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Appendix 1

Table 1. Survey counts and estimates for juvenile recruitment (Juv rec) for African buffalo, Kruger National Park, South Africa, 1969–2004.

	Southern Kruger		Northern Kruger	
Year	Survey count	Juv rec	Survey count	Juv rec
1969	11566		7490	
1970	13281		7861	
1971	11283		8502	
1972	12259		8792	
1973	12870		9145	
1974	13813		9478	
1975	14133		9583	
1976	15467		10985	
1977	15911		12086	
1978	17022		12650	
1979	16185		12671	
1980	15348	0.0991	12692	0.0933
1981	18299	0.1068	16598	0.1013
1982	17170	0.1066	15690	0.1054
1983	19431	0.0895	10056	0.0328
1984	15025	0.0620	9560	0.0986
1985	17418	0.0985	11629	0.1041
1986	17281	0.0887	11696	0.0913
1987	19151	0.0923	13873	0.1103
1988	18477	0.0889	13097	0.1074
1989	19025	0.0787	13161	0.0846
1990	17452	0.0688	12524	0.0734
1991	18414	0.0550	12701	0.0585
1992	13920	0.0749	9632	0.0651
1993	8184	0.0730	8087	0.0524
1994	8368	0.0840	7117	0.0562
1995	6927	0.0843	8063	0.0578
1996	7392	0.1710	9248	0.1609
1997	9661	0.1039	9816	0.1405
1998	9821	0.0900	11552	0.1157
1999	9081	0.1004	11314	0.0954
2000	9933	0.1194	12331	0.1047
2001	13288	0.1331	11867	0.1267
2002	11712	0.0926	11551	0.0861
2003	12752	0.0769	11026	0.0590
2004	15619	0.1304	12870	0.0716

Table 2. Results of autoregressive model selection for relationships between $\log_e$-transformed current abundance (X_t), juvenile recruitment, and previous abundance, for African Buffalo, Kruger National Park, South Africa, 1969–2004.

Response	Region	Models	AICc	ΔAICc
X_t	Northern	Intercept only	18.00	41.07
		X_{t-1}	–23.07	0.00
		X_{t-1}+ Xt–2	–20.51	2.56
		$X_{t-1} + X_{t-2} + X_{t-3}$	–18.69	4.38
	Southern	Intercept only	–11.86	25.18
		X_{t-1}	–36.17	0.87
		$X_{t-1} + X_{t-2}$	–37.04	0.00
		$X_{t-1} + X_{t-2} + X_{t-3}$	–34.18	2.86
Juvenile	Northern	Intercept only	–109.84	7.96
Recruitment		X_t	–108.94	8.86
		$X_t + X_{t-1}$	–117.80	0.00
		$X_t + X_{t-1} + X_{t-2}$	–114.81	2.99
		$X_t + X_{t-1} + X_{t-2} + X_{t-3}$	–111.13	6.67
	Southern	Intercept only	–100.62	6.99
		X_t	–99.73	7.88
		$X_t + X_{t-1}$	–104.17	3.44
		$X_t + X_{t-1} + X_{t-2}$	–107.61	0.00
		$X_t + X_{t-1} + X_{t-2} + X_{t-3}$	–104.49	3.12

Table 3. Comparison of candidate models of relationships between current abundance (X_t), and explanatory variables current wet-season rainfall, previous wet-season rainfall, previous dry-season rainfall, and Southern Oscillation index (SOI) for the previous and current year, after accounting for variation explained by previous year's $\log_e$-transformed abundance (X_{t-1}), for African buffalo, northern Kruger National Park, South Africa, 1969–2004.

Model	n	K	RSS	AICc	ΔAICc	w_i
Previous dry-season + Previous wet-season (T)	33	7	0.0093	–135.92	0.00	0.61
Current wet-season + Previous dry-season + Previous wet-season (T)	33	8	0.0087	–134.53	1.39	0.31
Previous wet-season (T)	33	6	0.0123	–129.81	6.11	0.03
Current wet-season + Previous wet-season (T)	33	7	0.0114	–129.17	6.75	0.02
Previous wet-season + Previous dry-season	33	5	0.0138	–129.07	6.85	0.02
Current wet-season + Previous wet-season + Previous dry-season	33	6	0.0136	–126.22	9.26	<0.01
Previous dry-season	33	4	0.0170	–125.02	10.90	<0.01
Previous wet-season	33	4	0.0180	–123.14	12.78	<0.01
Current SOI + Previous SOI (T)	33	7	0.0138	–122.80	13.12	<0.01
Previous SOI	33	4	0.0192	–120.96	14.96	<0.01
Previous wet-season + Previous dry-season + Current wet-season (T)	33	8	0.0132	–120.73	15.19	<0.01
Previous SOI (T)	33	6	0.0163	–120.61	15.31	<0.01
Current SOI + Previous SOI	33	5	0.0183	–119.82	16.10	<0.01
Previous dry-season + Current wet-season (T)	33	7	0.0162	–117.58	18.34	<0.01
Current SOI	33	4	0.0223	–116.05	19.87	<0.01
Previous wet-season + Current wet-season (T)	33	7	0.0171	–115.79	20.12	<0.01
Current wet-season	33	4	0.0227	–115.53	20.38	<0.01
Current SOI (T) + Previous SOI	33	7	0.0178	–114.55	21.37	<0.01
Current SOI (T)	33	6	0.0214	–111.56	24.36	<0.01
Current Wet-Season (T)	33	6	0.0221	–110.53	25.39	<0.01

