Conservation and Wildlife

Lewa-Borana Landscape Wildlife Count Report 2023

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1.0 Introduction

Seasonal variations influence habitat quality, consequently affecting wildlife population dynamics in rangelands. Managing arid and semi-arid rangelands requires regular documentation of rangelands resources, including wildlife numbers.

The Lewa - Borana Landscape (LBL) is a semi-closed landscape made up of the Lewa Wildlife Conservancy, Borana Wildlife Conservancy (BWC), and Ngare Ndare Forest (NNF). The landscape has wildlife migratory gaps/routes connecting the adjoining conservancies to the north and northwest, and the Mt. Kenya Forest to the south. These gaps allow wildlife movement to new habitats, while at the same time easing the population pressure when the landscape is constrained. Other key factors in this landscape that affects wildlife population dynamics are births, deaths, and translocations. Frequent wildlife count is therefore key in tracking the effects of these influencing factors for the effective management of wildlife populations.

The main objectives of the annual wildlife count on LBL are to:
1. Determine species abundance.
2. Derive and compare past and current species population trends.
3. Propose conservation priorities.

1.1 Methods

In 2023, the Annual Wildlife Count on the LBL combined both the aerial and ground counts (*farm/ranch*). This count was done between 0630hrs to 1200hrs on the 22nd day of February 2023. The landscape was divided into nine ground counting blocks and eight aerial counting blocks. The blocks were demarcated by either roads or other geographical features primarily rivers, valleys and hills. This year, we included NNF as a ground counting block despite the high vegetation density. On each ground counting block, wildlife species were counted by a minimum of three observers on a vehicle that traversed all the roads, counting all animals seen on the block. Also, distances and bearings from the point of observation to the position of the animals were recorded to extrapolate the near-exact geolocation of animals for accurate mapping. All the data were recorded

on a Cybertracker[1] Mobile Phone Application with a pre-configured data entry form from Spatial Monitoring and Reporting Tool (SMART[2]). The hand-filled data sheets with the same information were completed as a backup. The aerial counting blocks were classified as those with relatively poor accessibility and reduced visibility from the ground. Animals were counted using a PA–18 Supercub covering blocks 9a-e and a Cessna 180 aircraft covering blocks 9f-h, flying at an average height of 300 feet above ground level. The speed of the aircraft varied from 70 – 90 knots. Transects were maintained at 500 meters on either side of the aircraft and followed an east-west or north-south direction depending on the terrain, and the direction of wind and sunlight. The aerial counting teams used Dictaphones to record animal observations and a GPS unit to record geographic position data. The voice data was then downloaded onto a computer and transcribed into a Microsoft Excel spreadsheet. Data from the GPS unit was also downloaded and combined with the Cybertracker data for mapping. The figure below shows the ground and aerial counting blocks:
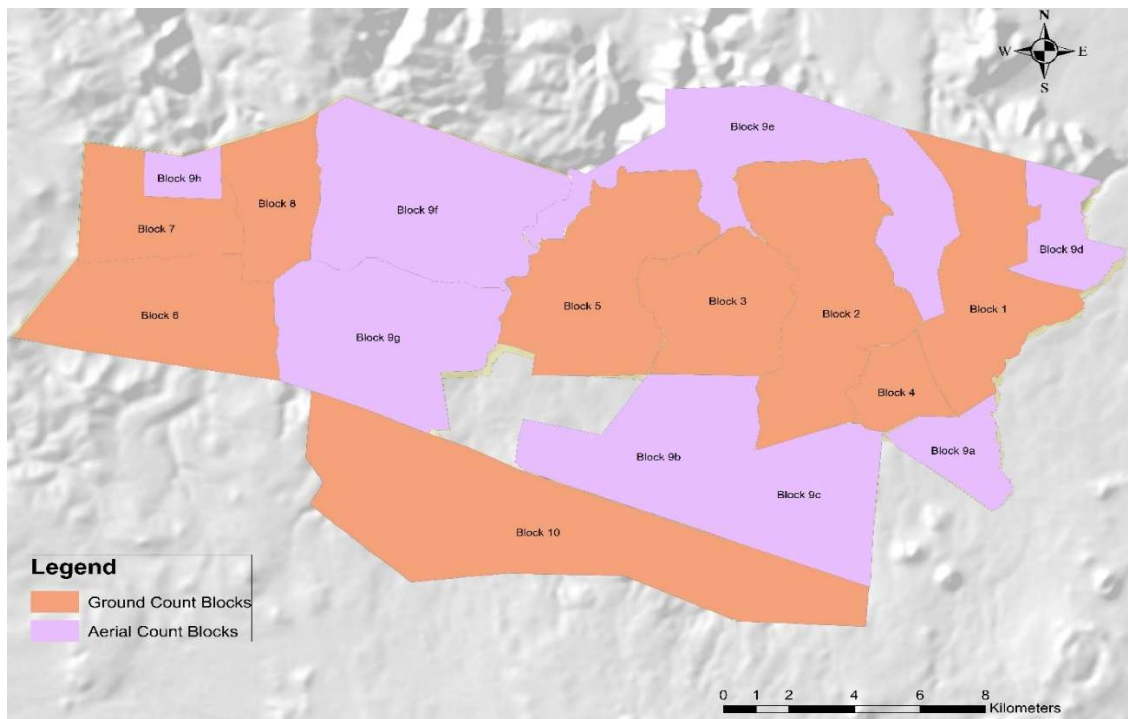
Figure 1: LBL ground and aerial wildlife counting blocks, 2023

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[1]**A Cybertracker** is a software that uses a geographic positioning system (GPS) enabled personal digital assistant (PDA) such as smartphones to collect GPS data and wildlife observation data in a single unit.

