Wildlife Biology

Appendix 1

Details of models from stepwise selection according to AIC for explaining 1 the likelihood of a call-up stations being visited by four lion groups (any lions –visited, adult male lions, adult female lions and adult females with cubs) and spotted hyena, and 2) lion group size, number adult males, number of adult females and number of cubs, from 101 call-up stations in 2005. For each response variable we show the starting model and all step models in increasing order of best fit according to AIC. For each model step we show included explanatory factors together with respective degrees of freedom. We also show AICc, AICc (Δi) and AIC(wi) and highlight models in grey where AICc (Δi) < 2 indicating substantial support of that models fit to the data.

Response variable and model step	Explanatory factors	AICc	AICc (Δi)	AIC(wi)
Visited				
1	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	137.293	12.037	0.001
2	HYENAS + s(Closest waterhole, 3) + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	134.062	8.807	0.006
3	HYENAS + s(Closest waterhole, 3) + s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	131.740	6.484	0.020
4	s(Closest waterhole, 3) + s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	129.630	4.375	0.057
5	s(Closest waterhole, 1) + s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	127.926	2.670	0.134
6	s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	126.485	1.229	0.275
7	s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	125.256	0.000	0.508
Adult males				
1	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	104.975	4.716	0.035
2	s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	102.802	2.543	0.104
3	s(Closest waterhole, 3) + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 3) ;	101.368	1.110	0.213
4	s(Closest waterhole, 3) + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 3) ;	100.853	0.594	0.276

5	s(Closest waterhole, 3) + PreyB + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 3) ;	100.259	0.000	0.371

Adult females

1	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	150.583	18.172	0.000
2	HYENAS + s(Closest waterhole, 3) + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	147.345	14.934	0.000
3	HYENAS + s(Closest waterhole, 1) + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	144.408	11.997	0.001
4	HYENAS + s(Closest waterhole, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	142.143	9.732	0.004
5	s(Closest waterhole, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	140.048	7.637	0.012
6	s(Closest waterhole, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	138.002	5.591	0.034
7	s(Closest waterhole, 1) + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 3) ;	137.216	4.805	0.051
8	s(Closest waterhole, 1) + s(sumNDVI, 3) + s(Latitude, 3) ;	135.350	2.939	0.130
9	s(Closest waterhole, 1) + s(sumNDVI, 1) + s(Latitude, 3) ;	134.455	2.044	0.203
10	s(Closest waterhole, 1) + s(Latitude, 3) ;	132.411	0.000	0.564

Females with cubs

1	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	65.523	10.790	0.002
2	HYENAS + s(Closest waterhole, 3) + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	62.810	8.076	0.008
3	HYENAS + s(Closest waterhole, 3) + s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	60.553	5.819	0.025
4	s(Closest waterhole, 3) + s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	58.479	3.745	0.070
5	s(Closest waterhole, 3) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	56.911	2.177	0.154
6	s(Closest waterhole, 3) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 1) ;	55.688	0.954	0.284
7	s(Closest waterhole, 3) + s(sumNDVI, 3) + s(rainfall, 3) ;	54.734	0.000	0.457

Hyena

1	s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	115.251	7.105	0.012
2	s(Closest waterhole, 3) + s(Latitude, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	112.991	4.845	0.037
3	s(Closest waterhole, 1) + s(Latitude, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	111.133	2.987	0.095
4	s(Latitude, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	109.895	1.748	0.176
5	s(Latitude, 1) + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 3) ;	109.131	0.985	0.258
6	s(Latitude, 1) + s(sumNDVI, 1) + s(rainfall, 1) + s(Latitude, 3) ;	108.146	0.000	0.422

Group size

1	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	422.350	10.161	0.003

2	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 1) ;	420.035	7.846	0.009
3	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) ;	417.852	5.662	0.027
4	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + s(sumNDVI, 3) + s(rainfall, 3) ;	415.890	3.700	0.073
5	HYENAS + s(Closest waterhole, 3) + s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 3) ;	415.121	2.932	0.108
6	HYENAS + s(Closest waterhole, 3) + s(sumNDVI, 3) + s(rainfall, 3) ;	412.982	0.793	0.314
7	HYENAS + s(Closest waterhole, 1) + s(sumNDVI, 3) + s(rainfall, 3) ;	412.190	0.000	0.466
Adult males				
1	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	152.882	4.458	0.039
2	s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	150.862	2.438	0.108
3	s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(sumNDVI, 1) + s(rainfall, 3) + s(Latitude, 3) ;	149.755	1.331	0.189
4	s(Closest waterhole, 1) + s(Latitude, 1) + PreyB + s(sumNDVI, 1) + s(rainfall, 3) + s(Latitude, 3) ;	148.851	0.427	0.296
5	s(Closest waterhole, 1) + s(Latitude, 1) + PreyB + s(rainfall, 3) + s(Latitude, 3) ;	148.424	0.000	0.367
Adult females				
1	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	227.058	14.946	0.000
2	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 1) ;	223.800	11.689	0.001
3	HYENAS + s(Closest waterhole, 3) + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 1) ;	221.176	9.064	0.005
4	HYENAS + s(Closest waterhole, 1) + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 1) ;	219.073	6.962	0.014
5	HYENAS + s(Closest waterhole, 1) + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) ;	216.797	4.686	0.043
6	HYENAS + s(Closest waterhole, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) ;	214.580	2.469	0.131
7	HYENAS + s(Closest waterhole, 1) + s(sumNDVI, 3) + s(rainfall, 3) ;	212.563	0.452	0.358
8	s(Closest waterhole, 1) + s(sumNDVI, 3) + s(rainfall, 3) ;	212.111	0.000	0.448
Cubs				
1	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	326.487	5.805	0.031
2	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 1) ;	324.072	3.390	0.105
3	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) ;	322.009	1.327	0.294
4	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + s(sumNDVI, 3) + s(rainfall, 3) ;	320.682	0.000	0.570

Appendix 2

Details of models from stepwise selection according to AIC for explaining 1) the likelihood of a call-up stations being visited by four lion groups (any lions –visited, adult male lions, adult female lions and adult females with cubs) and spotted hyena, and 2) lion group size, number adult males, number of adult females and number of cubs, from 124 call-up stations in 2006. For each response variable we show the starting model and all step models in increasing order of best fit according to AIC. For each model step we show included explanatory factors together with respective degrees of freedom. We also show AICc, AICc (Δi) and AIC(wi) and highlight models in grey where AICc (Δi) < 2 indicating substantial support of that models fit to the data.

