 April 2023	14	15	270.37	67.59	10.27
04 May 2023	15	15	270.64	67.66	10.28
13 June 2023	16	14*	269.94	67.49	10.25
07 July 2023	17	15	271.65	67.91	10.32
17 August 2023	18	15	271.49	67.87	10.31
04 September 2023	19	15	270.26	67.56	10.26
13 October 2023	20	15	271.26	67.81	10.30
14 November 2023	21	15	270.76	67.69	10.28
10 December 2023	22	15	273.37	68.34	10.38
30 January 2024	23	15	270.79	67.70	10.28
08 February 2024	24	15	270.86	67.72	10.29

**In March 2022 and June 2023, 15 transects were flown however only data from 14 transects were used in the analysis since the flight path of the far north-west transect was slightly out of the survey area (see Figure 2 and Figure 4). All data were cropped to the Bellrock survey area prior to analysis. Since this transect was at the far north-west edge of the survey area, it is much smaller than others (approximately 1.5km) so the level of potential data loss is minimal. All surveys met the required 10% coverage.*

Figure 2 Flight pattern for surveys flown between March and August 2022 over the Bellrock survey area

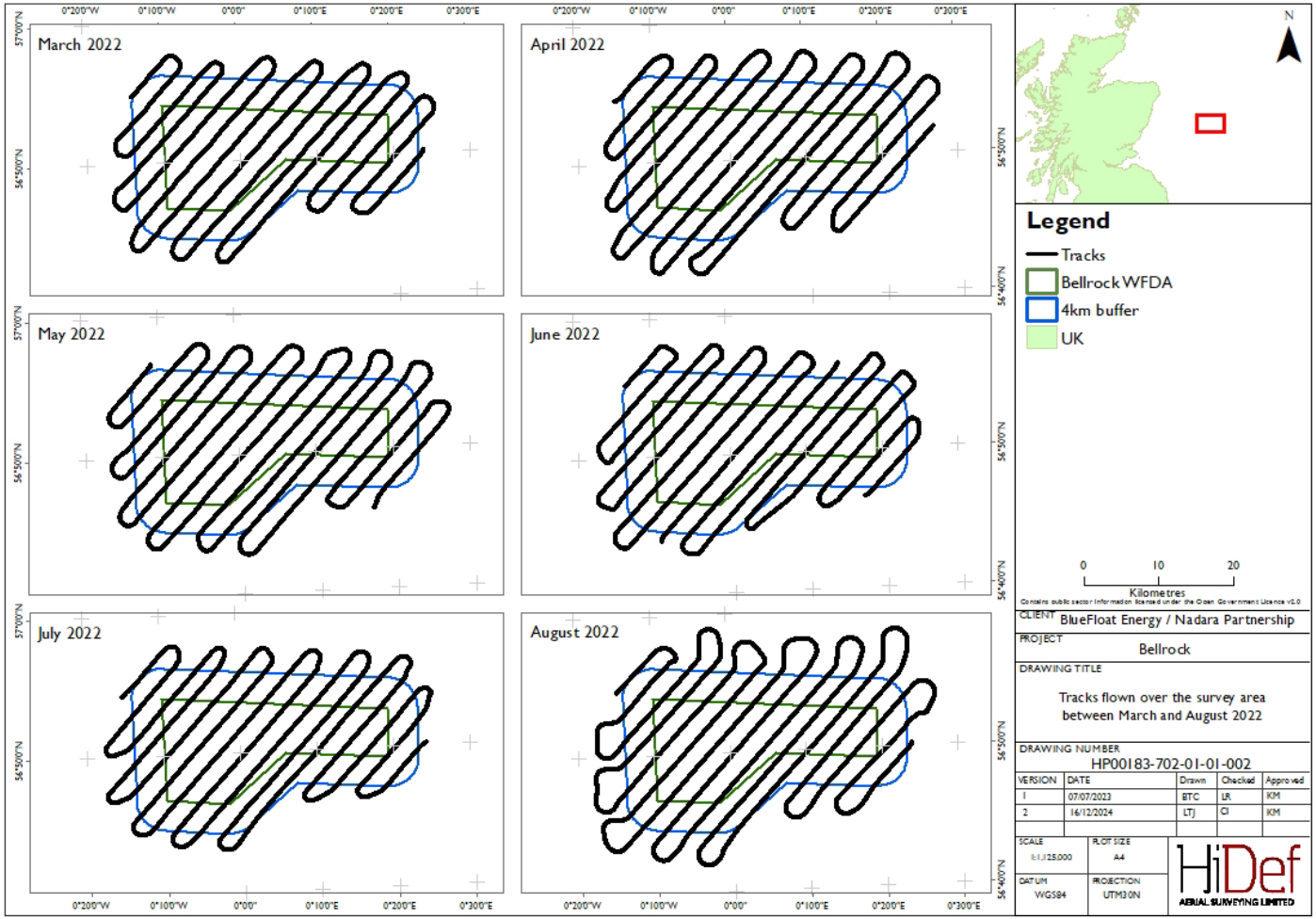


Figure 3 Flight pattern for surveys flown between September 2022 and February 2023 over the Bellrock survey area

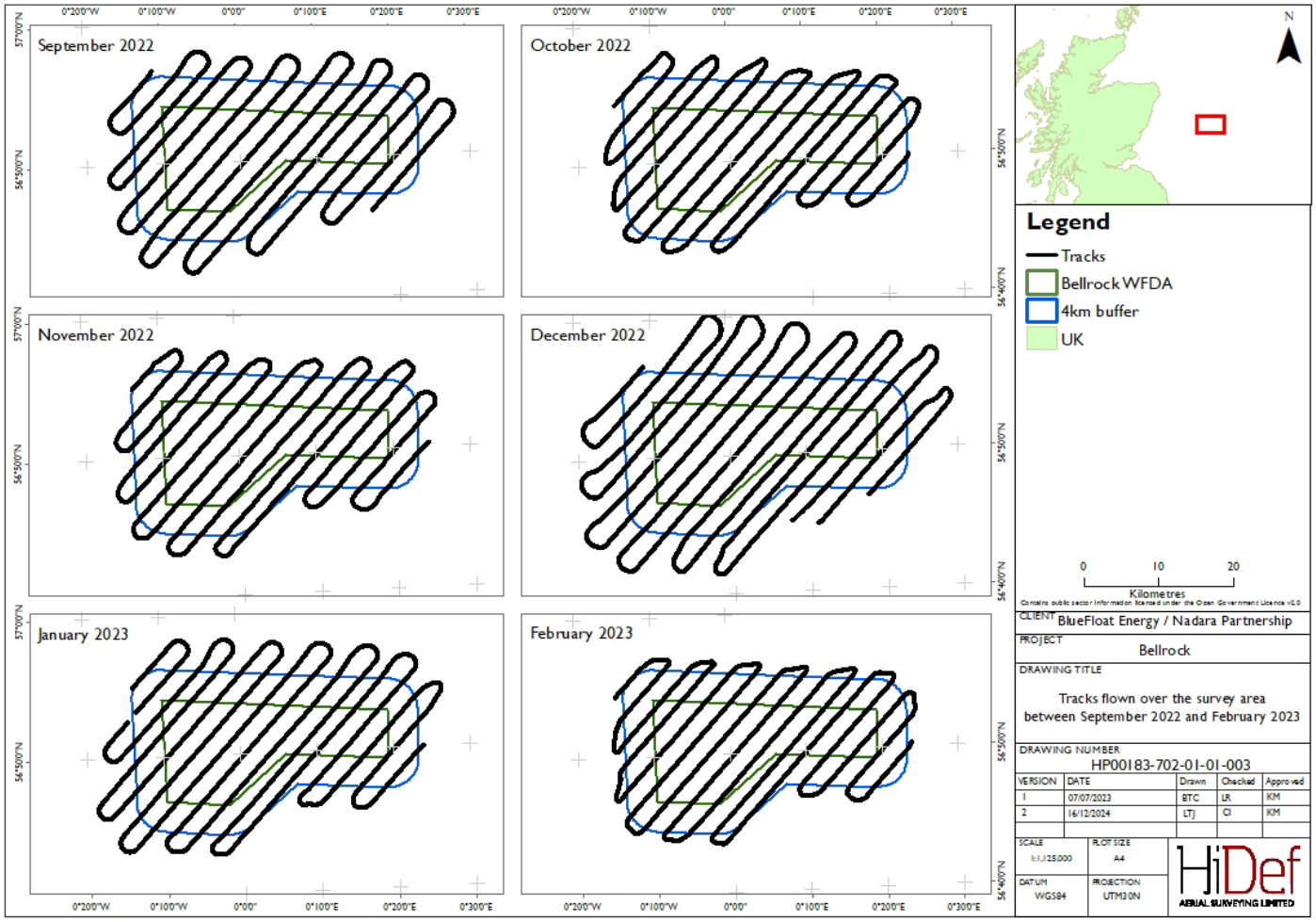


Figure 4 Flight pattern for surveys flown between March and August 2023 over the Bellrock survey area

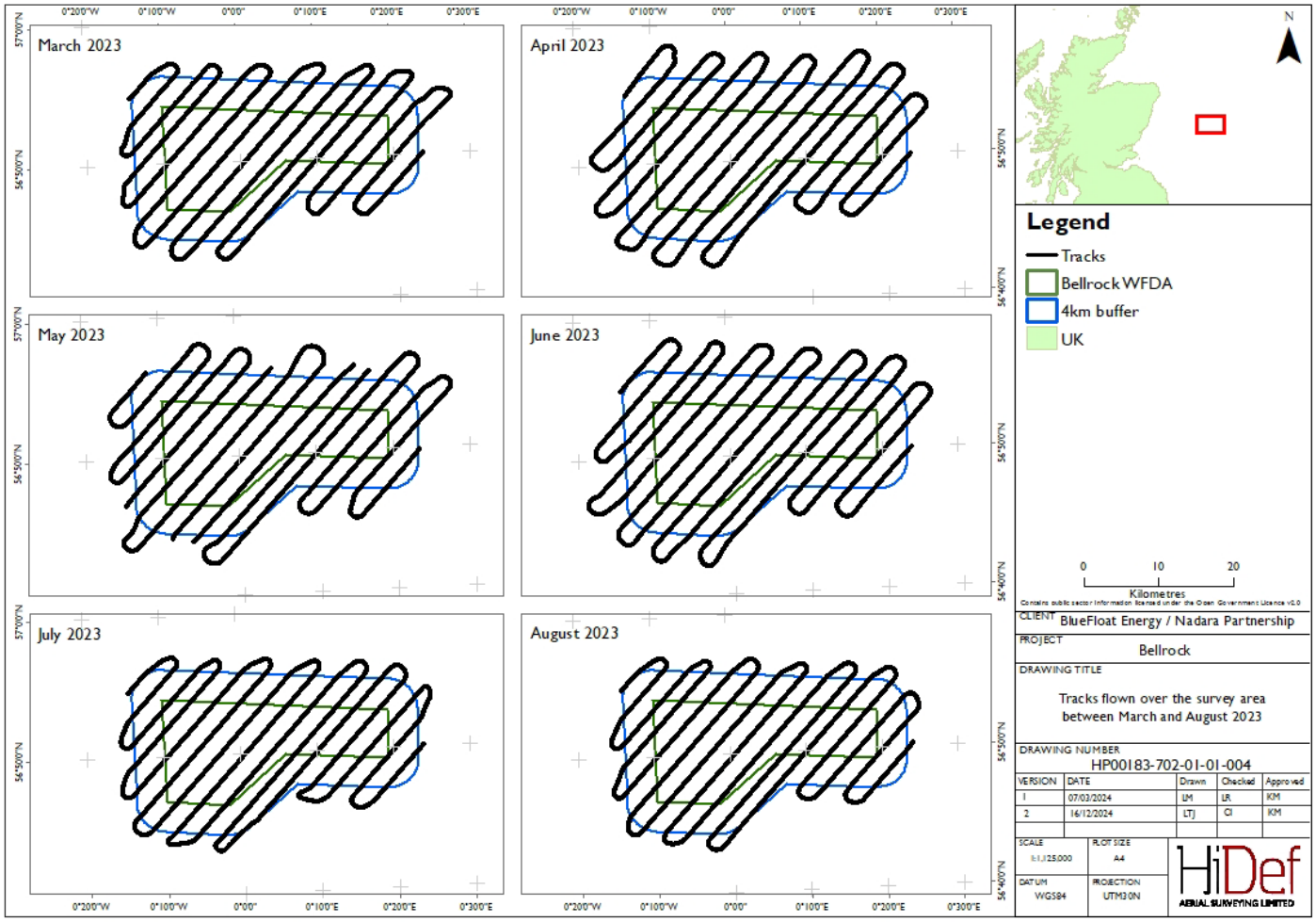
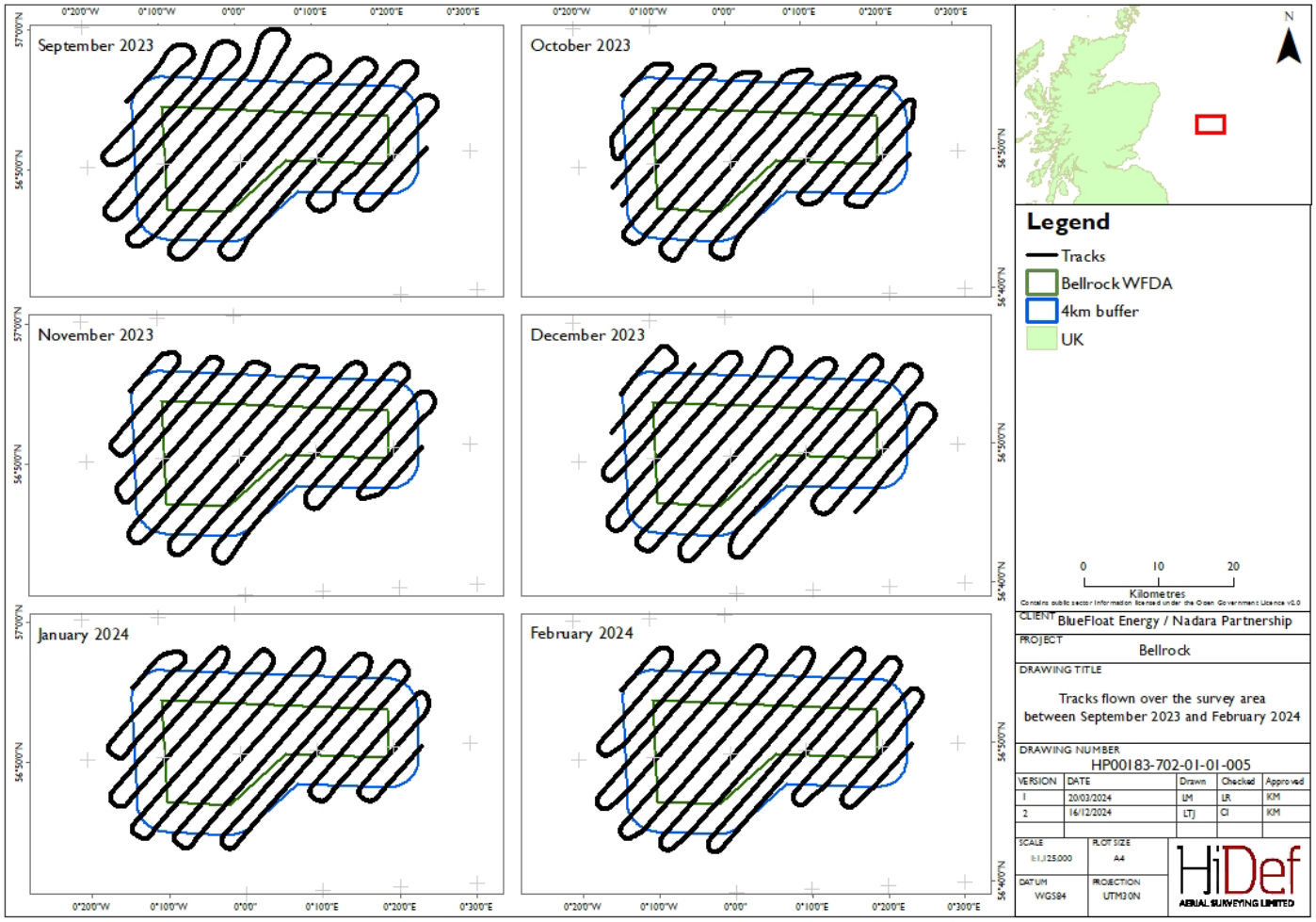


Figure 5 Flight pattern for surveys flown between September 2023 and February 2024 over the Bellrock survey area



3.2 Survey results

62 Each animal was assigned to a species group, and where possible these were also assigned a species identification with confidence levels of 'Possible', 'Probable' or 'Definite'. Any animals that could not be identified to species level were assigned to a category 'No ID'. The analysis of data to species level uses all levels of identification confidence. The overall identification rate of birds and non-avian animals to species level for the 24 surveys are given in Table 4. In the table, 'marine megafauna' relates to pinnipeds, cetaceans and shark species.

63 The total number of objects detected in each survey flight, within the survey area, as well as numbers of species and species groups are presented in Table 5 and Table 6.

64 Dead birds were recorded during the survey period. These are excluded from the numbers presented in Table 5 to Table 8 and in all analyses concerning species densities and abundance, but are mentioned in the relevant species sections if observed.

Table 4 Bellrock survey identification rates between March 2022 and February 2024 inclusive

Survey date	Avian animals ID rate (%)	Marine megafauna ID rates (%)
15 March 2022	87.22	100.00
17 April 2022	97.30	100.00
14 May 2022	95.92	70.00
06 June 2022	96.12	97.73
19 July 2022	88.56	100.00
07 August 2022	92.11	100.00
07 September 2022	98.20	0.00
02 October 2022	92.09	100.00
03 November 2022	95.63	0.00
20 December 2022	93.22	0.00
20 January 2023	97.81	50.00
04 February 2023	96.12	100.00
04 March 2023	93.22	66.67
03 April 2023	98.08	N/A
04 May 2023	93.68	100.00
13 June 2023	86.49	100.00
07 July 2023	96.67	100.00
17 August 2023	96.36	100.00
04 September 2023	85.29	85.71
13 October 2023	99.43	N/A
14 November 2023	100.00	N/A

Survey date	Avian animals ID rate (%)	Marine megafauna ID rates (%)
10 December 2023	95.24	N/A
30 January 2024	95.65	100.00
08 February 2024	91.89	83.33
Average	**94.26**	**77.67**

Table 5 Number of objects detected during each survey assigned to species level in the Bellrock survey area between March 2022 and February 2023. Survey dates presented in Table 4.

Species	Scientific name	Month												Year 1 Total
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	
Oystercatcher	*Haematopus ostralegus*	0	0	0	0	0	0	0	0	0	0	0	0	0
Curlew	*Numenius arquata*	0	0	0	0	0	1	0	0	0	0	0	0	1
Kittiwake	*Rissa tridactyla*	25	11	19	114	2	0	2	3	7	17	1	3	204
Common gull	*Larus canus*	0	0	0	0	0	0	0	0	0	0	0	1	1
Great black-backed gull	*Larus marinus*	0	0	0	0	0	0	0	0	1	3	5	0	9
Herring gull	*Larus argentatus*	0	0	0	0	0	1	1	0	0	0	1	0	3
Arctic tern	*Sterna paradisaea*	0	0	0	0	16	0	1	0	0	0	0	0	17
Arctic skua	*Stercorarius parasiticus*	0	0	0	1	0	0	0	0	0	0	0	0	1
Little auk	*Alle alle*	0	0	0	0	0	0	0	0	0	0	0	0	0
Guillemot	*Uria aalge*	250	189	53	17	1600	112	219	174	274	74	85	77	3124
Razorbill	*Alca torda*	13	0	0	11	261	0	0	0	0	0	0	6	291
Puffin	*Fratercula arctica*	61	6	38	2	29	2	24	8	3	1	0	0	174
Red-throated diver	*Gavia stellata*	0	0	0	0	0	0	0	0	0	0	0	0	0
European storm petrel	*Hydrobates pelagicus*	0	0	0	0	0	0	0	0	0	0	0	0	0
Fulmar	*Fulmarus glacialis*	5	6	4	24	10	16	24	5	20	11	41	36	202
Gannet	*Morus bassanus*	35	40	27	29	18	8	2	8	1	4	1	1	174

Species	Scientific name	Month												Year 1 Total
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	
Grey seal	*Halichoerus grypus*	0	0	0	0	0	0	0	0	0	0	0	0	0
Minke whale	*Balaenoptera acutorostrata*	0	0	0	1	0	0	0	1	0	0	0	0	2
White-beaked dolphin	*Lagenorhynchus albirostris*	0	0	0	0	3	0	0	0	0	0	0	0	3
Killer whale	*Orcinus orca*	0	0	0	0	0	0	0	0	0	0	0	0	0
Harbour porpoise	*Phocoena phocoena*	2	3	7	42	21	20	0	2	0	0	1	2	100
Total		**391**	**255**	**148**	**241**	**1960**	**160**	**273**	**201**	**306**	**110**	**135**	**126**	**4306**

Table 6 **Number of objects with no species ID detected during each survey assigned to species group in the Bellrock survey area between March 2022 and February 2023. Survey dates presented in Table 4.**

Species group (No ID)	Month												Year 1 Total
	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	
Wader species	0	0	0	0	0	0	0	0	0	0	0	0	0
Small gull species	0	0	0	1	0	0	0	0	0	0	0	0	1
Gull species	0	0	0	0	0	0	0	0	0	0	0	0	0
Arctic / common tern	0	0	0	0	50	6	0	0	0	0	0	0	56
Large auk species	12	0	1	2	99	0	0	8	8	3	1	0	134
Auk species	43	7	4	0	98	5	5	9	5	3	2	3	184
Auk / small gull species	1	0	1	2	3	1	0	0	1	0	0	0	9
Fulmar / gull species	1	0	0	3	0	0	0	0	0	2	0	2	8
Seal species	0	0	3	0	0	0	0	0	1	1	1	0	6
Dolphin species	0	0	0	0	0	0	1	0	0	0	0	0	1
Cetacean species	0	0	0	1	0	0	0	0	0	0	0	0	1
Total	**57**	**7**	**9**	**9**	**250**	**12**	**6**	**17**	**15**	**9**	**4**	**5**	**400**

Table 7 Number of objects detected during each survey assigned to species level in the Bellrock survey area between March 2023 and February 2024. Survey dates presented in Table 4.

Species	Scientific name	Month												Year 2 Total
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	
Oystercatcher	*Haematopus ostralegus*	0	0	0	0	0	5	0	0	0	0	0	0	5
Curlew	*Numenius arquata*	0	0	0	0	0	0	0	0	0	0	0	0	0
Kittiwake	*Rissa tridactyla*	4	5	5	3	0	0	0	11	6	0	2	0	36
Common gull	*Larus canus*	0	0	0	0	3	0	0	0	0	0	0	0	3
Great black-backed gull	*Larus marinus*	3	0	0	0	0	0	0	0	2	8	1	1	15
Herring gull	*Larus argentatus*	0	0	0	0	1	0	0	3	1	1	0	0	6
Arctic tern	*Sterna paradisaea*	0	0	0	0	0	4	0	0	0	0	0	0	4
Arctic skua	*Stercorarius parasiticus*	0	0	0	0	0	0	0	0	0	0	0	0	0
Little auk	*Alle alle*	0	0	0	0	0	0	0	0	0	0	1	0	1
Guillemot	*Uria aalge*	53	36	135	20	13	18	22	15	21	2	27	43	405
Razorbill	*Alca torda*	2	0	0	0	0	0	0	0	1	0	1	0	4
Puffin	*Fratercula arctica*	4	1	5	5	0	1	0	0	1	0	1	9	27
Red-throated diver	*Gavia stellata*	0	0	0	0	0	0	1	0	0	0	0	0	1
European storm petrel	*Hydrobates pelagicus*	0	0	0	0	0	0	0	1	0	0	0	0	1
Fulmar	*Fulmarus glacialis*	25	2	11	2	2	24	3	436	9	8	11	15	548
Gannet	*Morus bassanus*	19	7	7	2	10	1	3	56	0	1	0	0	106
Grey seal	*Halichoerus grypus*	1	0	0	0	0	0	0	0	0	0	0	0	1

Species	Scientific name	Month												Year 2 Total
		Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	
Minke whale	*Balaenoptera acutorostrata*	0	0	0	0	0	0	0	0	0	0	0	0	0
White-beaked dolphin	*Lagenorhynchus albirostris*	0	0	0	0	0	0	0	0	0	0	0	0	0
Killer whale	*Orcinus orca*	0	0	0	1	0	0	0	0	0	0	0	0	1
Harbour porpoise	*Phocoena phocoena*	1	0	1	6	4	1	6	0	0	0	2	5	26
Total		**112**	**51**	**164**	**39**	**33**	**54**	**35**	**522**	**41**	**20**	**46**	**73**	**1190**

Table 8 **Number of objects with no species ID detected during each survey assigned to species group in the Bellrock survey area between March 2023 and February 2024. Survey dates presented in Table 4.**

Species group (No ID)	Month												Year 2 Total
	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	
Wader species	0	0	0	0	0	0	2	0	0	0	0	0	2
Small gull species	0	0	0	2	0	0	0	0	0	0	0	0	2
Gull species	0	0	0	0	0	0	0	0	0	0	0	1	1
Arctic / common tern	0	0	0	0	0	1	0	0	0	0	0	0	1
Large auk species	1	1	1	1	0	0	1	0	0	0	1	0	6
Auk species	5	0	10	2	0	1	0	1	0	1	1	3	24
Auk / small gull species	2	0	0	0	0	0	2	0	0	0	0	1	5
Fulmar / gull species	0	0	0	0	1	0	0	2	0	0	0	1	4
Seal species	1	0	0	0	0	0	1	0	0	0	0	1	3
Dolphin species	0	0	0	0	0	0	0	0	0	0	0	0	0
Cetacean species	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**9**	**1**	**11**	**5**	**1**	**2**	**6**	**3**	**0**	**1**	**2**	**7**	**48**

3.3 Distribution patterns and seasonal abundances

65 The density, total estimated population and upper and lower 95% CLs are presented for key species only in this section. Estimates, including standard deviation and CV, for all species and species groups are presented in Appendix I. An explanation of these parameters is presented in Table 9.

66 For certain diving species (guillemot, razorbill, puffin and harbour porpoise), estimates were adjusted to account for availability bias (Section 2.5.3) to provide an estimate of absolute abundance. The adjusted (absolute) density and abundances provide the best estimates at the time of survey. No calculation of availability bias was carried out for any other diving species (e.g., gannet) due to a lack of information on dive times, and so estimates for such species should be considered low. Absolute density and abundance estimates for the relevant key species are presented within this result section, alongside the corresponding relative estimates.

67 Distribution patterns of the most abundant species are presented as density maps, in which a density surface depicts the estimated number of individuals per km². Distributions of less abundant species, unidentified species and anthropogenic activity are presented as dot maps only.

68 References to species-specific seasonality may be made throughout the report and are based on the biologically defined minimum population scale (BDMPS) report of Furness (2015) and the breeding seasons provided by NatureScot (2020) (Table 10).

Table 9 Terms used in population analysis

Term	Definition
Density estimate (animals/km^2)	The average number of animals per square km surveyed over the whole area
Population estimate (number)	The mean number of animals estimated within the survey area
95% confidence interval (CI)	A measure of uncertainty in the mean value. If the analysis was repeated, 95% of the time the mean population estimate would fall within this range. The smaller the CI range the more confident we can be that the mean estimate is an accurate reflection of the true population size.
Confidence limit (CL)	The upper and lower values that define the range of the 95% confidence interval.
Bootstrap standard deviation (SD) of population estimate	The amount of variability or dispersion of a set of bootstrapped samples. A small SE indicates that the mean estimates derived from repeated sampling are more consistent.
CV (%)	The coefficient of variation is a standard measure that describes the dispersion of data points around the mean. The lower the CV the more precise the estimate. This term is used interchangeably in scientific literature to define the standard deviation divided by the mean or the standard error (standard deviation of the sample means) divided by the mean. Given that both metrics are potentially relevant within an offshore survey and analysis setting, we use the terms "CV_{σ}" and "CV_{SE}" to define coefficients of variation applied to standard deviations and standard errors respectively.
Relative abundance	In the case of diving birds and mammals, this is the estimated population size based on animals recorded on or above the sea surface and does not account for any that may be diving and thus submerged at the time of survey.
Absolute abundance	The most accurate estimate of population size. In the case of diving birds and mammals, this includes an estimate for the number that are believed to be submerged at the time of survey.

Table 10 Seasonality for the presented key seabird species (based on Furness, 2015 and NatureScot, 2020b)

Species	Breeding season (NatureScot, 2020b)	Non-breeding season (Furness, 2015)		
		Post-breeding migration	Migration-free non-breeding season	Return migration
Kittiwake	mid Apr – Aug	Aug – Dec	n/a	Jan – Apr
Guillemot	Apr – mid Aug	Jul – Oct	Nov	Dec – Feb
Razorbill	Apr – mid Aug	Aug – Oct	Nov – Dec	Jan – Mar
Puffin	Apr – mid Aug	late Jul – Aug	Sep – Feb	Mar – Apr
Fulmar	Apr – mid Sep	Sep – Oct	Nov	Dec – Mar
Gannet	mid Mar – Sep	Sep – Nov	n/a	Dec – Mar

3.3.1 All bird species

69 The total number of individual birds from all species recorded across the Bellrock survey area is presented in Figure 6, whilst the distributions and densities of birds throughout the survey period are presented in Figure 7 to Figure 10.

70 The total number of birds varied between surveys, with the highest numbers recorded in July 2022 (2,186 observations) and the lowest in December 2023 (21 observations). During the second year of surveys, records peaked in October 2023 with 525 observations. Other than in July 2022 and October 2023, numbers of birds did not exceed 500 observations.

71 Birds were more widely distributed across the survey area in some months, such as in July 2022 (Figure 7). Many birds were distributed to the north and north-east of the survey area in September 2022 and October 2023 (Figure 7 to Figure 10) while in other months, higher densities were recorded in the WFDA and buffer.

72 Over the survey period a total of 165 dead birds were recorded (Table 11). There were 108 dead birds identified to species level (two fulmar, 101 gannet, two guillemot, two kittiwake and one lesser black-backed gull). An additional 57 dead birds were identified to species group (two auk species, one fulmar/gull species, one gull species and 53 large auk species).

Figure 6 Total number of individual birds recorded between March 2022 and February 2024 in the Bellrock survey area

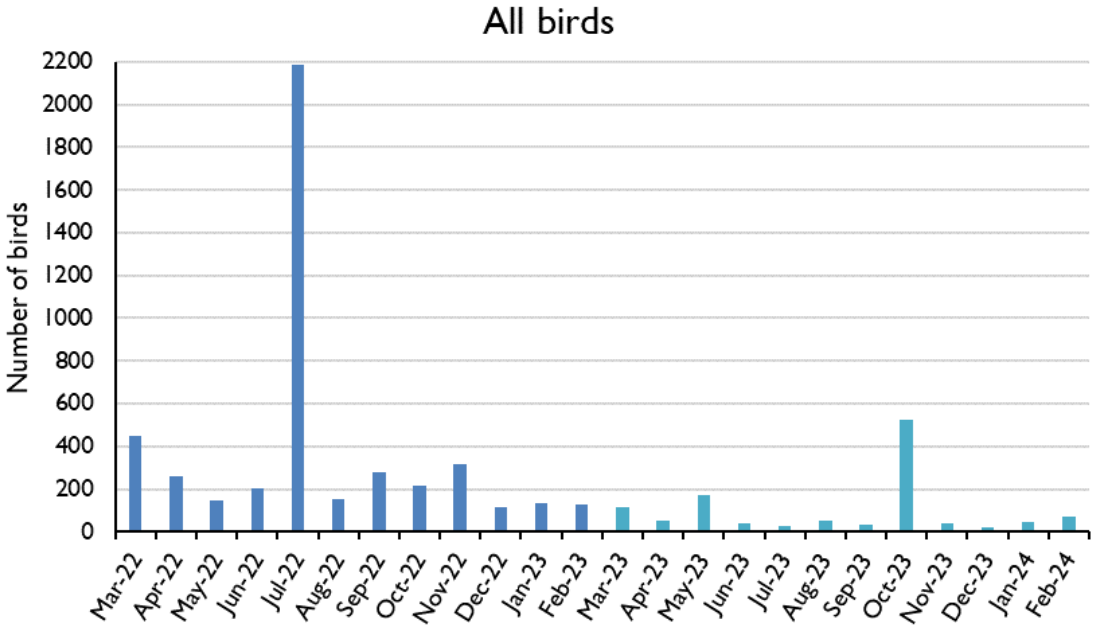


Table 11 Number of dead birds recorded in the Bellrock survey area between March 2022 and February 2024

	Jun-22	Jul-22	Aug-22	Oct-22	Mar-23	Apr-23	Jul-23	Sep-23	Grand Total
Species									
Fulmar	0	0	1	0	0	0	1	0	2
Gannet	2	92	4	2	0	0	1	0	101
Guillemot	0	1	1	0	0	0	0	0	2
Kittiwake	0	0	1	0	1	0	0	0	2
Lesser black-backed gull	0	0	0	0	0	0	0	1	1
Unidentified species									
Auk species	0	0	2	0	0	0	0	0	2
Fulmar / gull species	0	0	1	0	0	0	0	0	1
Gull species	0	0	1	0	0	0	0	0	1
Large auk species	0	32	20	0	0	1	0	0	53
Grand Total	**2**	**125**	**31**	**2**	**1**	**1**	**2**	**1**	**165**

Figure 7 Density of all birds (number/km²) and number of detections per segment in the Bellrock survey area between March and August 2022

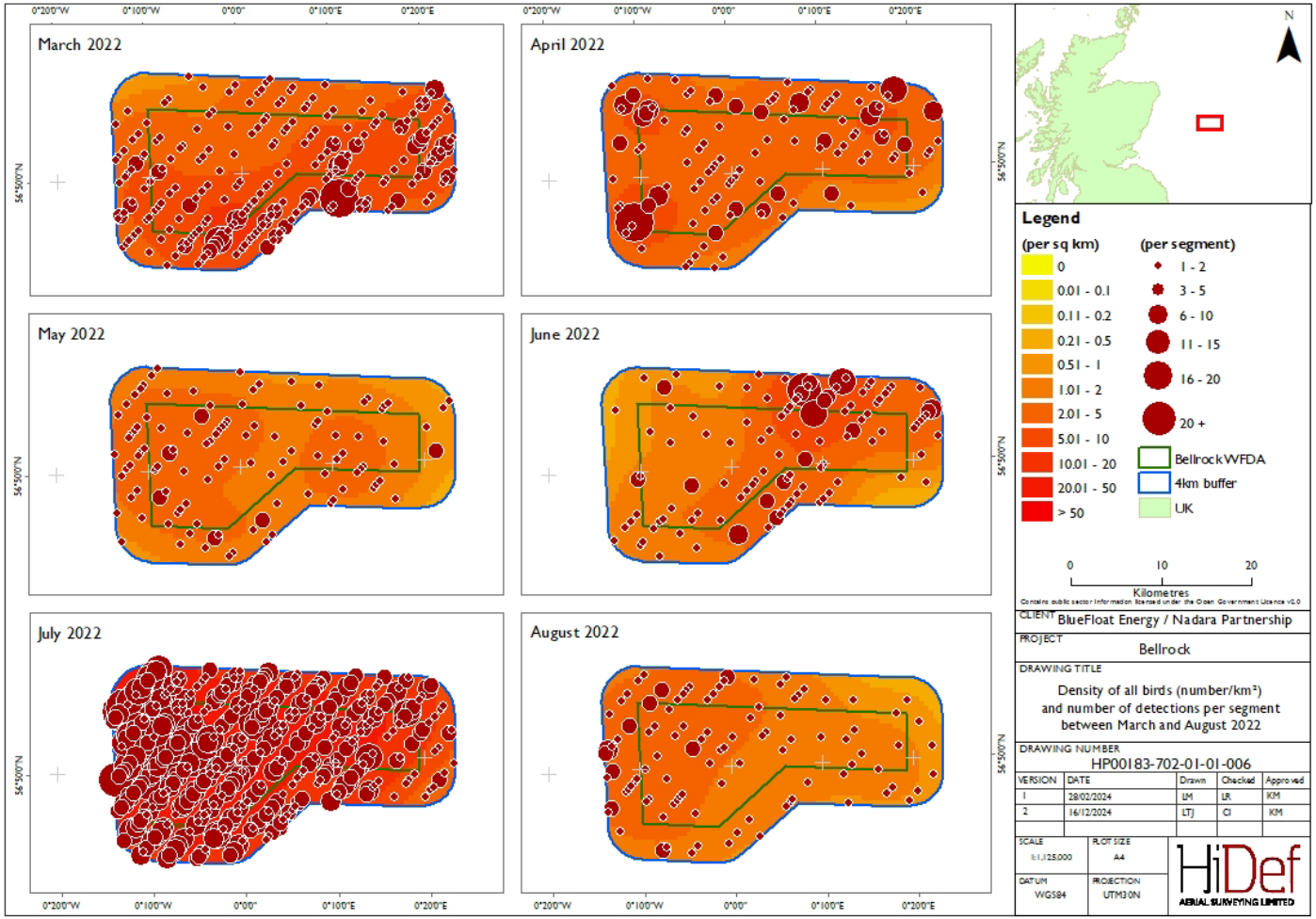


Figure 8 **Density of all birds (number/km²) and number of detections per segment in the Bellrock survey area between September 2022 and February 2023**

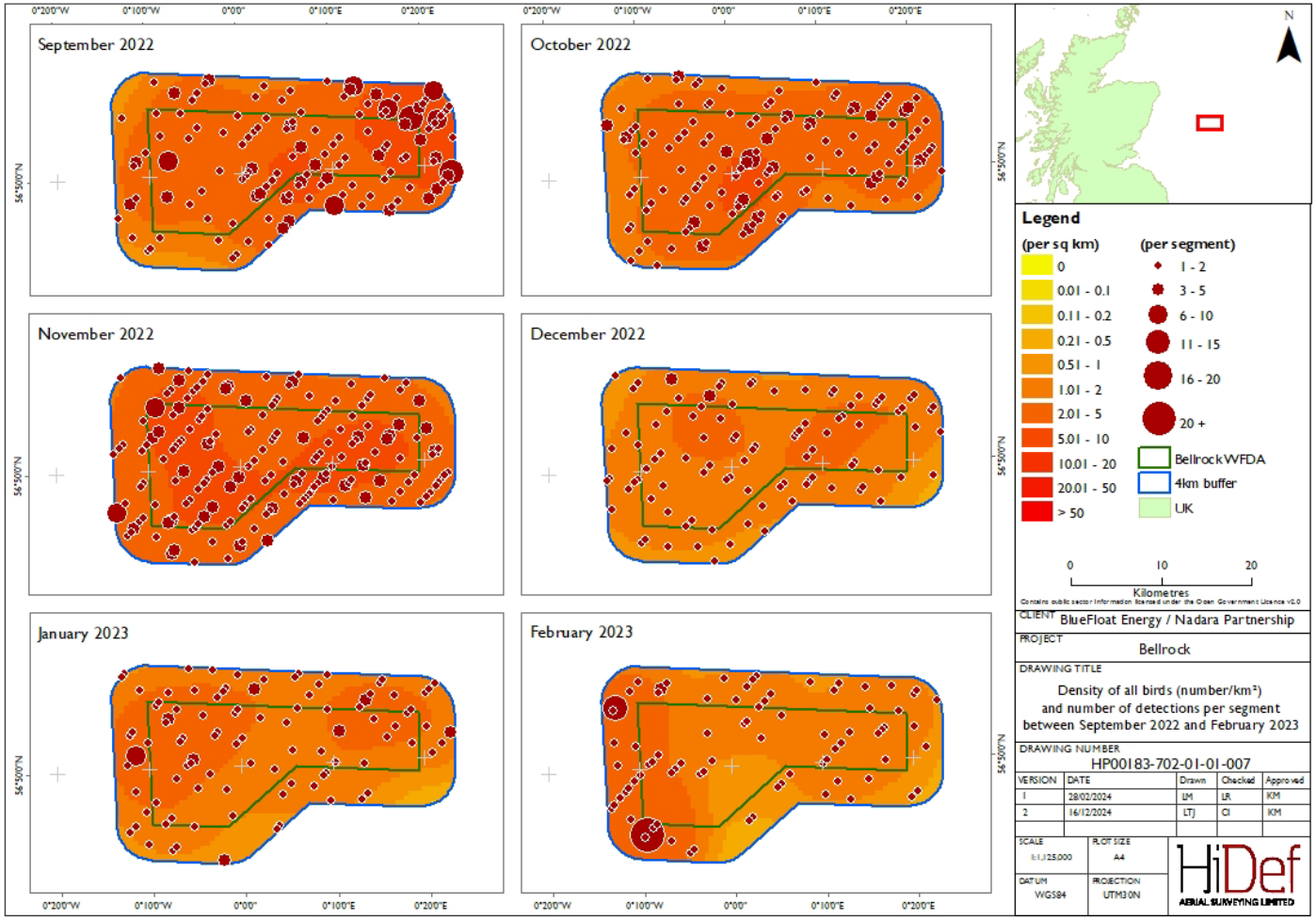


Figure 9 Density of all birds (number/km²) and number of detections per segment in the Bellrock survey area between March and August 2023

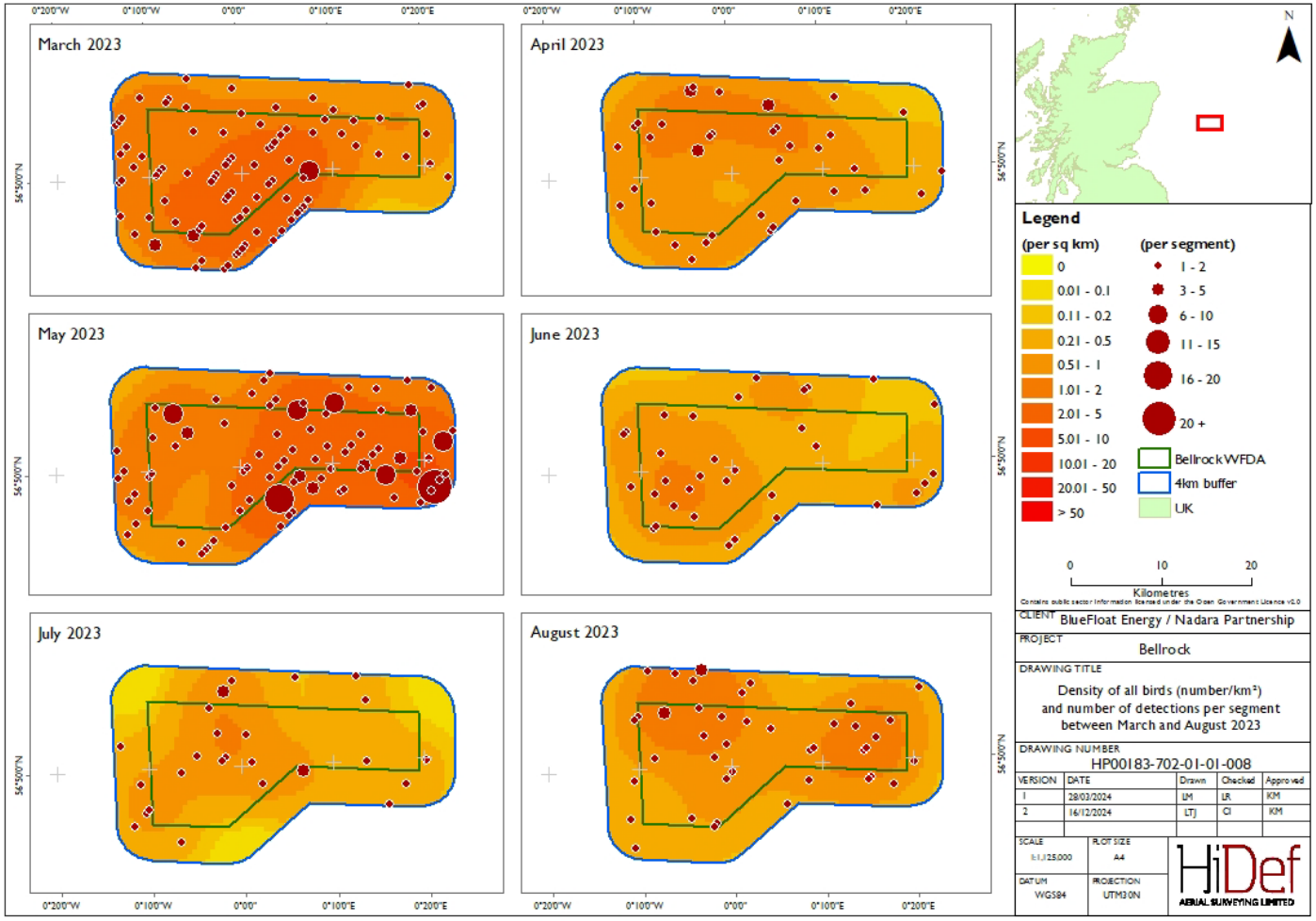
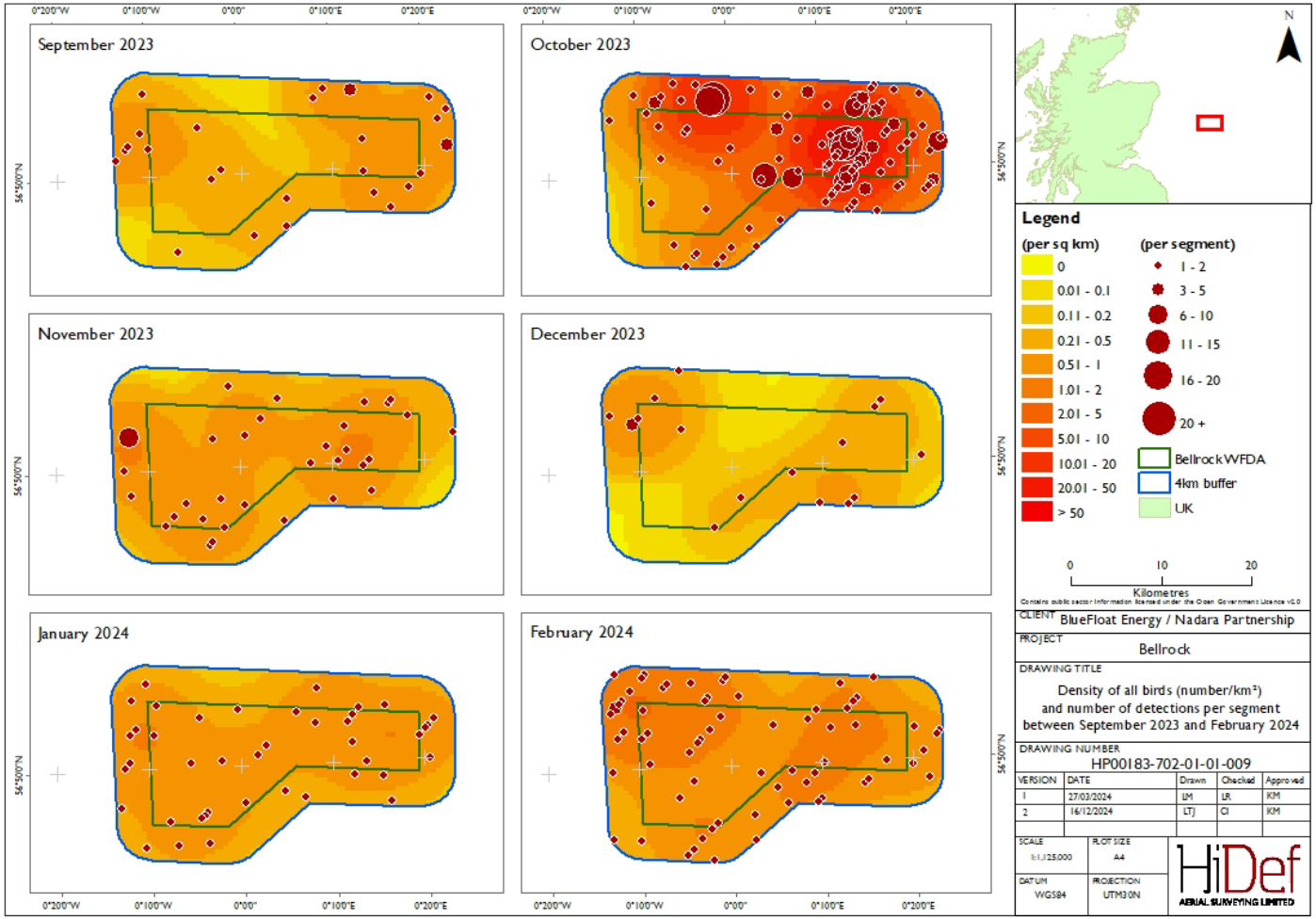


Figure 10 Density of all birds (number/km²) and number of detections per segment in the Bellrock survey area between September 2023 and February 2024



3.3.2 Kittiwake

73 Kittiwakes were recorded in 18 of the 24 surveys with a marked peak in June 2022 (114 individuals) (Figure 11). There were no birds recorded in August 2022, July to September 2023, December 2023 and February 2024. Higher numbers were observed during the first year of surveys between March 2022 to June 2022.

74 When recorded, density estimates for the species ranged between 0.02 birds/km^2 (95% CI 0.00 – 0.05) in January 2023 and 1.66 birds/km^2 (95% CI 0.97 – 2.40) in June 2022 (Figure 12 and Table 11), equating to 10 birds (95% CI 0 – 36) and 1,096 birds (95% CI 636 – 1,582) respectively.

75 Kittiwakes were found throughout the survey area and in June 2022, when records peaked, the highest density of birds was found in centre of the survey area (Figure 13). In March 2022, kittiwakes were distributed in the south of the buffer (Figure 13), while in November 2022 they were mainly distributed towards the east and south-west of the buffer (Figure 14).

76 Of the birds that could be aged, 91% were recorded as adults, with immature birds only recorded in March, May and June 2022, while juveniles were recorded in December 2022 and October 2023 (Table 12).

77 Over the survey period, 64% of birds were recorded flying with the other 36% recorded as sitting on the water, with all birds recorded as flying in January and October 2023 (Table 13). One dead bird was recorded in August 2022 and one dead bird was recorded in March 2023.

78 There were survey months in which no data regarding flight direction were available, therefore, only surveys which contained flight direction data are displayed (Figure 17). In June 2022, when numbers peaked, birds were mainly heading in southerly, south-westerly and westerly directions.

