TOTAL AERIAL COUNT OF ELEPHANTS AND OTHER LARGE MAMMALS IN NASOLOT/SOUTH TURKANA/RIMOI/KAMNAROK AREA,

KENYA

30TH July - 1ST August 2010

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Executive Summary

This is a report of the 2010 total aerial count of the Nasolot/South Turkana/Rimoi/Kamnarok area, that includes South Turkana and Nasolot National Reserve in the north and Rimoi/Kamnarok National Reserves to the south and the surrounding areas with an estimated area of 4551.49 km^2. It includes elephant ranges of West Pokot, Marakwet, Turkana and Baringo Districts. This is an ecologically important area that is also a refuge of the African Elephant. The count was carried out from the 30th July to the 1st August 2010.

During the count, a total of 1100 wildlife comprising of nine species were counted. This included 362 Elephants and 11 Elephant carcasses; 384 Grants gazelles, 135 Baboons and 129 Dik dik. The Elephant population declined by 26%, however the population of other larger mammals increased by over 90% compared to the previous counts of 2002.

A total of 20,148 Livestock comprising of Cattle, Shoats, Donkeys and Camels were counted. It was noted that the cattle declined by 62% and the Shoats by 14% compared with the previous counts of 2002. The decline was partially attributed to the drought of 2007-2009 as well as cattle rustling which is prevalent in the area.

The threats identified to the wildlife in the area include the loss of habitat due to change in land-use systems, poaching from the insecurity associated with firearms and cattle rustling. There is need to have a lot of “Barazas” to raise awareness in the local community. Communication within the various inter governmental agencies operating within the area will help reduce the impacts of human settlement and agriculture on the ecological integrity of the area. More resources need to be allocated to enhance wildlife security in the area.

Acronyms

CRCA	Central Rift Conservation Area
DRSRS	Department of Resource Surveys and Remote Sensing
FSO	Front Seat Observer
GIS	Geographical Information System
GPS	Global Positioning System
KWS	Kenya Wildlife Service
MIKE	Monitoring the Illegal Killing of Elephants
RSO	Rear Seat Observer
WCA	Western Conservation Area

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Introduction

The South Turkana and Nasalot reserves probably hold the largest elephant population in western Kenya. This population is currently facing the greatest threat from poaching, compared to other parts of the country and which has necessitated a total aerial count to be undertaken to ascertain the status of the elephant population, and other wildlife species in this region taking into account that the last comprehensive total aerial count was carried out in 2002 (Omondi *et al.* 2002).

In 1973 it was estimated that there were 1,500 elephants in Turkana District, but figures were unavailable for West Pokot, Elgeyo Marakwet and Baringo districts (Jarman, 1973). Surveys undertaken by Department of Remote Sensing and Resource Surveys (DRSRS) in 1970's and 1980's generally yielded low estimates apart from one count in 1981 that recorded more than 800 elephants outside the reserves.

Kenya Wildlife Service estimated in 1990 that 400 elephants utilized Nasalot and south Turkana with another 100 in Rimoi and Kamnarok. DRSRS sample counts in the same year gave estimates of 535 for West Pokot (including Nasolot), zero for Turkana and 596 for Baringo. In a sample count that was undertaken by Mbugua (1992) in Elgeyo Marakwet, a small number of elephants was sighted inside the sample strips, and thus the count was treated as a low-intensity total count. The count further presented a similar figure of 580 elephants, of which 525 were in Nasolot and South Turkana. Since this was carried out at a low intensity, it was estimated that the total population could have consisted over 900 elephants.

Total aerial counts of the Nasolot/South Turkana elephants were carried out in June 1997 (Muriuki *et al.* 1997) and July 1999 (Omondi *et al.* 1999) that employed methods by Douglas-Hamilton *et al.* 1994 and Douglas-Hamilton, 1997. A total of 852 and 792 elephants were counted in 1997 and 1999 respectively. In both counts the majority of elephants were found in the northern block of Nasolot/South Turkana, with smaller numbers observed in the southern Kerio block in the environs of the Rimoi and Kamnarok National Reserves. The most recent total aerial count was undertaken in 2002 (Omondi *et al*, 2002) and a total of 490 elephants were recorded. Most of them were found further south east towards South Turkana National Reserve and the rest in the furthest south of the Kerio valley in Rimoi National Reserve.

In addition, Elephant carcasses in different stages of decomposition (fresh, recent, old and very old) were recorded during the count. Other wildlife species counted included baboon, buffalo, grant gazelle, lesser kudu, warthog, dik dik, and domestic livestock mainly cattle, sheep and goats (Shoats). Cultivation and new human settlements were observed while pastrolism was noted as the main economic activity.

The objectives of the count were as follows

1. To determine the population status of the Elephants and other large animal species in the area assessed.

2. Determine the extent and spread of human activities in the area.

Materials and Methods

Study Area

The study area covered Nasolot, South Turkana, Rimoi and Kamnarok National Reserves and the surrounding areas with an estimated area of 4551.49 km^2. It includes elephant ranges of West Pokot, Marakwet, Turkana and Baringo Districts within the Western Conservation Area WCA and Central Rift Conservation Area CRCA. This dispersal area covers a part of the Kenyan North Rift between 2^0 4' N and 0^0 46' North and 35^0 3'E and $36^0$2' East (Figure 1). The ecosystem comprises the Kerio valley which is lined by the Turkwel gorge to the North. The gorge branches into escarpments flowing southwards to Keiyo and Baringo which host Rimoi and Kamnarok National Reserves respectively. Nasolot and South Turkana National Reserves covering 92 km^2 and 1019 km^2 respectively form the Northern part of the study area while Rimoi and Kamnarok National Reserves in the south cover 66km^2 and 87.7km^2 respectively.

The Kerio valley is situated at 1,000m and is formed by a narrow and long strip of approximately 80 km and by maximum 10 km wide (OP/MPND, 1991 & 2000; Chebet and Dietz, 2000; Jeatzold and Schmdt, 1983). The valley is a semi arid bush land interrupted by high altitude ridges with climates of moderate moisture. The general north – south trend of the Physiographic features influences climate, vegetation, soil, ecoclimatic zones and land use patterns. The relationship of elevation to climate is evidenced by the distribution of rainfall which decreases from 1400 mm to 1100 mm in the highlands and 760 mm to 400 mm in the lowlands. However, the rainfall pattern in the valley is quite erratic and figures as low as 220 mm per year have been recorded (MALDM/GTZ, 1994). The rainy season occurs from April through August. The mean annual temperature in the highlands is 14^0C and in the lowlands is 24^0C. Climatic patterns range from humid subtropical in the highlands to semi-arid in the lowlands.