[2] **SMART** is a tool that allows users to create datasheets and export to Cybertracker for data capture and can be used to manage and map data from systematic surveys of species and their habitats.

1.2 Results and interpretation

Below is a patrol-effort map and summarised results of this year's LBL game count as compared to the previous years as seen both in figure 2 and table 1 below:
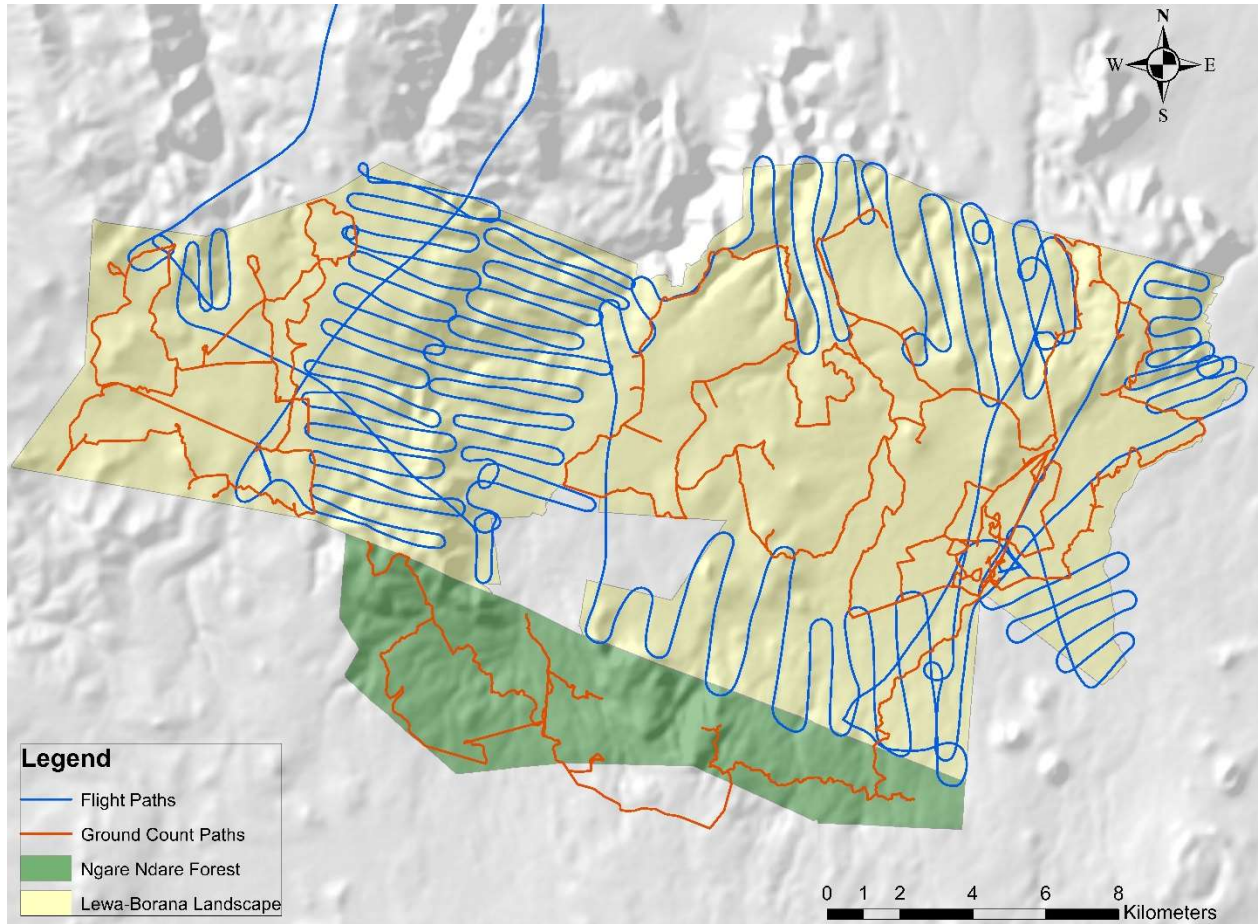
Figure 2: Patrol effort map/track logs during the wildlife count, February 2023

