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Volume 7B Proposed Development (Offshore) Appendices

Appendix 6-1 Offshore Ornithology Baseline Characterisation Report Annex 8 Model-based and Design-based Density and Abundance Estimates of Birds in Flight (Caledonia South)

Caledonia Offshore Wind Farm Ltd

5th Floor Atria One, 144 Morrison Street, Edinburgh, EH38EX



Volume 7B Appendix 6-1 Annex 8 Model-based and Design-based Density and Abundance Estimates of Birds in Flight (Caledonia South)

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Acronyms and Abbreviations

CV	Coefficient of Variation
DAS	Digital Aerial Survey
LCI	Lower Confidence Interval
OWF	Offshore Wind Farm
UCI	Upper Confidence Interval

1 Introduction

- 1.1.1.1 This annex provides the design-based density and abundance estimates for birds recorded in flight in the Caledonia Offshore Wind Farm (OWF), specifically the Caledonia South Site, and relevant buffers (2km and 4km). The tables provide both the unapportioned, and apportioned estimates. Model-based density and abundance estimates for kittiwake in flight recorded in the Caledonia South Site have also been provided. For the full justification see Volume 7B, Appendix 6-1: Offshore Ornithology Baseline Characterisation Report
- 1.1.1.2 For each species recorded within the 24-month Digital Aerial Survey (DAS) the raw count, abundance estimate (number of birds), lower and upper confidence intervals (LCI and UCI), density (birds/km²) and the Coefficient of Variation (CV) as a measure of precision.
- 1.1.1.3 As per the NatureScot guidance (NatureScot, 2023¹), tables on species abundance and density have been ordered first by taxonomic species groupings, then by most abundant species within each grouping.

2 Species Accounts

2.1 Wildfowl

2.1.1 Unidentified species

Unidentified wader species

2.1.1.1 The density and population estimates of unidentified wader species in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-1.

Table 2-1: Density and population estimate of unidentified wader species in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
<i>None recorded</i>						
Caledonia South (+2km)						
<i>None recorded</i>						
Caledonia South (+4km)						
Jun-22	1	6	1	17	0.01	1.00

2.1.2 Pink-footed goose

2.1.2.1 The density and population estimates of pink-footed goose in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-2.

Table 2-2: Unapportioned density and population estimate of pink footed geese in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis. No apportionment required for this species.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
<i>None recorded</i>						
Caledonia South (+2km)						
Jan-23	1	6	1	17	0.02	1.00
Caledonia South (+4km)						
Jan-23	1	6	1	18	0.01	1.00

2.1.3 Mallard

2.1.3.1 The density and population estimates of mallard in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-3.

Table 2-3: Unapportioned density and population estimate of mallard in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis. No apportionment required for this species.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
Feb-22	2	11	2	32	0.05	0.71
Caledonia South (+2km)						
Feb-22	2	11	2	32	0.03	0.71
Caledonia South (+4km)						
Feb-22	2	11	2	33	0.02	0.71

2.2 Laridae

2.2.1 Unidentified species

Unidentified black-backed gull species

2.2.1.1 No unidentified black-backed gull species in flight were recorded in Caledonia South.

Unidentified large gull species

2.2.1.2 The density and population estimates of unidentified large gull species in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-4.

Table 2-4: Density and population estimate of unidentified large gull species in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
Nov-21	2	12	2	35	0.06	0.71
Nov-22	1	6	1	18	0.03	1.00
Caledonia South (+2km)						
Nov-21	2	11	2	34	0.03	0.71
Nov-22	1	6	1	17	0.02	1.00
Caledonia South (+4km)						
Nov-21	2	11	2	34	0.02	0.71
Nov-22	1	6	1	18	0.01	1.00

Unidentified gull species

2.2.1.3 The density and population estimates of unidentified gull species in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-5.

Table 2-5: Density and population estimate of unidentified gull species in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
Dec-22	1	6	1	18	0.03	1.00
Caledonia South (+2km)						
May-21	1	6	1	17	0.02	1.00
Dec-22	1	6	1	17	0.02	1.00
Caledonia South (+4km)						
May-21	1	6	1	17	0.01	1.00
Dec-22	1	6	1	18	0.01	1.00

Unidentified fulmar and/or gull species

2.2.1.4 The density and population estimates of unidentified fulmar and/or gull species in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-6.

Table 2-6: Density and population estimate of unidentified fulmar and/ or gull species in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
Nov-22	1	6	1	18	0.03	1.00
Mar-23	1	6	1	17	0.03	1.00
Caledonia South (+2km)						
Nov-22	1	6	1	17	0.02	1.00
Mar-23	1	6	1	17	0.02	1.00
Caledonia South (+4km)						
Nov-22	1	6	1	18	0.01	1.00
Mar-23	1	6	1	17	0.01	1.00

2.2.2 Kittiwake

- 2.2.2.1 The density and population estimates of kittiwake in Caledonia South (plus the 2km buffer and plus the 4km buffer), calculated using model-based analysis for the breeding season (Mid-April to August) and design-based analysis for the non-breeding season (September to mid-April) have been presented in Table 2-7.
- 2.2.2.2 Table 2-8 presents the density and population estimates of kittiwake in Caledonia South (plus the 2km buffer and plus the 4km buffer), calculated using design-based analysis.
- 2.2.2.3 Table 2-7 includes the unapportioned density and population estimates of kittiwake, and Table 2-8 includes the apportioned density and population estimates of kittiwake.

Table 2-7: Unapportioned density and population estimate of kittiwake in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using model-based analysis for the breeding season (Mid-April to August) and design-based analysis for the non-breeding season (September to mid-April).

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
May-21	17	182	116	294	0.89	0.25
Jun-21	55	288	174	492	1.50	0.34
Jul-21	114	707	276	1,907	3.50	0.51
Aug-21	36	354	166	764	1.76	0.40
Sep-21	6	35	17	58	0.17	0.41
Oct-21	15	88	35	158	0.42	0.26
Nov-21	8	46	8	104	0.22	0.35
Dec-21	4	23	6	46	0.11	0.50
Jan-22	2	12	2	29	0.06	0.71
Feb-22	3	16	3	32	0.08	0.58
Mar-22	3	16	5	32	0.08	0.58
Apr-22	22	93	61	142	0.46	0.24
May-22	28	182	78	459	0.91	0.55
Jun-22	232	739	380	1,656	3.66	0.44

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Jul-22	111	673	375	1,182	3.54	0.35
Aug-22	47	197	118	333	0.98	0.28
Sep-22	9	52	17	93	0.25	0.33
Oct-22	5	29	12	53	0.14	0.45
Nov-22	2	12	2	35	0.06	0.71
Dec-22	2	12	2	35	0.06	0.71
Jan-23	1	6	1	18	0.03	1.00
Feb-23	4	23	6	40	0.11	0.50
Apr-23	73	138	41	499	0.69	0.74
Caledonia South (+2km)						
May-21	38	317	191	576	0.90	0.27
Jun-21	125	583	316	1,135	1.73	0.37
Jul-21	294	1,269	467	3,738	3.61	0.53
Aug-21	114	636	286	1,477	1.81	0.42
Sep-21	45	260	45	682	0.72	0.15
Oct-21	25	145	87	226	0.40	0.20
Nov-21	28	160	74	252	0.45	0.19
Dec-21	9	52	12	104	0.14	0.33
Jan-22	2	11	2	29	0.03	0.71
Feb-22	3	16	5	32	0.04	0.58
Mar-22	7	37	16	63	0.10	0.38
Apr-22	32	167	105	279	0.47	0.25
May-22	54	344	144	898	0.99	0.55
Jun-22	308	1,328	653	3,165	3.78	0.46
Jul-22	188	1,389	760	2,540	4.14	0.35

