Total Aerial Count of Elephants in Samburu-Laikipia EcoSystem: June 2002

Report By:
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July 2002

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Collaborating Institutions: Save The Elephants (STE), National Environment Management Authority (NEMA) & Laikipia Wildlife Forum

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Table of Contents

ACRONYMS

AFESG	African Elephant Specialist Group
CITES	Convention on International Trade in Endangered Species
NEMA	National Environment Management Authority
ERF	Elephant Research Fund
FSO	Front Seat Observer
GIS	Global Information Systems
GPS	Global Positioning System
KWS	Kenya Wildlife Service
MIKE	Monitoring of Illegal Killing of Elephants
NR	National Reserve
RSO	Rear Seat Observer
STE	Save The Elephants
UNEP	United Nations Environmental Programme

ACKNOWLEDGEMENTS

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We are also very grateful to Save the Elephants (STE) and The National Environment Management Authority (NEMA) for their continued support through the provision of aircraft and experienced crews. Many thanks to Iain Douglas-Hamilton for his technical advise and for editing this report. The dedication shown by the Pilots Bongo Woodley, Anthony Kiroken, Robert O'Brien, Donno Dunn, Richard Moller, Andrew Nagel, Toby Dunn, Andrew Francombe and Captain Godwin Wachira (DRSRS) helped us cover the blocks within schedule. We thank all the observers, volunteers and the ground crew especially that of Claire Geddes, Christian Lambretchts, Julian Blanc, Nasser Olwero and Hilde Vanleeuwe for ensuring that data was downloaded and finalised for each day.

We would also like to thank KWS Senior Wardens for Isiolo and Meru Park and their staff for their support on the ground. To the drivers, rangers, aircraft attendants without whom the count would not have been smooth we applaud their dedication. Finally, to all those who participated in anyway and have not been mentioned, we thank you for your contribution to make the 2002 Samburu count a success.

EXECUTIVE SUMMARY

The total aerial count of elephants in Laikipia/Samburu ecosystem was carried out between 20th and 24th of June 2002, During the census, total counts of elephants, elephant carcasses and buffaloes was done. Livestock numbers (cattle and shoats) were estimated. As a MIKE site the count provided baseline data for monitoring poaching levels and elephant trends in the ecosystem.

A total of 5,447elephants were counted during the survey (2,206 or 40.5% in Samburu and 3,241 or 59.5% in Laikipia). The overall increase since 1999 in the entire ecosystem was 58.5%. The number of carcasses counted was 64 with only one being fresh and three recent while the rest were old or very old. The carcass ratio for the ecosystem was 1.16% - a decline as compared to 1999 (2.8%), however the percentage of recent carcasses rose from 6% to 6.25% (1999 and 2002 respectively).

Two thousand and twelve buffaloes were counted in all the blocks with Laikipia having 1,745 or 86.7% while Samburu had only 267 or 13.3%. The number of buffalo decreased by 962 or 32.3% between 1999 and 2002. The highest decline (54.9%) was in Samburu while in Laikipia had a decline of 26.7%. As in 1999 (Kahumbu et al), Laikipia had the bulk of buffalo and all the rhinos (138) counted. Most of the livestock were in Samburu (67.5% of cattle and 67.2% of shoats) while the rest were in Laikipia. A total of 138 rhinos were counted in the Laikipia/Samburu ecosystem. Block 22 (Solio) had the highest concentration (128 or 92.7%).

INTRODUCTION

The current survey was undertaken as part of KWS and MIKE's (Monitoring of Illegal Killing of Elephants) joint initiatives to establish the status of Laikipia/Samburu elephant populations and provide baseline data to the MIKE Programme. The Laikipia/Samburu ecosystem is an important elephant range as it currently has the largest population of free ranging elephants in the country. The count was also carried out to build up existing data on elephants, buffalo and levels of livestock encroachment into the protected areas as well as document any threats currently facing this population.

The ecosystem is mainly made up of both protected and non-protected areas including trust land and private land, large scale ranches, intensively cultivated areas and private conservancies (Kahumbu et al, 1999). A series of total aerial counts have been carried out since 1992 (Thouless, 1992, Mpala Research 1996, Kahumbu et al 1999) while sample counts were carried for Laikipia in 1997 (DRSRS and Mpala Research). The 1992 counts (Thouless) were exclusive to Samburu district while in 1996 it covered mainly the Laikipia district. It is important to note that the 1999 and the 2002 counts were carried out simultaneously because many of the elephant populations move from Laikipia ranches in the south to Samburu in the north depending on seasons (Thouless, 1992 &1993).

OBJECTIVES

- Establish current elephant status and determine distribution of elephant carcasses in Laikipia/Samburu ecosystem
- Document any changes in the elephant population size and their distribution since 1999.
- Document distribution and numbers of other species such as the buffaloes and livestock.

