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Amboseli Ecosystem Aerial Count 2025

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Introduction

The Amboseli Conservation Program (ACP) has flown regular aerial sample counts of wildlife and livestock in the Amboseli ecosytsem and eastern Kajiado since 1973 (Figure 1). The counts track wildlife and livestock numbers in response to environmental changes and human activity. We published the results of the half-century of aerial counts in 2021. The main finding is that human activity now shapes the ecology of Amboseli far more than natural forces (Western and Mose, 2021). We have continued to conduct regular aerial censuses to track the ecological changes in Amboseli.

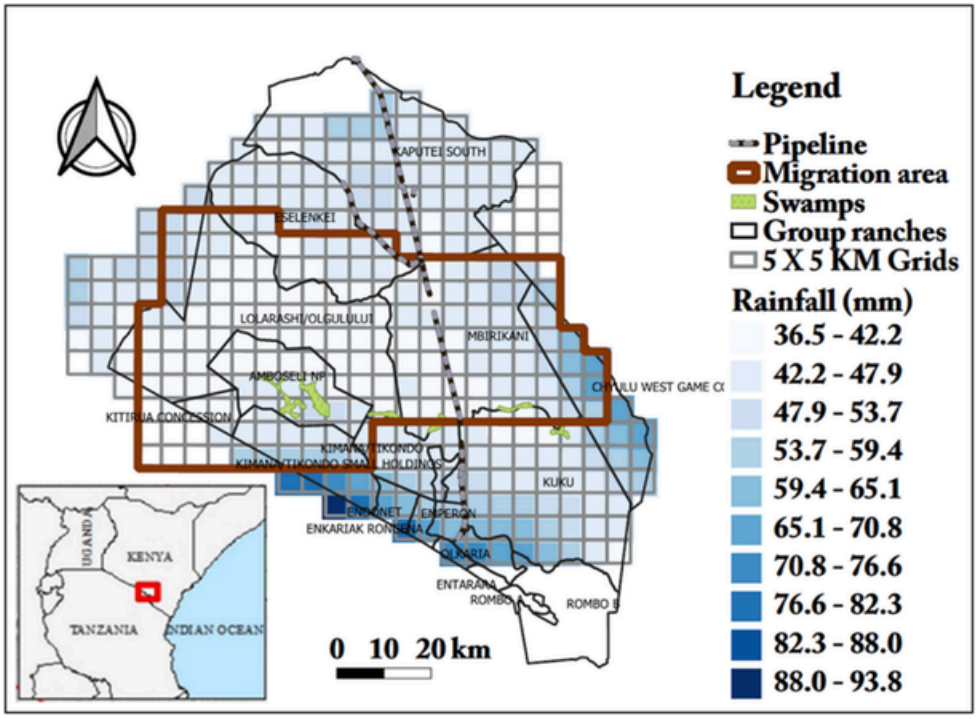


Figure 1. A map of the 8,300 km² eastern Kajiado covered by the ACP aerial counts since 1974. The map shows Amboseli National Park, surrounding group ranches, rainfall isopleths and the 5 × 5 km grid overlay used in flying flight lines (Western & Mose, 2021).

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ACP, funded by the European Union MOSAIC program at the African Conservation Centre, commissioned the Department of Remote Sensing and Regional Surveys (DRSRS) to conduct our latest count in October 2025. DRSRS used the ACP counting methods given in the Appendix. The count was timed to capture the distribution of wildlife and livestock at the end of the dry season.

The short-coming of a dry season aerial count when the migratory species cluster around the Amboseli swamps lies in the flight lines missing the densest herds. This tends to underestimate population sizes. Aerial counts also greatly underestimate the numbers of smaller thinly spaced species, including Thomson's gazelle, lesser kudu and gerenuk. To counter the under counting, ACP conducts regular ground counts of the Amboseli dry season area. The methods are given in the Appendix, together with the integration of aerial and ground counts.

We start by giving the results of October 2025 estimated popoulations and distributions of wildlife and livestock for eastern Kajiado. We then compare and comment on population changes since the extreme drought of 2009. We next give figures for the Amboseli ground counts and integrate both counts to give best estimates for wildlife and livestock numbers in October 2025.

Aerial Count October 2025

Species	October 2025 Population Estimates
Zebra	10,218
Wildebeest	4,120
Impala	127
Grant's gazelle	4,646
Eland	200
Buffalo	91
Elephant	1,071
Giraffe	2,377
Ostrich	599
Warthog	36
Lesser Kudu	54
Thomson's gazelle	-
Cattle	73,357
Sheep and goats	258,473
Donkey	817
Camel	200

Table 1: Population estimates for large herbivores across the 8,300 km² Amboseli ecosystem based on the October 2025 aerial survey.