Table 1: Wildlife numbers counted on Lewa–Borana Landscape, 2016 – 2023

| SPECIES	2016	2017	2018	2019	2020	2021	2022	2023
	Lewa - Borana Landscape Game Count							
	Dates: 2016 - 2023							
Beisa Oryx	179	220	178	227	307	239	247	285
Buffalo	1220	1391	1623	1753	2086	2153	1901	715
Bush buck	15	17	16	15	15	15	17	19
Cheetah	8	1	4	5	6	7	8	8
Eland	280	192	322	291	245	358	331	245
Elephant	416	509	250	253	727	516	425	356
Gerenuk	10	10	11	10	10	11	16	12
Gazelle, Grants	348	443	415	718	1101	1145	1135	1210
Gazelle, Thompsons	27	4	7	10	16	16	26	4
Giraffe	273	251	127	167	178	172	119	138
Greater kudu	28	35	22	32	32	32	32	29
Hippo	2	2	2	2	2	2	2	2
Hartebeest	30	62	64	64	93	91	92	100
Hyena, spotted	0	0	122	133	136	134	144	148
Hyena, striped	-	-	-	-	-	-	14	1
Impala	1113	1096	1763	1817	1505	1568	1285	1523
Jackal (Silver backed	9	12	6	7	14	22	6	14
Klipsringer	8	8	8	8	8	15	15	13
Leopard	7	8	9	9	9	9	14	18
Lion	17	44	45	47	53	61	57	46
Somali ostrich	51	44	41	52	65	83	61	58
Masai ostrich	-	-	-	-	-	-	-	5
Rhino, black	81	82	88	101	109	117	132	141
Rhino, white	70	75	80	87	97	107	118	123
Sitatunga	0	0	0	0	0	0	0	0
Warthog	68	85	140	161	168	162	151	157
Waterbuck	136	168	152	180	167	100	158	224
Zebra, Burchell	1262	1236	1228	1484	1599	1561	1557	1731
Zebra, Grevy's	299	292	308	313	331	322	310	359
Wild dog	-	-	-	-	-	-	-	15

The results include 29 elephants, 8 Black rhinos, 6 elands, 6 warthogs, 2 waterbucks, 2 giraffes, 2 bushbucks, 1 lion, and 1 Spotted hyena in Ngare Ndare Forest.

We also present here below the trends of select wildlife species, the overall wildlife distribution map, as well as the distribution of key species on the landscape as seen in figures 3, 4 and 5:
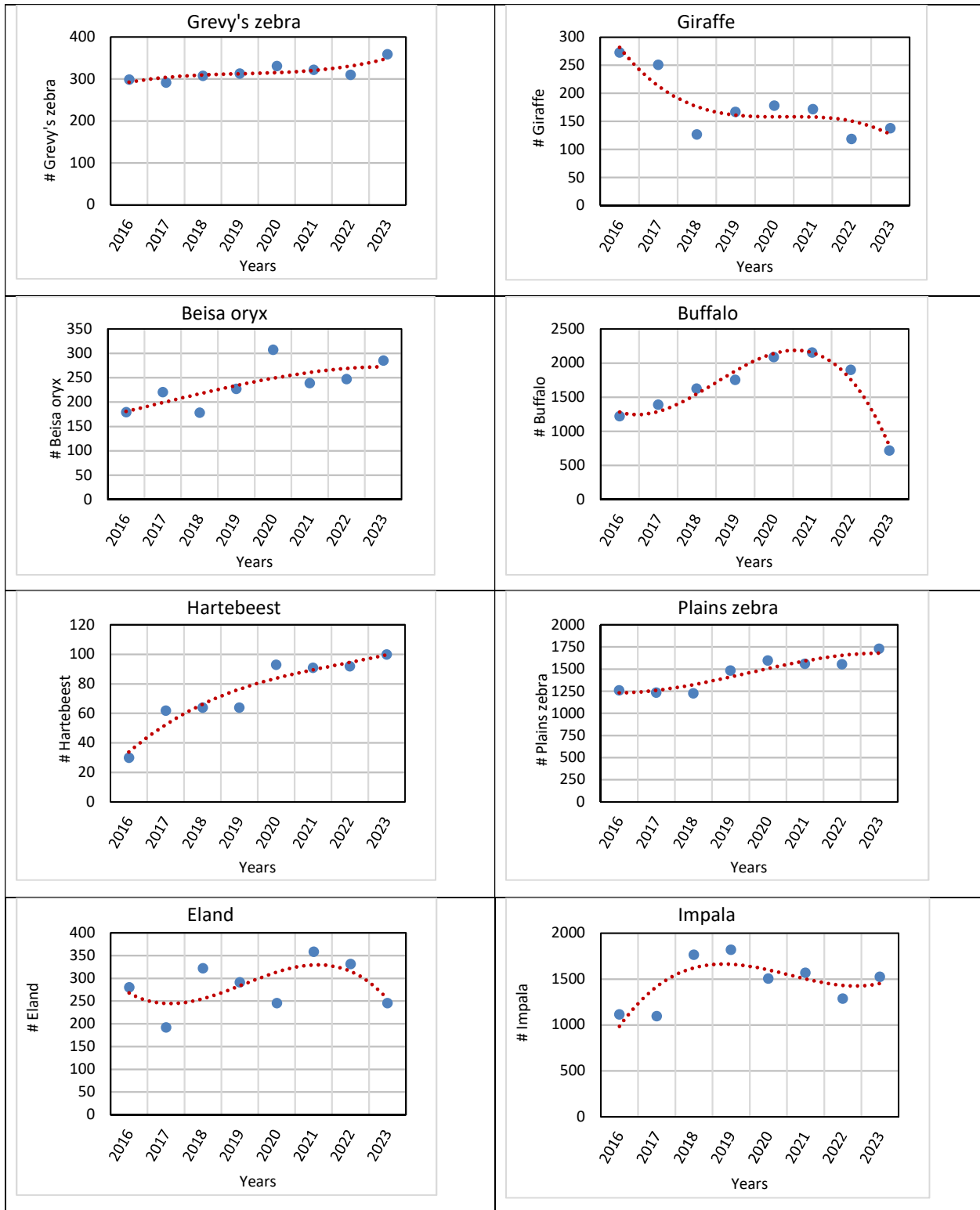
Figure 3: Trends of selected wildlife species based on present and historic data, 2016 – 2023