STUDY AREA

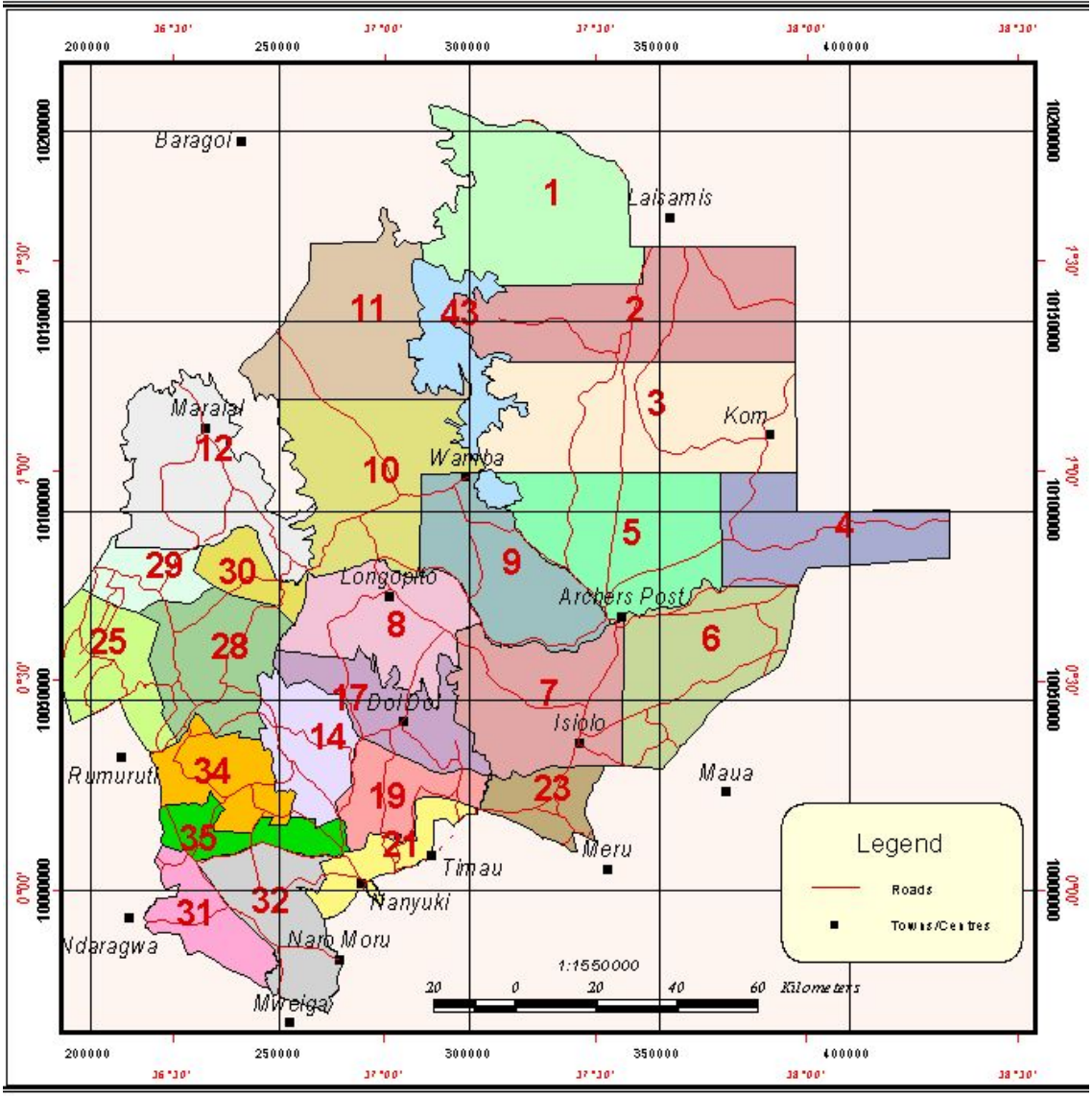
Samburu

This is mainly a low lying pastoralist (Fig.1 and table 1)grazing land with forested ranges (Kirisia/Leroghi/Mathews). The district has three protected areas; Samburu, Buffalo Springs and Shaba National Reserves. Two community based wildlife Conservancies (Namunyak and Il Ngwesi) are also found within the Samburu Ecosystem.

Laikipia

Private large-scale ranches predominantly occupy the district (Fig.1 and table 2). Most of the ranches have several resident wildlife populations that either have been confined by fencing or are free ranging. Some of the ranches are completely fenced off while some are partially fenced. A few others are however not fenced. The fencing has influenced the movement patterns of wildlife especially elephants. The subdivision of some of the ranches and the subsequent settlement in the western and southern parts of the district has led to intense human-elephant conflicts because migratory corridors have been blocked. Several private wildlife conservancies and sanctuaries are also found within the district and include Sweetwaters Rhino Sanctuary, Ol Jogi Rhino Sanctuary, Ngare Sergoi Rhino Sanctuary, (Lewa Downs) and Solio Wildlife Conservancy (Fig.1 and table 2)

LAIKIPIA SAMBURU TOTAL AERIAL COUNT - JUNE 2002
FIG 1: STUDY AREA



GIS Work and Map Production:
Rose Mayienda,
KWS GIS Section,
IT Department

Source of Data:
Laikipia Samburu Total Aerial Count June 2002, KWS

Date of Production :
July 2002

LEGEND

Laik-Samb Ecosystem
ADC Mutara
Barsalinga - Samburu
Barsaloi/N.U. Mathews
Colcheccio/Kisima
Doinyo Uasin
E. Barsalinga/Mukogodo
E. Ol Jogi/Borana
Ewaso
Isiolo
Kipsing
Kirimon
Kirisia/Maralal
Lewa
Lodume/Marti Sumalta
Mathews Ranges
Mpala/El Karama/Ol Jogi/U. Bara
Mugi/Marmar
Nanyuki
North Eastern
Ol Ari Nyiro/Ol Morani
Ol Doinyo Sabach
Ol Pejeta/Solio
Segera
Serolevi
Sugurol
U. Isiolo/Samburu

N

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METHOD

The method adopted for the 2002 total aerial count for wildlife and livestock was that used in the 1999 census (see methods Douglas-Hamilton et al. 1994 and Douglas-Hamilton, 1997). The count therefore employed the Global Positioning System (GPS) technique with Pathfinder software used for plotting species distribution maps.