Figure 11 Total number of kittiwakes recorded between March 2022 and February 2024 in the Bellrock survey area

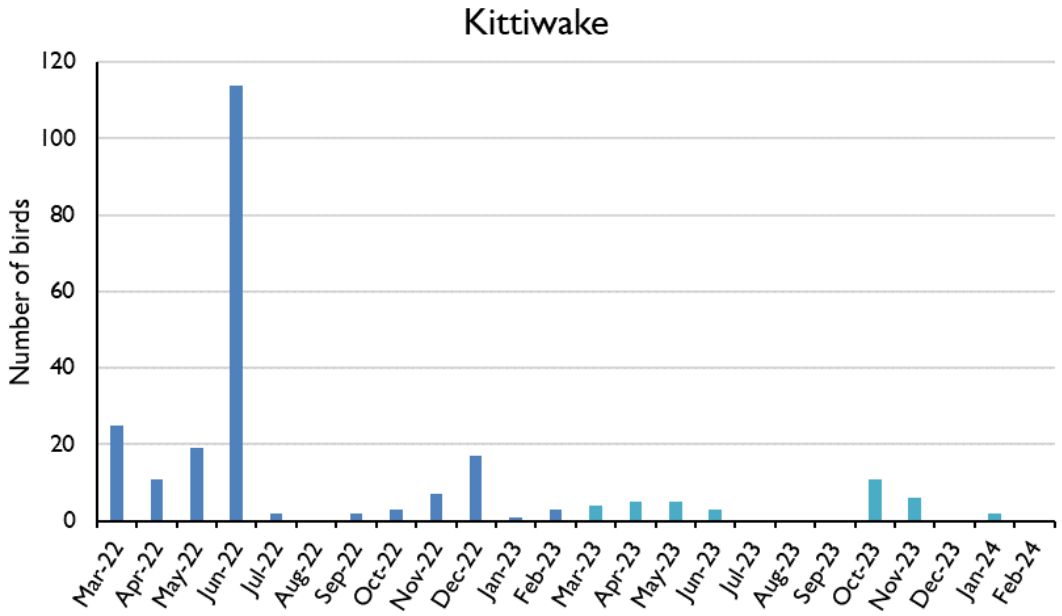


Figure 12 **Kittiwake apportioned density estimates, in the Bellrock survey area, between March 2022 and February 2024. Error bars represent the 95% lower and upper confidence limits.**

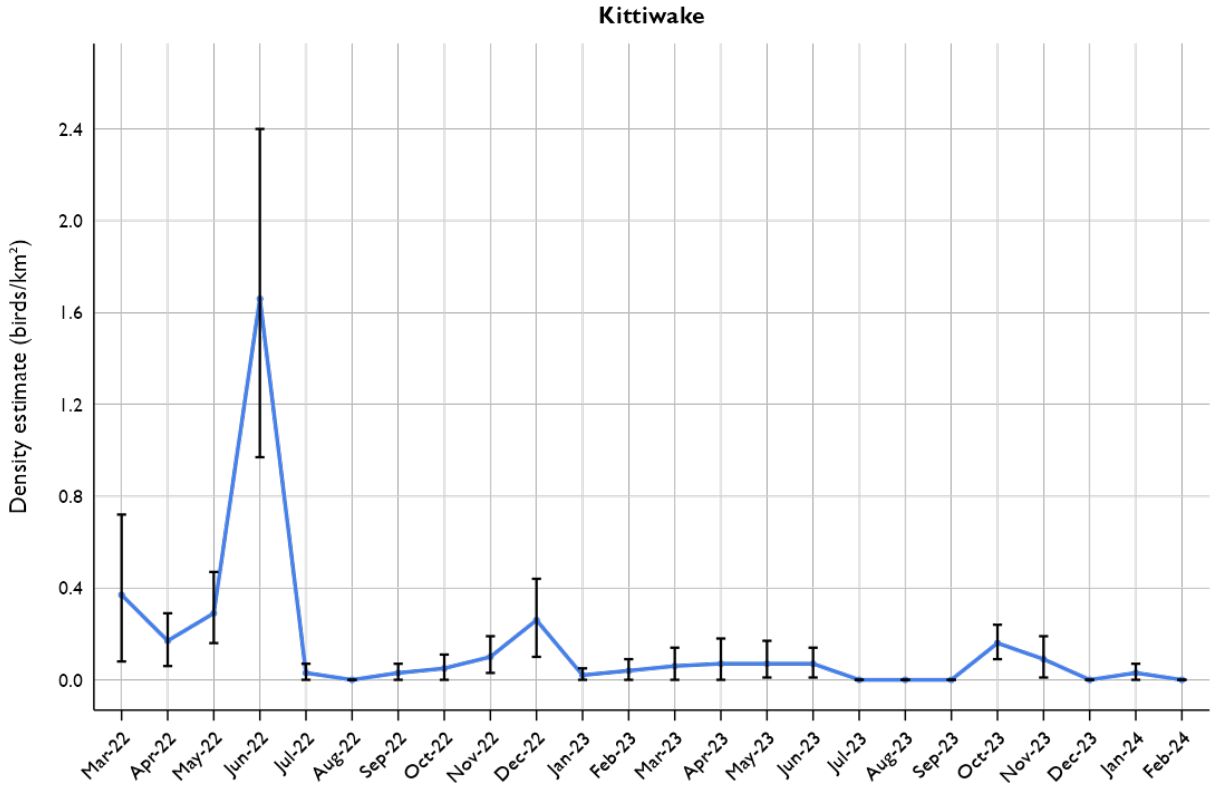


Table 12 Apportioned density and population estimates of kittiwake in the Bellrock survey area between March 2022 and February 2024

Survey date	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
15 March 2022	0.37	241	54	473	107	44.41
17 April 2022	0.17	109	38	189	40	36.09
14 May 2022	0.29	194	104	307	52	26.45
06 June 2022	1.66	1096	636	1582	242	22.01
19 July 2022	0.03	20	0	47	12	59.81
07 August 2022	0.00	0	0	0	0	0.00
07 September 2022	0.03	20	0	47	12	61.69
02 October 2022	0.05	31	0	75	20	64.62
03 November 2022	0.10	67	19	128	29	43.06
20 December 2022	0.26	171	64	292	60	35.16
20 January 2023	0.02	10	0	36	11	100.39
04 February 2023	0.04	30	0	58	15	49.75
04 March 2023	0.06	39	0	94	26	65.90
03 April 2023	0.07	50	0	116	30	59.78
04 May 2023	0.07	50	9	114	30	58.94
13 June 2023	0.07	50	10	96	22	43.65
07 July 2023	0.00	0	0	0	0	0.00
17 August 2023	0.00	0	0	0	0	0.00
04 September 2023	0.00	0	0	0	0	0.00
13 October 2023	0.16	107	63	157	26	23.81
14 November 2023	0.09	59	10	126	31	52.31
10 December 2023	0.00	0	0	0	0	0.00
30 January 2024	0.03	20	0	46	12	61.12
08 February 2024	0.00	0	0	0	0	0.00

Table 13 Summary of kittiwake ages in the Bellrock survey area between March 2022 and February 2024

Survey date	Number recorded as adult	Number recorded as immature	Number recorded as juvenile	Number recorded as unknown	% Adult (from aged birds)	Total of aged and unaged
15 March 2022	17	2	0	6	89	25
17 April 2022	11	0	0	0	100	11
14 May 2022	12	2	0	5	86	19
06 June 2022	82	5	0	27	94	114
19 July 2022	1	0	0	1	100	2
07 August 2022	0	0	0	0	-	0
07 September 2022	0	0	0	2	0	2
02 October 2022	2	0	0	1	100	3
03 November 2022	4	0	0	3	100	7
20 December 2022	11	0	4	2	73	17
20 January 2023	1	0	0	0	100	1
04 February 2023	2	0	0	1	100	3
04 March 2023	0	0	0	4	0	4
03 April 2023	4	0	0	1	100	5
04 May 2023	4	0	0	1	100	5
13 June 2023	2	0	0	1	100	3
07 July 2023	0	0	0	0	-	0
17 August 2023	0	0	0	0	-	0
04 September 2023	0	0	0	0	-	0
13 October 2023	8	0	3	0	73	11
14 November 2023	3	0	0	3	100	6
10 December 2023	0	0	0	0	-	0
30 January 2024	0	0	0	2	0	2
08 February 2024	0	0	0	0	-	0
Total	**164**	**9**	**7**	**60**	**91**	**240**

Table 14 Summary of kittiwake behaviours in the Bellrock survey area between March 2022 and February 2023

Survey date	Number recorded diving	Number recorded flying	Number recorded sitting	Number recorded taking off	% Flying	Total live birds	Number recorded dead
15 March 2022	0	14	11	0	56	**25**	0
17 April 2022	0	9	2	0	82	**11**	0
14 May 2022	0	14	5	0	74	**19**	0
06 June 2022	0	65	49	0	57	**114**	0
19 July 2022	0	0	2	0	0	**2**	0
07 August 2022	0	0	0	0	-	**0**	1
07 September 2022	0	0	2	0	0	**2**	0
02 October 2022	0	2	1	0	67	**3**	0
03 November 2022	0	5	2	0	71	**7**	0
20 December 2022	0	16	1	0	94	**17**	0
20 January 2023	0	1	0	0	100	**1**	0
04 February 2023	0	2	1	0	67	**3**	0
04 March 2023	0	1	3	0	25	**4**	1
03 April 2023	0	4	1	0	80	**5**	0
04 May 2023	0	4	1	0	80	**5**	0
13 June 2023	0	2	1	0	67	**3**	0
07 July 2023	0	0	0	0	-	**0**	0
17 August 2023	0	0	0	0	-	**0**	0
04 September 2023	0	0	0	0	-	**0**	0
13 October 2023	0	11	0	0	100	**11**	0
14 November 2023	0	3	3	0	50	**6**	0
10 December 2023	0	0	0	0	-	**0**	0
30 January 2024	0	0	2	0	0	**2**	0
08 February 2024	0	0	0	0	-	**0**	0
Total	**0**	**153**	**87**	**0**	**64**	**240**	**2**

Figure 13 **Detections, density (number/km²) and number of detections per segment of kittiwakes in the Bellrock survey area between March and August 2022**

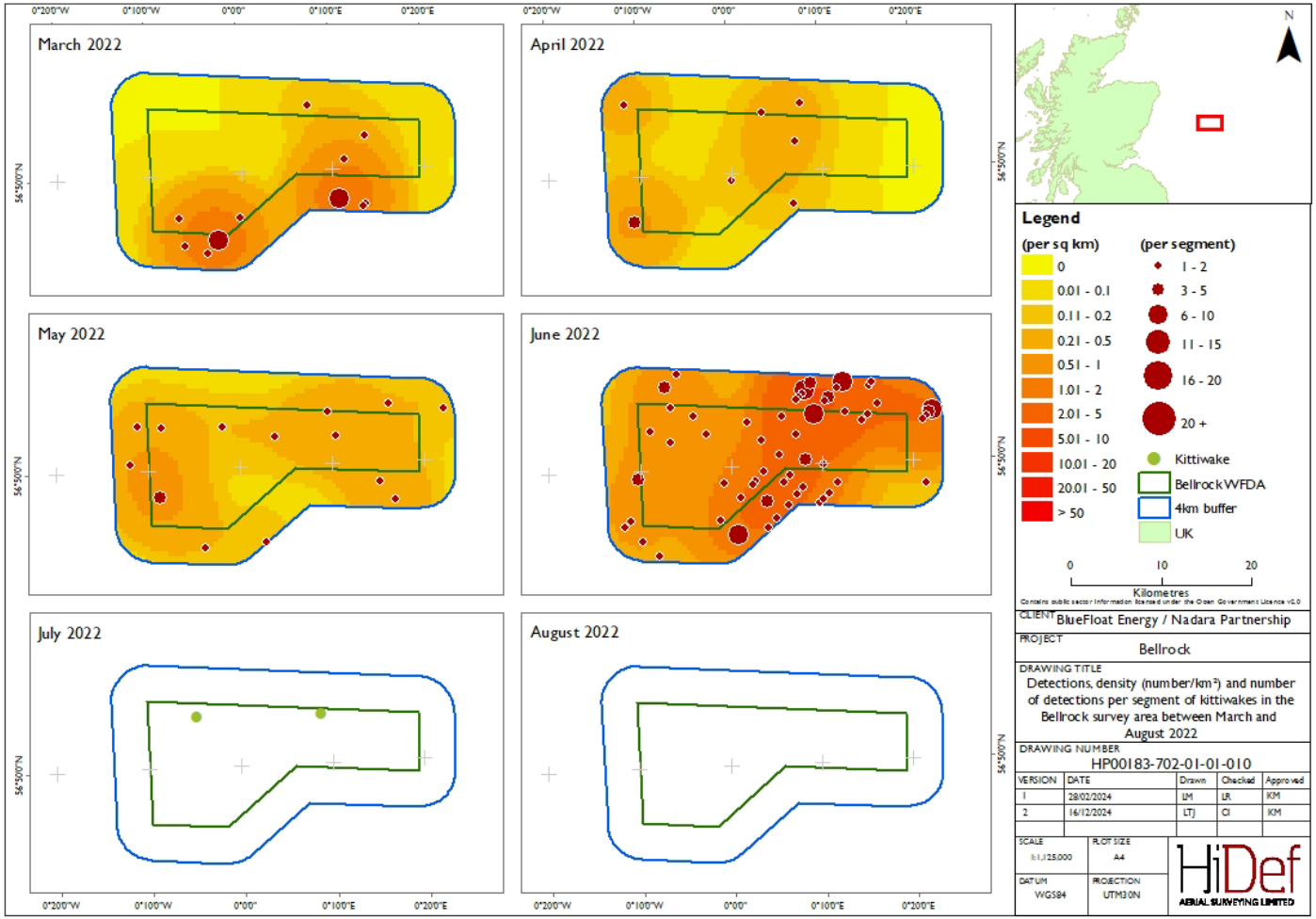


Figure 14 Detections, density (number/km²) and number of detections per segment of kittiwakes in the Bellrock survey area between September 2022 and February 2023

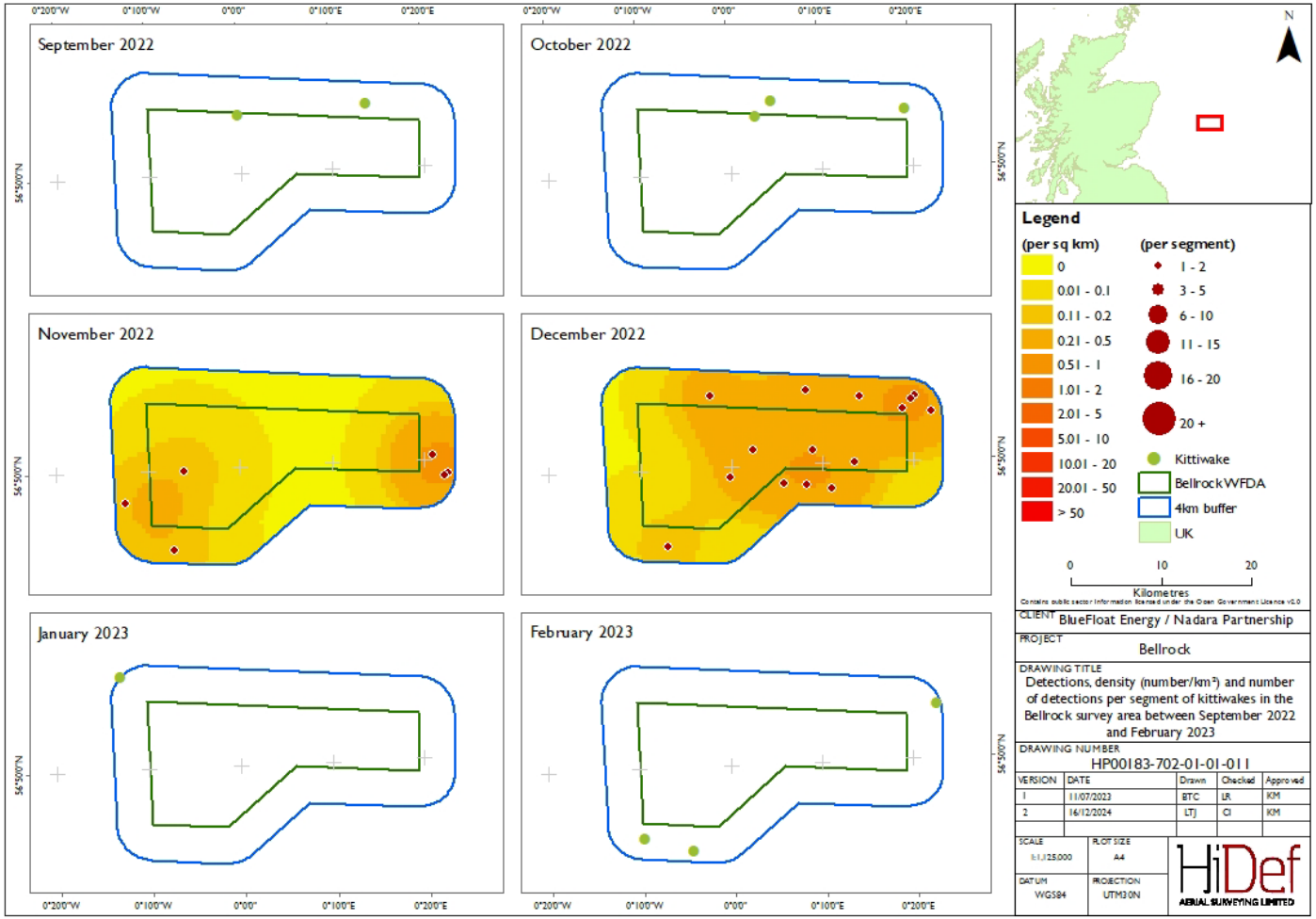


Figure 15 Detections of kittiwakes in the Bellrock survey area between March and August 2023

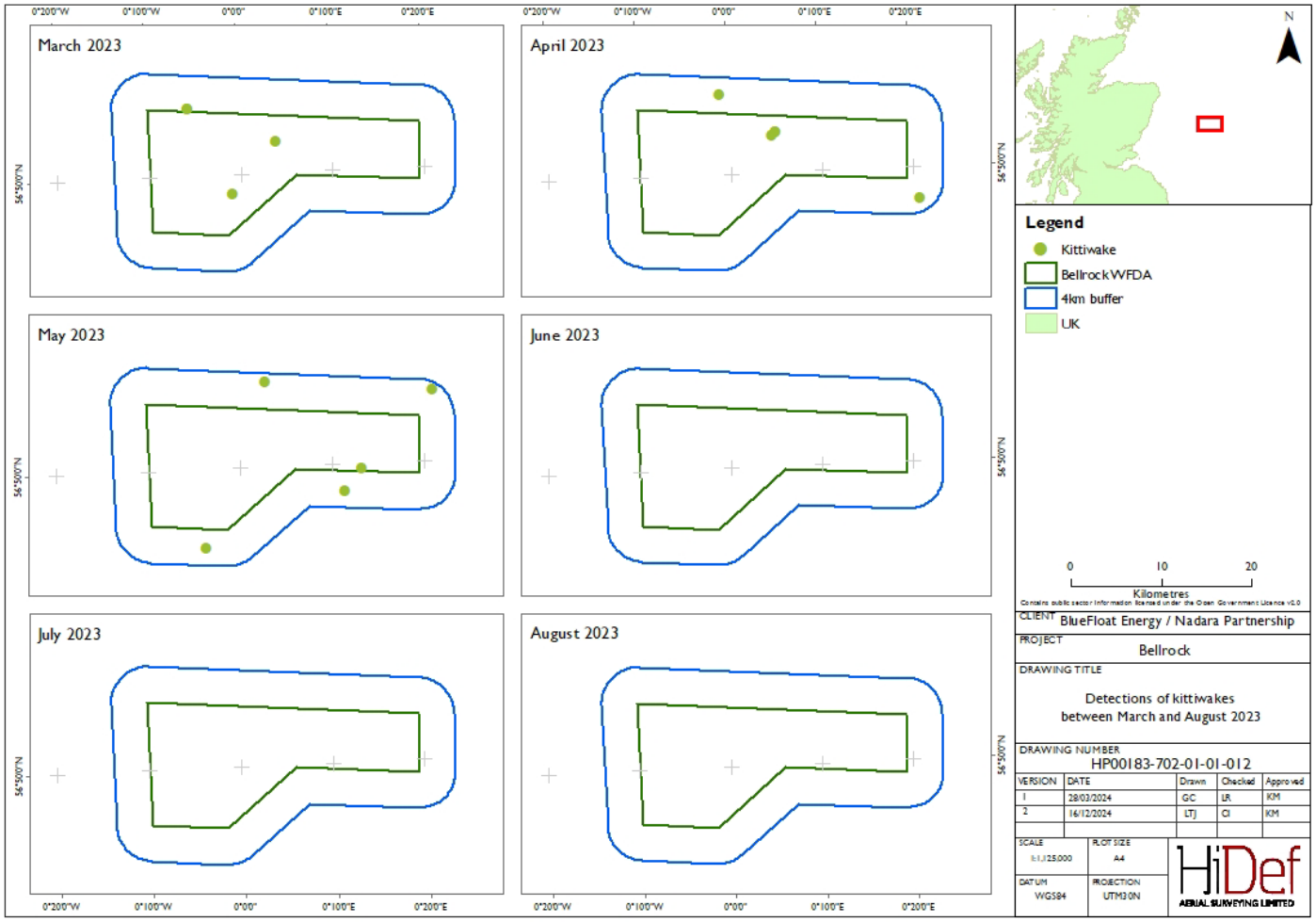


Figure 16 Detections, density (number/km²) and number of detections per segment of kittiwakes in the Bellrock survey area between September 2023 and February 2024

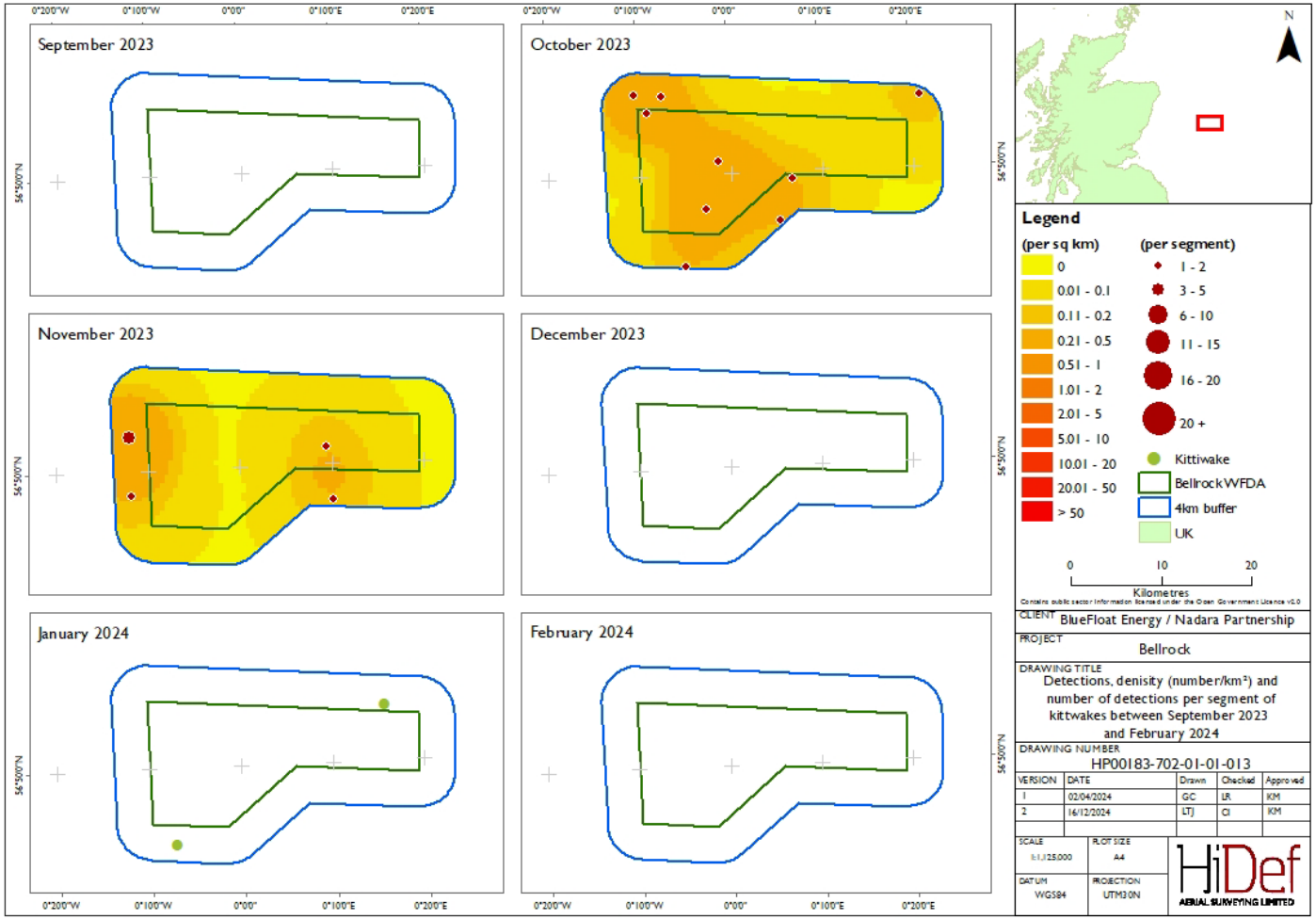
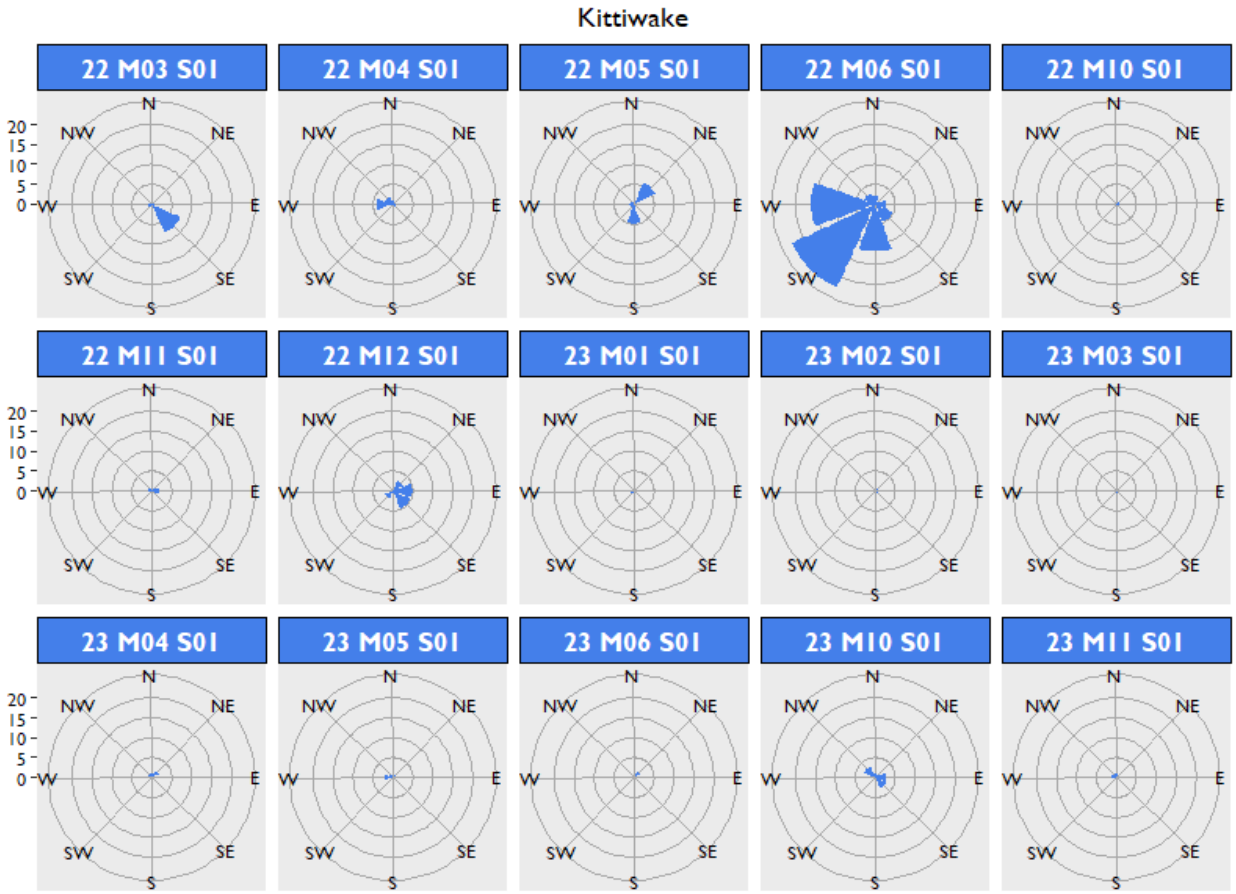


Figure 17 Summarised direction of movement of flying kittiwakes in the Bellrock survey area between March 2022 and February 2024

Note: Windrose plots are showing raw observations



3.3.3 Guillemot

79 Guillemot was the most abundant species recorded during the survey period, with observations peaking towards of the end of their breeding season and start of the post-breeding dispersal (Furness, 2015), with 1,600 individuals recorded in July 2022 (Figure 18). A total of 3,529 individuals were recorded across the 24-month period, with a total of 405 observations during the second year of surveys.

80 Absolute density estimates for the species ranged between 0.04 birds/km^2 (95% CI 0.00 – 0.09) in December 2023 and 33.56 birds/km^2 (95% CI 24.03 – 43.80) in July 2022 (Figure 19 and Table 14), equating to 26 birds (95% CI 0 – 62) and 22,088 birds (95% CI 15,819 – 28,827) respectively.

81 Guillemots were spread across the survey area, with higher densities present towards the west of the survey area in May, July and August 2022 (Figure 20). In September 2022, higher densities were observed in the east of the survey area and in February 2023, guillemots were distributed towards the west of the buffer (Figure 21). In other survey months, guillemots were widespread across the survey area.

82 Age data for guillemots are not presented since adults can only be aged when in the presence of a chick for size comparison. This generally only occurs during the post-breeding dispersal / moulting period (July and August) when birds are completely flightless and accompanied by flightless chicks. They occur almost always as single adult-chick pairs. . In July 2022, over 225 adult-chick pairs were recorded and in August 2022, three adult-chick pairs were recorded. There were no adult-chick pairs observed in 2023.

83 As expected for the species, the majority of individuals were recorded sitting on the water, with only 8% of all birds recorded as flying (Table 15). One dead bird was recorded in July 2022 and one in August 2022.

84 There were survey months in which no data regarding flight direction were available, therefore, only surveys which contained flight direction data are displayed (Figure 24). In April 2022, when flying numbers peaked, birds were mainly heading in northerly and westerly directions, while in May 2023 birds were mainly flying in a southern direction.

Figure 18 Number of guillemots recorded between March 2022 and February 2024 in the Bellrock survey area

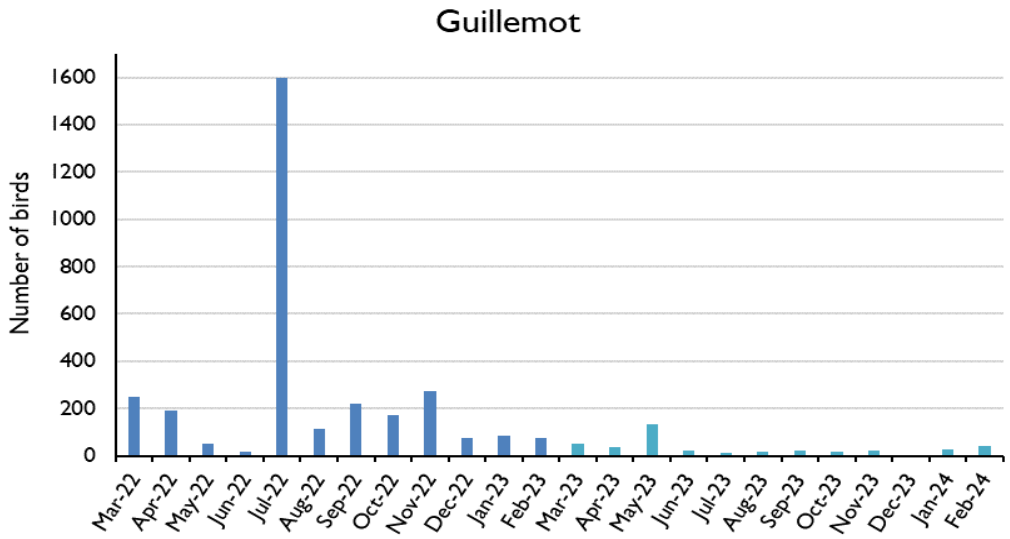


Figure 19 Guillemot absolute apportioned density estimates in the Bellrock survey area, between March 2022 and February 2024. Error bars represent the 95% lower and upper confidence limits.

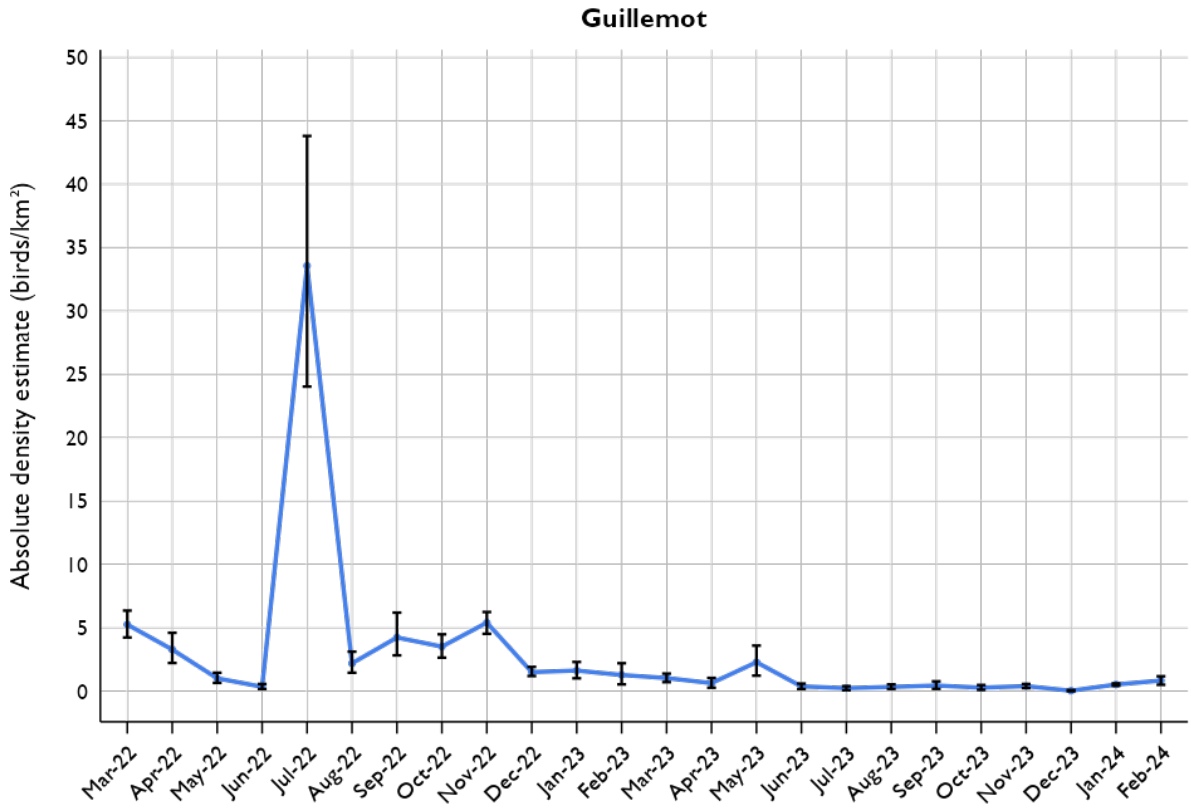


Table 15 Apportioned relative and absolute monthly density and apportioned population estimates for guillemot in the Bellrock survey area between March 2022 and February 2024, corrected for birds estimated as unavailable for detection

Survey date	Relative population estimates						Absolute population estimates					
	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
15 March 2022	4.05	2664	2129	3222	287	10.76	5.26	3470	2793	4191	367	10.58
17 April 2022	2.79	1838	1400	2359	251	13.62	3.29	2162	1470	3034	307	14.20
14 May 2022	0.80	526	338	736	101	19.18	1.02	666	432	956	126	18.92
06 June 2022	0.26	175	95	255	43	24.37	0.35	232	115	378	59	25.43
19 July 2022	25.49	16778	11967	22177	2527	15.06	33.56	22088	15819	28827	3250	14.71
07 August 2022	1.69	1111	730	1580	214	19.19	2.20	1449	966	2058	270	18.63
07 September 2022	3.25	2142	1402	2988	415	19.35	4.24	2790	1863	4079	539	19.32
02 October 2022	2.69	1769	1326	2247	231	13.02	3.52	2318	1741	2961	316	13.63
03 November 2022	4.16	2740	2347	3111	196	7.13	5.41	3558	2986	4116	262	7.36
20 December 2022	1.19	782	637	976	91	11.58	1.51	997	796	1266	104	10.43
20 January 2023	1.26	831	578	1104	140	16.75	1.63	1076	676	1523	171	15.89
04 February 2023	1.11	734	349	1235	231	31.47	1.28	846	356	1453	212	25.06
04 March 2023	0.81	531	409	662	64	12.05	1.04	690	474	916	98	14.20
03 April 2023	0.55	360	220	491	70	19.34	0.64	425	188	689	93	21.88
04 May 2023	2.01	1321	785	1953	301	22.78	2.29	1508	817	2371	289	19.16

Survey date	Relative population estimates						Absolute population estimates					
	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
13 June 2023	0.30	196	107	295	47	24.03	0.38	247	112	398	57	23.08
07 July 2023	0.19	128	59	194	35	27.20	0.24	157	51	267	41	26.11
17 August 2023	0.26	173	97	267	45	25.58	0.34	228	126	359	59	25.88
04 September 2023	0.34	224	97	376	72	32.19	0.45	294	122	517	98	33.33
13 October 2023	0.23	149	67	243	46	30.54	0.28	187	71	328	55	29.41
14 November 2023	0.31	203	133	277	37	17.80	0.40	266	169	381	48	18.05
10 December 2023	0.03	20	0	48	13	65.40	0.04	26	0	62	17	65.38
30 January 2024	0.42	275	215	340	32	11.47	0.53	349	288	407	32	9.17
08 February 2024	0.63	416	262	578	83	19.91	0.84	558	338	781	115	20.61

Table 16 Summary of guillemot behaviours in the Bellrock survey area between March 2022 and February 2024

Survey date	Number recorded diving	Number recorded flying	Number recorded sitting	Number recorded taking off	% Flying	Total live birds	Number recorded dead
15 March 2022	0	1	249	0	0	**250**	0
17 April 2022	0	86	103	0	46	**189**	0
14 May 2022	0	2	51	0	4	**53**	0
06 June 2022	0	1	16	0	6	**17**	0
19 July 2022	0	3	1591	6	0	**1600**	1
07 August 2022	0	1	111	0	1	**112**	1
07 September 2022	0	0	219	0	0	**219**	0
02 October 2022	0	2	172	0	1	**174**	0
03 November 2022	0	7	267	0	3	**274**	0
20 December 2022	0	6	68	0	8	**74**	0
20 January 2023	0	11	74	0	13	**85**	0
04 February 2023	0	42	35	0	55	**77**	0
04 March 2023	0	3	50	0	6	**53**	0
03 April 2023	0	16	20	0	44	**36**	0
04 May 2023	0	77	58	0	57	**135**	0
13 June 2023	0	4	16	0	20	**20**	0
07 July 2023	0	3	10	0	23	**13**	0
17 August 2023	0	0	18	0	0	**18**	0
04 September 2023	0	1	21	0	5	**22**	0
13 October 2023	0	2	13	0	13	**15**	0
14 November 2023	0	1	20	0	5	**21**	0
10 December 2023	0	0	2	0	0	**2**	0
30 January 2024	1	0	26	0	0	**27**	0
08 February 2024	0	0	43	0	0	**43**	0
Total	**1**	**269**	**3253**	**6**	**8**	**3529**	**2**

Figure 20 Density of guillemots (number/km²) and number of detections per segment in the Bellrock survey area between March and August 2022

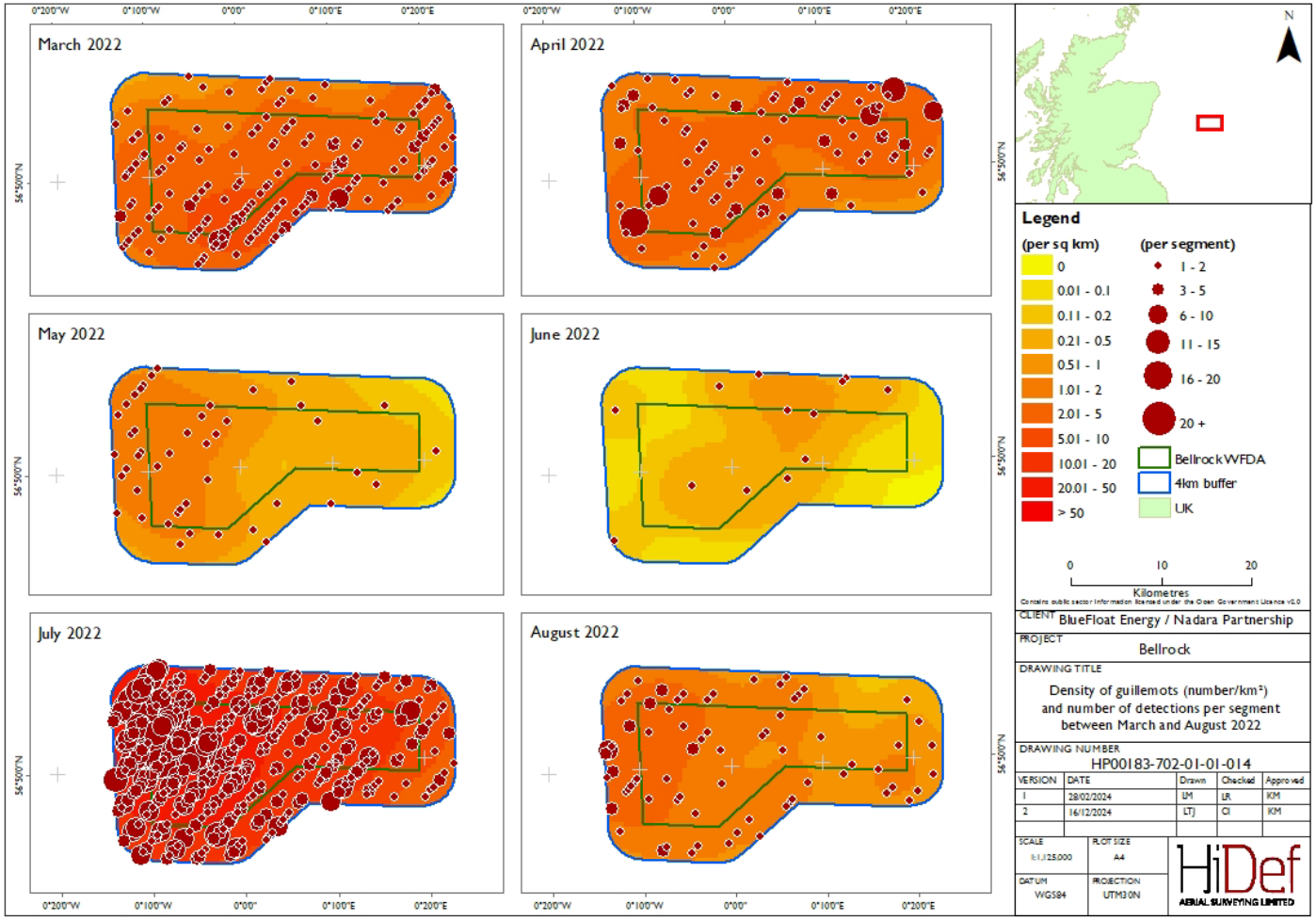


Figure 21 Density of guillemots (number/km²) and number of detections per segment in the Bellrock survey area between September 2022 and February 2023

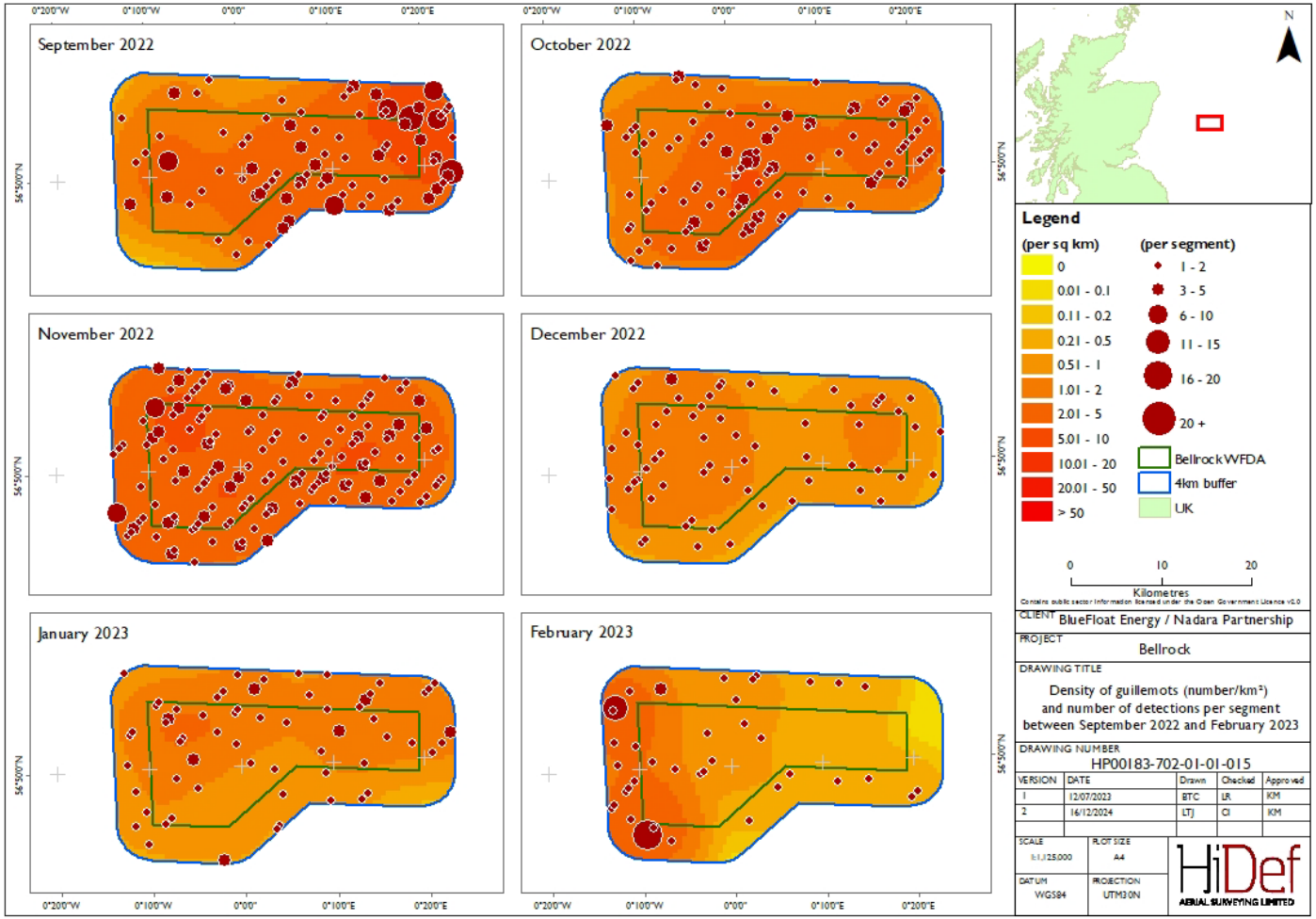


Figure 22 Density of guillemots (number/km²) and number of detections per segment in the Bellrock survey area between March and August 2023

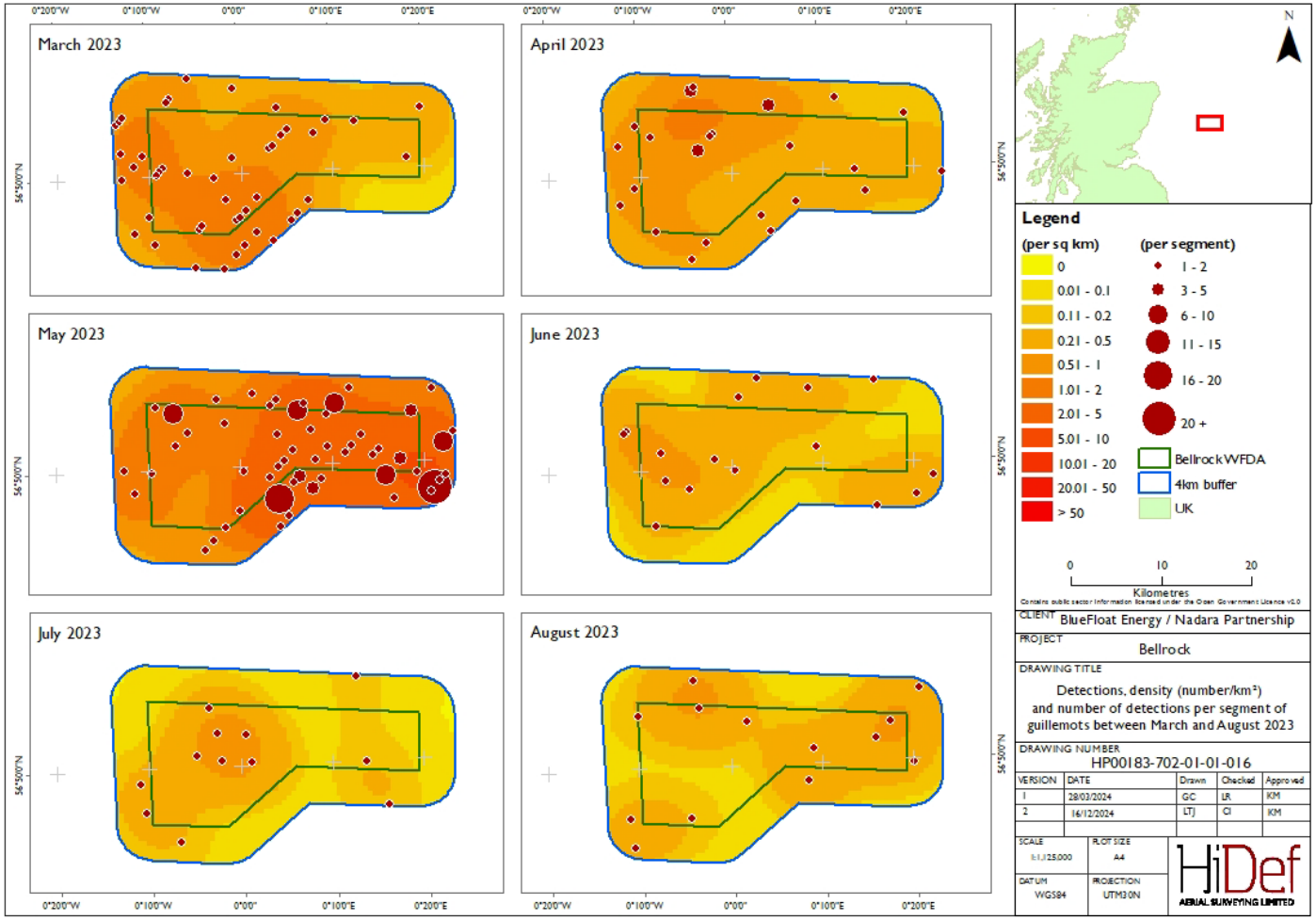


Figure 23 Detections, density of guillemots (number/km²) and number of detections per segment in the Bellrock survey area between September 2023 and February 2024

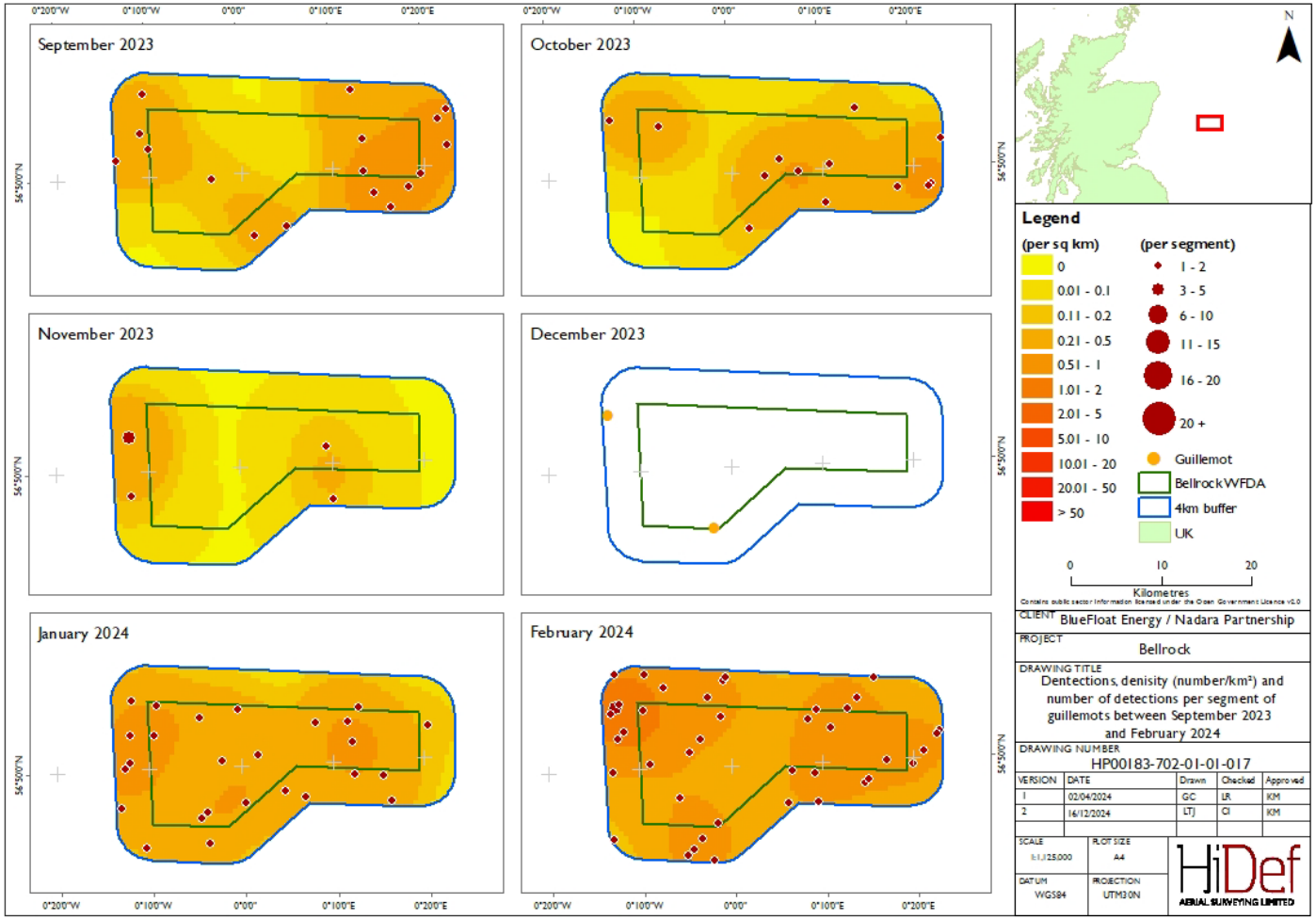
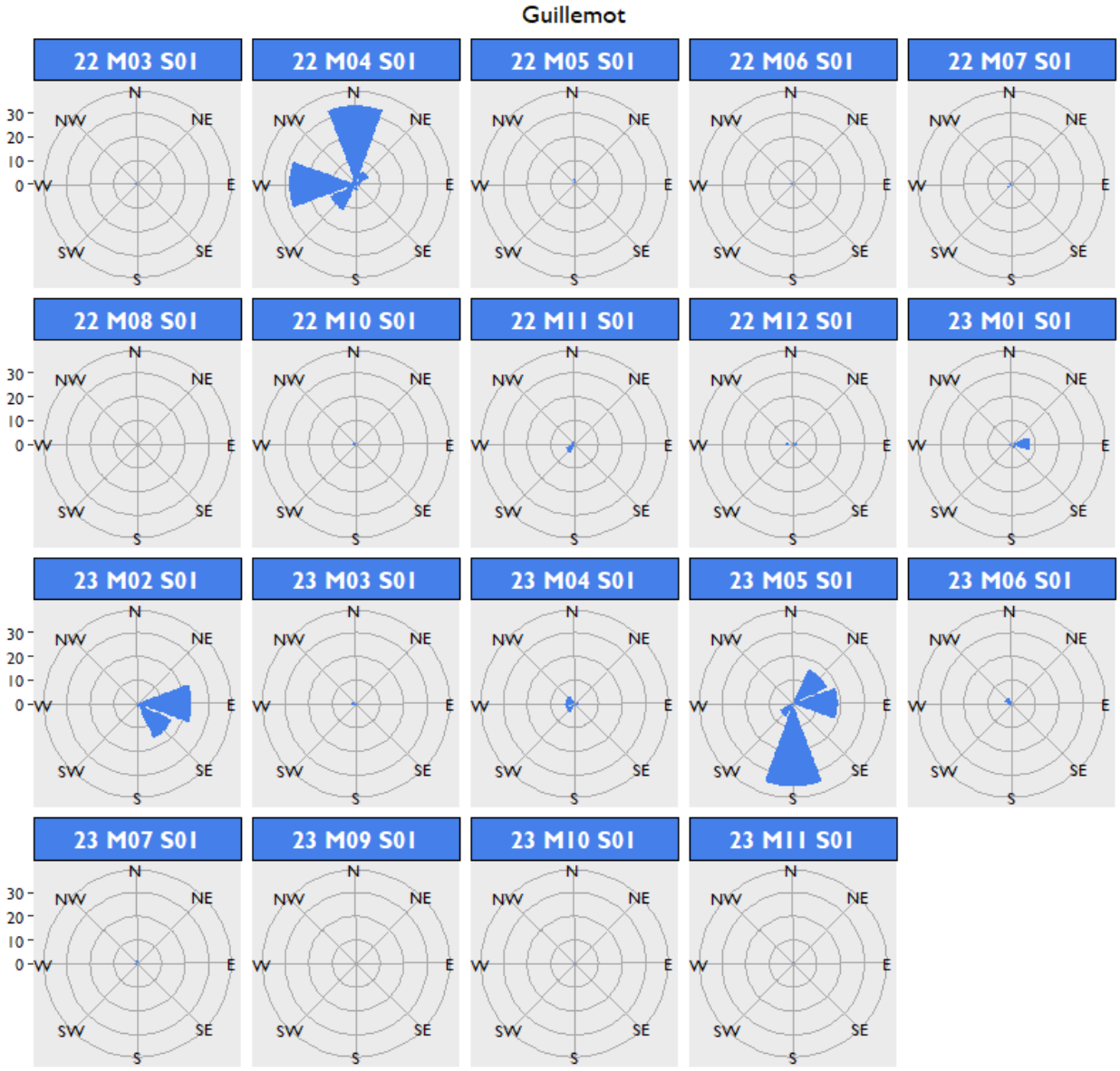


Figure 24 Summarised direction of movement of flying guillemots in the Bellrock survey area between March 2022 and February 2024

Note: Windrose plots are showing raw observations



3.3.4 Razorbill

85 Razorbills were the third most abundant species recorded when summed across the entire survey period, however they were only observed in seven months of the 24-month survey period (Figure 25). Numbers peaked in July 2022 with 261 individuals recorded.

