

# **BERWICK BANK WIND FARM OFFSHORE ENVIRONMENTAL IMPACT ASSESSMENT**

APPENDIX 11.1, ANNEX K:  
DESIGN-BASED ANALYSIS -  
ADJUSTED MONTHLY  
POPULATION ESTIMATES  
(BERWICK BANK  
DEVELOPMENT ARRAY ONLY)  
FOR AUK SPECIES

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Prepared by:	HiDef Aerial Surveying Ltd.
Prepared for:	SSE Renewables
Checked by:	Andrew Logie
Accepted by:	Emily Nelson
Approved by:	Sarah Edwards

# NOTE

This annex provides both apportioned (detections assigned from species groups to species) and unapportioned (detections assigned to species only) density and population estimates for three auk species (guillemot, razorbill and puffin) within the Berwick Bank Development array only, adjusted for availability bias. Further EIA/HRA assessments should rely on estimates that have this correction applied: with the apportioned estimates deemed to be the most appropriate available

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**Table 1: Unapportioned absolute density and population estimates of guillemots in the Berwick Bank Development array only, calculated using design-based analysis and adjusted for availability bias**

Guillemot	Adjusted Density Estimate (birds/km <sup>2</sup> )	Adjusted Lower 95% CI (birds/km <sup>2</sup> )	Adjusted Upper 95% CI (birds/km <sup>2</sup> )	Adjusted Population Estimate (number)	Adjusted Lower 95% CI (number)	Adjusted Upper 95% CI (number)	Adjusted SD	Adjusted CV
<b>Survey</b>								
Mar-19	12.17	7.94	17.37	12299	8028	17558	2326	18.91%
May-19	28.74	21.76	36.84	29053	21998	37237	4246	14.61%
Jun-19	7.13	4.65	10.13	7220	4706	10249	1481	20.51%
Jul-19	29.8	24.34	35.71	30120	24611	36107	3273	10.87%
Aug-19	32.94	20.87	50.8	33302	21090	51351	8510	25.55%
Sep-19	3.94	3.11	4.84	3990	3139	4893	477	11.95%
Oct-19	1.69	0.83	3	1706	848	3034	554	32.47%
Nov-19	0.82	0.52	1.11	820	529	1122	129	15.73%
Dec-19	1.64	1.05	2.24	1662	1063	2270	356	21.42%
Jan-20	11.77	8.07	17.48	11895	8150	17666	2544	21.39%
Feb-20	8.53	5.5	11.42	8632	5563	11546	1645	19.06%
Mar-20	29.34	20.61	38.03	29666	20833	38450	4610	15.54%
May S01 20	20.73	12.28	30.62	20963	12418	30956	4709	22.46%
May S02 20	19.82	12.59	27.98	20028	12733	28276	4046	20.2%
Jun-20	46.54	36.92	56.75	47045	37313	57373	5612	11.93%
Jul-20	10.88	8.59	13.39	10993	8687	13541	1336	12.15%
Aug-20	29.67	25.73	34.06	29986	26007	34423	2219	7.4%
Sep-20	33.34	24.57	43.32	33710	24836	43797	5220	15.49%
Oct-20	2.87	2.06	3.63	2902	2080	3671	435	14.99%
Nov-20	2.07	1.44	2.87	2105	1457	2889	367	17.43%
Dec-20	13.87	9.25	20.1	14026	9346	20321	3191	22.75%
Jan-21	9.74	7.78	12.18	9850	7865	12315	1130	11.47%
Feb-21	5.89	3.56	8.6	5956	3600	8696	1421	23.86%
Apr S01 20	26.12	21.7	30.77	26402	21937	31109	2563	9.71%
Apr S02 20	69.77	51.03	88.79	70526	51584	89762	10239	14.52%

**Table 2: Apportioned absolute density and population estimates of guillemots in the Berwick Bank Development array only, calculated using design-based analysis and adjusted for availability bias**