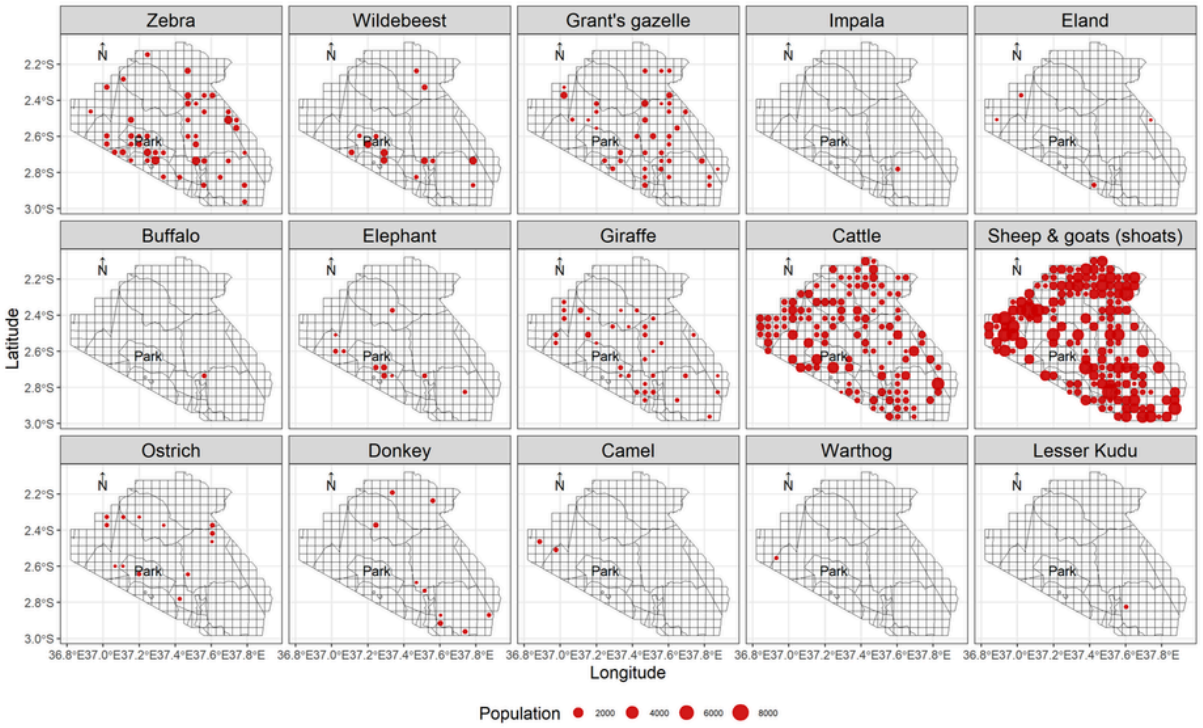


Figure 2: Spatial distribution of sampled large herbivore species across the Amboseli ecosystem during the October 2025 aerial survey. Large concentrations of zebra and wildebeest were recorded inside Amboseli National Park.



We next compare the 2025 count with those since 2009.

Species	Population Estimates							
	Feb 2010	May 2017	May 2018	Feb 2020	Feb 2022	Sep 2023	May 2024	Oct 2025
Zebra	3,056	6,423	15,902	17,239	20,466	8,112	8,820	10,218
Wildebeest	683	4,679	8,361	8,094	8,700	5,259	3,412	4,120
Impala	857	307	1,908	464	250	232	526	127
Grant's gazelle	2,961	6,807	10,839	12,515	10,732	5,223	6,715	4,646
Eland	2,545	786	4,368	4,154	2,692	143	91	200
Buffalo		288	428	1,355	1,711		889	91
Elephant	1,137	1,361	767	1,533	2,139	2,139	1,016	1,071
Giraffe	2,682	3,202	6,667	6,828	5,562	1,284	4,410	2,377
Ostrich	1,215	882	1,266	1,052	428	909	1,016	599
Thomson's gazelle	607	499	624	89	36		2,523	
Kongoni	463	586	196	695	89		526	
Warthog	259		107	303	89	125		36
Lesser Kudu	171	77	18	36	0	36		54
Gerenuk	155	38	18		18	18		
Oryx		72	464	89				
Waterbuck		19						
Hippo			36					
Cattle	49,368	55,874	107,358	143,601	283,849	84,467	130,198	73,315
Sheep & goats	95,047	179,184	184,907	249,478	296,810	156,936	183,864	258,473
Donkey	1,213	844	998	856	2,603	874	653	817
Camel		230	1,729	981	285	1,943		200

Table 2. A comparison of aerial counts for 2010 to 2025 tracking the course of drought losses and recovery in wildlife and livestock populations.