A total of 10 aircraft were used in the count. Each of the aircraft had a GPS for use in navigation, recording survey path and waypoints. All observations made were saved in the GPS as waypoints with the geographical location referenced and were used in producing species distribution maps. Photographs were used to count individuals in large herds, unless the view was obstructed by thick vegetation, in order to establish the correct count (Douglas-Hamilton, 1997). All GPS's were down loaded onto a computer at the operation base each evening and the Front Seat Observers (FSO) did a summary table of each block. Any double counts in neighbouring blocks were also worked out and eliminated during these sessions. The exercise started every morning at 7.30am and ended late in the evening. Breaks were taken during refuelling of the aircraft and at lunch. Fuelling sites were strategically distributed in survey area to cut down on ferrying time. Each survey crew consisted of 1 observer and a pilot for 2 seater aircraft and a pilot, 1 FSO and 2 Rear Seat Observers (RSO) for a 4 seater aircraft.

RESULTS

A total of 168.56 flying hours were flown by 10 aircraft. Actual flying time spent counting elephants, elephant carcasses, buffaloes, cattle and shoats amounted to 125.7 hours with 42.8 hours spent as ferrying time (appendix 3). The searching intensity/scanning rate for the entire ecosystem was 240.28km^2/hr. The results of the count are shown in Tables 1 & 2 respectively.

Table 1: Block totals of elephants, carcasses, buffalo, cattle and shoats in Samburu

AREA	BLOCK	NAME	Buffalo	Cattle	Elephant	Carcasses				Rhino	Shoats
						FR	R	O	VO		
SAMBURU	1	North Eastern		7002							17965
	2	Doinyo Wasin		4247	503		1	3	28		7305
	3	Serolevi	2	1635	336			4			2810
	4	Ewaso		3607	23						6947
	5	Ol Doinyo Sabach	25	1044	529				3		1755
	6	Isiolo	140	5684	7		1	3	3		2595
	7	W. Isiolo/Samburu		10976	328		1	1	1		12551
	8	Kipsing		5436	96			4			10729
	9	Barsalinga - Samburu	50	8539	51						21222
	10	Lodume/Marti Sumalta		16813	62			1			45168
	11	Barsaloi/N.W. Mathews		4384							13851
	12	Kirisia/Maralal	30	42526	42			3			86576
	43	Mathews Ranges		205	208						515
		Outside Study Area	20	1832	21						4535
		Sub-Totals	**267**	**113930**	**2206**	**0**	**3**	**19**	**35**	**0**	**234524**

VO/O (very old/old elephant carcass); F/R (fresh/recent elephant carcass); E (elephant); B (buffalo); CT (cattle)

Table 2: Block totals of elephants, carcasses, buffalo, cattle and shoats in Laikipia

AREA		BLOCK	NAME	Buffalo	Cattle	Elephant	Carcasses				Rhino	Shoats
							FR	R	O	VO		
LAIKIPIA	NEW BLOCK	OLD BLOCK	NAME									
	14	13	Mpala	8	1954	235			1			820
		14	El Karama	40	1212	10						875
		15	Ol Jogi	230	1684	393						950
		16	W. Barsalinga - Laikipia		413	21						2039
			Sub-Total	**278**	**5263**	**659**	**0**	**0**	**1**	**0**	**0**	**4684**
	17	17	E. Barsalinga		2420	65			1			17796
		18	Mukogodo	10	2407	121						6720
			Sub-Total	**10**	**4827**	**186**	**0**	**0**	**1**	**0**	**0**	**24516**
	19	19	E. Ol Jogi	324	1849	119						4668
		20	Borana	482	6077	366				1		2060
			Sub-Total	**806**	**7926**	**485**	**0**	**0**	**0**	**1**	**0**	**6728**
	21	21	Nanyuki		305	83						1750
			Sub-Total	**0**	**305**	**83**	**0**	**0**	**0**	**0**	**0**	**1750**
	23	23	Lewa Downs	50	800	127					7	1980
			Sub-Total	**50**	**800**	**127**	**0**	**0**	**0**	**0**	**7**	**1980**
	25	24	Ol Morani		3445							13293
		25	Ol Ari Nyiro	167	739	266			9			620
			Sub-Total	**167**	**4184**	**266**	**0**	**0**	**9**	**0**	**0**	**13913**
LAIKIPIA	28	28	Colcheccio		3600	107						17130
		33	Kisima		1310	833				1		1960
			Sub-Total	**0**	**4910**	**940**	**0**	**0**	**0**	**1**	**0**	**19090**
	29	29	Mugie/Marmar	35	3087	91	1					12130
			Sub-Total	**35**	**3087**	**91**	**1**	**0**	**0**	**0**	**0**	**12130**
	30	30	Kirimon		2212	56						6005
			Sub-Total	**0**	**2212**	**56**	**0**	**0**	**0**	**0**	**0**	**6005**
	31	31	Sugoroi		1068							1150
			Sub-Total	**0**	**1068**	**0**	**0**	**0**	**0**	**0**	**0**	**1150**
	32	32	Ol Pajeta	82	2175	97					3	1335
		22	Solio	167	2593	50					128	230
			Sub-Total	**249**	**4768**	**147**	**0**	**0**	**0**	**0**	**131**	**1565**
	34	34	Segera	150	7471	88			1	1		10185
			Sub-Total	**150**	**7471**	**88**	**0**	**0**	**1**	**1**	**0**	**10185**
	35	35	ADC Mutara		7276	60						8550
			Sub-Total	**0**	**7276**	**60**	**0**	**0**	**0**	**0**	**0**	**8550**
			Outside Study Area		**680**	**53**						**2151**
Block Totals - Laikipia & Samburu				**1745**	**54777**	**3241**	**1**	**0**	**11**	**3**	**138**	**114397**
GRAND TOTAL				**2012**	**168707**	**5447**	**1**	**3**	**22**	**38**	**138**	**348921**