There was a downward trend in rainfall for the last five years, which also varied in quantity with the landscape. This significantly reduced forage quantity and quality, especially in 2022 leading

to low Body Condition Scores (BCS) for most of the wild ungulates as well as their numbers. It was noted that rainfall also varied on LBL, with Lewa receiving 183mm while Borana received 378mm. The figure below shows the rainfall trend in LBL in the last five years:
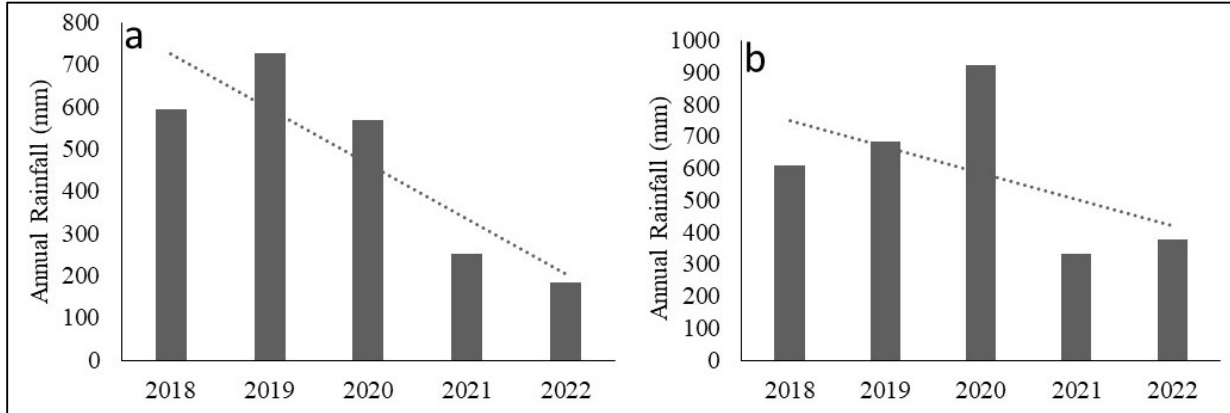
Figure 4: Rainfall pattern for a) Lewa and b) Borana for the last five years

In particular, we noted a reduction in buffalo (χ^2 = 741.86, df = 2, p = 0.0001) and eland (χ^2 = 95.69, df = 2, p = 0.0001) numbers in the landscape. Notwithstanding the drought, impala (χ^2 = 31.71, df = 2, p = 0.0001) and Plains zebra (χ^2 = 12.207, df = 2, p = 0.0022) numbers increased substantially, while there was a slight increase in Beisa oryx, Black rhino, White rhino, hartebeest, and giraffe. The reduction in the number of elephants compared to the last two years (χ^2 = 29.79, df = 2, p = 0.000) is not unusual. This is attributed to the very low rainfall which severely affected the vegetation cover forcing elephants to migrate to higher altitudes with better forage (Bohrer, *et al.,* 2014; Garstang *et al.,* 2014; Sankaran *et al*., 2005).

Supplemental feeding that was introduced in 2022 played a critical role in stabilising the numbers of severely affected species. Further delay in rainfall is likely to push the numbers further down, thus calling for the re-introduction of the feeding during the difficult months of 2023.

Our previous reports noted a shift in predator preference towards buffaloes and elands, which might have also contributed to their reduction in numbers in 2023. In particular, the buffalo BCS sharply dropped in 2022, which might have rendered them easy prey for carnivores. We also noted from the lion scat analysis that the avoidance of Grevy's zebra, Plains zebra, impala, and giraffe might have contributed to their increase in numbers (see Annual Report 2022). In addition to

removing the fence between Lewa and Borana conservancies in 2015, such effects have brought forward future research dynamics on wildlife in the landscape.