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Aug-22	71	355	204	659	1.01	0.29
Sep-22	15	86	34	143	0.24	0.26
Oct-22	20	115	46	196	0.32	0.22
Nov-22	6	35	6	76	0.10	0.41
Dec-22	3	17	3	46	0.05	0.58
Jan-23	1	6	1	17	0.02	1.00
Feb-23	7	40	17	63	0.11	0.38
Mar-23	4	23	6	40	0.06	0.50
Apr-23	80	248	73	978	0.71	0.73
Caledonia South (+4km)						
May-21	64	456	271	837	0.86	0.27
Jun-21	171	948	490	1907	1.82	0.37
Jul-21	417	1,843	683	5383	3.47	0.52
Aug-21	194	923	411	2152	1.74	0.42
Sep-21	59	343	81	813	0.64	0.13
Oct-21	41	238	163	313	0.45	0.16
Nov-21	56	322	161	460	0.60	0.13
Dec-21	15	87	35	145	0.16	0.26
Jan-22	4	23	6	40	0.04	0.50
Feb-22	5	27	5	54	0.05	0.45
Mar-22	13	70	32	107	0.13	0.28
Apr-22	40	242	152	402	0.46	0.25
May-22	70	530	225	1,356	1.02	0.54
Jun-22	357	1,929	935	4,616	3.64	0.47
Jul-22	482	2,260	1,222	4,191	4.32	0.36

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Aug-22	92	520	300	953	0.98	0.29
Sep-22	23	134	70	210	0.25	0.21
Oct-22	26	153	76	247	0.29	0.20
Nov-22	8	47	8	94	0.09	0.35
Dec-22	4	24	4	53	0.04	0.50
Jan-23	2	12	2	29	0.02	0.71
Feb-23	11	63	29	104	0.12	0.30
Mar-23	7	41	17	64	0.08	0.38
Apr-23	85	361	107	1387	0.68	0.72

Table 2-8: Apportioned density and population estimate of kittiwake in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Abundance Estimate			Density
	Abundance	LCI	UCI	
Caledonia South				
May-21	99	47	163	0.47
Jun-21	320	209	430	1.52
Jul-21	669	170	1325	3.18
Aug-21	208	92	364	0.99
Sep-21	35	17	58	0.17
Oct-21	88	35	158	0.42
Nov-21	46	8	104	0.22
Dec-21	23	6	46	0.11
Jan-22	12	2	29	0.06
Feb-22	16	3	32	0.08
Mar-22	16	5	32	0.08
Apr-22	127	86	167	0.60
May-22	162	69	283	0.77
Jun-22	1,344	481	2,693	6.39
Jul-22	647	210	1,307	3.07
Aug-22	270	127	420	1.28
Sep-22	52	17	93	0.25
Oct-22	29	12	53	0.14
Nov-22	12	2	36	0.06
Dec-22	14	2	42	0.07
Jan-23	6	1	18	0.03
Feb-23	23	6	40	0.11
Apr-23	415	73	1,126	1.97

Survey	Abundance Estimate			Density
	Abundance	LCI	UCI	
Caledonia South (+2km)				
May-21	226	122	364	0.63
Jun-21	725	400	1,108	2.02
Jul-21	1,711	372	3,665	4.76
Aug-21	654	224	1,290	1.82
Sep-21	260	45	682	0.72
Oct-21	145	87	226	0.40
Nov-21	160	74	252	0.44
Dec-21	52	12	104	0.14
Jan-22	11	2	29	0.03
Feb-22	16	5	32	0.04
Mar-22	37	16	63	0.10
Apr-22	183	114	252	0.51
May-22	310	155	476	0.86
Jun-22	1,749	761	3,100	4.86
Jul-22	1,088	486	1,985	3.02
Aug-22	406	217	623	1.13
Sep-22	86	34	143	0.24
Oct-22	115	46	196	0.32
Nov-22	35	6	78	0.10
Dec-22	19	5	51	0.05
Jan-23	6	1	17	0.02
Feb-23	40	17	63	0.11
Mar-23	24	7	43	0.07
Apr-23	448	80	1,137	1.25

Survey	Abundance Estimate			Density
	Abundance	LCI	UCI	
Caledonia South (+4km)				
May-21	377	198	591	0.71
Jun-21	994	494	1,645	1.86
Jul-21	2,504	727	5,056	4.69
Aug-21	1,116	408	2,030	2.09
Sep-21	343	81	813	0.64
Oct-21	238	163	313	0.45
Nov-21	322	161	460	0.60
Dec-21	87	35	145	0.16
Jan-22	23	6	40	0.04
Feb-22	27	5	54	0.05
Mar-22	70	32	107	0.13
Apr-22	229	149	310	0.43
May-22	402	230	609	0.75
Jun-22	2,067	1,060	3,689	3.87
Jul-22	2,791	1,060	4,886	5.23
Aug-22	527	287	808	0.99
Sep-22	134	70	210	0.25
Oct-22	153	76	247	0.29
Nov-22	47	8	95	0.09
Dec-22	26	4	58	0.05
Jan-23	12	2	29	0.02
Feb-23	63	29	104	0.12
Mar-23	42	17	68	0.08
Apr-23	487	85	1,208	0.91

2.2.3 Great black-backed gull

2.2.3.1 The density and population estimates of great black-backed gull in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-9 and Table 2-10.

2.2.3.2 Table 2-9 includes the unapportioned density and population estimates of great black-backed gull, and Table 2-10 includes the apportioned density and population estimates of great black-backed gull.

Table 2-9: Unapportioned density and population estimate of great black-backed gull in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
Nov-21	9	52	17	92	0.25	0.33
Dec-21	2	12	2	29	0.06	0.71
Jan-22	3	17	3	35	0.08	0.58
Feb-22	5	27	5	60	0.13	0.45
Nov-22	1	6	1	18	0.03	1.00
Jan-23	5	29	6	59	0.14	0.45
Feb-23	3	17	6	34	0.08	0.58
Caledonia South (+2km)						
Nov-21	11	63	23	103	0.18	0.30
Dec-21	3	17	3	35	0.05	0.58
Jan-22	6	34	11	57	0.09	0.41
Feb-22	8	43	8	85	0.12	0.35
Oct-22	2	12	2	35	0.03	0.71
Nov-22	8	47	23	76	0.13	0.35
Dec-22	3	17	3	35	0.05	0.58
Jan-23	5	29	5	57	0.08	0.45
Feb-23	4	23	6	40	0.06	0.50

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South (+4km)						
Sep-21	1	6	1	17	0.01	1.00
Nov-21	16	92	40	149	0.17	0.25
Dec-21	4	23	4	52	0.04	0.50
Jan-22	9	52	17	86	0.10	0.33
Feb-22	13	71	33	119	0.13	0.28
Mar-22	1	5	1	16	0.01	1.00
Sep-22	1	6	1	18	0.01	1.00
Oct-22	3	18	3	47	0.03	0.58
Nov-22	10	58	23	94	0.11	0.32
Dec-22	6	35	12	65	0.07	0.41
Jan-23	8	47	12	88	0.09	0.35
Feb-23	5	29	12	46	0.05	0.45