Guillemot	Adjusted Density Estimate (birds/km <sup>2</sup> )	Adjusted Lower 95% CI (birds/km <sup>2</sup> )	Adjusted Upper 95% CI (birds/km <sup>2</sup> )	Adjusted Population Estimate (number)	Adjusted Lower 95% CI (number)	Adjusted Upper 95% CI (number)	Adjusted SD	Adjusted CV
<b>Survey</b>								
Mar-19	12.52	8.67	18.05	12659	8768	18244	2395	18.92%
May-19	29.66	23.38	37.93	29981	23642	38342	4391	14.65%
Jun-19	7.45	4.93	10.5	7535	4977	10614	1512	20.07%
Jul-19	32.12	26.35	38.28	32466	26630	38703	3328	10.25%
Aug-19	35.81	22.12	52.11	36195	22357	52676	8685	24%
Sep-19	5.05	3.9	6.15	5101	3934	6205	583	11.43%
Oct-19	1.99	1.04	3.4	2009	1053	3429	586	29.17%
Nov-19	0.92	0.66	1.21	931	662	1230	134	14.39%
Dec-19	1.8	1.21	2.47	1822	1221	2501	349	19.15%
Jan-20	13.26	8.95	19.43	13406	9048	19643	2705	20.18%

Guillemot	Adjusted Density Estimate (birds/km <sup>2</sup> )	Adjusted Lower 95% CI (birds/km <sup>2</sup> )	Adjusted Upper 95% CI (birds/km <sup>2</sup> )	Adjusted Population Estimate (number)	Adjusted Lower 95% CI (number)	Adjusted Upper 95% CI (number)	Adjusted SD	Adjusted CV
<b>Survey</b>								
Feb-20	9.45	6.2	12.78	9555	6269	12926	1852	19.38%
Mar-20	31.82	22.15	41.13	32162	22398	41575	4987	15.51%
May S01 20	22.19	12.82	33	22434	12965	33362	5177	23.08%
May S02 20	20.47	13.94	27.91	20690	14085	28214	4120	19.91%
Jun-20	46.98	37.11	57.49	47498	37513	58112	5706	12.01%
Jul-20	11.72	9.13	14.14	11857	9235	14301	1486	12.53%
Aug-20	31.51	27.49	35.26	31851	27796	35641	2179	6.84%
Sep-20	35.52	25.87	45.7	35912	26150	46199	5353	14.91%
Oct-20	3.12	2.33	3.99	3152	2362	4040	458	14.53%
Nov-20	2.22	1.57	3.05	2245	1581	3093	383	17.06%
Dec-20	14.93	9.69	22.15	15099	9793	22400	3416	22.62%
Jan-21	10.77	8.33	13.05	10893	8424	13192	1221	11.21%
Feb-21	6.59	4.12	9.37	6658	4168	9474	1442	21.66%
Apr S01 20	27.45	22.68	32.06	27752	22925	32409	2592	9.34%
Apr S02 20	71.1	50.84	91.42	71881	51383	92410	10741	14.94%

**Table 3: Unapportioned absolute density and population estimates of sitting guillemots in the Berwick Bank Development array only, calculated using design-based analysis and adjusted for availability bias**

Sitting Guillemots	Adjusted Density Estimate (birds/km <sup>2</sup> )	Adjusted Lower 95% CI (birds/km <sup>2</sup> )	Adjusted Upper 95% CI (birds/km <sup>2</sup> )	Adjusted Population Estimate (number)	Adjusted Lower 95% CI (number)	Adjusted Upper 95% CI (number)	Adjusted SD	Adjusted CV
<b>Survey</b>								
Mar-19	11.60	7.58	16.56	11726	7668	16743	1999	17.05%
May-19	28.12	21.29	36.08	28429	21522	36465	3370	11.85%
Jun-19	6.78	4.45	9.60	6861	4500	9709	1160	16.91%
Jul-19	29.76	24.33	35.64	30082	24603	36036	2645	8.79%
Aug-19	32.93	20.87	50.77	33293	21090	51321	6815	20.47%
Sep-19	3.92	3.11	4.77	3967	3139	4822	381	9.60%
Oct-19	1.53	0.80	2.65	1543	812	2681	428	27.74%
Nov-19	0.70	0.49	0.91	702	498	915	93	13.24%
Dec-19	1.63	1.05	2.20	1648	1063	2226	278	16.85%
Jan-20	11.60	7.97	17.24	11720	8053	17419	2001	17.08%
Feb-20	8.49	5.49	11.35	8591	5551	11476	1339	15.59%
Mar-20	27.29	19.78	34.65	27596	19989	35028	3452	12.51%
May S01 20	20.37	12.13	29.93	20596	12263	30257	3873	18.80%
May S02 20	19.32	12.28	27.27	19519	12423	27562	3292	16.87%
Jun-20	45.85	36.54	55.73	46349	36928	56341	4526	9.76%
Jul-20	10.85	8.58	13.34	10961	8679	13485	1118	10.20%
Aug-20	29.65	25.73	34.01	29970	26007	34375	1800	6.01%
Sep-20	33.32	24.57	43.25	33687	24836	43726	4289	12.73%
Oct-20	2.79	2.03	3.50	2819	2045	3539	347	12.29%
Nov-20	1.97	1.40	2.69	2000	1418	2710	303	15.15%
Dec-20	13.76	9.20	19.92	13914	9298	20137	2542	18.27%
Jan-21	9.49	7.65	11.78	9596	7733	11914	882	9.20%
Feb-21	5.81	3.52	8.48	5876	3560	8578	1146	19.51%
Apr S01 20	25.50	21.30	29.91	25777	21531	30244	2001	7.76%