Note: T: variable with a threshold form; otherwise, variable has a linear form. K: number of parameters. RSS: residual sum of squares. AICc: Akaike information criterion corrected for small sample size. ΔAICc: difference in AICc between the given model and the model with the lowest AICc. w_i: model probability, representing the probability that the model is the best given the candidate set.

Table 4. Comparison of candidate models of relationships between current abundance (X_t), and explanatory variables current wet-season rainfall, previous wet-season rainfall, previous dry-season rainfall, and Southern Oscillation index (SOI) for the previous and current year, after accounting for variation explained by $\log_e$-transformed previous year's abundance (X_{t-1}), for African buffalo, southern Kruger National Park, South Africa, 1969–2004.

Model	n	K	RSS	AICc	ΔAICc	w_i
Previous dry-season + Current wet-season (T)	33	7	0.0088	–137.74	0.00	0.21
Current wet-season (T)	33	6	0.0098	–137.37	0.37	0.18
Current wet-season + Previous dry-season + Previous wet-season	33	6	0.0099	–137.17	0.57	0.16
Current wet-season	33	4	0.0119	–136.81	0.93	0.13
Current wet-season (T) + Previous wet-season	33	7	0.0090	–136.79	0.95	0.13
Previous wet-season + Previous dry-season + Current wet-season (T)	33	8	0.0083	–136.21	1.52	0.10
Current wet-season + Previous dry-season + Previous wet-season (T)	33	8	0.0091	–133.11	4.63	0.02
Previous dry-season	33	4	0.0136	–132.41	5.32	0.01
Current SOI	33	4	0.0138	–132.02	5.72	0.01
Current wet-season + Previous wet-season (T)	33	7	0.0107	–131.16	6.57	<0.01
Previous wet-season + Previous dry-season	33	5	0.0131	–130.76	6.98	<0.01
Current SOI (T)	33	6	0.0120	–130.63	7.11	<0.01
Current SOI + Previous SOI	33	5	0.0134	–129.97	7.77	<0.01
Previous wet-season	33	4	0.0149	–129.44	8.29	<0.01
Current SOI + Previous SOI (T)	33	7	0.0116	–128.72	9.02	<0.01
Previous SOI	33	4	0.0153	–128.53	9.20	<0.01
Current SOI + Previous SOI (T)	33	7	0.0118	–127.90	9.84	<0.01
Previous dry-season + Previous wet-season (T)	33	7	0.0126	–125.88	11.86	<0.01
Previous SOI (T)	33	6	0.0143	–124.93	12.81	<0.01
Previous wet-season (T)	33	6	0.0146	–124.34	13.40	<0.01

Note: T: variable with a threshold form; otherwise, variable has a linear form. K: number of parameters. RSS: residual sum of squares. AICc: Akaike information criterion corrected for small sample size. ΔAICc: difference in AICc between the given model and the model with the lowest AICc. w_i: model probability, representing the probability that the model is the best given the candidate set.

Table 5. Comparison of candidate models of relationships between juvenile recruitment, and explanatory variables current wet-season rainfall, previous wet-season rainfall, previous dry-season rainfall, and Southern Oscillation index (SOI) for the previous and current year, after accounting for variation explained by $\log_e$-transformed abundance two years previous (X_t, X_{t-1}), for African buffalo, northern Kruger National Park, South Africa, 1980–2004.

