

Additional Supplemental Information

Similarities between lions and sympatric carnivores in diel activity, size and morphology

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Table S1. Specimens used for measuring morphometric data.

Species	Collection¹	Catalogue nr	Morphology²	Sex	Country
<i>Canis mesomelas</i>	RCMA	2164	LB		Kenya
<i>Canis mesomelas</i>	RCMA	2145	LB + S		Kenya
<i>Canis mesomelas</i>	NHM	1991.586	LB + S		Zimbabwe
<i>Caracal caracal</i>	RMCA	23450	LB + S		Zaire
<i>Caracal caracal</i>	RMCA	2901	LB + S		Zaire
<i>Civettictis civetta</i>	RMCA	26565	LB	F	Zaire
<i>Civettictis civetta</i>	RMCA	21554	LB + S	F	
<i>Civettictis civetta</i>	RMCA	2900	LB + S	M	D.R.C.
<i>Civettictis civetta</i>	RMCA	5490	LB	F	
<i>Civettictis civetta</i>	NHM	30.2.9.1	LB	F	Uganda
<i>Civettictis civetta</i>	NHM	138.d.	LB		
<i>Civettictis civetta</i>	NHM	1926.11.1.92	LB	M	Congo
<i>Civettictis civetta</i>	NHM	1948.791	LB	F	Nigeria
<i>Civettictis civetta</i>	NHM	1906.6.5.7	LB		Tanzania
<i>Felis lybica</i>	RMCA	2130	LB + S	F	Kenya
<i>Felis lybica</i>	RMCA	2129	LB + S	M	Kenya
<i>Felis lybica</i>	RMCA	2902	LB		Zaire
<i>Leptailurus serval</i>	NHM	1981.998	LB	F	
<i>Leptailurus serval</i>	NHM	133e	LB		
<i>Leptailurus serval</i>	NHM	1966.7.11.1	LB		
<i>Leptailurus serval</i>	RMCA	37045	LB	M	Zaire
<i>Leptailurus serval</i>	RMCA	2148	LB + S	F	Kenya
<i>Leptailurus serval</i>	RMCA	1290	LB + S	M	Zaire
<i>Galerella sanguinea</i>	RMCA	37070	LB + S	F	Zaire
<i>Galerella sanguinea</i>	NHM	1906.6.5.8	LB		Tanzania
<i>Galerella sanguinea</i>	NHM	1906.6.5.12	LB		Tanzania
<i>Galerella sanguinea</i>	NHM	1906.6.5.13	LB		Tanzania
<i>Galerella sanguinea</i>	NHM	1906.6.5.14	LB + S		Tanzania
<i>Genetta genetta</i>	RMCA	22338	LB + S	M	Zaire
<i>Genetta genetta</i>	NHM	1905.12.12.6	LB		Sudan
<i>Genetta maculata</i>	NHM	29.5.28.1	LB		Kenya
<i>Genetta maculata</i>	NHM	1968.5.15.1	LB	M	
<i>Genetta maculata</i>	NHM	1934.4.1.35	LB + S	F	Uganda
<i>Genetta maculata</i>	NHM	1934.4.1.34	LB + S	M	Uganda
<i>Hyaena brunnea</i>	NHM	1962.7.23.1	LB + S		South Africa
<i>Hyaena brunnea</i>	NHM	274_75.1992	LB + S		
<i>Ichneumia albicauda</i>	RMCA	1935	LB + S	F	Zaire
<i>Ichneumia albicauda</i>	RMCA	2139	LB		Kenya
<i>Mellivora capensis</i>	RMCA	26529	LB + S		Zaire
<i>Mellivora capensis</i>	NHM	1907.9.14.1	LB		
<i>Mellivora capensis</i>	NHM	1934.4.14.1	LB + S	M	Uganda
<i>Panthera leo</i>	NHM	1935.9.19.5	LB	M	Tanzania
<i>Panthera leo</i>	NHM	70.1031	LB	F	Zambia
<i>Panthera leo</i>	NHM	73.175	LB	F	
<i>Panthera leo</i>	NHM	75.945	LB	M	Tanzania

<i>Panthera leo</i>	NHM	1931.4.13.1	LB	M	India
<i>Panthera leo</i>	NHM	1952.10.20.13	LB	F	India
<i>Panthera leo</i>	NHM	112.a.	LB		
<i>Panthera leo</i>	RMCA	1268	LB	M	Zaire
<i>Panthera leo</i>	RMCA	6162	LB + S	M	Congo
<i>Panthera leo</i>	RMCA	17773	LB		Tanzania
<i>Panthera leo</i>	RMCA	635	LB	F	Sudan
<i>Panthera leo</i>	RMCA	7016	LB		Rwanda
<i>Panthera leo</i>	RMCA	2264	LB + S	F	Zaire
<i>Panthera leo</i>	RMCA	2122	LB	F	Zaire
<i>Panthera leo</i>	RMCA	1757	LB	M	Zaire
<i>Panthera leo</i>	RMCA	4096	LB		Zaire
<i>Panthera leo</i>	NHM	1857.2.24.1_112.h	LB	F	
<i>Panthera pardus</i>	RMCA	7863	LB + S		Rwanda
<i>Panthera pardus</i>	RMCA	761	LB		Zaire

