

Supplementary Materials for

Climate and predation drive variation of diel activity patterns in chacma baboons (*Papio ursinus*) across southern Africa

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Fig. S1.

Filtering and dataset processing. Each box in the diagram represents the number of sites and indicates the number of remaining images for each project (Panthera, Snapshot Safari, and Cape Leopard Trust). Key filtering options are also indicated in the ovals. The final steps show the analyses performed using the different datasets.

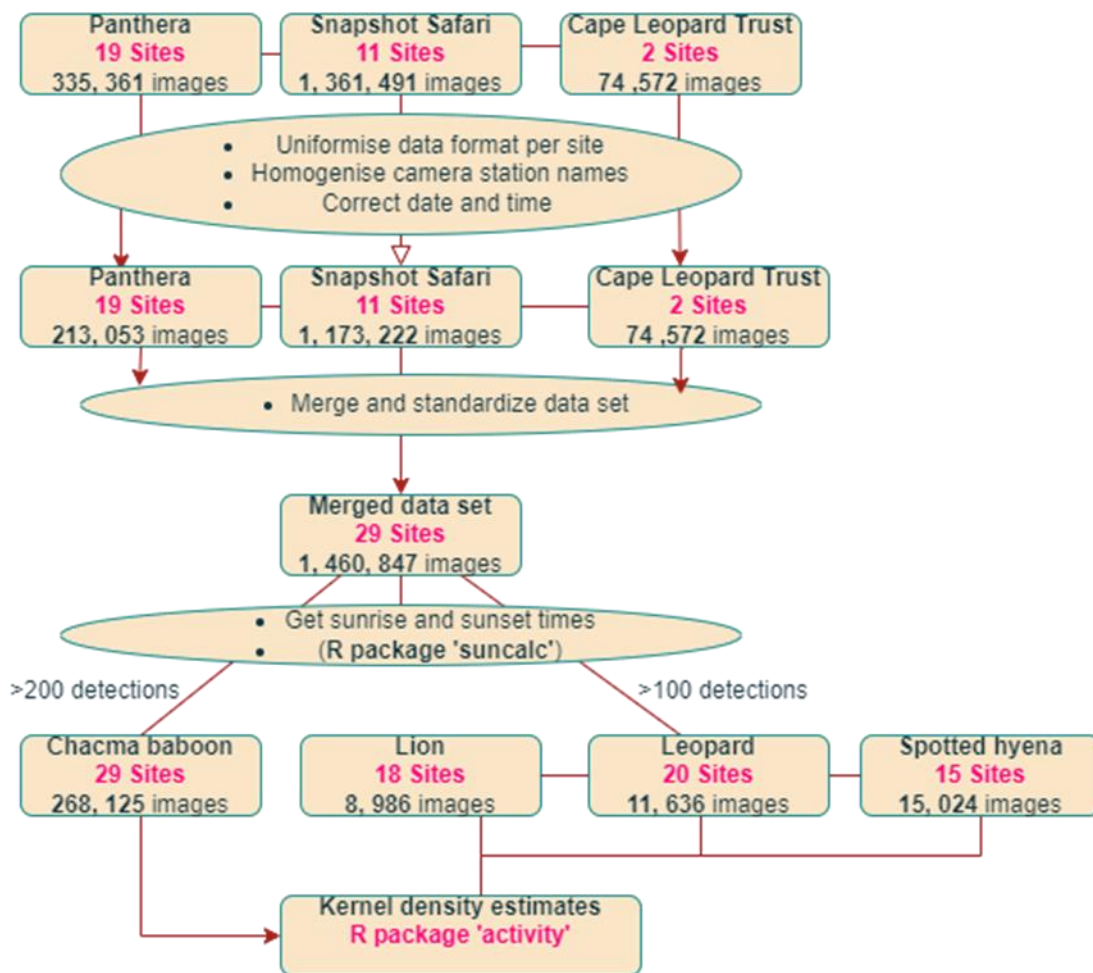
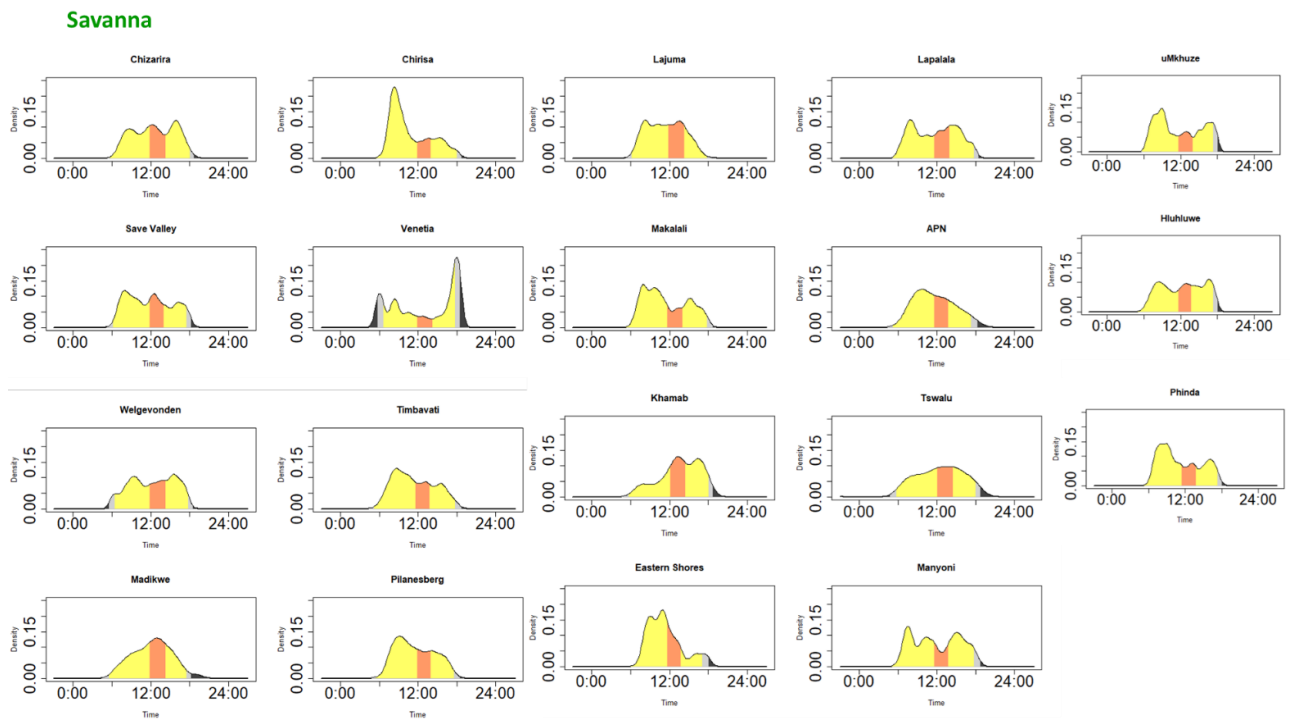
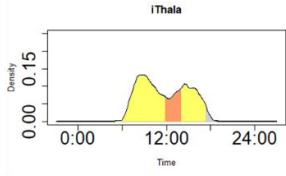