Table 2-10: Apportioned density and population estimate of great black-backed gull in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Abundance Estimate			Density
	Abundance	LCI	UCI	
Caledonia South				
Nov-21	63	19	122	0.30
Dec-21	12	2	29	0.06
Jan-22	17	3	35	0.08
Feb-22	27	5	60	0.13
Nov-22	8	1	27	0.04
Jan-23	29	6	59	0.14
Feb-23	17	6	34	0.08
Caledonia South (+2km)				
Nov-21	72	32	130	0.20
Dec-21	17	3	35	0.05
Jan-22	34	11	57	0.09
Feb-22	43	8	85	0.12
Oct-22	12	2	35	0.03
Nov-22	52	28	91	0.15
Dec-22	19	5	39	0.05
Jan-23	29	5	57	0.08
Feb-23	23	6	40	0.06
Caledonia South (+4km)				
Sep-21	6	1	17	0.01
Nov-21	102	42	177	0.19
Dec-21	23	4	52	0.04
Jan-22	52	17	86	0.10
Feb-22	71	33	119	0.13

Survey	Abundance Estimate			Density
	Abundance	LCI	UCI	
Mar-22	5	1	16	0.01
Sep-22	6	1	18	0.01
Oct-22	18	3	47	0.03
Nov-22	63	24	109	0.12
Dec-22	37	13	71	0.07
Jan-23	47	12	88	0.09
Feb-23	29	12	46	0.05

2.2.4 Herring gull

2.2.4.1 The density and population estimates of herring gull in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-11 and Table 2-12.

2.2.4.2 Table 2-11 includes the unapportioned density and population estimates of herring gull, and Table 2-12 includes the apportioned density and population estimates of herring gull.

Table 2-11: Unapportioned density and population estimate of herring gull in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
Nov-21	1	6	1	17	0.03	1.00
Jan-22	1	6	1	17	0.03	1.00
Feb-22	1	5	1	16	0.02	1.00
Oct-22	2	12	2	23	0.06	0.71
Nov-22	2	12	2	35	0.06	0.71
Feb-23	1	6	1	17	0.03	1.00
Caledonia South (+2km)						
Nov-21	2	11	2	29	0.03	0.71

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Dec-21	2	12	2	29	0.03	0.71
Jan-22	1	6	1	17	0.02	1.00
Feb-22	1	5	1	16	0.01	1.00
Oct-22	1	6	1	17	0.02	1.00
Nov-22	2	12	2	23	0.03	0.71
Dec-22	3	17	3	52	0.05	0.58
Feb-23	2	11	2	29	0.03	0.71
Caledonia South (+4km)						
Nov-21	2	11	2	29	0.02	0.71
Dec-21	2	12	2	29	0.02	0.71
Jan-22	1	6	1	17	0.01	1.00
Feb-22	1	5	1	16	0.01	1.00
Jul-22	20	116	20	255	0.22	0.22
Oct-22	1	6	1	18	0.01	1.00
Nov-22	2	12	2	29	0.02	0.71
Dec-22	4	24	4	65	0.04	0.50
Feb-23	2	12	2	29	0.02	0.71

Table 2-12: Apportioned density and population estimate of herring gull in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Abundance Estimate			Density
	Abundance	LCI	UCI	
Caledonia South				
Nov-21	7	1	22	0.03
Jan-22	6	1	17	0.03
Feb-22	5	1	16	0.02
Nov-22	16	3	34	0.08
Dec-22	14	2	42	0.07
Feb-23	6	1	17	0.03
Caledonia South (+2km)				
Nov-21	13	4	36	0.04
Dec-21	12	2	29	0.03
Jan-22	6	1	17	0.02
Feb-22	5	1	16	0.01
Oct-22	6	1	17	0.02
Nov-22	13	3	27	0.04
Dec-22	19	5	58	0.05
Feb-23	11	2	29	0.03
Caledonia South (+4km)				
Nov-21	12	2	35	0.02
Dec-21	12	2	29	0.02
Jan-22	6	1	17	0.01
Feb-22	5	1	16	0.01
Jul-22	116	20	255	0.22
Oct-22	6	1	18	0.01
Nov-22	13	2	34	0.02

Survey	Abundance Estimate			Density
	Abundance	LCI	UCI	
Dec-22	26	4	71	0.05
Feb-23	12	2	29	0.02

2.2.5 Common gull

2.2.5.1 The density and population estimates of common gull in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-13 and Table 2-14.

2.2.5.2 Table 2-13 includes the unapportioned density and population estimates of common gull, and Table 2-14 includes the apportioned density and population estimates of common gull.

Table 2-13: Unapportioned density and population estimate of common gull in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
Dec-22	1	6	1	18	0.03	1.00
Caledonia South (+2km)						
Sep-21	6	35	6	104	0.10	0.41
Dec-22	1	6	1	17	0.02	1.00
Caledonia South (+4km)						
Sep-21	6	35	6	105	0.07	0.41
Aug-22	2	11	2	34	0.02	0.71
Dec-22	1	6	1	18	0.01	1.00

Table 2-14: Apportioned density and population estimate of common gull in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Abundance Estimate			Density
	Abundance	LCI	UCI	
Caledonia South				
Dec-22	7	1	22	0.03
Caledonia South (+2km)				
Sep-21	35	6	104	0.10
Dec-22	7	2	19	0.02
Caledonia South (+4km)				
Sep-21	35	6	105	0.07
Aug-22	11	2	34	0.02
Dec-22	6	1	20	0.01

2.2.6 Lesser black-backed gull

2.2.6.1 The density and population estimates of lesser black-backed gull in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-15 and Table 2-16.

2.2.6.2 Table 2-15 includes the unapportioned density and population estimates of lesser black-backed gull, and Table 2-16 includes the apportioned density and population estimates of lesser black-backed gull.

Table 2-15: Unapportioned density and population estimate of lesser black-backed gull in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
<i>None recorded</i>						
Caledonia South (+2km)						
<i>None recorded</i>						
Caledonia South (+4km)						
Jul-22	2	12	2	35	0.02	0.71

Table 2-16: Apportioned density and population estimate of lesser black-backed gull in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Abundance Estimate			Density
	Abundance	LCI	UCI	
Caledonia South				
<i>None recorded</i>				
Caledonia South (+2km)				
<i>None recorded</i>				
Caledonia South (+4km)				
Jul-22	12	2	35	0.02

2.3 Sterninae

2.3.1 Unidentified species

Commic tern

2.3.1.1 The density and population estimates of commic tern in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-17.

Table 2-17: Density and population estimate of unidentified commic tern species in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
<i>None recorded</i>						
Caledonia South (+2km)						
Jun-21	3	17	3	52	0.05	0.58
Aug-22	4	23	4	57	0.06	0.50
Caledonia South (+4km)						
May-21	3	17	3	52	0.03	0.58
Sep-21	2	12	2	35	0.02	0.71
Aug-22	7	40	7	86	0.07	0.38

Unidentified tern species

2.3.1.2 The density and population estimates of unidentified tern species in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-18.

Table 2-18: Density and population estimate of unidentified tern species in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
<i>None recorded</i>						
Caledonia South (+2km)						
May-21	1	6	1	17	0.02	1.00
Caledonia South (+4km)						
May-21	1	6	1	17	0.01	1.00

2.3.2 Common tern

2.3.2.1 The density and population estimates of common tern in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-19 and Table 2-20.

2.3.2.2 Table 2-19 includes the unapportioned density and population estimates of common tern, and Table 2-20 includes the apportioned density and population estimates of common tern.