Response variable and model step	Explanatory factors	AICc	AICc (Δi)	AIC(wi)
Visited				
1	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	181.789	13.316	0.001
2	HYENAS + s(Closest waterhole, 3) + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	179.196	10.724	0.002
3	s(Closest waterhole, 3) + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	177.109	8.636	0.007
4	s(Closest waterhole, 3) + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 3) ;	175.377	6.905	0.017
5	s(Closest waterhole, 3) + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(Latitude, 3) ;	173.280	4.807	0.048
6	s(Closest waterhole, 3) + PreyB + s(sumNDVI, 3) + s(Latitude, 3) ;	171.371	2.899	0.125
7	s(Closest waterhole, 1) + PreyB + s(sumNDVI, 3) + s(Latitude, 3) ;	169.854	1.382	0.267
8	s(Closest waterhole, 1) + s(sumNDVI, 3) + s(Latitude, 3) ;	168.472	0.000	0.533
Adult males				
1	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	95.664	6.255	0.024
2	HYENAS + s(Closest waterhole, 1) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	93.024	3.615	0.089
3	HYENAS + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	92.036	2.626	0.145
4	HYENAS + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 3) ;	91.374	1.964	0.202
5	HYENAS + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(Latitude, 3) ;	89.410	0.000	0.540
Adult females				

1	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	160.427	15.463	0.000
2	HYENAS + s(Closest waterhole, 1) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	157.710	12.745	0.001
3	HYENAS + s(Closest waterhole, 1) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 1) ;	155.428	10.463	0.002
4	HYENAS + s(Closest waterhole, 1) + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 1) ;	153.259	8.294	0.005
5	HYENAS + s(Closest waterhole, 1) + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 1) ;	151.226	6.261	0.015
6	HYENAS + s(Closest waterhole, 1) + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(Latitude, 1) ;	148.982	4.018	0.046
7	HYENAS + s(Closest waterhole, 1) + PreyB + s(sumNDVI, 3) + s(Latitude, 1) ;	147.133	2.168	0.115
8	HYENAS + s(Closest waterhole, 1) + PreyB + s(sumNDVI, 3) ;	145.920	0.955	0.211
9	HYENAS + s(Closest waterhole, 1) + s(sumNDVI, 3) ;	145.460	0.495	0.265
10	s(Closest waterhole, 1) + s(sumNDVI, 3) ;	144.964	0.000	0.340

Females with cubs

1	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	93.369	19.458	0.000
2	HYENAS + s(Closest waterhole, 3) + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	90.222	16.312	0.000
3	HYENAS + s(Closest waterhole, 1) + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	87.310	13.399	0.000
4	HYENAS + s(Closest waterhole, 1) + s(Closest river, 1) + PreyB + s(sumNDVI, 1) + s(rainfall, 3) + s(Latitude, 3) ;	84.511	10.600	0.002
5	HYENAS + s(Closest waterhole, 1) + s(Closest river, 1) + PreyB + s(sumNDVI, 1) + s(rainfall, 3) + s(Latitude, 1) ;	81.995	8.084	0.007
6	HYENAS + s(Closest waterhole, 1) + s(Closest river, 1) + PreyB + s(sumNDVI, 1) + s(rainfall, 3) ;	79.769	5.858	0.021
7	HYENAS + s(Closest river, 1) + PreyB + s(sumNDVI, 1) + s(rainfall, 3) ;	77.602	3.691	0.062
8	HYENAS + PreyB + s(sumNDVI, 1) + s(rainfall, 3) ;	75.699	1.788	0.161
9	HYENAS + s(sumNDVI, 1) + s(rainfall, 3) ;	74.136	0.225	0.352
10	HYENAS + s(rainfall, 3) ;	73.911	0.000	0.394

Hyena

1	s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	185.497	12.291	0.001
2	s(Closest waterhole, 3) + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	181.922	8.716	0.005
3	s(Closest waterhole, 1) + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	179.450	6.244	0.016
4	s(Closest waterhole, 1) + s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	177.516	4.310	0.042
5	s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	175.626	2.420	0.108
6	s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 3) ;	175.418	2.212	0.120
7	s(Closest river, 1) + s(sumNDVI, 3) + s(Latitude, 3) ;	173.290	0.084	0.347

	8	s(sumNDVI, 3) + s(Latitude, 3) ;	173.206	0.000	0.362
Group size					
	1	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	643.017	0.000	1.000
Adult males					
	1	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	119.810	7.390	0.013
	2	HYENAS + s(Closest waterhole, 1) + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	116.902	4.482	0.056
	3	HYENAS + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	114.884	2.464	0.153
	4	HYENAS + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 3) ;	113.856	1.436	0.255
	5	HYENAS + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(Latitude, 3) ;	112.420	0.000	0.523
Adult females					
	1	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	300.216	0.231	0.471
	2	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	299.985	0.000	0.529
Cubs					
	1	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	472.695	5.641	0.023
	2	s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	471.382	4.328	0.045
	3	s(Closest waterhole, 3) + s(Latitude, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	470.369	3.315	0.074
	4	s(Closest waterhole, 3) + s(Latitude, 1) + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 3) ;	469.571	2.517	0.110
	5	s(Closest waterhole, 1) + s(Latitude, 1) + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 3) ;	468.957	1.903	0.150
	6	s(Closest waterhole, 1) + s(Latitude, 1) + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 1) ;	468.297	1.243	0.209
	7	s(Closest waterhole, 1) + s(Latitude, 1) + s(sumNDVI, 3) + s(rainfall, 1) ;	467.054	0.000	0.389

Appendix 3

Details of models from stepwise selection according to AIC for explaining 1) the likelihood of a call-up stations being visited by four lion groups (any lions –visited, adult male lions, adult female lions and adult females with cubs) and spotted hyena, and 2) lion group size, number adult males, number of adult females and number of cubs, from 127 call-up stations in 2008. For each response variable we show the starting model and all step models in increasing order of best fit according to AIC. For each model step we show included explanatory factors together with respective degrees of freedom. We also show AICc, AICc (Δi) and AIC(wi) and highlight models in grey where AICc (Δi) < 2 indicating substantial support of that models fit to the data.