During the count, a total of 5,447 (Table 1 & 2) elephants were counted in the Laikipia/Samburu ecosytem. Of these, 40.5% were counted in Samburu District and 59.5% were counted in Laikipia. The elephant population shows an increase of 55.7% between 1999 and 2002.

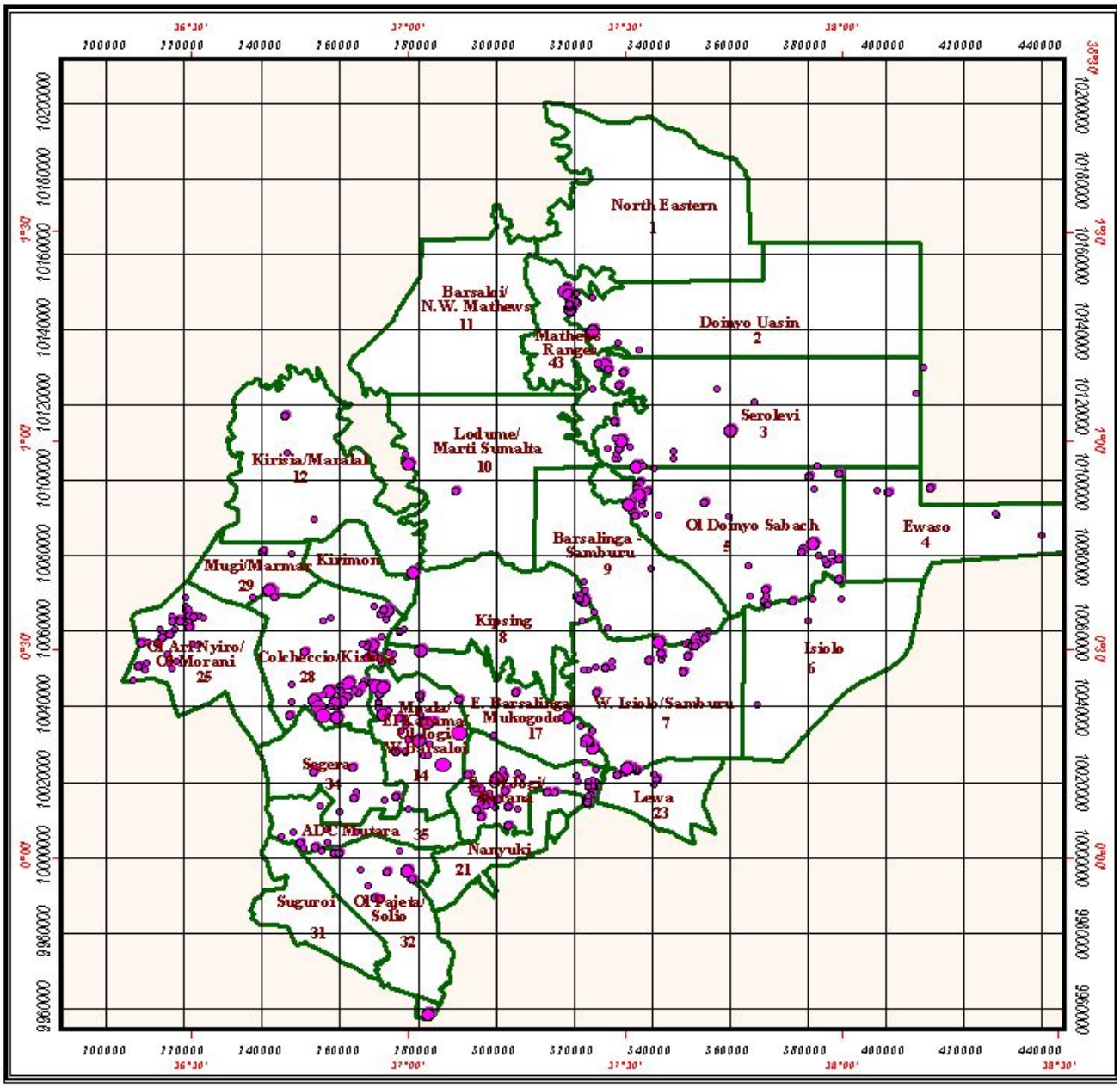
Two thousand and twelve buffaloes were counted in all the blocks with Laikipia having 1,745 (86.7%) while Samburu had only 267 (13.3%). The number of buffalo decreased by 962 (32.3%) between 1999 and 2002. The highest decline (54.9%) was in Samburu. Laikipia had a 26.7% decline. As in 1999 (Kahumbu et al), Laikipia had the bulk of buffalo and all the rhinos (138) counted. Most of the livestock were in Samburu (67.5% of cattle and 67.2% of shoats) while the rest were in Laikipia. The carcass ratio for the ecosystem was 1.16%, however the percentage of recent carcasses rose from 6% to 6.25% 1999 and 2002 respectively.