86 When recorded, absolute density estimates for the species ranged between 0.01 birds/km^2 (95% CI 0.00 – 0.05) in November 2023 and 5.32 birds/km^2 (95% CI 4.19 – 6.38) in July 2022 (Figure 26 and Table 16), equating to 12 birds (95% CI 0 – 35) and 3,497 birds (95% CI 2,756 – 4,199) respectively.

87 When abundance peaked in July 2022, razorbills were found throughout the survey area with highest densities recorded in the west of the survey area (Figure 27). In March 2022, razorbills were distributed towards the south and east (Figure 27) and in February 2023, higher densities were observed in the south-west of the buffer (Figure 28).

88 Age data for razorbills, like for guillemots, are not presented since adults can only be aged when in the presence of a chick for size comparison. This generally only occurs during the post-breeding dispersal / moulting period (July and August) when birds are completely flightless and accompanied by flightless chicks. They occur almost always as single adult-chick pairs. In July 2022 24 adult-chick pairs were recorded. There were no pairs observed in 2023.

89 As expected for the species, the majority of the birds were recorded sitting on the water, with only 2% of all birds recorded as flying (Table 17). No dead birds were recorded.

90 There were survey months in which no data regarding flight direction were available, therefore, only surveys which contained flight direction data are displayed (Figure 31). In February 2023, when numbers of flying razorbills peaked, birds were mainly heading in easterly directions, while in June 2022, one bird was flying south-west.

Figure 25 Number of razorbills recorded between March 2022 and February 2024 in the Bellrock survey area

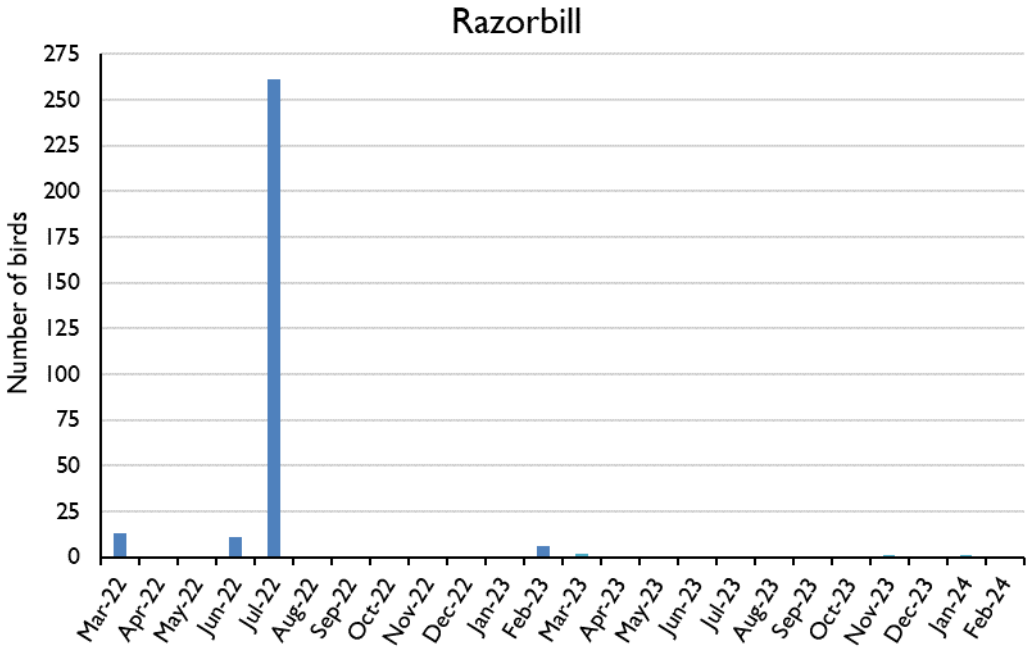


Figure 26 **Razorbill absolute apportioned density estimates in the Bellrock survey area, between March 2022 and February 2024. Error bars represent the 95% lower and upper confidence limits**

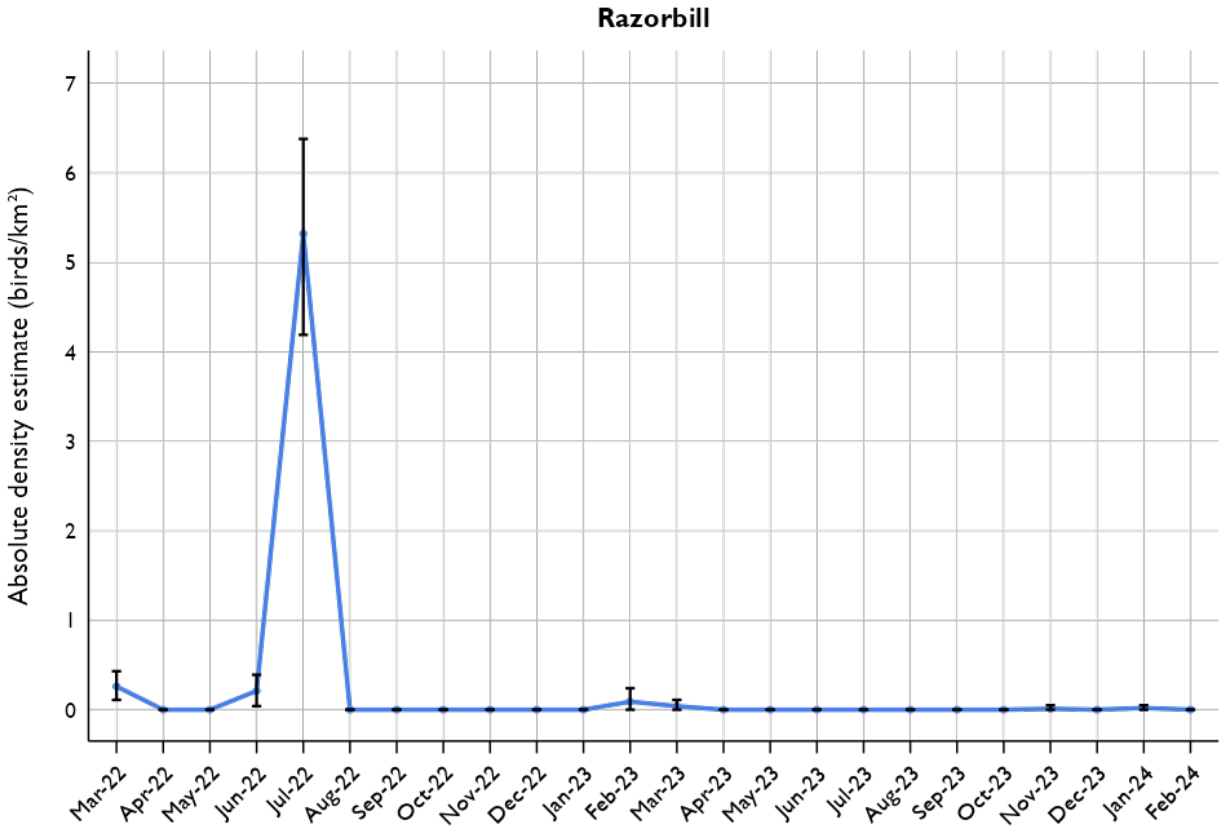


Table 17 Apportioned relative and absolute monthly density and apportioned population estimates for razorbill in the Bellrock survey area between March 2022 and February 2024, corrected for birds estimated as unavailable for detection

Survey date	Relative population estimates						Absolute population estimates					
	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
15 March 2022	0.21	142	65	231	43	30.25	0.26	172	75	279	55	31.98
17 April 2022	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
14 May 2022	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
06 June 2022	0.17	115	37	201	43	37.55	0.21	137	24	265	56	40.88
19 July 2022	4.32	2844	2267	3392	293	10.30	5.32	3497	2756	4199	361	10.32
07 August 2022	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
07 September 2022	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
02 October 2022	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
03 November 2022	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
20 December 2022	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
20 January 2023	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
04 February 2023	0.09	58	0	152	43	74.57	0.09	58	0	155	45	77.59
04 March 2023	0.03	21	0	58	18	86.85	0.04	24	0	71	22	91.67
03 April 2023	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
04 May 2023	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00

Survey date	Relative population estimates						Absolute population estimates					
	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
13 June 2023	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
07 July 2023	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
17 August 2023	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
04 September 2023	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
13 October 2023	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
14 November 2023	0.01	10	0	29	10	95.16	0.01	12	0	35	12	100.00
10 December 2023	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
30 January 2024	0.02	11	0	29	9	88.16	0.02	12	0	37	11	91.67
08 February 2024	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00

Table 18 Summary of razorbill behaviours in the Bellrock survey area between March 2022 and February 2024

Survey date	Number recorded diving	Number recorded flying	Number recorded sitting	Number recorded taking off	% Flying	Total live birds	Number recorded dead
15 March 2022	0	0	13	0	0	**13**	0
17 April 2022	0	0	0	0	-	**0**	0
14 May 2022	0	0	0	0	-	**0**	0
06 June 2022	0	1	10	0	9	**11**	0
19 July 2022	0	0	261	0	0	**261**	0
07 August 2022	0	0	0	0	-	**0**	0
07 September 2022	0	0	0	0	-	**0**	0
02 October 2022	0	0	0	0	-	**0**	0
03 November 2022	0	0	0	0	-	**0**	0
20 December 2022	0	0	0	0	-	**0**	0
20 January 2023	0	0	0	0	-	**0**	0
04 February 2023	0	6	0	0	100	**6**	0
04 March 2023	0	0	2	0	0	**2**	0
03 April 2023	0	0	0	0	-	**0**	0
04 May 2023	0	0	0	0	-	**0**	0
13 June 2023	0	0	0	0	-	**0**	0
07 July 2023	0	0	0	0	-	**0**	0
17 August 2023	0	0	0	0	-	**0**	0
04 September 2023	0	0	0	0	-	**0**	0
13 October 2023	0	0	0	0	-	**0**	0
14 November 2023	0	0	1	0	0	**1**	0
10 December 2023	0	0	0	0	-	**0**	0
30 January 2024	0	0	1	0	0	**1**	0
08 February 2024	0	0	0	0	-	**0**	0
Total	**0**	**7**	**288**	**0**	**2**	**295**	**0**

Figure 27 Density (number/km²) and number of detections per segment of razorbills in the Bellrock survey area between March and August 2022

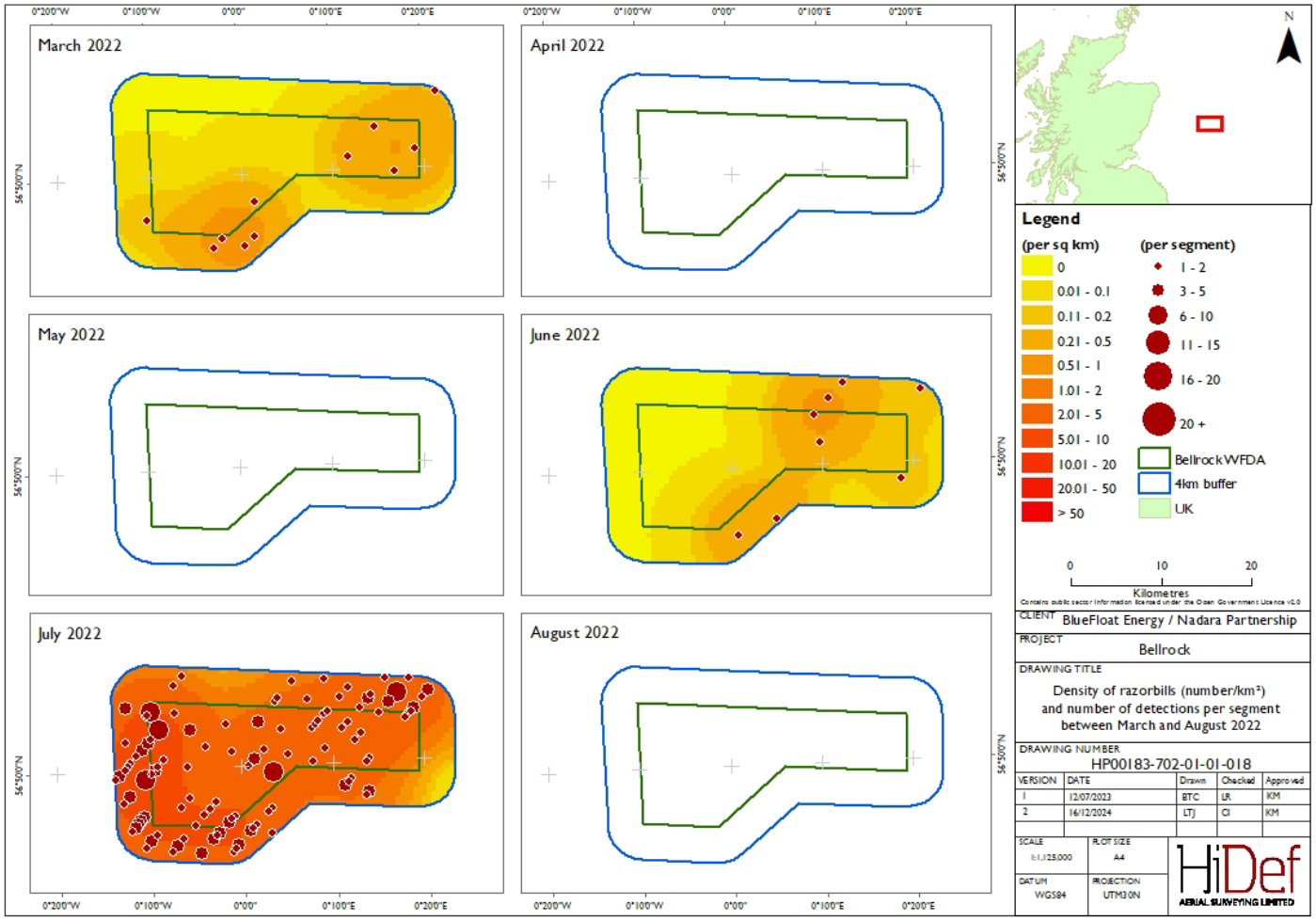


Figure 28 Density of razorbills (number/km²) and number of detections per segment in the Bellrock survey area between September 2022 and February 2023

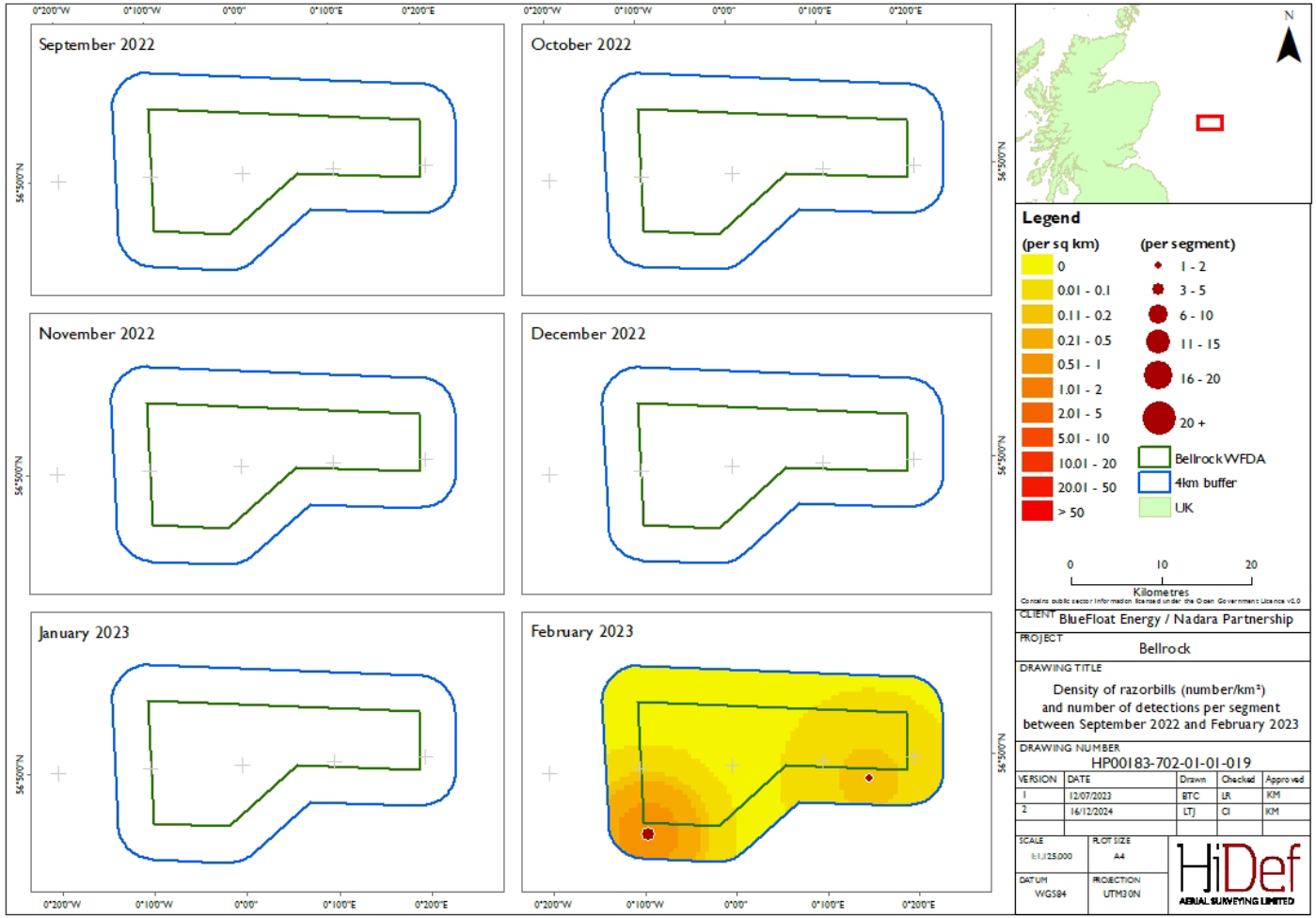


Figure 29 Detections of razorbills in the Bellrock survey area between March and August 2023

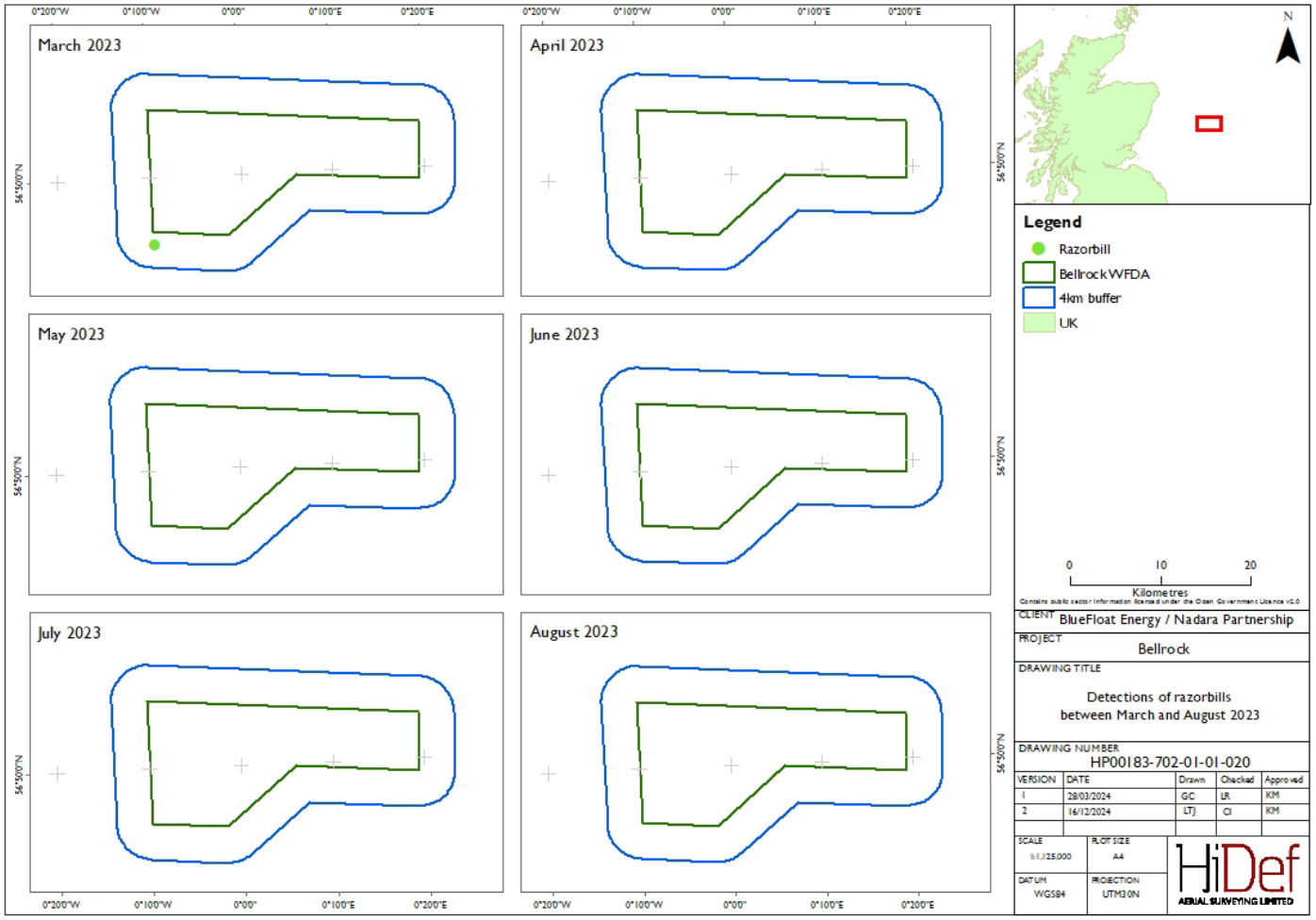


Figure 30 Detections of razorbills in the Bellrock survey area between September 2023 and February 2024

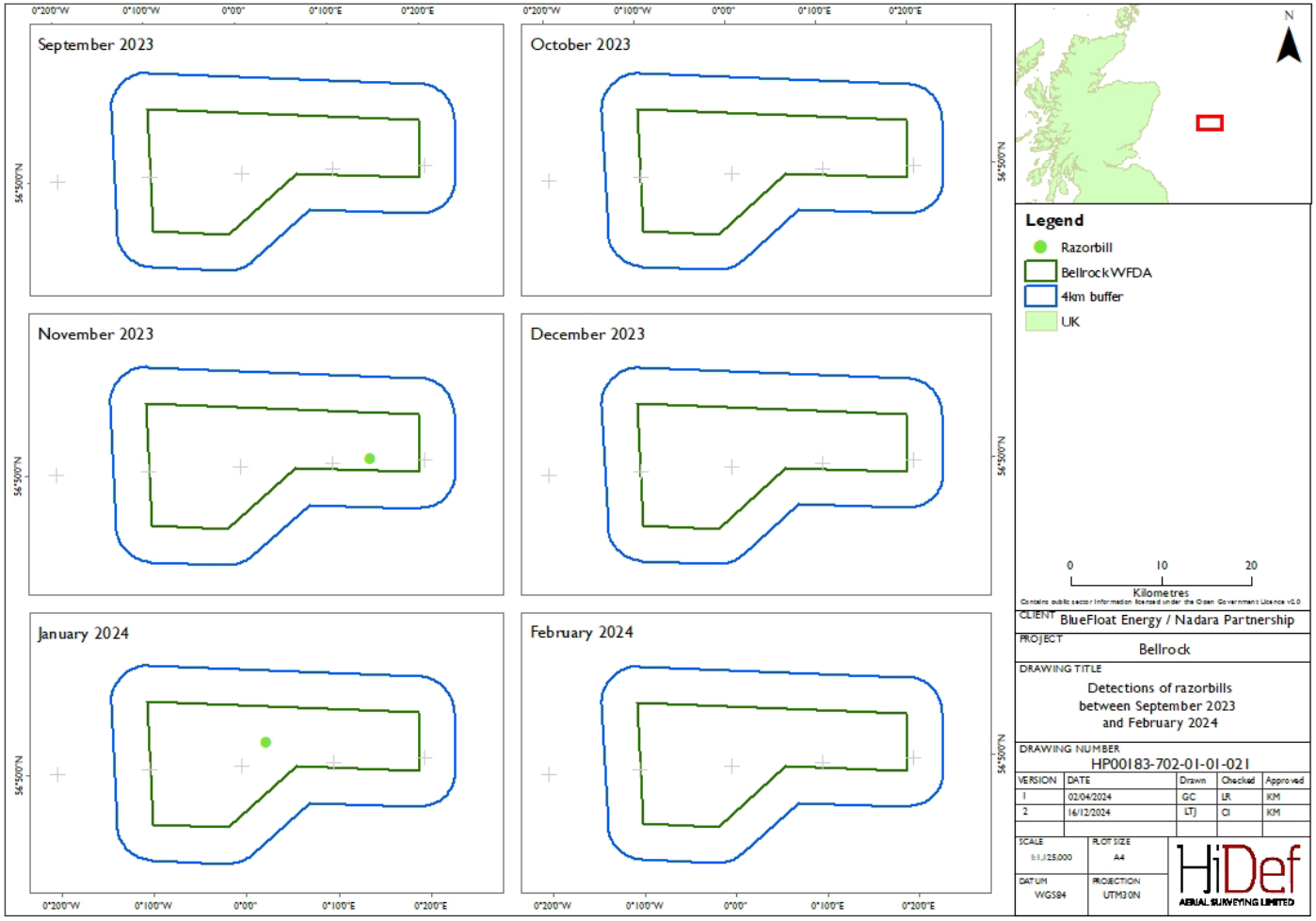
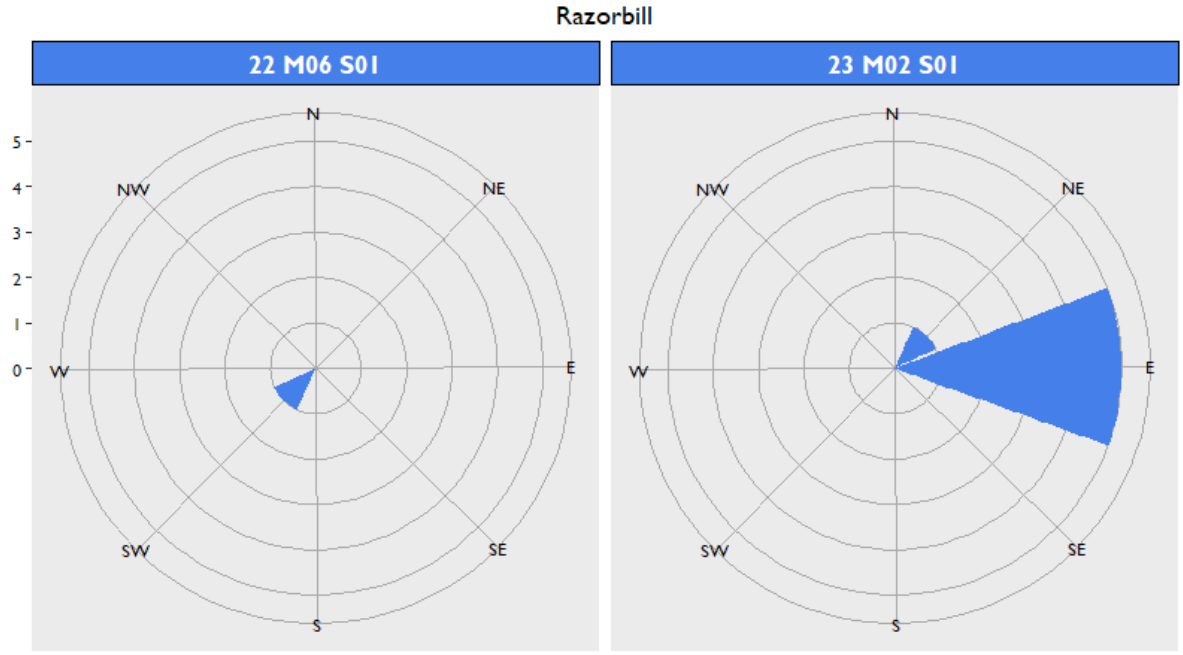


Figure 31 Summarised direction of movement of flying razorbills in the Bellrock survey area between March 2022 and February 2024

Note: Windrose plots are showing raw observations



3.3.5 Puffin

91 Puffins were recorded in lower numbers over the survey period compared to other key species, peaking in March 2022 with 61 observations (Figure 32). Puffins were recorded in higher numbers between March 2022 to September 2022, with numbers decreasing from October 2022 through to February 2023. Records increased between March 2023 to June 2023, with a peak in February 2024 during the second year of surveys.

92 When recorded, absolute density estimates for the species ranged between 0.01 birds/km^2 (95% CI 0.00 – 0.05) in April and November 2023 and 1.56 birds/km^2 (95% CI 1.21 – 1.90) in March 2022 (Figure 33 and Table 18), equating to 12 birds (95% CI 0 – 34) and 1,031 birds (95% CI 799 – 1,253) respectively.

93 In March 2022 when numbers peaked, puffins were observed in higher densities in the south of the survey area (Figure 34). In April, May and July 2022, higher densities were found in the WFDA. In September 2022, October 2022 and February 2024, higher densities were estimated in the north-west (Figure 35 and Figure 37).

94 Over the survey period, all puffins were recorded as sitting on the water. No dead birds were recorded.

Figure 32 Number of puffins recorded between March 2022 and February 2024 in the Bellrock survey area

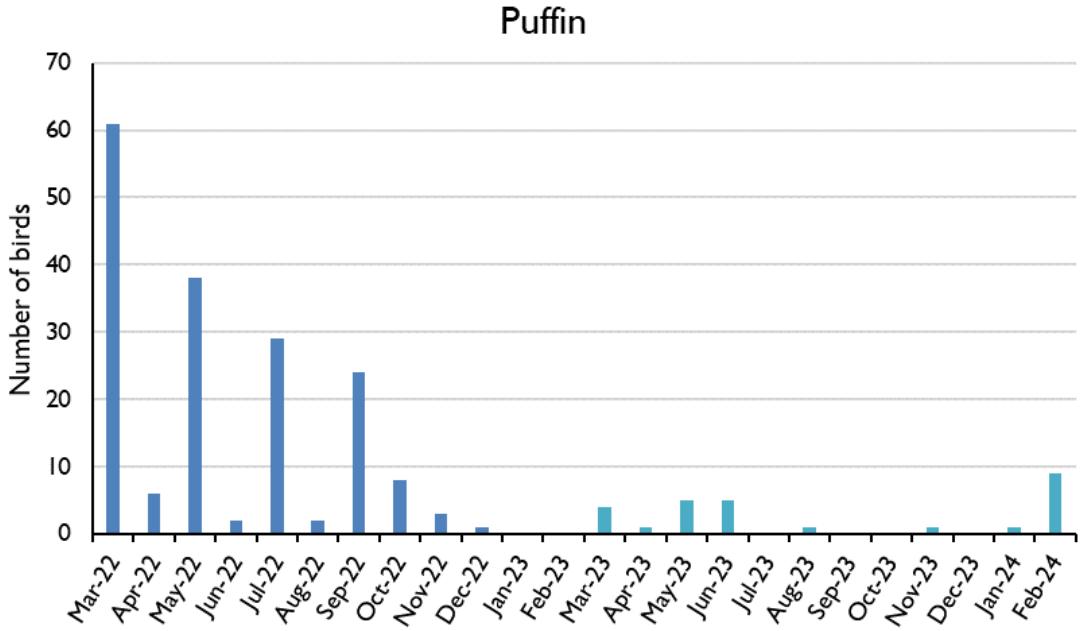


Figure 33 **Puffin absolute apportioned density estimates in the Bellrock survey area, between March 2022 and February 2024. Error bars represent the 95% lower and upper confidence limits,**

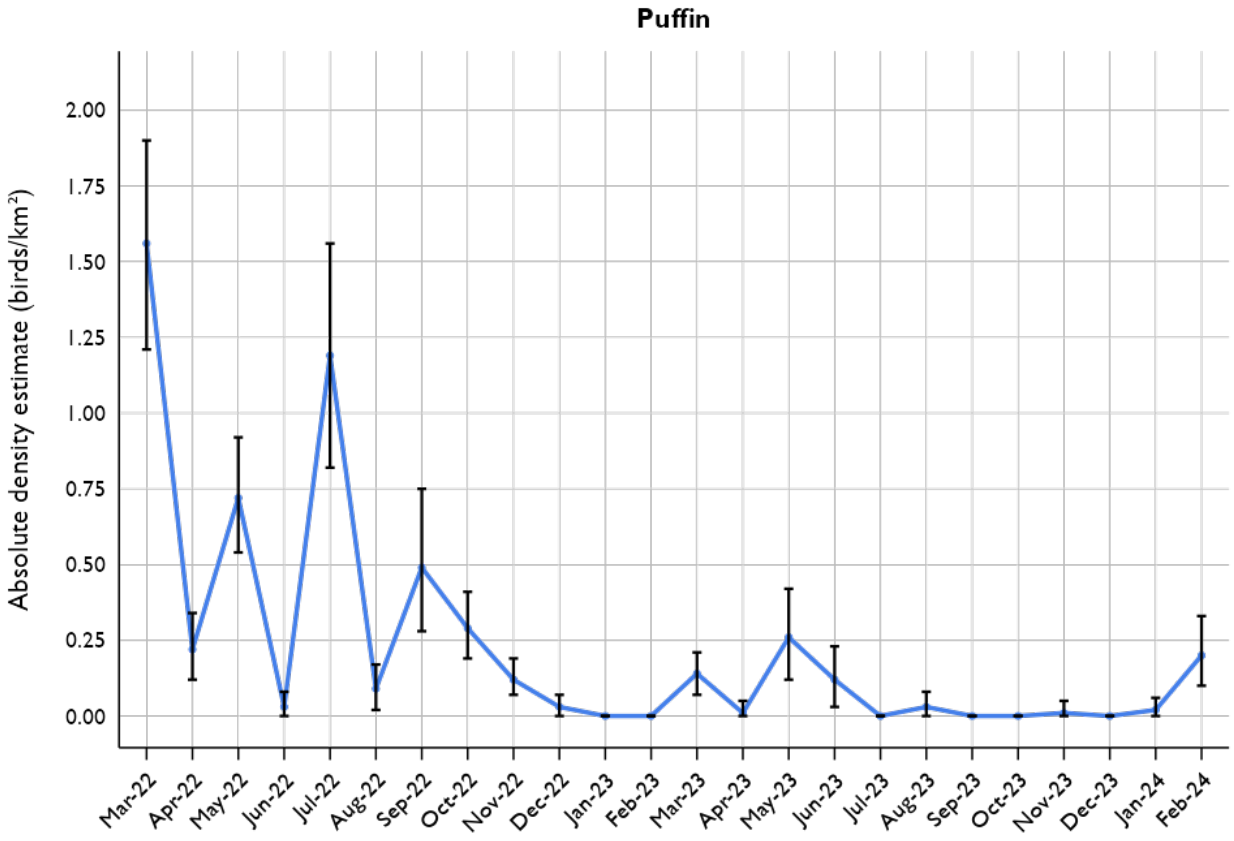


Table 19 **Apportioned relative and absolute monthly density and apportioned population estimates for puffin in the Bellrock survey area between March 2022 and February 2024, corrected for birds estimated as unavailable for detection**

Survey date	Relative population estimates						Absolute population estimates					
	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
15 March 2022	1.36	895	691	1094	102	11.34	1.56	1031	799	1253	118	11.45
17 April 2022	0.19	128	66	204	36	27.78	0.22	148	76	225	40	27.03
14 May 2022	0.61	405	301	523	58	14.26	0.72	478	354	607	68	14.23
06 June 2022	0.03	20	0	47	12	61.82	0.03	24	0	55	15	62.50
19 July 2022	1.02	671	453	882	113	16.77	1.19	785	535	1029	127	16.18
07 August 2022	0.08	54	13	103	24	44.81	0.09	63	15	118	28	44.44
07 September 2022	0.42	280	158	411	65	23.02	0.49	324	188	493	79	24.38
02 October 2022	0.25	166	111	233	31	18.38	0.29	192	125	271	38	19.79
03 November 2022	0.10	69	37	104	18	25.65	0.12	79	43	121	21	26.58
20 December 2022	0.03	18	3	39	10	56.58	0.03	21	3	45	12	57.14
20 January 2023	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
04 February 2023	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
04 March 2023	0.12	80	39	122	22	27.78	0.14	91	45	141	26	28.57
03 April 2023	0.02	10	0	29	9	89.45	0.01	12	0	34	10	83.33

Survey date	Relative population estimates						Absolute population estimates					
	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
04 May 2023	0.22	147	66	242	46	30.98	0.26	172	77	280	54	31.40
13 June 2023	0.10	68	19	130	29	42.06	0.12	79	22	151	35	44.30
07 July 2023	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
17 August 2023	0.03	19	0	49	14	69.97	0.03	23	0	57	16	69.57
04 September 2023	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
13 October 2023	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
14 November 2023	0.02	11	0	37	10	95.32	0.01	12	0	34	12	100.00
10 December 2023	0.00	0	0	0	0	0.00	0.00	0	0	0	0	0.00
30 January 2024	0.02	14	0	36	10	71.29	0.02	15	0	38	12	80.00
08 February 2024	0.17	115	56	182	32	27.51	0.20	133	66	213	38	28.57

Figure 34 **Detections, density (number/km²) and number of detections per segment of puffins in the Bellrock survey area between March and August 2022**

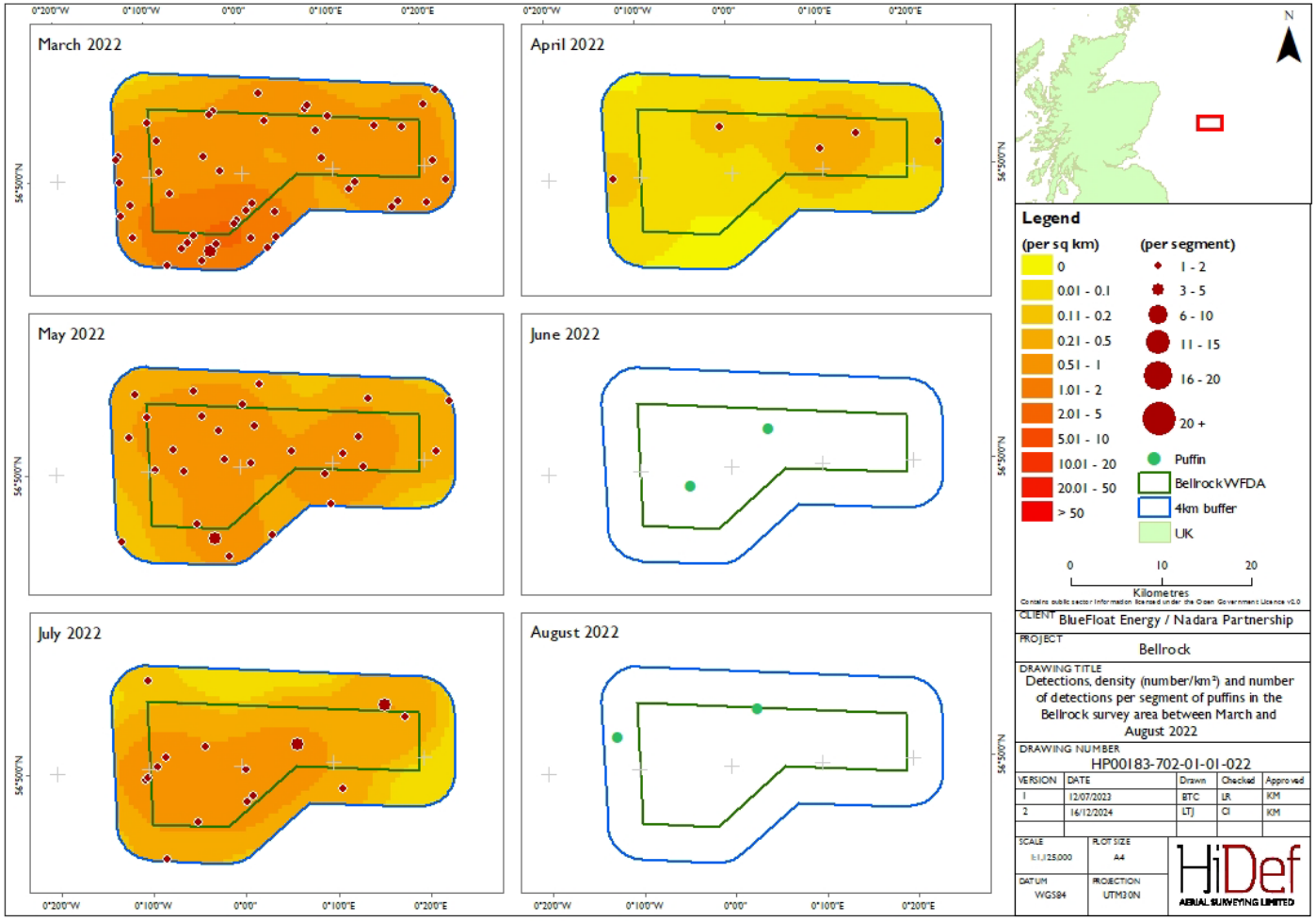


Figure 35 **Detections, density (number/km²) and number of detections per segment of puffins in the Bellrock survey area between September 2022 and February 2023**

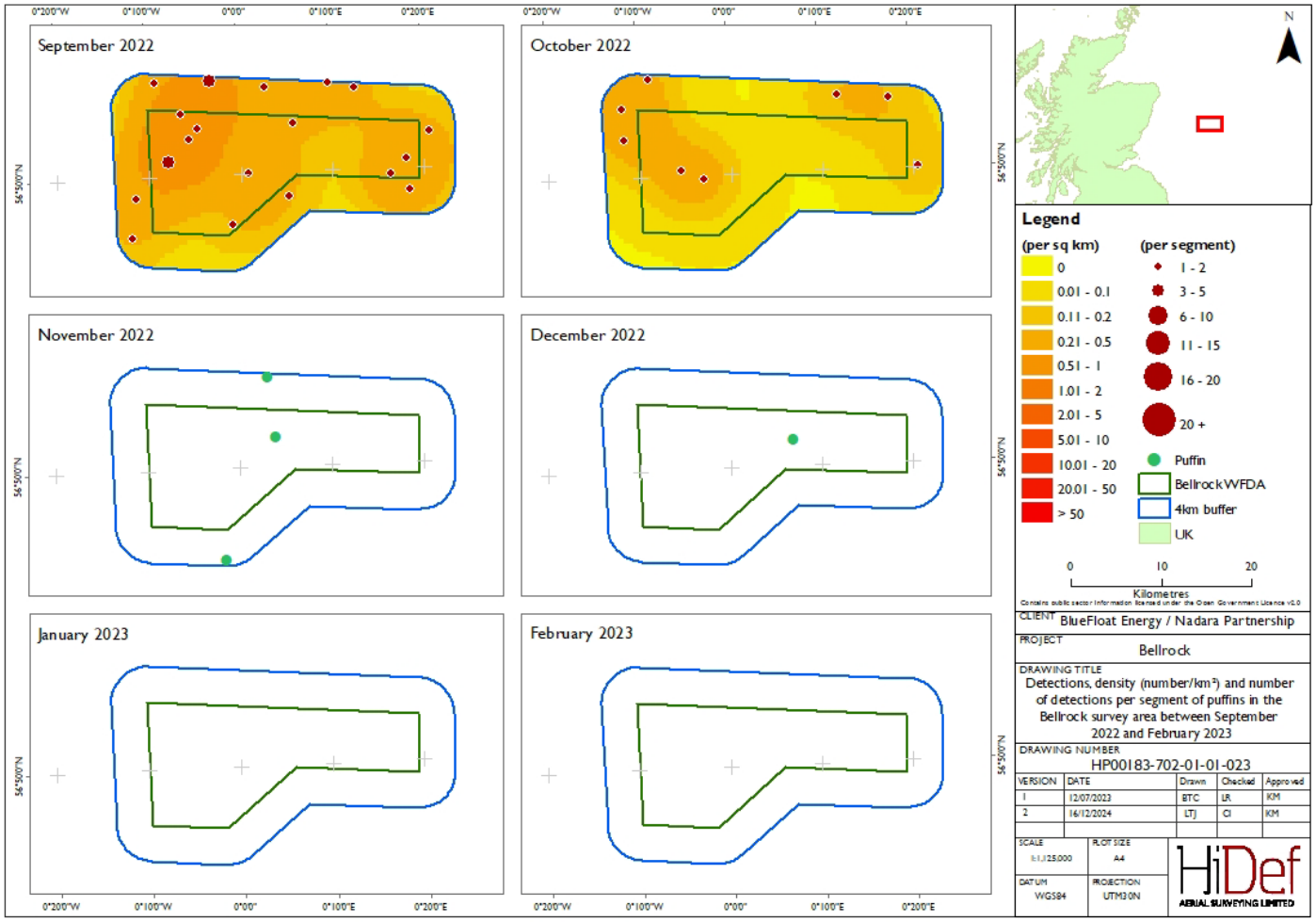


Figure 36 Detections of puffins in the Bellrock survey area between March and August 2023