Response variable and model step	Explanatory factors	AICc	AICc (Δi)	AIC(wi)
Visited				
1	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	167.961	16.633	0.000
2	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(sumNDVI, 1) + s(rainfall, 3) + s(Latitude, 3) ;	164.308	12.980	0.001
3	HYENAS + s(Closest waterhole, 1) + s(Latitude, 1) + PreyB + s(sumNDVI, 1) + s(rainfall, 3) + s(Latitude, 3) ;	160.994	9.667	0.003
4	HYENAS + s(Closest waterhole, 1) + s(Closest river, 1) + PreyB + s(sumNDVI, 1) + s(rainfall, 3) + s(Latitude, 3) ;	158.626	7.299	0.011
5	HYENAS + s(Closest waterhole, 1) + s(Closest river, 1) + PreyB + s(sumNDVI, 1) + s(rainfall, 3) + s(Latitude, 1) ;	156.176	4.848	0.037
6	HYENAS + s(Closest waterhole, 1) + s(Closest river, 1) + s(sumNDVI, 1) + s(rainfall, 3) + s(Latitude, 1) ;	153.246	1.919	0.161
7	HYENAS + s(Closest waterhole, 1) + s(Closest river, 1) + s(rainfall, 3) + s(Latitude, 1) ;	151.603	0.275	0.366
8	HYENAS + s(Closest waterhole, 1) + s(Closest river, 1) + s(rainfall, 1) + s(Latitude, 1) ;	151.328	0.000	0.420
Adult males				
1	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	125.124	19.619	0.000
2	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	120.495	14.990	0.000
3	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 3) ;	116.947	11.442	0.001
4	HYENAS + s(Closest waterhole, 1) + s(Closest river, 3) + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 3) ;	113.809	8.304	0.007
5	HYENAS + s(Closest waterhole, 1) + s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 3) ;	110.693	5.188	0.033
6	HYENAS + s(Closest waterhole, 1) + s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 1) ;	107.833	2.328	0.138
7	s(Closest waterhole, 1) + s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 1) ;	105.801	0.296	0.380

	8	s(Closest waterhole, 1) + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 1) ;	105.505	0.000	0.441

Adult females

1	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	136.330	16.871	0.000
2	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + PreyB + s(sumNDVI, 1) + s(rainfall, 3) + s(Latitude, 3) ;	133.481	14.022	0.001
3	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + PreyB + s(sumNDVI, 1) + s(rainfall, 3) + s(Latitude, 1) ;	131.251	11.792	0.002
4	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + PreyB + s(sumNDVI, 1) + s(rainfall, 3) ;	129.041	9.583	0.005
5	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + PreyB + s(sumNDVI, 1) + s(rainfall, 1) ;	127.206	7.747	0.012
6	HYENAS + s(Closest waterhole, 3) + s(Closest river, 1) + PreyB + s(sumNDVI, 1) + s(rainfall, 1) ;	125.124	5.666	0.034
7	HYENAS + s(Closest waterhole, 3) + s(Closest river, 1) + PreyB + s(sumNDVI, 1) ;	123.004	3.546	0.098
8	HYENAS + s(Closest waterhole, 3) + s(Closest river, 1) + PreyB ;	120.926	1.468	0.276
9	HYENAS + s(Closest waterhole, 1) + s(Closest river, 1) + PreyB ;	119.458	0.000	0.574

Females with cubs

1	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	62.632	15.093	0.000
2	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	56.907	9.368	0.004
3	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 3) ;	53.385	5.846	0.023
4	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 1) ;	51.181	3.642	0.070
5	HYENAS + s(Closest waterhole, 1) + s(Closest river, 3) + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 1) ;	49.538	1.999	0.158
6	s(Closest waterhole, 1) + s(Closest river, 3)+ s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 1) ;	48.162	0.623	0.315
7	s(Closest waterhole, 1) + s(closest river 3) + s(sumNDVI, 3) + s(rainfall, 1) ;	47.539	0.000	0.430

Hyena

1	s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	194.916	11.694	0.002
2	s(Closest waterhole, 3) + s(Latitude, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	188.754	5.533	0.044
3	s(Closest waterhole, 1) + s(Latitude, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	185.215	1.994	0.257
4	s(Latitude, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	183.221	0.000	0.697

Group size

1	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	523.715	2.605	0.159
2	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(sumNDVI, 1) + s(rainfall, 3) + s(Latitude, 3) ;	522.770	1.661	0.255

3	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(rainfall, 3) + s(Latitude, 3) ;	521.110	0.000	0.586

Adult males

1	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	185.880	18.447	0.000
2	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	182.577	15.145	0.000
3	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 3) ;	179.665	12.232	0.001
4	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 1) ;	177.217	9.785	0.004
5	s(Closest waterhole, 3) + s(Latitude, 1) + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 1) ;	175.078	7.646	0.012
6	s(Closest waterhole, 1) + s(Latitude, 1) + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 1) ;	173.795	6.363	0.023
7	s(Closest waterhole, 1) + s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 1) ;	171.837	4.405	0.060
8	s(Closest waterhole, 1) + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 1) ;	170.127	2.695	0.142
9	s(Closest waterhole, 1) + s(sumNDVI, 1) + s(rainfall, 1) + s(Latitude, 1) ;	169.340	1.907	0.211
10	s(Closest waterhole, 1) + s(rainfall, 1) + s(Latitude, 1) ;	167.432	0.000	0.547