SAMBURU

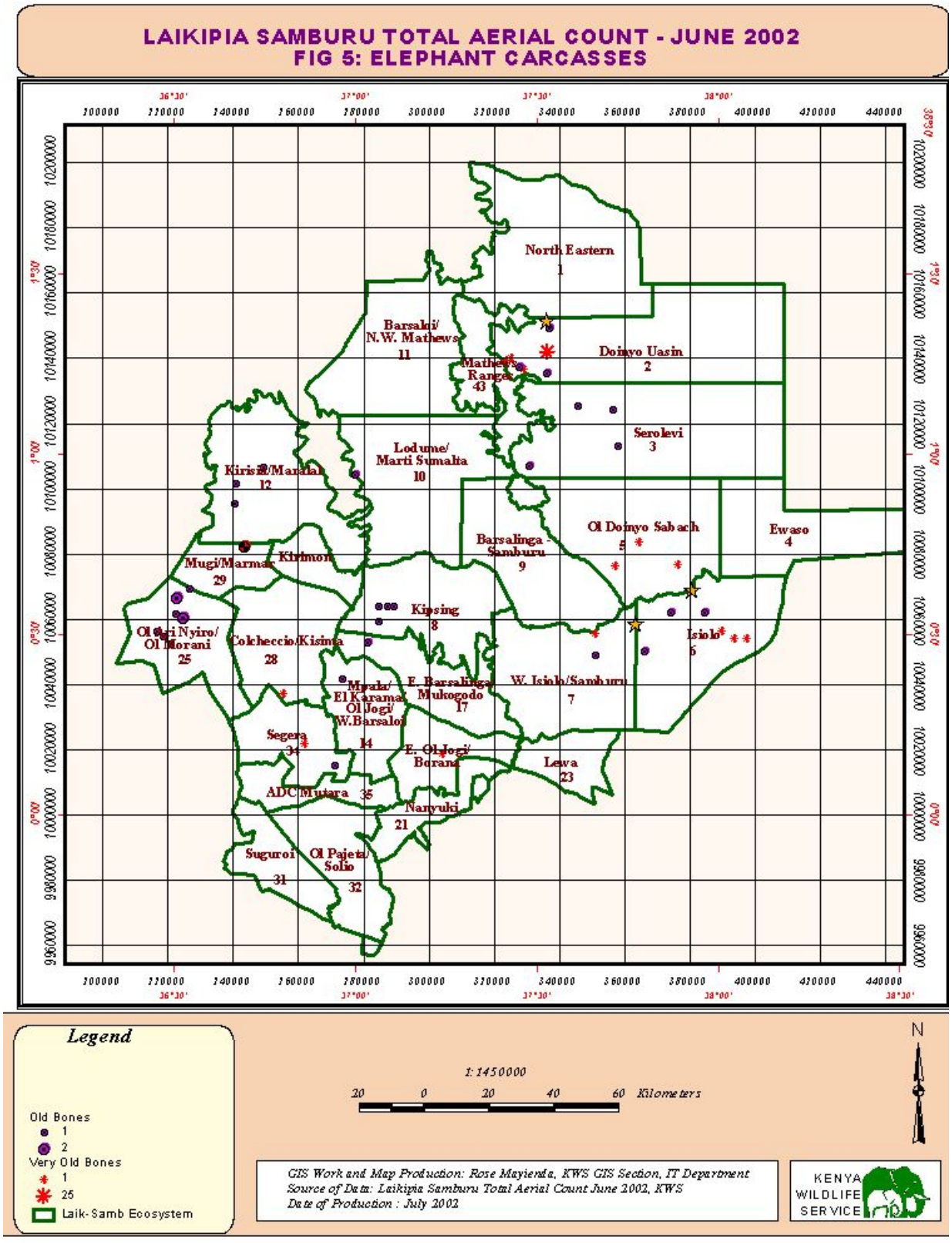
Elephants and Carcasses

A total of 2,206 elephants (Table 1) were counted in the Samburu ecosystem. Most of the elephants were spread out in the district with the highest concentrations on the slopes and fringes of the Mathew's ranges (Fig 2). Block 5 (Ol Doinyo Sabach) had the highest concentration of elephants (529 or 23.9%) followed by Block 2 (Doinyo Uasin), which had 503 or 22.8%. In the former, the elephants were concentrated on the footslopes of the Mathew's ranges and on the northern boundaries of Shaba National Reserve while in the later they were concentrated mainly on the slopes of the Mathew's. The rest of the elephants were distributed in the remaining blocks however the following had relatively higher concentrations than the others do; blocks 3 (Serolevi), block 7 (W.Isiolo/Samburu) and block 43 (Mathew's Ranges) which had 15.2%, 14.8% and 9.4% respectively. Most of the elephants in block 7 (W.Isiolo/Samburu) were within the vicinity of the protected areas of Samburu and Buffalo Springs National Reserves. Of the 2206 elephants found in this ecosystem, 13.6% were in blocks 4, 6,8, 9, 10, 12 and areas outside the counting blocks (table 1 and fig.2). It is important to note that despite the forest cover in the Mathew's, quite a number of elephants were counted.

