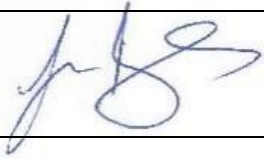
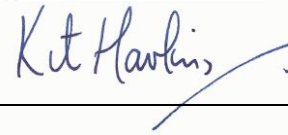


Sensitivity of offshore seabird concentrations to oil pollution around the United Kingdom: Report to Oil & Gas UK APPENDIX A

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Appendix A

Scaling factors used for correcting for bias in abundance estimates from different survey methods

I Scaling factors used for correcting for bias in abundance estimates from different survey methods

I The following sub-sections provide data used to determine scaling factors used to correct for known biases in abundance estimates arising from different survey methods.

I.1 Correction for distance effects on detection rates in boat-based surveys

2 Table A1 provides data on distance effects on detection rates using four distance bands from the transect line during bird surveys from boats in relation to sea state. The scaling factor used was applied to the abundance of birds sitting on the sea only, and was not applied to flying birds. A = number recorded in Band A (0 – 50m); B = number recorded in Band B (50 – 100m); C = number recorded in Band C (100 – 200m); D = number recorded in Band D (200 – 300m).

Table A1 Numbers of seabirds recorded in different distance bands from the transect line in relation to sea state during boat-based surveys and the calculated correction factor (“CCF”) and eventual scaling factor used (“SF”)

Species	Scientific name	Sea state	A	B	C	D	Total	CCF	SF
Red-throated diver	<i>Gavia stellata</i>	0	5	1	5	2	13	1.38	1.25
		1	15	16	13	70	114	0.82	1.25
		2	61	25	45	81	212	1.22	1.25
		3	90	44	68	112	314	1.28	1.25
		4	81	53	53	90	277	1.45	1.25
		5	43	26	35	71	175	1.18	1.25
		9	373	333	428	560	1694	1.25	1.25
Black-throated diver	<i>Gavia arctica</i>	0		1		5	6	0.5	1.44
		1	15	4	6	13	38	1.5	1.44
		2	27	24	20	23	94	1.63	1.44
		3	56	14	20	65	155	1.35	1.44
		4	32	13	12	7	64	2.11	2.09
		5	3		1	1	5	1.8	2.09
		9	26	12	31	18	87	1.31	1.53
Great Northern diver	<i>Gavia immer</i>	0	0	1	0	0	1	3	1.43
		1	3	1	0	0	4	3	1.43
		2	0	2	8	5	15	0.4	1.43
		3	2	5	11	28	46	0.46	1.43
		4	1	4	5	2	12	1.25	1.43
		5				2	2	0	1.43
		9	1				1	3	1.43
Diver sp.	<i>Gavia sp.</i>	0	1		1	3	5	0.6	1.43

Species	Scientific name	Sea state	A	B	C	D	Total	CCF	SF
		1	1	1		5	7	0.86	1.43
		2	14	6	7	23	50	1.2	1.43
		3	20	13	12	26	71	1.39	1.43
		4	23	2	1	8	34	2.21	1.43
		5	6	3	5	3	17	1.59	1.43
		9	38	24	30	42	134	1.39	1.43
Great crested grebe	<i>Podiceps cristatus</i>	0	13	20	23	57	113	0.88	1.11
		1	112	28	35	83	258	1.63	1.11
		2	93	42	68	147	350	1.16	1.11
		3	174	127	180	194	675	1.34	1.11
		4	513	212	222	1155	2102	1.03	1.11
		5	247	316	315	1222	2100	0.8	1.11
		9	494	625	801	647	2567	1.31	1.11
Red-necked grebe	<i>Podiceps grisegena</i>	0	3	1	4	3	11	1.09	1.54
		1	6	11	6	15	38	1.34	1.54
		2	14	21	20	21	76	1.38	1.54
		3	33	18	19	9	79	1.94	1.54
		4	16	12	13	9	50	1.68	1.54
		5	2	1		7	10	0.9	1.54
		9			4		4	0	1.54
Slavonian grebe	<i>Podiceps auritus</i>	0	10	8	4	17	39	1.38	1.69
		1	8	6	7	15	36	1.17	1.69
		2	55	48	40	53	196	1.58	1.69
		3	65	56	33	41	195	1.86	1.69
		4	16	14	5	7	42	2.14	1.69
		5		1			1	3	1.69
Grebe sp.	<i>Podiceps sp.</i>	0			1		1	0	1.16
		1			1		1	0	1.16
		2	1	1	1	0	3	2	1.16
		3				1	1	0	1.16
		4	1				1	3	1.16
		5		1			1	3	1.16
		9			1		1	0	1.16
Northern fulmar	<i>Fulmarus glacialis</i>	0	605	632	823	1052	3112	1.19	1.29
		1	1761	1577	2473	1938	7749	1.29	1.29
		2	3968	4424	5338	5660	19390	1.3	1.29
		3	4077	3995	5145	5869	19086	1.27	1.29
		4	2232	2242	2641	2553	9668	1.39	1.29