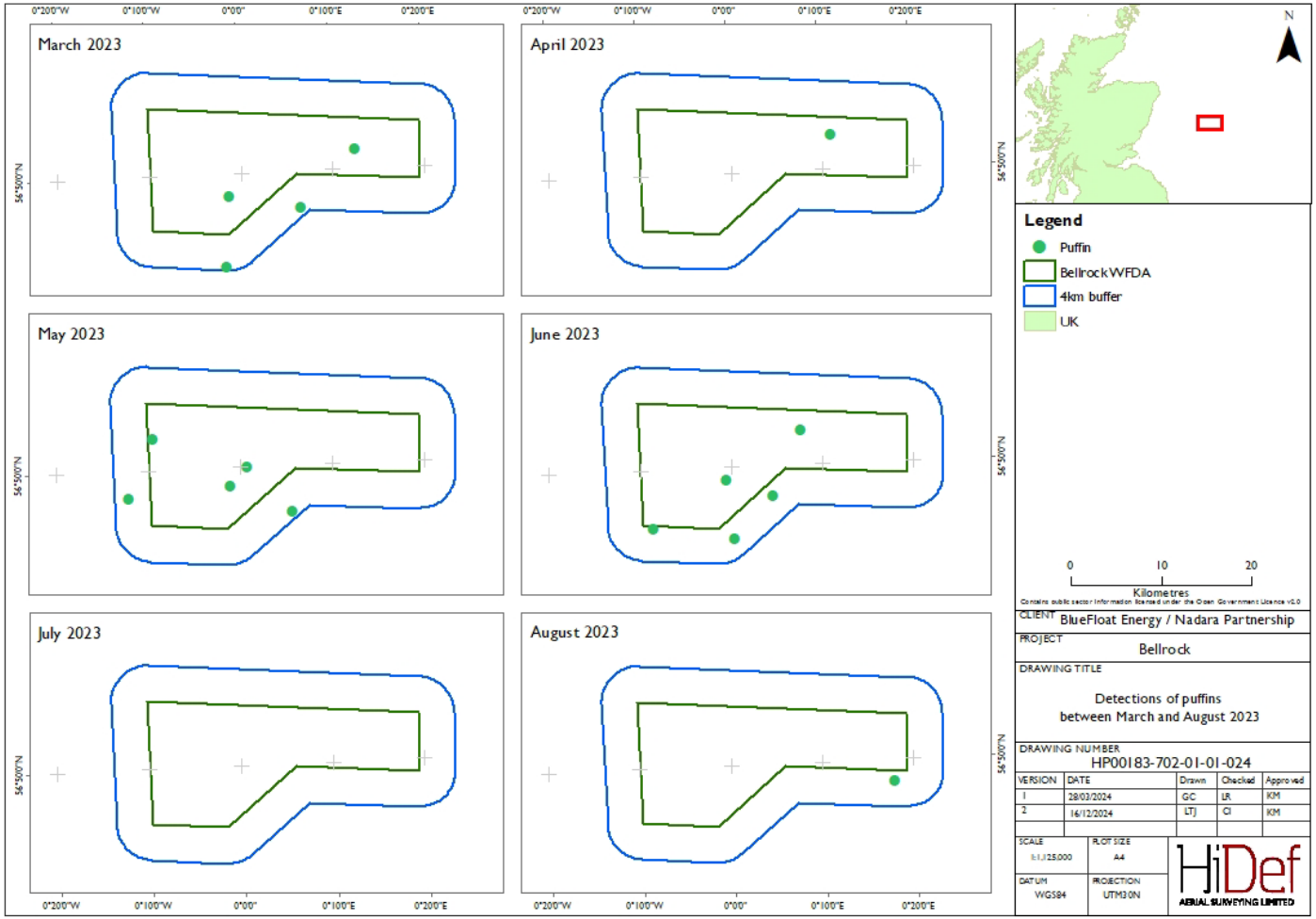
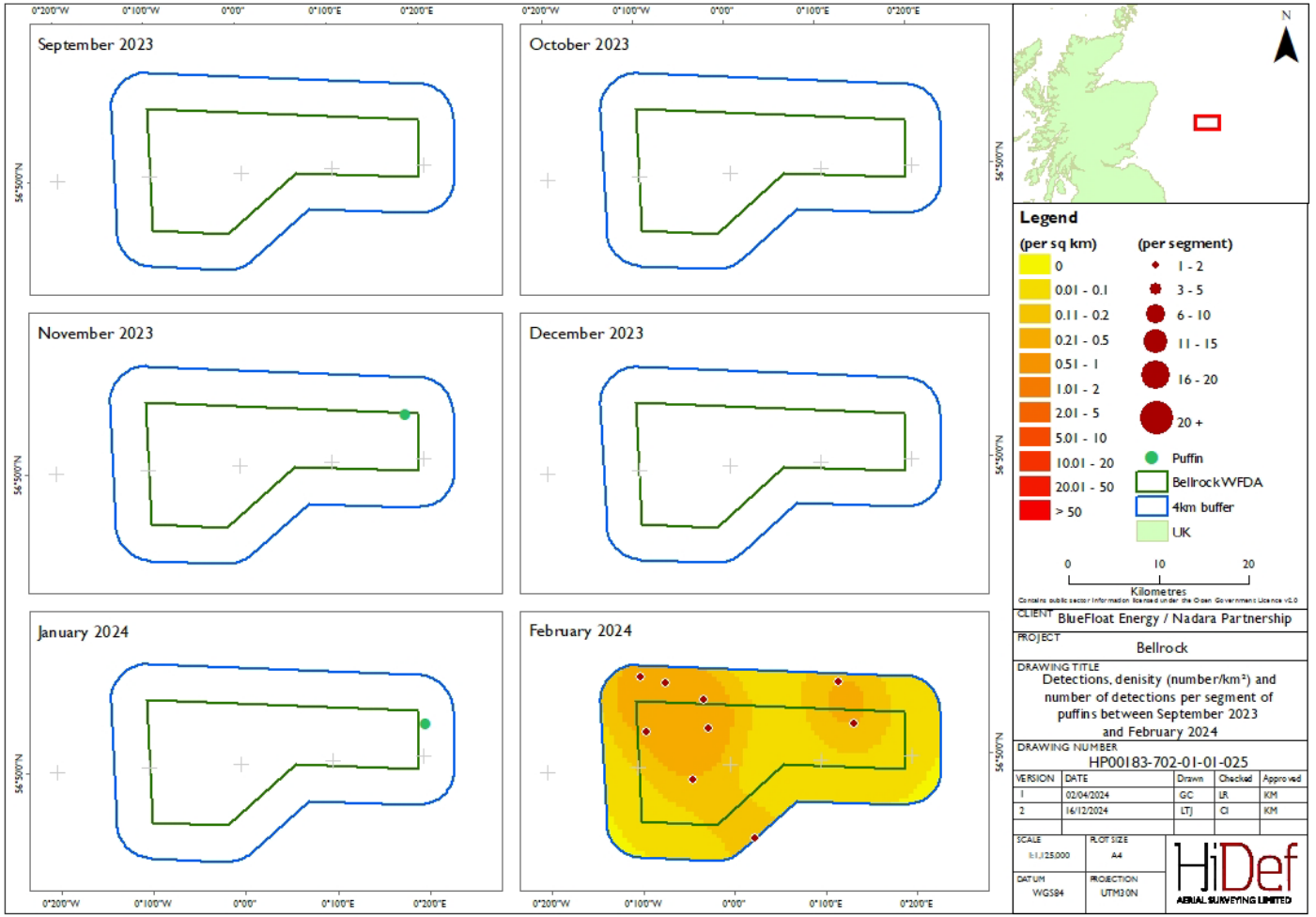


Figure 37 Detections, density (number/km²) and number of detections per segment of puffins in the Bellrock survey area between September 2023 and February 2024



3.3.6 Fulmar

95 Fulmars were the second most abundant species recorded across the survey period with observations in all 24 surveys. There was a marked peak in October 2023 during the post-breeding migration (Furness, 2015) (436 observations) (Figure 38).

96 When recorded, density estimates for the species ranged between 0.03 birds/km^2 (95% CI 0.00 – 0.07) such as in June 2023 and 6.40 birds/km^2 (95% CI 1.46 – 12.70) in October 2023 (Figure 39 and Table 19), equating to 19 birds (95% CI 0 – 48) and 4,214 birds (95% CI 963 – 8,361) respectively.

97 Fulmars were found throughout the survey area, distributed across both the WFDA and buffer (Figure 40 to Figure 43). In June 2022, fulmars were distributed towards the north and south-west of the survey area while in August 2022, towards the north-west. In October 2023 when abundance peaked, higher densities were observed in the north and west of the survey area (Figure 43).

98 Over the survey period, 58% of birds were recorded flying. Only 8% of the 24 birds recorded in September 2022 were observed as flying compared to April, June and July 2023 where all recorded birds were observed flying (Table 20). Two dead birds were recorded, one in August 2022 and one in July 2023.

99 Fulmars were recorded flying in all months and flight direction data are displayed in Figure 44. In October 2023, when the greatest number of flying birds were recorded, birds were mainly heading in north-easterly and easterly directions.

Figure 38 Number of fulmars recorded between March 2022 and February 2024 in the Bellrock survey area

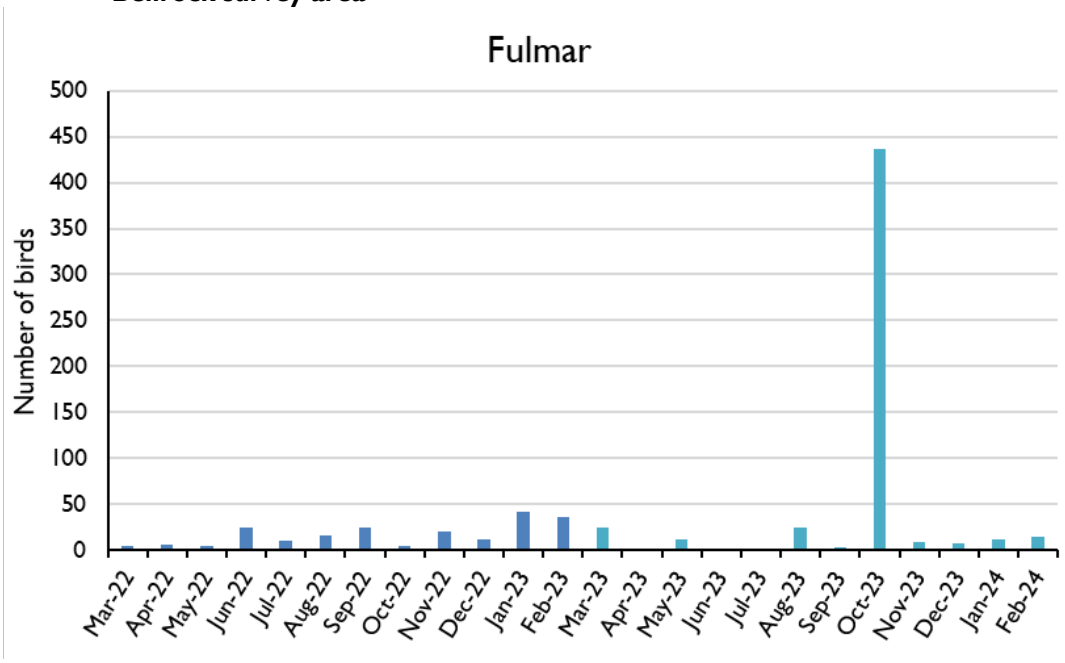


Figure 39 **Fulmar apportioned density estimates in the Bellrock survey area, between March 2022 and February 2024. Error bars represent the 95% lower and upper confidence limits,**

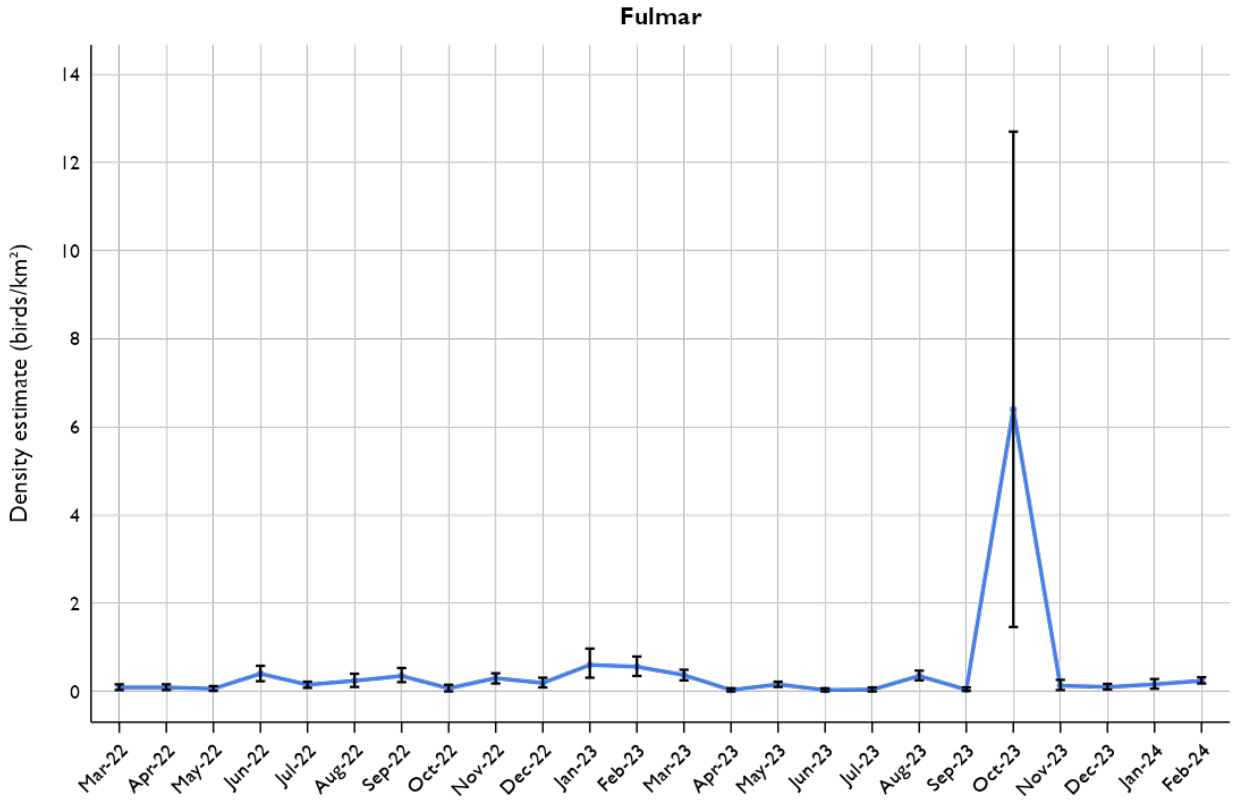


Table 20 Apportioned density and population estimates of fulmar in the Bellrock survey area between March 2022 and February 2024

Survey date	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
15 March 2022	0.09	61	20	108	22	36.12
17 April 2022	0.09	58	19	107	24	40.66
14 May 2022	0.06	39	9	81	20	50.47
06 June 2022	0.40	263	154	383	59	22.28
19 July 2022	0.15	98	55	142	23	23.19
07 August 2022	0.24	158	67	265	51	32.26
07 September 2022	0.35	234	139	349	55	23.22
02 October 2022	0.07	48	0	99	25	51.72
03 November 2022	0.30	195	121	267	38	19.20
20 December 2022	0.19	123	59	207	39	31.10
20 January 2023	0.60	395	207	639	114	28.65
04 February 2023	0.56	367	228	521	76	20.56
04 March 2023	0.37	245	164	325	42	17.20
03 April 2023	0.03	20	0	47	13	62.13
04 May 2023	0.16	106	66	145	20	18.72
13 June 2023	0.03	19	0	48	13	68.71
07 July 2023	0.04	30	0	58	15	48.64
17 August 2023	0.35	233	165	311	38	16.08
04 September 2023	0.04	30	10	57	14	45.04
13 October 2023	6.40	4214	963	8361	1911	45.34
14 November 2023	0.13	89	20	170	38	42.31
10 December 2023	0.10	67	28	110	22	32.53
30 January 2024	0.16	107	39	184	37	34.56
08 February 2024	0.24	157	116	209	25	15.38

Table 21 Summary of fulmar behaviours in the Bellrock survey area between March 2022 and February 2023

Survey date	Number recorded diving	Number recorded flying	Number recorded sitting	Number recorded taking off	% Flying	Total live birds	Number recorded dead
15 March 2022	0	3	2	0	60	**5**	0
17 April 2022	0	3	3	0	50	**6**	0
14 May 2022	0	3	1	0	75	**4**	0
06 June 2022	0	15	9	0	62	**24**	0
19 July 2022	0	6	4	0	60	**10**	0
07 August 2022	0	7	9	0	44	**16**	1
07 September 2022	0	2	22	0	8	**24**	0
02 October 2022	0	3	2	0	60	**5**	0
03 November 2022	0	8	12	0	40	**20**	0
20 December 2022	0	8	3	0	73	**11**	0
20 January 2023	0	24	16	1	59	**41**	0
04 February 2023	0	32	4	0	89	**36**	0
04 March 2023	0	14	11	0	56	**25**	0
03 April 2023	0	2	0	0	100	**2**	0
04 May 2023	0	7	4	0	64	**11**	0
13 June 2023	0	2	0	0	100	**2**	0
07 July 2023	0	2	0	0	100	**2**	1
17 August 2023	0	10	14	0	42	**24**	0
04 September 2023	0	1	2	0	33	**3**	0
13 October 2023	0	259	164	13	59	**436**	0
14 November 2023	0	7	2	0	78	**9**	0
10 December 2023	0	5	3	0	62	**8**	0
30 January 2024	0	8	3	0	73	**11**	0
08 February 2024	0	7	8	0	47	**15**	0
Total	**0**	**438**	**298**	**14**	**58**	**750**	**2**

Figure 40 Detections, density (number/km²) and number of detections per segment of fulmars in the Bellrock survey area between March and August 2022

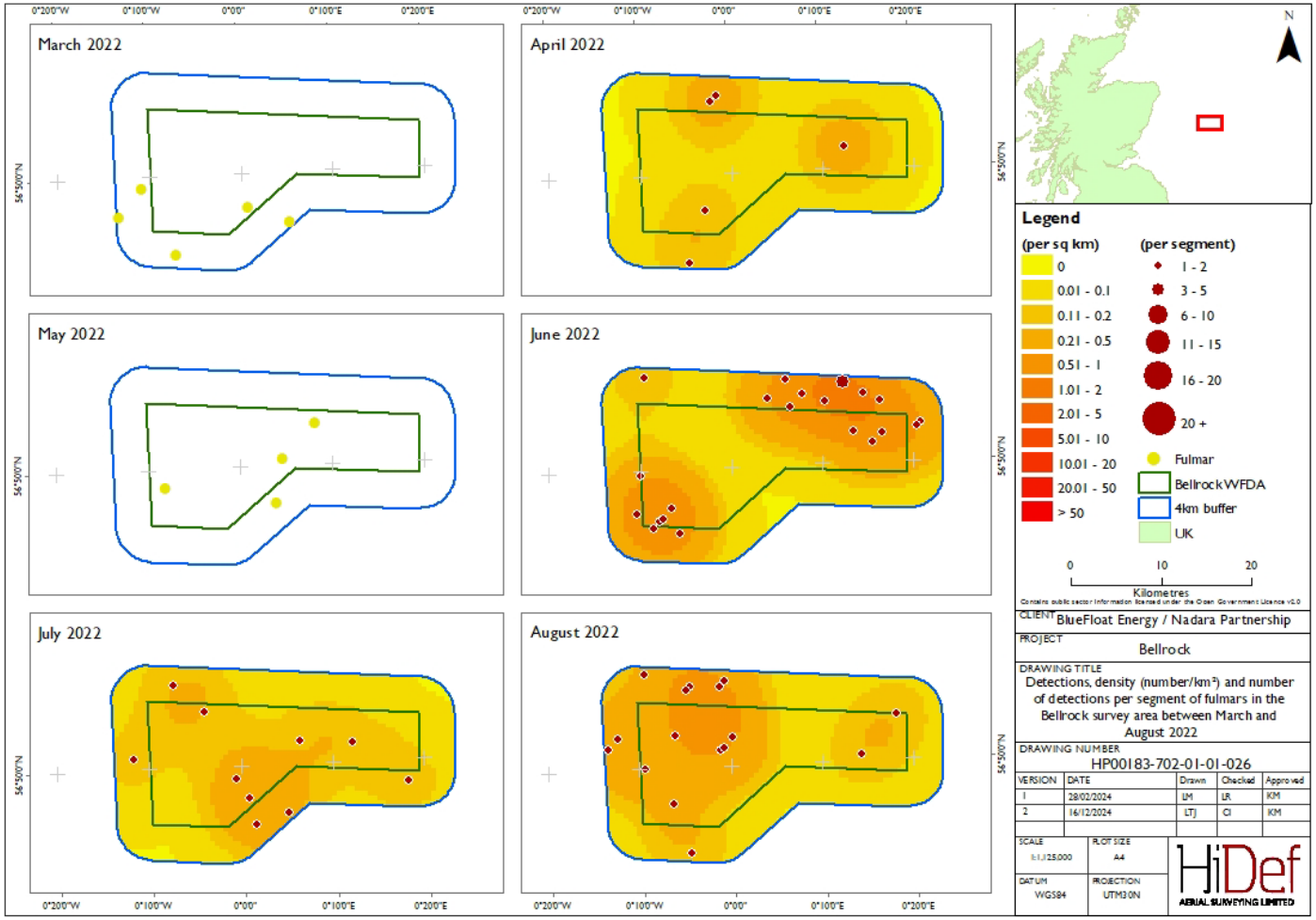


Figure 41 Detections, density (number/km²) and number of detections per segment of fulmars in the Bellrock survey area between September 2022 and February 2023

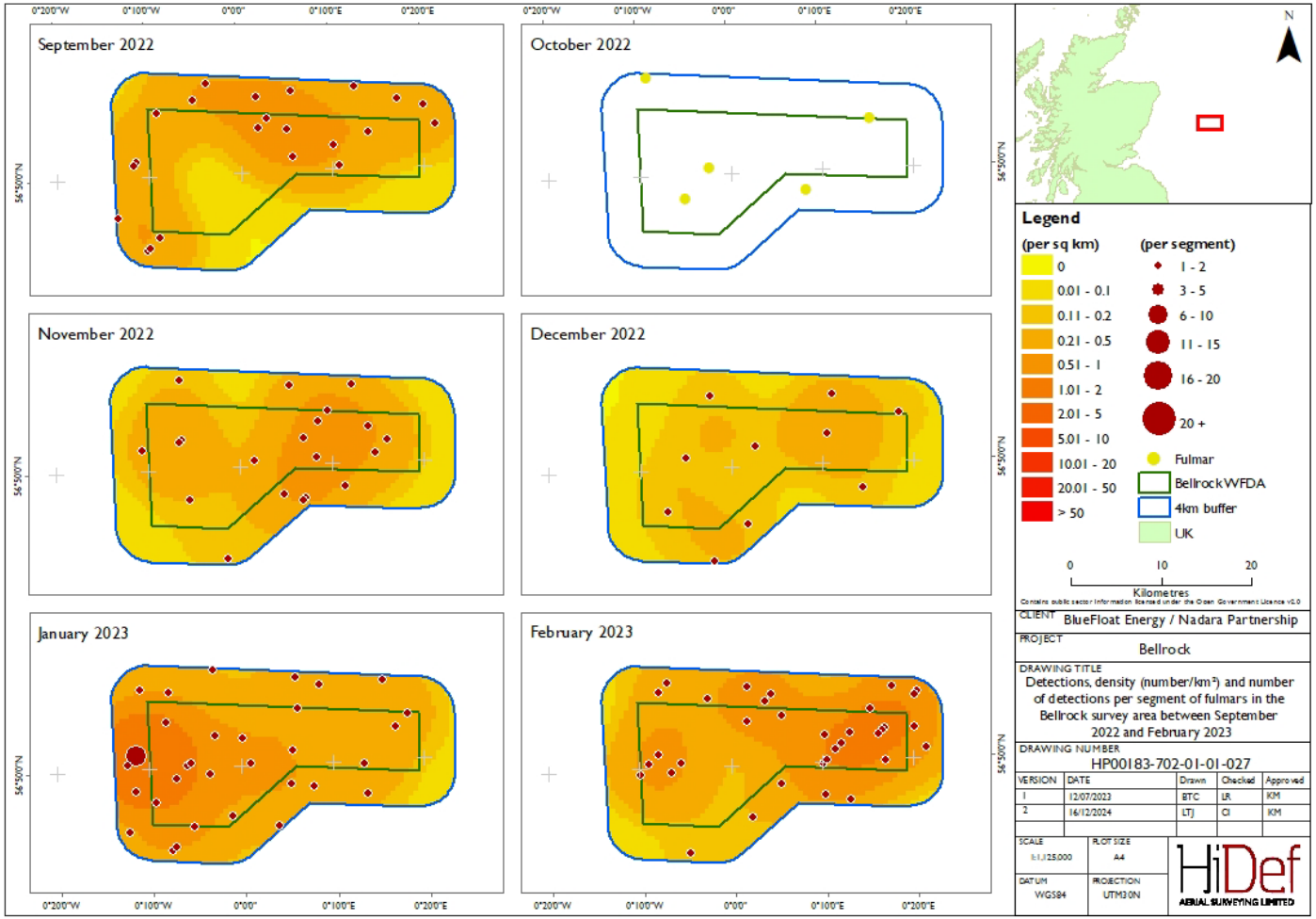


Figure 42 **Detections, density (number/km²) and number of detections per segment of fulmars in the Bellrock survey area between March and August 2023**

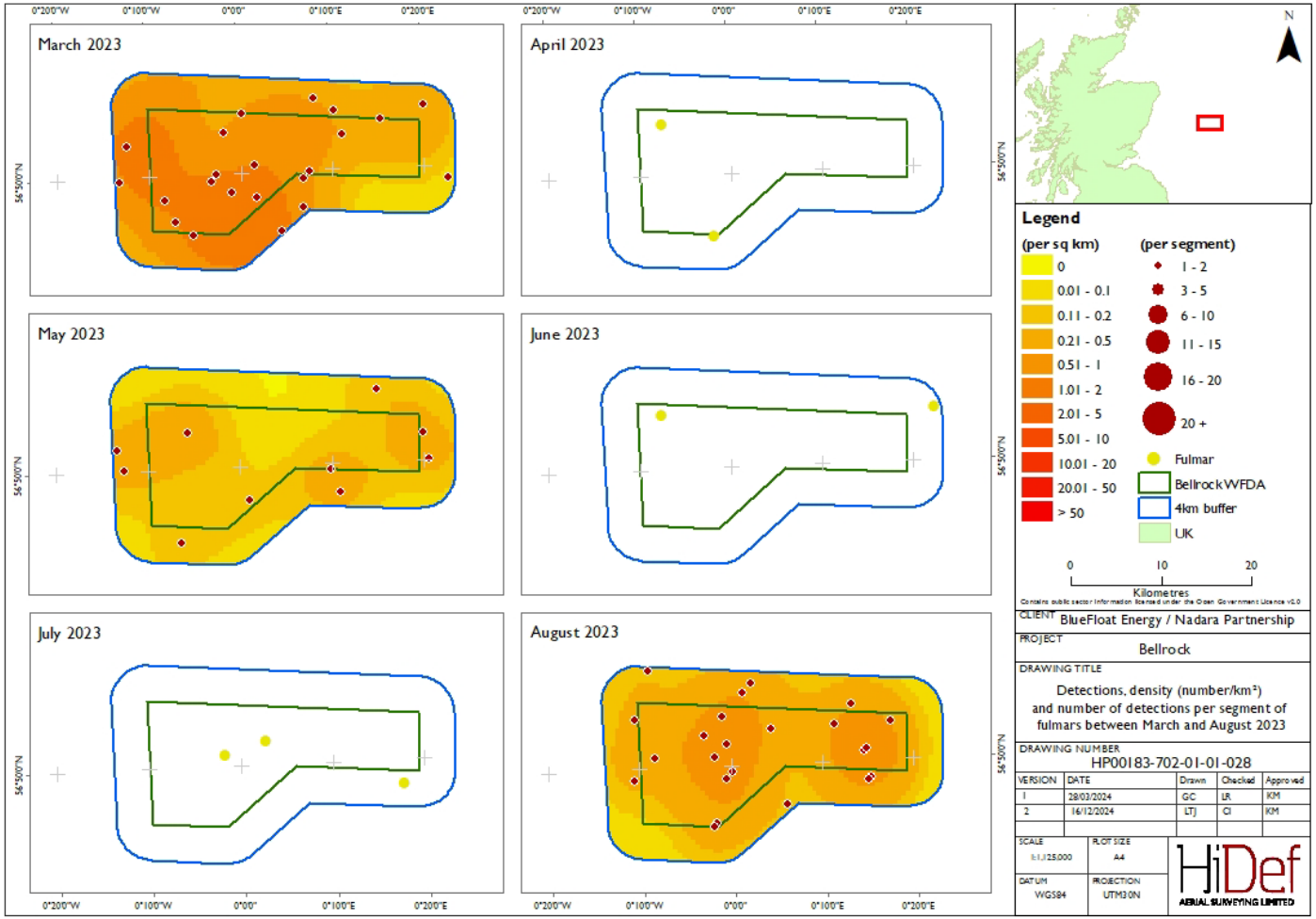


Figure 43 Detections, density (number/km²) and number of detections per segment of fulmars in the Bellrock survey area between September 2023 and February 2024

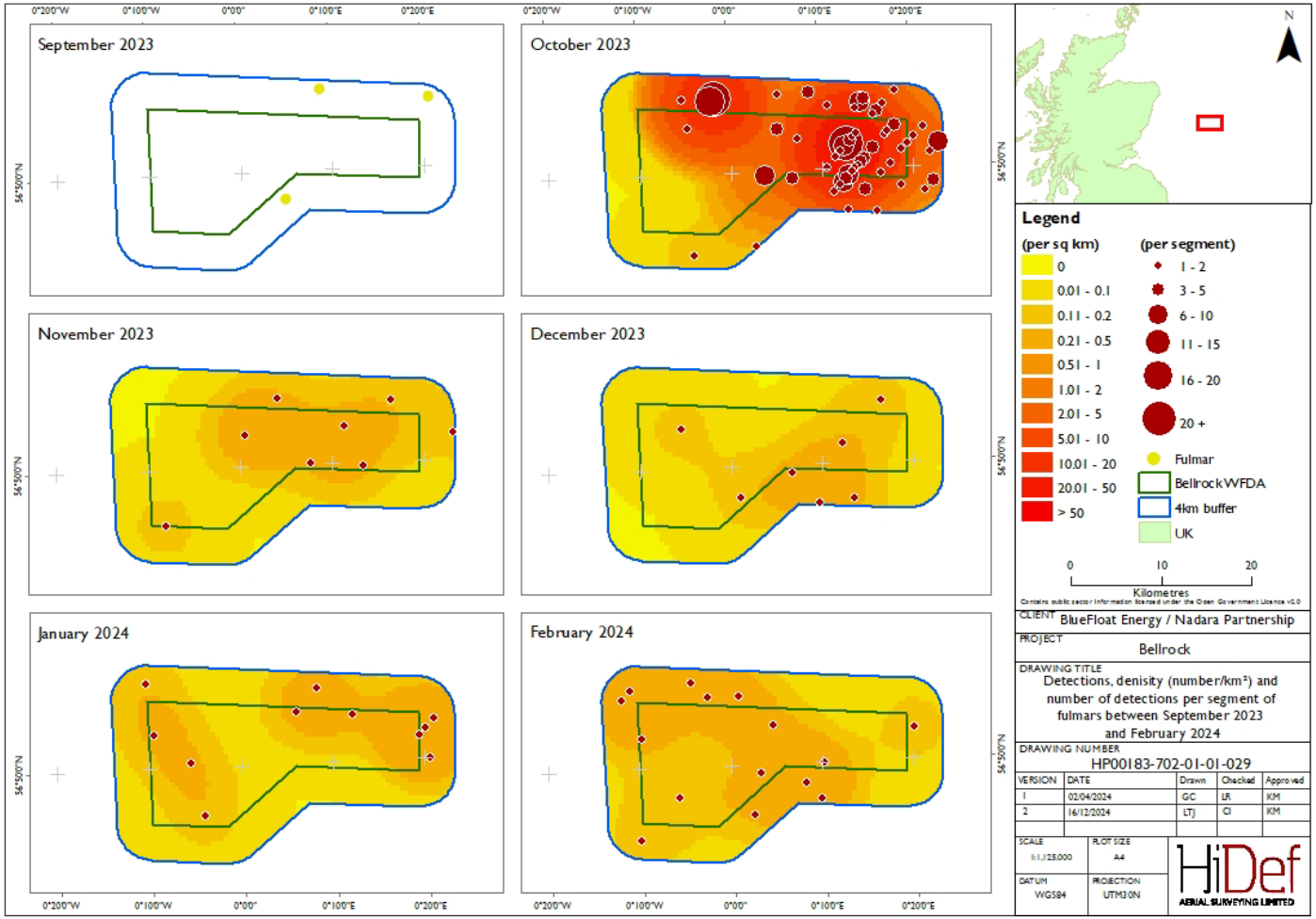
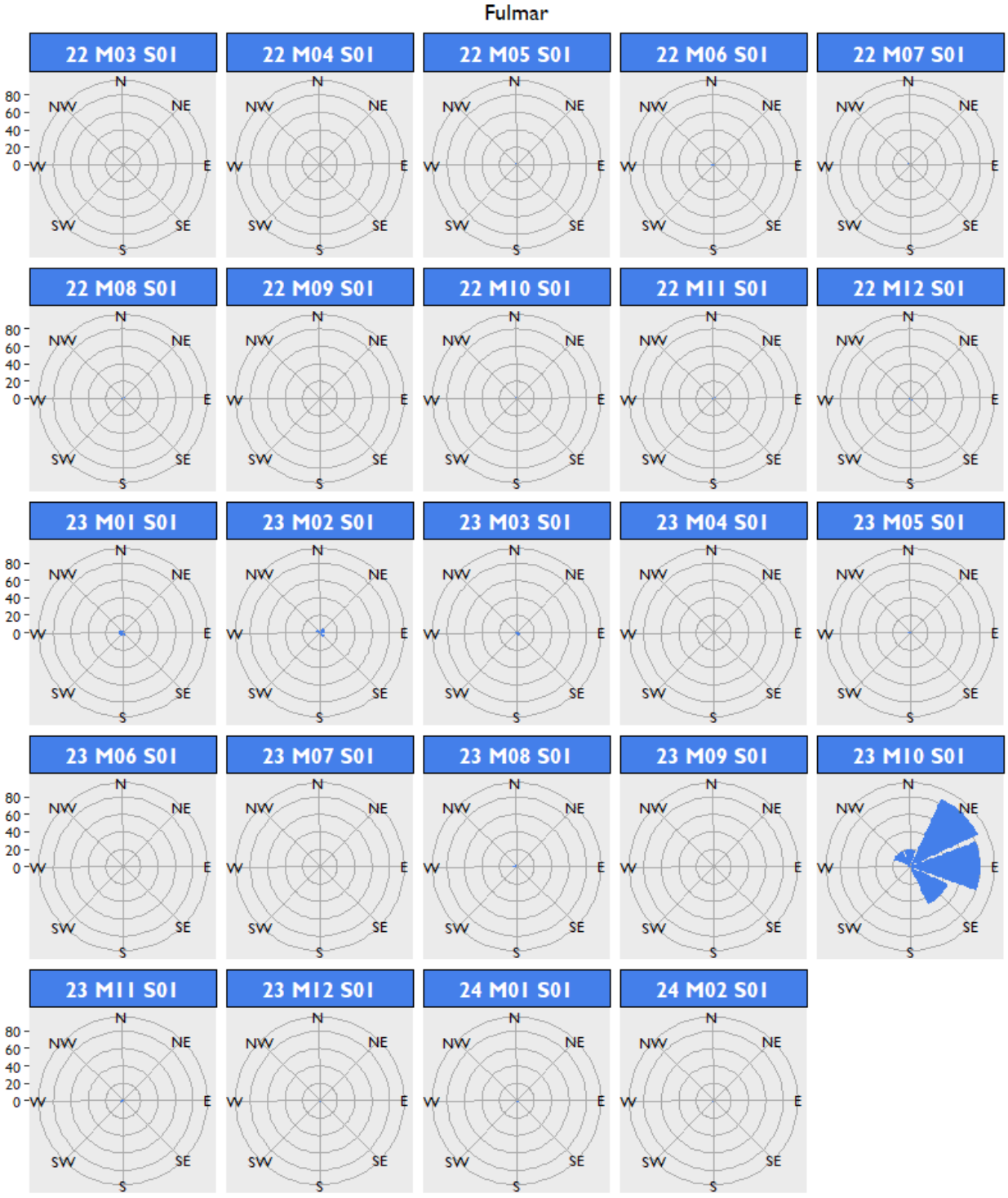


Figure 44 Summarised direction of movement of flying fulmars in the Bellrock survey area between March 2022 and February 2024

Note: Windrose plots are showing raw observations



3.3.7 Gannet

100 Gannets were observed in 21 out of 24 surveys, with no observations in November 2023, January and February 2024. Gannets were recorded in higher numbers between March and August 2022 during the first year of surveys and March to July 2023 during the second year, with a marked peak of 56 observations in October 2023 (Figure 45).

101 Density estimates for the species when recorded ranged between 0.01 birds/km^2 (95% CI 0.00 – 0.04) such as in November 2022 and 0.82 birds/km^2 (95% CI 0.25 – 1.59) in October 2023 (Figure 46 and Table 21), equating to 10 birds (95% CI 0 – 29) and 541 birds (95% CI 165 – 1,046) respectively.

102 Gannets were distributed throughout the survey area. In October 2023 when numbers peaked, higher densities were observed in the east of the survey area (Figure 50). In contrast, higher densities were observed in April 2022 in the north-west and south-west of the survey area (Figure 47). In June 2022, more birds were distributed towards the north of the buffer. In October 2022, gannets were distributed across the survey area, with higher densities observed in the north-east and north-west (Figure 48).

103 Of the birds that could be aged, 98% were recorded as adults (Table 22).

104 Over the survey period, 50% of birds were recorded flying. All birds were recorded as sitting on the water in September and November 2022 (Table 23). A total of 101 birds were recorded as dead across the survey period, with 92 dead birds in July 2022.

105 There were survey months in which no data regarding flight direction were available, therefore, only surveys which contained flight direction data are displayed (Figure 51). In October 2023, when numbers peaked, birds where predominantly flying in a south-easterly direction. Whilst in May and June 2022, birds were mainly heading in north-easterly to easterly directions and south-westerly directions respectively.

Figure 45 Number of gannets recorded between March 2022 and February 2024 in the Bellrock survey area

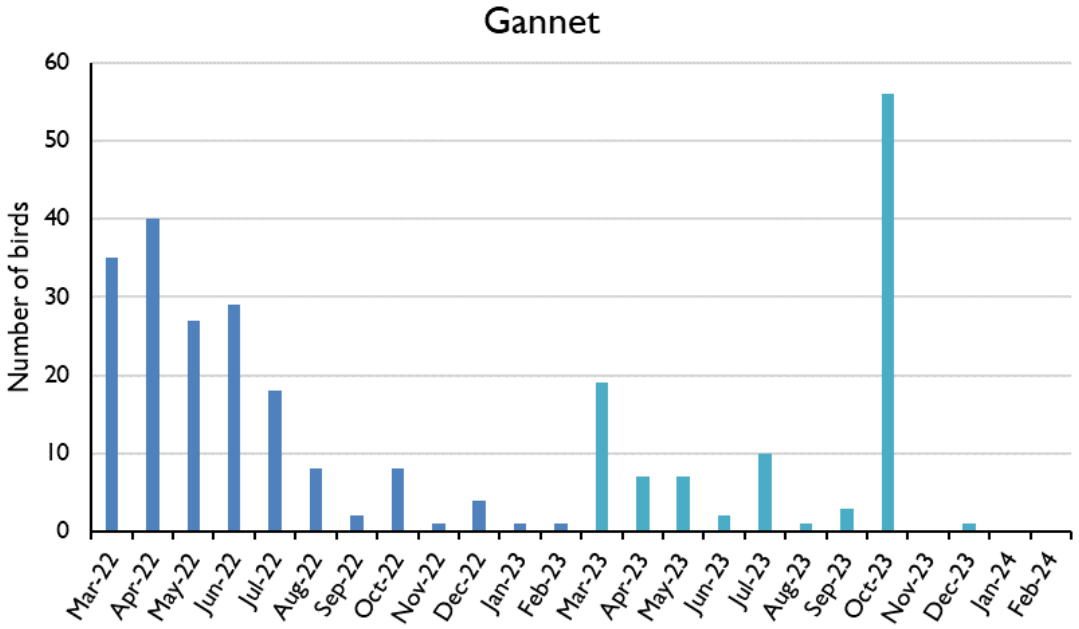


Figure 46 **Gannet apportioned density estimates in the Bellrock survey area, between March 2022 and February 2024. Error bars represent the 95% lower and upper confidence limits,**

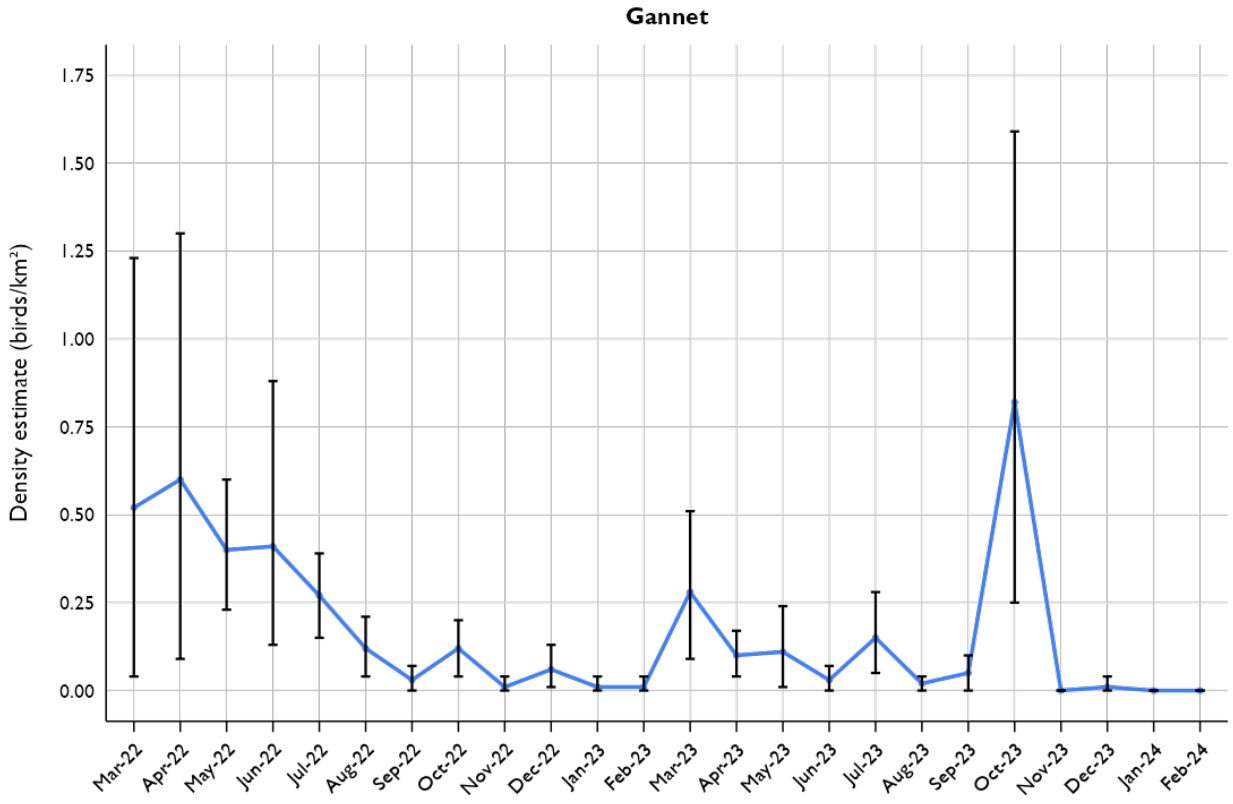


Table 22 Apportioned density and population estimates of gannet in the Bellrock survey area between March 2022 and February 2024

Survey date	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
15 March 2022	0.52	341	30	809	205	60.18
17 April 2022	0.60	396	63	856	206	51.90
14 May 2022	0.40	264	150	397	61	23.00
06 June 2022	0.41	273	84	582	135	49.38
19 July 2022	0.27	176	97	257	40	22.71
07 August 2022	0.12	80	29	136	28	35.13
07 September 2022	0.03	20	0	46	12	60.61
02 October 2022	0.12	79	29	134	27	34.55
03 November 2022	0.01	10	0	29	10	101.86
20 December 2022	0.06	41	10	87	22	52.40
20 January 2023	0.01	10	0	29	10	95.22
04 February 2023	0.01	10	0	29	9	93.27
04 March 2023	0.28	186	57	335	71	37.73
03 April 2023	0.10	68	29	115	22	31.41
04 May 2023	0.11	70	9	156	40	57.07
13 June 2023	0.03	21	0	47	12	58.28
07 July 2023	0.15	100	36	186	40	40.19
17 August 2023	0.02	10	0	29	9	90.48
04 September 2023	0.05	31	0	63	16	50.99
13 October 2023	0.82	541	165	1046	234	43.11
14 November 2023	0.00	0	0	0	0	0.00
10 December 2023	0.01	10	0	29	9	96.58
30 January 2024	0.00	0	0	0	0	0.00
08 February 2024	0.00	0	0	0	0	0.00

Table 23 Summary of gannet ages in the Bellrock survey area between March 2022 and February 2024

Survey date	Number recorded as adult	Number recorded as immature	Number recorded as juvenile	Number recorded as unknown	% Adult (from aged birds)	Total of aged and unaged
15 March 2022	22	0	0	13	100	35
17 April 2022	39	0	0	1	100	40
14 May 2022	23	0	0	4	100	27
06 June 2022	27	1	0	1	96	29
19 July 2022	16	0	0	2	100	18
07 August 2022	8	0	0	0	100	8
07 September 2022	2	0	0	0	100	2
02 October 2022	8	0	0	0	100	8
03 November 2022	1	0	0	0	100	1
20 December 2022	4	0	0	0	100	4
20 January 2023	1	0	0	0	100	1
04 February 2023	1	0	0	0	100	1
04 March 2023	16	1	0	2	94	19
03 April 2023	6	1	0	0	86	7
04 May 2023	6	1	0	0	86	7
13 June 2023	2	0	0	0	100	2
07 July 2023	10	0	0	0	100	10
17 August 2023	0	1	0	0	0	1
04 September 2023	3	0	0	0	100	3
13 October 2023	54	1	0	1	98	56
14 November 2023	0	0	0	0	-	0
10 December 2023	1	0	0	0	100	1
30 January 2024	0	0	0	0	-	0
08 February 2024	0	0	0	0	-	0
Total	**250**	**6**	**0**	**24**	**98**	**280**

Table 24 Summary of gannet behaviours in the Bellrock survey area between March 2022 and February 2024

Survey date	Number recorded diving	Number recorded flying	Number recorded sitting	Number recorded taking off	% Flying	Total live birds	Number recorded dead
15 March 2022	0	4	31	0	11	**35**	0
17 April 2022	0	6	34	0	15	**40**	0
14 May 2022	0	17	10	0	63	**27**	0
06 June 2022	0	18	10	1	62	**29**	2
19 July 2022	0	4	14	0	22	**18**	92
07 August 2022	0	3	5	0	38	**8**	4
07 September 2022	0	0	2	0	0	**2**	0
02 October 2022	0	7	1	0	88	**8**	2
03 November 2022	0	0	1	0	0	**1**	0
20 December 2022	0	4	0	0	100	**4**	0
20 January 2023	0	1	0	0	100	**1**	0
04 February 2023	0	1	0	0	100	**1**	0
04 March 2023	0	11	8	0	58	**19**	0
03 April 2023	0	5	2	0	71	**7**	0
04 May 2023	0	7	0	0	100	**7**	0
13 June 2023	0	2	0	0	100	**2**	0
07 July 2023	0	10	0	0	100	**10**	1
17 August 2023	0	1	0	0	100	**1**	0
04 September 2023	0	3	0	0	100	**3**	0
13 October 2023	0	36	19	1	64	**56**	0
14 November 2023	0	0	0	0	-	**0**	0
10 December 2023	0	1	0	0	100	**1**	0
30 January 2024	0	0	0	0	-	**0**	0
08 February 2024	0	0	0	0	-	**0**	0
Total	**0**	**141**	**137**	**2**	**50**	**280**	**101**

Figure 47 Density of gannets (number/km²) and number of detections per segment in the Bellrock survey area between March and August 2022

