Appendix S3

Matthew T. Farr, David S. Green, Kay E. Holekamp, Gary J. Roloff, and Elise F. Zipkin

Multi-species hierarchical modeling reveals variable responses of African carnivores to management alternatives

Ecological Applications

Model Results

Table S1. Summary (mean, standard deviation, 95% credible interval [CI]) of parameter estimates from hierarchical multi-species distance sampling model. μ_σ: mean of $\gamma0_s$; τ_σ^2: variance of $\gamma0_s$; $\mu_{\alpha0}$: mean of $\alpha0_s$; $\tau_{\alpha0}^2$: variance of $\alpha0_s$; $\mu_{\alpha1}$: mean of $\alpha1_s$; $\tau_{\alpha1}^2$: variance of $\alpha1_s$; $\mu_{\beta1}$: mean of $\beta1_s$; $\tau_{\beta1}^2$: variance of $\beta1_s$; $\gamma0_s$: species-specific intercepts of σ_{js}; $\alpha0_s$: species-specific intercepts of λ_{tjs}; $\alpha1_s$: species-specific effects of management regime on λ_{tjs}; $\beta0_s$: species-specific intercepts of μ_{tjs}; $\beta1_s$: species-specific effects of management regime on μ_{tjs}; $\gamma1$: effect of body size on σ_{js}; $\gamma2$: effect of management regime on σ_{js}; $Density_{s,MT}$: species-specific density in Mara Triangle; $Density_{s,TR}$: species-specific density in the Talek region; AL: African lion; BM: banded mongoose; BEF: bat-eared fox; BBJ: black-backed jackal; CAR: caracal; CHE: cheetah; LEO: leopard; SER: serval; SSJ: side-striped jackal; SM: slender mongoose; SH: spotted hyena.

Parameter	Mean	SD	2.5% CI	97.5% CI
μ_σ	4.13	0.22	3.66	4.53
τ_σ^2	0.6	0.25	0.27	1.2
$\mu_{\alpha0}$	-1.33	0.59	-2.55	-0.2
$\tau_{\alpha0}^2$	1.71	0.52	0.97	2.97
$\mu_{\alpha1}$	-0.24	0.45	-1.21	0.58
$\tau_{\alpha1}^2$	0.95	0.42	0.35	1.98
$\mu_{\beta1}$	-0.65	0.37	-1.48	-0.03
$\tau_{\beta1}^2$	0.65	0.36	0.24	1.59
$\gamma0_{AL}$	3.98	0.59	2.82	5.18
$\gamma0_{BM}$	4.28	0.17	3.95	4.61
$\gamma0_{BEF}$	3.88	0.17	3.55	4.21
$\gamma0_{BBJ}$	4.62	0.14	4.34	4.9
$\gamma0_{CAR}$	3.77	0.56	2.61	4.79
$\gamma0_{CHE}$	4.67	0.27	4.22	5.26
$\gamma0_{LEO}$	3.6	0.53	2.49	4.57
$\gamma0_{SER}$	4.03	0.25	3.56	4.56
$\gamma0_{SSJ}$	4.4	0.32	3.84	5.09
$\gamma0_{SM}$	3.56	0.38	2.8	4.25
$\gamma0_{SH}$	4.59	0.1	4.41	4.79
$\alpha0_{AL}$	-0.59	0.26	-1.14	-0.13
$\alpha0_{BM}$	0.54	0.35	-0.21	1.13
$\alpha0_{BEF}$	-1.87	1.08	-4.2	0.04
$\alpha0_{BBJ}$	0.03	0.35	-0.74	0.63
$\alpha0_{CAR}$	-3.05	1.12	-5.57	-1.04

Parameter	Mean	SD	2.5% CI	97.5% CI
$\alpha 0_{CHE}$	-2.73	0.62	-4.09	-1.67
$\alpha 0_{LEO}$	-2.71	0.99	-4.81	-0.89
$\alpha 0_{SER}$	-1.36	0.54	-2.56	-0.42
$\alpha 0_{SSJ}$	-2.91	0.79	-4.64	-1.57
$\alpha 0_{SM}$	-1.06	0.71	-2.5	0.33
$\alpha 0_{SH}$	0.99	0.21	0.55	1.38
$\alpha 1_{AL}$	-1.2	0.58	-2.38	-0.1
$\alpha 1_{BM}$	-0.19	0.53	-1.24	0.89
$\alpha 1_{BEF}$	-0.48	0.97	-2.57	1.33
$\alpha 1_{BBJ}$	0.63	0.53	-0.4	1.71
$\alpha 1_{CAR}$	-0.61	1.04	-3.05	1.12
$\alpha 1_{CHE}$	0.02	0.7	-1.39	1.39
$\alpha 1_{LEO}$	-0.73	1.02	-3.18	0.93
$\alpha 1_{SER}$	-0.68	0.79	-2.45	0.68
$\alpha 1_{SSJ}$	0.18	0.8	-1.38	1.81
$\alpha 1_{SM}$	-0.27	0.72	-1.81	1.07
$\alpha 1_{SH}$	0.65	0.39	-0.13	1.43
$\beta 0_{AL}$	1.23	0.14	0.95	1.51
$\beta 0_{BM}$	2.43	0.12	2.2	2.66
$\beta 0_{BEF}$	0.92	0.17	0.58	1.27
$\beta 0_{BBJ}$	0.26	0.15	0.02	0.59
$\beta 0_{CHE}$	0.33	0.28	0.01	1.02
$\beta 0_{SM}$	0.37	0.29	0.01	1.07
$\beta 0_{SH}$	0.11	0.08	0	0.31
$\beta 1_{AL}$	-0.93	0.52	-2.07	-0.03
$\beta 1_{BM}$	-0.4	0.22	-0.82	0.04
$\beta 1_{BEF}$	-0.99	0.63	-2.45	0.03
$\beta 1_{BBJ}$	-0.7	0.28	-1.27	-0.18
$\beta 1_{CHE}$	-0.6	0.55	-1.78	0.4
$\beta 1_{SM}$	-0.97	0.77	-2.84	0.19
$\beta 1_{SH}$	0.03	0.17	-0.31	0.36
$\gamma 1$	0.52	0.07	0.39	0.65
$\gamma 2$	0.43	0.22	-0.01	0.87
$Density_{AL,MT}$	2.23	0.5	1.41	3.36
$Density_{BM,MT}$	28.21	5.21	19.17	39.65
$Density_{BEF,MT}$	7.73	1.77	4.75	11.63
$Density_{BBJ,MT}$	1.86	0.42	1.18	2.81
$Density_{SH,MT}$	3.49	0.45	2.71	4.46
$Density_{AL,TR}$	0.35	0.24	0.07	0.95
$Density_{BM,TR}$	24.37	6.4	14.06	39.1
$Density_{BEF,TR}$	0.66	0.57	0.07	2.15
$Density_{BBJ,TR}$	2.4	0.69	1.29	3.95
$Density_{SH,TR}$	10.63	1.53	7.92	13.86