Species	Scientific name	Sea state	A	B	C	D	Total	CCF	SF
		5	1175	1249	2001	1757	6182	1.18	1.29
		9	1231	1157	1246	1030	4664	1.54	1.29
Cory's shearwater	<i>Calonectris diomedea</i>	1			1		1	0	1.09
		2				1	1	0	1.09
Great shearwater	<i>Puffinus gravis</i>	0	0	0	0	1	1	0	1.09
		1	1				1	3	1.09
		2	115	1	55	7	178	1.96	1.09
		3	20	17	27	80	144	0.77	1.09
		4	30	5	16	175	226	0.46	1.09
		5	33	31	20	65	149	1.29	1.09
		9	0	0	1	0	1	0	1.09
Sooty shearwater	<i>Puffinus griseus</i>	0	0	0	4	0	4	0	1.62
		1	6	5	2	7	20	1.65	1.62
		2	24	8	6	6	44	2.18	1.62
		3	22	15	19	18	74	1.5	1.62
		4	18	12	15	25	70	1.29	1.62
		5	3	10	2	1	16	2.44	1.62
		9	3	6	2	6	17	1.59	1.62
Manx shearwater	<i>Puffinus puffinus</i>	0	505	578	1335	1618	4036	0.81	1
		1	947	705	1191	2094	4937	1	1
		2	1022	931	1869	2191	6013	0.97	1
		3	1450	1085	2430	3346	8311	0.92	1
		4	760	806	667	846	3079	1.53	1.53
		5	299	90	294	123	806	1.45	1.53
		9	114	89	134	175	512	1.19	1.19
Balearic shearwater	<i>Puffinus mauretanicus</i>	1				1	1	0	1
		2			4		4	0	1
		3	0	1	2	0	3	1	1
		4	0	1	0	0	1	3	1.53
		5	2		1		3	2	1.53
Wilson's storm-petrel	<i>Oceanites oceanicus</i>	2			1	1	2	0	1.41
		3			1		1	0	1.41
		5				3	3	0	1.41
European storm-petrel	<i>Hydrobates pelagicus</i>	0	32	33	44	64	173	1.13	1.1
		1	47	41	98	58	244	1.08	1.1
		2	187	145	218	192	742	1.34	1.46
		3	153	126	108	114	501	1.67	1.46
		4	81	46	37	97	261	1.46	1.46

Species	Scientific name	Sea state	A	B	C	D	Total	CCF	SF
Leach's storm-petrel	<i>Oceanodroma leucorhoa</i>	5	20	31	21	44	116	1.32	1.46
		9	22	1	1	0	24	2.88	1.41
		0	19	28	29	32	108	1.31	1.48
		1	30	18	24	30	102	1.41	1.48
		2	18	7	12	7	44	1.7	1.48
		3	23	15	20	20	78	1.46	1.48
		4	5	2	2	3	12	1.75	1.48
		5	3	5	1	2	11	2.18	1.48
		9	2	4	2	1	9	2	1.48
Storm-petrel sp.	<i>O. leucorhoa/H. pelagicus</i>	2	11		2		13	2.54	1.41
		3	0	0	0	1	1	0	1.41
		5	0	0	7	5	12	0	1.41
Northern gannet	<i>Morus bassanus</i>	0	137	110	201	350	798	0.93	1.14
		1	467	363	758	799	2387	1.04	1.14
		2	1101	831	1326	1811	5069	1.14	1.14
		3	1194	1386	1523	2272	6375	1.21	1.14
		4	836	741	972	1629	4178	1.13	1.14
		5	384	376	458	1496	2714	0.84	1.14
		9	1188	1053	1341	1541	5123	1.31	1.14
Great cormorant	<i>Phalacrocorax carbo</i>	0	50	41	35	85	211	1.29	1.16
		1	123	100	78	206	507	1.32	1.16
		2	172	142	158	308	780	1.21	1.16
		3	266	164	212	589	1231	1.05	1.16
		4	188	101	132	221	642	1.35	1.16
		5	53	49	42	86	230	1.33	1.16
		9	58	118	151	270	597	0.88	1.16
European shag	<i>Phalacrocorax aristotelis</i>	0	12	13	43	76	144	0.52	1.39
		1	41	21	31	30	123	1.51	1.39
		2	99	73	101	97	370	1.39	1.39
		3	137	126	107	81	451	1.75	1.39
		4	62	50	48	54	214	1.57	1.39
		5	38	65	129	37	269	1.15	1.39
		9			1	2	3	0	1.39
Cormorant sp.	<i>Phalacrocorax sp.</i>	3	2	1	0	6	9	1	1.23
Great scaup	<i>Aythya marila</i>	0	2				2	3	1.09
		1				562	562	0	1.09
		2	8		7		15	1.6	1.09
		3	32			4	36	2.67	1.09