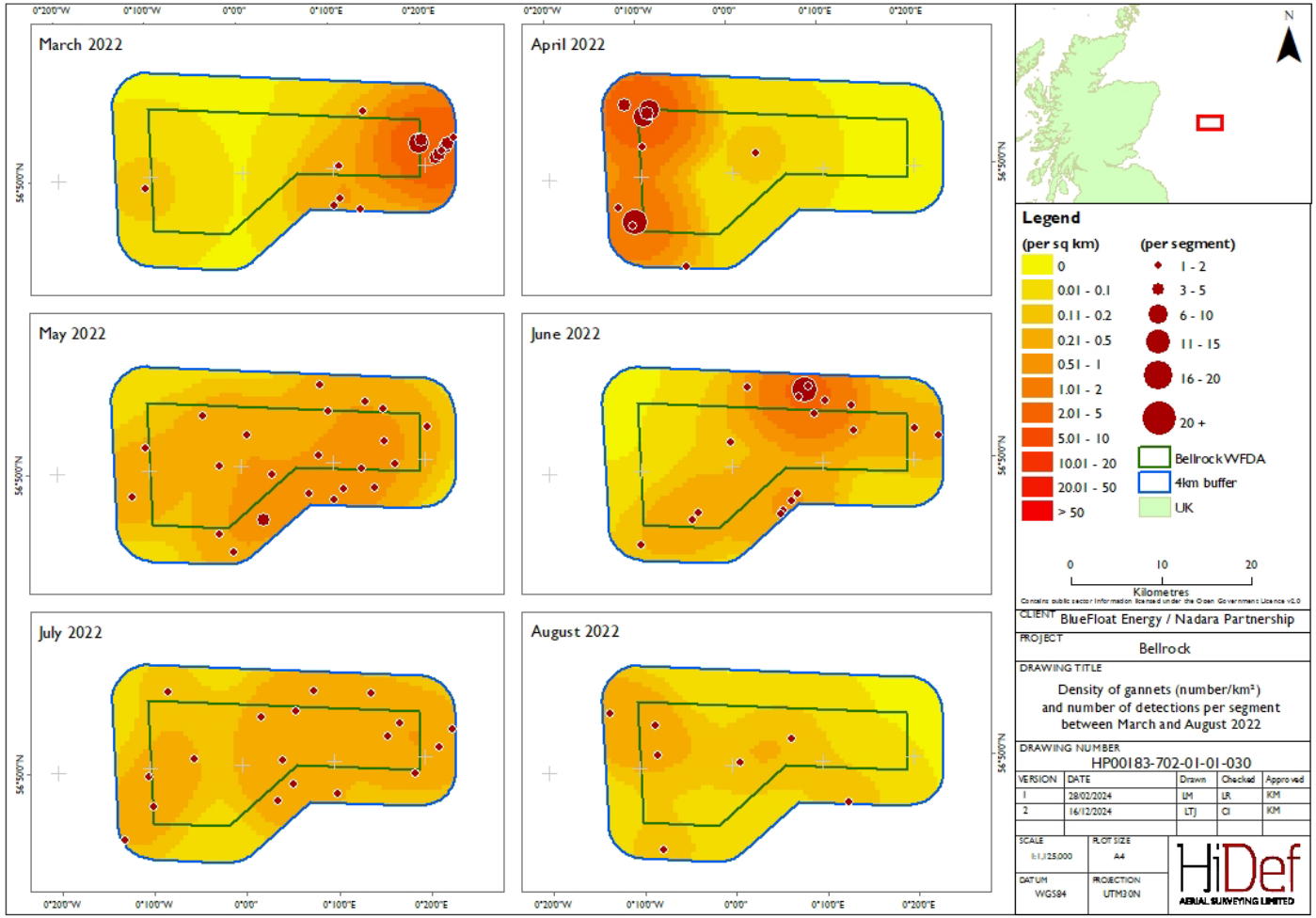


Figure 48 Detections, density (number/km²) and number of detections per segment of gannets in the Bellrock survey area between September 2022 and February 2023

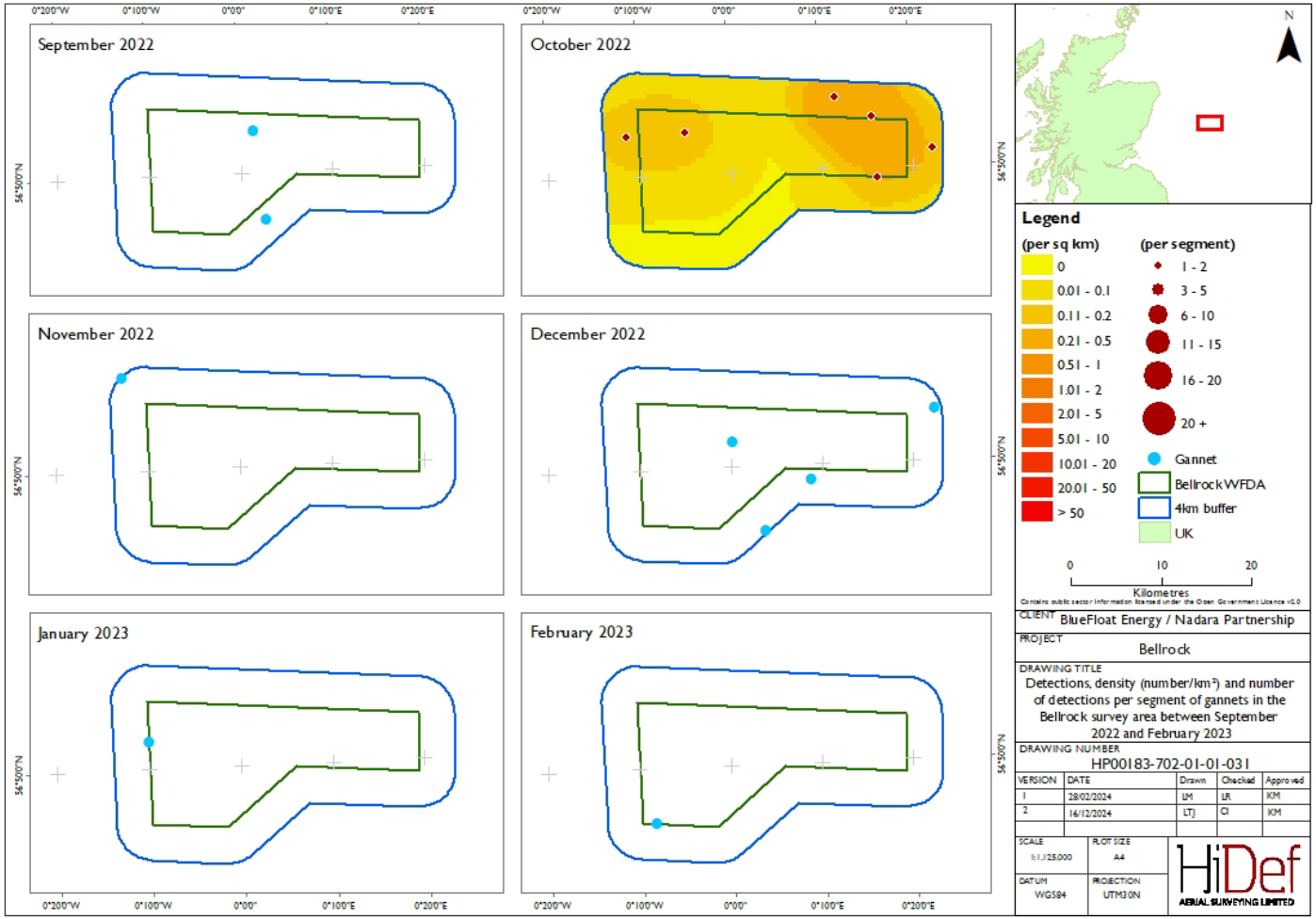


Figure 49 Detections, density of gannets (number/km²) and number of detections per segment in the Bellrock survey area between March and August 2023

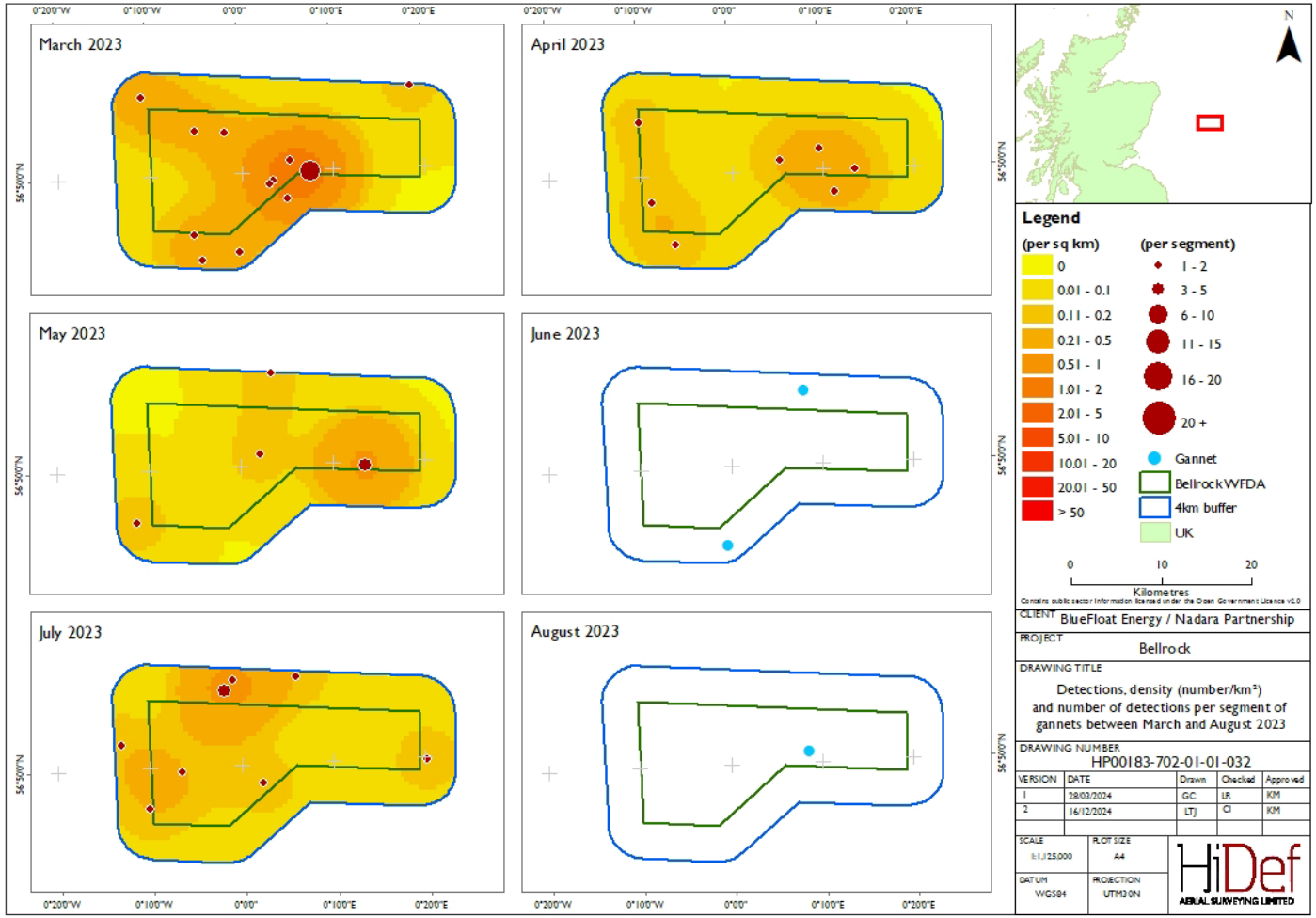


Figure 50 Detections, density (number/km²) and number of detections per segment of gannets in the Bellrock survey area between September 2023 and February 2024

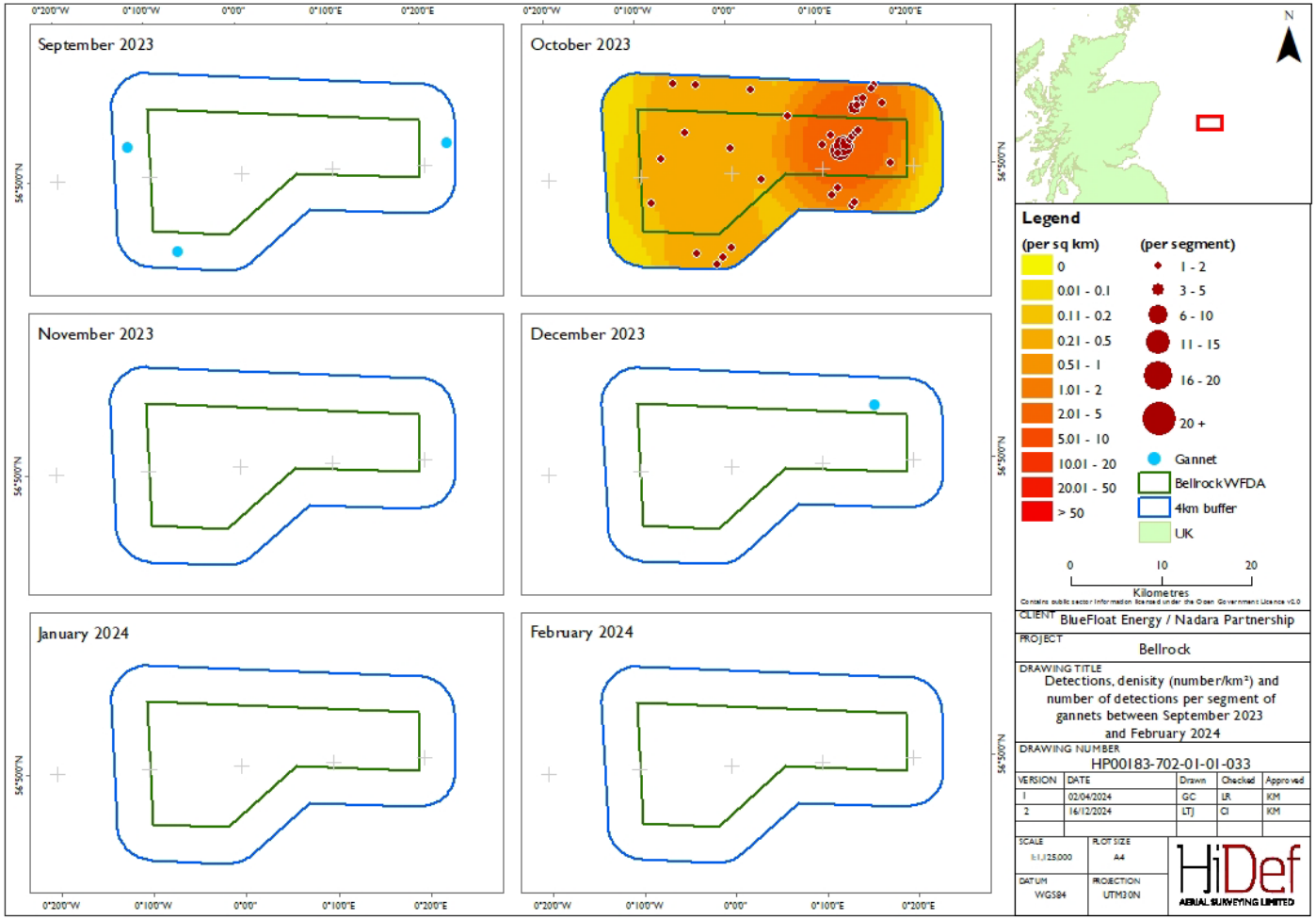
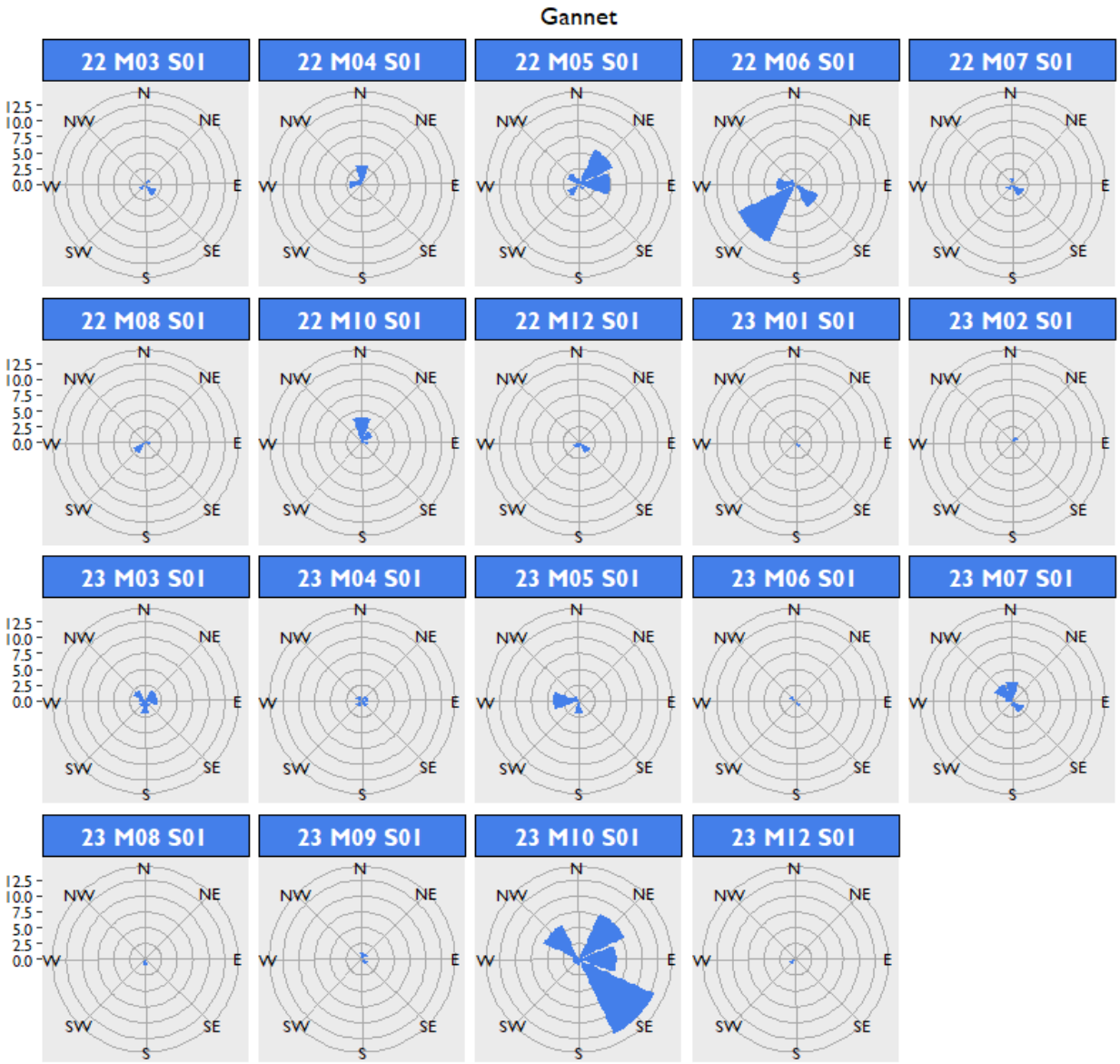


Figure 51 Summarised direction of movement of flying gannets in the Bellrock survey area between March 2022 and February 2024

Note: Windrose plots are showing raw observations



3.3.8 Less abundant bird species

106 Across the survey period, 68 less abundant birds of ten species were recorded throughout the survey period, the most numerous being great black-backed gull (*Larus marinus*) and Arctic tern (*Sterna paradisaea*), with 24 and 21 records respectively over the 24-month period (Figure 52). Distributions are presented in Figure 53 to Figure 56, while population and density estimates for these species can be found in Appendix I.

107 Arctic terns were only recorded in July 2022, September 2022 and August 2023 (but noting that Arctic / common tern records which could not be identified to species level were also recorded in August 2022) (Section 3.3.9). Of the 21 individuals observed, 16 were recorded in July 2022 and were located in the middle of the WFDA and towards the north and west in the buffer area. Great black-backed gulls were recorded throughout the survey area in: November 2022- January 2023, March 2023 and November 2023-February 2024.

108 Two other gull species were recorded across the survey period. Nine herring gulls were observed across seven months (Figure 52) and four common gulls (*Larus canus*) were recorded with one observation in February 2023 and three observations in July 2023.

109 A total of five oystercatchers (*Haematopus ostralegus*) were recorded in August 2023. Other species which were recorded with only one observation include: Arctic skua (*Stercorarius parasiticus*), curlew (*Numenius arquata*), European storm petrel (*Hydrobates pelagicus*), little auk (*Alle alle*) and red-throated diver (*Gavia stellata*).

Figure 52 Numbers of less abundant bird species recorded within the Bellrock survey area between March 2022 and February 2024

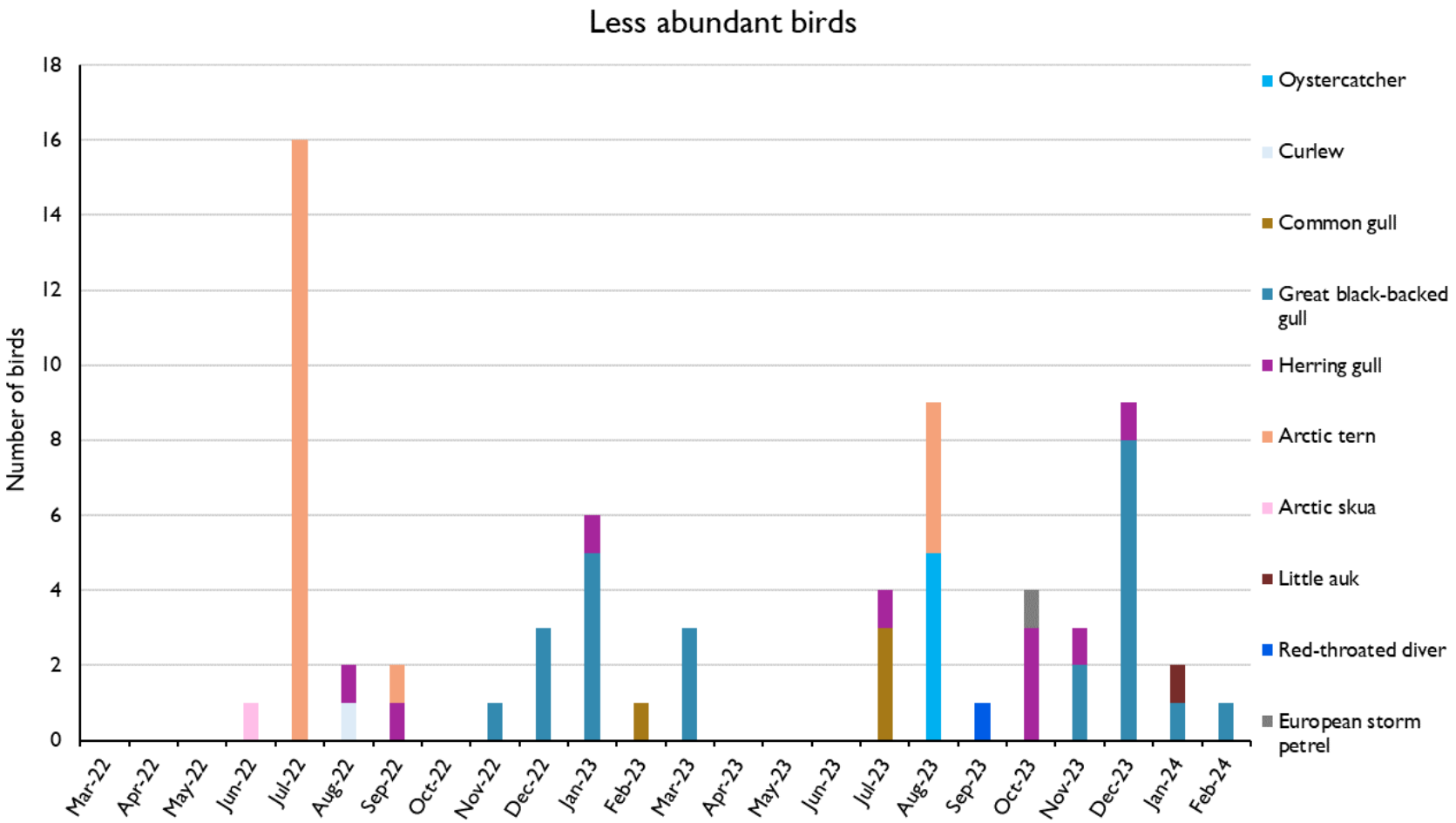


Figure 53 Detections of less abundant bird species in the Bellrock survey area between March and August 2022

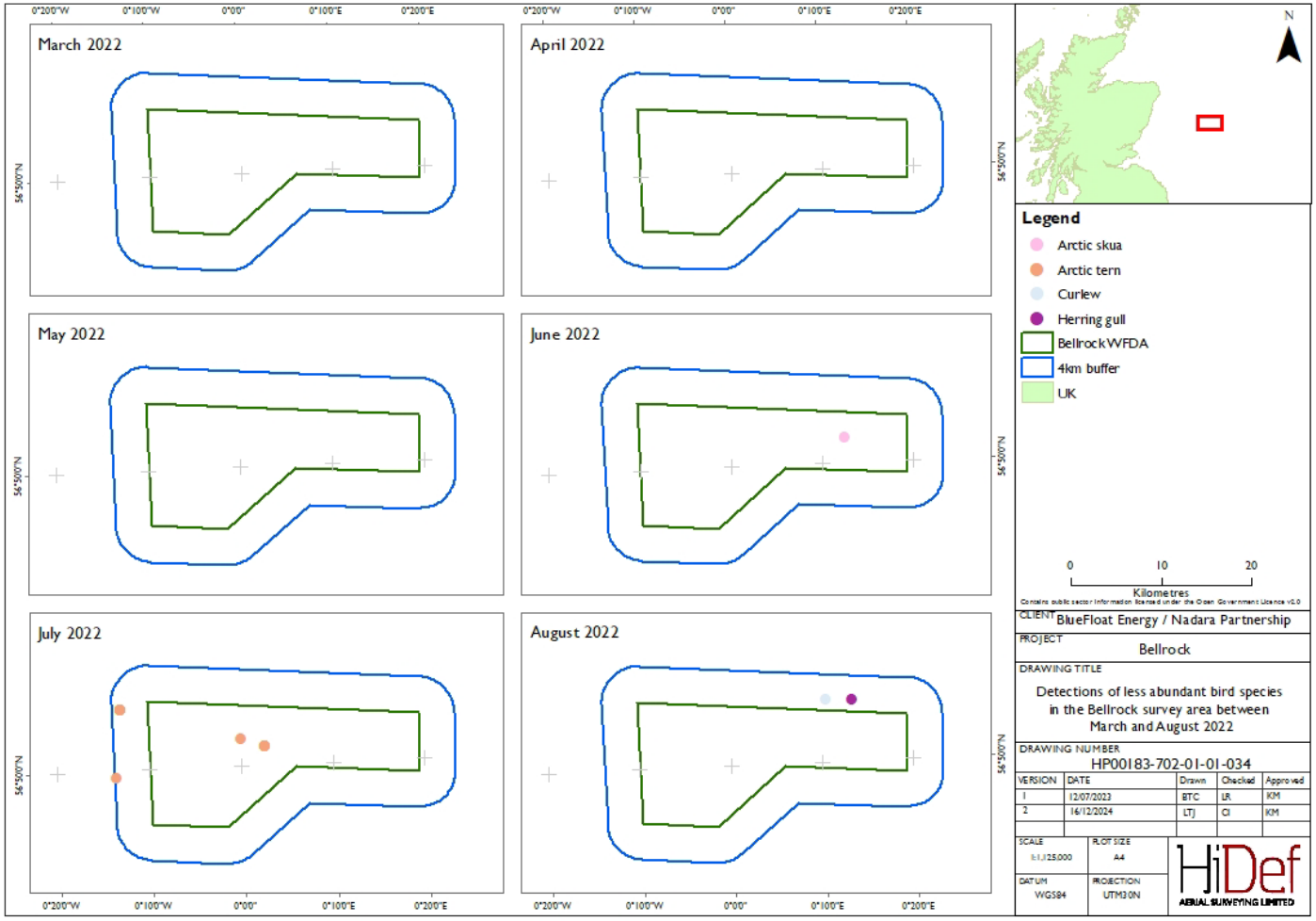


Figure 54 Detections of less abundant bird species in the Bellrock survey area between September 2022 and February 2023

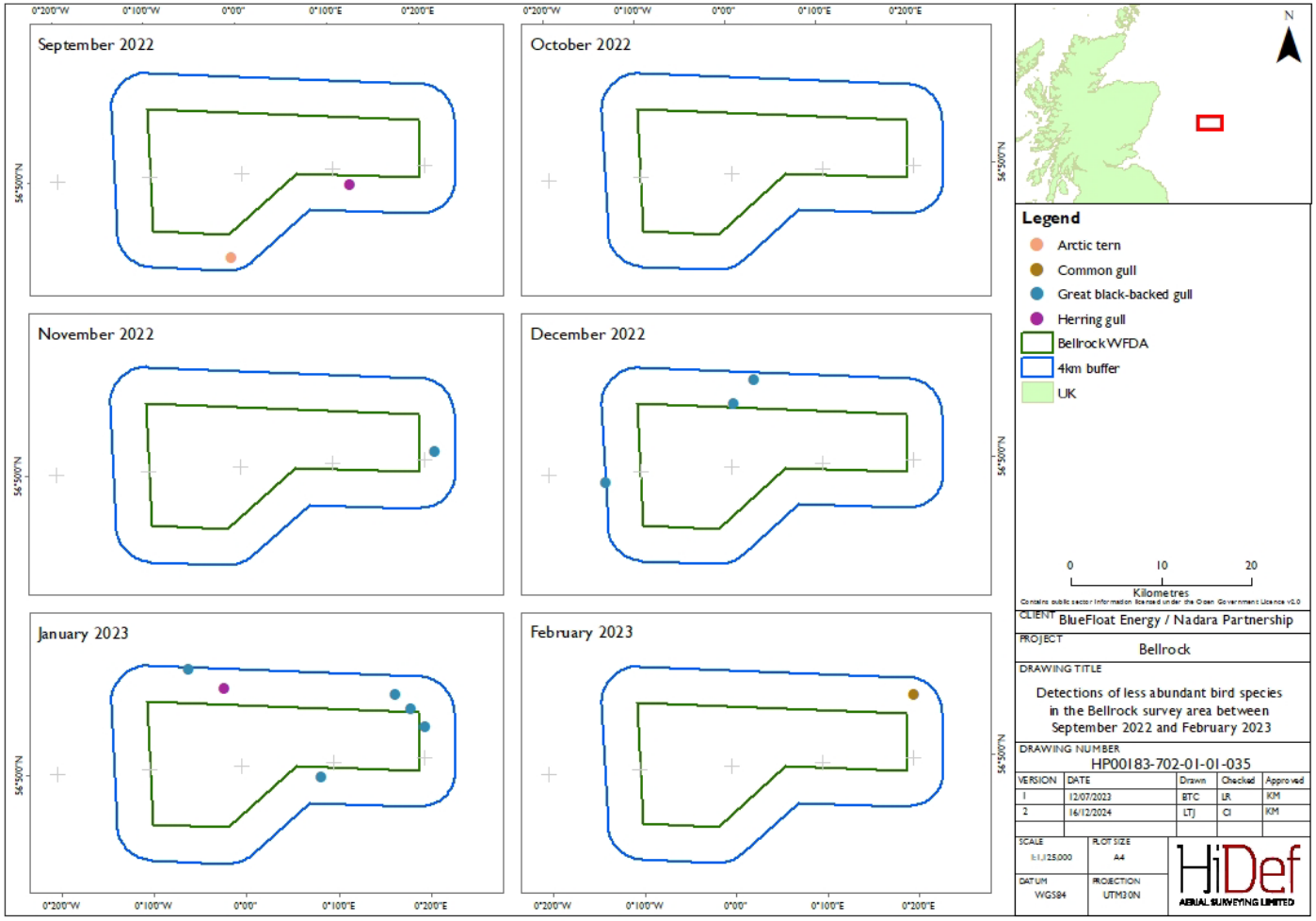


Figure 55 Detections of less abundant bird species in the Bellrock survey area between March and August 2023

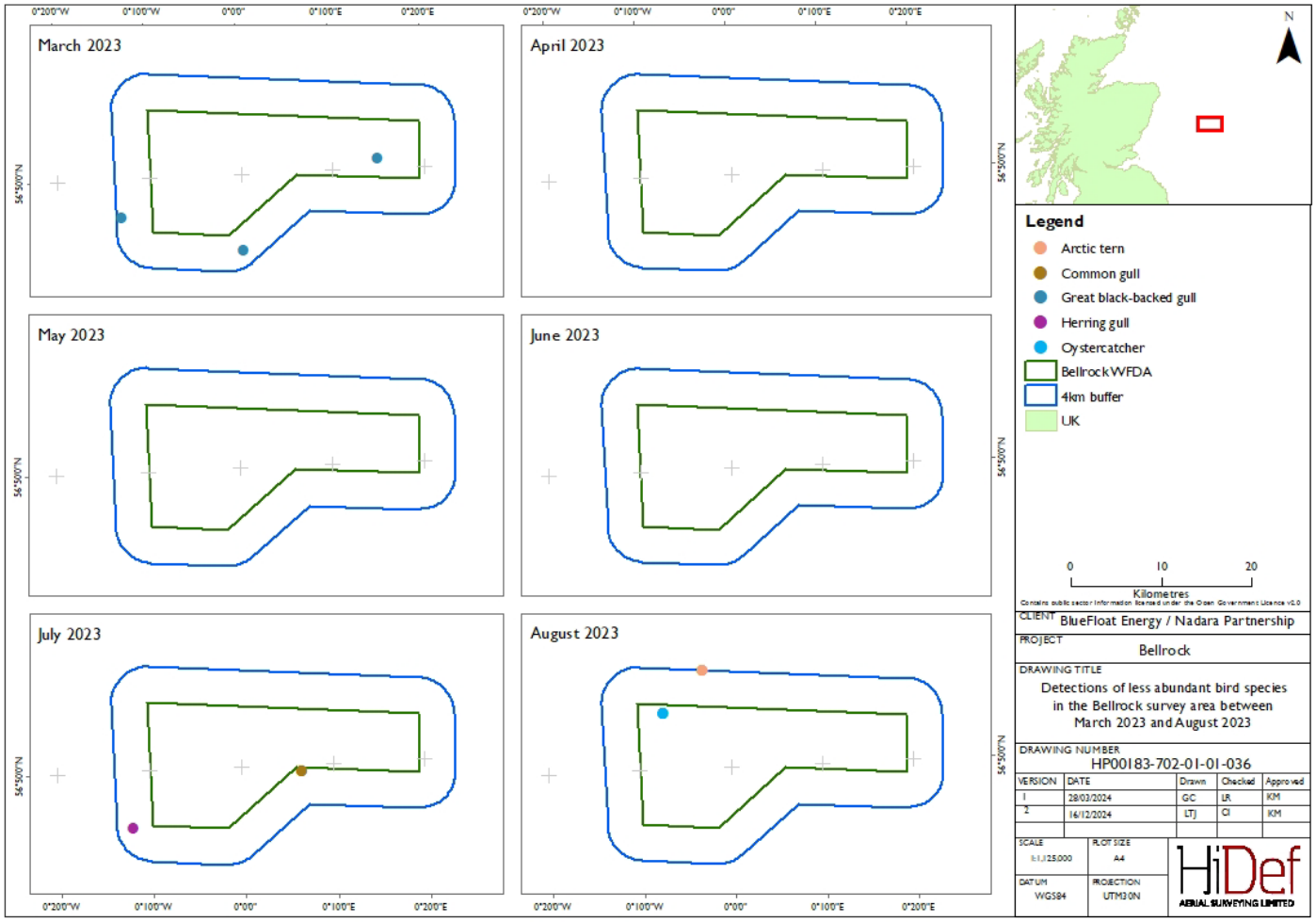
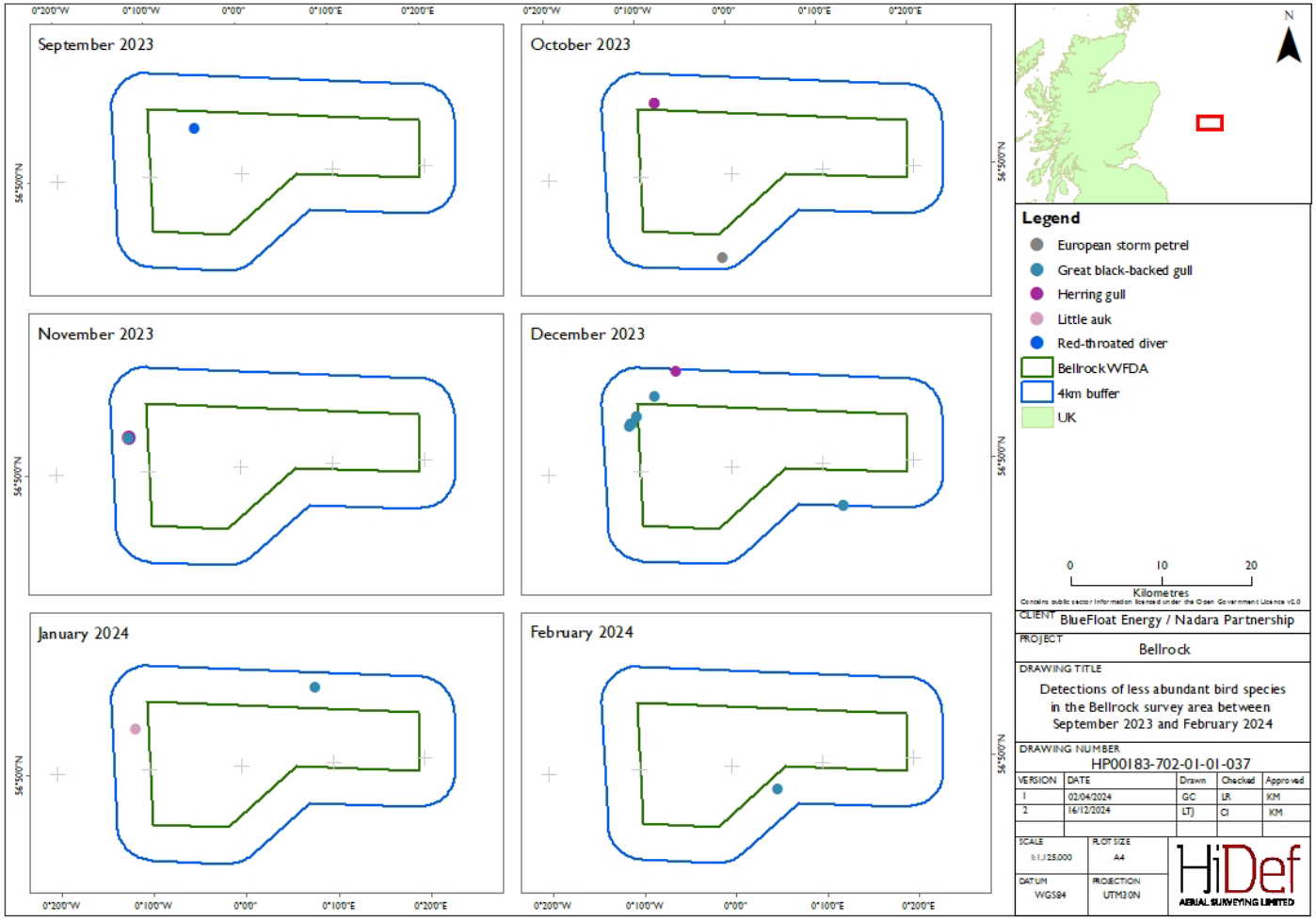


Figure 56 Detections of less abundant bird species in the Bellrock survey area between September 2023 and February 2024



3.3.9 Unidentified bird species

110 Unidentified birds were recorded throughout the survey period with greatest numbers recorded in July 2022 (Figure 57 and Figure 58). Large auk and auk species have been presented separately due to the high numbers observed. The summer peaks of non-identification relate primarily to difficulties separating razorbill and guillemot and reflect the large number of birds present at that time. These are especially hard to distinguish when birds are in moult and accompanied by juveniles.

The number of unidentified auks (242) versus the total number of identified auks (1,948) in July 2022 provides an identification rate of 87.7%. The overall avian ID rate for the 24 months of survey was 94.26% but there were three months with ID rates of between 85% and 90% (including July 2022). HiDef data from other offshore wind sites off Northeast Scotland show comparable identification rates although July 2022 is a little lower than those reviewed (all sites recorded an identification rate between 90% and approximately 95%). Various factors may contribute to a lower ID rate, particularly weather conditions, although it is not believed to have been a significant factor here. Unidentified auks recorded in July and other surveys will be apportioned appropriately for each auk species, and their respective density and population estimates, as is the case for all auks where there is not an ID rate of 100%. We therefore do not consider that the lower ID rate in July 2022 will detrimentally affect the overall data provided for the purposes of assessing auk species.

111 There is also a peak of non-identification in relation to common and Arctic tern due to the small differences in morphological distinctive features. The overall experience of the HiDef ID team, and improvements in footage quality, means that the identification of these two species is now made with a relatively high degree of confidence. In the Bellrock survey area, no common terns were identified to species level throughout the survey period. Arctic / common terns were identified to species group level in July and August 2022 and August 2023. Due to Arctic tern being recorded to a species level in July 2022 and August 2023, the Arctic / common tern birds were all apportioned to Arctic tern in these months. In August 2022, due to no Arctic tern or common terns being identified to a species level, the Arctic / common terns were not apportioned to a species. The abundance estimates for Artic / common tern in August 2022 can be found in Table 42. The apportioned density and population estimates for July 2022 and August 2023 can be found in Table 40 and Table 79.

112 therefore all the “arctic/common tern” birds, in the months where Arctic terns were recorded, were apportioned to Arctic tern when calculating the apportioned density and population estimates, with these apportioned estimates presented in Table 39 to Table 41 and Table 42.

113 Distributions of unidentified birds are displayed in Figure 59 to Figure 62.

Figure 57 Number of unidentified birds assigned to species group, excluding large auk species and auk species, recorded within the Bellrock survey area between March 2022 and February 2024

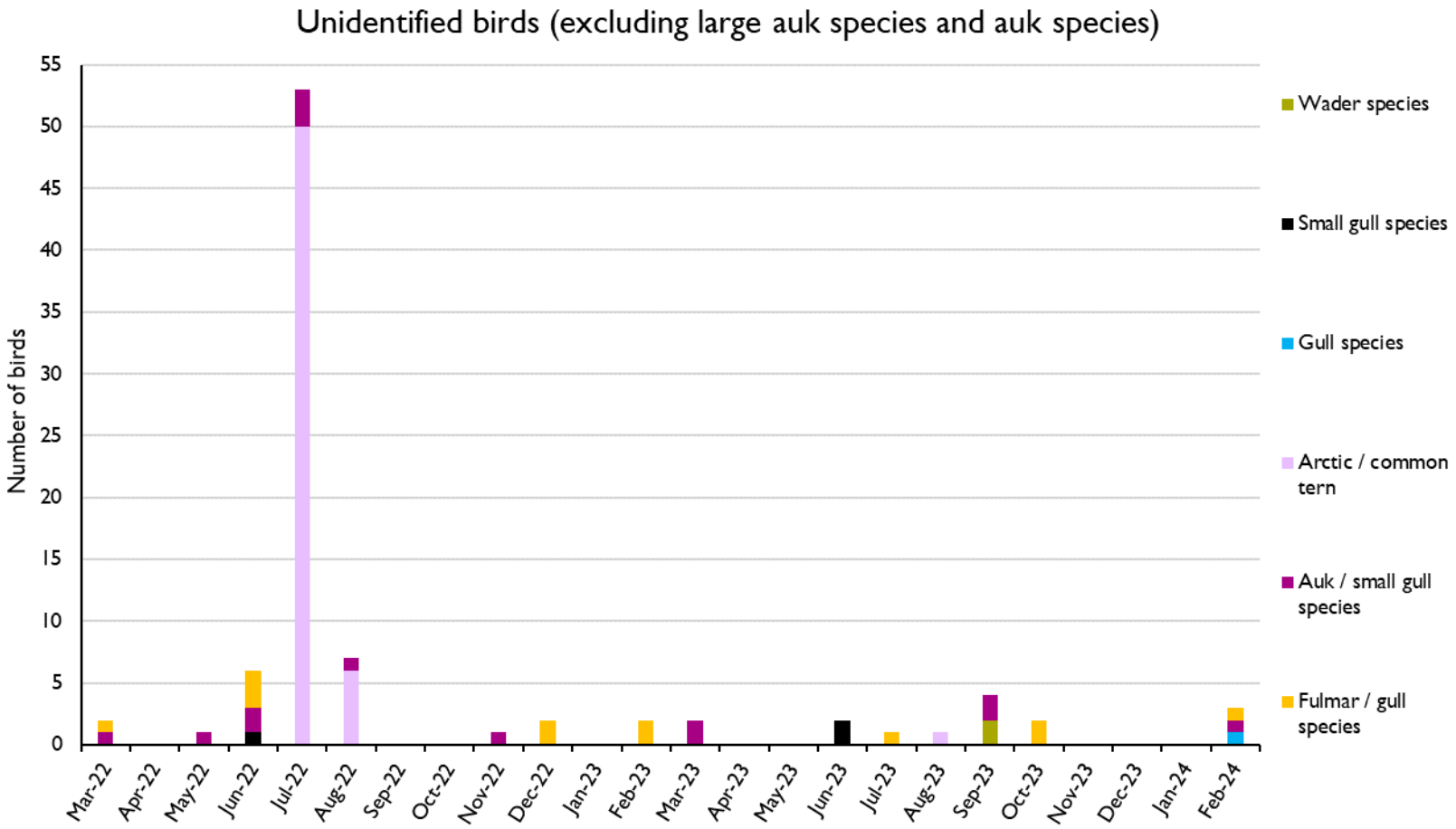


Figure 58 Number of unidentified birds, assigned to large auk species and auk species group, recorded within the Bellrock survey area between March 2022 and February 2024

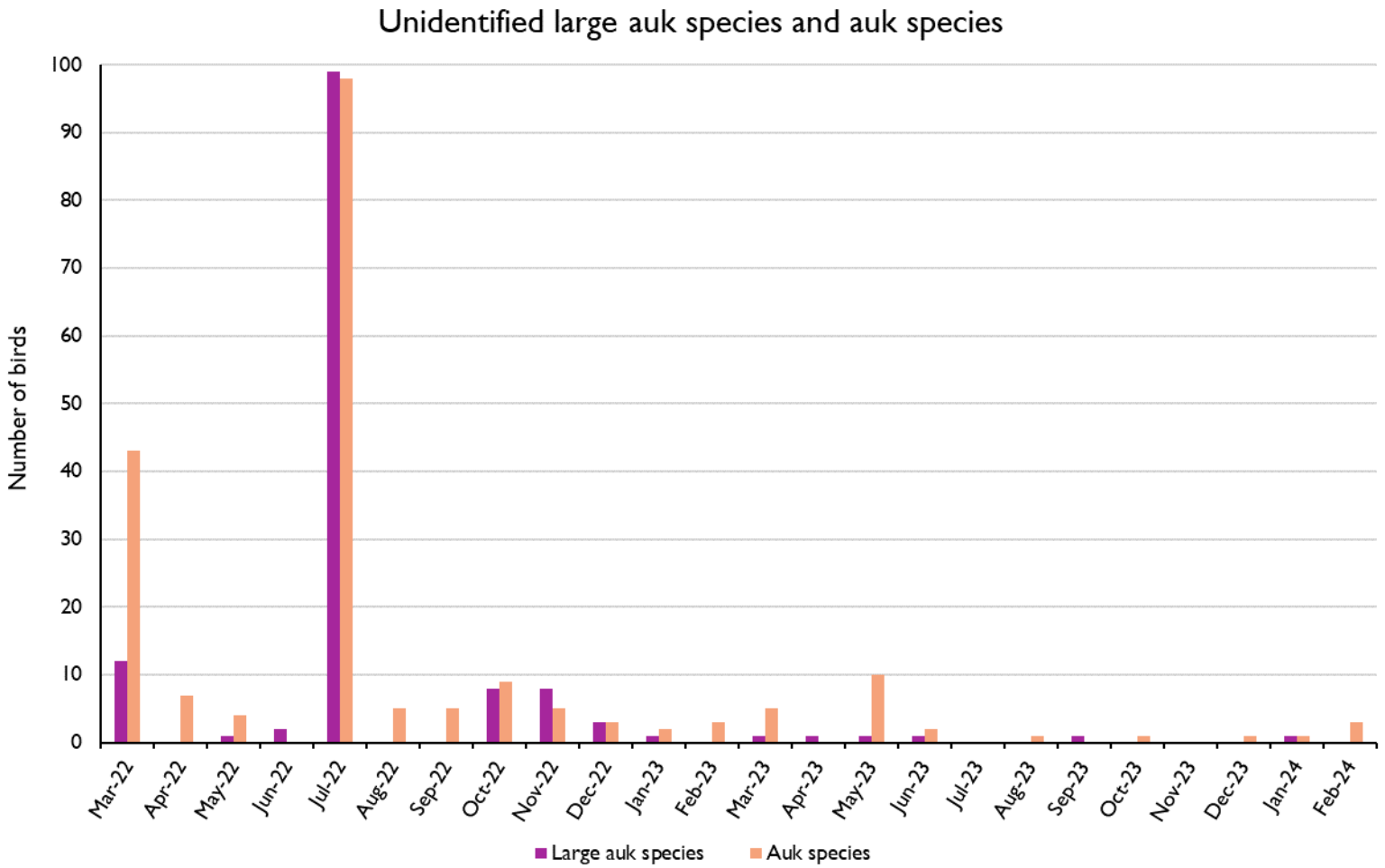


Figure 59 Detections of unidentified birds, assigned to species group in the Bellrock survey area between March and August 2022

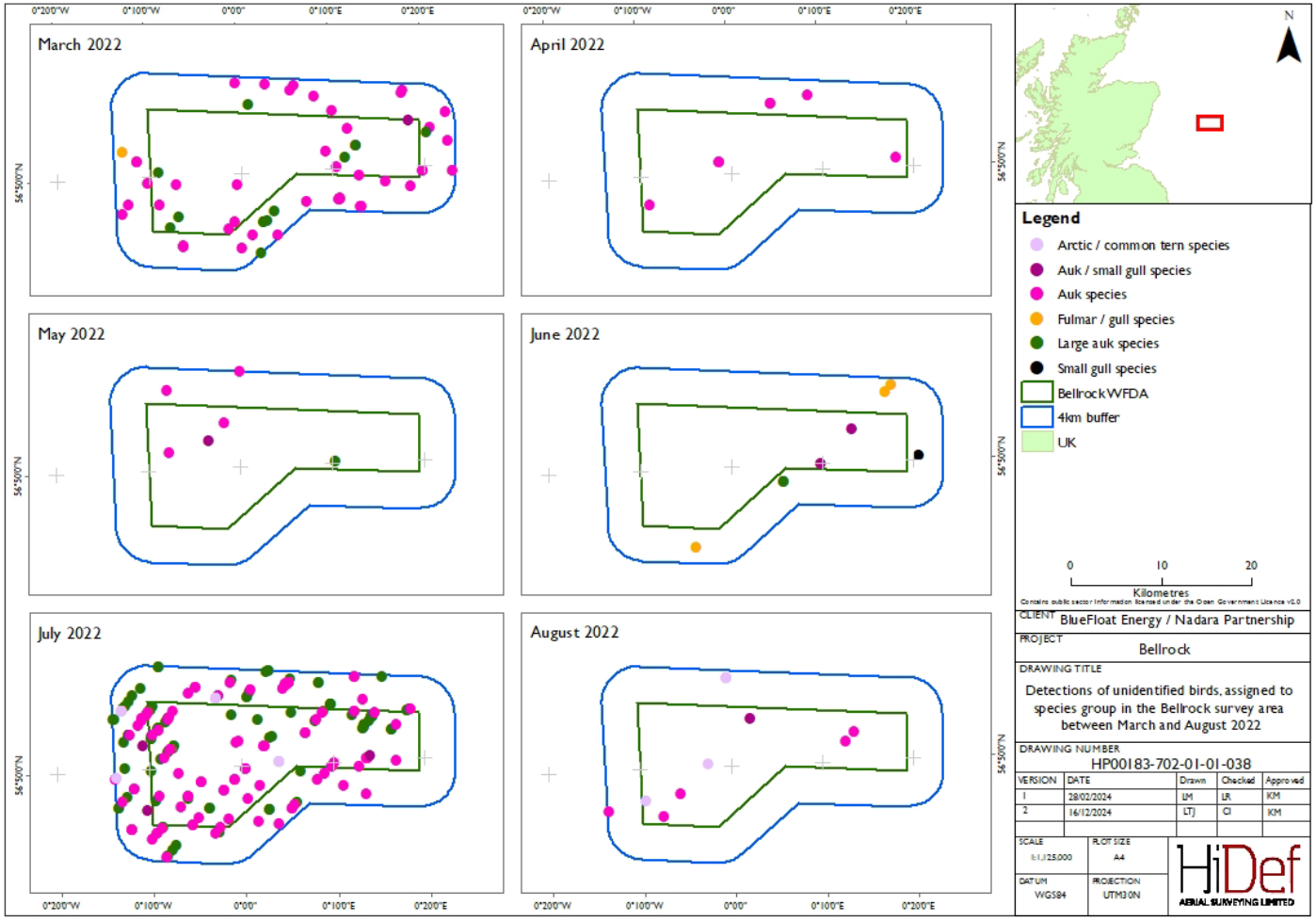


Figure 60 Detections of unidentified birds, assigned to species group in the Bellrock survey area between September 2022 and February 2023