Adult females

1	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	268.242	3.474	0.073
2	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(sumNDVI, 1) + s(rainfall, 3) + s(Latitude, 3) ;	266.985	2.217	0.136
3	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(rainfall, 3) + s(Latitude, 3) ;	264.945	0.176	0.378
4	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(rainfall, 3) + s(Latitude, 1) ;	264.768	0.000	0.413

cubs

1	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	313.900	9.086	0.006
2	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	309.776	4.962	0.046
3	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + s(sumNDVI, 1) + s(rainfall, 3) + s(Latitude, 3) ;	307.572	2.758	0.139
4	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + s(sumNDVI, 1) + s(rainfall, 1) + s(Latitude, 3) ;	306.322	1.508	0.259
5	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + s(sumNDVI, 1) + s(Latitude, 3) ;	304.813	0.000	0.551

Appendix 4

Details of models from stepwise selection according to AIC for explaining 1) the likelihood of a call-up stations being visited by four lion groups (any lions –visited, adult male lions, adult female lions and adult females with cubs) and spotted hyena, and 2) lion group size, number adult males, number of adult females and number of cubs, from 225 call-up stations grouped from sampling in 2005 and 2006 (2005/2006 sampling period). For each response variable we show the starting model and all step models in increasing order of best fit according to AIC. For each model step we show included explanatory factors together with respective degrees of freedom. We also show AICc, AICc (Δi) and AIC(wi) and highlight models in grey where AICc (Δi) < 2 indicating substantial support of that models fit to the data.

Response variable and model step		Explanatory factors	AICc	AICc (Δi)	AIC(wi)
Visited					
	1	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	318.370	13.027	0.001
	2	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	314.508	9.165	0.006
	3	HYENAS + s(Closest waterhole, 1) + s(Latitude, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	311.341	5.998	0.027
	4	HYENAS + s(Closest waterhole, 1) + s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	308.500	3.157	0.113
	5	s(Closest waterhole, 1) + s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	306.503	1.160	0.306
	6	s(Closest waterhole, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	305.343	0.000	0.547
Adult males					
	1	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	204.063	4.356	0.029
	2	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 3) ;	203.452	3.745	0.039
	3	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(Latitude, 3) ;	201.813	2.106	0.088
	4	HYENAS + s(Closest waterhole, 1) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(Latitude, 3) ;	201.467	1.760	0.105
	5	HYENAS + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(Latitude, 3) ;	200.895	1.188	0.140
	6	HYENAS + s(Closest river, 1) + s(sumNDVI, 3) + s(Latitude, 3) ;	200.482	0.775	0.172
	7	HYENAS + s(Closest river, 1) + s(sumNDVI, 3) + s(Latitude, 3) ;	200.469	0.762	0.173
	8	HYENAS + s(sumNDVI, 3) + s(Latitude, 3) ;	199.707	0.000	0.253

Adult females

1	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	296.122	21.397	0.000
2	HYENAS + s(Closest waterhole, 3) + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	292.270	17.545	0.000
3	HYENAS + s(Closest waterhole, 1) + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	288.892	14.167	0.000
4	HYENAS + s(Closest waterhole, 1) + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 1) ;	286.191	11.466	0.001
5	HYENAS + s(Closest waterhole, 1) + s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 1) ;	283.682	8.957	0.005
6	HYENAS + s(Closest waterhole, 1) + s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 1) ;	281.630	6.905	0.014
7	HYENAS + s(Closest waterhole, 1) + s(Closest river, 1) + s(sumNDVI, 3) + s(Latitude, 1) ;	279.411	4.686	0.044
8	HYENAS + s(Closest waterhole, 1) + s(Closest river, 1) + s(sumNDVI, 3) ;	277.280	2.555	0.127
9	HYENAS + s(Closest waterhole, 1) + s(sumNDVI, 3) ;	275.242	0.517	0.352
10	s(Closest waterhole, 1) + s(sumNDVI, 3) ;	274.725	0.000	0.456

Females with cubs

1	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	153.920	17.321	0.000
2	HYENAS + s(Closest waterhole, 3) + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	150.297	13.698	0.000
3	HYENAS + s(Closest waterhole, 3) + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 3) ;	147.484	10.886	0.002
4	HYENAS + s(Closest waterhole, 3) + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 1) ;	145.227	8.629	0.006
5	HYENAS + s(Closest waterhole, 3) + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(Latitude, 1) ;	143.145	6.547	0.017
6	HYENAS + s(Closest waterhole, 3) + PreyB + s(sumNDVI, 3) + s(Latitude, 1) ;	141.268	4.670	0.044
7	HYENAS + s(Closest waterhole, 3) + PreyB + s(sumNDVI, 1) + s(Latitude, 1) ;	140.451	3.852	0.067
8	HYENAS + s(Closest waterhole, 3) + PreyB + s(Latitude, 1) ;	138.522	1.924	0.175
9	HYENAS + s(Closest waterhole, 1) + PreyB + s(Latitude, 1) ;	137.987	1.388	0.229
10	HYENAS + PreyB + s(Latitude, 1) ;	136.598	0.000	0.459

Hyena

1	year + s(Closest waterhole, 3) + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	289.470	6.841	0.015
2	year + s(Closest waterhole, 3) + s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	286.018	3.390	0.085
3	s(Closest waterhole, 3) + s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	284.240	1.611	0.207
4	s(Closest waterhole, 1) + s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	284.042	1.413	0.229
5	s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	282.629	0.000	0.464

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Groupsize

1	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	1146.511	0.100	0.488
2	HYENAS + s(Closest waterhole, 3) + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	1146.411	0.000	0.512

Adult males

1	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	283.692	2.730	0.096
2	HYENAS + s(Closest waterhole, 1) + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	282.113	1.151	0.211
3	HYENAS + s(Closest waterhole, 1) + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	281.294	0.331	0.318
4	HYENAS + s(Closest waterhole, 1) + s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	280.962	0.000	0.375