LAIKIPIA SAMBURU TOTAL AERIAL COUNT - JUNE 2002
FIG 2: ELEPHANT DISTRIBUTION



During the count, 49 elephant carcasses were recorded (table 1). Most of these carcasses (57.1%) though very old were found in block 2 (Doinyo Uasin) which had the second highest concentration of live elephants (Fig 5). Recent carcasses (3) were recorded in Doinyo Uasin, Isiolo and W.Isiolo/Samburu (blocks 2, 6, & 7 respectively). The carcass ratio was 2.17% while the percentage of recent carcasses was 6.12%.


LAIKIPIA SAMBURU TOTAL AERIAL COUNT - JUNE 2002
FIG 5: ELEPHANT CARCASSES
North Eastern
1
Barsaki/
N.W. Mathews
11
Mathews
Range
43
Doinyo Uasin
2
Serolevi
3
Loduma/
Marti Sumalta
10
Kirisia/Maralal
12
Ol Doinyo Sabach
5
Ewaso
4
Barsalinga -
Samburu
9
Mugi/Marmar
29
Kirimon
Kipsing
8
Ol Arri Nyiro/
Ol Morani
25
Colcheccio/Kisima
28
Isiolo
6
W. Isiolo/Samburu
7
Mpala/
El Karama/
Ol Jogi/
W.Barsalo
14
E. Barsaliga/
Mukogodo
17
Segera
34
E. Ol Jogi/
Burani
Lewa
23
ADC Mutara
35
Nanyuki
21
Suguroi
31
Ol Pajeta/
Solio
32
Legend
Old Bones
1
2
Very Old Bones
1
25
Laik-Samb Ecosystem
1:1450000
20 0 20 40 60 Kilometers
N
GIS Work and Map Production: Rose Mayienda, KWS GIS Section, IT Department
Source of Data: Laikipia Samburu Total Aerial Count June 2002, KWS
Date of Production : July 2002
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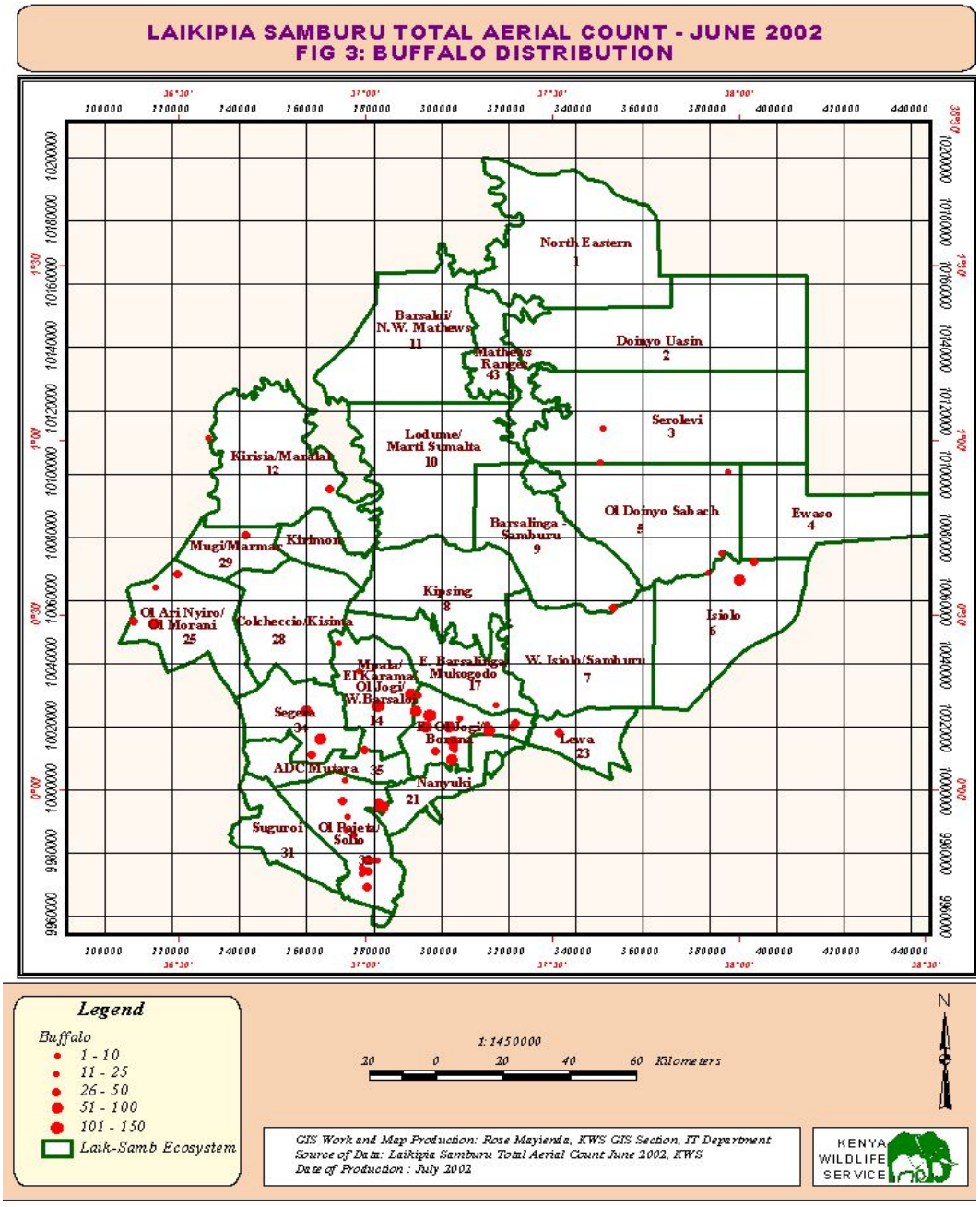
Buffalo