Sitting Guillemots	Adjusted Density Estimate (birds/km <sup>2</sup> )	Adjusted Lower 95% CI (birds/km <sup>2</sup> )	Adjusted Upper 95% CI (birds/km <sup>2</sup> )	Adjusted Population Estimate (number)	Adjusted Lower 95% CI (number)	Adjusted Upper 95% CI (number)	Adjusted SD	Adjusted CV
<b>Survey</b>								
Apr S02 20	69.44	50.82	88.33	70188	51373	89292	8391	11.96%

**Table 4: AppORTIONED absolute density and population estimates of sitting guillemots in the Berwick Bank Development array only, calculated using design-based analysis and adjusted for availability bias**

Sitting Guillemots	Adjusted Density Estimate (birds/km <sup>2</sup> )	Adjusted Lower 95% CI (birds/km <sup>2</sup> )	Adjusted Upper 95% CI (birds/km <sup>2</sup> )	Adjusted Population Estimate (number)	Adjusted Lower 95% CI (number)	Adjusted Upper 95% CI (number)	Adjusted SD	Adjusted CV
<b>Survey</b>								
Mar-19	11.93	8.31	17.16	12058	8400	17342	1998	16.57%
May-19	29.01	22.88	37.12	29322	23136	37519	3446	11.75%
Jun-19	7.10	4.73	9.98	7181	4773	10091	1193	16.62%
Jul-19	32.05	26.32	38.17	32398	26603	38591	2724	8.41%
Aug-19	35.80	22.12	52.09	36187	22357	52652	7047	19.47%
Sep-19	5.02	3.90	6.06	5069	3934	6117	484	9.55%
Oct-19	1.82	1.01	2.99	1838	1020	3016	467	25.41%
Nov-19	0.78	0.61	0.97	789	612	990	87	11.06%
Dec-19	1.78	1.21	2.42	1799	1221	2446	288	16.01%
Jan-20	13.05	8.85	19.12	13192	8945	19327	2324	17.61%
Feb-20	9.40	6.18	12.69	9501	6246	12837	1527	16.07%
Mar-20	29.69	21.25	37.79	30009	21483	38196	3792	12.64%
May S01 20	21.84	12.68	32.31	22076	12819	32661	4413	19.99%
May S02 20	19.95	13.63	27.18	20167	13774	27473	3228	16.01%
Jun-20	46.29	36.72	56.47	46795	37123	57080	4577	9.78%
Jul-20	11.69	9.12	14.09	11826	9227	14245	1167	9.87%
Aug-20	31.49	27.49	35.21	31835	27796	35593	1751	5.50%
Sep-20	35.50	25.87	45.62	35887	26150	46118	4458	12.42%
Oct-20	3.03	2.29	3.86	3065	2321	3907	355	11.57%
Nov-20	2.11	1.53	2.87	2136	1539	2907	302	14.13%
Dec-20	14.81	9.64	21.97	14980	9737	22216	2893	19.31%
Jan-21	10.51	8.19	12.65	10625	8278	12786	1010	9.50%
Feb-21	6.50	4.08	9.24	6571	4125	9340	1135	17.27%
Apr S01 20	26.82	22.25	31.18	27111	22491	31522	2007	7.40%
Apr S02 20	70.74	50.60	90.92	71517	51143	91908	8880	12.42%

**Table 5: UnapPORTIONED absolute density and population estimates of razorbills in the Berwick Bank Development array only, calculated using design-based analysis and adjusted for availability bias**

