

**Table S2. Details of the AIC<sub>c</sub> analysis used to choose the most appropriate detection function for each avian guild.**

Birds were surveyed on the Coxe Islands, Igloolik Island and the northern tip of the Melville Peninsula, Nunavut, from 2010-2012. The  $\Delta AIC_c$  value of the model used for each guild is bolded. If multiple models had a  $\Delta AIC_c < 4$ , the model with the least number of parameters was chosen to satisfy the rule of parsimony. Models with no  $\Delta AIC_c$  value (-) did not converge during parameter estimation.

Key function	Series expansion	# Adjustment terms	Covariates	# Parameters	$\Delta AIC_c$				
					Songbirds	Shorebirds	Gulls	Geese	Loons
Half Normal	-	0	-	1	9.80	15.75	<b>2.30</b>	6.39	<b>0.94</b>
Half Normal	-	0	Time	2	6.94	17.31	4.22	8.21	0.00
Half Normal	-	0	Rugged	2	9.81	16.73	0.00	6.46	1.74
Half Normal	-	0	Year	3	10.93	16.00	2.49	<b>0.00</b>	1.25
Half Normal	-	0	Julian Day	3	5.90	12.41	5.89	<b>3.71</b>	2.47
Half Normal	Cosine	1	-	2	8.66	<b>1.91</b>	4.28	7.56	2.93
Half Normal	Cosine	1	Time	3	6.04	3.55	6.21	9.41	1.95
Half Normal	Cosine	1	Rugged	3	8.71	3.09	2.00	7.76	3.71
Half Normal	Cosine	1	Year	4	9.94	2.89	4.49	1.70	7.89
Half Normal	Cosine	1	Julian Day	4	5.29	0.00	7.88	5.22	4.43
Half Normal	Hermite Poly.	1	-	2	11.71	17.66	4.29	8.35	2.94
Half Normal	Hermite Poly.	1	Time	3	-	-	-	-	-
Half Normal	Hermite Poly.	1	Rugged	3	-	-	2.00	-	-
Half Normal	Hermite Poly.	1	Year	4	-	-	-	-	-
Half Normal	Hermite Poly.	1	Julian Day	4	-	-	-	-	-
Hazard Rate	-	0	-	2	9.72	2.54	4.91	7.02	2.67
Hazard Rate	-	0	Time	3	9.74	8.00	6.64	8.85	5.37
Hazard Rate	-	0	Rugged	3	13.89	7.90	3.56	7.42	5.37
Hazard Rate	-	0	Year	4	13.01	7.58	7.17	3.86	5.56
Hazard Rate	-	0	Julian Day	4	<b>0.00</b>	7.67	8.57	5.14	7.27
Hazard Rate	Cosine	1	-	3	8.58	3.43	5.79	8.89	4.45
Hazard Rate	Cosine	1	Time	4	8.98	13.34	8.69	10.71	7.32
Hazard Rate	Cosine	1	Rugged	4	10.01	13.31	5.11	8.87	7.32
Hazard Rate	Cosine	1	Year	5	11.94	13.47	10.67	5.54	7.89
Hazard Rate	Cosine	1	Julian Day	5	-	13.27	10.69	7.56	9.19
Hazard Rate	Simply Poly.	1	-	3	11.44	2.89	6.62	9.02	4.25
Hazard Rate	Simply Poly.	1	Time	4	10.01	7.93	-	10.83	5.70
Hazard Rate	Simply Poly.	1	Rugged	4	14.82	8.10	5.16	9.32	5.77
Hazard Rate	Simply Poly.	1	Year	5	12.40	7.79	8.61	5.52	7.13
Hazard Rate	Simply Poly.	1	Julian Day	5	0.97	8.96	9.90	7.09	5.05