A total of 267 buffalo were observed in the Samburu ecosystem. The distribution map (Fig. 3) indicates most of these buffaloes (140 or 52.4%) were in block 6 (Isiolo). Block 9 (Barsalinga-Samburu) had 50 or 18.7% while the rest of the blocks 12, 5, 3 (Kirisia/Maralal, Ol Doinyo Sabach and Serolevi) and outside study area blocks had 11.2%, 9.4%, 0.75% and 7.5% respectively.



Livestock

A total of 348,454 livestock (cattle and shoats) were counted in Samburu. The bulk of the population (67.3%) was made of shoats while the remaining 33.7% being cattle. Livestock were recorded in all blocks however the highest concentrations were observed in block 12 (Kirisia/Maralal) which had 37.3% and 36.9% of all cattle and shoats counted respectively. The lowest concentration of cattle and shoats (0.17% and 0.22% respectively) were recorded in the Mathew's Ranges.

LAIKIPIA

For ease of analysis, most of the blocks used in the 1999 count were combined however data for individual blocks have been retained (Table 2:)

Elephants and Carcasses

A total of 3241 elephants (Table 2) were counted in the Laikipia ecosystem. Elephants were recorded in all blocks except in blocks 24 (Ol Morani) and 31 (Sugoroi) (Fig 2). Block 28 combining blocks 28 (Colcheccio) and 33 (Kisima) had the highest concentration of elephants (940 or 29%). This was followed by block 14 (13, 14, 15 and 16 or Mpala, El Karama, Ol Jogi and W. Barsalinga-Laikipia respectively) which had 659 or 20.3%. Kisima (block 33) had the highest concentration of elephants (833 or 25.7%) in individual blocks. Ol Jogi (block 15) which is part of block 14 had the second highest concentration of elephants (393 or 12.1% of total count) in

individual blocks while Borana (block 20 of 19) had the third highest concentration (366 or 11.3% of the total count). The rest of the elephants were distributed in the remaining blocks however the following had relatively higher concentrations than the others; blocks 19 (E. Ol Jogi and Borana), 25 (Ol Morani & Ol Ari Nyiro) and 32 (Ol pajeta and Solio) which had 14.9%, 8.2% and 4.5% respectively.

The carcass ratio was 0.46% while the percentage of recent carcasses was 6.67%. 15 elephant carcasses were recorded (table 2 and fig.5). Most of these carcasses (60%) were found in block 25 (Ol Ari Nyiro). Only one fresh carcass was recorded in block 29 (Mugie/Marmar).

Buffalo

In the Laikipia ecosystem a total of 1745 buffalo were observed (Fig. 3). Most of these buffaloes (806 or 46.2%) were in block 19 (19 &20 or E. Ol Jogi and Borana respectively). In block 19, Borana (block 20) had the highest concentration of elephants (482 or 27.6%) in individual block units (not combined) while block 19 or E. Ol Jogi had 324 or 18.6%. No buffalo were recorded in the following blocks, 16, 17, 21, 24, 28, 30, 31 and 35.