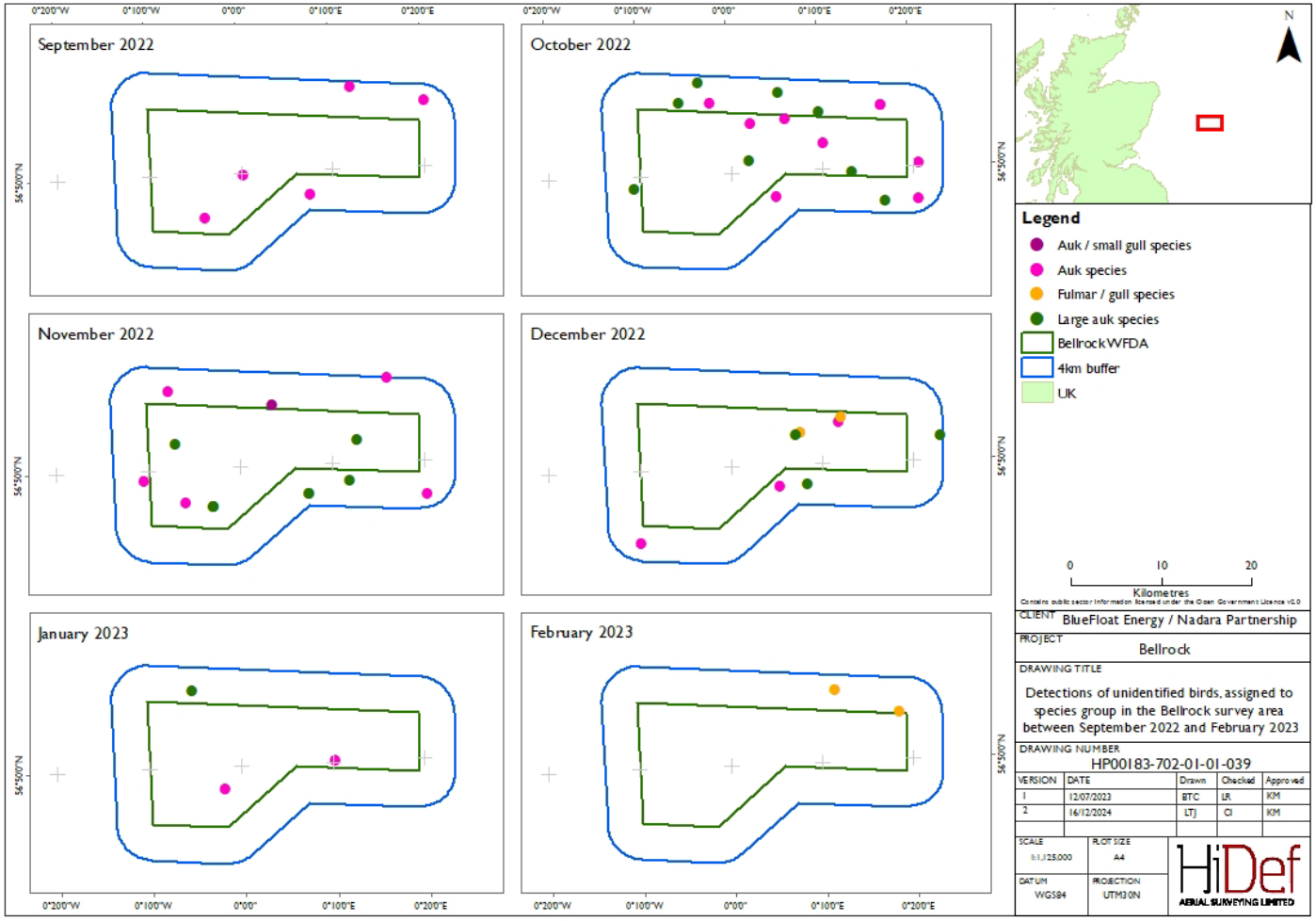


Figure 61 Detections of unidentified birds, assigned to species group in the Bellrock survey area between March and August 2023

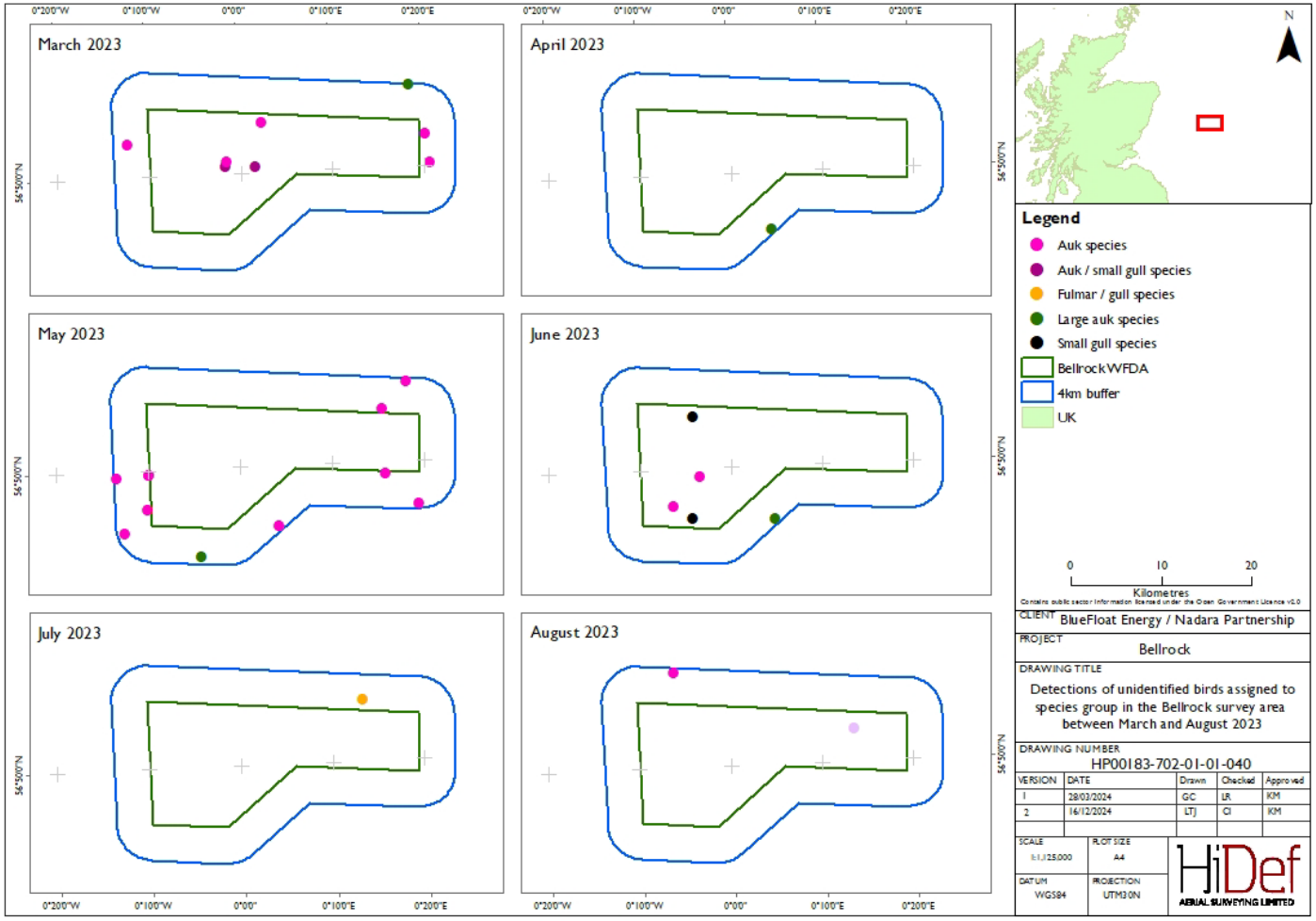
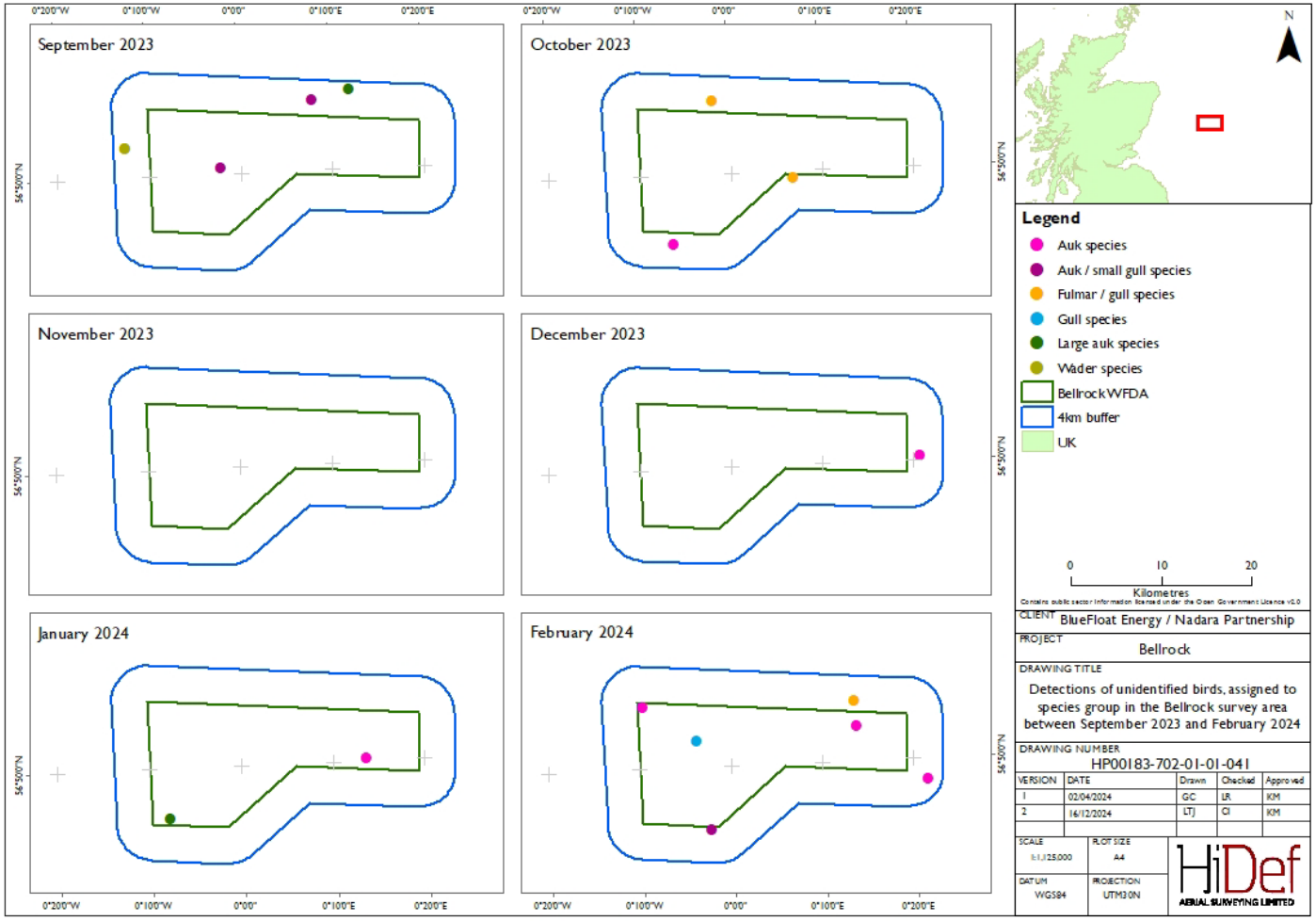


Figure 62 Detections of unidentified birds, assigned to species group in the Bellrock survey area between September 2023 and February 2024



3.3.10 All non-avian animals

114 Non-avian animals were recorded in all surveys, with the highest numbers recorded in June 2022 (Figure 63).

115 The higher number of marine mammals in the first year of the survey primarily relates to the peak numbers of harbour porpoise recorded between June and August 2022. Natural variability is most likely the reason for this difference between years, with porpoise know to travel at times in large pods. Survey conditions were checked and no significant difference in weather conditions can be noticed between June, July and August 2022 and the rest of the survey months and therefore survey conditions are not expected to cause the difference in numbers between the two years of survey.

116 Surfacing rates of species and unidentified animals can be found in Table 24.

117 The densities of all non-avian animals are presented in Figure 64 to Figure 67.

Figure 63 Total number of non-avian animals recorded in the Bellrock survey area, between March 2022 and February 2024

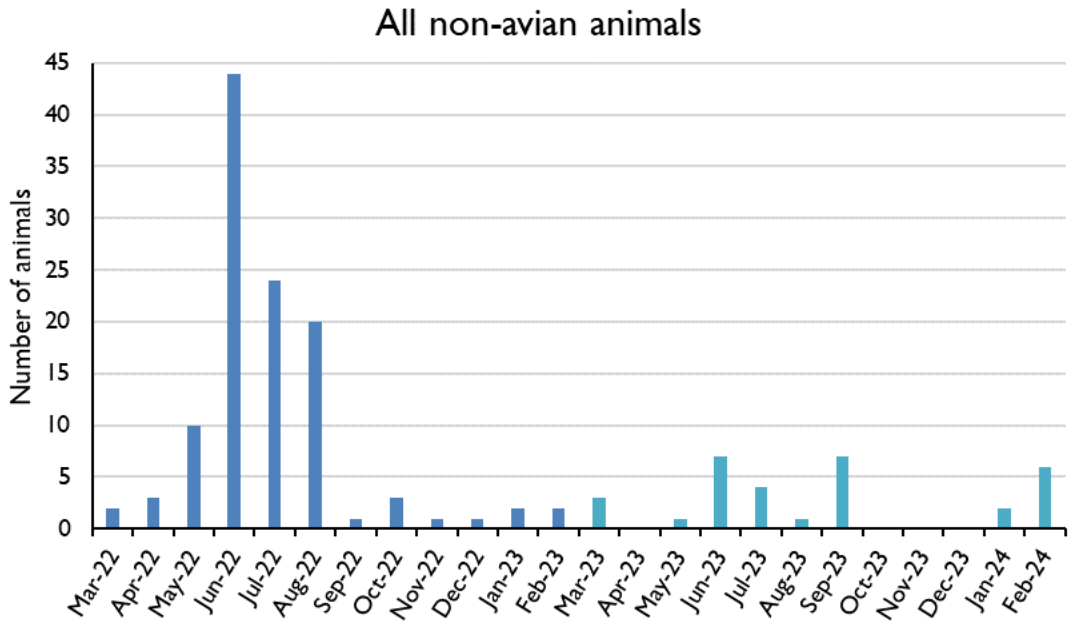


Table 25 Summary of surfacing behaviour for all non-avian animals in the Bellrock survey area between March 2022 and February 2024

Species	Submerged	Surfacing	Surfacing at red line	% Surfacing at red line	Unknown	Total
Grey seal	0	0	1	100	0	1
Harbour porpoise	81	10	34	27	1	126
Killer whale	1	0	0	0	0	1
Minke whale	1	0	1	50	0	2
White-beaked dolphin	3	0	0	0	0	3
No ID						
Cetacean species	1	0	0	0	0	1
Dolphin species	0	0	1	100	0	1
Seal species	2	1	6	67	0	9
Total	**89**	**11**	**43**	**30**	**1**	**144**

Figure 64 Density of all non-avian animals (number/km²) and number of detections per segment in the Bellrock survey area between March and August 2022

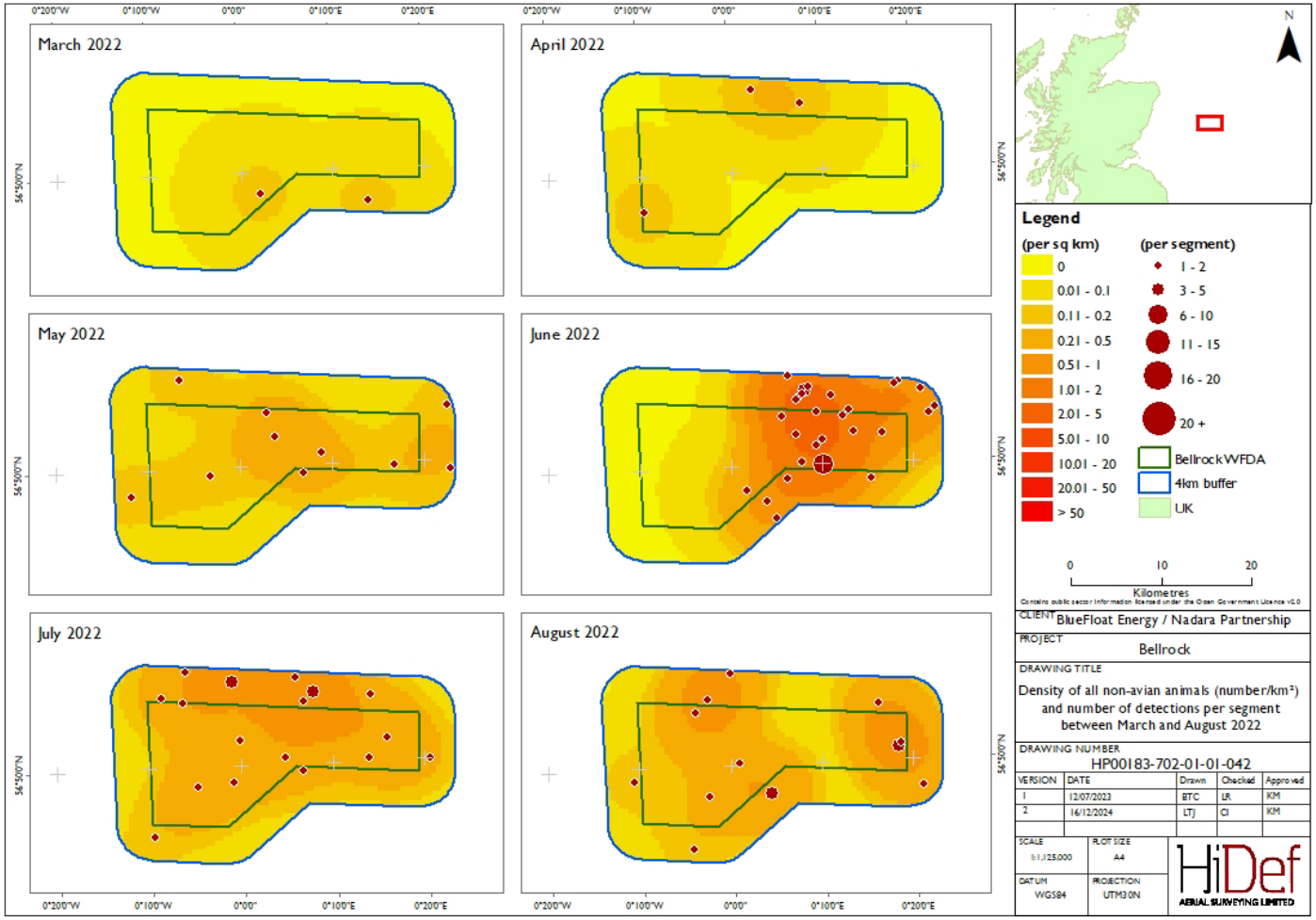


Figure 65 Detections, density of all non-avian animals (number/km²) and number of detections per segment in the Bellrock survey area between September 2022 and February 2023

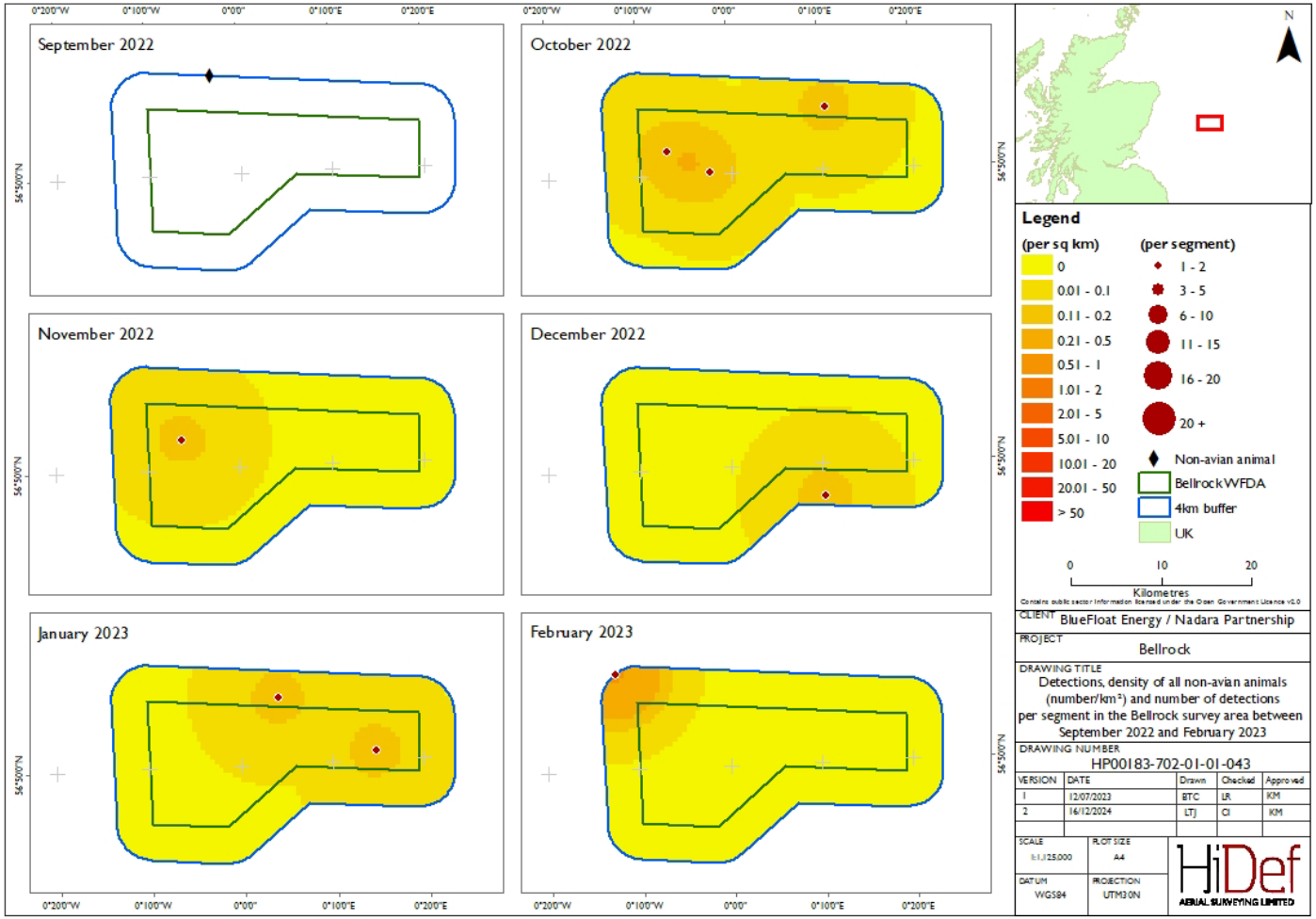


Figure 66 **Density of all non-avian animals (number/km²) and number of detections per segment in the Bellrock survey area between March and August 2023**

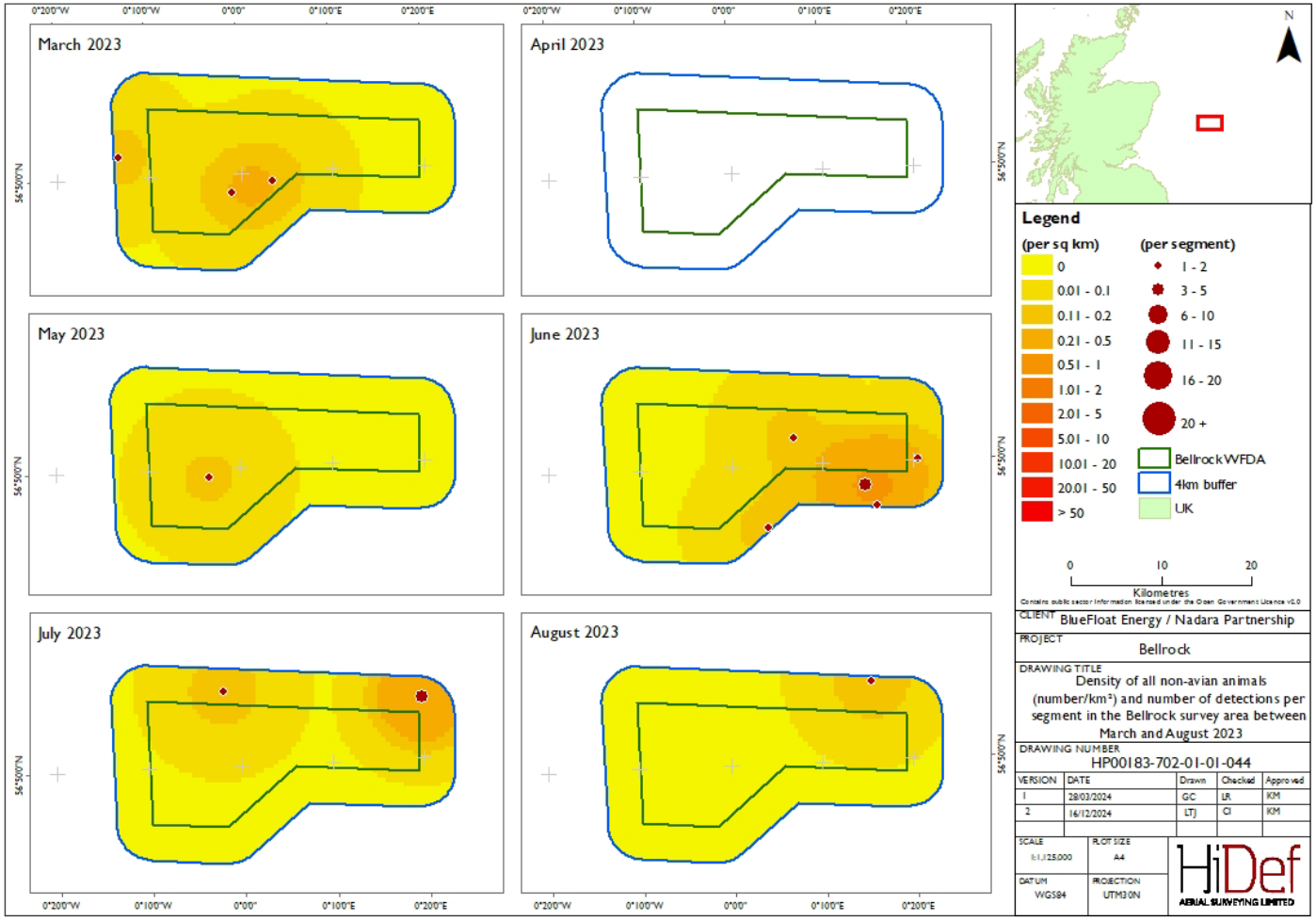
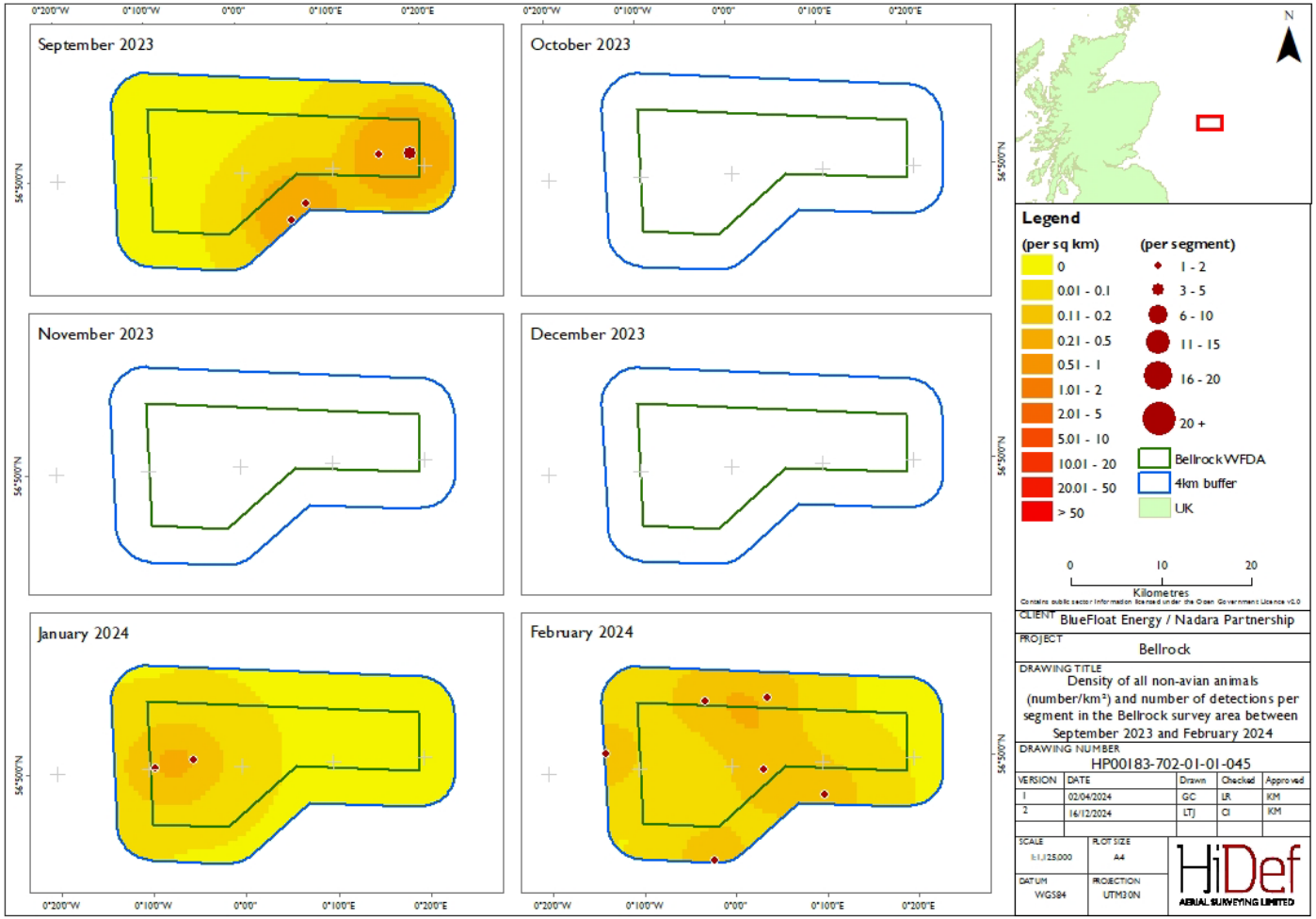


Figure 67 Density of all non-avian animals (number/km²) and number of detections per segment in the Bellrock survey area between September 2023 and February 2024



3.3.11 Harbour porpoise

118 Harbour porpoise was the most abundant marine mammal species recorded throughout the survey period, with numbers peaking at 42 individuals recorded in June 2022 (Figure 68).

119 When observed and when corrected for animals submerged at the time of the survey, absolute density estimates for the species ranged from 0.05 animals/km^2 (95% CI 0.00 – 0.20) such as in March 2023 to 3.23 animals/km^2 (95% CI 1.36 – 5.42) in June 2022 (Figure 69 and Table 25), equating to 50 animals (95% CI 0 – 144) and 2,127 animals (95% CI 886 – 3,581) respectively.

120 Harbour porpoises were widespread across the survey area (Figure 70 to Figure 73). In June 2022, when abundance peaked, the highest densities were observed towards the north of the survey area (Figure 70).

121 Proportions of surfacing animals can be found in Table 24; 64% of individuals were recorded as submerged.

122 There were three adult/juvenile pairs were recorded in July 2022.

Figure 68 Number of harbour porpoise recorded between March 2022 and February 2024 in the Bellrock survey area

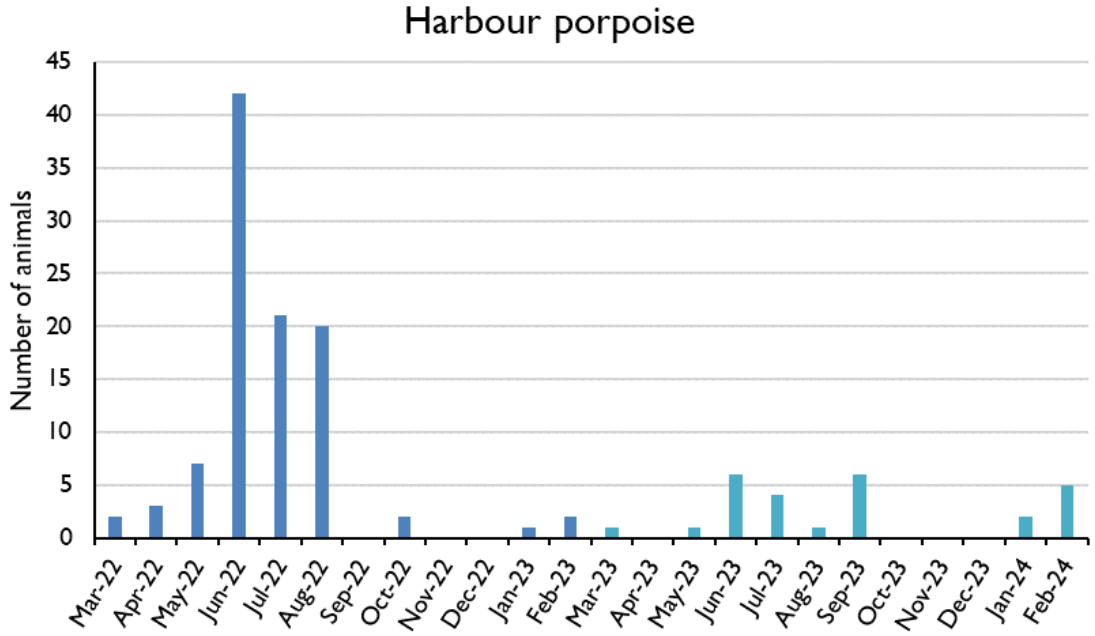


Figure 69 **Harbour porpoise unapportioned density estimates in the Bellrock survey area, between March 2022 and February 2024. Error bars represent the 95% lower and upper confidence limits**

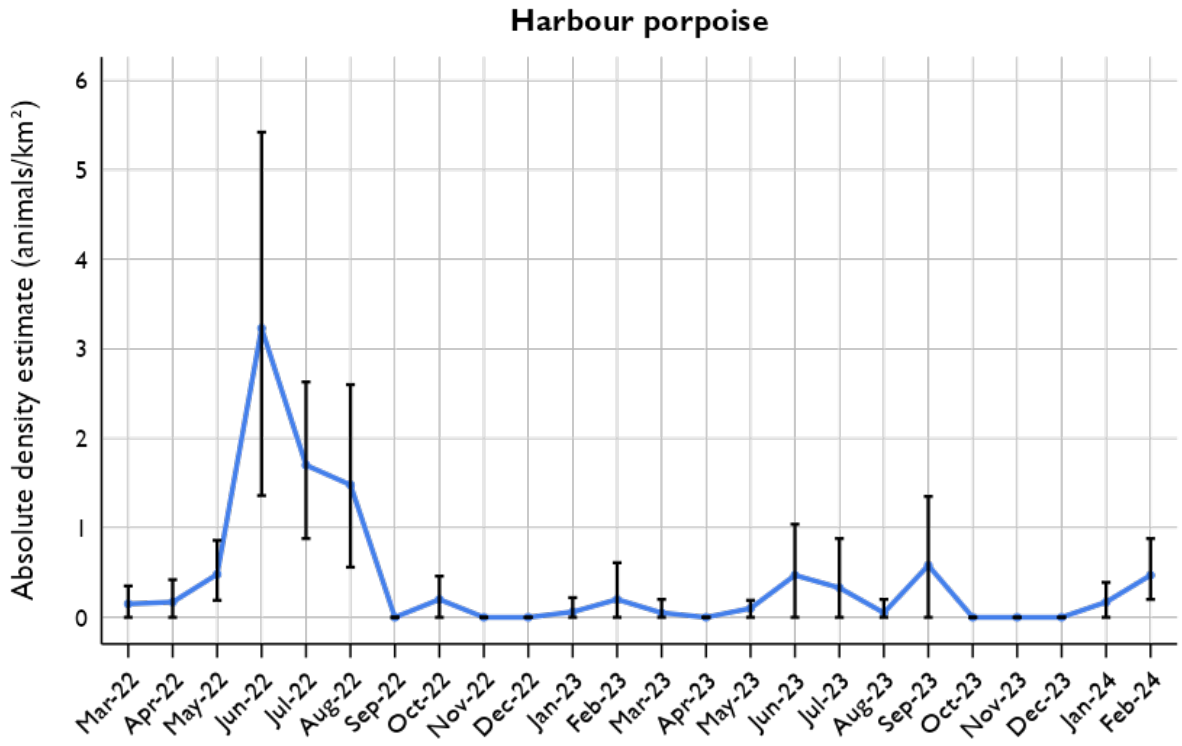


Table 26 Relative and absolute monthly unapportioned density and population estimates for harbour porpoise in the Bellrock survey area between March 2022 and February 2024, corrected for animals estimated as unavailable for detection

Survey date	Relative population estimates						Absolute population estimates			
	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)
19 March 2022	0.03	21	0	47	12	59.00	0.15	104	0	234
11 April 2022	0.04	30	0	69	20	65.07	0.17	125	0	288
02 May 2022	0.10	68	29	117	23	33.31	0.48	326	139	561
04 June 2022	0.62	408	170	687	135	32.96	3.23	2127	886	3581
08 July 2022	0.31	204	104	317	55	26.95	1.70	1117	570	1736
17 August 2022	0.29	193	75	337	69	35.53	1.48	983	382	1717
20 September 2022	0.00	0	0	0	0	0.00	0.00	0	0	0
01 October 2022	0.03	20	0	47	12	61.76	0.20	131	0	307
09 November 2022	0.00	0	0	0	0	0.00	0.00	0	0	0
20 December 2022	0.00	0	0	0	0	0.00	0.00	0	0	0
21 January 2023	0.01	10	0	29	9	92.69	0.06	55	0	160
13 February 2023	0.03	20	0	58	19	94.74	0.20	136	0	393
04 March 2023	0.01	10	0	29	9	91.02	0.05	50	0	144
03 April 2023	0.00	0	0	0	0	0.00	0.00	0	0	0
04 May 2023	0.02	10	0	30	10	91.26	0.10	48	0	144

Survey date	Relative population estimates						Absolute population estimates			
	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)
13 June 2023	0.09	59	0	133	34	57.66	0.47	308	0	693
07 July 2023	0.06	40	0	105	30	74.41	0.33	219	0	575
17 August 2023	0.01	10	0	29	9	93.05	0.05	51	0	148
04 September 2023	0.09	58	0	141	38	64.59	0.58	373	0	906
13 October 2023	0.00	0	0	0	0	0.00	0.00	0	0	0
14 November 2023	0.00	0	0	0	0	0.00	0.00	0	0	0
10 December 2023	0.00	0	0	0	0	0.00	0.00	0	0	0
30 January 2024	0.03	20	0	48	13	62.46	0.17	110	0	264
08 February 2024	0.07	50	20	85	18	34.88	0.47	339	136	577

Figure 70 **Detections, density (number/km²) and number of detections per segment of harbour porpoises in the Bellrock survey area between March and August 2022**

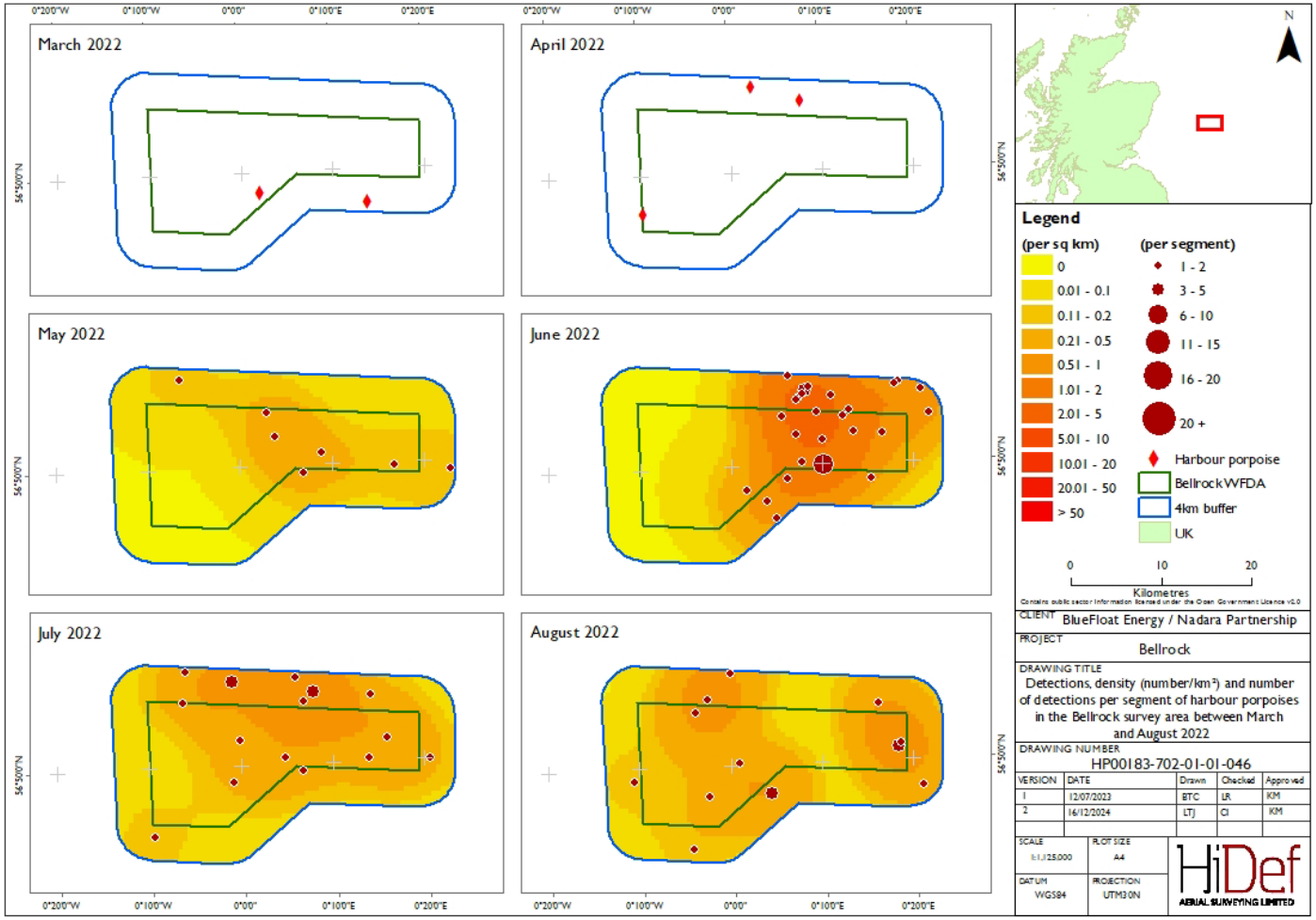


Figure 71 Detections of harbour porpoises in the Bellrock survey area between September 2022 and February 2023

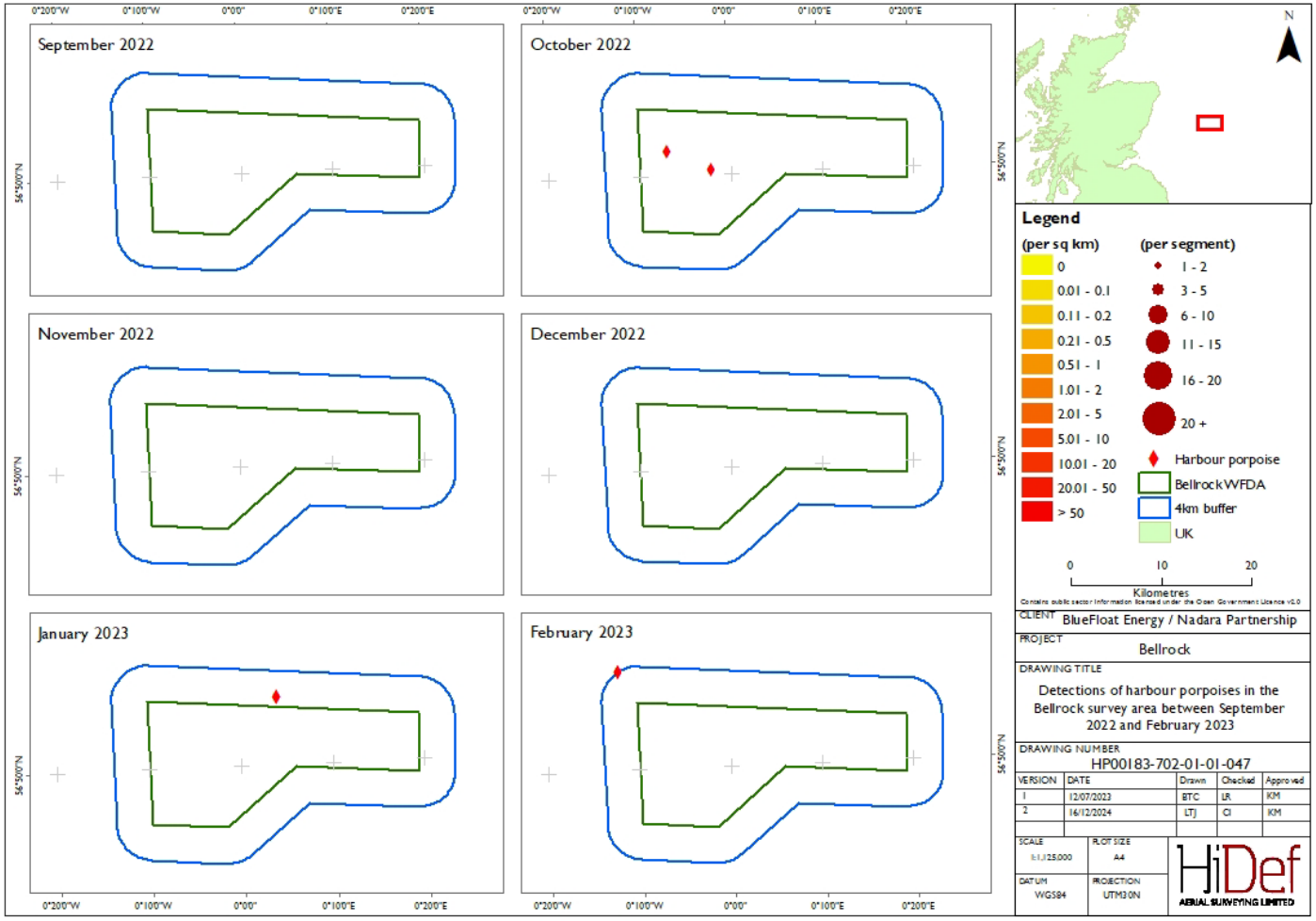


Figure 72 **Detections, density (number/km²) and number of detections per segment of harbour porpoises in the Bellrock survey area between March and August 2023**

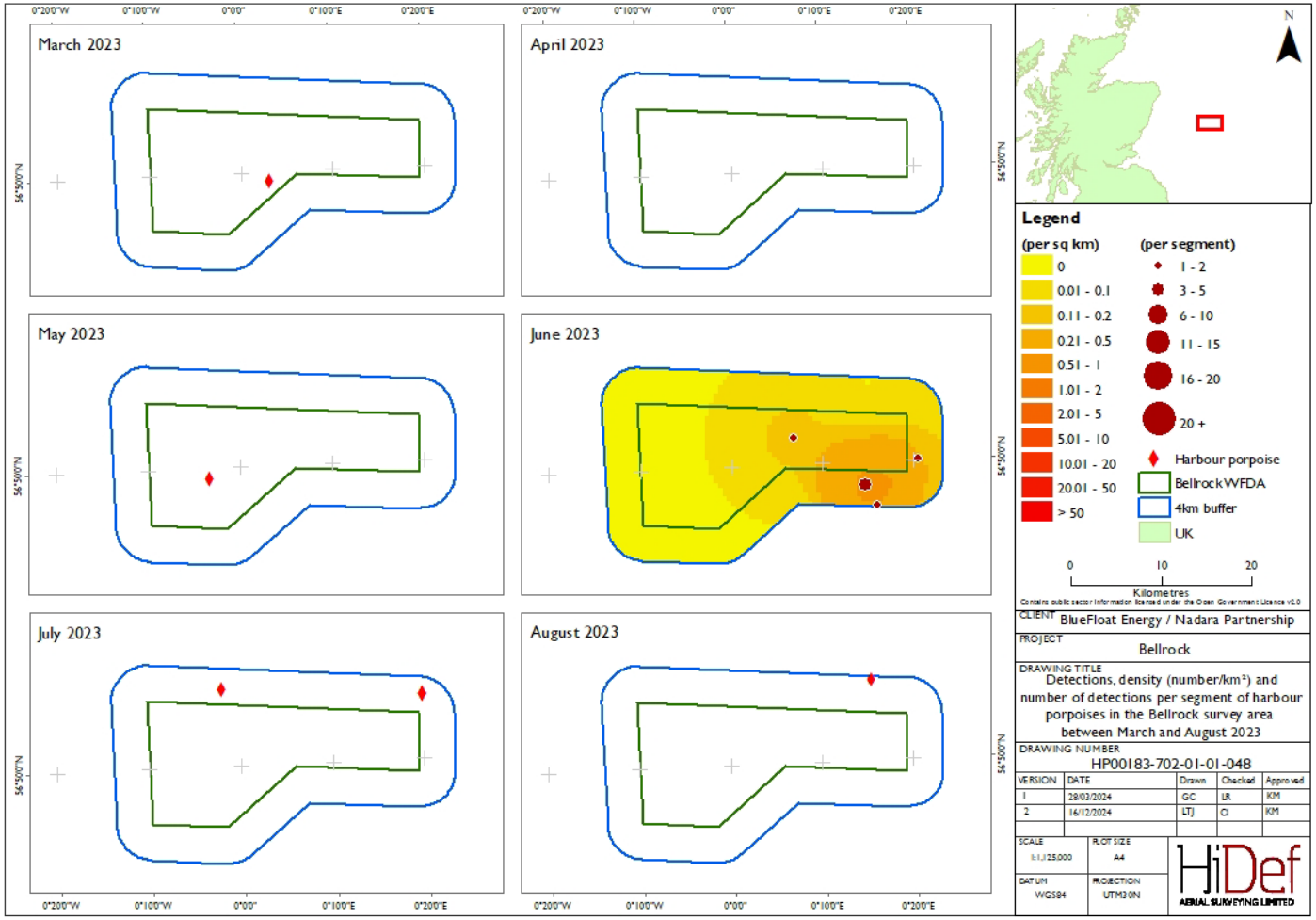
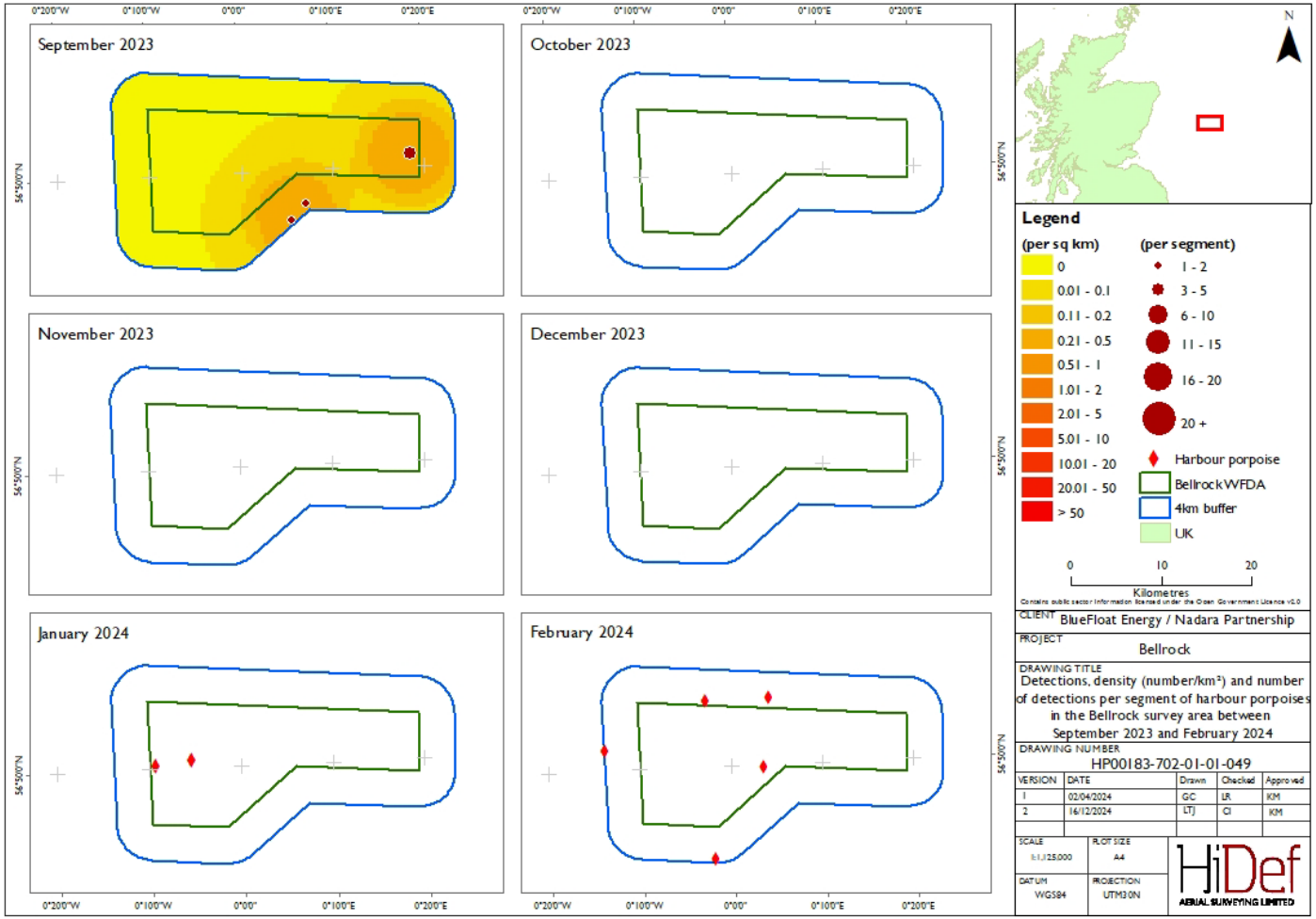


Figure 73 Detections, density (number/km²) and number of detections per segment of harbour porpoises in the Bellrock survey area between September 2023 and February 2024



3.3.12 Less abundant non-avian animal species

123 Four other species of non-avian animals were recorded in the survey area across five surveys of the 24-month period. A total of three white-beaked dolphins (*Lagenorhynchus albirostris*) were recorded in July 2022 and a single minke whale was observed in June and a single minke whale was observed in October 2022 (Figure 74). A single grey seal was recorded in March 2023 and a single killer whale (*Orcinus orca*) was recorded in June 2023.