The figure below shows the overall wildlife distribution map as established during the count:
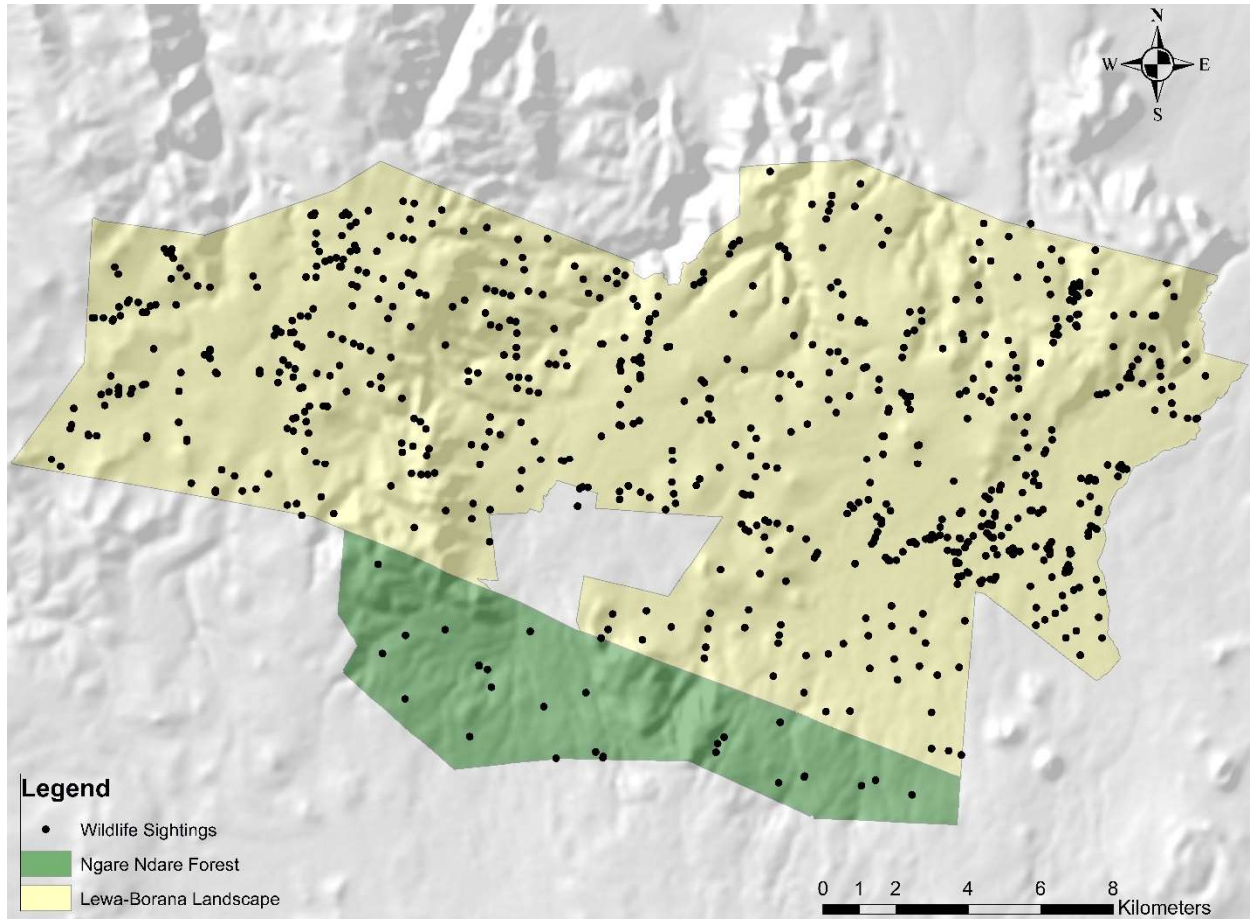
Figure 5: Distribution map of all wildlife sightings, February 2023

From the figure on wildlife sightings during the count, it is seen that animals were fairly distributed throughout the LB.