Species	Scientific name	Sea state	A	B	C	D	Total	CCF	SF
		4	20	2		1	23	2.87	1.09
		5							1.09
Common eider	<i>Somateria mollissima</i>	0	36	44	179	744	1003	0.24	1
		1	182	177	670	2267	3296	0.33	1
		2	655	839	1359	4246	7099	0.63	1
		3	2904	1337	2568	7774	14583	0.87	1
		4	902	584	947	2681	5114	0.87	1
		5	147	113	228	681	1169	0.67	1
		9	262	199	545	907	1913	0.72	1
Long-tailed duck	<i>Clangula hyemalis</i>	0	286	60	58	300	704	1.47	1.39
		1	463	233	342	803	1841	1.13	1.39
		2	2279	1087	1524	3243	8133	1.24	1.39
		3	7095	4021	4761	7778	23655	1.41	1.39
		4	3450	1658	2187	3191	10486	1.46	1.39
		5	446	205	232	405	1288	1.52	1.39
		9	27	45	24	14	110	1.96	1.39
Common scoter	<i>Melanitta nigra</i>	0	209	81	112	663	1065	0.82	1
		1	640	306	489	1365	2800	1.01	1
		2	1177	395	478	1787	3837	1.23	1
		3	1715	660	1031	4446	7852	0.91	1
		4	1192	734	865	3414	6205	0.93	1
		5	1032	1159	1281	2322	5794	1.13	1
		9	1151	400	2804	1354	5709	0.82	1
Scoter sp.	<i>Melanitta sp.</i>	0							1.08
		2							1.08
		4	3				3	3	1.08
Velvet scoter	<i>Melanitta fusca</i>	0	76	33	73	127	309	1.06	1.41
		1	341	174	158	381	1054	1.47	1.41
		2	722	312	305	871	2210	1.4	1.41
		3	1301	491	650	1540	3982	1.35	1.41
		4	808	249	292	791	2140	1.48	1.41
		5	152	18	21	141	332	1.54	1.41
		9	5		3	3	11	1.36	1.41
Common goldeneye	<i>Bucephala clangula</i>	0	1			24	25	0.12	1.09
		1		6	21	33	60	0.3	1.09
		2	25	4	7	49	85	1.02	1.09
		3	2	4	28	37	71	0.25	1.09
		4				2	2	0	1.09

Species	Scientific name	Sea state	A	B	C	D	Total	CCF	SF
		5				2	2	0	1.09
Red-breasted merganser	<i>Mergus serrator</i>	0	10			35	45	0.67	1.09
		1	17	9	35	51	112	0.7	1.09
		2	63	33	56	147	299	0.96	1.09
		3	86	50	50	144	330	1.24	1.09
		4	27	8	15	32	82	1.28	1.09
		5	28	4	20	20	72	1.33	1.09
		9		2			2	3	1.09
Goosander	<i>Mergus merganser</i>	0							1.09
		1		2	1	3	6	1	1.09
		2	35	3		12	50	2.28	1.09
		3				13	13	0	1.09
		4			1		1	0	1.09
		5							1.09
		9			1		1	0	1.09
Duck sp.	<i>Anatidae sp.</i>	0							1.09
		1				1	1	0	1.09
		2							1.09
		3							1.09
		4							1.09
		5							1.09
Grey phalarope	<i>Phalaropus fulicaria</i>	1	0	1	0	0	1	3	1.83
		2		1		1	2	1.5	1.83
		3	0	1	1	1	3	1	1.83
		4	7	0	0	1	8	2.62	1.83
		5	1	0	0	1	2	1.5	1.83
Pomarine skua	<i>Stercorarius pomarinus</i>	1			1	1	2	0	1.36
		2	0	2	1	1	4	1.5	1.36
		3	4	4	3	6	17	1.41	1.36
		4	8	0	4	6	18	1.33	1.36
		5	0	6	0	0	6	3	1.36
		9	10	4	3	5	22	1.91	1.36
Arctic skua	<i>Stercorarius parasiticus</i>	0	3	1	3	15	22	0.55	1.36
		1	3	3	2	7	15	1.2	1.36
		2	13	11	15	11	50	1.44	1.36
		3	13	14	21	18	66	1.23	1.36
		4	4	14	10	5	33	1.64	1.36
		5	0	1	4	4	9	0.33	1.36

Species	Scientific name	Sea state	A	B	C	D	Total	CCF	SF
		9	22	12	16	14	64	1.59	1.36
Long-tailed skua	<i>Stercorarius longicaudus</i>	0	0	0	3	1	4	0	1.36
		1	0	1	0	0	1	3	1.36
		2	2	1	0	0	3	3	1.36
		3	1	0	1	1	3	1	1.36
		4	1	0	0	1	2	1.5	1.36
		9	1	0	0	0	1	3	1.36
Great skua	<i>Stercorarius skua</i>	0	8	15	20	29	72	0.96	1.36
		1	32	32	24	38	126	1.52	1.36
		2	61	57	83	86	287	1.23	1.36
		3	84	90	118	101	393	1.33	1.36
		4	58	45	46	46	195	1.58	1.36
		5	17	34	25	51	127	1.2	1.36
		9	52	28	32	37	149	1.61	1.36
Skua sp.	<i>Stercorarius sp.</i>	1	0	0	0	1	1	0	1.36
		2	1	0	2	0	3	1	1.36
		3	1	1	2	1	5	1.2	1.36
		4	0	1	0	0	1	3	1.36
		5				2	2	0	1.36
		9	0	1	3	2	6	0.5	1.36
Mediterranean gull	<i>Larus melanocephalus</i>	0	0	0	0	1	1	0	1.34
		2							1.34
		4	1				1	3	1.34
		9	6	5	2	1	14	2.36	1.34
Little gull	<i>Hydrocoeleus minutus</i>	0	23	5	29	2	59	1.42	1.58
		1	85	61	101	99	346	1.27	1.58
		2	587	171	144	888	1790	1.27	1.58
		3	299	359	249	422	1329	1.49	1.58
		4	279	179	130	170	758	1.81	1.58
		5	51	19	27	58	155	1.35	1.58
		9	885	882	690	460	2917	1.82	1.58
Sabine's gull	<i>Xema sabini</i>	0	1				1	3	1.34
		1	3		1	1	5	1.8	1.34
		2	0	0	1	0	1	0	1.34
		3	2	0	0	2	4	1.5	1.34
		4	0	0	0	2	2	0	1.34
Black-headed gull	<i>Chroicocephalus ridibundus</i>	0	89	44	219	255	607	0.66	1.3
		1	385	539	472	558	1954	1.42	1.3

