

BERWICK BANK WIND FARM OFFSHORE ENVIRONMENTAL IMPACT ASSESSMENT

**APPENDIX 11.1, ANNEX D:
DESIGN-BASED ANALYSIS –
POPULATION ESTIMATES FOR
FLYING BIRDS GROUPED BY
SPECIES (BERWICK BANK
DEVELOPMENT AREA PLUS
16KM BUFFER)**

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NOTE

This annex provides unapportioned (detections assigned to species only) density and population estimates for flying birds of focal species for the Offshore Ornithology Study Area. Apportioned estimates can be found in the Technical Baseline Report

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Table 1: Unapportioned density and population estimates of flying common scoters in the Offshore Ornithology Study Area, calculated using design-based analysis

Flying Common scoter	Density Estimate (birds/km ²)	Lower 95% CI (birds/km ²)	Upper 95% CI (birds/km ²)	Population Estimate (number)	Lower 95% CI (number)	Upper 95% CI (number)	SD	CV
Survey								
Mar-19	0	0	0	0	0	0	0	0
May-19	0	0	0	0	0	0	0	0
Jun-19	0	0	0.01	17	0	48	16	95.51%
Jul-19	0	0	0	0	0	0	0	0
Aug-19	0	0	0	0	0	0	0	0
Sep-19	0	0	0	0	0	0	0	0
Oct-19	0	0	0	0	0	0	0	0
Nov-19	0	0	0	0	0	0	0	0
Dec-19	0	0	0	0	0	0	0	0
Jan-20	0	0	0.01	10	0	29	9	92.47%
Feb-20	0	0	0	0	0	0	0	0
Mar-20	0	0	0	0	0	0	0	0
May S01 20	0	0	0	0	0	0	0	0
May S02 20	0	0	0	0	0	0	0	0
Jun-20	0	0	0	0	0	0	0	0
Jul-20	0	0	0	0	0	0	0	0
Aug-20	0	0	0	0	0	0	0	0
Sep-20	0	0	0	0	0	0	0	0
Oct-20	0	0	0	0	0	0	0	0
Nov-20	0	0	0	0	0	0	0	0
Dec-20	0	0	0	0	0	0	0	0
Jan-21	0	0	0	0	0	0	0	0
Feb-21	0	0	0	0	0	0	0	0
Apr S01 21	0	0	0	0	0	0	0	0
Apr S02 21	0	0	0	0	0	0	0	0

Table 2: Unapportioned density and population estimates of flying kittiwakes in the Offshore Ornithology Study Area, calculated using design-based analysis

Flying Kittiwake	Density Estimate (birds/km ²)	Lower 95% CI (birds/km ²)	Upper 95% CI (birds/km ²)	Population Estimate (number)	Lower 95% CI (number)	Upper 95% CI (number)	SD	CV
Survey								
Mar-19	2.97	1.91	4.21	11817	7587	16760	2321	19.63%
May-19	1.79	1.37	2.2	7130	5457	8754	825	11.57%
Jun-19	0.78	0.58	0.99	3096	2311	3927	419	13.52%
Jul-19	1.71	1.45	2.09	6815	5762	8316	649	9.52%
Aug-19	2.86	2.38	3.46	11384	9475	13766	1087	9.54%
Sep-19	0.48	0.36	0.61	1897	1428	2418	265	13.93%
Oct-19	0.67	0.37	1.07	2678	1467	4248	742	27.71%
Nov-19	0.38	0.19	0.65	1505	745	2579	462	30.7%
Dec-19	0.24	0.17	0.34	962	662	1355	175	18.18%
Jan-20	1.03	0.68	1.38	4114	2703	5473	735	17.87%
Feb-20	0.56	0.43	0.7	2224	1701	2770	270	12.12%

Flying Kittiwake	Density Estimate (birds/km ²)	Lower 95% CI (birds/km ²)	Upper 95% CI (birds/km ²)	Population Estimate (number)	Lower 95% CI (number)	Upper 95% CI (number)	SD	CV
Survey								
Mar-20	2.41	1.51	3.4	9575	6013	13519	1917	20.02%
May S01 20	1.63	1.06	2.31	6477	4215	9190	1242	19.17%
May S02 20	4.28	3.49	5.13	17017	13882	20405	1709	10.04%
Jun-20	4.3	3.59	5.03	17096	14278	20019	1436	8.4%
Jul-20	1.82	1.45	2.27	7228	5771	9041	831	11.49%
Aug-20	3.27	2.69	3.92	13017	10706	15576	1295	9.94%
Sep-20	3.23	2.69	3.83	12860	10702	15224	1160	9.02%
Oct-20	1.18	0.83	1.62	4684	3321	6437	789	16.82%
Nov-20	2.53	1.9	3.21	10079	7549	12765	1370	13.58%
Dec-20	1.66	0.99	2.54	6607	3928	10103	1623	24.56%
Jan-21	1.66	1.16	2.34	6591	4608	9304	1238	18.77%
Feb-21	0.25	0.15	0.35	989	584	1401	205	20.71%
Apr S01 21	3.73	3.02	4.54	14827	12027	18056	1615	10.89%
Apr S02 21	3.55	2.41	5.21	14109	9603	20727	2938	20.82%