¹ NHM = Natural History Museum, London, UK

RMCA = Royal Museum of Central Africa, Tervuren, Belgium

¹ LB = Long bone morphology measured

S = Skull morphology measured

Table S2. Body mass as well as species averages for five long bone characteristics. Body mass is given in kg and long bone characteristics in cm.

Species	Body mass	Humerus length	Radius length	Femur length	Tibia length	MtIII
<i>Canis mesomelas</i>	8.50	13.35	14.13	14.60	15.60	6.43
<i>Caracal caracal</i>	13.75	16.78	15.50	19.63	19.15	8.30
<i>Civettictis civetta</i>	12.00	11.40	10.74	13.21	12.99	4.91
<i>Felis lybica</i>	4.65	11.67	11.48	12.92	13.70	6.04
<i>Felis serval</i>	12.00	4.82	3.90	5.23	5.58	2.04
<i>Galerella sanguinea</i>	0.55	7.68	6.83	8.65	9.43	3.48
<i>Genetta genetta</i>	2.00	6.93	5.85	7.99	8.51	3.22
<i>Genetta maculata</i>	2.23	19.63	19.63	20.73	19.15	8.85
<i>Hyaena brunnea</i>	32.20	8.85	7.99	10.18	10.98	4.97
<i>Ichneumia albicauda</i>	3.50	15.62	15.09	17.49	17.65	7.60
<i>Mellivora capensis</i>	8.00	18.24	18.98	20.19	20.54	8.59
<i>Panthera leo</i>	161.50	13.77	11.12	15.20	12.32	3.91
<i>Panthera pardus</i>	45.50	5.69	4.63	6.69	6.74	2.99

Table S3. Species averages for 11 skull characteristics, given in cm.

Species	Skull length	Palate length	Palate width	Zygom. length	Zygom. width	Mandible length	Mandible distance	MAT	MAM	P4 length	P4 width
<i>Canis mesomelas</i>	13.89	7.74	2.44	3.22	2.98	11.29	1.71	2.10	1.71	1.56	0.70
<i>Caracal caracal</i>	11.86	5.90	3.40	3.52	3.49	9.34	1.80	2.50	1.68	1.52	0.66
<i>Civettictis civetta</i>	13.51	8.04	3.01	3.78	2.52	11.31	1.92	2.13	1.44	1.43	0.74
<i>Felis lybica</i>	8.08	3.61	2.22	2.24	2.40	6.08	1.11	1.47	0.94	1.09	0.49
<i>Felis serval</i>	6.07	3.40	1.17	1.43	1.13	4.16	0.64	1.12	0.65	0.60	0.40
<i>Galerella sanguinea</i>	8.00	4.23	1.47	2.21	1.51	6.21	1.04	1.37	0.71	0.72	0.45
<i>Genetta genetta</i>	7.68	3.91	1.22	2.00	1.46	5.77	0.79	1.09	0.87	0.69	0.42
<i>Genetta maculata</i>	20.27	11.28	5.54	4.60	5.33	16.98	3.91	4.01	2.09	3.17	1.91
<i>Hyaena brunnea</i>	9.79	5.91	1.94	2.41	1.92	7.13	1.11	1.43	0.95	0.76	0.63
<i>Ichneumia albicauda</i>	10.30	4.69	2.91	3.06	3.02	8.32	1.37	2.16	1.14	1.25	0.58
<i>Mellivora capensis</i>	16.95	9.29	4.39	4.24	4.30	13.86	2.67	2.98	2.23	1.90	1.00
<i>Panthera leo</i>	14.11	7.49	3.43	3.69	2.89	9.19	1.93	2.97	1.89	1.32	1.02
<i>Pantera pardus</i>	6.89	3.97	1.46	1.75	1.29	5.01	0.91	1.20	0.72	0.52	0.50

Table S4. Pairwise coefficients of activity overlap ($\Delta 1$) between lions and each co-occurring carnivore species in Welgevonden game reserve, which contained lions during the study, using data from the dry and wet season separately.