Vegetation of the study area is savannah; Blundell (1992) classified the ecological zone as semi desert or dry bush land with scattered herbs and shrubs, much of the ground surface being bare. Terrain in some spots is rugged and gorgeous, and thus inaccessible. Nasolot and South Turkana plateau is dominated by lower layer Acacia

woodlands with sparse herbaceous ground vegetation. The woodlands are capable of concealing medium size animals such as the sunis, kudus and Impalas.

The Pokot communities occupy the northern part while the Turkana live in the central parts and the southern are occupied by the Tugen. Most of communities living in this ecosystem are pastoral, and the emerging agricultural activities, influx of firearms and lack of a management plan has undermined wildlife conservation *inter alia*.

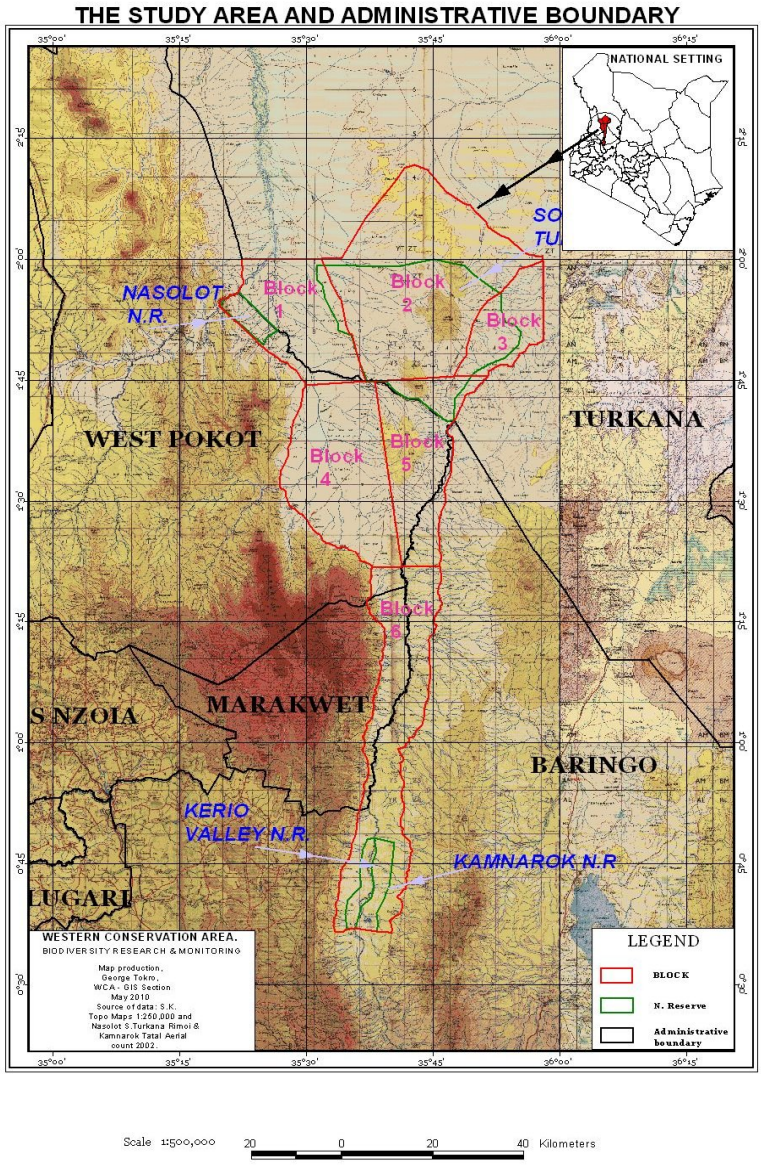

Figure 1: Map of Study Area showing Counting Blocks

Census technique

The actual count was conducted from 30th July to 1st August 2010. The exercise started every morning at 0600hrs and ended late in the evening depending on the weather conditions.

Total aerial count method as described by Norton Griffins (1978) was applied. The same was also used in 1999 and 2002. The method has also been described in Douglas-Hamilton *et al.* (1994) and Douglas-Hamilton, (1997).

Two aircrafts consisting of a four seater Cessna 182 and a two seater husky were used. Each of the aircraft had a Global Positioning System (GPS) for use in navigation, recording survey path and marking waypoints. The study area was divided into six blocks with the total area of Each block was systematically searched by an air-craft flying at height of about 100 m either East West or North South directions along transects of 1-2 km width depending on the visibility and terrain (Figure 2). The crew of the aircrafts consisted of a pilot, Front Seat Observer (FSO) and Rear Seat Observers (RSOs).