Adult females

1	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	529.723	12.455	0.001
2	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	525.978	8.709	0.007
3	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 3) ;	523.403	6.135	0.025
4	HYENAS + s(Closest waterhole, 3) + s(Latitude, 1) + s(sumNDVI, 3) + s(Latitude, 3) ;	521.217	3.949	0.075
5	HYENAS + s(Closest waterhole, 1) + s(Latitude, 1) + s(sumNDVI, 3) + s(Latitude, 3) ;	520.136	2.867	0.129
6	HYENAS + s(Closest waterhole, 1) + s(Latitude, 1) + s(sumNDVI, 3) + s(Latitude, 1) ;	519.083	1.815	0.219
7	HYENAS + s(Closest waterhole, 1) + s(Latitude, 1) + s(sumNDVI, 3) ;	517.269	0.000	0.543

Cubs

1	HYENAS + s(Closest waterhole, 3) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	866.107	1.534	0.317
2	s(Closest waterhole, 3) + s(Latitude, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	864.573	0.000	0.683

Appendix 5

Details of models from stepwise selection according to AIC for explaining 1) the likelihood of a call-up stations being visited by four lion groups (any lions –visited, adult male lions, adult female lions and adult females with cubs) and spotted hyena, and 2) lion group size, number adult males, number of adult females and number of cubs, from 352 call-up stations grouped from sampling in 2005, 2006 and 2008. For each response variable we show the starting model and all step models in increasing order of best fit according to AIC. For each model step we show included explanatory factors together with respective degrees of freedom. We also show AICc, AICc (Δi) and AIC(wi) and highlight models in grey where AICc (Δi) < 2 indicating substantial support of that models fit to the data.

Response variable and model step		Explanatory factors	AICc	AICc (Δi)	AIC(wi)
Visited					
	1	HYENAS + year + s(Closest waterhole 3) + s(Closest river 3) + PreyB + s(sumNDVI 3) + s(rainfall 3) + s(Latitude 3)	476.389	13.167	0.001
	2	HYENAS + year + s(Closest waterhole 3) + s(Closest river 3) + s(sumNDVI 3) + s(rainfall 3) + s(Latitude 3)	471.898	8.676	0.006
	3	HYENAS + year + s(Closest waterhole 1) + s(Closest river 3) + s(sumNDVI 3) + s(rainfall 3) + s(Latitude 3)	468.502	5.280	0.031
	4	HYENAS + year + s(Closest waterhole 1) + s(Closest river 1) + s(sumNDVI 3) + s(rainfall 3) + s(Latitude 3)	465.415	2.193	0.147
	5	HYENAS + year + s(Closest waterhole 1) + s(sumNDVI 3) + s(rainfall 3) + s(Latitude 3)	463.549	0.327	0.374
	6	year + s(Closest waterhole 1) + s(sumNDVI 3) + s(rainfall 3) + s(Latitude 3)	463.222	0.000	0.441
Adult males					
	1	HYENAS + year + s(Closest waterhole, 3) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	315.304	9.201	0.003
	2	HYENAS + year + s(Closest waterhole, 1) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	312.692	6.589	0.011
	3	HYENAS + year + s(Closest waterhole, 1) + s(Closest river, 3) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	309.960	3.857	0.045
	4	year + s(Closest waterhole, 1) + s(Latitude, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	308.697	2.594	0.084
	5	year + s(Closest waterhole, 1) + s(Latitude, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 1) ;	308.033	1.930	0.117
	6	s(Closest waterhole, 1) + s(Latitude, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 1) ;	307.604	1.501	0.145
	7	s(Closest waterhole, 1) + s(Latitude, 1) + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 1) ;	306.244	0.141	0.287

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8	s(Closest waterhole, 1) + s(Latitude, 1) + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 3) ;	306.103	0.000	0.308

Adult females

1	HYENAS + year + s(Closest waterhole, 3) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	418.097	18.782	0.000
2	HYENAS + year + s(Closest waterhole, 3) + s(Closest river, 3) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	414.054	14.739	0.000
3	HYENAS + year + s(Closest waterhole, 1) + s(Closest river, 3) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	410.292	10.977	0.002
4	HYENAS + year + s(Closest waterhole, 1) + s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	406.957	7.642	0.012
5	HYENAS + year + s(Closest waterhole, 1) + s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 1) ;	404.825	5.510	0.034
6	HYENAS + s(Closest waterhole, 1) + s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 1) ;	403.225	3.910	0.075
7	HYENAS + s(Closest waterhole, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 1) ;	401.986	2.671	0.139
8	HYENAS + s(Closest waterhole, 1) + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 1) ;	401.171	1.856	0.209
9	HYENAS + s(Closest waterhole, 1) + s(sumNDVI, 3) + s(Latitude, 1) ;	399.315	0.000	0.529

Females with cubs

1	HYENAS + year + s(Closest waterhole, 3) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	200.870	18.860	0.000
2	HYENAS + year + s(Closest waterhole, 3) + s(Closest river, 3) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	197.519	15.509	0.000
3	HYENAS + year + s(Closest waterhole, 3) + s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	194.703	12.693	0.001
4	HYENAS + year + s(Closest waterhole, 3) + s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 1) ;	192.563	10.553	0.003
5	HYENAS + year + s(Closest waterhole, 3) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 1) ;	190.527	8.517	0.008
6	HYENAS + year + s(Closest waterhole, 3) + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 1) ;	188.567	6.557	0.020
7	HYENAS + year + s(Closest waterhole, 3) + s(sumNDVI, 3) + s(Latitude, 1) ;	186.730	4.720	0.051
8	HYENAS + year + s(Closest waterhole, 3) + s(sumNDVI, 1) + s(Latitude, 1) ;	185.373	3.363	0.100
9	HYENAS + year + s(Closest waterhole, 3) + s(Latitude, 1) ;	183.347	1.337	0.277
10	HYENAS + year + s(Closest waterhole, 1) + s(Latitude, 1) ;	182.010	0.000	0.540