Table 3: Unapportioned density and population estimates of flying black-headed gulls in the Offshore Ornithology Study Area, calculated using design-based analysis

Flying Black-headed gull	Density Estimate (birds/km ²)	Lower 95% CI (birds/km ²)	Upper 95% CI (birds/km ²)	Population Estimate (number)	Lower 95% CI (number)	Upper 95% CI (number)	SD	CV
Survey								
Mar-19	0	0	0	0	0	0	0	0
May-19	0	0	0	0	0	0	0	0
Jun-19	0	0	0	0	0	0	0	0
Jul-19	0	0	0	0	0	0	0	0
Aug-19	0	0	0	0	0	0	0	0
Sep-19	0	0	0	0	0	0	0	0
Oct-19	0	0	0	0	0	0	0	0
Nov-19	0	0	0	0	0	0	0	0
Dec-19	0	0	0	0	0	0	0	0
Jan-20	0	0	0	0	0	0	0	0
Feb-20	0	0	0	0	0	0	0	0
Mar-20	0	0	0	0	0	0	0	0
May S01 20	0	0	0	0	0	0	0	0
May S02 20	0	0	0	0	0	0	0	0
Jun-20	0	0	0	0	0	0	0	0
Jul-20	0	0	0	0	0	0	0	0
Aug-20	0	0	0	0	0	0	0	0
Sep-20	0	0	0.01	8	0	24	8	101.25%
Oct-20	0	0	0	0	0	0	0	0
Nov-20	0	0	0	0	0	0	0	0
Dec-20	0	0	0.01	9	0	24	8	98.77%
Jan-21	0	0	0	0	0	0	0	0
Feb-21	0	0	0	0	0	0	0	0
Apr S01 21	0	0	0	0	0	0	0	0
Apr S02 21	0	0	0	0	0	0	0	0

Table 4: Unapportioned density and population estimates of flying little gulls in the Offshore Ornithology Study Area, calculated using design-based analysis

Flying Little gull	Density Estimate (birds/km ²)	Lower 95% CI (birds/km ²)	Upper 95% CI (birds/km ²)	Population Estimate (number)	Lower 95% CI (number)	Upper 95% CI (number)	SD	CV
Survey								
Mar-19	0	0	0	0	0	0	0	0
May-19	0	0	0	0	0	0	0	0
Jun-19	0	0	0	0	0	0	0	0
Jul-19	0.01	0	0.02	33	8	63	15	46.52%
Aug-19	0.01	0	0.03	60	17	113	25	40.86%
Sep-19	0	0	0	0	0	0	0	0
Oct-19	0	0	0	0	0	0	0	0
Nov-19	0	0	0.01	8	0	23	8	96.12%
Dec-19	0	0	0	0	0	0	0	0
Jan-20	0	0	0.01	16	0	49	16	96.5%
Feb-20	0.01	0	0.01	25	0	60	17	67.47%
Mar-20	0	0	0	0	0	0	0	0
May S01 20	0	0	0	0	0	0	0	0
May S02 20	0	0	0	0	0	0	0	0
Jun-20	0	0	0	0	0	0	0	0
Jul-20	0	0	0.01	8	0	24	8	100.84%
Aug-20	0.06	0.02	0.1	236	90	418	84	35.41%
Sep-20	0.01	0	0.02	33	0	88	25	74.55%
Oct-20	0	0	0	0	0	0	0	0
Nov-20	0	0	0	0	0	0	0	0
Dec-20	0.01	0	0.02	31	0	72	18	57.33%
Jan-21	0	0	0.01	8	0	24	8	95.17%
Feb-21	0	0	0	0	0	0	0	0
Apr S01 21	0	0	0	0	0	0	0	0
Apr S02 21	0	0	0	0	0	0	0	0

Table 5: Unapportioned density and population estimates of flying common gulls in the Offshore Ornithology Study Area, calculated using design-based analysis

Flying Common gull	Density Estimate (birds/km ²)	Lower 95% CI (birds/km ²)	Upper 95% CI (birds/km ²)	Population Estimate (number)	Lower 95% CI (number)	Upper 95% CI (number)	SD	CV
Survey								
Mar-19	0	0	0.01	19	0	40	10	52.44%
May-19	0	0	0	0	0	0	0	0
Jun-19	0	0	0	0	0	0	0	0
Jul-19	0.01	0	0.01	25	0	52	13	50.7%
Aug-19	0.01	0	0.01	25	0	51	14	54.46%
Sep-19	0	0	0	0	0	0	0	0
Oct-19	0.03	0.01	0.06	114	28	223	51	44.09%
Nov-19	0.09	0.04	0.15	359	165	605	116	32.28%
Dec-19	0.04	0.01	0.08	167	59	307	64	37.99%
Jan-20	0.01	0	0.02	51	16	99	23	45.21%
Feb-20	0.01	0	0.01	24	0	48	13	55.48%
Mar-20	0	0	0.01	8	0	25	8	93.69%