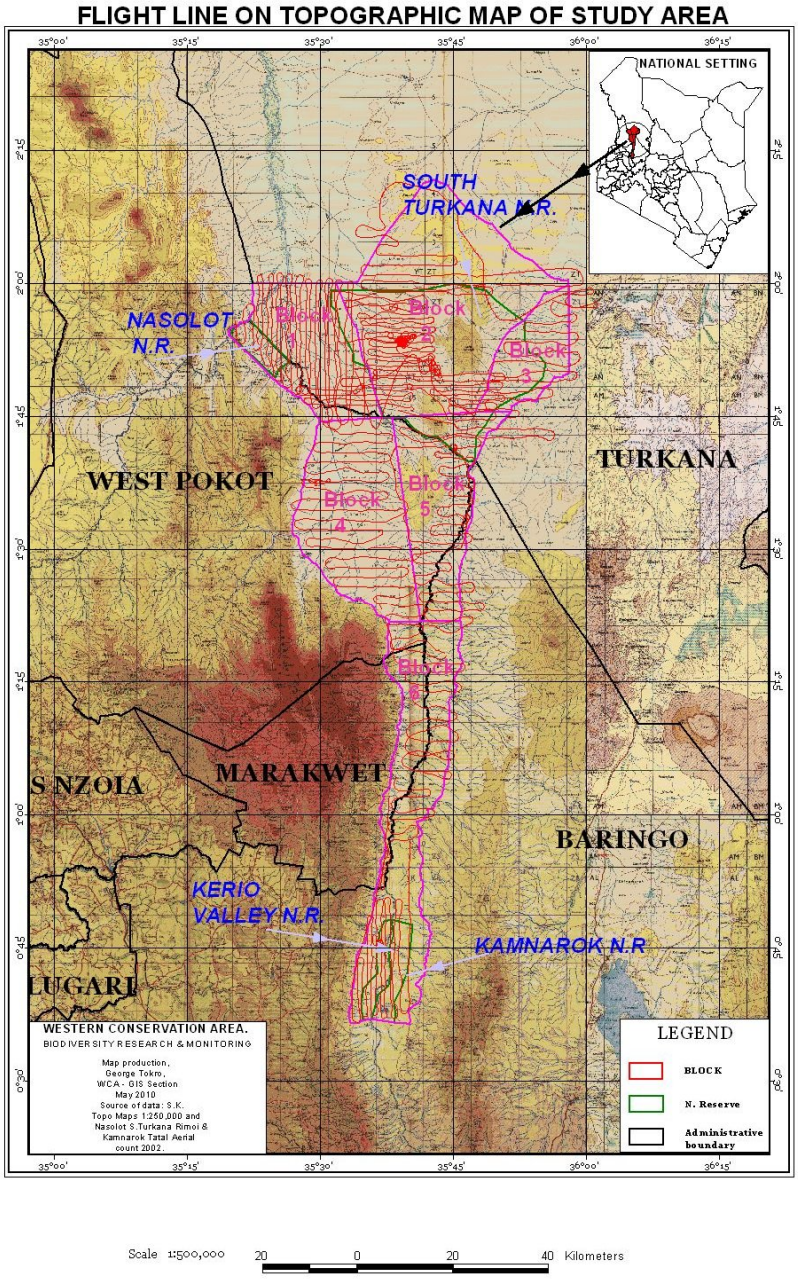

Figure 2: Map Indicating the Survey Flight Lines

The aircraft crew systematically searched for and made observations and recording of parameters of interest within the flight transects. For each observation a waypoint was marked on a hand held GPS and the observation recorded on a data sheet. The pilot was responsible for navigation and safety with help of the FSO. He would keep flight paths and circle over large herds to allow for accurate recording by the FSO. The FSO was responsible for marking the waypoints on GPS and recording the counts on pre-designed data forms (appendix 4). The data recorded included wildlife species numbers,

carcasses, livestock, human settlements, watering points, market centers, schools, agricultural farms, other human activities and their geographical locations. Photographs were taken of large herds to later verify the correct count, unless the view was obstructed by thick vegetation (Douglas-Hamilton, 1997). At the end of count session the GPS flight paths and waypoints were down loaded using DNR Garmin software. The FSO did a summary table of each block and any double counts in the neighboring blocks were worked out and eliminated. The observation data sheets were then cleaned and entered into Microsoft Excel 2003/2007 for further analysis and presentation. ArcView software was used for plotting all the data collected and to generate maps.

Results and Discussion

Wildlife

The numbers of wildlife recorded from the summations of the Front Seat Observer FSO tally sheets are presented below. These numbers are quite likely to be under estimates due to the very nature of aerial total counts (Krebs 1989). There were a total of 9 mammalian species recorded during the count (table 1). Grant's gazelle (*Gazella granti*) was the most abundant wild species followed by elephant (*Loxontoda africana*), Olive baboon *(Papio anubis)* and Dik dik (*Madoqua kirkii*). Others species recorded included Thomson's gazelle (*Gazella thomsonii*), Lesser Kudu *(Tragelaphus imberbis),* Beisa Oryx (*Oryx beisa beisa*), Warthog (*Phacochoerus aethiopicus)* and Impala (*Aepyceros melampus*). This information has been summarized in the block summary table below.

Block	Lesser Kudu	Grant Gazelle	Impala	Oryx	Baboon	Dik dik	Thomsons Gazelle	Warthog	Elephant	Elephant Carcass
1	5	-	2		-	30	-	5	11	2
2	12	384	-	11	112	43	30	2	199	5
3	4	-	-	3	12	20	-	-		
4	4	-	-	-	11	5	-	-		1
5	-	-	-	-	-	11	-	-	16	
6	-	-	-	-	-	10	-	-	136	3
Total	**25**	**384**	**2**	**14**	**135**	**119**	**30**	**7**	**362**	**11**

Table 1: Wildlife Summaries 2010. Block 1= Nasalot National Reserve; Block 2 = South Trukana National Reserve; Block 6= Kamnarok National Reserve;

From the above results the largest number of wild animals recorded was Grant Gazelles (384) which were all found in block 2. This was followed by Elephant (362) and did dik (135). However, Elephant carcasses (11) were also counted. The least number of wild animals counted was Impala (2) and Warthog (7). Low recorded numbers of Impala and

warthog could be due to low visibility of the animals from the air as well as the time of the day the counts were carried out.

Block 2 had the largest variety of wild mammals recorded (798) and block 5 the least (21).

Animal Species	Lesser Kudu	Grant Gazelle	Impala	Oryx	Baboon	Dik dik	Thomson's Gazelle	Warthog	Elephant	Elephant Carcass	Buffalo
2010 Total	26	384	2	14	135	129	30	7	362	11	0
2002 Total	2	1	0	1	12	3	0	11	490	62	5

Table 2: Comparison between 2010 and 2002 wildlife numbers

We compared the wildlife numbers from the previous census (2002) in the table above. It was noted that some species were counted in 2002 but not in the 2010 count. These were the African buffalo *Syncerus caffer* (none in 2010 but five in 2002), Thomson's gazelle (30 in 2010 and none in 2002) and Impala *Aepyceros melampus* (two in 2010 and none in 2002).

Lesser Kudu, Grant's gazelle, Oryx, Baboon and Dik Dik populations were all observed to have increased by more than 90%. However, the Warthog and Elephant populations had declined by 57% and 35% respectively.

Elephant Distribution

The highest number of Elephants were found in block 2(199) followed by Block 6 (136) while the least number of Elephants was recorded in block 1 (11). Five elephant carcasses were observed in this block. Block 6 is the southern part of the study area and the Rimoi and Kamnarok National reserves are located here. Block 2 is mainly South Turkana National Reserve. Therefore the elephants are concentrated mainly around the National Reserves.