124 The distributions of less abundant non-avian animal species are presented in Figure 75 to Figure 77. No map is presented for September 2023 to February 2024 as no less abundant non-avian animals were observed during that period. Both minke whales and a killer whale were observed within the buffer, whilst white-beaked dolphins were recorded within the WFDA and buffer. A grey seal was recorded within the WFDA.

Figure 74 Number of less abundant non-avian animals recorded within the Bellrock survey area between March 2022 and February 2024

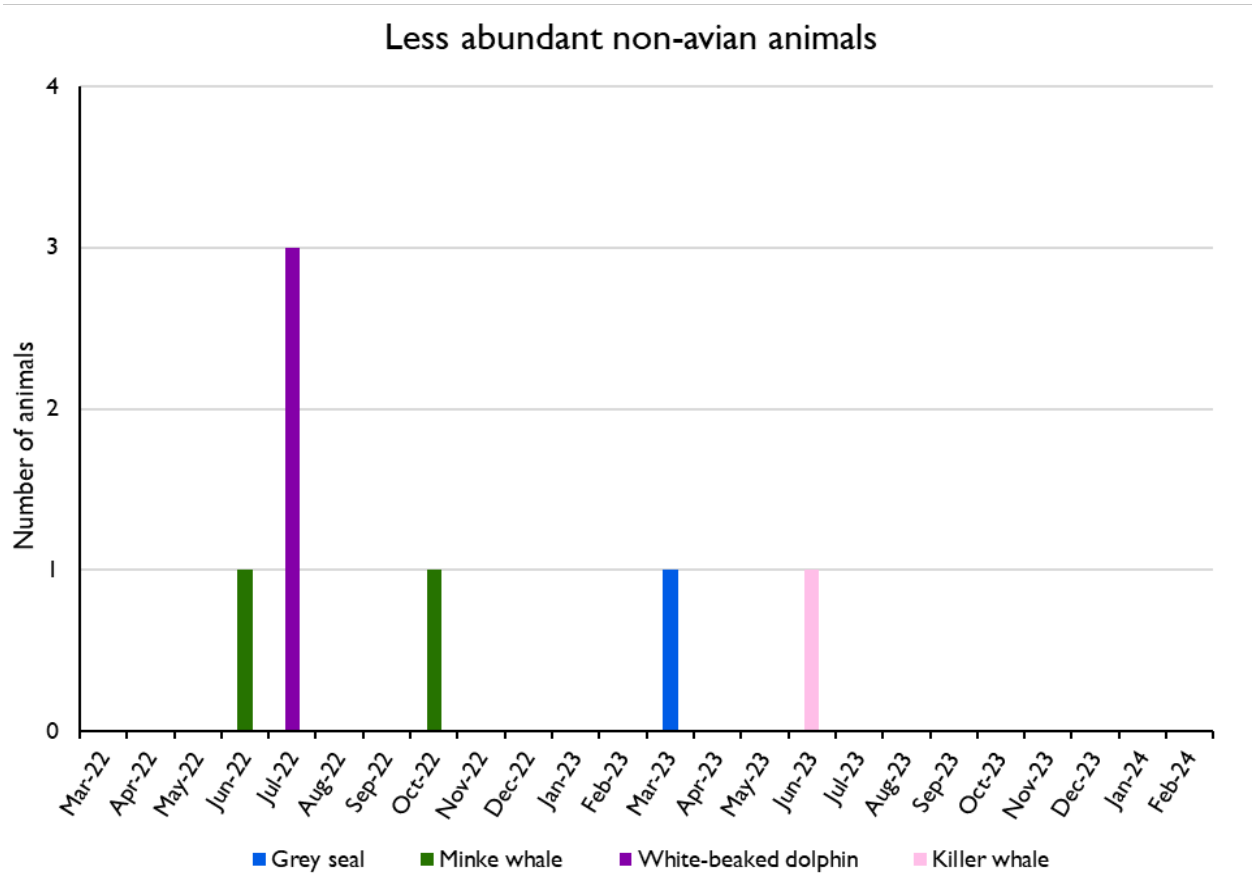


Figure 75 Detections of less abundant non-avian animal species in the Bellrock survey area between March and August 2022

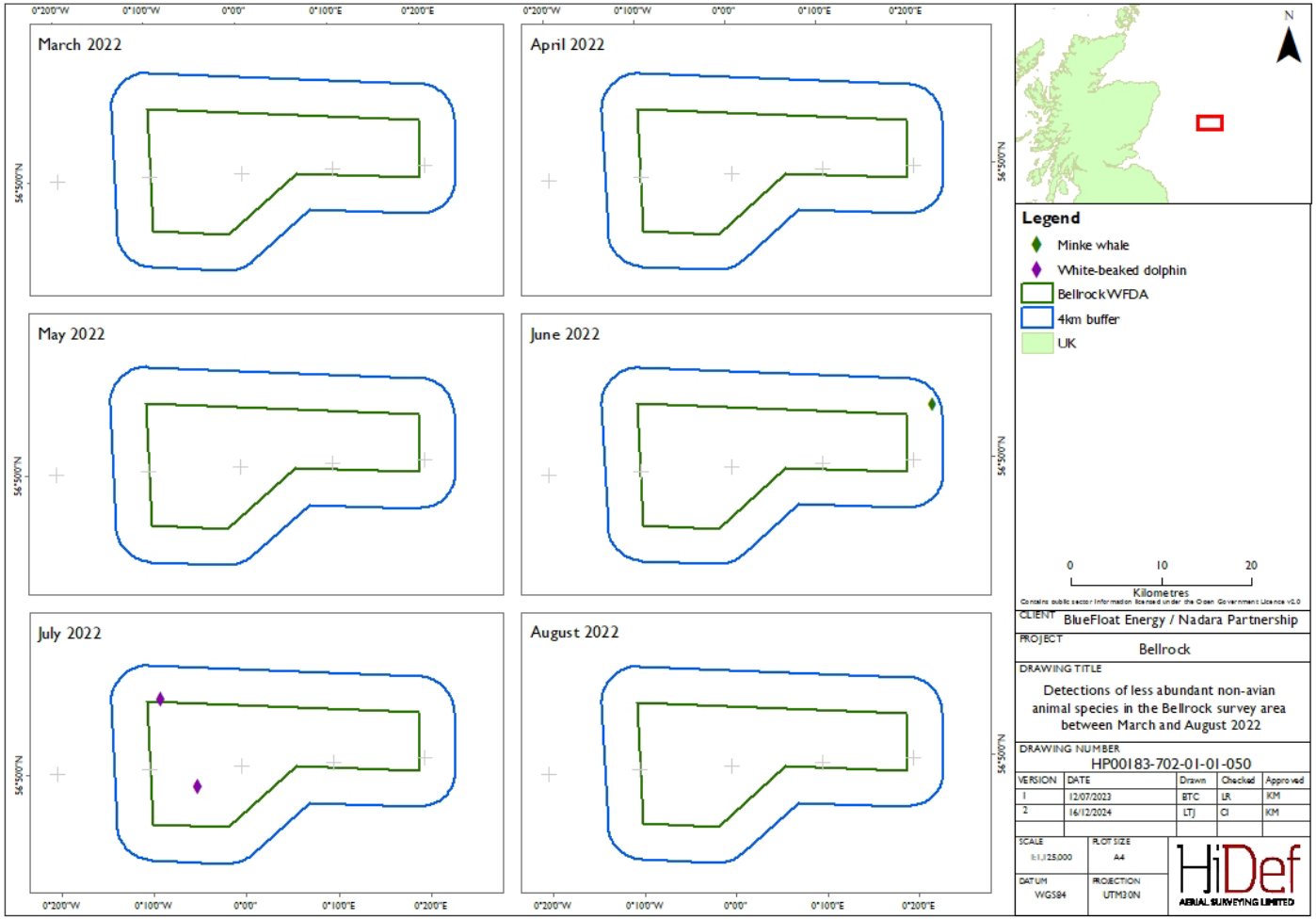


Figure 76 Detections of less abundant non-avian animal species in the Bellrock survey area between September 2022 and February 2023

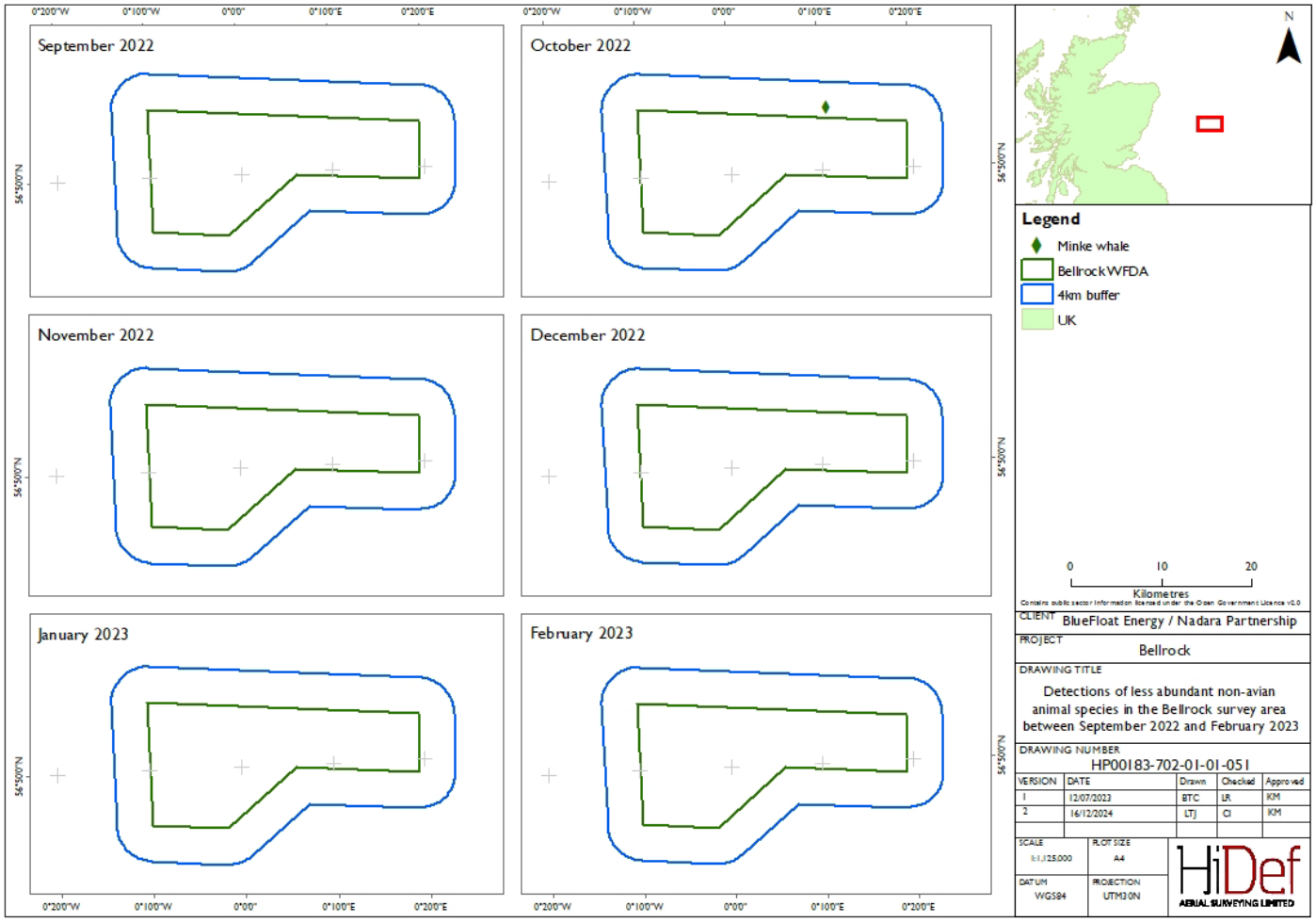
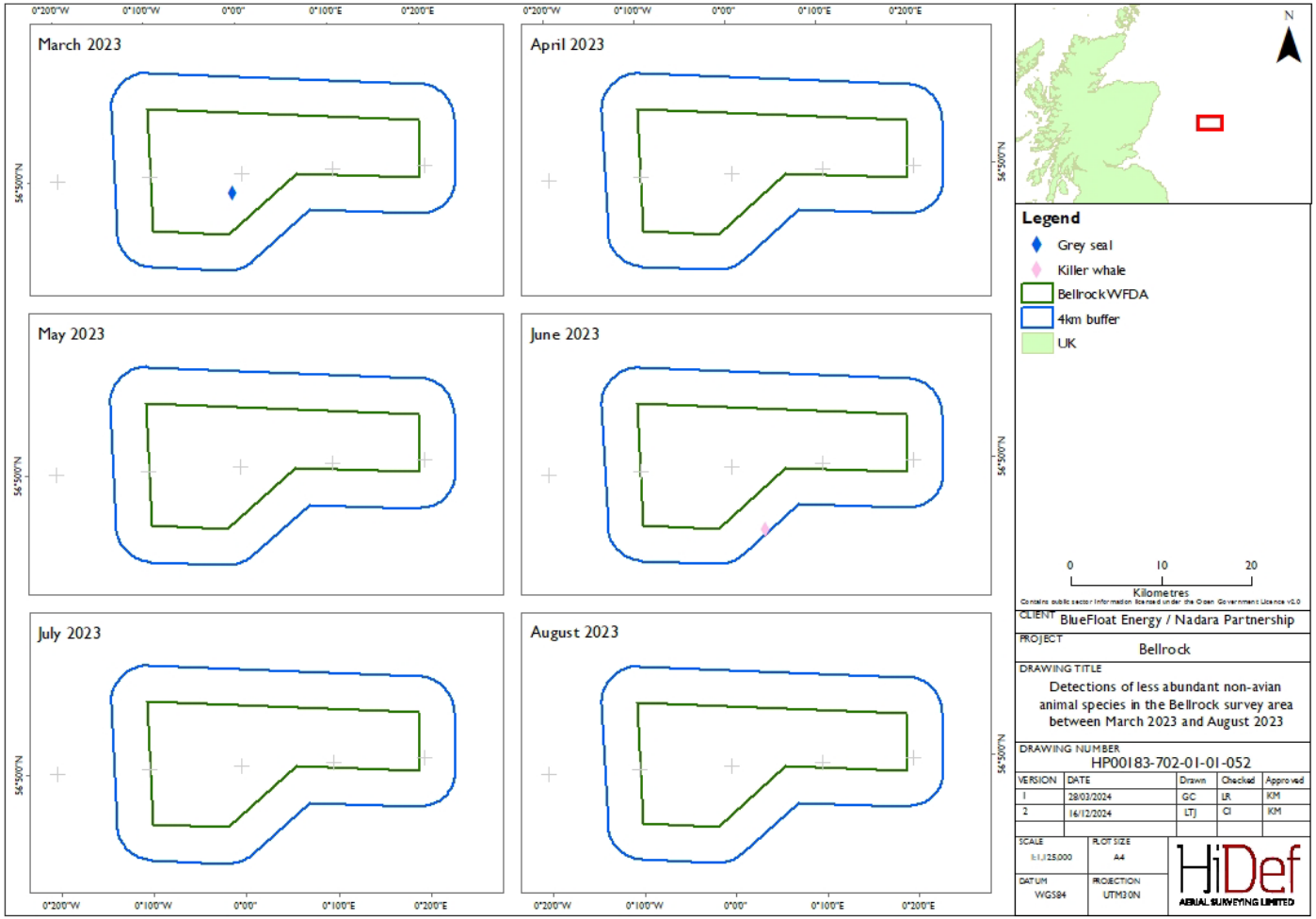


Figure 77 **Detections of less abundant non-avian animal species in the Bellrock survey area between March and August 2023. NB: There is no map presented for September 2023 to February 2024 as no less abundant non-avian animals were recorded in those months.**



3.3.13 Unidentified non-avian animals

125 Three unidentified non-avian animal species groups were recorded through the survey period (Figure 78). Peaks in non-identification is primarily related to difficulties differentiating between harbour and grey seals, due to the size overlap between females and juveniles of these species. One unidentified cetacean species and one unidentified dolphin species was recorded in June and September 2022 respectively.

126 When present, unidentified non-avian animals were dispersed throughout the survey area in both the WFDA and buffer (Figure 79 to Figure 82).

Figure 78 Number of unidentified non-avian animals recorded within the Bellrock survey area between March 2022 and February 2024

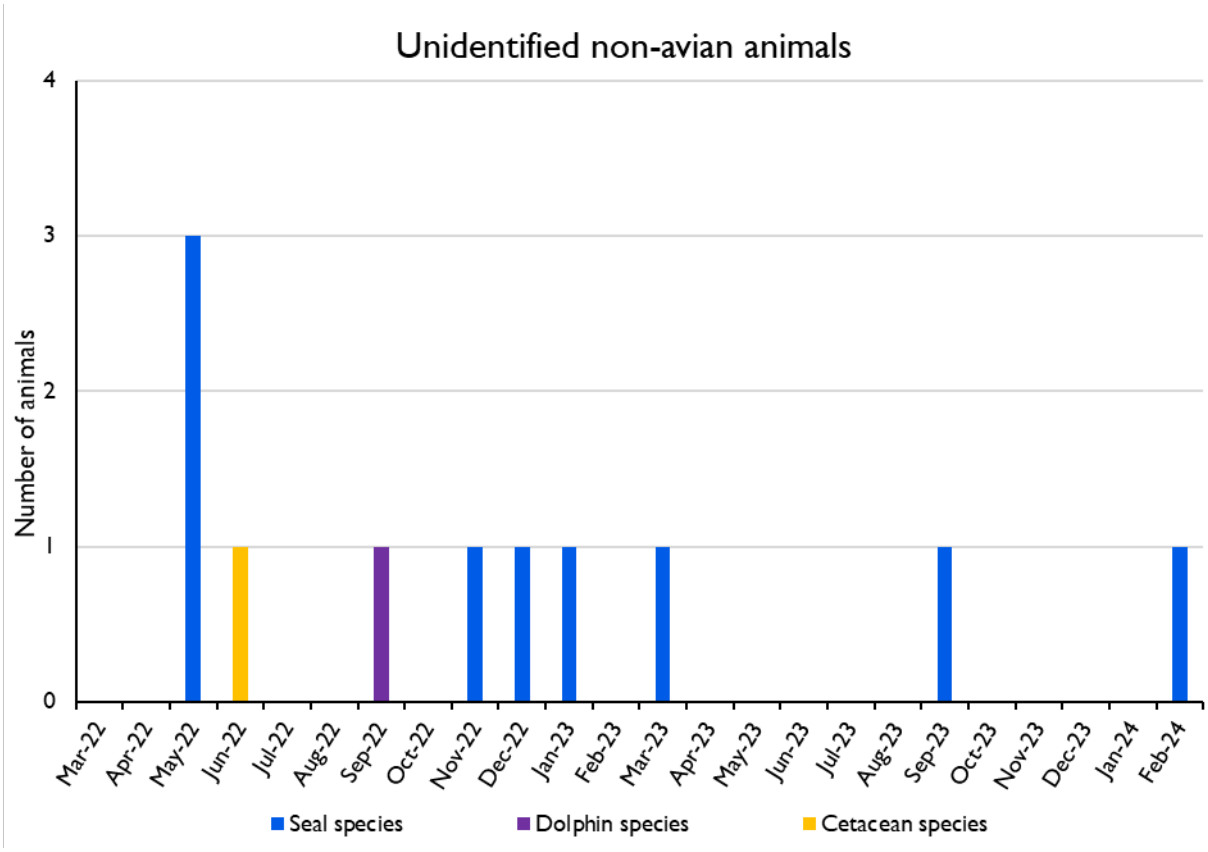


Figure 79 Detections of unidentified non-avian animal species in the Bellrock survey area between March and August 2022

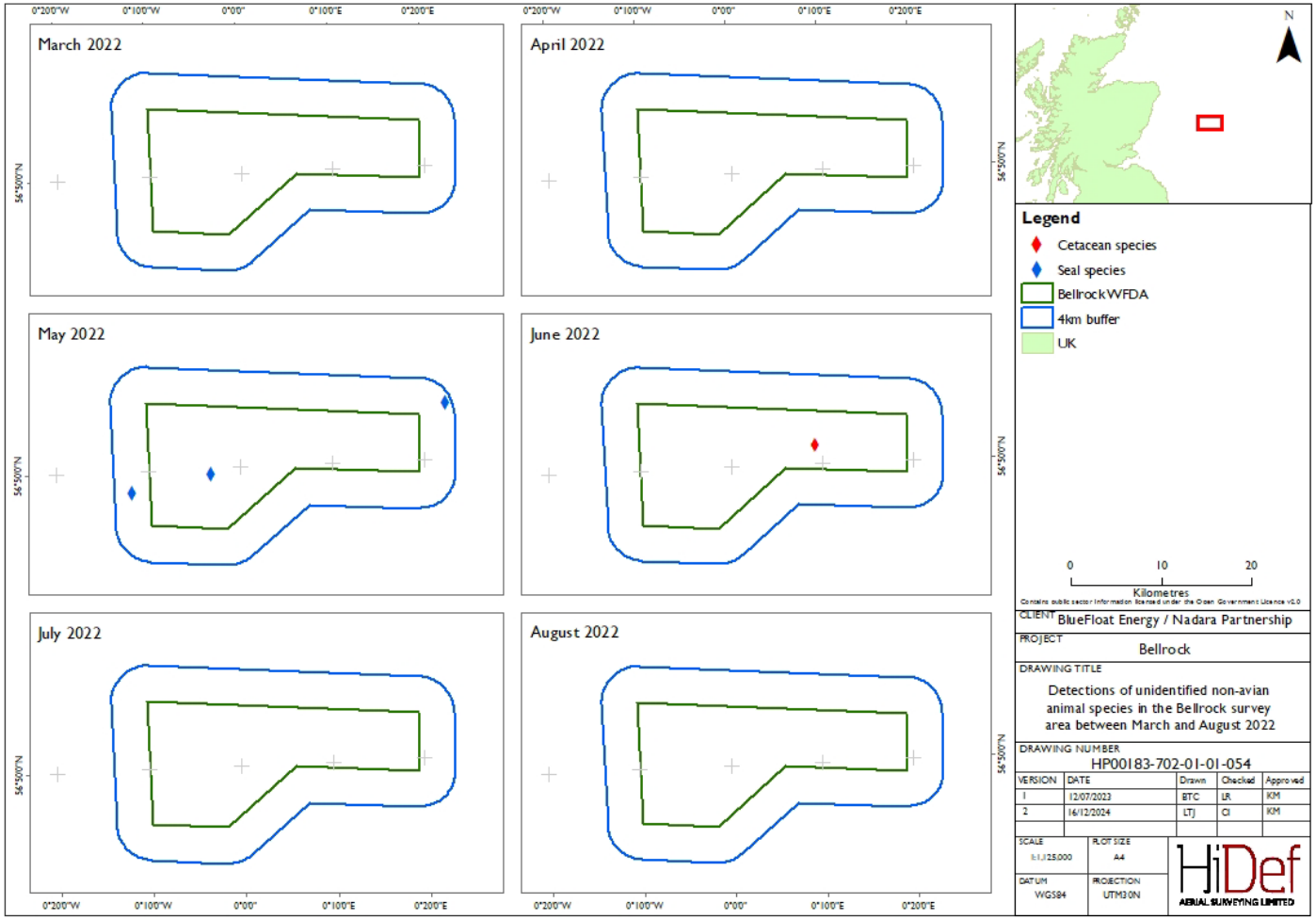


Figure 80 Detections of unidentified non-avian animal species in the Bellrock survey area between September 2022 and February 2023

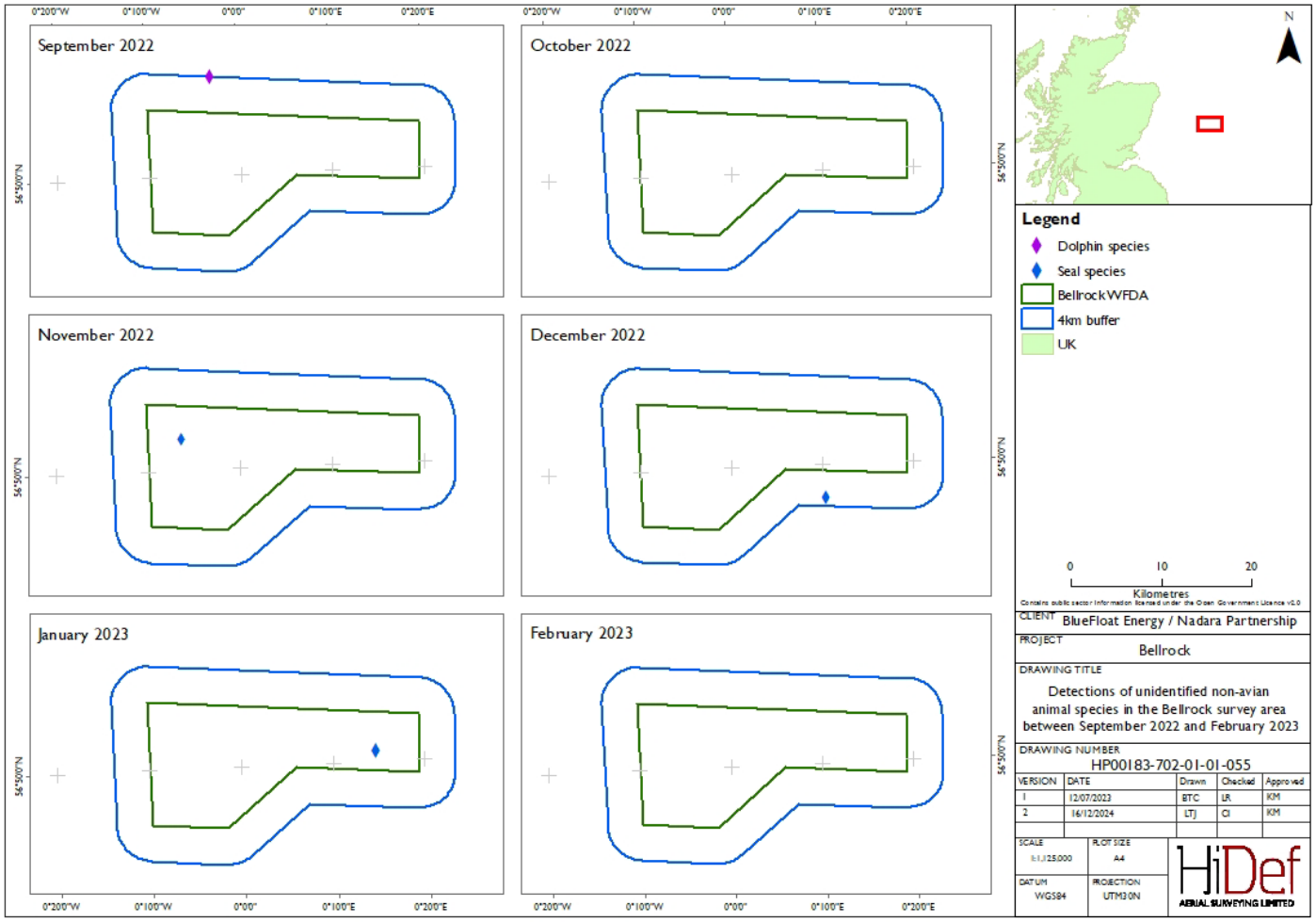


Figure 81 Detections of unidentified non-avian animal species in the Bellrock survey area between March and August 2023

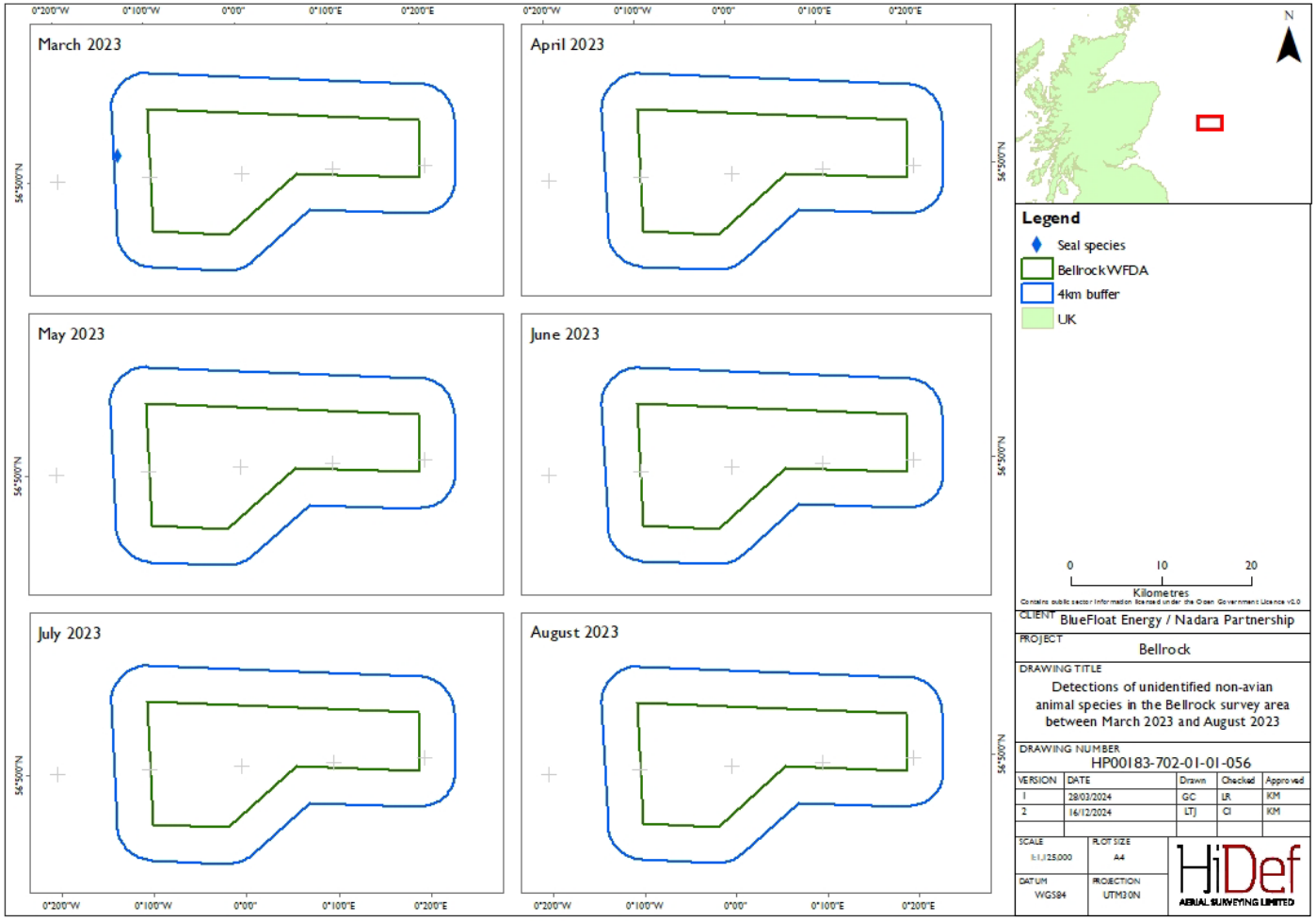
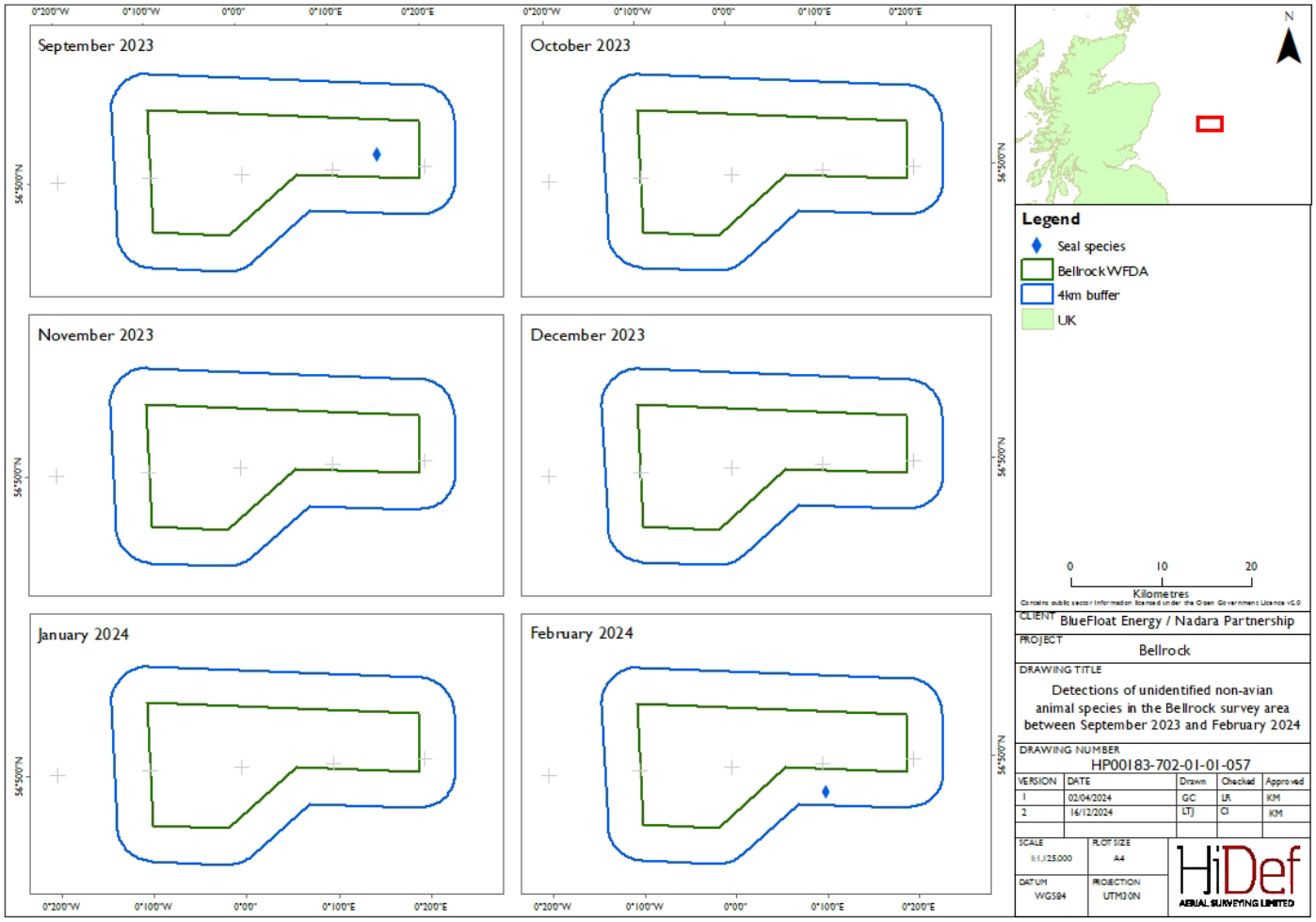


Figure 82 Detections of unidentified non-avian animal species in the Bellrock survey area between September 2023 and February 2024



3.3.14 Anthropogenic activity

127 Minimal anthropogenic activity was recorded throughout the survey period (Figure 83). A total of seven fishing buoys were recorded and were located both in the WFDA and the buffer. A single boat was observed in December 2023 within the buffer (Figure 84 to Figure 87).

Figure 83 Number of vessels and anthropogenic objects recorded within the Bellrock survey area between March 2022 and February 2024

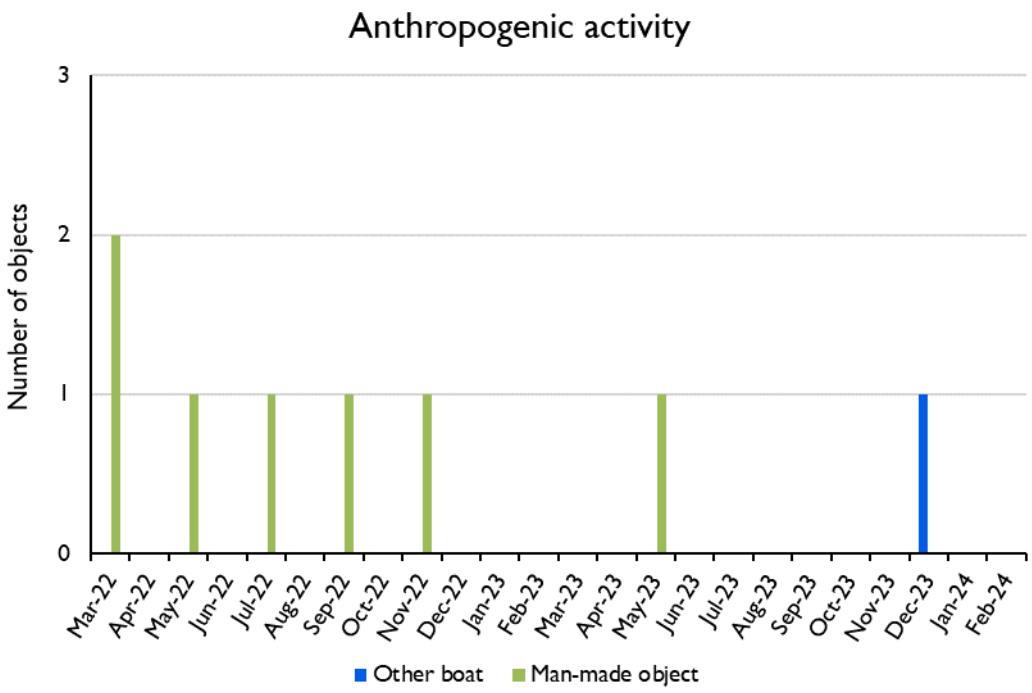


Figure 84 Detections of anthropogenic activity within the Bellrock survey area between March and August 2022

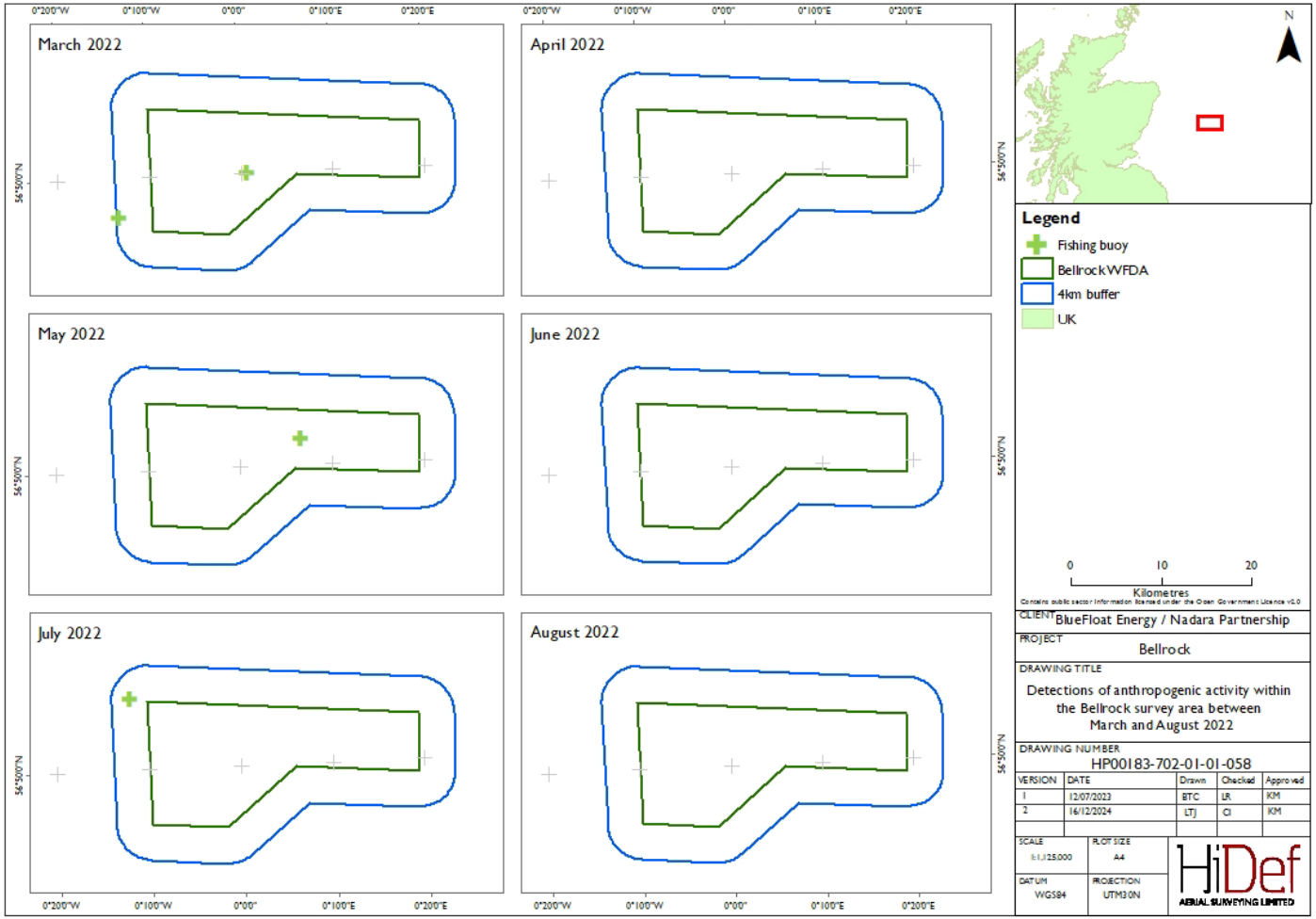


Figure 85 Detections of anthropogenic activity within the Bellrock survey area between September 2022 and February 2023

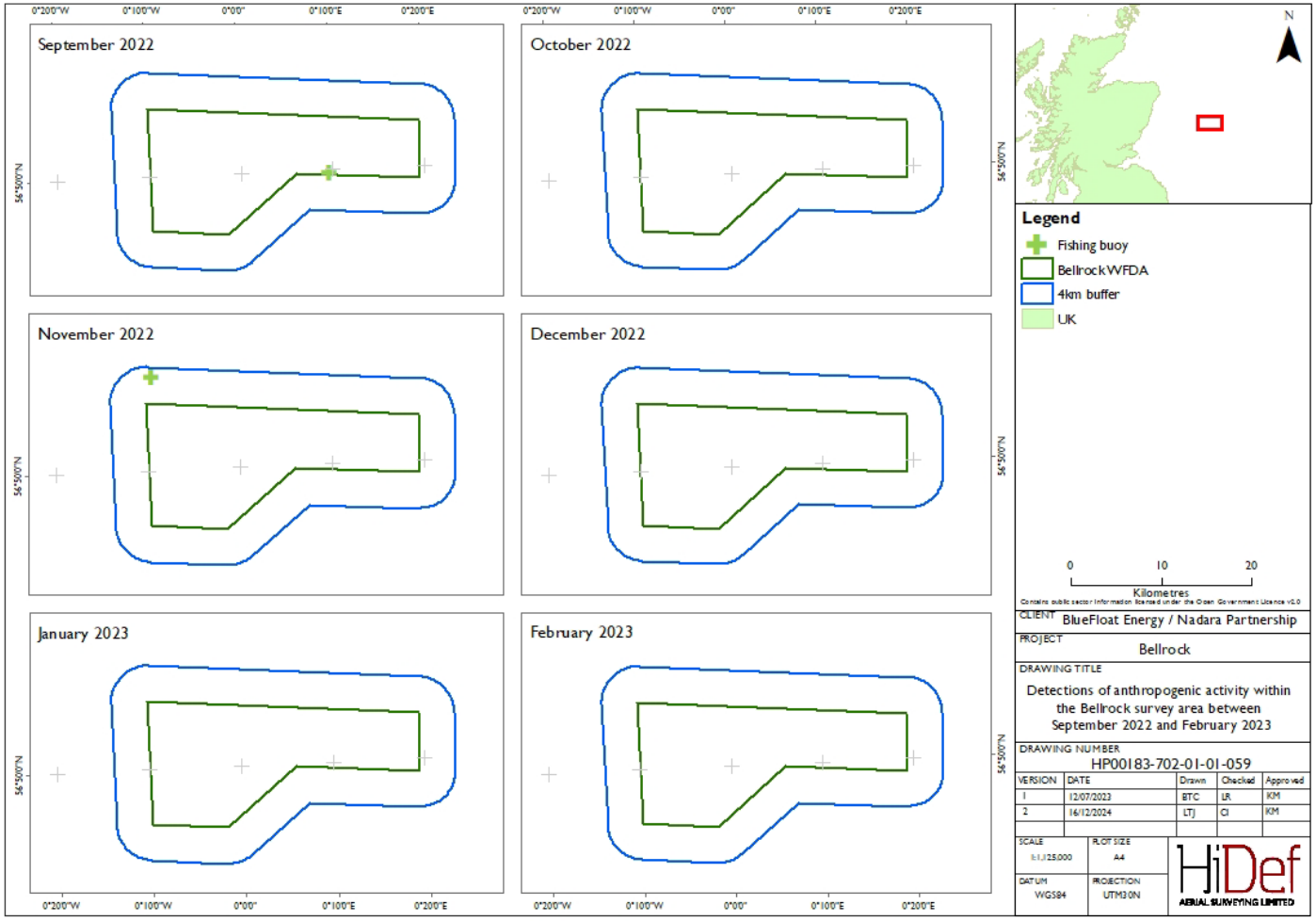


Figure 86 Detections of anthropogenic activity within the Bellrock survey area between March and August 2023

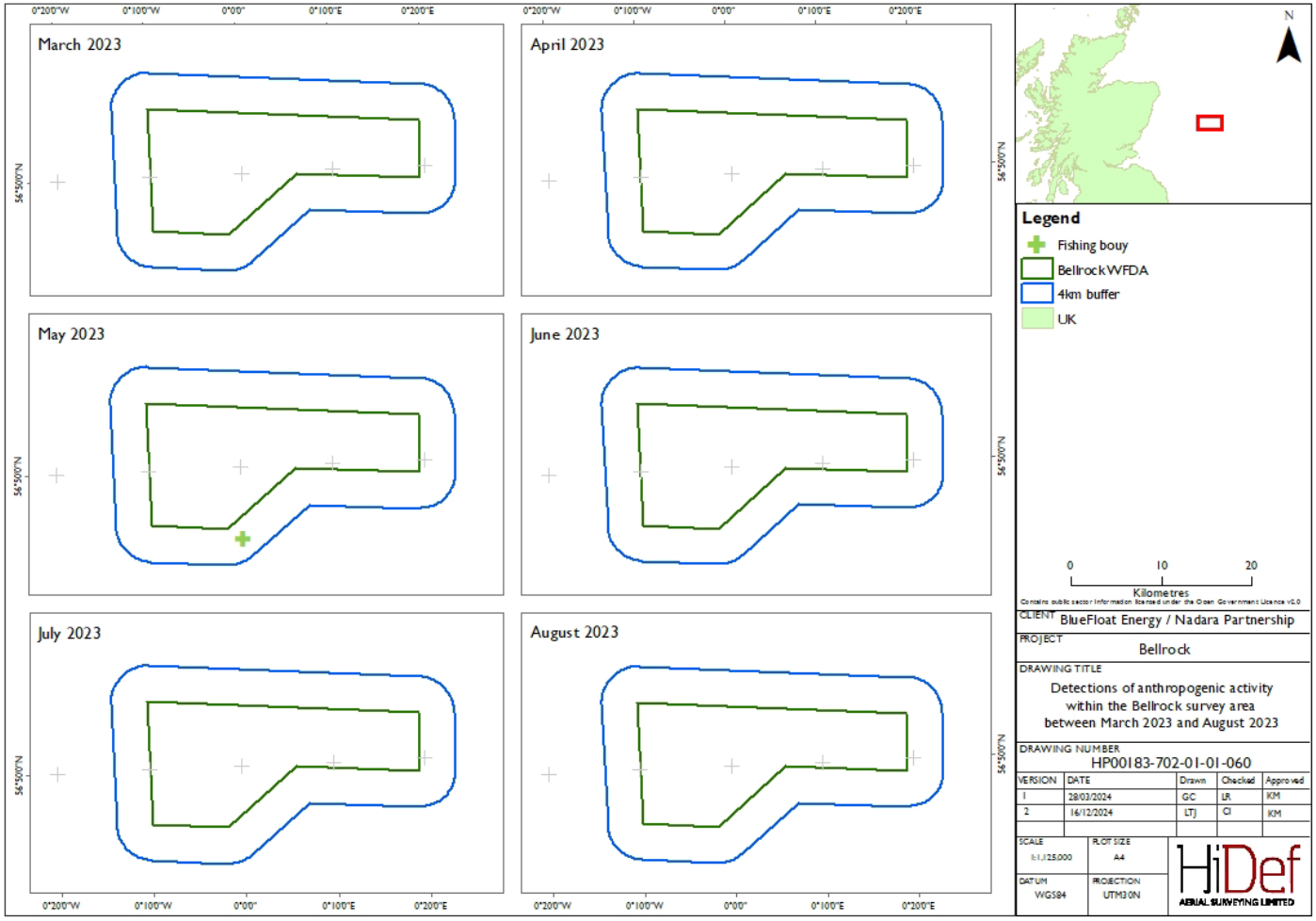
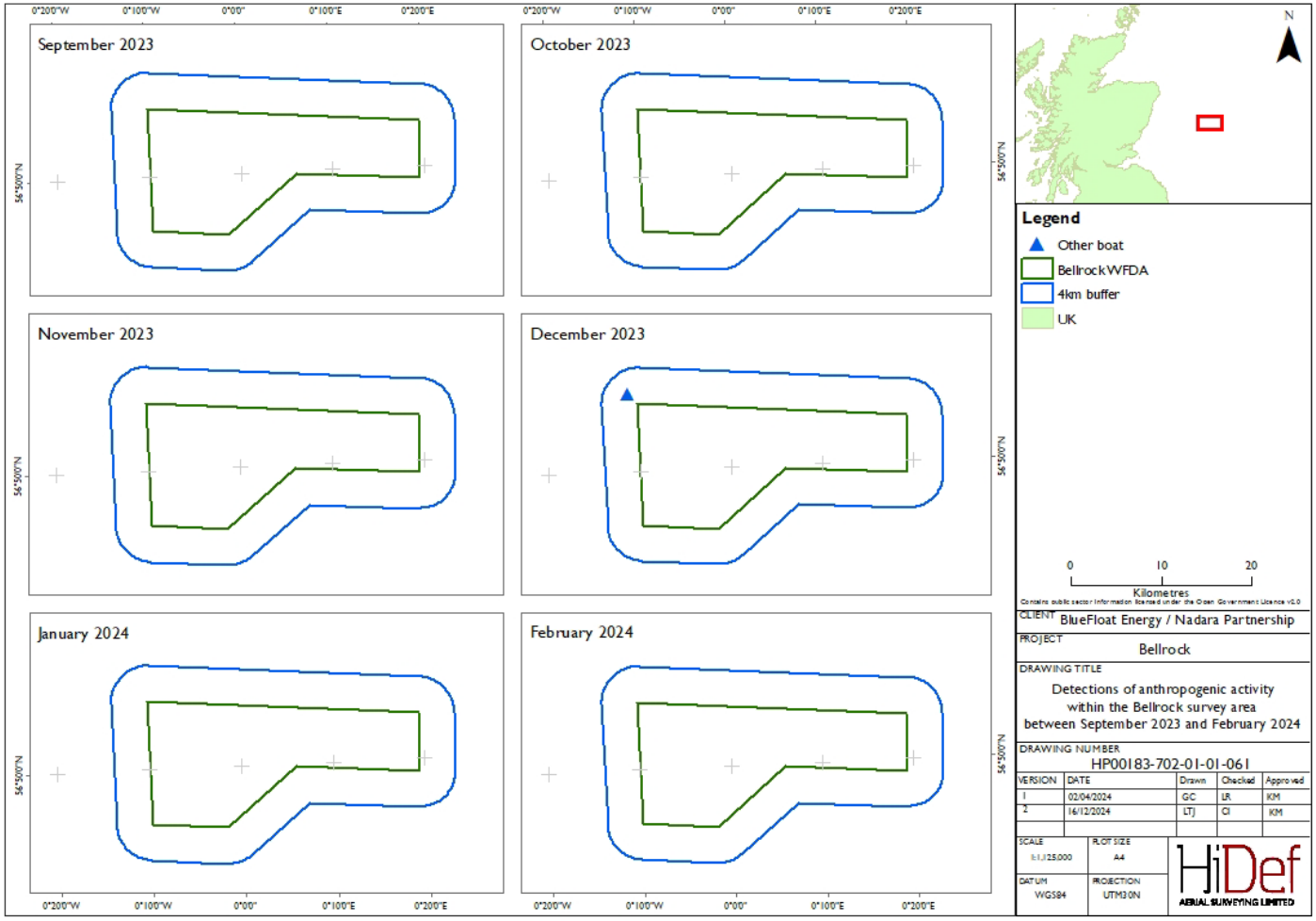


Figure 87 Detections of anthropogenic activity within the Bellrock survey area between September 2023 and February 2024



4 Discussion

128 The surveys recorded a total of 5,363 birds of 16 species and 133 marine mammals of five species. A further 437 birds were partially identified to eight species groups and 11 non-avian animals were partially identified to three species groups. An additional 165 dead birds were recorded across the survey period. An identification rate to species level of 92.46% was achieved throughout the 24-month period.