Species	Scientific name	Sea state	A	B	C	D	Total	CCF	SF
		2	1369	869	957	2121	5316	1.26	1.3
		3	1195	642	791	1343	3971	1.39	1.3
		4	152	76	74	89	391	1.75	1.75
		5	20	2	3	12	37	1.78	1.75
		9	369	458	885	740	2452	1.01	1.01
Common gull	<i>Larus canus</i>	0	72	93	170	186	521	0.95	1.16
		1	317	300	468	535	1620	1.14	1.16
		2	1264	775	858	2235	5132	1.19	1.16
		3	845	666	574	960	3045	1.49	1.49
		4	195	201	204	193	793	1.5	1.49
		5	130	57	91	103	381	1.47	1.49
		9	1341	1681	1729	2005	6756	1.34	1.34
Small gull sp.	<i>Larus/Rissa sp.</i>	1			1		1	0	1.34
		3			12	4	16	0	1.34
		4	0	0	8	10	18	0	1.34
		9	1	4	5	4	14	1.07	1.34
Lesser black-backed gull	<i>Larus fuscus</i>	0	155	110	178	422	865	0.92	1.01
		1	460	429	499	1159	2547	1.05	1.01
		2	1199	1123	1346	1612	5280	1.32	1.33
		3	1449	1359	1306	2213	6327	1.33	1.33
		4	871	508	491	699	2569	1.61	1.58
		5	151	167	171	142	631	1.51	1.58
		9	4977	5566	6399	6065	23007	1.37	1.37
Herring/lesser black-back	<i>L. fuscus/L. argentatus</i>	1	3	0	0	0	3	3	1.31
		2	0	1	0	0	1	3	1.31
		4	6				6	3	1.31
		5	0	0	1	1	2	0	1.31
		9			1	2	3	0	1.31
Herring gull	<i>Larus argentatus</i>	0	181	183	190	425	979	1.12	1.03
		1	619	585	1172	1143	3519	1.03	1.03
		2	1484	1364	1699	3791	8338	1.02	1.03
		3	1608	1602	1523	2807	7540	1.28	1.29
		4	493	474	451	1030	2448	1.19	1.29
		5	177	157	289	118	741	1.35	1.29
		9	2241	4536	3489	3756	14022	1.45	1.45
Glaucous gull	<i>Larus hyperboreus</i>	2	1	0	1	1	3	1	1
		3	1	0	1	1	3	1	1
		4	11	3	6	3	23	1.83	1

Species	Scientific name	Sea state	A	B	C	D	Total	CCF	SF
		5	3	3	65	11	82	0.22	1
		9	1				1	3	1
Great black-backed gull	<i>Larus marinus</i>	0	28	31	46	42	147	1.2	1.41
		1	152	129	170	161	612	1.38	1.41
		2	390	336	406	901	2033	1.07	1.41
		3	487	447	543	603	2080	1.35	1.41
		4	335	397	382	494	1608	1.37	1.41
		5	123	191	210	121	645	1.46	1.41
		9	1782	3115	2694	2378	9969	1.47	1.41
Large gull sp.	<i>Larus spec.</i>	0	5	1	35	199	240	0.07	0.76
		1	32	62	54	77	225	1.25	0.76
		2	11	5	13	71	100	0.48	0.76
		3	0	12	54	207	273	0.13	0.76
		4	33	40	13	13	99	2.21	0.76
		5	4	2	6	0	12	1.5	0.76
		9	163	108	391	280	942	0.86	0.76
Black-backed gull sp.	<i>L. fuscus/L. marinus</i>	1	1	0	18	3	22	0.14	0.56
		2	4	13	21	32	70	0.73	0.56
		3	0	5	28	24	57	0.26	0.56
		4	1	2	7	3	13	0.69	0.56
		5	6	0	0	1	7	2.57	0.56
		9	0	76	62	270	408	0.56	0.56
Black-legged kittiwake	<i>Rissa tridactyla</i>	0	728	672	983	2078	4461	0.94	1.33
		1	1368	1387	1349	1960	6064	1.36	1.33
		2	2913	2024	2625	4060	11622	1.27	1.33
		3	3417	3098	3465	6043	16023	1.22	1.33
		4	1915	2347	2258	2995	9515	1.34	1.33
		5	695	721	777	749	2942	1.44	1.33
		9	2774	2925	2270	2081	10050	1.7	1.33
Gull sp.	<i>Larus sp.</i>	0	1	0	0	2	3	1	0.12
		1	0	0	0	19	19	0	0.12
		2	1	2	1	70	74	0.12	0.12
		3	1	0	251	6	258	0.01	0.12
		4			1	5	6	0	0.12
		9	52	146	987	3570	4755	0.12	0.12
Sandwich tern	<i>Sterna sandvicensis</i>	0	20	24	14	7	65	2.03	1.42
		1	46	45	35	32	158	1.73	1.42
		2	34	82	39	82	237	1.47	1.42