Razorbill	Adjusted Density Estimate (birds/km <sup>2</sup> )	Adjusted Lower 95% CI (birds/km <sup>2</sup> )	Adjusted Upper 95% CI (birds/km <sup>2</sup> )	Adjusted Population Estimate (number)	Adjusted Lower 95% CI (number)	Adjusted Upper 95% CI (number)	Adjusted SD	Adjusted CV
<b>Survey</b>								
Mar-19	1.45	0.7	2.36	1462	706	2396	464	31.74%
May-19	1.3	0.93	1.71	1314	942	1731	246	18.72%
Jun-19	0.21	0.05	0.45	207	48	457	131	63.29%
Jul-19	2.32	1.43	3.3	2350	1447	3335	604	25.7%
Aug-19	1.65	0.94	2.42	1667	955	2452	434	26.03%
Sep-19	1.23	0.77	1.77	1254	785	1791	292	23.29%
Oct-19	0.61	0.24	1.04	614	249	1051	198	32.25%
Nov-19	0.11	0.04	0.2	101	37	194	34	33.66%
Dec-19	0.33	0.12	0.55	324	119	555	117	36.11%
Jan-20	1.27	0.66	2.06	1292	660	2082	386	29.88%
Feb-20	1.11	0.71	1.61	1122	719	1632	274	24.42%
Mar-20	5.9	3.85	8.16	5961	3901	8258	1130	18.96%
May S01 20	0.88	0.51	1.33	889	519	1348	248	27.9%
May S02 20	0.49	0.22	0.87	497	225	884	198	39.84%
Jun-20	0.99	0.66	1.36	1001	666	1387	209	20.88%
Jul-20	1.65	0.9	2.55	1665	912	2583	516	30.99%
Aug-20	3.35	2.46	4.6	3389	2481	4650	654	19.3%
Sep-20	10.08	6.73	13.84	10192	6809	13990	2122	20.82%
Oct-20	0.67	0.27	1.16	680	278	1174	226	33.24%
Nov-20	0.24	0.09	0.42	241	90	413	83	34.44%
Dec-20	1.28	0.68	1.94	1291	698	1969	366	28.35%
Jan-21	3.2	2.33	4.29	3232	2358	4325	573	17.73%
Feb-21	1.37	0.68	2.16	1387	690	2191	398	28.7%
Apr S01 20	3.46	2.14	5.12	3506	2161	5174	832	23.73%
Apr S02 20	1.44	1.1	1.87	1456	1112	1884	218	14.97%

**Table 6: AppORTIONED absolute density and population estimates of razorbills in the Berwick Bank Development array only, calculated using design-based analysis and adjusted for availability bias**

Razorbill	Adjusted Density Estimate (birds/km <sup>2</sup> )	Adjusted Lower 95% CI (birds/km <sup>2</sup> )	Adjusted Upper 95% CI (birds/km <sup>2</sup> )	Adjusted Population Estimate (number)	Adjusted Lower 95% CI (number)	Adjusted Upper 95% CI (number)	Adjusted SD	Adjusted CV
<b>Survey</b>								
Mar-19	1.53	0.77	2.58	1548	788	2599	463	29.91%
May-19	1.44	1.08	1.91	1458	1090	1926	251	17.22%
Jun-19	0.22	0.05	0.5	226	55	508	136	60.18%
Jul-19	2.53	1.66	3.54	2563	1684	3588	595	23.21%
Aug-19	1.82	1.1	2.64	1838	1113	2663	441	23.99%
Sep-19	1.48	1.06	1.93	1496	1074	1957	274	18.32%
Oct-19	0.87	0.48	1.37	872	482	1381	238	27.29%
Nov-19	0.14	0.07	0.23	141	75	233	35	24.82%
Dec-19	0.46	0.2	0.82	472	197	822	167	35.38%



Razorbill	Adjusted Density Estimate (birds/km <sup>2</sup> )	Adjusted Lower 95% CI (birds/km <sup>2</sup> )	Adjusted Upper 95% CI (birds/km <sup>2</sup> )	Adjusted Population Estimate (number)	Adjusted Lower 95% CI (number)	Adjusted Upper 95% CI (number)	Adjusted SD	Adjusted CV
<b>Survey</b>								
Jan-20	1.77	0.99	2.63	1794	1000	2663	457	25.47%
Feb-20	1.21	0.78	1.73	1228	788	1749	284	23.13%
Mar-20	6.38	4.19	8.48	6448	4239	8570	1158	17.96%
May S01 20	0.95	0.56	1.43	967	565	1451	264	27.3%
May S02 20	0.57	0.32	0.92	585	318	924	199	34.02%
Jun-20	1.04	0.7	1.44	1049	704	1456	216	20.59%
Jul-20	1.87	1	2.88	1890	1014	2916	582	30.79%
Aug-20	3.48	2.53	4.82	3520	2563	4866	675	19.18%
Sep-20	10.88	7.31	15.12	10994	7387	15290	2330	21.19%
Oct-20	0.87	0.46	1.38	888	464	1395	228	25.68%
Nov-20	0.33	0.17	0.52	331	175	533	92	27.79%
Dec-20	1.82	1.03	2.65	1845	1041	2671	453	24.55%
Jan-21	3.84	2.77	5.23	3889	2797	5280	631	16.23%
Feb-21	1.65	0.9	2.44	1658	916	2460	419	25.27%
Apr S01 20	3.76	2.39	5.46	3805	2416	5517	824	21.66%
Apr S02 20	1.62	1.21	2.07	1633	1229	2087	238	14.57%