The figures for 2010 reflect the extreme losses of zebra, wildebeest, cattle and sheep and goats (shoats) in the 2009 drought. Two thirds of zebras, over 90 percent of wildebeest, three quarters of cattle and two thirds of shoats succumbed to the drought. The following years saw a steady recovery in numbers until a further drought in 2022. Zebras wildebeest and livestock suffered heavy losses to starvation, and herders selling animals to ride out the drought.

Figures from the 2024 count has zebra and wildebeest numbers growing substantially from the 2022 drought. Cattle numbers also showed steady recovery, sheep and goats less so due to herders selling livestock to see them through recovery. By 2025 zebra and wildebeest numbers had recovered by half. Sheep and goat numbers fully recovered from the 2022 drought but cattle figures fell steeply due to herders turning increasingly to small stock and market sales.





Ground Count October 2025

The ground counts for the 704 km² Amboseli dry season concentration area are given in Table 3. The table also gives the aerial counts and the integrated aerial and ground counts to give best estimates of wildlife populations for October 2025.

Species	Population Estimates		
	Basin area 704Km² (Ground Counts)	Outside Basin area (Aerial Counts)	Total for eastern Kajiado
Zebra	7,145	6,852	**13,997**
Wildebeest	5,345	1,877	**7,222**
Impala		125	**125**
Grant's gazelle	1,290	4,230	**5,520**
Thomson's gazelle	1,863		**1,863**
Eland		198	**198**
Buffalo	448	90	**538**
Elephant	820	414	**1,234**
Giraffe	45	2,190	**2,235**
Ostrich	135	504	**639**
Warthog	9	36	**45**
Eland		198	**198**
Lesser Kudu		54	**54**
Hippo	5		**5**
Reedbuck	18		**18**

Table 3. Ground estimates for wildlife populations in the 704 km² Amboseli basin area and aerial estimates for the remainder of eastern Kajiado. The pooled results give a best estimate of the 8,300 km² eastern Kajiado wildlife numbers.

Discussion of results

The stratification and pooling of the aerial and ground counts increased the numbers of zebras and wildebeest for eastern Kajiado considerably, most of which are confined to the Amboseli ecosystem. The numbers of smaller species also increased considerably with the correction for undercounting on the aerial census. The figures for small species nevertheless remain low due to the inherent difficulty of spotting them on aerial counts. The low giraffe numbers speak to a considerable loss compared to the pre-2022 drought figures. We suspect the spread of farms and fences across Mbirikani where the densest populations resided to be a key factor in the decline.

Future ecosystem monitoring in Amboseli

ACP's funding for monitoring the ecosystem has ended after fifty years. Sustaining the counts has been a hard sell even though the data has been vital to the planning and management of Amboseli National Park and ecosystem over the decades.

We are exploring ways sustain the monitoring as a permanent component of the Amboseli ecosystem management. The transfer of the management functions of Amboseli to the semi-autonomous Amboseli Ecosystem Conservation Authority (AECA) under the Kajiado County holds promise. One of AECA's five main functions is an ecological management program. The program includes provisions and funding for an MoU with research and conservation partners to conduct the ecosystem monitoring. ACC/ACP already has an MoU with the Kajiado County to coordinate an ecological assessment of the ecosystem which provides a framework agreement.

Conducting regular aerial counts is expensive and has its shortcomings, including undercounting species, especially smaller and cryptic animals. We are exploring two other options to increase the resolution and lower the cost of aerial counts.

The first is to expand the coverage of the ground counts ACP already does for the Amboseli dry season range. This could be done effectively and cheaply by adding rangers to the regular ground counts done by resource assessors. This would entail coordination with NGOs like Big Life and IFAW conducting ranger patrols.

The second is to use drones which hold considerable promise to replace fixed wing aircraft in animal counts and environmental monitoring. ACP is currently working with partners to pioneer this option.