Species	Scientific name	Sea state	A	B	C	D	Total	CCF	SF
		3	109	62	33	160	364	1.41	1.42
		4	36	23	23	68	150	1.18	1.42
		5	3	5	2	7	17	1.41	1.42
		9	158	298	285	267	1008	1.36	1.42
Common tern	<i>Sterna hirundo</i>	0	3	3	5	3	14	1.29	1.55
		1	10	20	9	18	57	1.58	1.55
		2	36	43	19	43	141	1.68	1.55
		3	74	40	51	217	382	0.9	1.55
		4	42	25	18	75	160	1.26	1.55
		5	46	4	6	13	69	2.17	1.55
		9	1011	770	715	803	3299	1.62	1.55
Arctic tern	<i>Sterna paradisaea</i>	0	13	8	5	34	60	1.05	1.54
		1	37	29	35	37	138	1.43	1.54
		2	71	37	52	65	225	1.44	1.54
		3	125	34	83	63	305	1.56	1.54
		4	115	26	32	53	226	1.87	1.54
		5	7	6	23	3	39	1	1.54
		9	7	1	4	0	12	2	1.54
Common/Arctic tern	<i>S. hirundo / S. paradisaea</i>	0	2	0	34	16	52	0.12	0.56
		1	4	4	32	45	85	0.28	0.56
		2	10	48	47	143	248	0.7	0.56
		3	19	28	37	51	135	1.04	0.56
		4	0	5	2	60	67	0.22	0.56
		5	1			29	30	0.1	0.56
		9	49	35	94	297	475	0.53	0.56
Little tern	<i>Sterna albifrons</i>	1				2	2	0	1.38
		2	12	1		3	16	2.44	1.38
		3				4	4	0	1.38
		4				2	2	0	1.38
		9	2	1	1		4	2.25	1.38
Black tern	<i>Chlidonias niger</i>	0			1	12	13	0	1.38
		1	3	1			4	3	1.38
		2	2	1	2	0	5	1.8	1.38
		3	1			3	4	0.75	1.38
		4	0	0	2	4	6	0	1.38
		9	3	9		1	13	2.77	1.38
Tern sp.	<i>Sterna spec.</i>	1				1	1	0	1.38
		2			2	6	8	0	1.38

Species	Scientific name	Sea state	A	B	C	D	Total	CCF	SF
		3	3	0	1	0	4	2.25	1.38
		4			15	15	30	0	1.38
Common guillemot	<i>Uria aalge</i>	0	4355	4383	5498	6938	21174	1.24	1.24
		1	6688	6926	8694	7944	30252	1.35	1.35
		2	10806	11928	14061	12571	49366	1.38	1.38
		3	11380	12938	14836	13986	53140	1.37	1.37
		4	6760	7340	7963	6586	28649	1.48	1.48
		5	2845	2748	3438	2346	11377	1.47	1.47
		9	6807	7010	7183	5537	26537	1.56	0.64
Guillemot/razorbill	<i>Alca torda/Uria aalge</i>	0	221	158	325	1042	1746	0.65	0.64
		1	633	215	846	1428	3122	0.81	0.64
		2	218	505	1052	1296	3071	0.71	0.64
		3	264	279	937	2343	3823	0.43	0.64
		4	186	100	275	560	1121	0.77	0.64
		5	48	30	101	89	268	0.87	0.64
		9	251	257	408	1711	2627	0.58	0.64
Razorbill	<i>Alca torda</i>	0	670	675	879	780	3004	1.34	1.4
		1	1024	1314	1751	1300	5389	1.3	1.4
		2	1724	2012	2458	1768	7962	1.41	1.4
		3	2135	2425	2721	2552	9833	1.39	1.4
		4	1193	1316	1599	1086	5194	1.45	1.4
		5	526	454	614	489	2083	1.41	1.4
		9	1174	1337	1324	1309	5144	1.46	1.4
Black guillemot	<i>Cephus grylle</i>	0	8	26	26	14	74	1.38	1.59
		1	10	13	29	11	63	1.1	1.59
		2	49	35	31	20	135	1.87	1.59
		3	49	28	37	25	139	1.66	1.59
		4	23	24	15	19	81	1.74	1.59
		5	7	5	9	8	29	1.24	1.59
		9	0	1	2	0	3	1	1.59
Little auk	<i>Alle alle</i>	0	21	17	24	22	84	1.36	1.83
		1	37	28	24	12	101	1.93	1.83
		2	69	54	33	34	190	1.94	1.83
		3	121	79	84	40	324	1.85	1.83
		4	87	91	66	29	273	1.96	1.83
		5	95	69	67	37	268	1.84	1.83
		9	1				1	3	1.83
Atlantic puffin		0	984	967	1231	1075	4257	1.37	1.46