Flying Common gull	Density Estimate (birds/km ²)	Lower 95% CI (birds/km ²)	Upper 95% CI (birds/km ²)	Population Estimate (number)	Lower 95% CI (number)	Upper 95% CI (number)	SD	CV
Survey								
May S01 20	0	0	0	0	0	0	0	0
May S02 20	0	0	0.01	9	0	24	8	97.43%
Jun-20	0	0	0	0	0	0	0	0
Jul-20	0	0	0.01	17	0	40	12	67.72%
Aug-20	0.04	0.03	0.06	168	103	236	34	19.98%
Sep-20	0	0	0	0	0	0	0	0
Oct-20	0	0	0	0	0	0	0	0
Nov-20	0.01	0	0.01	25	0	55	14	56.11%
Dec-20	0.16	0.03	0.33	655	139	1305	299	45.56%
Jan-21	0.04	0.02	0.06	167	98	239	36	21.27%
Feb-21	0	0	0	0	0	0	0	0
Apr S01 21	0	0	0.01	8	0	24	8	95.13%
Apr S02 21	0.02	0.01	0.04	96	39	170	34	35.51%

Table 6: Unapportioned density and population estimates of flying great black-backed gulls in the Offshore Ornithology Study Area, calculated 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)	Population Estimate (number)	Lower 95% CI (number)	Upper 95% CI (number)	SD	CV
Survey								
Mar-19	0	0	0.01	12	0	31	9	68.9%
May-19	0	0	0	0	0	0	0	0
Jun-19	0.02	0	0.05	79	8	208	58	73.35%
Jul-19	0	0	0	0	0	0	0	0
Aug-19	0	0	0	0	0	0	0	0
Sep-19	0	0	0	0	0	0	0	0
Oct-19	0	0	0	0	0	0	0	0
Nov-19	0.03	0.01	0.05	110	48	180	35	31.13%
Dec-19	0	0	0.01	8	0	30	9	103.54%
Jan-20	0	0	0	0	0	0	0	0
Feb-20	0	0	0.01	8	0	24	8	96.29%
Mar-20	0	0	0	0	0	0	0	0
May S01 20	0	0	0	0	0	0	0	0
May S02 20	0	0	0	0	0	0	0	0
Jun-20	0	0	0.01	8	0	25	9	104.57%
Jul-20	0.01	0	0.02	39	0	96	26	65.12%
Aug-20	0	0	0	0	0	0	0	0
Sep-20	0	0	0	0	0	0	0	0
Oct-20	0	0	0	0	0	0	0	0
Nov-20	0.01	0	0.01	24	0	55	14	55.63%
Dec-20	0.05	0.03	0.07	185	102	288	48	25.87%
Jan-21	0.03	0.01	0.04	102	55	159	28	26.85%
Feb-21	0	0	0.01	8	0	24	8	99.62%
Apr S01 21	0	0	0	0	0	0	0	0
Apr S02 21	0	0	0	0	0	0	0	0

Table 7: Unapportioned density and population estimates of flying herring gulls in the Offshore Ornithology Study Area, calculated using design-based analysis

Flying Herring gull	Density Estimate (birds/km ²)	Lower 95% CI (birds/km ²)	Upper 95% CI (birds/km ²)	Population Estimate (number)	Lower 95% CI (number)	Upper 95% CI (number)	SD	CV
Survey								
Mar-19	0	0	0.01	19	0	40	10	53.18%
May-19	0	0	0	0	0	0	0	0
Jun-19	0.17	0.12	0.21	662	486	849	96	14.38%
Jul-19	0.1	0.07	0.13	387	274	517	63	16.12%
Aug-19	0.13	0.06	0.21	507	251	830	149	29.31%
Sep-19	0	0	0.01	8	0	24	8	97.18%
Oct-19	0	0	0.01	9	0	26	8	92.13%
Nov-19	0.2	0.04	0.43	793	159	1720	398	50.19%
Dec-19	0.06	0.01	0.14	243	33	550	149	61.35%
Jan-20	0	0	0.01	10	0	27	9	90.14%
Feb-20	0	0	0.01	9	0	24	8	96.69%
Mar-20	0	0	0	0	0	0	0	0
May S01 20	0	0	0	0	0	0	0	0
May S02 20	0	0	0	0	0	0	0	0
Jun-20	0.03	0.01	0.05	110	36	191	42	38.31%
Jul-20	0.29	0.2	0.38	1141	781	1520	191	16.66%
Aug-20	0.09	0.04	0.17	377	140	680	139	36.91%
Sep-20	0	0	0	0	0	0	0	0
Oct-20	0	0	0.01	8	0	24	8	98.51%
Nov-20	0.02	0	0.04	68	0	159	46	67.66%
Dec-20	0.83	0.27	1.6	3309	1077	6362	1429	43.18%
Jan-21	0.07	0.04	0.1	284	165	410	61	21.36%
Feb-21	0	0	0.01	9	0	28	9	93.19%
Apr S01 21	0	0	0.01	9	0	31	9	101.32%
Apr S02 21	0	0	0	0	0	0	0	0

Table 8: Unapportioned density and population estimates of flying lesser black-backed gulls in the Offshore Ornithology Study Area, calculated using design-based analysis