**Table 7: Unapportioned absolute density and population estimates of sitting razorbills in the Berwick Bank Development array only, calculated using design-based analysis and adjusted for availability bias**

Sitting Razorbills	Adjusted Density Estimate (birds/km <sup>2</sup> )	Adjusted Lower 95% CI (birds/km <sup>2</sup> )	Adjusted Upper 95% CI (birds/km <sup>2</sup> )	Adjusted Population Estimate (number)	Adjusted Lower 95% CI (number)	Adjusted Upper 95% CI (number)	Adjusted SD	Adjusted CV
<b>Survey</b>								
Mar-19	1.25	0.61	2.05	1263	614	2080	339	26.88%
May-19	1.30	0.93	1.71	1314	942	1731	182	13.88%
Jun-19	0.21	0.05	0.45	207	48	457	101	48.71%
Jul-19	2.32	1.43	3.30	2350	1447	3335	451	19.19%
Aug-19	1.65	0.94	2.42	1667	955	2452	339	20.36%
Sep-19	1.23	0.77	1.77	1254	785	1791	239	19.04%
Oct-19	0.55	0.24	0.87	557	249	878	145	25.99%
Nov-19	0.09	0.04	0.15	84	37	148	27	31.46%
Dec-19	0.31	0.12	0.50	303	119	502	93	30.64%
Jan-20	1.21	0.64	1.94	1227	642	1963	303	24.69%
Feb-20	1.11	0.71	1.61	1122	719	1632	218	19.41%
Mar-20	5.32	3.54	7.27	5370	3582	7356	900	16.76%
May S01 20	0.88	0.51	1.33	889	519	1348	199	22.40%
May S02 20	0.49	0.22	0.87	497	225	884	154	30.89%
Jun-20	0.98	0.66	1.34	992	666	1363	164	16.49%
Jul-20	1.64	0.90	2.53	1657	912	2559	397	23.95%
Aug-20	3.35	2.46	4.60	3389	2481	4650	510	15.04%
Sep-20	10.08	6.73	13.84	10192	6809	13990	1675	16.43%
Oct-20	0.49	0.23	0.78	494	240	785	135	27.32%
Nov-20	0.22	0.09	0.37	224	90	365	64	28.67%
Dec-20	1.27	0.68	1.92	1282	698	1945	285	22.25%
Jan-21	3.08	2.30	4.06	3113	2327	4097	410	13.18%
Feb-21	1.31	0.67	2.03	1322	682	2057	323	24.41%

Sitting Razorbills	Adjusted Density Estimate (birds/km <sup>2</sup> )	Adjusted Lower 95% CI (birds/km <sup>2</sup> )	Adjusted Upper 95% CI (birds/km <sup>2</sup> )	Adjusted Population Estimate (number)	Adjusted Lower 95% CI (number)	Adjusted Upper 95% CI (number)	Adjusted SD	Adjusted CV
<b>Survey</b>								
Apr S01 20	3.36	2.10	4.95	3401	2121	4999	653	19.21%
Apr S02 20	1.42	1.10	1.82	1439	1112	1836	169	11.76%

**Table 8: Apportioned absolute density and population estimates of sitting razorbills in the Berwick Bank Development array only, calculated using design-based analysis and adjusted for availability bias**