Fig. S2.

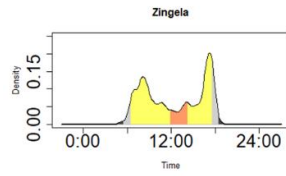
Chacma baboons' activity density patterns in each of the 29 study sites. The Y-axis represents the density of activity, and the X-axis represents the hours throughout the day (solar time). Each day is divided into six periods: dawn and dusk (grey), morning and afternoon (yellow), midday (orange), night (black).



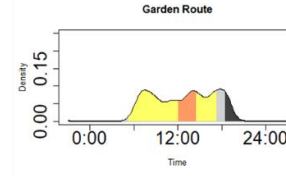
Grassland



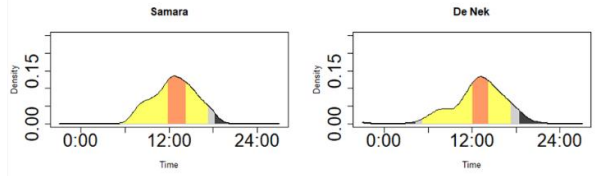
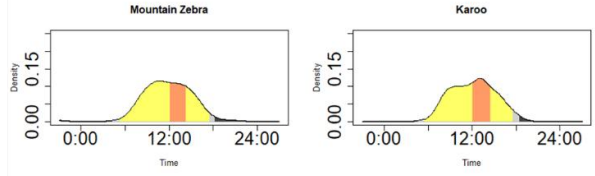
Thicket



FOREST



Nama Karoo



Fynbos

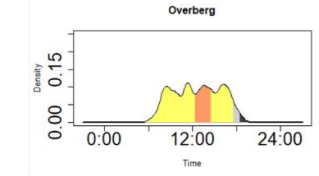
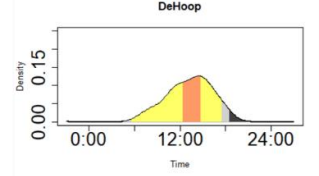
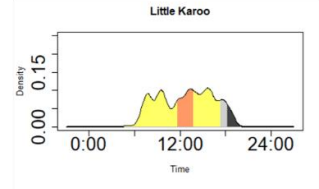
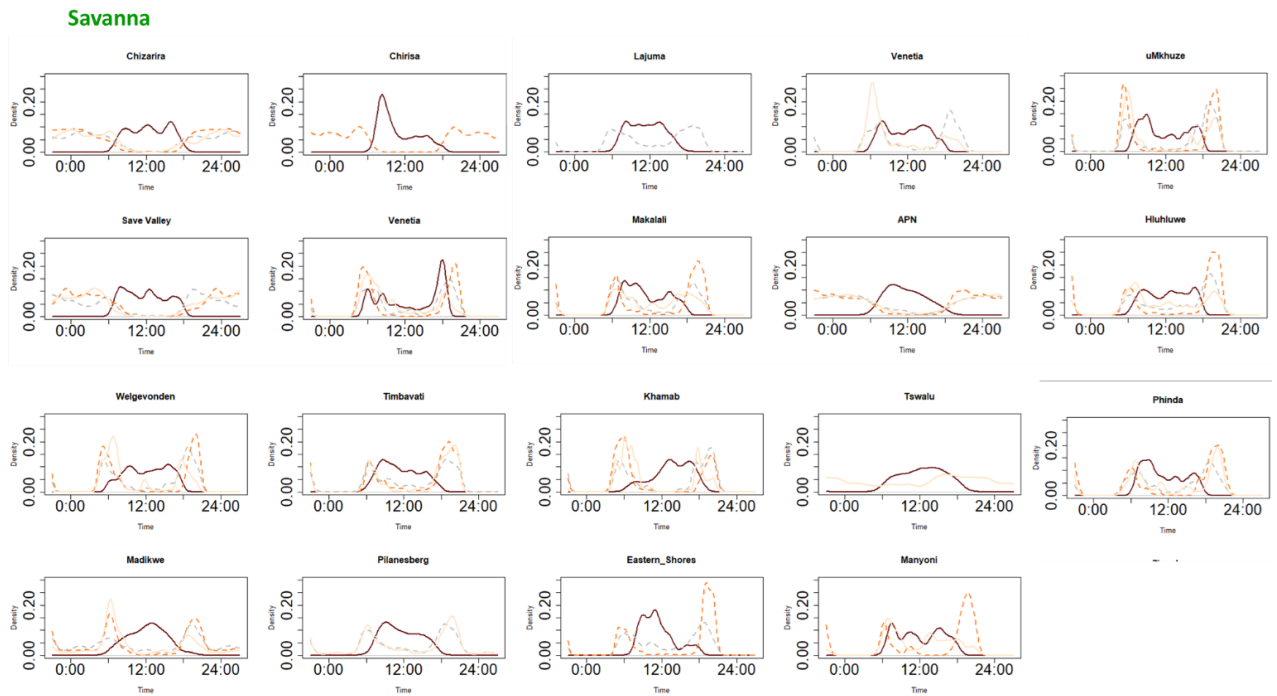
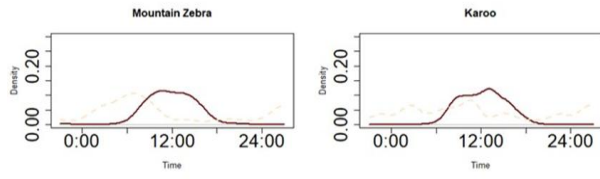


Fig. S3.