Flying Lesser black-backed gull	Density Estimate (birds/km ²)	Lower 95% CI (birds/km ²)	Upper 95% CI (birds/km ²)	Population Estimate (number)	Lower 95% CI (number)	Upper 95% CI (number)	SD	CV
Survey								
Mar-19	0	0	0	0	0	0	0	0
May-19	0	0	0.01	9	0	24	8	92.73%
Jun-19	0.02	0.01	0.04	88	31	171	37	41.12%
Jul-19	0.04	0.02	0.05	153	96	215	31	20.08%
Aug-19	0.02	0.01	0.04	90	35	145	29	31.82%
Sep-19	0	0	0	0	0	0	0	0
Oct-19	0	0	0	0	0	0	0	0
Nov-19	0	0	0	0	0	0	0	0
Dec-19	0	0	0	0	0	0	0	0
Jan-20	0	0	0	0	0	0	0	0
Feb-20	0	0	0	0	0	0	0	0
Mar-20	0	0	0	0	0	0	0	0
May S01 20	0	0	0.01	15	0	44	14	94.77%

Flying Lesser black-backed gull	Density Estimate (birds/km ²)	Lower 95% CI (birds/km ²)	Upper 95% CI (birds/km ²)	Population Estimate (number)	Lower 95% CI (number)	Upper 95% CI (number)	SD	CV
Survey								
May S02 20	0	0	0	0	0	0	0	0
Jun-20	0.01	0	0.02	33	0	72	19	58.56%
Jul-20	0.09	0.06	0.13	373	236	517	73	19.52%
Aug-20	0.04	0.02	0.07	165	67	279	53	32.22%
Sep-20	0	0	0	0	0	0	0	0
Oct-20	0	0	0	0	0	0	0	0
Nov-20	0	0	0	0	0	0	0	0
Dec-20	0	0	0	0	0	0	0	0
Jan-21	0	0	0	0	0	0	0	0
Feb-21	0	0	0	0	0	0	0	0
Apr S01 21	0	0	0.01	9	0	24	9	97.44%
Apr S02 21	0	0	0	0	0	0	0	0

Table 9: Unapportioned density and population estimates of flying common terns in the Offshore Ornithology Study Area, calculated using design-based analysis

Flying Common tern	Density Estimate (birds/km ²)	Lower 95% CI (birds/km ²)	Upper 95% CI (birds/km ²)	Population Estimate (number)	Lower 95% CI (number)	Upper 95% CI (number)	SD	CV
Survey								
Mar-19	0	0	0	0	0	0	0	0
May-19	0	0	0	0	0	0	0	0
Jun-19	0	0	0	0	0	0	0	0
Jul-19	0.01	0	0.02	26	0	81	25	96.04%
Aug-19	0.01	0	0.02	32	8	61	15	44.27%
Sep-19	0	0	0	0	0	0	0	0
Oct-19	0	0	0	0	0	0	0	0
Nov-19	0	0	0	0	0	0	0	0
Dec-19	0	0	0	0	0	0	0	0
Jan-20	0	0	0	0	0	0	0	0
Feb-20	0	0	0	0	0	0	0	0
Mar-20	0	0	0	0	0	0	0	0
May S01 20	0	0	0.01	8	0	22	7	94.35%
May S02 20	0	0	0.01	9	0	24	8	91.46%
Jun-20	0	0	0	0	0	0	0	0
Jul-20	0.01	0	0.04	55	0	158	48	86.75%
Aug-20	0.07	0.02	0.13	282	87	525	115	40.74%
Sep-20	0.04	0.01	0.08	170	51	314	71	41.43%
Oct-20	0	0	0	0	0	0	0	0
Nov-20	0	0	0	0	0	0	0	0
Dec-20	0	0	0	0	0	0	0	0
Jan-21	0	0	0	0	0	0	0	0
Feb-21	0	0	0	0	0	0	0	0
Apr S01 21	0	0	0	0	0	0	0	0
Apr S02 21	0.01	0	0.02	32	0	72	19	57.68%

Table 10: Unapportioned density and population estimates of flying Arctic terns in the Offshore Ornithology Study Area, calculated using design-based analysis

Flying Arctic tern	Density Estimate (birds/km ²)	Lower 95% CI (birds/km ²)	Upper 95% CI (birds/km ²)	Population Estimate (number)	Lower 95% CI (number)	Upper 95% CI (number)	SD	CV
Survey								
Mar-19	0	0	0	0	0	0	0	0
May-19	0	0	0.01	9	0	24	8	97.9%
Jun-19	0	0	0	0	0	0	0	0
Jul-19	0.08	0.05	0.13	328	182	505	87	26.41%
Aug-19	0.06	0.04	0.1	257	145	387	64	24.95%
Sep-19	0	0	0	0	0	0	0	0
Oct-19	0	0	0	0	0	0	0	0
Nov-19	0	0	0	0	0	0	0	0
Dec-19	0	0	0	0	0	0	0	0
Jan-20	0	0	0	0	0	0	0	0
Feb-20	0	0	0	0	0	0	0	0
Mar-20	0	0	0	0	0	0	0	0
May S01 20	0	0	0.01	8	0	22	8	94.46%
May S02 20	0.02	0	0.04	66	8	146	36	54.16%
Jun-20	0.01	0	0.02	41	8	87	21	50.46%
Jul-20	0.01	0	0.03	56	8	111	27	48.05%
Aug-20	0.05	0.01	0.11	182	40	451	113	62.13%
Sep-20	0.02	0	0.05	96	16	212	51	52.86%
Oct-20	0	0	0	0	0	0	0	0
Nov-20	0	0	0	0	0	0	0	0
Dec-20	0	0	0	0	0	0	0	0
Jan-21	0	0	0	0	0	0	0	0
Feb-21	0	0	0	0	0	0	0	0
Apr S01 21	0	0	0	0	0	0	0	0
Apr S02 21	0	0	0	0	0	0	0	0