129 Kittiwakes were present in 18 out of 24 surveys with a marked peak in June 2022 during the breeding season. Typically, kittiwakes will be strongly associated with colonies between May and June (Coulson, 2011), with the higher abundance during this time suggesting the area is utilised during chick rearing. The presence of birds during the breeding season, and in particular, the relatively high numbers of birds sitting on the water in June 2022 suggests the area may be suited for foraging. During the second year of surveys kittiwakes peaked in October 2023 during the post-breeding migration. The Buchan Ness to Collieston Coast SPA and the Troup, Pennan and Lion's Heads SPA are located within the foraging range of kittiwakes (mean max 156.1km ±144.5 SD; Woodward *et al.,* 2019) and support around 13,547 Apparently Occupied Nests (AONs) in 2023 to 9,853 AON in 2023, respectively (BTO, 2024).

130 Guillemots were the most abundant species recorded during the 24-month survey period, with a peak observed during the start of post-breeding dispersal in July 2022. Birds lay a single egg between mid-April / May, with incubation lasting 33-34 days and the young leaving the colony 20 days after hatching (Gilbert *et al.*, 2011). They remain in care of the adult male at sea from the end of June to August. The increased numbers in July suggest the area may be used as a moult site during post-breeding dispersal from further afield rather than solely from the nearby colonies, with more than 225 adult-juvenile pairs recorded during July 2022. During the second year of surveys, higher numbers were observed in May 2023, suggesting the site may also be used during the start of the breeding season. Bellrock is likely to be within foraging range of birds associated with Buchan Ness to Collieston Coast SPA (mean max 73.2km ±80.5 SD; Woodward *et al.,* 2019), which is designated for the protection of breeding and migratory guillemots.

131 Razorbills were recorded sporadically over the survey period with observations in only seven months out of 24. They were recorded in relatively small numbers throughout the survey period compared to the other auk species, peaking markedly in July 2022 towards the end of the breeding season. The low numbers of birds recorded makes it hard to draw realistic conclusions, but absence in May coincides with egg-laying when birds may be constrained to colonies (Forrester *et al.,* 2012). In July 2022, 24 adult-chick pairs were recorded and the large number of birds sitting on the water in this month corresponds to the post-breeding flightless moult period where birds are no longer associated with the colonies. It also suggests the survey area is used to raft and forage. As with guillemots, razorbills are a designated feature at Buchan Ness to Collieston Coast SPA, with Bellrock located within razorbills' foraging range (mean max 88.7km ±75.9 SD; Woodward *et al.,* 2019) from this site.

132 Puffins were recorded in relatively low numbers throughout the survey period compared to other key species. Puffins were most abundant during the return migration period and in the breeding season, although numbers varied greatly in consecutive months during this time. Puffin numbers were particularly high during the March 2022 survey, when birds begin to return for the breeding season. Eggs are laid in mid-April, incubated for 36-45 days, with chicks fledging 38 days after hatching (Gilbert *et al.*, 2011). This is reflected in the low numbers of puffin observed in April 2022 and April 2023 and the increase in May 2022 and May 2023 which coincides with approximate nesting and hatching periods.

These results may suggest puffins are utilising the site to forage during the chick-rearing period. The low numbers to complete absence during the winter months, suggest the area is not used as much for wintering. Puffins' relatively large foraging range (mean max 137.1km ±128.3 SD; Woodward *et al.,* 2019) means the birds observed are potentially coming from a range of breeding colonies in the North Sea, such as those at the East Caithness Cliffs SPA which held almost 200 individuals in 2015 (BTO, 2024).

133 Fulmars were the second most abundant species across the survey period, with observations in all 24 surveys. During the first year of surveys, higher numbers were recorded in January and February 2023 which coincides with the return migration period (Furness, 2015). Generally, fulmars move further offshore to spend the winter at sea when there is less requirement to return to coastal breeding colonies as frequently, with many birds travelling back to coastal areas for the breeding season at the start of April (Edwards *et al.,* 2013). Higher abundances in January and February 2023 as well as higher percentages of flying birds in these months, could indicate movement back into the area prior to the start of the breeding season. Fulmars' have a relatively large foraging range of mean max 542.3 ±657.9 SD (Woodward *et al.,* 2019). Fulmar colonies are present and protected in almost all SPAs found within a 180km radius from the survey area, including Buchan Ness to Collieston Coast SPA, Troup, Pennan and Lion's Heads SPA and Fowlsheugh SPA, which supported 897 Apparently Occupied Sites (AOSs) (in 2023), 1,894 AOS (in 2021) and 121 AOS (in 2022) respectively (BTO, 2024).

134 Gannets were recorded across 21 out of 24 surveys, with a peak in October 2023 during the post-breeding migration period. High numbers were also observed between March 2022 to August 2022 and March 2023 to July 2023 during the breeding season. Birds are most closely associated with colonies from May to August: with egg-laying occurring in late March-April until early-mid-July and hatching occurring in 43 days later. Chicks fledge on average after 91 days from hatching, with an average fledging peak in mid-late September. Colonies are typically fully abandoned during the mid-winter (Forrester *et al.,* 2012). These timings are reflected by the increasing number of birds present in the survey area throughout the breeding season and absence during winter months. The presence of sitting and flying birds suggests the area is utilised both during foraging as well as during passage to other potential feeding grounds. Gannets are wide-ranging (foraging range of mean max 315.2km ±194.2 SD; Woodward *et al.,* 2019), therefore the gannets observed could also have travelled from Fair Isle SPA or the Forth Island SPA, which supported nearly 5,000 AON in 2023 and more than 75,000 AOS in 2014, respectively (Furness, 2015; BTO, 2024). Several dead gannets were recorded over the breeding season (92 individuals in July 2022) which were most likely mortalities from the avian influenza outbreak (Tremlett *et al*., 2024).

135 Harbour porpoise was the most commonly observed marine mammal species. Abundance peaked in June 2022 with an estimated absolute density of 3.23 porpoise/km² (33.31% CV). In July 2022, an absolute density of 1.70 (26.95% CV) was recorded, a higher estimate than the absolute density of 0.60 (36.70% CV) recorded in July 2022 in the SCANS-IV Block NS-D survey (Gilles *et al.,* 2023). As the most common cetacean species present in the North Sea and wider UK waters (Gilles *et al.,* 2023), it is not unexpected that this species was the most abundant non-avian animal recorded during the survey period.

5 Conclusions

136 The provision of high-resolution digital aerial video surveys provided spatial distributions of birds, mammals and other megafauna in the Bellrock survey area. The survey design allowed repeatable estimates of species abundance, and the digital aerial platform provides a unique, auditable record of species identification.

137 The surveys recorded a total of 5,363 birds of 16 species and 133 marine mammals of five species. A further 437 birds were partially identified to eight species groups and 11 non-avian animals were partially identified to three species groups. An identification rate to species level of 92.46% was achieved throughout the 24-month period.

138 Over the survey period an additional 165 dead birds were recorded, 92 of which were gannets in a single month (July 2022).

139 The seasonal changes in the numbers of seabirds recorded can be attributed to the project's location within the breeding season foraging range of many species from colonies along the north coast of Scotland, such as those at Buchan Ness to Collieston SPA and Troup, Pennan and Lion's Head SPA. Several seabird species appear to use the area more during the breeding season (e.g., puffin), while others use it more during the non-breeding season (e.g., fulmar).

140 The abundance of cetaceans was variable from month to month with no strong seasonal pattern. Harbour porpoise was the most abundant marine mammal species.

141 The study provided robust distribution and density data for multiple seabird and marine mammal species off the north-east coast of Scotland. Regular data collection is essential to begin to determine trends in distributions and abundance of marine species and will be important in informing further assessments and decisions on the development of the WFDA.

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Appendix I: Apportioned and unapportioned density and population estimates

142 The apportioned and unapportioned density, total estimated population, upper and lower 95% CLs, standard deviation and CV for each species and species group have been calculated using strip transect analysis and are presented here for each of the surveys undertaken.

Table 27 Density and population estimates of species groups in the Bellrock survey area during Survey 1 on 15 March 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Broad category						
All birds	6.63	4364	3343	5451	541	12.39
All non-avian animals	0.03	20	0	48	13	63.70
Species group						
Small gull species	0.36	239	59	453	102	42.50
Large auk	3.71	2441	1909	3004	288	11.76
Auk species	1.90	1251	967	1507	143	11.39
Auk / small gull	0.01	10	0	29	10	95.44
Fulmar / gull species	0.09	60	20	107	22	35.42
Gannet species	0.53	349	38	815	206	58.98
Cetacean species	0.03	20	0	48	13	65.31

Table 28 Apportioned density and population estimates of species in the Bellrock survey area during Survey 1 on 15 March 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.37	241	54	473	107	44.41
Guillemot	4.05	2664	2129	3222	287	10.76
Razorbill	0.21	142	65	231	43	30.25
Puffin	1.36	895	691	1094	102	11.34
Fulmar	0.09	61	20	108	22	36.12
Gannet	0.52	341	30	809	205	60.18
Harbour porpoise	0.03	20	0	48	13	65.09

Table 29 Unapportioned density and population estimates of species in the Bellrock survey area during Survey 1 on 15 March 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.37	245	67	471	104	42.38
Guillemot	3.68	2420	1932	2938	262	10.80
Razorbill	0.19	127	54	212	41	32.14
Puffin	0.91	599	417	792	98	16.21
Fulmar	0.07	49	10	92	21	41.70
Gannet	0.51	339	37	798	208	61.28
Harbour porpoise	0.03	21	0	47	12	59.00

Table 30 Density and population estimates of species groups in the Bellrock survey area during Survey 2 on 17 April 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Broad category						
All birds	3.83	2520	1830	3383	397	15.72
All non-avian animals	0.04	29	0	74	20	67.90
Species group						
Small gull species	0.16	108	39	193	40	36.81
Large auk	2.80	1844	1377	2341	246	13.3
Auk species	0.19	128	66	200	35	26.86
Fulmar / gull species	0.09	61	18	113	26	41.71
Gannet species	0.59	391	59	842	206	52.65
Cetacean species	0.04	28	0	72	20	69.38

Table 31 Apportioned density and population estimates of species in the Bellrock survey area during Survey 2 on 17 April 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.17	109	38	189	40	36.09
Guillemot	2.79	1838	1400	2359	251	13.62
Puffin	0.19	128	66	204	36	27.78
Fulmar	0.09	58	19	107	24	40.66
Gannet	0.60	396	63	856	206	51.90
Harbour porpoise	0.05	30	0	69	19	62.15

Table 32 Unapportioned density and population estimates of species in the Bellrock survey area during Survey 2 on 17 April 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.16	107	38	192	40	37.46
Guillemot	2.78	1831	1394	2356	246	13.39
Puffin	0.09	58	19	104	22	36.65
Fulmar	0.09	57	18	107	24	42.23
Gannet	0.59	386	58	828	203	52.48
Harbour porpoise	0.04	30	0	69	20	65.07

Table 33 Density and population estimates of species groups in the Bellrock survey area during Survey 3 on 14 May 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Broad category						
All birds	2.17	1428	1186	1680	126	8.78
All non-avian animals	0.15	98	45	155	29	29.26
Species group						
Small gull species	0.22	144	85	204	32	21.65
Large auk	0.80	525	329	762	108	20.58
Auk species	0.62	407	306	520	57	13.85
Auk / small gull	0.07	49	0	144	48	97.60
Fulmar / gull species	0.06	39	9	81	20	51.09
Gannet species	0.40	263	160	380	59	22.49
Seal species	0.04	29	0	58	15	51.71
Cetacean species	0.10	68	28	116	23	32.72

Table 34 Apportioned density and population estimates of species in the Bellrock survey area during Survey 3 on 14 May 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.29	194	104	307	52	26.45
Guillemot	0.80	526	338	736	101	19.18
Puffin	0.61	405	301	523	58	14.26
Fulmar	0.06	39	9	81	20	50.47
Gannet	0.40	264	150	397	61	23.00
Harbour porpoise	0.10	68	28	115	23	33.50

Table 35 Unapportioned density and population estimates of species in the Bellrock survey area during Survey 3 on 14 May 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.28	185	101	285	45	24.18
Guillemot	0.78	516	334	722	102	19.75
Puffin	0.56	370	281	473	48	12.89
Fulmar	0.06	40	10	81	20	49.99
Gannet	0.40	263	145	378	60	22.78
Harbour porpoise	0.10	68	29	117	23	33.31

Table 36 Density and population estimates of species groups in the Bellrock survey area during Survey 4 on 06 June 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Broad category						
All birds	2.99	1967	1237	2767	400	20.33
All non-avian animals	0.65	430	183	685	129	29.85
Species group						
Small gull species	1.69	1113	659	1623	249	22.34
Skua species	0.01	10	0	29	9	92.00
Large auk	0.44	293	162	437	75	25.39
Auk species	0.03	20	0	46	12	61.88
Auk / small gull	0.03	20	0	57	18	91.10
Fulmar / gull species	0.40	261	159	376	57	21.82
Gannet species	0.42	280	87	563	130	46.31
Cetacean species	0.66	437	188	693	132	30.08

Table 37 Apportioned density and population estimates of species in the Bellrock survey area during Survey 4 on 06 June 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	1.66	1096	636	1582	242	22.01
Arctic skua	0.01	10	0	29	9	95.21
Guillemot	0.26	175	95	255	43	24.37
Razorbill	0.17	115	37	201	43	37.55
Puffin	0.03	20	0	47	12	61.82
Fulmar	0.40	263	154	383	59	22.28
Gannet	0.41	273	84	582	135	49.38
Minke whale	0.01	10	0	30	10	98.29
Harbour porpoise	0.63	417	168	700	137	32.77

Table 38 Unapportioned density and population estimates of species in the Bellrock survey area during Survey 4 on 06 June 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	1.69	1113	641	1647	260	23.31
Arctic skua	0.02	10	0	29	9	88.91
Guillemot	0.24	162	86	242	40	24.25
Razorbill	0.16	108	29	189	42	38.48
Puffin	0.03	19	0	46	12	61.31
Fulmar	0.35	231	136	340	53	22.70
Gannet	0.42	280	86	554	129	46.02
Minke whale	0.01	10	0	29	10	95.87
Harbour porpoise	0.62	408	170	687	135	32.96

Table 39 Density and population estimates of species groups in the Bellrock survey area during Survey 5 on 19 July 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Broad category						
All birds	32.31	21267	15790	26909	2866	13.48
All non-avian animals	0.35	234	124	341	58	24.66
Species group						
Gull species	0.01	10	0	29	9	89.73
Arctic / common tern	0.98	644	93	1608	442	68.69
Large auk	28.27	18608	14163	23656	2499	13.43
Auk species	2.45	1612	1171	2010	210	12.98
Auk / small gull	0.04	29	0	64	16	53.05
Fulmar / gull species	0.16	108	57	155	26	23.83
Gannet species	0.26	174	104	249	39	22.18
Dolphin species	0.04	30	0	77	21	69.93
Cetacean species	0.31	207	107	315	55	26.38

Table 40 Apportioned density and population estimates of species in the Bellrock survey area during Survey 5 on 19 July 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.03	20	0	47	12	59.81
Arctic tern	1.00	658	94	1819	454	69.00
Guillemot	25.49	16778	11967	22177	2527	15.06
Razorbill	4.32	2844	2267	3392	293	10.30
Puffin	1.02	671	453	882	113	16.77
Fulmar	0.15	98	55	142	23	23.19
Gannet	0.27	176	97	257	40	22.71
White-beaked dolphin	0.04	29	0	75	20	68.42
Harbour porpoise	0.31	204	107	306	53	25.62

Table 41 Unapportioned density and population estimates of species in the Bellrock survey area during Survey 5 on 19 July 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.03	20	0	47	12	61.74
Arctic tern	0.24	156	10	373	94	60.09
Guillemot	23.56	15507	11164	20407	2396	15.45
Razorbill	3.84	2527	1977	3066	285	11.27
Puffin	0.42	278	131	449	83	29.80
Fulmar	0.15	97	54	145	23	23.76
Gannet	0.27	176	103	255	40	22.64
White-beaked dolphin	0.04	30	0	74	20	65.07
Harbour porpoise	0.31	204	104	317	55	26.95

Table 42 Density and population estimates of species groups in the Bellrock survey area during Survey 6 on 07 August 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Broad category						
All birds	2.28	1499	1027	2066	261	17.38
All non-avian animals	0.30	196	76	346	69	35.13
Species group						
Wader species	0.02	11	0	29	9	86.70
Large gull species	0.01	10	0	29	10	94.13
Arctic / common tern	0.09	61	9	149	39	63.03
Large auk	1.65	1084	701	1546	213	19.60
Auk species	0.12	78	20	146	31	39.85
Auk / small gull	0.01	10	0	29	10	100.13
Fulmar / gull species	0.24	157	59	253	50	31.83
Gannet species	0.12	77	29	135	28	35.70
Cetacean species	0.29	193	73	337	70	36.06

Table 43 Apportioned density and population estimates of species in the Bellrock survey area during Survey 6 on 07 August 2022[3]

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Curlew	0.01	10	0	29	9	96.89
Herring gull	0.02	11	0	30	10	91.01
Guillemot	1.69	1111	730	1580	214	19.19
Puffin	0.08	54	13	103	24	44.81
Fulmar	0.24	158	67	265	51	32.26
Gannet	0.12	80	29	136	28	35.13
Harbour porpoise	0.30	198	77	354	71	35.97

[3] Artic tern and common tern observed in survey 6 on 07 August 2022 could not be apportioned to species, therefore densities are not estimated for these species although it is acknowledged that one or other species was present as shown in Table 41

Table 44 Unapportioned density and population estimates of species in the Bellrock survey area during Survey 6 on 07 August 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Curlew	0.02	11	0	30	10	89.90
Herring gull	0.02	10	0	29	9	90.00
Guillemot	1.67	1099	694	1561	218	19.79
Puffin	0.03	20	0	48	13	63.19
Fulmar	0.24	156	68	261	52	33.11
Gannet	0.12	79	29	137	28	35.27
Harbour porpoise	0.29	193	75	337	69	35.53

Table 45 Density and population estimates of species groups in the Bellrock survey area during Survey 7 on 07 September 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Broad category						
All birds	4.09	2690	1999	3522	395	14.66
Species group						
Small gull species	0.03	20	0	47	13	62.62
Gull species	0.01	10	0	30	10	98.34
Arctic / common tern	0.01	10	0	29	9	92.33
Large auk	3.21	2115	1377	2942	411	19.40
Auk species	0.42	280	147	425	72	25.74
Auk / shearwater species	0.02	10	0	30	10	97.37
Fulmar / gull species	0.35	233	136	347	55	23.55
Gannet species	0.03	19	0	45	12	63.27

Table 46 Apportioned density and population estimates of species in the Bellrock survey area during Survey 7 on 07 September 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.03	20	0	47	12	61.69
Herring gull	0.02	10	0	29	10	95.26
Arctic tern	0.01	10	0	29	9	90.16
Guillemot	3.25	2142	1402	2988	415	19.35
Puffin	0.42	280	158	411	65	23.02
Fulmar	0.35	234	139	349	55	23.22
Gannet	0.03	20	0	46	12	60.61

Table 47 Unapportioned density and population estimates of species in the Bellrock survey area during Survey 7 on 07 September 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.03	20	0	47	12	62.48
Herring gull	0.01	10	0	29	10	94.70
Arctic tern	0.01	10	0	29	9	92.34
Guillemot	3.21	2116	1384	3005	405	19.11
Puffin	0.36	234	114	386	71	30.11
Fulmar	0.35	232	135	347	55	23.56
Gannet	0.03	20	0	47	12	59.85

Table 48 Density and population estimates of species groups in the Bellrock survey area during Survey 8 on 02 October 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Broad category						
All birds	3.18	2091	1696	2535	211	10.06
All non-avian animals	0.04	29	0	58	14	47.28
Species group						
Small gull species	0.03	20	0	48	13	63.57
Large auk	2.70	1776	1342	2289	241	13.53
Auk species	0.25	166	104	231	33	19.52
Auk / small gull	0.01	10	0	29	9	94.85
Fulmar / gull species	0.07	49	9	101	25	50.83
Gannet species	0.12	78	29	131	27	34.00
Cetacean species	0.05	30	9	58	14	46.94

Table 49 Apportioned density and population estimates of species in the Bellrock survey area during Survey 8 on 02 October 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.05	31	0	75	20	64.62
Guillemot	2.69	1769	1326	2247	231	13.02
Puffin	0.25	166	111	233	31	18.38
Fulmar	0.07	48	0	99	25	51.72
Gannet	0.12	79	29	134	27	34.55
Minke whale	0.02	10	0	29	9	88.92
Harbour porpoise	0.03	19	0	47	12	64.13

Table 50 Unapportioned density and population estimates of species in the Bellrock survey area during Survey 8 on 02 October 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.04	30	0	75	20	67.52
Guillemot	2.55	1679	1266	2152	228	13.55
Puffin	0.12	81	38	132	25	30.02
Fulmar	0.07	47	0	96	25	51.58
Gannet	0.12	78	28	134	27	34.01
Minke whale	0.01	10	0	29	9	91.84
Harbour porpoise	0.03	20	0	47	12	61.76

Table 51 Density and population estimates of species groups in the Bellrock survey area during Survey 9 on 03 November 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Broad category						
All birds	4.69	3089	2695	3472	195	6.29
All non-avian animals	0.01	10	0	29	9	92.75
Species group						
Small gull species	0.10	67	19	128	29	42.04
Large gull species	0.01	10	0	29	10	97.59
Large auk	4.15	2735	2355	3105	187	6.83
Auk species	0.1	68	37	101	18	25.08
Auk / small gull	0.01	10	0	29	9	94.30
Fulmar / gull species	0.30	195	122	273	39	20.03
Gannet species	0.01	10	0	37	10	101.41
Seal species	0.02	11	0	29	10	91.52

Table 52 Apportioned density and population estimates of species in the Bellrock survey area during Survey 9 on 03 November 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.10	67	19	128	29	43.06
Great black-backed gull	0.01	10	0	29	10	98.68
Guillemot	4.16	2740	2347	3111	196	7.13
Puffin	0.10	69	37	104	18	25.65
Fulmar	0.30	195	121	267	38	19.20
Gannet	0.01	10	0	29	10	101.86

Table 53 Unapportioned density and population estimates of species in the Bellrock survey area during Survey 9 on 03 November 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.10	69	19	131	29	41.58
Great black-backed gull	0.01	10	0	29	10	94.07
Guillemot	4.05	2664	2312	3033	185	6.91
Puffin	0.05	30	10	57	14	43.83
Fulmar	0.29	194	114	265	40	20.29
Gannet	0.01	10	0	36	10	98.79

Table 54 Density and population estimates of species groups in the Bellrock survey area during Survey 10 on 20 December 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Broad category						
All birds	1.77	1167	997	1371	98	8.33
All non-avian animals	0.01	10	0	30	10	95.49
Species group						
Small gull species	0.24	159	56	286	61	38.28
Large gull species	0.05	30	0	76	21	67.62
Large auk	1.11	729	575	935	95	12.98
Auk species	0.10	69	10	137	32	45.42
Fulmar / gull species	0.21	138	69	222	41	29.09
Gannet species	0.06	39	0	88	22	55.49
Seal species	0.01	10	0	30	10	97.08

Table 55 Apportioned density and population estimates of species in the Bellrock survey area during Survey 10 on 20 December 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.26	171	64	292	60	35.16
Great black-backed gull	0.05	31	0	74	20	65.01
Guillemot	1.19	782	637	976	91	11.58
Puffin	0.03	18	3	39	10	56.58
Fulmar	0.19	123	59	207	39	31.10
Gannet	0.06	41	10	87	22	52.4

Table 56 Unapportioned density and population estimates of species in the Bellrock survey area during Survey 10 on 20 December 2022

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.26	169	67	294	60	35.44
Great black-backed gull	0.05	32	0	79	22	67.58
Guillemot	1.10	728	575	936	96	13.07
Puffin	0.02	10	0	29	9	88.65
Fulmar	0.16	109	57	180	32	29.10
Gannet	0.06	40	0	86	21	52.78

Table 57 Density and population estimates of species groups in the Bellrock survey area during Survey 11 on 20 January 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Broad category						
All birds	2.01	1323	975	1704	190	14.33
All non-avian animals	0.03	20	0	48	13	61.96
Species group						
Small gull species	0.01	10	0	30	10	102.15
Large gull species	0.09	58	19	106	24	39.96
Large auk	1.27	836	550	1129	140	16.72
Auk species	0.03	21	0	47	13	61.35
Fulmar / gull species	0.60	398	215	625	110	27.42
Gannet species	0.01	10	0	29	10	95.48
Seal species	0.01	10	0	29	10	96.63
Cetacean species	0.01	10	0	29	10	95.50

Table 58 Apportioned density and population estimates of species in the Bellrock survey area during Survey 11 on 20 January 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.02	10	0	36	11	100.39
Great black-backed gull	0.07	50	10	99	23	45.18
Herring gull	0.01	10	0	30	10	100.55
Guillemot	1.26	831	578	1104	140	16.75
Fulmar	0.60	395	207	639	114	28.65
Gannet	0.01	10	0	29	10	95.22
Harbour porpoise	0.02	10	0	29	9	89.09

Table 59 Unapportioned density and population estimates of species in the Bellrock survey area during Survey 11 on 20 January 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.01	10	0	36	10	100.83
Great black-backed gull	0.07	49	10	96	23	46.95
Herring gull	0.01	10	0	29	9	93.30
Guillemot	1.25	823	564	1098	137	16.56
Fulmar	0.61	403	221	694	119	29.45
Gannet	0.01	10	0	30	10	95.80
Harbour porpoise	0.01	10	0	29	9	92.69

Table 60 Density and population estimates of species groups in the Bellrock survey area during Survey 12 on 04 February 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Broad category						
All birds	1.90	1252	807	1882	280	22.36
All non-avian animals	0.03	20	0	58	20	102.90
Species group						
Small gull species	0.06	38	10	68	15	39.57
Large auk	1.23	812	367	1407	264	32.47
Auk species	0.04	30	0	58	15	49.50
Fulmar / gull species	0.56	368	228	516	76	20.66
Gannet species	0.01	10	0	29	9	93.88
Cetacean species	0.03	20	0	58	20	99.72

Table 61 Apportioned density and population estimates of species in the Bellrock survey area during Survey 12 on 04 February 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.04	30	0	58	15	49.75
Common gull	0.02	10	0	29	10	93.50
Guillemot	1.11	734	349	1235	231	31.47
Razorbill	0.09	58	0	152	43	74.57
Fulmar	0.56	367	228	521	76	20.56
Gannet	0.01	10	0	29	9	93.27
Harbour porpoise	0.03	20	0	58	19	97.86

Table 62 Unapportioned density and population estimates of species in the Bellrock survey area during Survey 12 on 04 February 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.05	30	9	57	14	46.92
Common gull	0.01	10	0	29	10	98.20
Guillemot	1.13	746	356	1260	230	30.81
Razorbill	0.09	58	0	158	45	77.00
Fulmar	0.54	354	221	509	74	20.90
Gannet	0.02	11	0	29	9	83.46
Harbour porpoise	0.03	20	0	58	19	94.74

Table 63 Density and population estimates of species groups in the Bellrock survey area during Survey 13 on 04 March 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Broad category						
All birds	1.73	1139	892	1395	133	11.68
All non-avian animals	0.04	29	0	57	15	49.69
Small gull species	0.06	40	0	95	26	65.11
Large gull species	0.04	30	0	58	15	47.41
Large auk	0.82	537	413	647	60	11.05
Auk species	0.14	96	54	140	23	23.56
Auk / small gull	0.03	20	0	46	12	58.38
Fulmar / gull species	0.37	242	155	321	42	17.37
Gannet species	0.28	186	65	328	71	37.91
Seal species	0.03	21	0	48	13	63.51
Cetacean species	0.01	10	0	29	9	92.47

Table 64 Apportioned density and population estimates of species in the Bellrock survey area during Survey 13 on 04 March 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.06	39	0	94	26	65.90
Great black-backed gull	0.04	29	0	58	15	50.75
Guillemot	0.81	531	409	662	64	12.05
Razorbill	0.03	21	0	58	18	86.85
Puffin	0.12	80	39	122	22	27.78
Fulmar	0.37	245	164	325	42	17.20
Gannet	0.28	186	57	335	71	37.73
Grey seal	0.03	20	0	47	13	62.00
Harbour porpoise	0.01	10	0	29	9	93.47

Table 65 Unapportioned density and population estimates of species in the Bellrock survey area during Survey 13 on 04 March 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.06	40	0	94	25	62.64
Great black-backed gull	0.04	28	9	56	14	47.92
Guillemot	0.78	514	384	641	67	13.04
Razorbill	0.03	20	0	58	19	90.41
Puffin	0.06	38	0	81	20	50.37
Fulmar	0.37	241	153	328	44	17.92
Gannet	0.28	185	54	342	75	40.38
Grey seal	0.01	10	0	29	9	93.06
Harbour porpoise	0.01	10	0	29	9	91.02

Table 66 Density and population estimates of species groups in the Bellrock survey area during Survey 14 on 03 April 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Broad category						
All birds	0.77	509	379	645	67	13.11
Species group						
Small gull species	0.07	49	0	111	28	58.09
Large auk	0.54	359	222	491	69	19.12
Auk species	0.02	10	0	30	10	91.22
Fulmar / gull species	0.03	20	0	48	13	62.55
Gannet species	0.10	69	29	116	22	30.97

Table 67 Apportioned density and population estimates of species in the Bellrock survey area during Survey 14 on 03 April 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.07	50	0	116	30	59.78
Guillemot	0.55	360	220	491	70	19.34
Puffin	0.02	10	0	29	9	89.45
Fulmar	0.03	20	0	47	13	62.13
Gannet	0.10	68	29	115	22	31.41

Table 68 Unapportioned density and population estimates of species in the Bellrock survey area during Survey 14 on 03 April 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.08	50	9	111	29	58.09
Guillemot	0.53	349	218	484	70	20.00
Puffin	0.02	10	0	29	9	89.69
Fulmar	0.03	21	0	48	14	64.75
Gannet	0.10	69	30	111	21	29.94

Table 69 Density and population estimates of species groups in the Bellrock survey area during Survey 15 on 04 May 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Broad category						
All birds	2.58	1701	1146	2312	305	17.89
All non-avian animals	0.02	11	0	30	10	92.25
Species group						
Small gull species	0.07	49	0	115	29	59.84
Large auk	2.01	1322	787	1937	297	22.47
Auk species	0.23	150	67	241	44	29.28
Fulmar / gull species	0.16	107	66	144	21	19.08
Gannet species	0.10	69	0	156	41	58.97
Cetacean species	0.01	10	0	29	10	94.73

Table 70 Apportioned density and population estimates of species in the Bellrock survey area during Survey 15 on 04 May 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.07	50	9	114	30	58.94
Guillemot	2.01	1321	785	1953	301	22.78
Puffin	0.22	147	66	242	46	30.98
Fulmar	0.16	106	66	145	20	18.72
Gannet	0.11	70	9	156	40	57.07
Harbour porpoise	0.01	10	0	29	9	92.95

Table 71 Unapportioned density and population estimates of species in the Bellrock survey area during Survey 15 on 04 May 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.07	48	9	111	29	59.25
Guillemot	2.02	1331	811	1962	289	21.69
Puffin	0.07	50	10	90	21	41.68
Fulmar	0.16	108	67	146	22	19.76
Gannet	0.11	70	0	156	40	56.81
Harbour porpoise	0.02	10	0	30	10	91.26

Table 72 Density and population estimates of species groups in the Bellrock survey area during Survey 16 on 13 June 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Broad category						
All birds	0.53	351	233	469	62	17.50
All non-avian animals	0.10	69	10	149	36	52.14
Species group						
Small gull species	0.07	49	10	100	23	46.03
Large auk	0.30	196	111	289	46	23.26
Auk species	0.10	69	19	130	29	41.14
Fulmar / gull species	0.03	21	0	48	13	64.66
Gannet species	0.03	20	0	45	12	60.36
Dolphin species	0.02	11	0	30	10	93.19
Cetacean species	0.09	60	0	137	35	58.07

Table 73 Apportioned density and population estimates of species in the Bellrock survey area during Survey 16 on 13 June 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.07	50	10	96	22	43.65
Guillemot	0.30	196	107	295	47	24.03
Puffin	0.10	68	19	130	29	42.06
Fulmar	0.03	19	0	48	13	68.71
Gannet	0.03	21	0	47	12	58.28
Killer whale	0.01	10	0	29	9	92.80
Harbour porpoise	0.09	59	0	130	35	58.46

Table 74 Unapportioned density and population estimates of species in the Bellrock survey area during Survey 16 on 13 June 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.04	30	0	63	16	52.51
Guillemot	0.28	187	100	281	50	26.29
Puffin	0.07	50	19	88	19	38.41
Fulmar	0.03	21	0	49	14	64.55
Gannet	0.03	20	0	47	12	60.00
Killer whale	0.01	10	0	29	9	90.98
Harbour porpoise	0.09	59	0	133	34	57.66

Table 75 Density and population estimates of species groups in the Bellrock survey area during Survey 17 on 07 July 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Broad category						
All birds	0.44	291	169	424	65	22.09
All non-avian animals	0.06	39	0	106	29	75.67
Species group						
Small gull species	0.05	30	0	87	28	90.84
Large gull species	0.02	11	0	29	10	91.38
Large auk	0.19	127	59	192	34	26.63
Fulmar / gull species	0.04	30	9	58	15	48.57
Gannet species	0.15	98	37	175	38	38.50
Cetacean species	0.06	38	0	103	29	74.47

Table 76 Apportioned density and population estimates of species in the Bellrock survey area during Survey 17 on 07 July 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Common gull	0.04	28	0	86	27	94.00
Herring gull	0.02	11	0	29	10	91.08
Guillemot	0.19	128	59	194	35	27.20
Fulmar	0.04	30	0	58	15	48.64
Gannet	0.15	100	36	186	40	40.19
Harbour porpoise	0.06	38	0	101	29	74.75

Table 77 Unapportioned density and population estimates of species in the Bellrock survey area during Survey 17 on 07 July 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Common gull	0.05	31	0	87	28	88.70
Herring gull	0.01	10	0	29	9	93.61
Guillemot	0.19	127	63	195	34	26.48
Fulmar	0.03	20	0	48	13	66.41
Gannet	0.15	99	29	184	39	39.58
Harbour porpoise	0.06	40	0	105	30	74.41

Table 78 Density and population estimates of species groups in the Bellrock survey area during Survey 18 on 17 August 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Broad category						
All birds	0.81	535	369	755	100	18.63
All non-avian animals	0.01	10	0	29	10	96.11
Species group						
Wader species	0.07	47	0	144	45	96.05
Arctic / common tern	0.07	48	0	133	37	76.45
Large auk	0.27	176	97	279	47	26.40
Auk species	0.03	20	0	48	14	69.99
Fulmar / gull species	0.35	233	164	309	38	16.00
Gannet species	0.01	10	0	29	9	94.43
Cetacean species	0.02	11	0	29	9	87.27

Table 79 Apportioned density and population estimates of species in the Bellrock survey area during Survey 18 on 17 August 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Oystercatcher	0.08	50	0	145	47	93.59
Arctic tern	0.07	49	0	135	38	77.56
Guillemot	0.26	173	97	267	45	25.58
Puffin	0.03	19	0	49	14	69.97
Fulmar	0.35	233	165	311	38	16.08
Gannet	0.02	10	0	29	9	90.48
Harbour porpoise	0.01	10	0	29	9	91.54

Table 80 Unapportioned density and population estimates of species in the Bellrock survey area during Survey 18 on 17 August 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Oystercatcher	0.07	49	0	144	46	93.63
Arctic tern	0.06	39	0	115	37	94.50
Guillemot	0.27	175	96	280	48	27.20
Puffin	0.01	10	0	29	10	93.80
Fulmar	0.35	233	165	310	37	15.52
Gannet	0.01	10	0	29	9	89.89
Harbour porpoise	0.01	10	0	29	9	93.05

Table 81 Density and population estimates of species groups in the Bellrock survey area during Survey 19 on 04 September 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Broad category						
All birds	0.51	333	194	519	83	24.85
All non-avian animals	0.11	70	0	154	39	55.19
Species group						
Wader species	0.03	20	0	59	20	97.02
Large auk	0.32	214	92	368	72	33.48
Auk species	0.01	10	0	30	10	98.70
Auk / small gull	0.03	19	0	46	12	62.50
Diver species	0.02	11	0	30	10	93.27
Fulmar / gull species	0.04	30	10	57	14	46.54
Gannet species	0.04	30	0	64	16	53.30
Seal species	0.02	10	0	29	10	93.89
Cetacean species	0.09	59	0	145	39	66.77

Table 82 Apportioned density and population estimates of species in the Bellrock survey area during Survey 19 on 04 September 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Guillemot	0.34	224	97	376	72	32.19
Red-throated diver	0.01	10	0	30	10	96.94
Fulmar	0.04	30	10	57	14	45.04
Gannet	0.05	31	0	63	16	50.99
Harbour porpoise	0.09	59	0	144	38	64.66

Table 83 Unapportioned density and population estimates of species in the Bellrock survey area during Survey 19 on 04 September 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Guillemot	0.32	213	87	373	72	33.57
Red-throated diver	0.01	10	0	29	9	96.80
Fulmar	0.04	30	0	58	14	47.16
Gannet	0.04	30	0	58	15	51.15
Harbour porpoise	0.09	58	0	141	38	64.59

Table 84 Density and population estimates of species groups in the Bellrock survey area during Survey 20 on 13 October 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Broad category						
All birds	7.58	4991	1588	9583	2125	42.57
Species group						
Small gull species	0.16	108	58	162	27	24.62
Large gull species	0.05	31	0	88	30	97.01
Large auk	0.22	148	67	242	45	30.33
Auk species	0.01	10	0	29	9	91.47
Storm petrel species	0.01	10	0	29	9	94.84
Fulmar / gull species	6.50	4278	968	8434	1972	46.09
Gannet species	0.80	530	165	1011	225	42.29

Table 85 Apportioned density and population estimates of species in the Bellrock survey area during Survey 20 on 13 October 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.16	107	63	157	26	23.81
Herring gull	0.05	30	0	88	30	99.20
Guillemot	0.23	149	67	243	46	30.54
European storm petrel	0.01	10	0	29	9	94.48
Fulmar	6.40	4214	963	8361	1911	45.34
Gannet	0.82	541	165	1046	234	43.11

Table 86 Unapportioned density and population estimates of species in the Bellrock survey area during Survey 20 on 13 October 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.16	106	58	158	26	23.81
Herring gull	0.04	30	0	87	29	98.02
Guillemot	0.22	147	58	244	47	31.90
European storm petrel	0.02	10	0	29	9	89.70
Fulmar	6.48	4265	916	8782	2002	46.94
Gannet	0.83	545	170	1079	234	43.00

Table 87 Density and population estimates of species groups in the Bellrock survey area during Survey 21 on 14 November 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Broad category						
All birds	0.60	397	281	528	64	16.06
Species group						
Small gull species	0.09	58	10	128	31	52.76
Large gull species	0.04	29	0	88	30	101.87
Large auk	0.33	216	149	286	36	16.49
Auk species	0.01	10	0	29	10	99.16
Fulmar / gull species	0.13	88	27	164	37	41.89

Table 88 Apportioned density and population estimates of species in the Bellrock survey area during Survey 21 on 14 November 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.09	59	10	126	31	52.31
Great black-backed gull	0.03	20	0	58	19	93.25
Herring gull	0.01	10	0	29	10	96.39
Guillemot	0.31	203	133	277	37	17.80
Razorbill	0.01	10	0	29	10	95.16
Puffin	0.02	11	0	37	10	95.32
Fulmar	0.13	89	20	170	38	42.31

Table 89 Unapportioned density and population estimates of species in the Bellrock survey area during Survey 21 on 14 November 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.09	58	10	125	31	51.88
Great black-backed gull	0.03	20	0	58	19	98.67
Herring gull	0.01	10	0	29	10	95.41
Guillemot	0.31	205	139	275	36	17.32
Razorbill	0.01	10	0	29	10	99.68
Puffin	0.01	10	0	30	10	93.64
Fulmar	0.13	88	28	169	38	42.41

Table 90 Density and population estimates of species groups in the Bellrock survey area during Survey 22 on 10 December 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Broad category						
All birds	0.30	195	74	363	75	38.41
Species group						
Large gull species	0.13	85	0	252	68	79.65
Large auk	0.03	19	0	48	13	67.29
Auk species	0.01	10	0	29	10	102.76
Fulmar / gull species	0.10	69	29	113	21	29.35
Gannet species	0.02	10	0	29	10	94.91

Table 91 Apportioned density and population estimates of species in the Bellrock survey area during Survey 22 on 10 December 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Great black-backed gull	0.12	77	0	213	60	77.57
Herring gull	0.01	10	0	29	10	98.61
Guillemot	0.03	20	0	48	13	65.40
Fulmar	0.10	67	28	110	22	32.53
Gannet	0.01	10	0	29	9	96.58
Auk species	0.01	10	0	29	9	94.86

Table 92 Unapportioned density and population estimates of species in the Bellrock survey area during Survey 22 on 10 December 2023

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Great black-backed gull	0.12	76	0	206	59	76.97
Herring gull	0.01	10	0	29	10	101.82
Guillemot	0.03	19	0	47	13	65.17
Fulmar	0.10	69	28	111	21	30.75
Gannet	0.02	11	0	29	10	90.92
Auk species	0.01	10	0	29	10	96.61

Table 93 Density and population estimates of species groups in the Bellrock survey area during Survey 23 on 30 January 2024

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Broad category						
All birds	0.67	443	310	595	71	15.81
All non-avian animals	0.03	20	0	47	12	62.28
Species group						
Small gull species	0.03	20	0	47	13	62.61
Large gull species	0.01	10	0	29	9	89.55
Large auk	0.41	273	208	339	35	12.55
Auk species	0.06	40	10	75	17	41.93
Fulmar / gull species	0.16	107	45	180	37	34.30
Cetacean species	0.03	20	0	48	13	64.30

Table 94 Apportioned density and population estimates of species in the Bellrock survey area during Survey 23 on 30 January 2024

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.03	20	0	46	12	61.12
Great black-backed gull	0.01	10	0	29	9	94.13
Little auk	0.02	14	0	38	11	76.49
Guillemot	0.42	275	215	340	32	11.47
Razorbill	0.02	11	0	29	9	88.16
Puffin	0.02	14	0	36	10	71.29
Fulmar	0.16	107	39	184	37	34.56
Harbour porpoise	0.03	20	0	47	12	60.38

Table 95 Unapportioned density and population estimates of species in the Bellrock survey area during Survey 23 on 30 January 2024

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Kittiwake	0.03	20	0	47	12	59.05
Great black-backed gull	0.01	9	0	29	9	96.51
Little auk	0.01	10	0	29	9	95.43
Guillemot	0.40	264	207	331	32	11.88
Razorbill	0.01	10	0	29	10	97.91
Puffin	0.01	10	0	29	10	95.26
Fulmar	0.16	106	45	182	36	33.99
Harbour porpoise	0.03	20	0	48	13	62.46

Table 96 Density and population estimates of species groups in the Bellrock survey area during Survey 24 on 08 February 2024

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Broad category						
All birds	1.10	725	521	930	105	14.45
All non-avian animals	0.09	58	28	95	18	30.55
Species group						
Large gull species	0.01	10	0	29	9	93.25
Gull species	0.01	10	0	29	9	94.79
Large auk	0.62	407	258	580	84	20.58
Auk species	0.19	127	65	200	35	26.85
Auk / small gull	0.01	10	0	29	10	93.90
Fulmar / gull species	0.24	157	114	207	25	15.45
Seal species	0.01	10	0	30	10	98.26
Cetacean species	0.07	49	19	85	17	34.97

Table 97 Apportioned density and population estimates of species in the Bellrock survey area during Survey 24 on 08 February 2024

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Great black-backed gull	0.02	10	0	29	9	90.34
Guillemot	0.63	416	262	578	83	19.91
Puffin	0.17	115	56	182	32	27.51
Fulmar	0.24	157	116	209	25	15.38
Harbour porpoise	0.07	49	19	84	18	35.35

Table 98 Unapportioned density and population estimates of species in the Bellrock survey area during Survey 24 on 08 February 2024

Category	Density estimate (n/km²)	Population estimate (number)	Lower 95% confidence limit of population (number)	Upper 95% confidence limit of population (number)	Bootstrap standard error of population estimate (number)	CV_{SE} (%)
Species						
Great black-backed gull	0.02	10	0	29	9	89.47
Guillemot	0.63	415	260	581	82	19.63
Puffin	0.13	87	45	132	23	26.01
Fulmar	0.22	146	104	201	25	16.60
Harbour porpoise	0.07	50	20	85	18	34.88