Table 2-19: Unapportioned density and population estimate of common tern in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
<i>None recorded</i>						
Caledonia South (+2km)						
<i>None recorded</i>						
Caledonia South (+4km)						
Aug-21	3	17	3	52	0.03	0.58

Table 2-20: Apportioned density and population estimate of common tern in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Abundance Estimate			Density
	Abundance	LCI	UCI	
Caledonia South				
<i>None recorded</i>				
Caledonia South (+2km)				
<i>None recorded</i>				
Caledonia South (+4km)				
Aug-21	29	5	87	0.05

2.3.3 Arctic tern

2.3.3.1 The density and population estimates of Arctic tern in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-21 and Table 2-22.

2.3.3.2 Table 2-21 includes the unapportioned density and population estimates of Arctic tern, and Table 2-22 includes the apportioned density and population estimates of Arctic tern.

Table 2-21: Unapportioned density and population estimate of Arctic tern in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
<i>None recorded</i>						
Caledonia South (+2km)						
May-21	6	35	6	92	0.10	0.41
Aug-22	5	29	5	69	0.08	0.45
Caledonia South (+4km)						
May-21	6	35	6	93	0.07	0.41
Aug-22	6	34	6	69	0.06	0.41

Table 2-22: Apportioned density and population estimate of Arctic tern in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Abundance Estimate			Density
	Abundance	LCI	UCI	
Caledonia South				
<i>None recorded</i>				
Caledonia South (+2km)				
May-21	58	29	161	0.16
Aug-22	52	28	126	0.14
Caledonia South (+4km)				
May-21	58	10	162	0.11
Aug-22	74	13	155	0.14

2.4 Stercorariidae

2.4.1 Great skua

2.4.1.1 The density and population estimates of great skua in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-23 and Table 2-24.

2.4.1.2 Table 2-23 includes the unapportioned density and population estimates of great skua, and Table 2-24 includes the apportioned density and population estimates of great skua.

Table 2-23: Unapportioned density and population estimate of great skua in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
Aug-21	1	6	1	17	0.03	1.00
Jul-22	1	6	1	17	0.03	1.00
Caledonia South (+2km)						
Jun-21	1	6	1	17	0.02	1.00
Jul-21	1	6	1	17	0.02	1.00
Aug-21	2	11	2	29	0.03	0.71
Jul-22	1	6	1	17	0.02	1.00
Caledonia South (+4km)						
Jun-21	1	6	1	17	0.01	1.00
Jul-21	1	6	1	18	0.01	1.00
Aug-21	2	12	2	29	0.02	0.71
Sep-21	1	6	1	17	0.01	1.00
Jul-22	1	6	1	17	0.01	1.00

Table 2-24: Apportioned density and population estimate of great skua in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Abundance Estimate			Density
	Abundance	LCI	UCI	
Caledonia South				
Aug-21	6	1	17	0.03
Jul-22	6	1	17	0.03
Caledonia South (+2km)				
Jun-21	6	1	17	0.02
Jul-21	6	1	17	0.02
Aug-21	11	2	29	0.03
Jul-22	6	1	17	0.02
Caledonia South (+4km)				
Jun-21	6	1	17	0.01
Jul-21	6	1	18	0.01
Aug-21	12	2	29	0.02
Sep-21	6	1	17	0.01
Jul-22	6	1	17	0.01

2.4.2 Arctic skua

2.4.2.1 The density and population estimates of Arctic skua in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-25 and Table 2-26.

2.4.2.2 Table 2-25 includes the unapportioned density and population estimates of Arctic skua, and Table 2-26 includes the apportioned density and population estimates of Arctic skua.

Table 2-25: Unapportioned density and population estimate of Arctic skua in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
<i>None recorded</i>						
Caledonia South (+2km)						
Aug-22	2	11	2	29	0.71	0.03
Caledonia South (+4km)						
Aug-22	2	11	2	29	0.71	0.02

Table 2-26: Apportioned density and population estimate of Arctic skua in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Abundance Estimate			Density
	Abundance	LCI	UCI	
Caledonia South				
<i>None recorded</i>				
Caledonia South (+2km)				
Aug-22	11	2	29	0.03
Caledonia South (+4km)				
Aug-22	11	2	29	0.02

2.5 Alcidae

2.5.1 Unidentified species

Unidentified guillemot and/or razorbill

2.5.1.1 The density and population estimates of unidentified guillemot and/or razorbill species in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-27.

Table 2-27: Density and population estimate of unidentified guillemot and/or razorbill in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
Jun-21	14	81	14	186	0.39	0.27
Oct-21	3	18	3	53	0.09	0.58
Nov-21	1	6	1	17	0.03	1.00
Mar-22	3	16	3	27	0.08	0.58
Apr-22	1	6	1	17	0.03	1.00
Jun-22	1	6	1	17	0.03	1.00
Sep-22	2	12	2	29	0.06	0.71
Oct-22	27	159	27	464	0.76	0.19
Jan-23	1	6	1	18	0.03	1.00
Feb-23	8	46	8	126	0.22	0.35
Caledonia South (+2km)						
Jun-21	20	116	35	215	0.32	0.22
Sep-21	1	6	1	17	0.02	1.00
Oct-21	7	41	7	99	0.11	0.38
Nov-21	1	6	1	17	0.02	1.00
Mar-22	5	26	5	48	0.07	0.45
Apr-22	1	6	1	17	0.02	1.00

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Jun-22	1	6	1	17	0.02	1.00
Jul-22	1	6	1	17	0.02	1.00
Sep-22	2	11	2	29	0.03	0.71
Oct-22	54	311	54	657	0.87	0.14
Jan-23	1	6	1	17	0.02	1.00
Feb-23	9	51	9	148	0.14	0.33
Mar-23	2	12	2	29	0.03	0.71
Caledonia South (+4km)						
Jun-21	41	238	52	500	0.45	0.16
Sep-21	1	6	1	17	0.01	1.00
Oct-21	21	122	21	302	0.23	0.22
Nov-21	2	11	2	29	0.02	0.71
Jan-22	2	12	2	35	0.02	0.71
Mar-22	5	27	5	54	0.05	0.45
Apr-22	1	6	1	17	0.01	1.00
Jun-22	1	6	1	17	0.01	1.00
Jul-22	2	12	2	29	0.02	0.71
Sep-22	2	12	2	29	0.02	0.71
Oct-22	54	317	54	705	0.59	0.14
Nov-22	2	12	2	29	0.02	0.71
Jan-23	1	6	1	18	0.01	1.00
Feb-23	12	69	12	162	0.13	0.29
Mar-23	2	12	2	29	0.02	0.71
Apr-23	1	6	1	17	0.01	1.00

Unidentified auk species

2.5.1.2 The density and population estimates of unidentified auk species in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-28.

Table 2-28: Density and population estimate of unidentified auk species in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
Jul-21	1	6	1	18	0.03	1.00
Caledonia South (+2km)						
Jul-21	1	6	1	17	0.02	1.00
Aug-22	1	6	1	17	0.02	1.00
Caledonia South (+4km)						
Jul-21	1	6	1	18	0.01	1.00
Aug-22	1	6	1	17	0.01	1.00

Unidentified auk and/or shearwater species

2.5.1.3 The density and population estimates of unidentified auk and/or shearwater species in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-29.

Table 2-29: Density and population estimate of unidentified auk and/or shearwater species in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
<i>None recorded</i>						
Caledonia South (+2km)						
Jul-22	2	11	2	34	0.03	0.71
Caledonia South (+4km)						
Jul-21	1	6	1	17	0.01	1.00
Jul-22	2	12	2	35	0.02	0.71

2.5.2 Common guillemot

2.5.2.1 The density and population estimates of common guillemot in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-30 and Table 2-31.