Species	Scientific name	Sea state	A	B	C	D	Total	CCF	SF
	<i>Fratercula arctica</i>	1	1447	1279	1597	1387	5710	1.43	1.46
		2	3736	3823	4308	3345	15212	1.49	1.46
		3	2867	2641	2690	1898	10096	1.64	1.67
		4	1366	1335	1191	912	4804	1.69	1.67
		5	578	537	489	276	1880	1.78	1.67
		9	122	131	155	112	520	1.46	1.46
Auk sp.	<i>Alcidae sp.</i>	0	3	4	15	135	157	0.13	1.01
		1	8	17	53	20	98	0.77	1.01
		2	23	19	56	41	139	0.91	1.01
		3	50	47	20	24	141	2.06	1.01
		4	23	11	14	51	99	1.03	1.01
		5	7	4	5	5	21	1.57	1.01
		9	1				1	3	1.01

1.2 Correction for responsive movement of seabirds towards ships in boat-based surveys

- 3 An additional scaling factor was applied to abundance estimates for species for which there was evidence in Kober *et al.* (2010) as having inflated abundance estimates, probably as a result of generic responsive movement towards survey ships. The same scaling factors as Kober *et al.* (2010) were used and are presented in Table A2.

Table A2 **Scaling factors used for species which show responsive movement towards boats during offshore surveys according to the time of year**

Name	Scientific name	Months	SF
Northern fulmar	<i>Fulmarus glacialis</i>	Mar. to Jul.	0.37
		Aug. To Feb.	0.45
Northern gannet	<i>Morus bassanus</i>	May to Sep.	0.86
		Oct. to Apr.	0.73
Great skua	<i>Stercorarius skua</i>	May to Aug.	0.64
		Sep. to Apr.	0.81
Great black-backed gull	<i>Larus marinus</i>	Apr. to Aug.	0.72
		Sep. to Mar.	0.21
Black-legged kittiwake	<i>Rissa tridactyla</i>	Oct. to Apr.	0.66

1.3 Correction for distance effects on detection rates in visual aerial surveys

4 Scaling factors were applied to visual aerial survey data to account for distance effects on detection rates. These are given separately for surveys carried out prior to 2003 in Table A3 and those carried out from 2003 onwards in Table A4. A high proportion of observations from surveys carried out prior to 2003 lacked distance information, so where sample sizes were too small, the scaling factors were taken from surveys carried out from 2003 onwards (Table A5).

Table A3 Scaling factors used to correct for distance effects on detection rates for seabirds recorded during visual aerial surveys prior to 2003. A = number in Band A (44 – 163m); O = number in Band O (163 – 426m); D = number in Band D (426 – 1000m); CCF = calculated correction factor; and SF = scaling factor applied for the species/species group. * denotes species with scaling factors taken from Table A5.

Species	Scientific name	A	O	D	Total	CCF	SF
Red-throated diver *	<i>Gavia stellata</i>				0		5.49
Great northern diver *	<i>Gavia immer</i>				0		4.99
Diver sp. *	<i>Gavia sp.</i>	2	2		4		4.83
Great crested grebe *	<i>Podiceps cristatus</i>				0		5.53
Grebe sp. *	<i>Podiceps sp.</i>				0		5.53
Northern fulmar	<i>Fulmarus glacialis</i>	12	23	4	39	2.47	2.47
Manx shearwater	<i>Puffinus puffinus</i>	27	1		28	7.75	7.75
Northern gannet	<i>Morus bassanus</i>	151	214	165	530	2.29	2.29
Great cormorant	<i>Phalacrocorax carbo</i>	103	180	103	386	2.14	2.14
European shag	<i>Phalacrocorax aristotelis</i>	7	10		17	3.31	3.31
Cormorant sp.	<i>Phalacrocorax sp.</i>	22	71	15	108	1.64	1.64
Greater scaup *	<i>Aythya marila</i>				0		2.36
Common eider	<i>Somateria mollissima</i>	5	5		10	4.02	4.02
Long-tailed duck *	<i>Clangula hyemalis</i>				0		2.36
Common scoter	<i>Melanitta nigra</i>	318	2909	3191	6418	0.4	0.4
Scoter sp. *	<i>Melanitta sp.</i>				0		1
Velvet scoter *	<i>Melanitta fusca</i>				0		1
Common goldeneye *	<i>Bucephala clangula</i>				0		2.36
Red-breasted merganser *	<i>Mergus serrator</i>				0		4.69
Duck sp. *	<i>Anatidae sp.</i>				0		1.67
Arctic skua *	<i>Stercorarius parasiticus</i>				0		4.86
Great skua *	<i>Stercorarius skua</i>	1			1		4.86
Little gull *	<i>Hydrocoloeus minutus</i>				0		5.05
Black-headed gull	<i>Chroicocephalus ridibundus</i>	42	7		49	6.89	6.89
Common gull *	<i>Larus canus</i>	1			1		6.46
Lesser black-backed gull	<i>Larus fuscus</i>	232	105	17	354	5.26	5.26