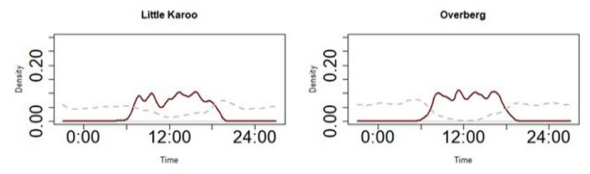
Overlap between chacma baboons and predators' activity density patterns in each of the 29 study sites. The Y-axis represents the density of activity, and the X-axis represents the hours throughout the day (solar time, see text). Each line represents a species: chacma baboon (brown), leopard (grey), lion (light peach), spotted hyena (orange).



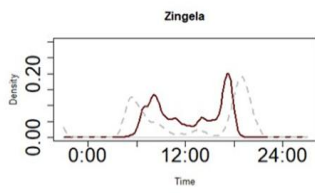
Nama Karoo



Fynbos



Thicket



Grassland

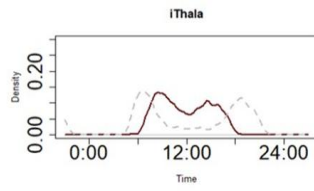


Fig. S4.

Extended drivers of variation in the total activity level estimates of chacma baboons in each day period. The Y-axis represents activity level estimates of chacma baboons, and the X-axis represents scaled values of each abiotic driver (temperature, precipitation, NDVI) and activity level estimates of predators (lion, leopard, spotted hyena). Circles represent activity level estimates at dawn (maroon), morning (green), midday (purple), afternoon (blue), dusk (olive green), and night (brown). Lines represent predictions from the Beta regression models along a range of activity level estimates. The shaded area represents 95% confidence intervals at $\alpha=0.05$.

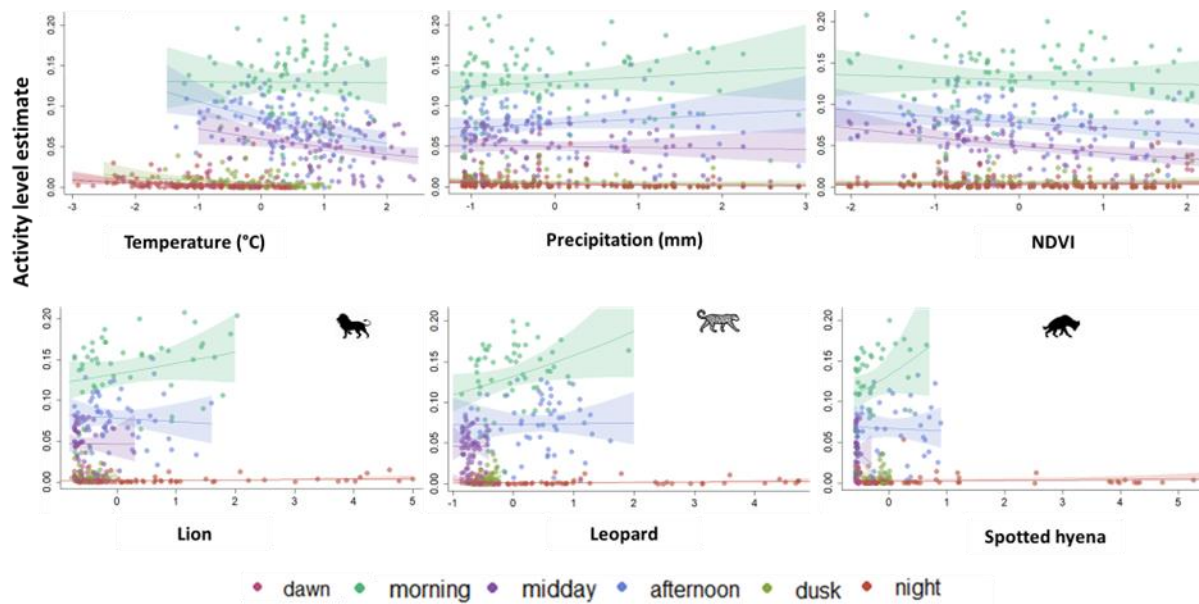


Table S1.