The figure below shows the distribution of elephants and elephant carcasses as recorded in the aerial count.

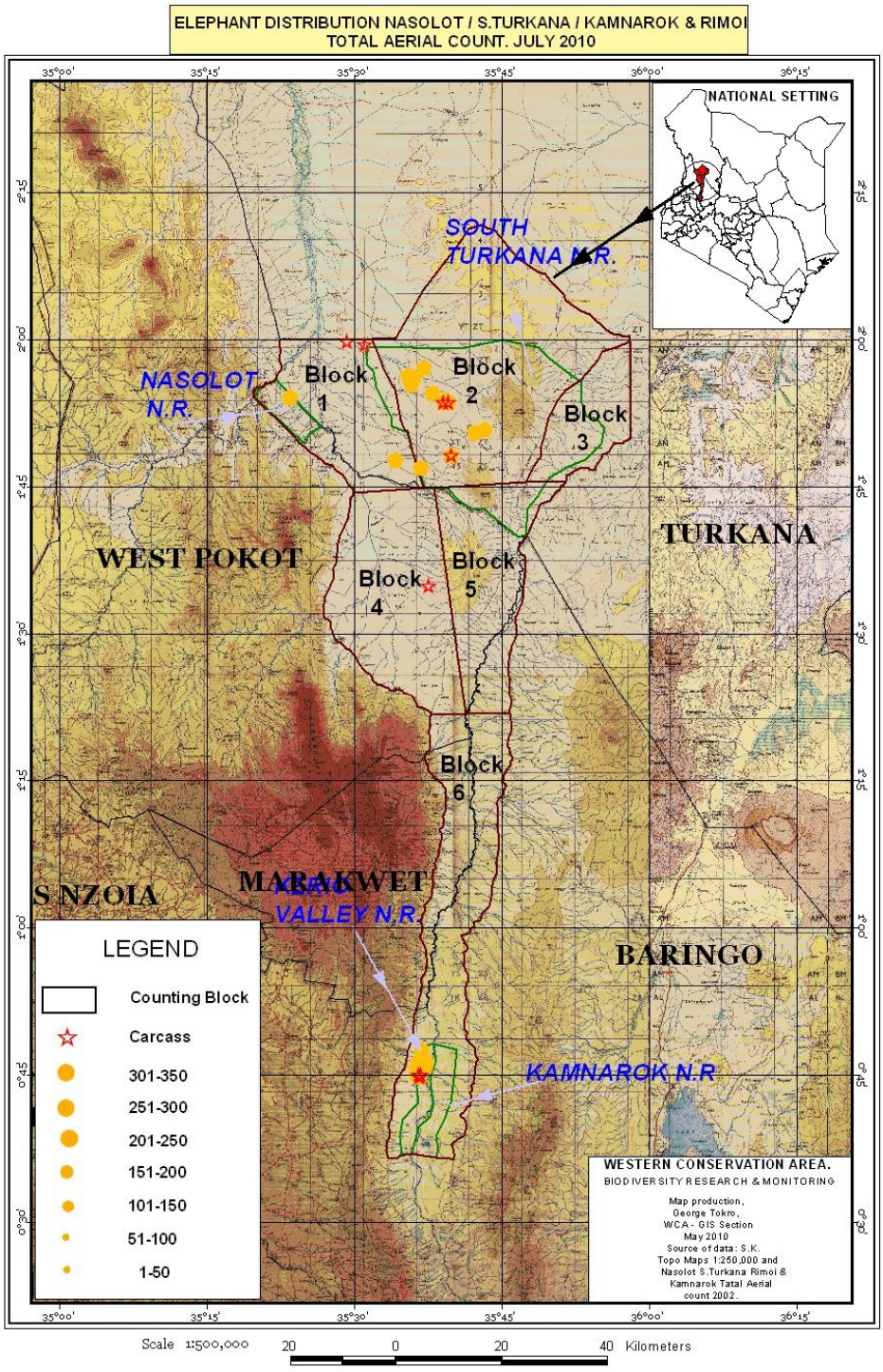

Figure 3: Distribution of Elephants and Elephant Carcasses

The figure below shows the distribution of the other animal species in the census area.