2.5.2.2 Table 2-30 includes the unapportioned density and population estimates of common guillemot, and Table 2-31 includes the apportioned density and population estimates of common guillemot.

Table 2-30: Unapportioned density and population estimate of common guillemot in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
May-21	19	111	19	268	0.53	0.23
Jun-21	50	291	122	494	1.38	0.14
Jul-21	42	246	152	328	1.17	0.15
Aug-21	3	17	3	40	0.08	0.58
Sep-21	1	6	1	17	0.03	1.00
Oct-21	1	6	1	18	0.03	1.00
Nov-21	6	35	6	81	0.17	0.41
Feb-22	1	5	1	16	0.02	1.00
Mar-22	44	236	81	446	1.12	0.15
Apr-22	33	190	35	461	0.90	0.17
May-22	5	29	6	52	0.14	0.45
Jun-22	27	156	81	243	0.74	0.19
Jul-22	83	484	286	735	2.30	0.11
Aug-22	1	6	1	17	0.03	1.00
Sep-22	5	29	12	52	0.14	0.45
Oct-22	5	29	6	71	0.14	0.45
Jan-23	6	35	6	70	0.17	0.41
Feb-23	62	354	171	531	1.68	0.13
Mar-23	11	64	11	145	0.30	0.30
Apr-23	61	347	91	717	1.65	0.13
Caledonia South (+2km)						
May-21	34	196	81	364	0.55	0.17
Jun-21	106	615	354	882	1.71	0.10

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Jul-21	74	431	256	623	1.20	0.12
Aug-21	6	34	6	75	0.09	0.41
Sep-21	2	12	2	29	0.03	0.71
Oct-21	9	52	12	110	0.14	0.33
Nov-21	12	69	29	120	0.19	0.29
Feb-22	5	27	5	69	0.08	0.45
Mar-22	51	270	95	497	0.75	0.14
Apr-22	119	681	315	1,081	1.89	0.09
May-22	6	34	11	57	0.09	0.41
Jun-22	46	261	153	380	0.73	0.15
Jul-22	122	706	422	1,070	1.96	0.09
Aug-22	1	6	1	17	0.02	1.00
Sep-22	5	29	6	57	0.08	0.45
Oct-22	6	35	6	69	0.10	0.41
Jan-23	18	103	34	201	0.29	0.24
Feb-23	106	605	342	867	1.68	0.10
Mar-23	15	86	17	178	0.24	0.26
Apr-23	76	426	157	829	1.19	0.11
Caledonia South (+4km)						
May-21	66	383	145	679	0.72	0.12
Jun-21	199	1,157	593	2,058	2.17	0.07
Jul-21	97	583	324	823	1.09	0.10
Aug-21	12	69	17	127	0.13	0.29
Sep-21	3	17	3	35	0.03	0.58
Oct-21	9	52	9	110	0.10	0.33

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Nov-21	14	80	34	132	0.15	0.27
Feb-22	7	38	7	87	0.07	0.38
Mar-22	67	360	167	586	0.67	0.12
Apr-22	245	1,405	797	2,070	2.63	0.06
May-22	30	172	69	305	0.32	0.18
Jun-22	77	446	301	585	0.84	0.11
Jul-22	156	903	562	1,366	1.69	0.08
Aug-22	1	6	1	17	0.01	1.00
Sep-22	5	29	6	53	0.05	0.45
Oct-22	6	35	6	76	0.07	0.41
Nov-22	1	6	1	18	0.01	1.00
Jan-23	20	117	35	234	0.22	0.22
Feb-23	173	998	444	1,575	1.87	0.08
Mar-23	27	157	58	262	0.29	0.19
Apr-23	89	509	189	973	0.95	0.11

Table 2-31: Apportioned density and population estimate of common guillemot in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Abundance Estimate			Density
	Abundance	LCI	UCI	
Caledonia South				
May-21	111	19	268	0.53
Jun-21	372	136	680	1.77
Jul-21	252	153	346	1.20
Aug-21	17	3	40	0.08
Sep-21	6	1	17	0.03
Oct-21	24	4	71	0.11
Nov-21	41	7	98	0.19
Feb-22	5	1	16	0.02
Mar-22	252	84	472	1.20
Apr-22	196	36	477	0.93
May-22	29	6	52	0.14
Jun-22	162	82	260	0.77
Jul-22	484	286	735	2.30
Aug-22	6	1	17	0.03
Sep-22	39	14	74	0.19
Oct-22	188	33	535	0.89
Jan-23	41	7	88	0.19
Feb-23	399	179	653	1.90
Mar-23	64	11	145	0.30
Apr-23	347	91	717	1.65
Caledonia South (+2km)				
May-21	196	81	364	0.54
Jun-21	730	469	1,093	2.03

Survey	Abundance Estimate			Density
	Abundance	LCI	UCI	
Jul-21	437	262	640	1.21
Aug-21	34	6	75	0.09
Sep-21	16	6	40	0.04
Oct-21	93	53	209	0.26
Nov-21	75	35	137	0.21
Feb-22	27	5	69	0.08
Mar-22	296	121	544	0.82
Apr-22	687	321	1,097	1.91
May-22	34	11	57	0.09
Jun-22	278	170	431	0.77
Jul-22	712	428	1,087	1.98
Aug-22	12	7	34	0.03
Sep-22	35	12	72	0.10
Oct-22	346	317	726	0.96
Jan-23	109	40	218	0.30
Feb-23	655	392	1,012	1.82
Mar-23	96	27	202	0.27
Apr-23	426	157	829	1.18
Caledonia South (+4km)				
May-21	383	145	679	0.72
Jun-21	1,394	645	2,554	2.61
Jul-21	589	325	841	1.10
Aug-21	69	17	127	0.13
Sep-21	21	4	46	0.04
Oct-21	174	30	412	0.33

Survey	Abundance Estimate			Density
	Abundance	LCI	UCI	
Nov-21	91	36	161	0.17
Jan-22	12	2	35	0.02
Feb-22	38	7	87	0.07
Mar-22	387	172	639	0.72
Apr-22	1,411	798	2,086	2.64
May-22	172	69	305	0.32
Jun-22	464	304	637	0.87
Jul-22	915	564	1,394	1.71
Aug-22	12	2	34	0.02
Sep-22	36	7	66	0.07
Oct-22	352	60	781	0.66
Nov-22	18	3	47	0.03
Jan-23	123	36	252	0.23
Feb-23	1,066	456	1,734	2.00
Mar-23	166	60	284	0.31
Apr-23	514	190	988	0.96

2.5.3 Razorbill

2.5.3.1 The density and population estimates of razorbill in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-32 and Table 2-33.

2.5.3.2 Table 2-32 includes the unapportioned density and population estimates of razorbill, and Table 2-33 includes the apportioned density and population estimates of razorbill.