Description of the 29 study sites used for camera trap data collection. For each site, we provide the country, biome classification, mean summer and winter temperatures (in °C), mean annual rainfall (in mm), main predators of chacma baboons, dominant plant species, reserve size (in hectares), rainfall seasonality (summer, winter, or year-round), and type of land management (e.g., privately owned, state or provincial government, national government). Predator presence is based on confirmed detections or known historical occurrences at each site. Plant species listed reflect the dominant vegetation type observed within the main baboon habitat areas. NA. Not available.

Number ID	Site	Country	Biome	Mean summer temperature (°C)	Mean winter temperature (°C)	Mean annual rainfall (mm)	Mean annual NDVI	Key baboon predators	Dominant plant species	Size (ha)	Rainfall seasonality	Management
1	Venetia Limpopo Nature Reserve	South Africa	Savanna	26	16	366	0.34	spotted hyena, lion, leopard	<i>Colophospermum mopane</i>	39000	Summer	Privately owned
2	Lajuma Research Centre	South Africa	Savanna	24	11	724	0.59	spotted hyena, leopard		430	Summer	Privately owned

3	Welgevonden Game Reserve	South Africa	Savanna	23	13	665	0.46	spotted leopard	hyena, lion,		37500	Summer	Privately owned
4	Timbavati Private Nature Reserve	South Africa	Savanna	28	19	550	0.39	spotted leopard	hyena, lion,	<i>Terminalia sericea, Colophospermum mopane, Combretum. Spp</i>	53392	Summer	Privately owned
5	Makalali Game Reserve	South Africa	Savanna	32	18	450	0.45	spotted leopard	hyena, lion,		26000	Summer	Privately owned
6	Lapalala Wilderness	South Africa	Savanna	22	12	500	0.44	spotted leopard	hyena, lion,		48000	Summer	Privately owned
7	Associate Private Nature Reserves	South Africa	Savanna	26	19	550	0.37	spotted leopard	hyena, lion,		182500	Summer	Privately owned
8	Pilanesberg National Park	South Africa	Savanna	29	13	630	0.44	spotted leopard	hyena, lion,		57200	Summer	Provincial government

9	Madikwe Game Reserve	South Africa	Savanna	30	13	750	0.40	spotted leopard	hyena, lion,		75000	Summer	Provincial government
10	Khamab Kalahari Reserve	South Africa	Savanna	26	11	330	0.28	spotted leopard	hyena, lion,		95538	Summer	Privately owned
11	Tswalu Kalahari Reserve	South Africa	Savanna	34	10	253	0.28	spotted leopard	hyena, lion,	<i>Vachellia erioloba</i> , <i>Boscia albitrunca</i> and <i>Terminalia sericea</i>	102000	Summer	Privately owned
12	uMkhuze Game Reserve	South Africa	Savanna	32	18	1200	0.57	spotted leopard	hyena, lion,		40000	Summer	Provincial government
13	Phinda Private Game Reserve	South Africa	Savanna	30	18	1000	0.57	spotted leopard	hyena, lion,		28555	Summer	Privately owned
14	Manyoni Private Game reserve	South Africa	Savanna	26	16	580	0.60	spotted leopard	hyena, lion,		21700	Summer	Privately owned