Sitting Razorbills	Adjusted Density Estimate (birds/km <sup>2</sup> )	Adjusted Lower 95% CI (birds/km <sup>2</sup> )	Adjusted Upper 95% CI (birds/km <sup>2</sup> )	Adjusted Population Estimate (number)	Adjusted Lower 95% CI (number)	Adjusted Upper 95% CI (number)	Adjusted SD	Adjusted CV
<b>Survey</b>								
Mar-19	1.32	0.67	2.24	1335	684	2256	363	27.17%
May-19	1.44	1.08	1.91	1457	1089	1925	196	13.43%
Jun-19	0.22	0.05	0.50	225	55	506	108	48.18%
Jul-19	2.53	1.66	3.54	2562	1684	3586	458	17.87%
Aug-19	1.82	1.10	2.64	1838	1113	2663	352	19.13%
Sep-19	1.48	1.06	1.93	1495	1074	1954	209	13.98%
Oct-19	0.81	0.48	1.20	812	479	1210	179	22.07%
Nov-19	0.12	0.07	0.18	122	75	181	25	20.80%
Dec-19	0.44	0.20	0.76	447	194	765	128	28.67%
Jan-20	1.70	0.97	2.51	1723	977	2538	375	21.75%
Feb-20	1.21	0.78	1.72	1225	788	1743	222	18.15%
Mar-20	5.77	3.85	7.54	5832	3891	7623	878	15.05%
May S01 20	0.95	0.56	1.43	967	565	1451	206	21.27%
May S02 20	0.57	0.32	0.92	584	318	922	151	25.93%
Jun-20	1.03	0.70	1.42	1040	704	1432	167	16.05%
Jul-20	1.86	1.00	2.86	1881	1014	2892	442	23.51%
Aug-20	3.48	2.53	4.82	3520	2563	4866	522	14.82%
Sep-20	10.88	7.31	15.12	10994	7387	15290	1763	16.04%
Oct-20	0.68	0.42	0.99	692	424	1001	138	19.98%
Nov-20	0.31	0.17	0.46	312	175	473	72	23.06%
Dec-20	1.81	1.03	2.62	1835	1041	2641	358	19.53%
Jan-21	3.72	2.74	4.99	3762	2766	5035	490	13.02%
Feb-21	1.58	0.89	2.30	1591	902	2322	321	20.15%
Apr S01 20	3.65	2.35	5.28	3697	2372	5336	645	17.43%
Apr S02 20	1.60	1.21	2.02	1613	1228	2034	185	11.44%

**Table 9: Unapportioned absolute density and population estimates of puffins in the Berwick Bank Development array only, calculated using design-based analysis and adjusted for availability bias**

Puffin	Adjusted Density Estimate (birds/km <sup>2</sup> )	Adjusted Lower 95% CI (birds/km <sup>2</sup> )	Adjusted Upper 95% CI (birds/km <sup>2</sup> )	Adjusted Population Estimate (number)	Adjusted Lower 95% CI (number)	Adjusted Upper 95% CI (number)	Adjusted SD	Adjusted CV
<b>Survey</b>								
Mar-19	0.91	0.55	1.33	916	545	1359	243	26.53%
May-19	1.86	1.5	2.2	1876	1528	2223	210	11.19%
Jun-19	0.31	0.13	0.54	315	133	546	121	38.41%
Jul-19	1.92	1.3	2.51	1941	1314	2533	336	17.31%
Aug-19	2.53	1.93	3.2	2567	1950	3240	393	15.31%
Sep-19	0.68	0.24	1.34	696	250	1353	338	48.56%
Oct-19	0.17	0.08	0.28	175	86	281	57	32.57%
Nov-19	0	0	0	0	0	0	0	0
Dec-19	0	0	0	0	0	0	0	0
Jan-20	0.02	0	0.05	21	0	47	16	76.19%
Feb-20	0.03	0	0.07	37	0	75	24	64.86%
Mar-20	0.3	0.1	0.55	302	103	563	108	35.76%
May S01 20	0.73	0.41	1.11	737	412	1123	212	28.77%
May S02 20	0.4	0.29	0.51	405	291	518	74	18.27%
Jun-20	0.49	0.29	0.71	490	296	717	125	25.51%
Jul-20	0.74	0.34	1.32	760	339	1327	319	41.97%
Aug-20	1.3	0.84	1.76	1325	850	1781	293	22.11%
Sep-20	12.47	10.58	14.61	12605	10692	14769	1271	10.08%
Oct-20	0.07	0.03	0.1	72	35	112	28	38.89%
Nov-20	0.08	0.02	0.16	84	19	168	43	51.19%
Dec-20	0.01	0	0.02	9	0	28	11	122.22%
Jan-21	0.01	0	0.02	10	0	28	11	110%
Feb-21	0.22	0.1	0.36	225	112	363	81	36%
Apr S01 20	0.49	0.28	0.79	505	277	805	138	27.33%
Apr S02 20	3.35	2.4	4.27	3388	2421	4318	614	18.12%