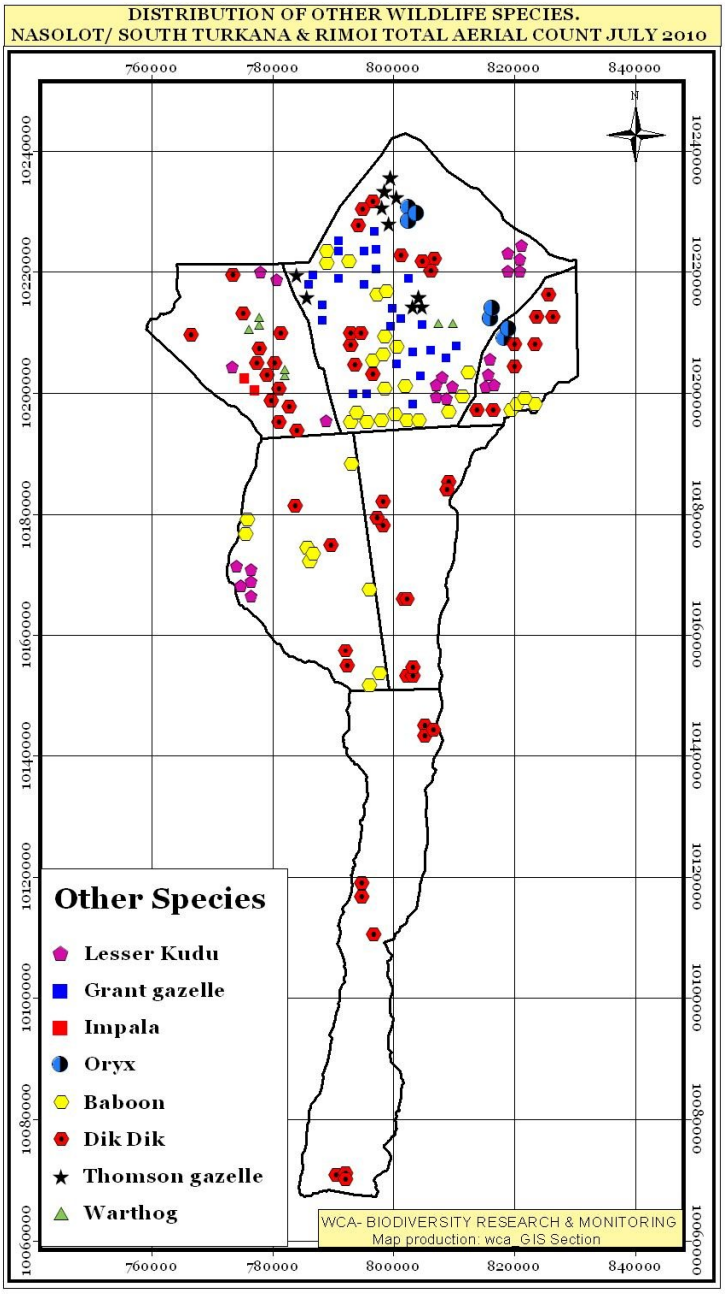

Figure 4: Other Wildlife Species in the Census Area

Human Activities

The human activities recorded in this survey included livestock rearing (Shoats these are sheep and goats; donkey, cattle and camels), human settlements, cultivation fields, charcoal production, and artificial water provisions. Human settlements included structures such as schools, churches, shopping centers and manyattas.

Summary

Livestock Numbers

Livestock type	Block 1	Block 2	Block 3	Block 4	Block 5	Block 6	Block Totals
Cattle	300			990	1874	890	4054
Donkey		10					10
Shoats	500	2050		5156	4709	1582	13997
Camel				10	59	8	77

Table 3: Livestock numbers per Census block

From the above table, 10 donkeys were counted and shoats were the highest number (13997). No livestock were counted in block 3. The donkeys were counted in one block 2.

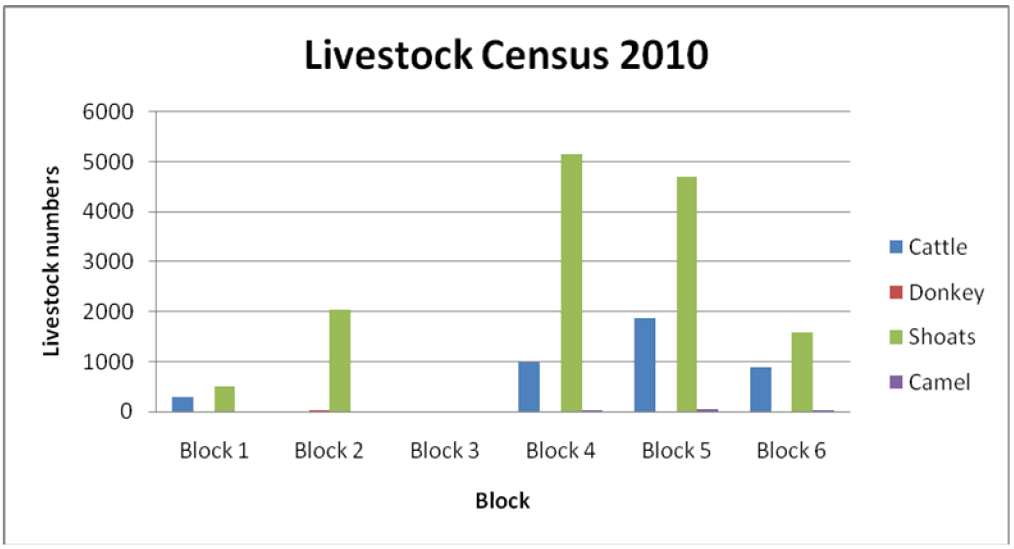

Figure 5: Livestock Counted in 2010

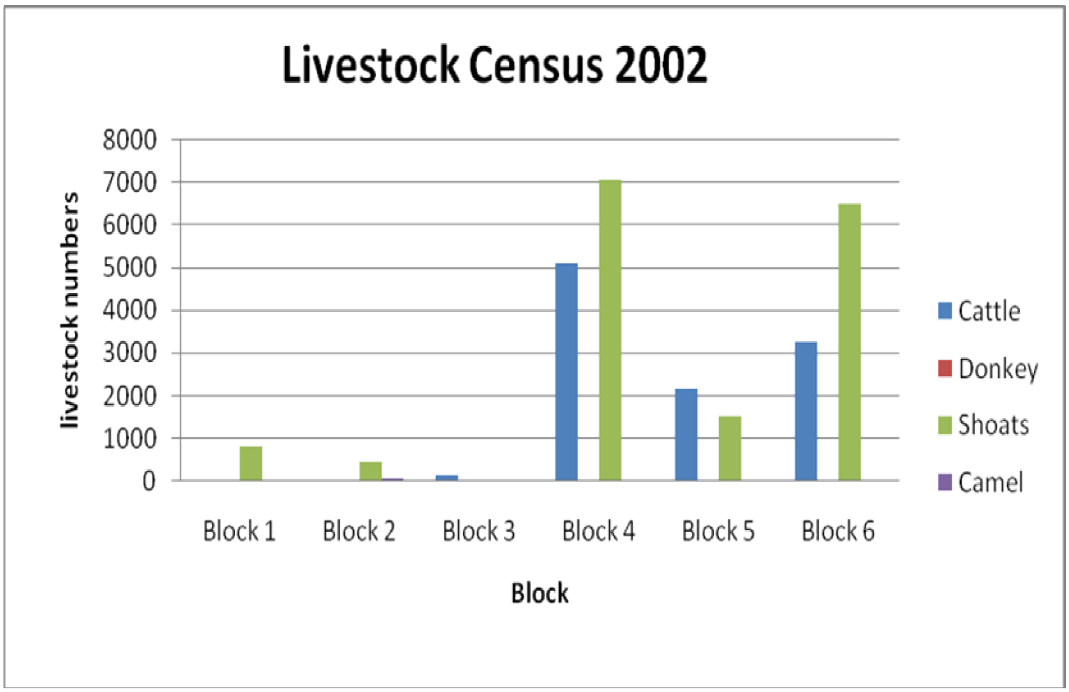

Figure 6: Livestock Counted in 2002

	Block Totals	
Livestock type	2010	2002
Cattle	4054	10701
Donkey	10	0
Shoats	13997	16347
Camel	77	78

Table 4: Comparison between livestock numbers in 2010 and 2002

The table above indicates that livestock has declined. The cattle declined by 62% and the shoats declined by 14%. The decline may be due to the cattle rustling as well as the drought. The Shoats seem to be able to survive the drought conditions better and are also not a target for rustling.