References

Jolly, G. M. (1969). Sampling Methods for Aerial Censuses of Wildlife Populations. East African Agricultural and Forestry Journal, 34(sup1), 46–49. https://doi.org/10.1080/00128325.1969.11662347

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Appendix

Aerial Counts

Aerial wildlife surveys in the Amboseli ecosystem use systematic reconnaissance sampling to estimate the abundance and spatial distribution of large herbivores and livestock across approximately 8,300 km². The survey area is mapped using a 5 × 5 km grid system, with each grid cell representing 25 km², to guide flight planning, locate observations and map species distributions. Surveys are conducted using a light aircraft flying north–south transects approximately 5 km apart at a nominal altitude of 90 m above ground and an average speed of 190 km/hr. Two rear-seat observers count animals within defined strips extending 144 m on either side of the aircraft, giving a total observation width of 288 m (Western and Mose, 2021).
The strip boundaries are determined by markers attached to the aircraft's wing struts. The resulting sampling fraction is approximately 5.6% of the survey area. Herds containing 15 or fewer animals are counted directly, while larger herds are photographed to verify group sizes. Population estimates are calculated using Jolly's Method II to accommodate unequal-length transects.

Counts and the corresponding areas surveyed are used to estimate population density, which is then extrapolated to the total survey area. The method also provides estimates of sampling variance, standard errors and coefficients of variation (CVs), allowing the precision of species-specific population estimates to be assessed. Wildlife species are not uniformly distributed across the ecosystem. Some form large, concentrated herds within particular areas.
The 5 × 5 km grid facilitates the mapping of these spatial concentrations, while Jolly's Method II accounts for sampling variation in population estimates. However, it does not independently correct for clustering-related bias or animals missed by observers. Highly aggregated species may therefore have larger standard errors and CVs, which should be considered when interpreting their estimates (Jolly, 1969).

Ground counts

To calibrate aerial survey estimates against ground counts and the effects of highly clustered wildlife species within the park, we estimated wildlife populations separately for the basin area and the area outside it. We used ground counts to estimate populations within the 704 km² basin, where monitoring is more intensive, and aerial survey data to estimate populations in the area outside the basin. We then added the two estimates to obtain the total wildlife population for the approximately 8,300 km² Amboseli ecosystem. This approach takes advantage of the intensive ground-based sampling within the basin while incorporating aerial survey estimates for the wider ecosystem. The resulting population estimates are presented in Table 3.

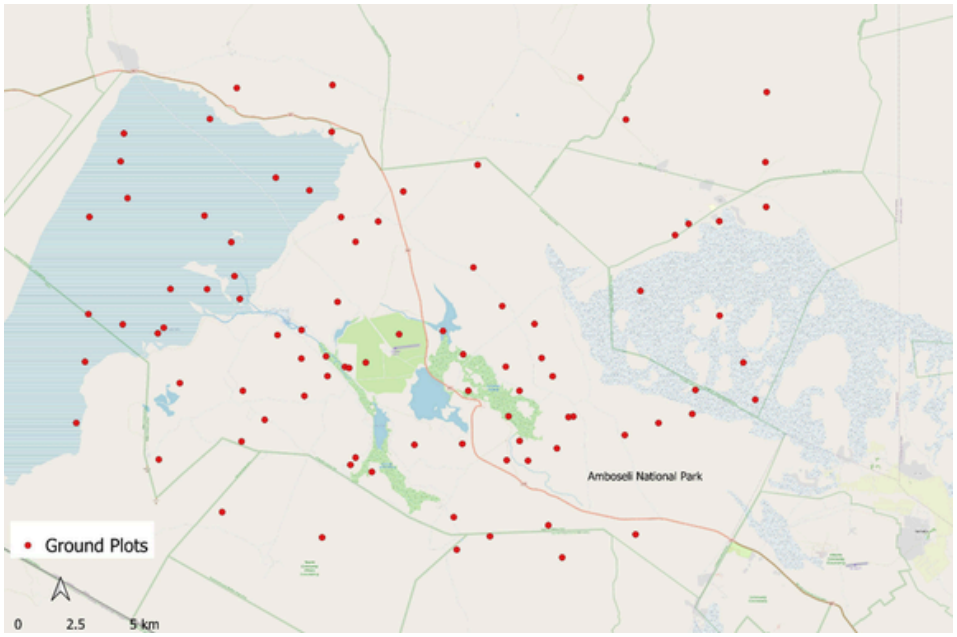


Figure A1: Distribution of the 89 ground plots used to sample the herbivore population during the October 2025 survey. Herbivore species were highly concentrated in the Amboseli Basin at this time of year.