**Table 10: Apportioned absolute density and population estimates of puffins in the Berwick Bank Development array only, calculated using design-based analysis and adjusted for availability bias**

Puffin	Adjusted Density Estimate (birds/km <sup>2</sup> )	Adjusted Lower 95% CI (birds/km <sup>2</sup> )	Adjusted Upper 95% CI (birds/km <sup>2</sup> )	Adjusted Population Estimate (number)	Adjusted Lower 95% CI (number)	Adjusted Upper 95% CI (number)	Adjusted SD	Adjusted CV
<b>Survey</b>								
Mar-19	1.36	0.85	1.93	1375	859	1959	314	22.84%
May-19	2.31	1.86	2.81	2342	1881	2836	281	12%
Jun-19	0.38	0.17	0.63	385	177	645	129	33.51%
Jul-19	3.35	2.46	4.25	3381	2484	4296	598	17.69%
Aug-19	3.99	2.98	4.91	4033	3017	4965	569	14.11%
Sep-19	1.08	0.63	1.79	1100	642	1815	368	33.45%
Oct-19	0.29	0.19	0.42	287	190	418	67	23.34%
Nov-19	0.02	0.01	0.05	29	10	51	14	48.28%
Dec-19	0	0	0	0	0	0	0	0

Puffin	Adjusted Density Estimate (birds/km <sup>2</sup> )	Adjusted Lower 95% CI (birds/km <sup>2</sup> )	Adjusted Upper 95% CI (birds/km <sup>2</sup> )	Adjusted Population Estimate (number)	Adjusted Lower 95% CI (number)	Adjusted Upper 95% CI (number)	Adjusted SD	Adjusted CV
<b>Survey</b>								
Jan-20	0.06	0.02	0.09	54	26	93	22	40.74%
Feb-20	0.19	0.09	0.33	190	90	330	78	41.05%
Mar-20	0.57	0.29	0.91	576	289	921	157	27.26%
May S01 20	1.9	1.05	2.61	1929	1065	2643	490	25.4%
May S02 20	0.73	0.52	0.94	737	536	955	132	17.91%
Jun-20	0.86	0.59	1.13	864	603	1142	176	20.37%
Jul-20	1.03	0.51	1.79	1049	517	1809	390	37.18%
Aug-20	1.91	1.34	2.62	1927	1356	2648	400	20.76%
Sep-20	13.7	11.47	16.33	13854	11598	16513	1530	11.04%
Oct-20	0.14	0.1	0.19	142	101	188	28	19.72%
Nov-20	0.14	0.07	0.21	143	77	218	45	31.47%
Dec-20	0.03	0.01	0.06	31	15	55	12	38.71%
Jan-21	0.02	0.01	0.05	27	13	47	12	44.44%
Feb-21	0.41	0.26	0.58	412	255	585	109	26.46%
Apr S01 20	0.98	0.64	1.37	992	645	1397	210	21.17%
Apr S02 20	4.8	3.56	6.08	4849	3608	6145	840	17.32%

**Table 11: Unapportioned absolute density and population estimates of sitting puffins in the Berwick Bank Development array only, calculated using design-based analysis and adjusted for availability bias**