Species	Dry season	Wet season
<i>Canis mesomelas</i>	0.82	0.37
<i>Caracal caracal</i>	0.76	0.54
<i>Civettictis civetta</i>	0.6	0.33
<i>Felis lybica</i>		0.25
<i>Felis serval</i>	0.8	
<i>Galerella sanguinea</i>	0.34	
<i>Genetta genetta</i>	0.66	0.54
<i>Genetta maculata</i>	0.55	
<i>Hyaena brunnea</i>	0.66	0.31
<i>Ichneumia albicauda</i>	0.54	
<i>Mellivora capensis</i>	0.77	0.42
<i>Pantera pardus</i>	0.77	0.62

Table S5. Pairwise coefficients of activity overlap ($\Delta 1$) between two reserves, one with (Welgevonden game reserve) and one without (Lapalala Wilderness) lions, for each co-occurring carnivore species, using data from both seasons pooled as well as data from the dry and wet season separately.

Species	Dry season	Wet season
<i>Canis mesomelas</i>	0.78	0.62
<i>Caracal caracal</i>	0.64	
<i>Civettictis civetta</i>	0.87	0.74
<i>Galerella sanguinea</i>	0.6	
<i>Genetta maculata</i>	0.85	
<i>Hyaena brunnea</i>	0.86	0.83
<i>Mellivora capensis</i>	0.74	
<i>Pantera pardus</i>	0.74	0.57

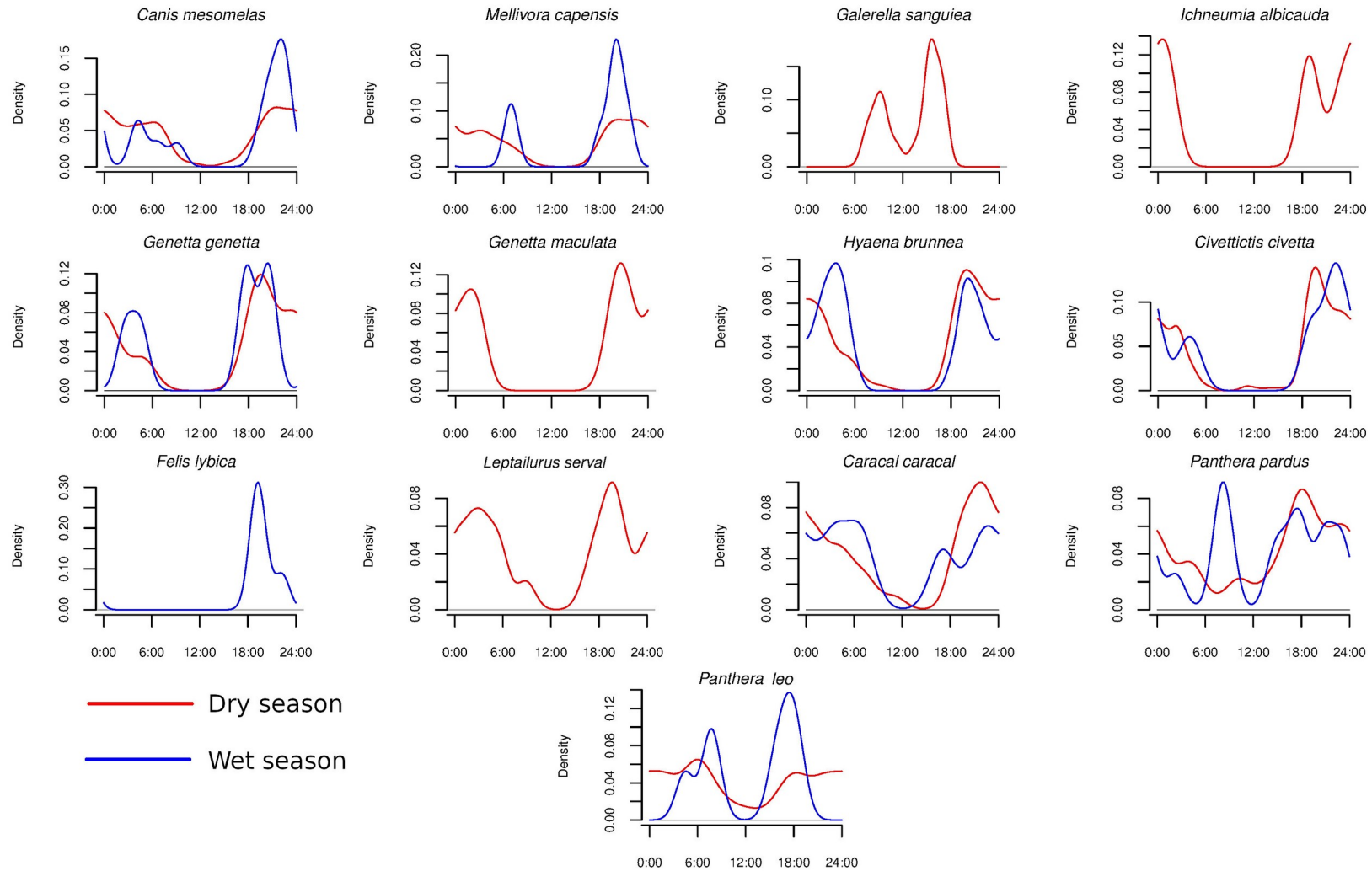


Figure S1. Probability distributions describing diel activity patterns of carnivore species observed in Welgevonden Game Reserve using activity data from the dry and wet season respectively. Data comes from camera trapping surveys. Only species with at least 5 observations per season are included.