Species	Scientific name	A	O	D	Total	CCF	SF
Herring gull	<i>Larus argentatus</i>	76	58	11	145	4.21	4.21
Common/herring gull *	<i>L. canus/L. argentatus</i>				0		4.21
Great black-backed gull *	<i>Larus marinus</i>	5	8		13		5.39
Large gull sp. *	<i>Larus sp.</i>				0		2.57
Black-backed gull *	<i>L. fuscus/L. marinus</i>				0		3.5
Black-legged kittiwake	<i>Rissa tridactyla</i>	326	232	21	579	4.52	4.52
Gull sp.	<i>Larus sp.</i>	1461	2026	2190	5677	2.07	2.07
Sandwich tern *	<i>Sterna sandvicensis</i>	16	1		17		5.56
Common tern *	<i>Sterna hirundo</i>	3	2		5		6.43
Common/Arctic tern	<i>S. hirundo/S. paradisaea</i>	24	6		30	6.43	6.43
Little tern *	<i>Sterna albifrons</i>	1	2		3		4.46
Tern sp.	<i>Sterna sp.</i>	78	50	105	233	2.69	2.69
Common guillemot/razorbill *	<i>Alca torda/Uría aalge</i>				0		4
Auk sp.	<i>Alcid sp.</i>	565	566	4	1135	4	4

Table A4 **Scaling factors used to correct for distance effects on detection rates for seabirds recorded during visual aerial surveys from 2003 onwards. A = number in Band A (44 – 163m); B = number in Band B (163 – 282m); C = number in Band C (282 – 426m); D = number in Band D (426 – 1000m); CCF = calculated correction factor; and SF = scaling factor applied for the species/species group.**

Species	Scientific name	A	B	C	D	Total	CCF	SF
Red-throated diver	<i>Gavia stellata</i>	651	242	59		952	5.493	5.49
Black-throated diver	<i>Gavia arctica</i>	1				1		4.99
Great northern diver	<i>Gavia immer</i>	26	15	11		52	4.016	4.99
Diver sp.	<i>Gavia sp.</i>	1613	914	133	24	2684	4.827	4.83
Great crested grebe	<i>Podiceps cristatus</i>	19	3			22		5.53
Grebe sp.	<i>Podiceps sp.</i>	23	16			39	4.737	5.53
Northern fulmar	<i>Fulmarus glacialis</i>	1085	516	103	16	1720	5.067	5.07
Manx shearwater	<i>Puffinus puffinus</i>	15532	10498	4296	900	31226	3.995	4
Shearwater sp.	<i>Puffinus sp.</i>	129	104	90	1	324	3.198	3.2
European storm-petrel	<i>Hydrobates pelagicus</i>	31	6			37	6.730	6.8
Storm-petrel sp.	<i>O. leucorhoa / H. pelagicus</i>	2				2		6.8
Northern gannet	<i>Morus bassanus</i>	4228	3474	2796	1822	12320	2.756	2.76
Great cormorant	<i>Phalacrocorax carbo</i>	787	610	368	1259	3024	2.090	2.09
European shag	<i>Phalacrocorax aristotelis</i>	238	246	33		517	3.698	3.7
Cormorant sp.	<i>Phalacrocorax sp.</i>	138	178	88	135	539	2.056	2.06
Greater scaup	<i>Aythya marila</i>	1				1		2.36
Common eider	<i>Somateria mollissima</i>	989	1318	134	73	2514	3.160	3.16

Species	Scientific name	A	B	C	D	Total	CCF	SF
Long-tailed duck	<i>Clangula hyemalis</i>	1	1			2		2.36
Common scoter	<i>Melanitta nigra</i>	30646	41304	23619	9702	105271	2.338	2.34
Scoter sp.	<i>Melanitta sp.</i>					0		2.36
Velvet scoter	<i>Melanitta fusca</i>	7	5	1		13		2.36
Common goldeneye	<i>Bucephala clangula</i>					0		2.36
Red-breasted merganser	<i>Mergus serrator</i>	104	67	7		178	4.693	4.69
Duck sp.	<i>Anatidae sp.</i>	32	48	56	18	154	1.669	1.67
Pomarine skua	<i>Stercorarius pomarinus</i>							4.86
Arctic skua	<i>Stercorarius parasiticus</i>	2	4			6		4.86
Great skua	<i>Stercorarius skua</i>	17	6	2		25		4.86
Skua sp.	<i>Stercorarius sp.</i>	4	3			7	4.590	4.86
Little gull	<i>Hydrocoloeus minutus</i>	193	74	40		307	5.050	5.05
Black-headed gull	<i>Chroicocephalus ridibundus</i>	1235	448	47	32	1762	5.630	5.63
Common gull	<i>Larus canus</i>	940	172	57		1169	6.459	6.46
Small gull sp.	<i>Larus/Rissa sp.</i>	1125	645	238	11	2019	4.476	4.48
Lesser black-backed gull	<i>Larus fuscus</i>	1078	410	46	1	1535	5.641	5.64
Herring gull	<i>Larus argentatus</i>	3372	1974	408	25	5779	4.687	4.69
Common/herring gull	<i>L. canus/L. argentatus</i>	1652	1079	368	295	3394	3.910	3.91
Great black-backed gull	<i>Larus marinus</i>	413	168	34	1	616	5.386	5.39
Large gull sp.	<i>Larus sp.</i>	861	791	848	194	2694	2.567	2.57
Black-backed gull sp.	<i>L. fuscus/L. marinus</i>	725	665	255	17	1662	3.504	3.5
Black-legged kittiwake	<i>Rissa tridactyla</i>	7451	4000	557	49	12057	4.964	4.96
Gull sp.	<i>Larus sp.</i>	8133	7184	5045	4713	25075	2.605	2.61
Sandwich tern	<i>Sterna sandvicensis</i>	117	51	1		169	5.561	5.56
Arctic tern	<i>Sterna paradisaea</i>	1				1		5.29
Common/Arctic tern	<i>S. hirundo/S. paradisaea</i>	818	378	46		1242	5.291059	5.29
Little tern	<i>Sterna albifrons</i>	7	2			9		4.46
Black tern	<i>Chlidonias niger</i>	2				2		4.46
Tern sp.	<i>Sterna sp.</i>	616	484	211	80	1391	3.557	3.56
Common guillemot	<i>Uria aalge</i>	471	21			492	7.690	7.69
Razorbill	<i>Alca torda</i>	116	5			121	7.701	7.7
Black guillemot	<i>Cepphus grylle</i>	8	6			14		5.44
Little auk	<i>Alle alle</i>	1				1		5.44
Atlantic puffin	<i>Fratercula arctica</i>	79	16			95	6.680	6.68
Auk sp.	<i>Alcidae sp.</i>	49664	20432	3311	193	73600	5.420	5.42