The figure below shows the distribution of key species on the landscape:
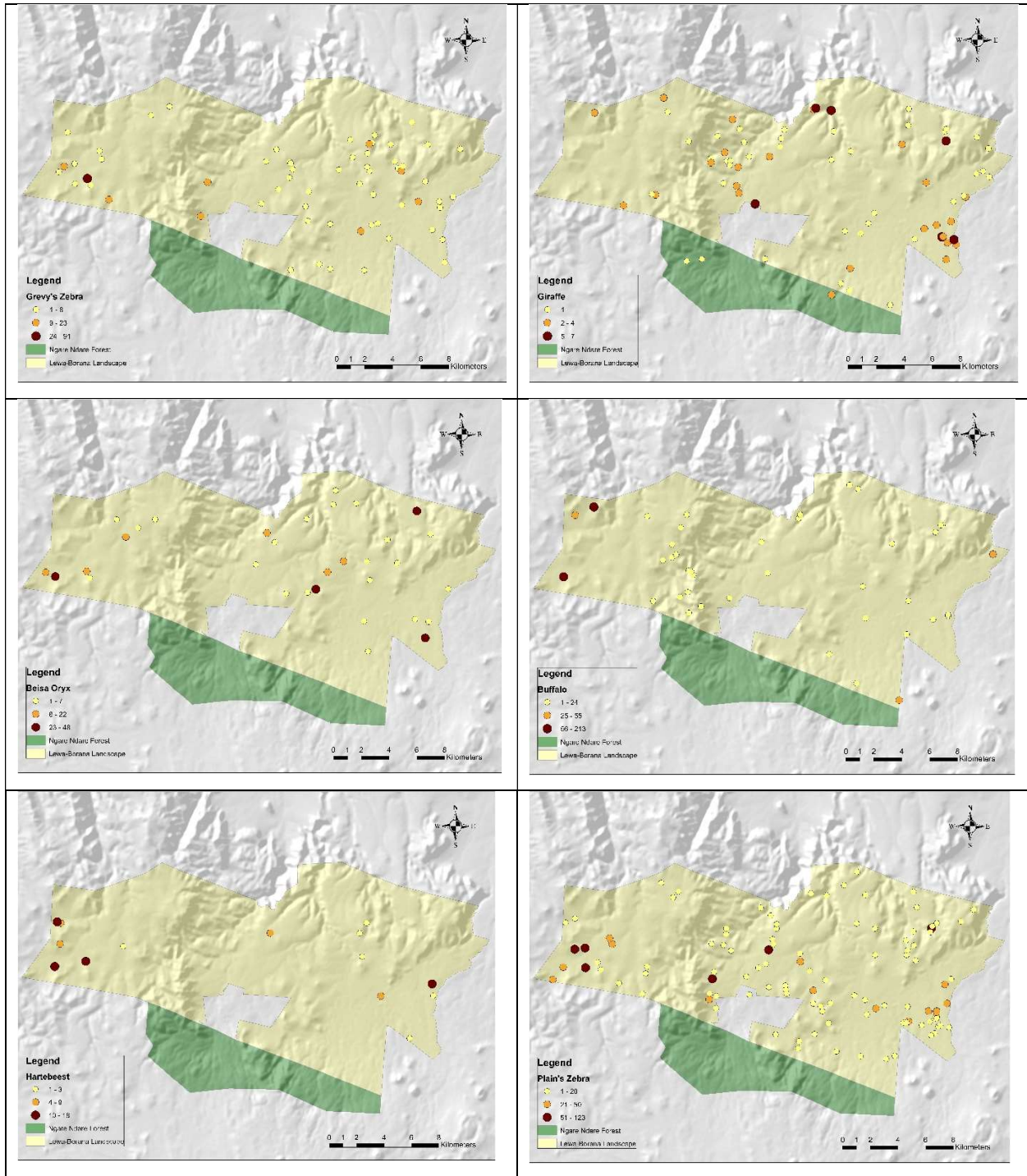
Figure 6: Distribution maps of some selected wildlife species, February 2023

The wildlife seems to be fairly distributed in every part of the landscape with the majority around the swamps and riverine areas.

For detailed reports on historical data of wildlife counts, see appendixes 1 and 2.

2.0 Conclusion and recommendations

Whereas some species like buffalo and eland were decreasing, others like Plains zebra, Grevy's zebra, impala, and Grant's gazelle were increasing. Even though these are resilient wild ungulates, there is a need to understand intraspecific and interspecific relationships in wild ungulates and how they influence population dynamics. This, therefore, calls for the determination of the ecological carrying capacity of wildlife in this landscape. For the first time, we included the NNF in the annual count. This was informed by the number of rhinos, buffalos and elands increasingly sighted in the forest in recent years. Accessibility to various corners of the forest was impaired by fallen logs, unpassable trails and closed routes. This will be rectified before the counts in future to facilitate effective counting.

Reference

Bohrer, G., Beck, P. S., Ngene, S. M., Skidmore, A. K., & Douglas-Hamilton, I. (2014). Elephant movement closely tracks precipitation-driven vegetation dynamics in a Kenyan forest-savanna landscape. Movement Ecology, 2(1), 1-12.

Garstang, M., Davis, R. E., Leggett, K., Frauenfeld, O. W., Greco, S., Zipser, E., & Peterson, M. (2014). Response of African elephants (Loxodonta africana) to seasonal changes in rainfall. *PloS one*, *9*(10), e108736.

Sankaran, M., Hanan, N. P., Scholes, R. J., Ratnam, J., Augustine, D. J., Cade, B. S., ... & Zambatis, N. (2005). Determinants of woody cover in African savannas. *Nature*, *438*(7069), 846-849.