15	Ithala Game Reserve	South Africa	Grassland	24	20	791	0.55	spotted leopard, hyena, lion,		29653	Summer	Provincial government
16	Hluhluwe Game Reserve	South Africa	Savanna	25	17	620	0.61	spotted leopard, hyena, lion,		95000	Summer	Provincial government
17	Eastern Shores	South Africa	Savanna	30	20	1129	0.66	spotted hyena, leopard		264000	Summer	Provincial government
18	Zingela Nature Reserve	South Africa	Thicket	36	12	421	0.36	spotted leopard, hyena, lion,		27000	Summer	Provincial government
19	Samara Private Game Reserve	South Africa	Nama Karoo	22	13	336	0.36	lion	<i>Acacia karroo, Themed a tiandra</i>	28000	Summer	Privately owned
20	DeNek Farm	South Africa	Nama Karoo	22	13	336	0.31	absent		unknown	Summer	Privately owned

21	Mountain Zebra National Park	South Africa	Nama Karoo	29	15	400	0.31	lion		28412	Summer	National government
22	Karoo National Park	South Africa	Nama Karoo	27	11	220	0.13	spotted hyena, lion		76990	Summer	National government
23	Overberg Nature Reserve	South Africa	Fynbos	22	13	600	0.42	leopard	<i>Proteas, Ericas and Restios</i>		Winter	Provincial government
24	Little Karoo	South Africa	Nama Karoo	21	14	220	0.33	leopard		62000	Summer	Privately owned
25	Garden Route National Park	South Africa	Forest	15	18	1000	0.74	leopard		130000	All year	National government
26	DeHoop Nature Reserve	South Africa	Fynbos	21	14	455	0.53	absent	<i>Proteas, Ericas and Restios</i>	36000	Winter	Provincial government
27	Save Valley Conservancy	Zimbabwe	Savanna	33	18	450	0.40	spotted leopard, hyena, lion,		344200	Summer	Privately owned

28	Chirisa Safari Area	Zimbabwe	Savanna	28	13	600	0.37	spotted leopard	hyena,	lion,	<i>Colophospermum mopane</i> , <i>Acacia spp</i> , <i>Combretum spp</i>	17 13 00	Summer	State owned
29	Chizaria National Park	Zimbabwe	Savanna	24	18	800	0.37	spotted leopard	hyena,	lion,	<i>Colophospermum mopane</i> , <i>Terminalia spp</i>	20 00 00	Summer	State owned

Table S2.

Summary of camera trap deployment location and capture data for chacma baboons (*Papio ursinus*) and their primary predators (spotted hyena, leopard, and lion) across 29 study sites in South Africa and Zimbabwe. For each site are indicated the site name, source project, country, biome, number of camera traps deployed (CTs), start and end dates of monitoring, total number of trap days, and total number of capture events. "Unfiltered" and "Filtered" refer to raw and manually verified capture events, respectively. Predator and baboon capture columns correspond to capture events after filtration.

Number ID	Site name	Source project	Country	Biome	CTs	Start date	End date	Trap days	Unfiltered	Filtered	Chacma baboon	Spotted hyena	Leopard	Lion
1	Venetia Limpopo Nature Reserve	Panthera	South Africa	Savanna	40	02/07/2016	06/07/2022	197	11,531	6,002	4,342	146	409	471
2	Lajuma Nature Reserve	Panthera	South Africa	Savanna	40	08/03/2016	19/05/2022	412	66,489	39,093	37,982	22	853	0
3	Welgevonden Game Reserve	Panthera	South Africa	Savanna	40	06/04/2016	17/07/2022	348	25,333	14,284	11,975	359	698	729
4	Timbavati Private Nature Reserve	Panthera	South Africa	Savanna	40	01/09/2016	08/11/2022	291	15,569	6,644	2,669	3173	571	247
5	Makalali Game Reserve	Panthera	South Africa	Savanna	40	03/09/2016	31/12/2022	356	19,119	9,602	5,874	1,520	804	1,191
6	Lapalala Wilderness	Panthera	South Africa	Savanna	40	29/10/2016	13/09/2022	323	13,446	11,336	9,435	51	532	308