Hyena

1	year + s(Closest waterhole, 3) + s(Closest river, 1) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	468.024	10.673	0.003
2	year + s(Closest waterhole, 3) + s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	463.010	5.658	0.035
3	year + s(Closest waterhole, 1) + s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	460.731	3.379	0.109
4	s(Closest waterhole, 1) + s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	458.947	1.595	0.265

	5	s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	457.352	0.000	0.589

Group size

1	HYENAS + year + s(Closest waterhole, 3) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	1727.078	6.523	0.024
2	HYENAS + year + s(Closest waterhole, 3) + s(Closest river, 3) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	1721.637	1.083	0.359
3	HYENAS + year + s(Closest waterhole, 1) + s(Closest river, 3) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	1720.554	0.000	0.617

Adult males

1	HYENAS + year + s(Closest waterhole, 3) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	461.767	8.856	0.004
2	HYENAS + year + s(Closest waterhole, 3) + s(Closest river, 3) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	456.795	3.883	0.052
3	HYENAS + year + s(Closest waterhole, 1) + s(Closest river, 3) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	453.396	0.484	0.284
4	HYENAS + s(Closest waterhole, 1) + s(Latitude, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	453.303	0.392	0.298
5	HYENAS + s(Closest waterhole, 1) + s(Latitude, 1) + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 3) ;	452.911	0.000	0.362

Adult females

1	HYENAS + year + s(Closest waterhole, 3) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	812.991	10.865	0.002
2	HYENAS + year + s(Closest waterhole, 3) + s(Closest river, 3) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	808.796	6.671	0.014
3	HYENAS + year + s(Closest waterhole, 3) + s(Closest river, 1) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	807.069	4.944	0.032
4	HYENAS + year + s(Closest waterhole, 3) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	805.074	2.949	0.087
5	HYENAS + year + s(Closest waterhole, 3) + s(sumNDVI, 3) + s(rainfall, 1) + s(Latitude, 3) ;	803.591	1.466	0.183
6	HYENAS + year + s(Closest waterhole, 3) + s(sumNDVI, 1) + s(rainfall, 1) + s(Latitude, 3) ;	802.610	0.485	0.300
7	HYENAS + year + s(Closest waterhole, 1) + s(sumNDVI, 1) + s(rainfall, 1) + s(Latitude, 3) ;	802.125	0.000	0.382

Cubs

1	HYENAS + year + s(Closest waterhole, 3) + s(Closest river, 3) + PreyB + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3);	1207.025	4.824	0.082
2	HYENAS + year + s(Closest waterhole, 3) + s(Closest river, 3) + s(sumNDVI, 3) + s(rainfall, 3) + s(Latitude, 3) ;	1202.200	0.000	0.918

Appendix 6

Shapes of relationships between the likelihood of a station being visited and explanatory factors within best fit Generalised additive models selected according to AIC
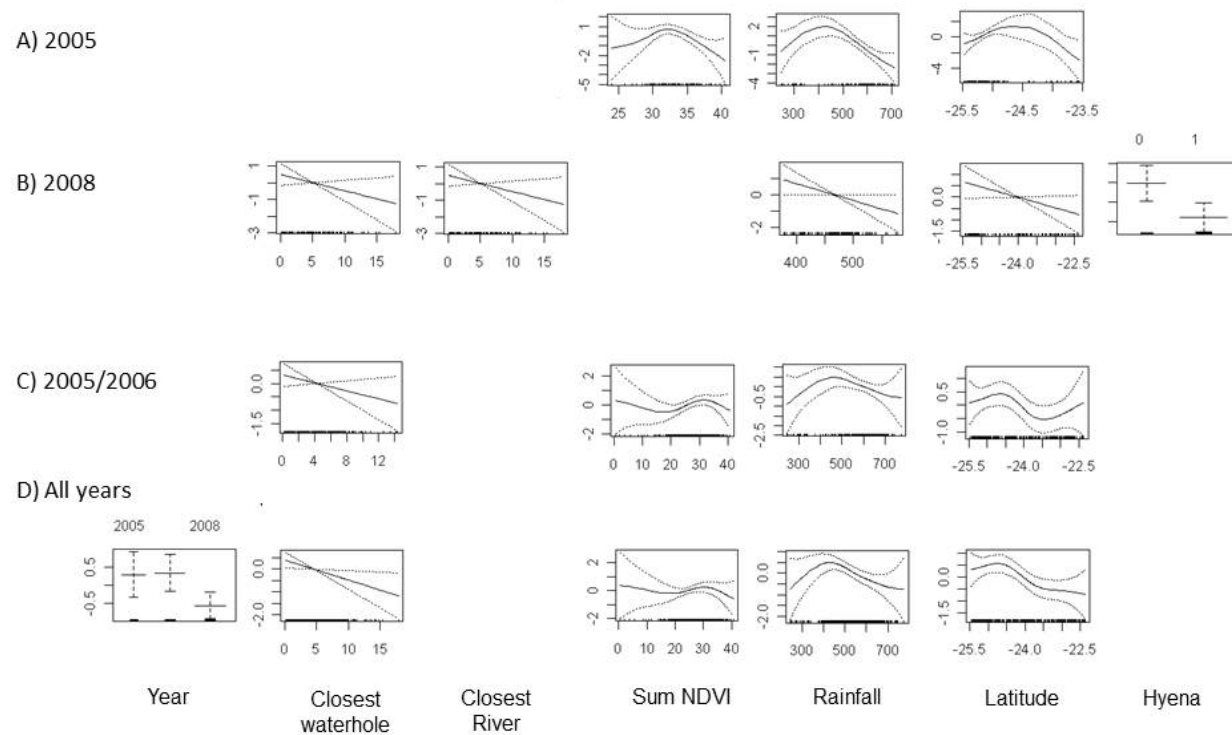