Table 2-32: Unapportioned density and population estimate of razorbill in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
Sep-21	1	6	1	17	0.03	1.00
Mar-22	1	5	1	16	0.02	1.00
Apr-22	2	12	2	35	0.06	0.71
May-22	1	6	1	17	0.03	1.00
Sep-22	1	6	1	17	0.03	1.00
Feb-23	1	6	1	17	0.03	1.00
Mar-23	3	17	3	41	0.08	0.58
Apr-23	5	28	5	74	0.13	0.45
Caledonia South (+2km)						
Jun-21	1	6	1	17	0.02	1.00
Sep-21	1	6	1	17	0.02	1.00
Mar-22	1	5	1	16	0.01	1.00
Apr-22	6	34	11	69	0.09	0.41
May-22	1	6	1	17	0.02	1.00
Jul-22	1	6	1	17	0.02	1.00
Sep-22	4	23	4	57	0.06	0.50
Feb-23	1	6	1	17	0.02	1.00
Mar-23	3	17	3	40	0.05	0.58

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Apr-23	5	28	5	78	0.08	0.45
Caledonia South (+4km)						
Jun-21	6	35	6	81	0.07	0.41
Sep-21	1	6	1	17	0.01	1.00
Mar-22	1	5	1	16	0.01	1.00
Apr-22	7	40	7	80	0.07	0.38
May-22	3	17	3	52	0.03	0.58
Jul-22	2	12	2	29	0.02	0.71
Sep-22	4	23	4	64	0.04	0.50
Feb-23	2	12	2	29	0.02	0.71
Mar-23	8	47	12	87	0.09	0.35
Apr-23	9	52	9	137	0.10	0.33

Table 2-33: Apportioned density and population estimate of razorbill in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Abundance Estimate			Density
	Abundance	LCI	UCI	
Caledonia South				
Sep-21	6	1	17	0.03
Mar-22	5	1	17	0.03
Apr-22	12	2	36	0.06
May-22	6	1	17	0.03
Sep-22	8	1	24	0.04
Feb-23	7	1	21	0.03
Mar-23	17	3	41	0.08
Apr-23	28	5	74	0.13
Caledonia South (+2km)				
Jun-21	7	2	21	0.02
Sep-21	8	3	23	0.02
Mar-22	5	1	17	0.02
Apr-22	34	11	70	0.10
May-22	6	1	17	0.02
Jul-22	6	1	17	0.02
Sep-22	28	9	72	0.08
Feb-23	7	2	20	0.02
Mar-23	19	5	45	0.05
Apr-23	28	5	78	0.08
Caledonia South (+4km)				
Jun-21	42	7	101	0.08
Sep-21	8	1	23	0.01
Mar-22	5	1	17	0.01

Survey	Abundance Estimate			Density
	Abundance	LCI	UCI	
Apr-22	40	7	81	0.08
May-22	17	3	52	0.03
Jul-22	12	2	30	0.02
Sep-22	28	5	80	0.05
Feb-23	13	2	32	0.02
Mar-23	50	12	94	0.09
Apr-23	53	9	139	0.10

2.5.4 Puffin

- 2.5.4.1 The density and population estimates of puffin in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-34 and Table 2-35.
- 2.5.4.2 Table 2-34 includes the unapportioned density and population estimates of puffin, and Table 2-35 includes the apportioned density and population estimates of puffin.

Table 2-34: Unapportioned density and population estimate of puffin in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
Jul-22	1	6	1	17	0.03	1.00
Sep-22	2	12	2	35	0.06	0.71
Caledonia South (+2km)						
Jun-21	3	17	3	35	0.05	0.58
Jul-21	1	6	1	17	0.02	1.00
Jul-22	1	6	1	17	0.02	1.00
Sep-22	2	11	2	34	0.03	0.71
Caledonia South (+4km)						
Jun-21	4	23	6	41	0.04	0.50
Jul-21	1	6	1	18	0.01	1.00
Jul-22	1	6	1	17	0.01	1.00
Sep-22	5	29	5	70	0.05	0.45

Table 2-35: Apportioned density and population estimate of puffin in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Abundance Estimate			Density
	Abundance	LCI	UCI	
Caledonia South				
Jul-22	6	1	17	0.03
Sep-22	12	2	35	0.06
Caledonia South (+2km)				
Jun-21	17	3	35	0.05
Jul-21	6	1	17	0.02
Jul-22	6	1	17	0.02
Sep-22	11	2	34	0.03
Caledonia South (+4km)				
Jun-21	23	6	41	0.04
Jul-21	6	1	18	0.01
Jul-22	6	1	17	0.01
Sep-22	29	5	70	0.05

2.5.5 Black guillemot

2.5.5.1 The density and population estimates of black guillemot in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-36 and Table 2-37.

2.5.5.2 Table 2-36 includes the unapportioned density and population estimates of black guillemot, and Table 2-37 includes the apportioned density and population estimates of black guillemot.

Table 2-36: Unapportioned density and population estimate of black guillemot in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
<i>None recorded</i>						
Caledonia South (+2km)						
Jun-22	1	6	1	17	0.02	1.00
Caledonia South (+4km)						
Jun-22	1	6	1	17	0.02	1.00

Table 2-37: Apportioned density and population estimate of black guillemot in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Abundance Estimate			Density
	Abundance	LCI	UCI	
Caledonia South				
<i>None recorded</i>				
Caledonia South (+2km)				
Jun-22	6	1	17	0.02
Caledonia South (+4km)				
Jun-22	6	1	17	0.02

2.6 Gaviidae

2.6.1 Red-throated diver

2.6.1.1 The density and population estimates of red-throated diver in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-38 and Table 2-39.

2.6.1.2 Table 2-38 includes the unapportioned density and population estimates of red-throated diver, and Table 2-39 includes the apportioned density and population estimates of red-throated diver.

Table 2-38: Unapportioned density and population estimate of red-throated diver in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
Oct-22	1	6	1	18	0.03	1.00
Caledonia South (+2km)						
Oct-22	1	6	1	17	0.02	1.00
Caledonia South (+4km)						
Oct-22	1	6	1	18	0.01	1.00

Table 2-39: Apportioned density and population estimate of red-throated diver in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Abundance Estimate			Density
	Abundance	LCI	UCI	
Caledonia South				
Oct-22	6	1	18	0.03
Caledonia South (+2km)				
Oct-22	6	1	17	0.02
Caledonia South (+4km)				
Oct-22	6	1	18	0.01

2.6.2 Great northern diver

2.6.2.1 No great northern diver in flight were recorded in Caledonia South.

2.7 Procellariidae

2.7.1 Unidentified species

Unidentified fulmar and/or gull species

2.7.1.1 The density and population estimates of unidentified fulmar and/or gull species in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-40.

Table 2-40: Density and population estimate of unidentified fulmar and/ or gull species in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis. Repeated from Table 2-6.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
Nov-22	1	6	1	18	0.03	1.00
Mar-23	1	6	1	17	0.03	1.00
Caledonia South (+2km)						
Nov-22	1	6	1	17	0.02	1.00
Mar-23	1	6	1	17	0.02	1.00
Caledonia South (+4km)						
Nov-22	1	6	1	18	0.01	1.00
Mar-23	1	6	1	17	0.01	1.00

Unidentified small shearwater species

2.7.1.2 The density and population estimates of unidentified small shearwater species in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-41.

Table 2-41: Density and population estimate of unidentified small shearwater species in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
Aug-22	1	6	1	17	0.03	1.00
Caledonia South (+2km)						
Aug-22	1	6	1	17	0.02	1.00
Sep-22	1	6	1	17	0.02	1.00
Caledonia South (+4km)						
Aug-22	1	6	1	17	0.01	1.00
Sep-22	1	6	1	18	0.01	1.00

Unidentified shearwater species

2.7.1.3 No unidentified shearwater species in flight were recorded in Caledonia South.

Unidentified auk and/or shearwater species

2.7.1.4 The density and population estimates of unidentified auk and/or shearwater species in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-42.

Table 2-42: Density and population estimate of unidentified auk and/or shearwater species in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis. Repeated from Table 2-29.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
<i>None recorded</i>						
Caledonia South (+2km)						
Jul-22	2	11	2	34	0.03	0.71
Caledonia South (+4km)						
Jul-21	1	6	1	17	0.01	1.00
Jul-22	2	12	2	35	0.02	0.71

2.7.2 Fulmar

2.7.2.1 The density and population estimates of fulmar in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-43 and Table 2-44.