7	Associate Private Nature Reserves	Snapshot Safari	South Africa	Savanna	45	28/06/2017	26/11/2019	880	51,401	47,810	476	1859	168	246
8	Pilanesberg National Park	Panthera	South Africa	Savanna	40	13/03/2016	14/03/2022	286	16,398	6,763	1,394	38	567	1102
8	Pilanesberg National Park	Snapshot Safari	South Africa	Savanna	39	07/10/2017	26/02/2021	1681	31,253	31,237	236	14	67	245
9	Madikwe Game Reserve	Panthera	South Africa	Savanna	40	01/11/2016	30/10/2022	338	11,714	6,764	3,256	1077	141	412
9	Madikwe Game Reserve	Snapshot Safari	South Africa	Savanna	53	11/06/2018	23/02/2021	1023	141,363	123,458	1,322	384	100	145
10	Khamab Kalahari Reserve	Panthera	South Africa	Savanna	40	01/09/2016	30/08/2022	1119	7,702	4,726	1,505	271	335	1,303
11	Tswalu Kalahari Reserve	Snapshot Safari	South Africa	Savanna	30	18/11/2018	16/09/2022	1410	21,3052	107,706	769	16	16	175
12	uMkhuze Game Reserve	Panthera	South Africa	Savanna	40	27/05/2016	19/08/2022	337	18,002	11,586	9,568	541	1177	297
13	Phinda Private Game Reserve	Panthera	South Africa	Savanna	42	24/06/2016	16/12/2019	175	10,972	7,162	6,167	301	368	327
14	Little Karoo	Cape Leopard Trust	South Africa	Nama Karoo	61	22/07/2022	29/12/2022	160	23,589	23,589	22,994	0	600	0
14	Manyoni Private Game Reserve	Panthera	South Africa	Savanna	37	15/02/2017	15/12/2022	148	2,743	1,721	1,198	116	63	312
15	Ithala Game Reserve	Panthera	South Africa	Grassland	50	23/07/2016	02/03/2022	350	51,721	42,373	40,678	21	1,354	2
16	Hluhluwe Game Reserve	Panthera	South Africa	Savanna	46	01/04/2016	17/10/2022	492	22,967	14,232	12,194	1,197	356	503
17	Eastern Shores	Panthera	South Africa	Savanna	41	16/09/2016	24/06/2022	350	12,282	5,590	1,740	2,639	1,210	0
18	Zingela Nature Reserve	Panthera	South Africa	Thicket	41	02/05/2016	10/05/2022	285	16,910	12,712	11,676	13	236	1

19	Samara Private Game Reserve	Snapshot Safaris	South Africa	Nama Karoo	20	28/05/2016	09/02/2020	313	15,401	15,392	2,263	0	0	6
20	DeNek Farm	Snapshot Safari	South Africa	Nama Karoo	9	24/06/2019	14/09/2020	384	4,673	4,673	242	0	0	0
21	Mountain Zebra National Park	Snapshot Safari	South Africa	Nama Karoo	19	10/04/2017	01/04/2021	1470	112,789	112,706	1,143	0	0	103
22	Karoo National Park	Snapshot Safari	South Africa	Nama Karoo	25	04/10/2017	19/10/2020	1035	66,286	13,294	12,710	1	0	348
23	Overberg	Cape Leopard Trust	South Africa	Fynbos	77	02/08/2021	10/02/2022	127	50,983	50,983	50,417	0	547	0
23	Overberg Nature Reserve	Snapshot Safari	South Africa	Fynbos	18	05/09/2018	05/07/2021	910	22,328	17,628	629	0	11	0
25	Garden Route National Park	Snapshot Safari	South Africa	Forest	73	01/01/2018	20/05/2022	491	685,940	682,313	3,161	0	64	0
26	DeHoop Nature Reserve	Snapshot Safari	South Africa	Fynbos	38	08/09/2018	09/11/2019	438	17,005	17,005	601	0	0	0
27	Save Valley Conservancy	Panthera	Zimbabwe	Savanna	40	14/07/2020	10/08/2022	239	8,944	8,944	7,317	680	341	239
28	Chirisa Safari Area	Panthera	Zimbabwe	Savanna	34	04/07/2019	16/11/2022	124	1,525	1,525	1,071	366	70	4
29	Chizaria National Park	Panthera	Zimbabwe	Savanna	38	29/06/2019	26/10/2022	131	1,994	1,994	1,121	395	191	283
							Total	16,623	1,771,424	1,460,847	268,125	15,200	11,849	8,999