Appendix 1: Wildlife count figures in Lewa Wildlife Conservancy: 1977 – 2023

Wildlife Count for Lewa Wildlife Conservancy: 1977 - 2023

SPECIES	Aug-77	May-90	Apr-91	May-92	Feb-93	Jun-94	Feb-95	Mar-96	May-97	Mar-98	Feb-99	Feb-00	Jan-01	Jan-02	Feb-03	Feb-04	Feb-05	Mar-06	Mar-07	Mar-08	Feb-09	Feb-10	Mar-11	Mar-12	Mar-13	2014	Feb-15	Mar-16	Mar-17	Mar-18	Mar-19	Mar-20	Mar-21	Feb-22	Feb-23
Beisa Oryx	7	68	80	68	74	57	100	65	165	127	141	126	84	86	62	85	49	69	91	115	65	76	72	76	74	102	140	138	138	101	122	174	147	180	190
Buffalo	78	71	128	197	37	74	113	203	236	159	245	238	125	161	203	233	255	339	343	349	402	403	332	269	547	695	707	941	1046	1262	1363	1459	1774	1353	187
Bush buck	0	0	0	17	7	10	3	6	3	0	6	0	0	0	>20	>20	>20	>20	>20	>20	>20	>20	20	20	15	15	15	15	15	15	15	15	15	12	12
Cheetah	4	0	1	0	2	0	0	4	7	7	10	4	21	10	7	8	8	8	5	6	6	5	11	12	7	12	5	8	1	4	5	2	1	3	1
Eland	94	260	274	135	435	128	190	146	273	227	299	228	151	121	108	137	214	169	248	255	218	165	123	95	162	204	207	173	134	231	250	205	330	254	120
Elephant	62	102	10	220	149	15	199	178	110	247	170	193	150	28	157	216	297	392	256	177	211	207	184	297	166	151	150	187	186	162	131	399	276	207	129
Gerenuk	24	31	36	77	35	37	42	50	55	5	16	4	17	15	11	7	11	11	~10	~10	~10	~10	9	7	6	7	12	10	10	10	10	10	11	16	9
Gazelle, Grants	174	322	332	274	583	174	159	133	327	181	176	132	162	192	167	261	258	320	362	452	376	371	378	386	292	337	288	322	315	259	537	648	842	784	761
Gazelle, Thompson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Giraffe	190	440	367	588	361	229	334	196	202	186	240	237	236	245	215	177	173	147	189	243	293	252	243	241	158	163	182	199	157	102	112	127	136	92	101
Greater kudu	24	14	40	34	25	27	19	30	53	22	30	13	38	37	33	36	>20	>20	>20	12	17	16	24	3	8	28	26	21	22	20	20	20	20	31	20
Hippo	0	0	0	0	0	0	0	0	0	0	0	0	1**	2**	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Hartebeest	25	63	106	45	40	46	60	35	50	58	45	28	9	7	4	2	2	2	2	24	5	7	5	10	12	11	20	18	22	27	38	47	44	44	39
Hyena, spotted	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	119	133	134	132	144	147
Hyena, striped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1
Impala	231	379	501	475	486	729	594	508	821	698	825	733	627	749	760	679	836	739	829	922	1029	1227	953	895	563	1021	814	880	777	1078	1294	952	1134	908	796
Jackal (Silver back)	0	0	0	0	0	2	2	2	0	8	0	0	0	0	>15	>12	>12	>12	>12	>12	>12	>12	8	3	9	9	9	10	4	6	4	12	2	3	
Klipsringer	0	0	0	0	0	0	0	0	12	4	8	>8	>8	>8	>8	>6	>8	>8	>8	>8	>8	>10	2	6	8	8	8	8	8	8	8	8	10	10	3
Leopard	0	0	0	0	0	3	0	0	1	1	10	0	1	7	>8	>8	8	8	>8	8	8	8	10	12	6	8	7	7	8	9	9	9	14	17	
Lion	4	0	0	0	2	0	5	0	7	2	11	0	8	20	18	28	24	16	12	16	19	17	21	23	22	26	17	23	23	23	19	22	21	26	
Somali ostrich	16	40	34	38	48	37	73	45	75	66	85	84	119	98	65	68	48	36	48	74	44	50	20	41	26	37	43	51	42	41	44	60	67	43	47
Masai ostrich	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rhino, black	0	17	14	15	19	21	21	21	20	25	25	26	29	29	32	36	40	48	53	55	64	65	62	71	69	67	72	61	60	63	73	80	78	89	87
Rhino, white	0	0	0	5	11	0	19	23	23	25	28	32	30	31	32	32	39	36*	36	38	45	46	53	58	56	63	65	70	72	80	85	91	101	110	111
Sitatunga	0	0	0	0	0	0	0	10	11	11	12	12	21	21	16	16	14	14	<10	<10	<10	<10	2	1	0	0	0	0	0	0	0	0	0	0	0
Warthog	15	124	142	230	310	110	213	147	272	233	367	304	88	194	136	129	170	140	163	277	160	162	114	50	31	59	48	68	33	69	82	55	80	80	83
Waterbuck	59	147	326	223	408	171	104	226	300	242	220	474	149	170	64*	52	116	134	93	173	175	96	171	102	96	98	92	117	101	117	133	97	68	120	110
Zebra, burchell	241	1291	1452	1375	1302	1372	1387	1428	1647	1552	1756	1467	1264	1039*	1025	1102	1094	970	1098	1184	1288	1164***	908	1151	946	956	836	991	653	694	985	725	1050	1152	1041
Zebra, Grevy's	106	287	259	380	262	236	140	387	470	517	632	497	556	487	462*	435	448	399	430	370	364**	343***	371****	378	296	284	325	299	286	308	313	331	321	308	174
Wild dog	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0