Table 11: Unapportioned density and population estimates of flying great skuas in the Offshore Ornithology Study Area, calculated using design-based analysis

Flying Great skua	Density Estimate (birds/km ²)	Lower 95% CI (birds/km ²)	Upper 95% CI (birds/km ²)	Population Estimate (number)	Lower 95% CI (number)	Upper 95% CI (number)	SD	CV
Survey								
Mar-19	0	0	0	0	0	0	0	0
May-19	0	0	0.01	8	0	24	8	91.23%
Jun-19	0	0	0	0	0	0	0	0
Jul-19	0.01	0	0.01	25	4	55	14	53.65%
Aug-19	0	0	0	0	0	0	0	0
Sep-19	0	0	0.01	17	0	40	11	63.55%
Oct-19	0	0	0	0	0	0	0	0
Nov-19	0	0	0	0	0	0	0	0
Dec-19	0	0	0	0	0	0	0	0
Jan-20	0	0	0	0	0	0	0	0
Feb-20	0	0	0	0	0	0	0	0

Flying Great skua	Density Estimate (birds/km ²)	Lower 95% CI (birds/km ²)	Upper 95% CI (birds/km ²)	Population Estimate (number)	Lower 95% CI (number)	Upper 95% CI (number)	SD	CV
Survey								
Mar-20	0	0	0.01	9	0	33	9	98.24%
May S01 20	0	0	0	0	0	0	0	0
May S02 20	0	0	0	0	0	0	0	0
Jun-20	0	0	0	0	0	0	0	0
Jul-20	0	0	0	0	0	0	0	0
Aug-20	0	0	0.01	8	0	24	8	94.12%
Sep-20	0	0	0.01	16	0	40	11	68.52%
Oct-20	0	0	0.01	17	0	47	12	67.71%
Nov-20	0.01	0	0.02	32	8	63	15	46.19%
Dec-20	0.01	0	0.02	33	8	64	16	46.86%
Jan-21	0	0	0	0	0	0	0	0
Feb-21	0	0	0	0	0	0	0	0
Apr S01 21	0	0	0	0	0	0	0	0
Apr S02 21	0	0	0	0	0	0	0	0

Table 12: Unapportioned density and population estimates of flying little auks in the Offshore Ornithology Study Area, calculated using design-based analysis

Flying Little auk	Density Estimate (birds/km ²)	Lower 95% CI (birds/km ²)	Upper 95% CI (birds/km ²)	Population Estimate (number)	Lower 95% CI (number)	Upper 95% CI (number)	SD	CV
Survey								
Mar-19	0	0	0	0	0	0	0	0
May-19	0	0	0	0	0	0	0	0
Jun-19	0	0	0	0	0	0	0	0
Jul-19	0	0	0	0	0	0	0	0
Aug-19	0	0	0	0	0	0	0	0
Sep-19	0	0	0	0	0	0	0	0
Oct-19	0	0	0.01	15	0	44	13	89.54%
Nov-19	0	0	0.01	8	0	25	8	107.6%
Dec-19	0	0	0	0	0	0	0	0
Jan-20	0	0	0.01	9	0	27	8	99.2%
Feb-20	0	0	0	0	0	0	0	0
Mar-20	0	0	0	0	0	0	0	0
May S01 20	0	0	0	0	0	0	0	0
May S02 20	0	0	0	0	0	0	0	0
Jun-20	0	0	0	0	0	0	0	0
Jul-20	0	0	0	0	0	0	0	0
Aug-20	0	0	0	0	0	0	0	0
Sep-20	0	0	0	0	0	0	0	0
Oct-20	0	0	0	0	0	0	0	0
Nov-20	0.02	0	0.03	63	0	138	36	56.76%
Dec-20	0	0	0	0	0	0	0	0
Jan-21	0	0	0	0	0	0	0	0
Feb-21	0	0	0	0	0	0	0	0
Apr S01 21	0	0	0	0	0	0	0	0
Apr S02 21	0	0	0	0	0	0	0	0

Table 13: Unapportioned density and population estimates of flying guillemots in the Offshore Ornithology Study Area, calculated using design-based analysis