2.7.2.2 Table 2-43 includes the unapportioned density and population estimates of fulmar, and Table 2-44 includes the apportioned density and population estimates of fulmar.

Table 2-43: Unapportioned density and population estimate of fulmar in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
May-21	11	64	35	105	0.30	0.30
Jun-21	12	70	35	99	0.33	0.29
Jul-21	45	264	88	534	1.26	0.15
Aug-21	65	375	289	462	1.78	0.12
Sep-21	8	46	17	75	0.22	0.35
Nov-21	35	202	35	426	0.96	0.17
Dec-21	44	255	180	325	1.21	0.15
Jan-22	10	58	23	98	0.28	0.32
Feb-22	9	49	11	97	0.23	0.33
Mar-22	1	5	1	16	0.02	1.00
Apr-22	13	75	13	179	0.36	0.28
May-22	3	17	6	35	0.08	0.58
Jun-22	35	203	116	324	0.97	0.17
Jul-22	124	723	525	933	3.44	0.09
Aug-22	18	104	58	150	0.49	0.24
Sep-22	1	6	1	17	0.03	1.00
Nov-22	55	322	269	381	1.53	0.13

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Dec-22	17	100	47	153	0.48	0.24
Jan-23	4	23	6	41	0.11	0.50
Feb-23	9	51	17	91	0.24	0.33
Mar-23	13	75	35	122	0.36	0.28
Apr-23	4	23	6	51	0.11	0.50
Caledonia South (+2km)						
May-21	21	121	75	173	0.34	0.22
Jun-21	28	162	104	226	0.45	0.19
Jul-21	81	471	221	838	1.31	0.11
Aug-21	113	648	522	757	1.80	0.09
Sep-21	14	81	46	116	0.23	0.27
Oct-21	1	6	1	17	0.02	1.00
Nov-21	44	252	80	504	0.70	0.15
Dec-21	71	409	317	501	1.14	0.12
Jan-22	18	103	46	161	0.29	0.24
Feb-22	19	101	64	150	0.28	0.23
Mar-22	5	26	5	48	0.07	0.45
Apr-22	21	120	46	217	0.33	0.22
May-22	12	69	34	109	0.19	0.29
Jun-22	53	301	187	448	0.84	0.14
Jul-22	214	1,238	937	1,556	3.44	0.07
Aug-22	23	131	80	183	0.36	0.21
Sep-22	3	17	3	34	0.05	0.58
Nov-22	97	565	483	635	1.57	0.10

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Dec-22	28	162	104	225	0.45	0.19
Jan-23	10	57	29	86	0.16	0.32
Feb-23	12	68	29	114	0.19	0.29
Mar-23	21	121	69	178	0.34	0.22
Apr-23	6	34	6	62	0.09	0.41
Caledonia South (+4km)						
May-21	29	168	104	226	0.31	0.19
Jun-21	46	267	169	384	0.50	0.15
Jul-21	110	661	330	1,129	1.24	0.10
Aug-21	163	938	707	1,127	1.76	0.08
Sep-21	24	139	87	192	0.26	0.20
Oct-21	1	6	1	17	0.01	1.00
Nov-21	47	270	80	523	0.51	0.15
Dec-21	112	648	474	792	1.21	0.09
Jan-22	25	144	75	219	0.27	0.20
Feb-22	27	147	92	212	0.28	0.19
Mar-22	8	43	16	70	0.08	0.35
Apr-22	26	149	75	241	0.28	0.20
May-22	14	80	40	126	0.15	0.27
Jun-22	78	452	290	614	0.85	0.11
Jul-22	325	1,882	1,401	2,345	3.53	0.06
Aug-22	42	241	166	310	0.45	0.15
Sep-22	8	47	23	76	0.09	0.35
Oct-22	2	12	2	35	0.02	0.71
Nov-22	132	772	567	930	1.45	0.09

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Dec-22	46	271	171	395	0.51	0.15
Jan-23	27	158	88	228	0.30	0.19
Feb-23	17	98	52	156	0.18	0.24
Mar-23	26	152	82	227	0.28	0.20
Apr-23	8	46	11	86	0.09	0.35

Table 2-44: Apportioned density and population estimate of fulmar in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Abundance Estimate			Density
	Abundance	LCI	UCI	
Caledonia South				
May-21	64	35	105	0.30
Jun-21	70	35	99	0.33
Jul-21	264	88	534	1.25
Aug-21	375	289	462	1.78
Sep-21	46	17	75	0.22
Nov-21	202	35	426	0.96
Dec-21	255	180	325	1.21
Jan-22	58	23	98	0.28
Feb-22	49	11	97	0.23
Mar-22	5	1	16	0.02
Apr-22	75	13	179	0.36
May-22	17	6	35	0.08
Jun-22	203	116	324	0.96
Jul-22	723	525	933	3.44
Aug-22	104	58	150	0.49
Sep-22	6	1	17	0.03
Nov-22	327	270	396	1.56
Dec-22	100	47	153	0.48
Jan-23	23	6	41	0.11
Feb-23	51	17	91	0.24
Mar-23	81	36	139	0.38
Apr-23	23	6	51	0.11

Survey	Abundance Estimate			Density
	Abundance	LCI	UCI	
Caledonia South (+2km)				
May-21	121	75	173	0.34
Jun-21	162	104	226	0.45
Jul-21	471	221	838	1.31
Aug-21	648	522	757	1.80
Sep-21	81	46	116	0.23
Oct-21	6	1	17	0.02
Nov-21	252	80	504	0.70
Dec-21	409	317	501	1.14
Jan-22	103	46	161	0.29
Feb-22	101	64	150	0.28
Mar-22	26	5	48	0.07
Apr-22	120	46	217	0.33
May-22	69	34	109	0.19
Jun-22	301	187	448	0.84
Jul-22	1,238	937	1,556	3.44
Aug-22	131	80	183	0.36
Sep-22	17	3	34	0.05
Nov-22	570	488	648	1.58
Dec-22	162	104	225	0.45
Jan-23	57	29	86	0.16
Feb-23	68	29	114	0.19
Mar-23	126	74	192	0.35
Apr-23	34	6	62	0.09

Survey	Abundance Estimate			Density
	Abundance	LCI	UCI	
Caledonia South (+4km)				
May-21	168	104	226	0.31
Jun-21	267	169	384	0.50
Jul-21	661	330	1,129	1.24
Aug-21	938	707	1,127	1.76
Sep-21	139	87	192	0.26
Oct-21	6	1	17	0.01
Nov-21	270	80	523	0.51
Dec-21	648	474	792	1.21
Jan-22	144	75	219	0.27
Feb-22	147	92	212	0.28
Mar-22	43	16	70	0.08
Apr-22	149	75	241	0.28
May-22	80	40	126	0.15
Jun-22	452	290	614	0.85
Jul-22	1,882	1,401	2,345	3.53
Aug-22	241	166	310	0.45
Sep-22	47	23	76	0.09
Oct-22	12	2	35	0.02
Nov-22	777	568	945	1.46
Dec-22	271	171	395	0.51
Jan-23	158	88	228	0.30
Feb-23	98	52	156	0.18
Mar-23	157	83	240	0.29
Apr-23	46	11	86	0.09

2.7.3 Sooty shearwater

2.7.3.1 The density and population estimates of sooty shearwater in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-45 and Table 2-46.