Appendix 2: Wildlife count figures in Borana Wildlife Conservancy: 1977 – 2023

Wildlife Count for Borana Wildlife Conservancy: 1977 - 2023

SPECIES	Aug-77	May-90	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Mar-16 (Aerial count)	Mar-17 (Total aerial & ground count)	Mar-18	Mar-19	Mar-20	######	Feb-22	Feb-23
Beisa oryx	-	-	38	112	-	-	47	101.5	88	111	-	-	-	-	-	-	-	70	-	-	-	30	25	19	26	29	33	41	82	77	105	133	92	67	95
Buffalo	-	-	78	66	-	-	127	196.5	222	165	-	-	-	-	-	-	-	380	-	-	-	122	133	141	190	229	228	279	345	361	390	627	379	548	528
Bushbuck	-	-	20	18	-	-	6	8	0	0	-	-	-	-	-	-	-	0	-	-	-	0	1	1	0	1	3	0	2	1	0	-	-	5	5
Cheetah	-	-	0	0	-	-	1	2	0	0	-	-	-	-	-	-	-	3	-	-	-	0	0	1	0	0	0	0	0	0	0	4	6	5	7
Eland	-	-	105	257	-	-	176	203.5	185	372	-	-	-	-	-	-	-	104	-	-	-	37	34	51	53	60	59	107	58	91	40	28	-	77	119
Elephant	-	-	0	35	-	-	27	91.5	9	29	-	-	-	-	-	-	-	67	-	-	-	60	59	105	85	106	94	229	323	88	122	328	240	218	198
Gerenuk	-	-	0	0	-	-	0	0	0	0	-	-	-	-	-	-	-	0	-	-	-	1	1	1	0	1	2	0	0	1	0	0	0	0	3
Gazelle, Grants	-	-	88	140	-	-	94	93.5	109	55	-	-	-	-	-	-	-	74	-	-	-	12	14	16	30	30	26	26	128	156	181	453	303	351	449
Gazelle, Thompsons	-	-	0	0	-	-	0	0	0	0	-	-	-	-	-	-	-	0	-	-	-	0	2	1	0	0	0	27	4	7	10	16	16	26	4
Giraffe	-	-	77	120	-	-	102	166.5	153	151	-	-	-	-	-	-	-	105	-	-	-	60	61	63	78	56	63	74	94	25	55	51	36	27	35
Greater kudu	-	-	48	36	-	-	32	40	32	1	-	-	-	-	-	-	-	18	-	-	-	5	5	8	9	9	11	7	13	2	12	12	12	1	9
Hippo	-	-	0	0	-	-	0	0	0	0	-	-	-	-	-	-	-	0	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hartebeest	-	-	18	43	-	-	22	23	27	43	-	-	-	-	-	-	-	11	-	-	-	4	6	5	8	10	12	10	44	42	37	55	44	48	61
Hyena, spotted	-	-	3	13	-	-	10	5	0	0	-	-	-	-	-	-	-	0	-	-	-	0	0	0	0	0	0	0	0	3	0	2	2	0	0
Hyena, striped	-	-	2	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	-	-
Impala	-	-	77	217	-	-	206	176	415	166	-	-	-	-	-	-	-	311	-	-	-	115	161	198	190	165	174	233	319	685	523	553	434	377	727
Jackal (Silver backed)	-	-	11	7	-	-	18	8	0	0	-	-	-	-	-	-	-	0	-	-	-	0	0	0	0	0	0	0	2	2	1	10	10	4	11
Klipsringer	-	-	0	0	-	-	0	0	0	0	-	-	-	-	-	-	-	0	-	-	-	0	0	0	0	0	0	0	0	0	0	5	-	5	5
Leopard	-	-	4	7	-	-	5	6	0	0	-	-	-	-	-	-	-	6	-	-	-	0	0	0	0	9	0	0	0	0	0	-	0	0	1
Lion	-	-	0	6	-	-	5	7.5	5	0	-	-	-	-	-	-	-	20	-	-	-	2	10	8	3	3	2	0	21	22	24	34	39	35	19
Somali ostrich	-	-	0	0	-	-	0	0	14	14	-	-	-	-	-	-	-	0	-	-	-	0	0	0	0	0	0	0	2	0	8	5	16	18	11
Masai ostrich	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
Rhino, black	-	-	0	0	-	-	0	0	0	0	-	-	-	-	-	-	-	0	-	-	-	0	0	0	21	21	20	20	22	25	28	29	39	43	46
Rhino, white	-	-	0	0	-	-	0	0	0	0	-	-	-	-	-	-	-	0	-	-	-	0	0	0	0	2	0	0	3	0	2	6	6	8	12
Sitatunga	-	-	0	0	-	-	0	0	0	0	-	-	-	-	-	-	-	0	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Warthog	-	-	0	0	-	-	19	30	25	51	-	-	-	-	-	-	-	6	-	-	-	6	7	6	9	9	7	0	52	71	79	113	75	71	68
Waterbuck	-	-	149	110	-	-	50	139.5	150	116	-	-	-	-	-	-	-	51	-	-	-	17	26	25	37	45	43	19	67	35	47	70	32	38	112
Zebra, burchell	-	-	524	1036	-	-	867	831	675	714	-	-	-	-	-	-	-	635	-	-	-	276	265	241	271	297	284	271	583	534	499	874	511	405	690
Zebra, Grevys	-	-	0	0	-	-	0	1	2	0	-	-	-	-	-	-	-	1	-	-	-	0	0	0	0	0	0	0	6	0	0	0	0	2	185
Wild dog	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15