Flying Guillemot	Density Estimate (birds/km ²)	Lower 95% CI (birds/km ²)	Upper 95% CI (birds/km ²)	Population Estimate (number)	Lower 95% CI (number)	Upper 95% CI (number)	SD	CV
Survey								
Mar-19	0.71	0.49	0.95	2816	1964	3768	459	16.27%
May-19	0.82	0.52	1.16	3250	2059	4611	646	19.87%
Jun-19	0.38	0.25	0.52	1495	991	2086	290	19.4%
Jul-19	0.06	0.04	0.08	237	147	325	47	19.49%
Aug-19	0.01	0	0.02	24	0	62	18	73.81%
Sep-19	0.03	0.01	0.07	139	32	279	68	48.62%
Oct-19	0.23	0.12	0.38	909	459	1509	274	30.12%
Nov-19	0.11	0.06	0.18	439	234	705	123	27.88%
Dec-19	0.01	0	0.02	38	4	77	20	52.67%
Jan-20	0.18	0.11	0.26	725	456	1043	156	21.4%
Feb-20	0.06	0.04	0.08	241	150	338	50	20.44%
Mar-20	1.12	0.71	1.57	4454	2814	6261	938	21.06%
May S01 20	0.84	0.58	1.14	3357	2315	4544	552	16.44%
May S02 20	0.76	0.55	1.02	3039	2197	4058	474	15.58%
Jun-20	0.53	0.36	0.72	2120	1415	2857	370	17.45%
Jul-20	0.19	0.09	0.32	772	357	1280	229	29.65%
Aug-20	0.01	0	0.02	32	0	72	19	58.49%
Sep-20	0.01	0	0.03	50	0	119	31	62.53%
Oct-20	0.2	0.14	0.27	797	544	1075	142	17.76%
Nov-20	0.16	0.09	0.25	622	360	1004	162	26.04%
Dec-20	0.41	0.24	0.6	1621	963	2368	364	22.43%
Jan-21	0.12	0.08	0.18	482	327	707	97	19.97%
Feb-21	0.06	0.04	0.09	255	155	366	56	21.66%
Apr S01 21	1.06	0.76	1.39	4232	3029	5520	628	14.84%
Apr S02 21	0.74	0.44	1.09	2954	1761	4323	651	22.02%

Table 14: Unapportioned density and population estimates of flying razorbills in the Offshore Ornithology Study Area, calculated using design-based analysis

Flying Razorbill	Density Estimate (birds/km ²)	Lower 95% CI (birds/km ²)	Upper 95% CI (birds/km ²)	Population Estimate (number)	Lower 95% CI (number)	Upper 95% CI (number)	SD	CV
Survey								
Mar-19	0.21	0.12	0.31	827	475	1247	197	23.79%
May-19	0.01	0	0.02	24	0	63	17	71.14%
Jun-19	0.03	0.01	0.07	124	24	263	62	49.57%
Jul-19	0	0	0	0	0	0	0	0
Aug-19	0	0	0.01	16	0	39	11	66.48%
Sep-19	0	0	0	0	0	0	0	0
Oct-19	0.15	0.06	0.26	581	254	1029	201	34.51%
Nov-19	0.02	0	0.04	64	0	140	35	54.18%
Dec-19	0.01	0	0.02	31	0	74	19	61.02%
Jan-20	0.04	0.01	0.08	165	60	302	61	36.96%
Feb-20	0.01	0	0.02	39	0	96	28	71.16%
Mar-20	0.3	0.2	0.41	1195	795	1638	213	17.75%

Flying Razorbill	Density Estimate (birds/km ²)	Lower 95% CI (birds/km ²)	Upper 95% CI (birds/km ²)	Population Estimate (number)	Lower 95% CI (number)	Upper 95% CI (number)	SD	CV
Survey								
May S01 20	0.03	0.01	0.05	105	35	190	41	38.39%
May S02 20	0.03	0.01	0.07	132	24	262	58	43.84%
Jun-20	0.03	0.01	0.05	111	40	192	40	35.78%
Jul-20	0.01	0	0.02	48	16	87	18	37.16%
Aug-20	0	0	0	0	0	0	0	0
Sep-20	0.01	0	0.02	31	0	83	24	78.5%
Oct-20	0.16	0.09	0.26	649	349	1047	185	28.49%
Nov-20	0.02	0	0.04	87	16	177	41	46.85%
Dec-20	0.07	0.03	0.12	278	118	489	96	34.27%
Jan-21	0.05	0.03	0.08	202	106	308	55	26.81%
Feb-21	0.03	0.01	0.05	105	40	186	38	35.44%
Apr S01 21	0.29	0.15	0.45	1144	613	1792	292	25.48%
Apr S02 21	0.06	0.03	0.09	221	109	359	67	30.33%

Table 15: Unapportioned density and population estimates of flying puffins in the Offshore Ornithology Study Area, calculated using design-based analysis