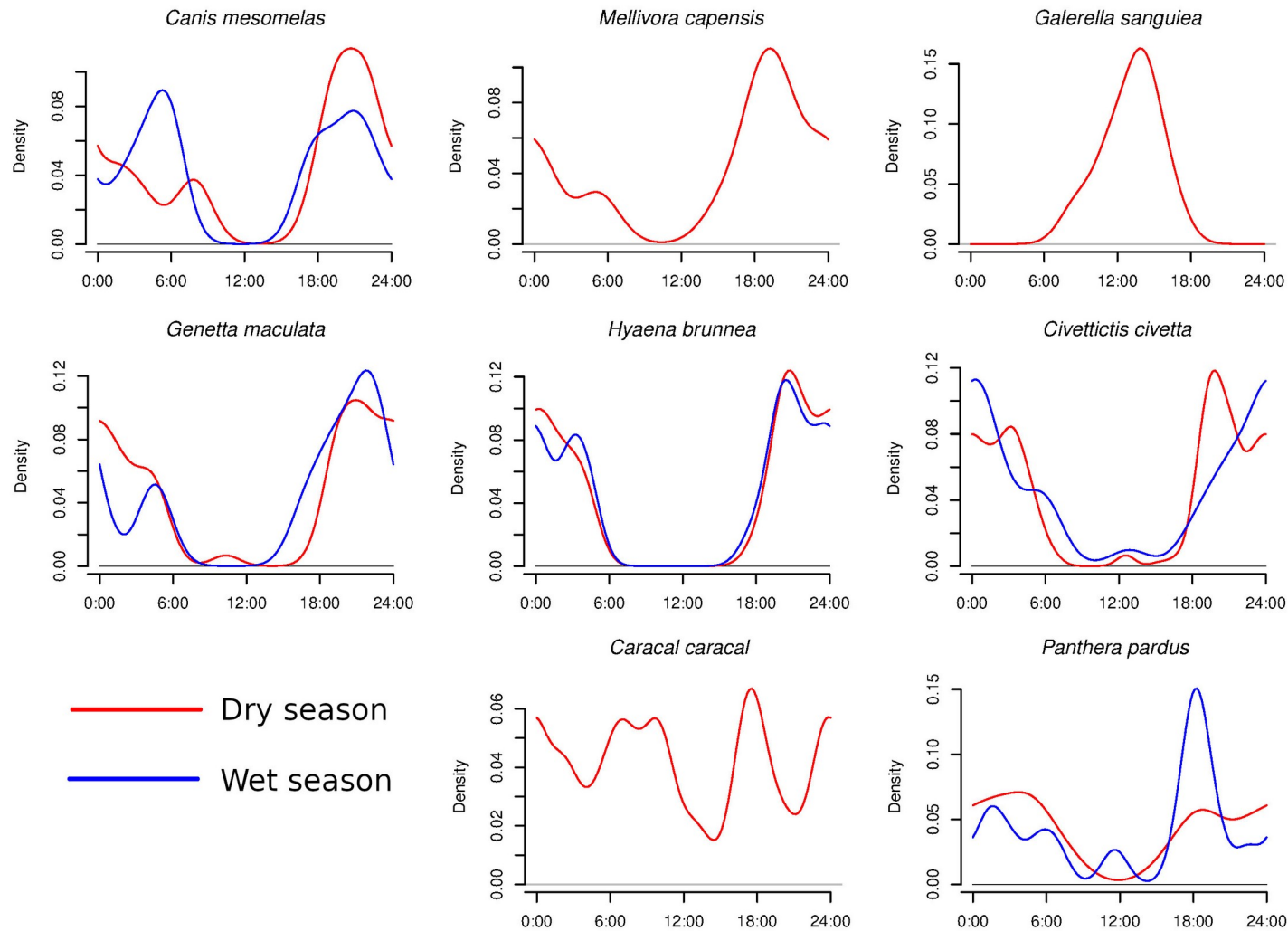


Figure S2. Probability distributions describing diel activity patterns of carnivore species in Lapalala Wilderness using activity data from the dry and wet season respectively. Data comes from camera trapping surveys. Only species with at least 5 observations per season are included, and only species which were also observed on Welgevonden hence contributing to intra specific comparisons between the reserves.