Figure A1. The probability of a station being visited (all y-axis values) as a function of explanatory factors in the best fit generalised additive model selected according to AIC (Appendix 1–5). Lines are a smoother through residuals generated by each model with three degrees of freedom and it is the shape rather than the values that represent the relationship. The error bar plots show the mean deviance from the mean of all values combined where small horizontal bars are one standard error.
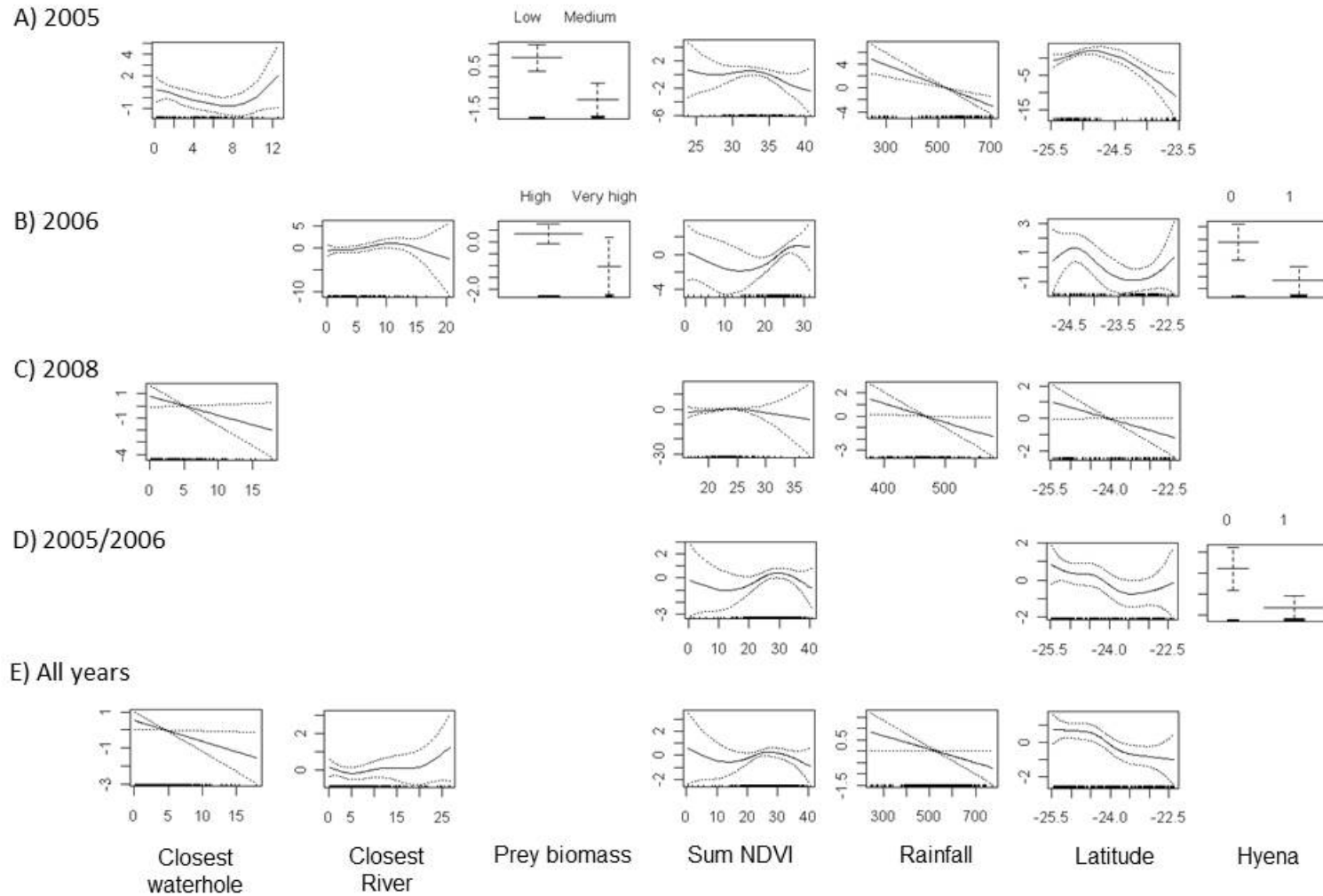
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Figure A2. The probability of a station being visited by adult male lions (all y-axis values) as a function of explanatory factors in the best fit generalised additive model selected according to AIC (Appendix 1–5). Lines are a smoother through residuals generated by each model with three degrees of freedom and it is the shape rather than the values that represent the relationship. The error bar plots show the mean deviance from the mean of all values combined where small horizontal bars are one standard error.
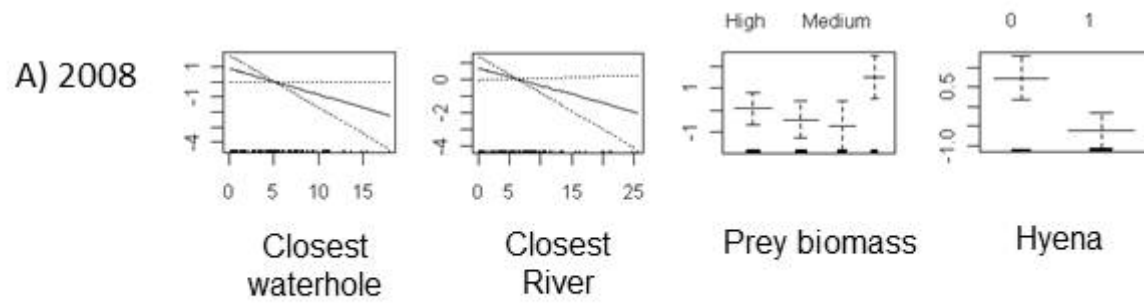
Figure A3. The probability of a station being visited by adult female lions (all y-axis values) as a function of explanatory factors in the best fit generalised additive model selected according to AIC (Appendix 1–5). Lines are a smoother through residuals generated by each model with