Flying Puffin	Density Estimate (birds/km ²)	Lower 95% CI (birds/km ²)	Upper 95% CI (birds/km ²)	Population Estimate (number)	Lower 95% CI (number)	Upper 95% CI (number)	SD	CV
Survey								
Mar-19	0.02	0.01	0.04	94	42	148	29	30.69%
May-19	0.03	0.02	0.06	135	64	228	44	32.59%
Jun-19	0.07	0.03	0.13	283	127	502	97	34.22%
Jul-19	0.03	0.01	0.06	128	47	245	50	38.7%
Aug-19	0.05	0.02	0.08	196	93	324	60	30.61%
Sep-19	0.02	0	0.04	72	8	167	41	56.35%
Oct-19	0.01	0	0.01	22	0	51	13	57.25%
Nov-19	0	0	0	0	0	0	0	0
Dec-19	0	0	0	0	0	0	0	0
Jan-20	0	0	0	0	0	0	0	0
Feb-20	0	0	0	0	0	0	0	0
Mar-20	0.11	0.06	0.16	454	259	654	100	21.95%
May S01 20	0.01	0	0.03	58	14	113	26	44.12%
May S02 20	0	0	0	0	0	0	0	0
Jun-20	0.08	0.02	0.15	316	87	606	138	43.65%
Jul-20	0.09	0.04	0.15	359	151	611	123	34.22%
Aug-20	0.01	0	0.02	33	0	95	26	77.4%
Sep-20	0	0	0	0	0	0	0	0
Oct-20	0	0	0	0	0	0	0	0
Nov-20	0.01	0	0.02	25	0	63	18	71.26%
Dec-20	0	0	0	0	0	0	0	0
Jan-21	0	0	0	0	0	0	0	0
Feb-21	0	0	0.01	9	0	24	8	97.23%
Apr S01 21	0.04	0.02	0.06	149	72	234	46	30.55%
Apr S02 21	0.04	0.02	0.07	163	63	278	57	34.68%

Table 16: Unapportioned density and population estimates of flying fulmars in the Offshore Ornithology Study Area, calculated using design-based analysis

Flying Fulmar	Density Estimate (birds/km ²)	Lower 95% CI (birds/km ²)	Upper 95% CI (birds/km ²)	Population Estimate (number)	Lower 95% CI (number)	Upper 95% CI (number)	SD	CV
Survey								
Mar-19	0.07	0.05	0.1	274	190	386	47	17.07%
May-19	0.03	0.01	0.04	113	56	173	30	26.45%
Jun-19	0.01	0	0.01	23	0	48	13	56.41%
Jul-19	0.03	0.01	0.04	103	52	163	29	27.8%
Aug-19	0.04	0.03	0.06	170	113	229	30	17.43%
Sep-19	0.03	0.02	0.05	129	71	206	34	26.08%
Oct-19	0	0	0.01	16	0	41	11	70.04%
Nov-19	0.08	0.06	0.1	311	219	410	51	16.27%
Dec-19	0.09	0.06	0.12	342	246	461	57	16.66%
Jan-20	0.09	0.06	0.13	376	250	529	74	19.44%
Feb-20	0.03	0.01	0.05	114	48	195	39	33.93%
Mar-20	0.07	0.05	0.1	292	191	409	57	19.47%
May S01 20	0.02	0.01	0.04	88	39	150	29	32.91%
May S02 20	0.03	0.01	0.04	105	47	165	32	30.02%
Jun-20	0.06	0.04	0.08	231	143	330	46	19.86%
Jul-20	0.03	0.02	0.05	133	75	196	32	23.9%
Aug-20	0.07	0.05	0.09	281	183	364	46	16.23%
Sep-20	0.3	0.23	0.36	1179	920	1450	138	11.69%
Oct-20	0.1	0.07	0.14	387	262	543	72	18.59%
Nov-20	0	0	0	0	0	0	0	0
Dec-20	0.23	0.17	0.29	915	671	1148	119	12.99%
Jan-21	0.06	0.04	0.09	243	151	340	49	20.23%
Feb-21	0.06	0.04	0.08	238	167	318	39	16.02%
Apr S01 21	0.02	0.01	0.04	94	40	164	34	35.36%
Apr S02 21	0.07	0.04	0.09	259	174	352	48	18.45%

Table 17: Unapportioned density and population estimates of flying Manx shearwaters in the Offshore Ornithology Study Area, calculated using design-based analysis

Flying Manx shearwater	Density Estimate (birds/km ²)	Lower 95% CI (birds/km ²)	Upper 95% CI (birds/km ²)	Population Estimate (number)	Lower 95% CI (number)	Upper 95% CI (number)	SD	CV
Survey								
Mar-19	0	0	0	0	0	0	0	0
May-19	0	0	0	0	0	0	0	0
Jun-19	0.02	0	0.03	66	8	137	34	51.65%
Jul-19	0	0	0	0	0	0	0	0
Aug-19	0	0	0.01	8	0	26	8	100.82%
Sep-19	0	0	0	0	0	0	0	0
Oct-19	0	0	0	0	0	0	0	0
Nov-19	0	0	0	0	0	0	0	0
Dec-19	0	0	0	0	0	0	0	0
Jan-20	0	0	0	0	0	0	0	0