Model	n	K	RSS	AICc	ΔAICc	w_i
Previous dry-season	25	5	0.0003	–190.69	0.00	0.29
Current wet-season	25	5	0.0003	–189.63	1.06	0.17
Current wet-season + Previous dry-season + Previous wet-season	25	7	0.0002	–189.47	1.22	0.16
Previous dry-season + Current wet-season (T)	25	8	0.0002	–188.62	2.07	0.10
Current SOI	25	5	0.0003	–187.87	2.82	0.07
Previous dry-season + Previous wet-season	25	6	0.0003	–187.60	3.09	0.06
Previous wet-season	25	5	0.0003	–187.06	3.63	0.05
Previous SOI	25	5	0.0003	–186.75	3.94	0.04
Current wet-season (T) + Previous dry-season + Previous wet-season	25	9	0.0002	–184.57	6.12	0.01
Current SOI + Previous SOI	25	6	0.0003	–184.38	6.31	0.01
Current wet-season (T)	25	7	0.0003	–184.24	6.45	0.01
Previous wet-season (T)	25	7	0.0003	–181.14	9.55	<0.01
Previous dry-season + Previous wet-season (T)	25	8	0.0003	–180.97	9.72	<0.01
Current SOI (T)	25	7	0.0003	–180.97	9.72	<0.01
Current wet-season + Previous dry-season + Previous wet-season (T)	25	9	0.0002	–180.61	10.08	<0.01
Current wet-season (T) + Previous wet-season	25	8	0.0003	–180.38	10.31	<0.01
Previous SOI (T)	25	7	0.0003	–179.68	11.00	<0.01
Current wet-season + Previous wet-season (T)	25	8	0.0003	–179.06	11.63	<0.01
Current SOI + Previous SOI (T)	25	8	0.0003	–176.97	13.72	<0.01
Previous SOI + Current SOI (T)	25	8	0.0003	–176.57	14.12	<0.01

Note: T: variable with a threshold form; otherwise, variable has a linear form. K: number of parameters. RSS: residual sum of squares. AICc: Akaike information criterion corrected for small sample size. ΔAICc: difference in AICc between the given model and the model with the lowest AICc. w_i: model probability, representing the probability that the model is the best given the candidate set.

Table 6. Comparison of candidate models of relationships between juvenile recruitment, and explanatory variables current wet-season rainfall, previous wet-season rainfall, previous dry-season rainfall, and Southern Oscillation index (SOI) for the previous and current year, after accounting for variation explained by $\log_e$-transformed abundance three years previous (X_t, X_{t-1}, X_{t-2}), for African buffalo, southern Kruger National Park, South Africa, 1980–2004.

Model	n	K	RSS	AICc	ΔAICc	w_i
Previous dry-season	25	6	0.0003	–185.00	0.00	0.58
Current wet-season + Previous dry-season + Previous wet-season	25	8	0.0002	–182.63	2.37	0.18
Previous dry-season + Previous wet-season	25	7	0.0003	–181.40	3.60	0.10
Previous dry-season + Current wet-season (T)	25	9	0.0002	–179.29	5.71	0.03
Current SOI	25	6	0.0004	–178.99	6.01	0.03
Current wet-season	25	6	0.0004	–178.95	6.05	0.03
Previous wet-season	25	6	0.0004	–177.76	7.25	0.02
Previous SOI	25	6	0.0004	–176.95	8.05	0.01
Previous SOI (T)	25	8	0.0003	–176.72	8.28	<0.01
Current SOI + Previous SOI	25	7	0.0004	–175.23	9.77	<0.01
Previous dry-season + Previous wet-season (T)	25	9	0.0003	–174.91	10.09	<0.01
Current wet-season (T) + Previous dry-season + Previous wet-season	25	10	0.0002	–173.86	11.15	<0.01
Current SOI (T)	25	8	0.0004	–173.00	12.00	<0.01
Previous wet-season (T)	25	8	0.0004	–172.93	12.07	<0.01
Current wet-season + Previous dry-season + Previous wet-season (T)	25	10	0.0002	–172.84	12.16	<0.01
Previous SOI (T) + Current SOI	25	9	0.0003	–172.05	12.95	<0.01
Current wet-season (T)	25	8	0.0004	–171.82	13.18	<0.01
Current wet-season + Previous wet-season (T)	25	9	0.0004	–168.74	16.26	<0.01
Previous SOI + Current SOI (T)	25	9	0.0004	–168.42	16.58	<0.01
Current wet-season (T) + Previous wet-season	25	9	0.0004	–168.27	16.73	<0.01

Note: T: variable with a threshold form; otherwise, variable has a linear form. K: number of parameters. RSS: residual sum of squares. AICc: Akaike information criterion corrected for small sample size. ΔAICc: difference in AICc between the given model and the model with the lowest AICc. w_i: model probability, representing the probability that the model is the best given the candidate set.