The cattle were most numerous in block 5 (1874) followed by block 4 (990) and block 6 (890). There were no cattle recorded in blocks 2 and 3.

The figures of the cattle are shown in the map below (figure 5).

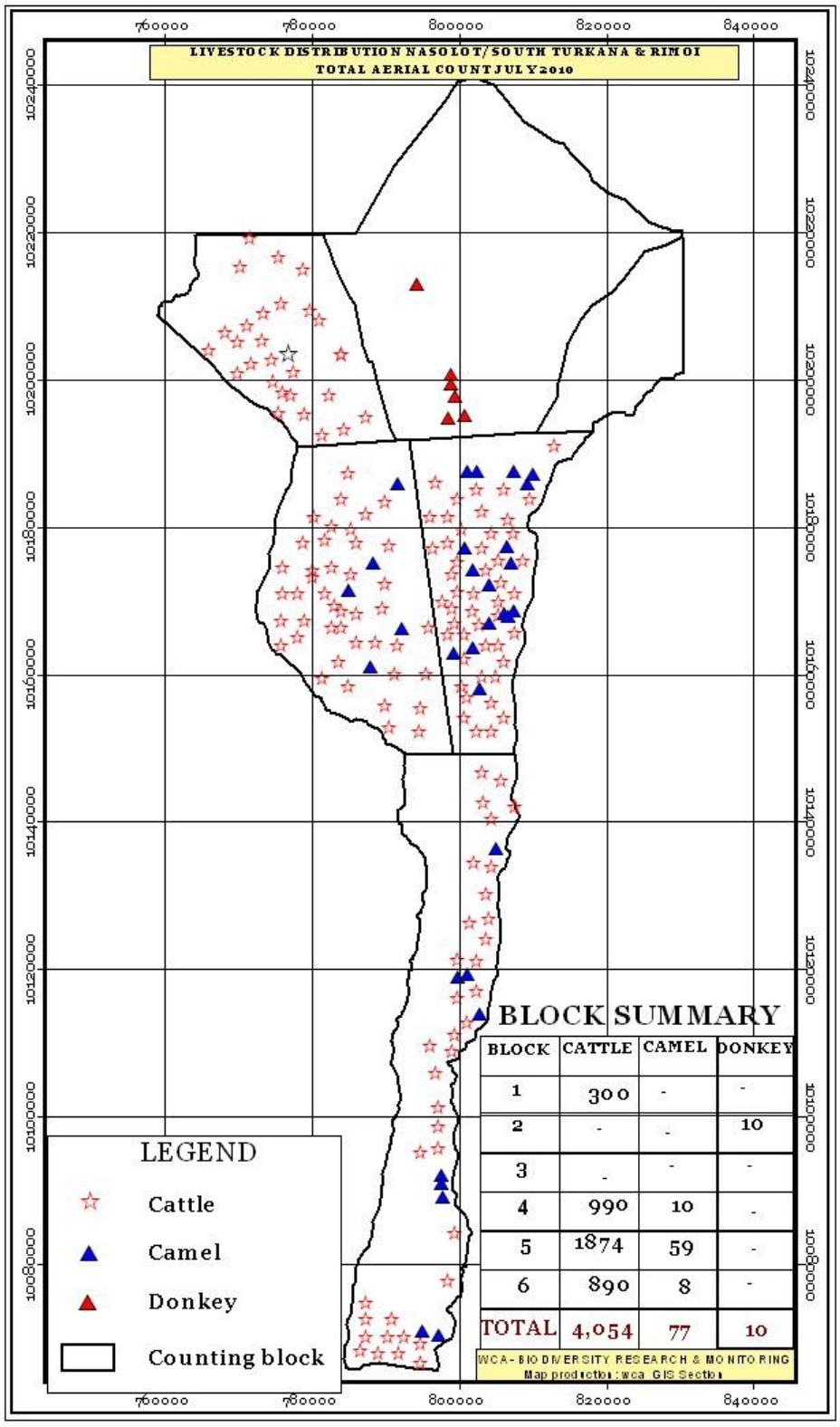

Figure 7: Livestock Distribution in the Census Area

Shoats

The distribution of shoats is shown in the figure below. The highest number of shoats was recorded in block 4 (5156) followed by block 5 (4650). The least number of shoats was recorded in block 3 (nil).