Flying Manx shearwater	Density Estimate (birds/km ²)	Lower 95% CI (birds/km ²)	Upper 95% CI (birds/km ²)	Population Estimate (number)	Lower 95% CI (number)	Upper 95% CI (number)	SD	CV
Survey								
Feb-20	0	0	0	0	0	0	0	0
Mar-20	0	0	0	0	0	0	0	0
May S01 20	0	0	0	0	0	0	0	0
May S02 20	0	0	0	0	0	0	0	0
Jun-20	0.01	0	0.02	41	8	79	18	42.74%
Jul-20	0	0	0	0	0	0	0	0
Aug-20	0.02	0	0.05	61	0	191	62	101.81%
Sep-20	0	0	0	0	0	0	0	0
Oct-20	0	0	0	0	0	0	0	0
Nov-20	0	0	0	0	0	0	0	0
Dec-20	0	0	0	0	0	0	0	0
Jan-21	0	0	0	0	0	0	0	0
Feb-21	0	0	0	0	0	0	0	0
Apr S01 21	0	0	0	0	0	0	0	0
Apr S02 21	0	0	0	0	0	0	0	0

Table 18: Unapportioned density and population estimates of flying gannets in the Offshore Ornithology Study Area, calculated using design-based analysis

Flying Gannet	Density Estimate (birds/km ²)	Lower 95% CI (birds/km ²)	Upper 95% CI (birds/km ²)	Population Estimate (number)	Lower 95% CI (number)	Upper 95% CI (number)	SD	CV
Survey								
Mar-19	0.2	0.13	0.27	784	534	1071	145	18.49%
May-19	0.55	0.39	0.72	2173	1543	2877	341	15.66%
Jun-19	0.71	0.55	0.87	2821	2185	3454	331	11.7%
Jul-19	1.66	1.43	1.93	6607	5691	7678	505	7.63%
Aug-19	1.96	1.66	2.27	7812	6585	9046	639	8.17%
Sep-19	2	1.73	2.3	7946	6886	9138	557	7%
Oct-19	0.66	0.47	0.87	2610	1889	3452	429	16.43%
Nov-19	0.13	0.09	0.16	499	342	641	77	15.38%
Dec-19	0.01	0	0.02	38	7	87	21	55.38%
Jan-20	0.01	0	0.02	33	0	74	18	55.38%
Feb-20	0	0	0.01	8	0	24	8	100.94%
Mar-20	0.17	0.12	0.22	676	490	878	103	15.2%
May S01 20	0.51	0.38	0.65	2031	1527	2592	283	13.93%
May S02 20	0.95	0.77	1.15	3774	3070	4571	387	10.25%
Jun-20	1.13	0.93	1.47	4500	3680	5852	550	12.22%
Jul-20	1.64	1.4	1.9	6504	5576	7561	516	7.93%
Aug-20	0.74	0.58	0.9	2938	2327	3575	310	10.54%
Sep-20	1.24	1.03	1.47	4930	4083	5835	447	9.05%
Oct-20	0.31	0.25	0.37	1239	998	1484	125	10.07%
Nov-20	0.59	0.45	0.74	2362	1788	2962	300	12.69%
Dec-20	0.11	0.06	0.16	437	256	651	100	22.76%
Jan-21	0.04	0.02	0.05	146	90	205	30	20.67%

Flying Gannet	Density Estimate (birds/km ²)	Lower 95% CI (birds/km ²)	Upper 95% CI (birds/km ²)	Population Estimate (number)	Lower 95% CI (number)	Upper 95% CI (number)	SD	CV
Survey								
Feb-21	0.02	0.01	0.04	98	40	172	35	34.97%
Apr S01 21	0.39	0.33	0.46	1566	1326	1831	132	8.42%
Apr S02 21	0.76	0.47	1.14	3036	1871	4549	685	22.55%

Table 19: Unapportioned density and population estimates of flying shags in the Offshore Ornithology Study Area, calculated using design-based analysis

Flying Shag	Density Estimate (birds/km ²)	Lower 95% CI (birds/km ²)	Upper 95% CI (birds/km ²)	Population Estimate (number)	Lower 95% CI (number)	Upper 95% CI (number)	SD	CV
Survey								
Mar-19	0	0	0	0	0	0	0	0
May-19	0	0	0	0	0	0	0	0
Jun-19	0.01	0	0.02	22	0	71	22	98.44%
Jul-19	0	0	0	0	0	0	0	0
Aug-19	0	0	0	0	0	0	0	0
Sep-19	0	0	0	0	0	0	0	0
Oct-19	0	0	0	0	0	0	0	0
Nov-19	0	0	0	0	0	0	0	0
Dec-19	0	0	0	0	0	0	0	0
Jan-20	0	0	0	0	0	0	0	0
Feb-20	0	0	0	0	0	0	0	0
Mar-20	0	0	0	0	0	0	0	0
May S01 20	0	0	0	0	0	0	0	0
May S02 20	0	0	0	0	0	0	0	0
Jun-20	0	0	0	0	0	0	0	0
Jul-20	0	0	0	0	0	0	0	0
Aug-20	0	0	0	0	0	0	0	0
Sep-20	0	0	0	0	0	0	0	0
Oct-20	0	0	0	0	0	0	0	0
Nov-20	0	0	0	0	0	0	0	0
Dec-20	0	0	0	0	0	0	0	0
Jan-21	0	0	0	0	0	0	0	0
Feb-21	0	0	0	0	0	0	0	0
Apr S01 21	0	0	0	0	0	0	0	0
Apr S02 21	0	0	0	0	0	0	0	0