Sitting Puffins	Adjusted Density Estimate (birds/km <sup>2</sup> )	Adjusted Lower 95% CI (birds/km <sup>2</sup> )	Adjusted Upper 95% CI (birds/km <sup>2</sup> )	Adjusted Population Estimate (number)	Adjusted Lower 95% CI (number)	Adjusted Upper 95% CI (number)	Adjusted SD	Adjusted CV
<b>Survey</b>								
Mar-19	0.89	0.54	1.29	894	539	1314	190	21.26%
May-19	1.81	1.49	2.11	1827	1513	2134	153	8.39%
Jun-19	0.29	0.13	0.50	299	133	508	92	30.64%
Jul-19	1.90	1.30	2.45	1919	1314	2474	268	13.95%
Aug-19	2.50	1.93	3.11	2536	1950	3147	291	11.49%
Sep-19	0.66	0.24	1.27	672	250	1281	249	37.09%
Oct-19	0.16	0.08	0.26	169	86	263	42	24.92%
Nov-19	0.00	0.00	0.00	0	0	0	0	#DIV/0!
Dec-19	0.00	0.00	0.00	0	0	0	0	0.00%
Jan-20	0.02	0.00	0.05	21	0	47	12	56.62%
Feb-20	0.03	0.00	0.07	37	0	75	18	49.22%
Mar-20	0.20	0.07	0.38	204	69	390	79	38.65%
May S01 20	0.72	0.41	1.07	726	412	1087	161	22.16%
May S02 20	0.40	0.29	0.51	405	291	518	55	13.58%
Jun-20	0.48	0.29	0.69	481	296	693	95	19.74%
Jul-20	0.72	0.34	1.25	735	339	1259	232	31.57%
Aug-20	1.30	0.84	1.76	1325	850	1781	223	16.87%
Sep-20	12.47	10.58	14.61	12605	10692	14769	994	7.89%
Oct-20	0.07	0.03	0.10	72	35	112	21	28.39%
Nov-20	0.08	0.02	0.16	84	19	168	35	41.18%
Dec-20	0.01	0.00	0.02	9	0	28	9	92.65%
Jan-21	0.01	0.00	0.02	10	0	28	9	82.36%
Feb-21	0.22	0.10	0.36	225	112	363	62	27.36%

Sitting Puffins	Adjusted Density Estimate (birds/km <sup>2</sup> )	Adjusted Lower 95% CI (birds/km <sup>2</sup> )	Adjusted Upper 95% CI (birds/km <sup>2</sup> )	Adjusted Population Estimate (number)	Adjusted Lower 95% CI (number)	Adjusted Upper 95% CI (number)	Adjusted SD	Adjusted CV
<b>Survey</b>								
Apr S01 20	0.45	0.28	0.70	464	277	711	104	22.35%
Apr S02 20	3.34	2.40	4.25	3380	2421	4294	465	13.76%

**Table 12:** Apportioned absolute density and population estimates of sitting puffins in the Berwick Bank Development array only, calculated using design-based analysis and adjusted for availability bias

Sitting Puffins	Adjusted Density Estimate (birds/km <sup>2</sup> )	Adjusted Lower 95% CI (birds/km <sup>2</sup> )	Adjusted Upper 95% CI (birds/km <sup>2</sup> )	Adjusted Population Estimate (number)	Adjusted Lower 95% CI (number)	Adjusted Upper 95% CI (number)	Adjusted SD	Adjusted CV
<b>Survey</b>								
Mar-19	1.28	0.83	1.77	1295	838	1796	234	18.08%
May-19	2.25	1.84	2.70	2279	1858	2727	216	9.47%
Jun-19	0.36	0.17	0.59	366	177	605	99	27.15%
Jul-19	3.32	2.46	4.18	3352	2481	4229	441	13.17%
Aug-19	3.94	2.98	4.78	3979	3017	4829	440	11.07%
Sep-19	1.06	0.63	1.72	1076	642	1743	273	25.37%
Oct-19	0.28	0.19	0.40	281	190	400	51	18.07%
Nov-19	0.02	0.01	0.05	29	10	51	11	37.06%
Dec-19	0.00	0.00	0.00	0	0	0	0	0.00%
Jan-20	0.06	0.02	0.09	54	26	93	16	30.21%
Feb-20	0.19	0.09	0.33	190	90	330	59	31.26%
Mar-20	0.45	0.24	0.70	455	243	708	110	24.17%
May S01 20	1.86	1.05	2.54	1891	1065	2571	362	19.12%
May S02 20	0.72	0.52	0.92	729	536	931	95	13.02%
Jun-20	0.85	0.59	1.11	855	603	1118	128	15.02%
Jul-20	1.01	0.51	1.74	1025	517	1753	302	29.48%
Aug-20	1.91	1.34	2.62	1927	1356	2648	309	16.02%
Sep-20	13.70	11.47	16.33	13854	11598	16513	1166	8.41%
Oct-20	0.14	0.10	0.19	140	101	184	21	14.67%
Nov-20	0.14	0.07	0.21	143	77	218	35	24.10%
Dec-20	0.03	0.01	0.06	31	15	55	10	30.88%
Jan-21	0.02	0.01	0.05	27	13	47	10	36.25%
Feb-21	0.41	0.26	0.58	412	255	585	83	20.15%
Apr S01 20	0.94	0.64	1.29	952	645	1313	162	17.01%
Apr S02 20	4.79	3.56	6.06	4840	3608	6121	627	12.96%