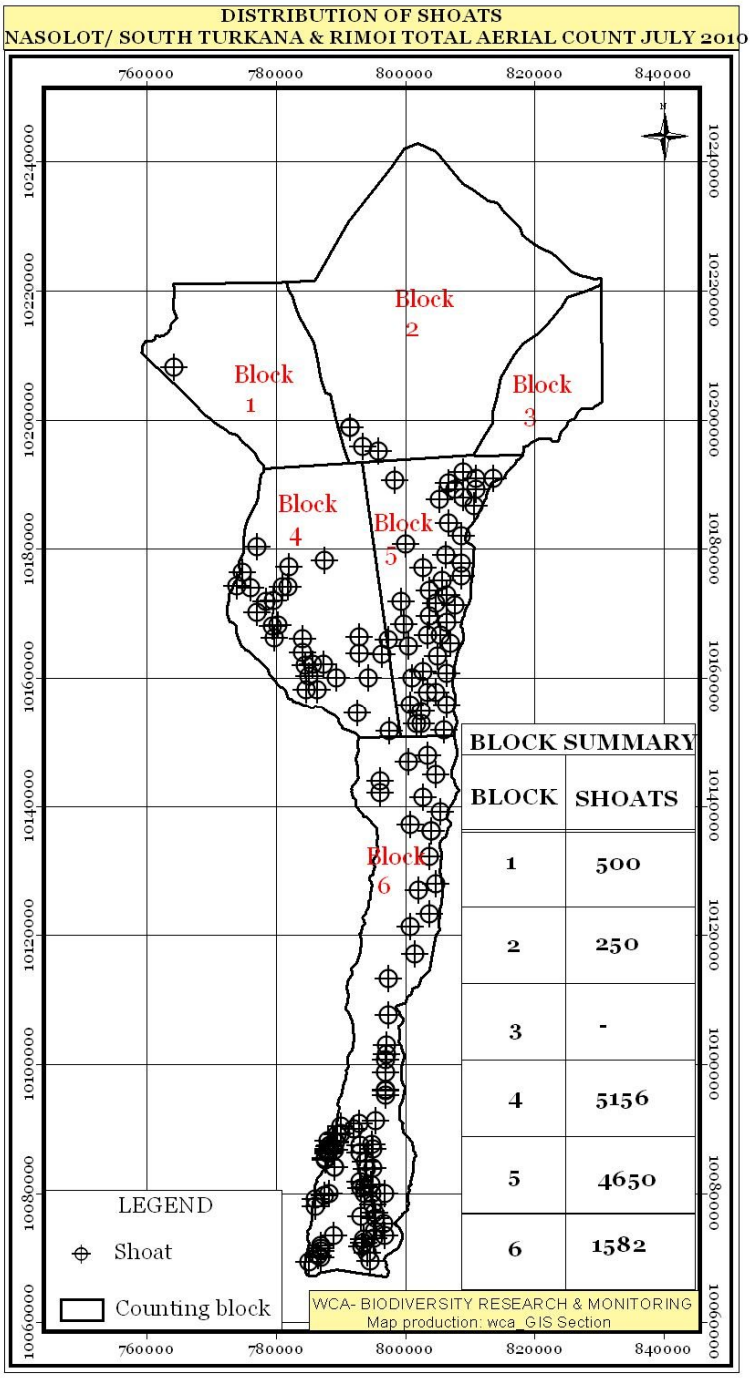

Figure 8: Distribution of Shoats in the Study Area

Structures/Activities	Block 1	Block 2	Block 3	Block 4	Block 5	Block 6	Block Totals
Abandoned Schools	1						**1**
Bomas	2	11	3		14		**30**
Campsite							**0**
Market/Center	1				1		**2**
Lobokat Base	1						**1**
Lodge				1			**1**
Manyatta	14	1		113	130	24	**282**
Police Post	1				1		**2**
Schools	1	1		5	3		**10**
Settlement	101			103	18	2	**224**
Cultivation	6	1	1	294	45	51	**398**
Water point	2	3	1	15	9		**30**
Dam		1			3		**4**
Charcoal Kiln		1			1	10	**12**
Burnt area		2					**2**

Table 5: Human Activities recorded in the Study Area

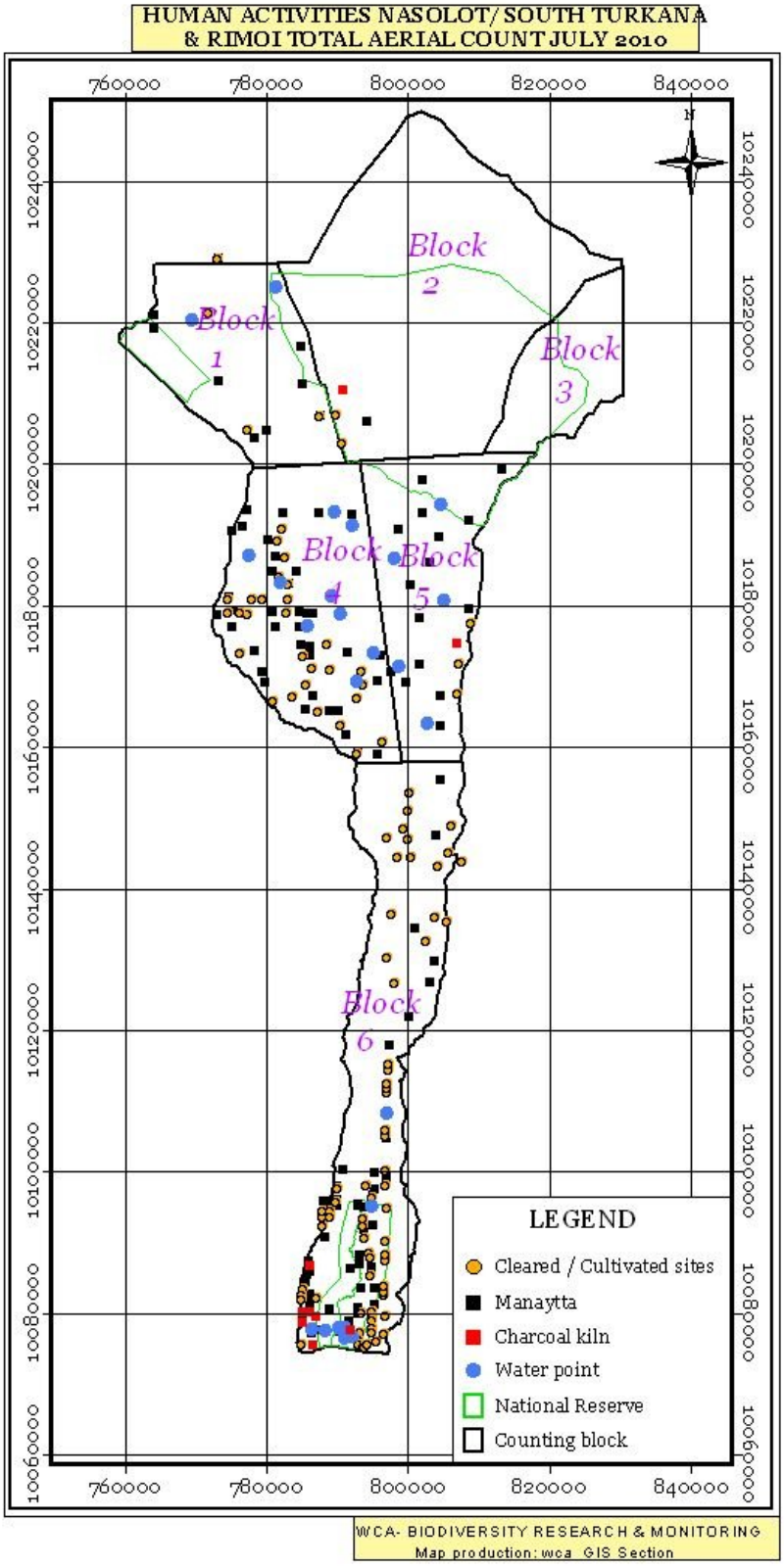

Figure 9: Map of Human Activities in the Census Area

As shown in the map above, most human activities especially settlements are found in blocks 4, 5 and 6. Numerous water points are located in block 6 that houses the Kamnarok and Rimoi National Reserves. This is also an area that had many Elephants and wildlife. There is a possibility of human wildlife conflict in this area due to the close proximity of agricultural activities and wildlife conservation here.