three degrees of freedom and it is the shape rather than the values that represent the relationship. The error bar plots show the mean deviance from the mean of all values combined where small horizontal bars are one standard error.
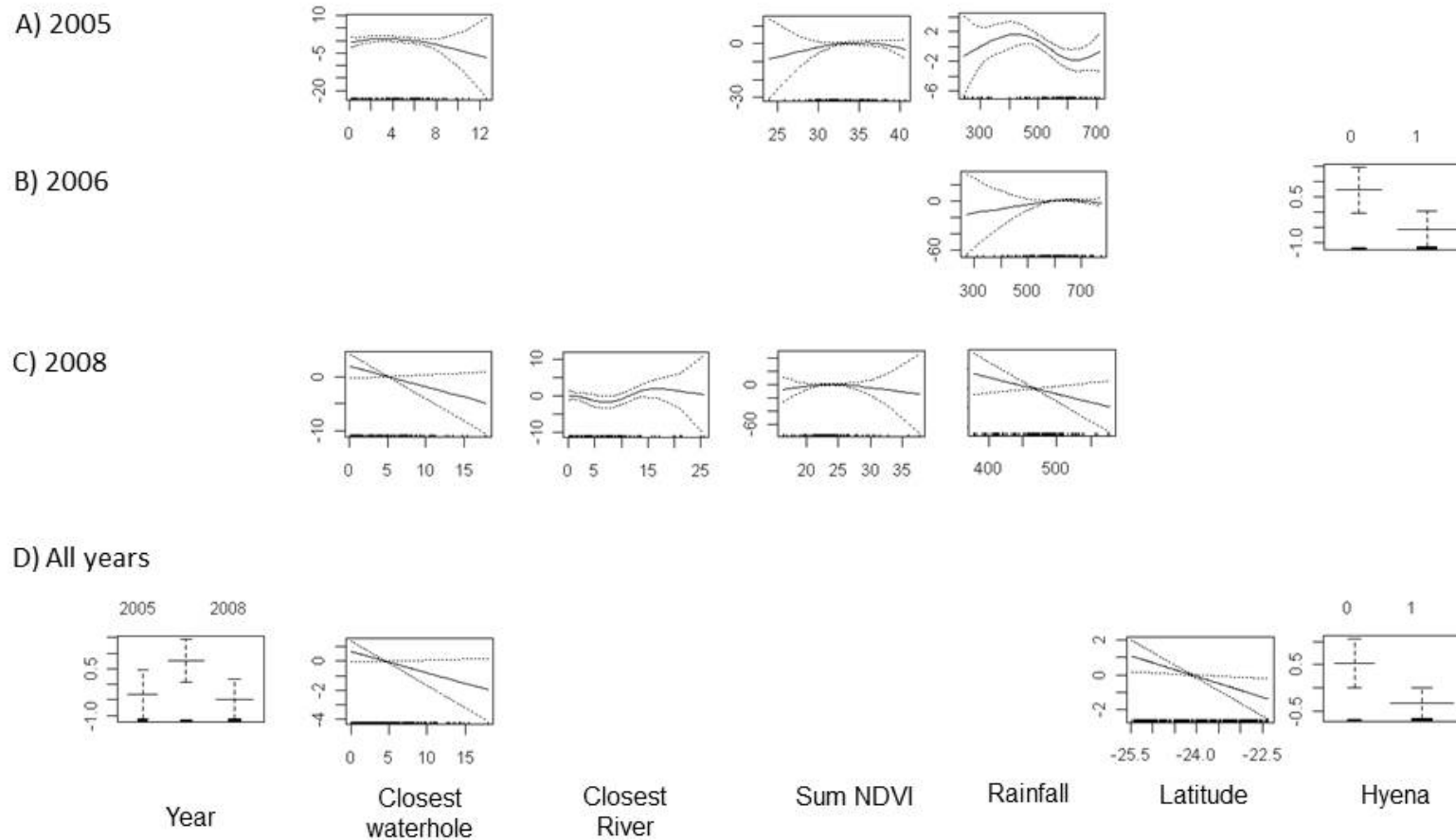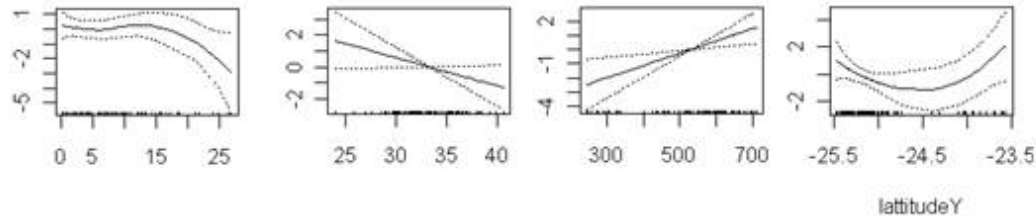
Figure A4. The probability of a station being visited by adult females with cubs (all y-axis values) as a function of explanatory factors in the best fit generalised additive model selected according to AIC (Appendix 1–5). Lines are a smoother through residuals generated by each model with three degrees of freedom and it is the shape rather than the values that represent the relationship. The error bar plots show the mean deviance from the mean of all values combined where small horizontal bars are one standard error.
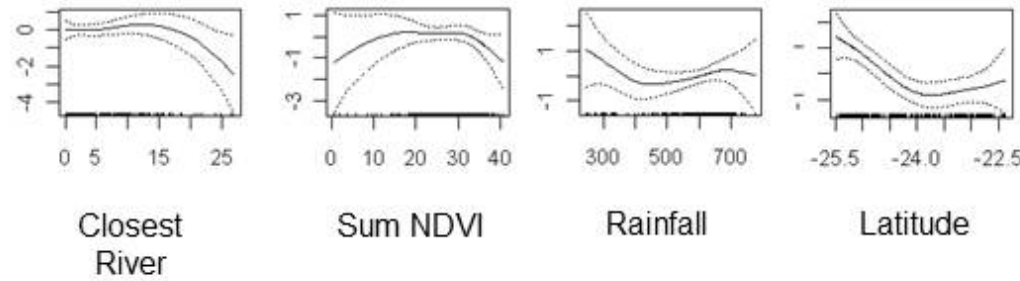
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Figure A5. The probability of a station being visited by hyenas (all y-axis values) as a function of explanatory factors in the best fit generalised additive model selected according to AIC (Appendix 1–5). Lines are a smoother through residuals generated by each model with three degrees of freedom and it is the shape rather than the values that represent the relationship. The error bar plots show the mean deviance from the mean of all values combined where small horizontal bars are one standard error.