2.7.3.2 Table 2-45 includes the unapportioned density and population estimates of sooty shearwater, and Table 2-46 includes the apportioned density and population estimates of sooty shearwater.

Table 2-45: Unapportioned density and population estimate of sooty shearwater in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
Sep-21	1	6	1	17	1.00	0.03
Caledonia South (+2km)						
Sep-21	1	6	1	17	1.00	0.02
Caledonia South (+4km)						
Sep-21	1	6	1	17	1.00	0.01

Table 2-46: Apportioned density and population estimate of sooty shearwater in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Abundance Estimate			Density
	Abundance	LCI	UCI	
Caledonia South				
Sep-21	6	1	17	0.03
Caledonia South (+2km)				
Sep-21	6	1	17	0.02
Caledonia South (+4km)				
Sep-21	6	1	17	0.01

2.7.4 Manx shearwater

2.7.4.1 The density and population estimates of Manx shearwater in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-47 and Table 2-48.

2.7.4.2 Table 2-47 includes the unapportioned density and population estimates of Manx shearwater, and Table 2-48 includes the apportioned density and population estimates of Manx shearwater.

Table 2-47: Unapportioned density and population estimate of Manx shearwater in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
Jun-21	2	12	2	29	0.06	0.71
Caledonia South (+2km)						
Jun-21	2	12	2	29	0.03	0.71
Caledonia South (+4km)						
Jun-21	6	35	6	87	0.07	0.41
May-22	2	11	2	29	0.02	0.71

Table 2-48: Apportioned density and population estimate of Manx shearwater in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Abundance Estimate			Density
	Abundance	LCI	UCI	
Caledonia South				
Jun-21	12	2	29	0.06
Aug-22	6	1	17	0.03
Caledonia South (+2km)				
Jun-21	12	2	29	0.03
Aug-22	6	6	17	0.02
Caledonia South (+4km)				
Jun-21	35	6	88	0.07
May-22	11	2	29	0.02
Aug-22	6	1	17	0.01

2.8 Sulidae

2.8.1 Gannet

2.8.1.1 The density and population estimates of gannet species in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-49.

Table 2-49: Density and population estimate of gannet in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis. No apportionment required for this species.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
May-21	1	6	1	17	0.03	1.00
Jun-21	10	58	17	116	0.28	0.32
Jul-21	3	18	3	35	0.09	0.58
Aug-21	9	52	35	69	0.25	0.33
Sep-21	6	35	12	64	0.17	0.41
Oct-21	10	59	29	88	0.28	0.32
Nov-21	5	29	6	52	0.14	0.45
Jan-22	1	6	1	17	0.03	1.00
Mar-22	1	5	1	16	0.02	1.00
Apr-22	1	6	1	17	0.03	1.00
May-22	1	6	1	17	0.03	1.00
Jun-22	77	446	77	1,153	2.12	0.11
Jul-22	10	58	17	105	0.28	0.32
Aug-22	5	29	12	52	0.14	0.45
Sep-22	20	117	58	169	0.56	0.22
Oct-22	4	24	6	47	0.11	0.5
Nov-22	1	6	1	18	0.03	1.00
Dec-22	1	6	1	18	0.03	1.00
Jan-23	1	6	1	18	0.03	1.00
Apr-23	6	34	6	91	0.16	0.41
Caledonia South (+2km)						
May-21	3	17	3	35	0.05	0.58
Jun-21	23	133	64	220	0.37	0.21

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Jul-21	4	23	6	41	0.06	0.50
Aug-21	22	126	86	166	0.35	0.21
Sep-21	11	64	35	98	0.18	0.30
Oct-21	18	104	46	162	0.29	0.24
Nov-21	7	40	17	69	0.11	0.38
Jan-22	1	6	1	17	0.02	1.00
Mar-22	1	5	1	16	0.01	1.00
Apr-22	3	17	6	34	0.05	0.58
May-22	1	6	1	17	0.02	1.00
Jun-22	80	454	80	1,158	1.26	0.11
Jul-22	15	87	29	156	0.24	0.26
Aug-22	6	34	11	69	0.09	0.41
Sep-22	37	211	114	314	0.59	0.16
Oct-22	14	81	17	190	0.23	0.27
Nov-22	1	6	1	17	0.02	1.00
Dec-22	2	12	2	29	0.03	0.71
Jan-23	2	11	2	29	0.03	0.71
Feb-23	1	6	1	17	0.02	1.00
Mar-23	1	6	1	17	0.02	1.00
Apr-23	6	34	6	90	0.09	0.41
Caledonia South (+4km)						
May-21	4	23	4	52	0.04	0.50
Jun-21	37	215	110	349	0.40	0.16
Jul-21	9	54	18	96	0.10	0.33
Aug-21	38	219	155	288	0.41	0.16

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Sep-21	15	87	41	139	0.16	0.26
Oct-21	37	215	134	296	0.40	0.16
Nov-21	9	52	17	86	0.10	0.33
Jan-22	1	6	1	17	0.01	1.00
Feb-22	1	5	1	16	0.01	1.00
Mar-22	1	5	1	16	0.01	1.00
Apr-22	8	46	8	109	0.09	0.35
May-22	3	17	6	34	0.03	0.58
Jun-22	92	533	110	1,245	1.00	0.10
Jul-22	33	191	87	301	0.36	0.17
Aug-22	6	34	6	69	0.06	0.41
Sep-22	49	286	152	438	0.54	0.14
Oct-22	27	159	59	329	0.30	0.19
Nov-22	1	6	1	18	0.01	1.00
Dec-22	3	18	3	47	0.03	0.58
Jan-23	3	18	3	35	0.03	0.58
Feb-23	2	12	2	29	0.02	0.71
Mar-23	1	6	1	17	0.01	1.00
Apr-23	7	40	7	109	0.07	0.38

2.9 Turdidae

2.9.1 Unidentified thrush species

2.9.1.1 The density and population estimates of unidentified thrush species in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-50.

Table 2-50: Density and population estimate of unidentified thrush species in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
Oct-22	13	76	13	206	0.36	0.28
Caledonia South (+2km)						
Oct-22	62	357	62	933	0.99	0.13
Caledonia South (+4km)						
Oct-22	188	1,104	188	2,514	2.07	0.07

2.10 Passeriformes

2.10.1 Unidentified passerine species

2.10.1.1 The density and population estimates of unidentified passerine species in Caledonia South (plus the 2km buffer and plus the 4km buffer, calculated using design-based analysis) have been presented in Table 2-51.

Table 2-51: Density and population estimate of unidentified passerine species in flight in Caledonia South; plus 2km buffer and plus 4km buffer, calculated using design-based analysis.

Survey	Raw Count	Abundance Estimate			Density	CV
		Abundance	LCI	UCI		
Caledonia South						
Oct-22	2	12	2	35	0.06	0.71
Caledonia South (+2km)						
Oct-22	2	12	2	35	0.03	0.71
Caledonia South (+4km)						
Oct-22	37	217	37	458	0.41	0.16

3 References

¹ NatureScot (2023) 'Guidance Note 2: Guidance to support Offshore Wind Applications: Advice for Marine Ornithology Baseline Characterisation Surveys and Reporting'. Available at: <https://www.nature.scot/doc/guidance-note-2-guidance-support-offshore-wind-applications-advice-marine-ornithology-baseline> (Accessed 01/07/2024)

Caledonia Offshore Wind Farm
5th Floor, Atria One
144 Morrison Street
Edinburgh
EH3 8EX

www.caledoniaoffshorewind.com