Discussion

The elephant population has declined from 490 in 2002 to 362. This represents a decline of 26%. Further, 11 elephant carcasses were counted compared to the 62 counted in 2002. The decline in number of elephant carcasses found is 82%. The reasons for the decline include the recent drought as well as the population being isolated by settlements and change in land use.

The area is a security area and there is an influx of firearms that are sometimes used for poaching.

Other wildlife species that appear to have increased are the Lesser Kudu, the Gazelles and Baboons. This increase can be attributed to the change in land use which has resulted in an increase in settlements and farming activities. This results in the animals being pushed out in the open, hence more visible. Increased reports of crop raiding have been noted and the main culprit is the baboon (pers comm Area Warden).

The livestock population declined with the cattle declining by 62%. This could be attributed to the drought and the cattle rustling activities. The local community has resorted to the cattle being taken to Laikipia area for safety and pasture.

It was noted that the Shoats population declined by 14%. This implies that the Shoats seem better able to withstand the drought conditions. They are also not a focus of the cattle rustling activity as they were well spread out in some of the census blocks. There were no livestock recorded in block 3, where part of the South Turkana National Reserve is located.

However, relatively high numbers of livestock were recorded in block 6 that contains the Rimoi and Kamnarok National Reserves. Further, cultivation and human settlement were also observed. This is a potential area for human wildlife conflict as well as habitat loss. Large scale irrigation projects have been planned and are in the process of construction in the area. This effectively reduces the migratory corridor for wildlife within Rimoi South Turkana.

Conclusions and Recommendations

There is need for the different government institutions operating in the area to work together in order to reduce the human wildlife conflicts. For example, the stakeholders need to be engaged and the results of this aerial count shared with them. This will help bring out the challenges being faced in wildlife management in the area.

There is need to undertake a dry season count after the wet season aerial counts. The counts should be done on a regular basis probably within an interval of three years. Further, the results of the regular air patrols need to be shared with the scientists as it will give a better picture of the area. Other methods need to be used for the counting medium sized mammals. This includes ground counts.

The influx of firearms still poses a threat to the wildlife in the area especially the Elephants. Some elephant carcasses were observed with their tusks removed. There is need to engage the local leaders in collaborative law enforcement. More resources need to be set aside for information gathering as well as holding community barazas for raising awareness.

Acknowledgements

We acknowledge the Kenya Wildlife Service; Species Conservation and Management Department for providing the funding for this exercise. The Management of Western Conservation Area and Central Rift Conservation Area are also appreciated for their support. The Warden Nasolot is appreciated for the logistical support. Personnel and logistical support were provided by KWS.

The efforts of all the participants, the ground crew and support personnel are highly appreciated.

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Appendix

Appendix 1: Checklist of mammals seen in the Aerial Census

Common Name	***Scientific Name***
Grant's gazelle	*Gazella granti*
African elephant	*Loxontoda africana*
Olive baboon	*Papio anubis*
Dik dik	*Madoqua kirkii*
Thomson's gazelle	*Gazella thomsonii*
Lesser Kudu	*Tragelaphus imberbis*
Beisa Oryx	*Oryx beisa beisa*
Warthog	*Phacochoerus aethiopicus*
Impala	*Aepyceros melampus*

Appendix 2: List of aerial census participants

#	Name	KWS Station
	Coordination	
1	Frederick Lala	WCA
2	Alice Bett	CRCA
3	J.K Wambua	Warden - Nasolot
	Guest	
1	Daniel Onsembe	AD-WCA
	Front Seat Observers (FSO)	
1	Elphas Bitok	WCA
2	David Kones	TCA
	Rear Seat Observers (RSO)	
1	J.K Wambua	Nasolot
2	James Nduati	Nasolot
3	Emily Atai	CRCA
4	Samuel Mungai	CRCA
5	James Kiparus	Iten/Rimoi
6	Chrispine Odhiambo	WCA
7	Alice Bett	CRCA
8	James Nduati	Nasolot
	Data Entry Personnel	
1	Miriam Chiyumba	WCA
2	Israel Makau	WCA
3	Chrispine Odhiambo	WCA
4	Emily Atai	CRCA
	GIS Personnel	
1	Peter Hongo	KWS-HQ
2	George Tokro	WCA
3	Joseph Edebe	KWS-HQ
	Pilots	
1	Robert Obrein	NCA
2	Kenneth Ochieng	MCA
	Drivers	
1	Kenneth Simiyu	WCA
2	John Momanyi	CRCA
3	Joel Cheruiyot	Iten/Rimoi
	Mechanic	
	James Kasore	
	Rangers/Security	
1	Francis Mutuku	
2	Joseph Kirwa	
3	Jamin Chemining'wa	
4	Sengu Marankai	
5	Rose Kapengi	
6	Ismael Kiprop	
7	Nicholas Makallah	
8	Boniface Shimenga	

Appendix 3: Census Data sheet

Nasolot/South Turkana/Rimoi Aerial total count **SHEET NO.**

Pilot							**Block No.**	
Front Seat Observer								
Rear Seat Observer(left)							**Date**	
Rear Seat Observer(right)								
Take off		**Start count**			**Stop count**		**Land**	
Way Point	Dist.	L/R	Species	Estimate	Film# & Frames	End Frame	Photo-count	Comments (Transects,etc)

Appendix 4: Block Summary of Wild Animals counted

Block	**Lesser Kudu**	**Grant Gazelle**	**Impala**	**Oryx**	**Baboon**	**Dik dik**	**Thomson's Gazelle**	**Warthog**	**Elephant**	**Elephant Carcass**	**Block Totals**
1	5	-	2		-	30	-	5	11	2	**55**
2	12	384	-	11	112	43	30	2	199	5	**798**
3	4	-	-	3	12	20	-	-			**39**
4	4	-	-	-	11	5	-	-		1	**21**
5	-	-	-	-	-	11	-	-	16		**27**
6	-	-	-	-	-	10	-	-	136	3	**254**
Total	**26**	**384**	**2**	**14**	**135**	**129**	**30**	**7**	**362**	**11**	