1.4 Correction for availability bias in digital video aerial surveys

- 5 A scaling factor was used to correct for availability bias for species recorded during digital video aerial surveys in Table A5.

Table A5 **Scaling factors used for correcting availability bias for diving seabirds and the source for these scaling factors**

Species	Scientific name	Availability correction	Source/notes
Red-throated diver	<i>Gavia stellata</i>	0.56	Polak and Ciach (2007)
Black-throated diver	<i>Gavia arctica</i>	0.56	Assumed from Polak and Ciach (2007)
Great northern diver	<i>Gavia immer</i>	0.56	Assumed from Polak and Ciach (2007)
Diver sp.	<i>Gavia sp.</i>	0.56	Assumed from Polak and Ciach (2007)
Northern fulmar	<i>Fulmarus glacialis</i>	1	Forewind (2013)
Sooty shearwater	<i>Puffinus griseus</i>	1	Forewind (2013)
Manx shearwater	<i>Puffinus puffinus</i>	1	Forewind (2013)
Shearwater sp.	<i>Puffinus sp.</i>	1	Forewind (2013)
Northern gannet	<i>Morus bassanus</i>	1	Forewind (2013)
Great cormorant	<i>Phalacrocorax carbo</i>	0.79	Gremillet (1997)
European shag	<i>Phalacrocorax aristotelis</i>	0.6	Wanless <i>et al.</i> (1997)
Cormorant sp.	<i>Phalacrocorax sp.</i>	0.69	Averaged
Common eider	<i>Somateria mollissima</i>	0.85	Guillemette (1998)
Common scoter	<i>Melanitta nigra</i>	0.76	Zydelis and Richman (2015)
Red-breasted merganser	<i>Mergus serrator</i>	0.73	Averaged
Duck sp.	<i>Anatidae sp.</i>	0.77	Averaged
Pomarine skua	<i>Stercorarius pomarinus</i>	1	Forewind (2013)
Arctic skua	<i>Stercorarius parasiticus</i>	1	Forewind (2013)
Great skua	<i>Stercorarius skua</i>	1	Forewind (2013)
Skua sp.	<i>Stercorarius sp.</i>	1	Forewind (2013)
Little gull	<i>Hydrocoloeus minutus</i>	1	Forewind (2013)
Black-headed gull	<i>Chroicocephalus ridibundus</i>	1	Forewind (2013)
Common gull	<i>Larus canus</i>	1	Forewind (2013)
Small gull sp.	<i>Larus/Rissa sp.</i>	1	Forewind (2013)
Lesser black-backed gull	<i>Larus fuscus</i>	1	Forewind (2013)
Herring gull	<i>Larus argentatus</i>	1	Forewind (2013)
Great black-backed gull	<i>Larus marinus</i>	1	Forewind (2013)
Large gull sp.	<i>Larus sp.</i>	1	Forewind (2013)
Black-backed gull sp.	<i>L. fuscus/L. marinus</i>	1	Forewind (2013)
Black-legged kittiwake	<i>Rissa tridactyla</i>	1	Forewind (2013)

Species	Scientific name	Availability correction	Source/notes
Gull sp.	<i>Larus sp.</i>	1	Forewind (2013)
Common/Arctic tern	<i>S. hirundo/S. paradisaea</i>	1	Forewind (2013)
Tern sp.	<i>Sterna spec.</i>	1	Forewind (2013)
Common guillemot	<i>Uria aalge</i>	0.82	Forewind (2013)
Common guillemot/razorbill	<i>Alca torda/Uria aalge</i>	0.83	Averaged
Razorbill	<i>Alca torda</i>	0.84	Forewind (2013)
Little auk	<i>Alle alle</i>	0.74	Forewind (2013)
Atlantic puffin	<i>Fratercula arctica</i>	0.8	Forewind (2013)
Auk sp.	<i>Alcidae sp.</i>	0.8	Forewind (2013)