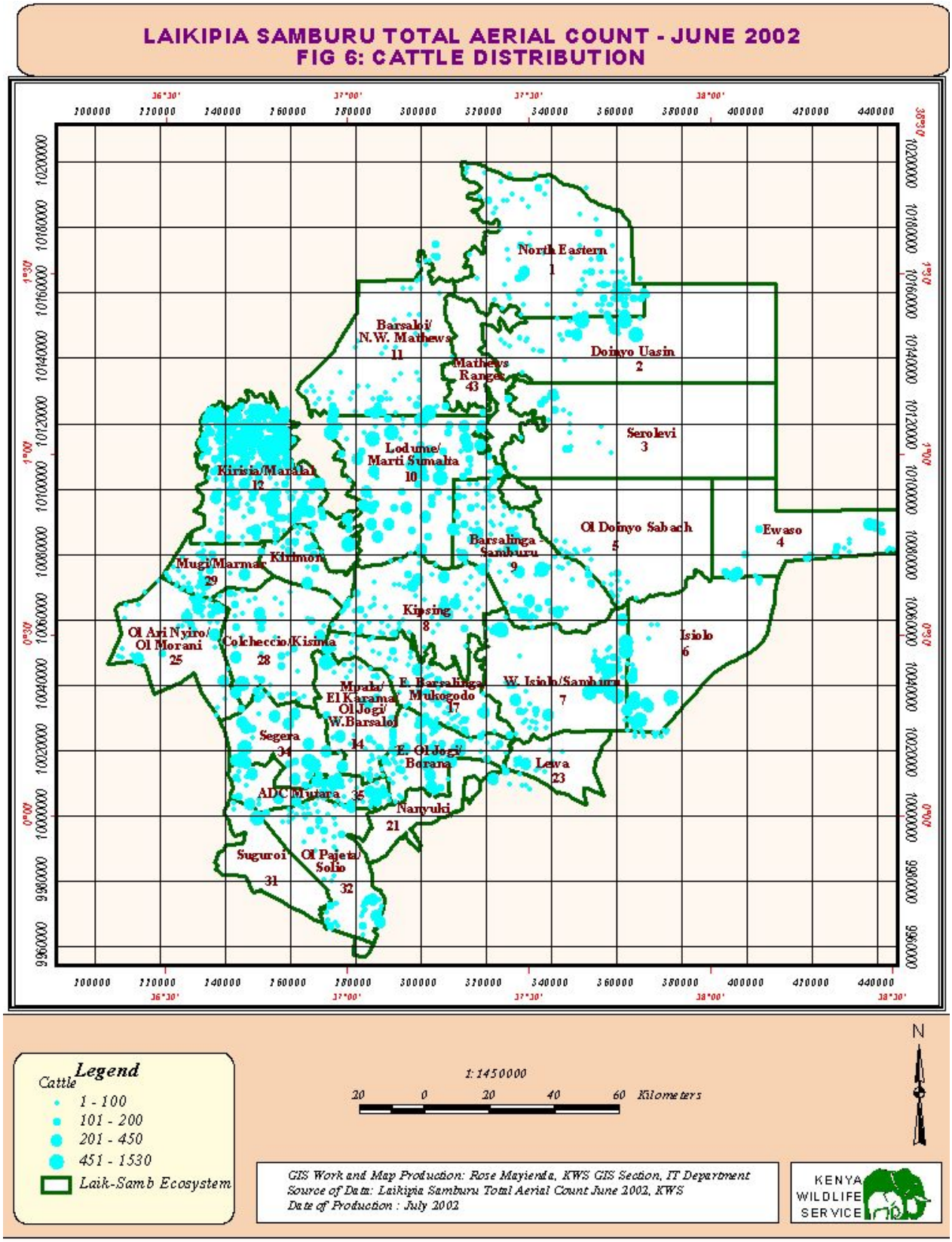
Livestock

A total of 169,194 livestock (cattle and shoats) were estimated in Laikipia (Table 2 and Fig 6). As in Samburu, the bulk of the population (67.6%) was made of shoats. Block 19 (E. Ol Jogi & Borana) had the highest concentration of cattle (14.5% of the total counted in Laikipia) while blocks 34 and 35 (Segera and ADC Mutara) had 13.6% and 13.2% respectively. Blocks 21 and 25 (Nanyuki and Ol Ari Nyiro had the least number of cattle (0.56% and

1.3% respectively). The highest concentration of shoats in Laikipia (21.4%) was in 17 (17&18 combined or E. Barsalinga and Mugogodo respectively). E. Barsalinga had the highest concentration (15.5%) of shoats in individual blocks. Blocks 28 and 33 (Colcheccio and Kisima) combined, had the second highest concentration (16.7%) while block 25 (Ol Morani and Ol Ari Nyiro combined) had 12.2%. The lowest concentrations of shoats (0.2% & 0.5%) were recorded in Solio and Ol Ari Nyiro (Blocks 22 and 25) respectively. Shoats were recorded in all blocks.

Rhino

A total of 138 rhinos were counted in the Laikipia/Samburu ecosystem (fig 4). Block 22 (Solio) had the highest concentration (128 or 92.7%). Lewa Downs followed (block 23) with seven or 5% of the total counted. In Ol Pajeta, only three rhinos were counted. All other blocks had no rhinos.


LAIKIPIA SAMBURU TOTAL AERIAL COUNT - JUNE 2002
FIG 6: CATTLE DISTRIBUTION
North Eastern
1
Barsaloi/
N.W. Mathews
11
Mathews
Range
43
Doinyo Uasin
2
Serolevi
3
Lodume/
Marti Sumalta
10
Kirisia/Maralal
12
Ol Doinyo Sabach
5
Ewaso
4
Barsalinga
Samburu
9
Kilimon
Mugi/Marmar
29
Kipsing
8
Ol Ari Nyiro/
Ol Morani
25
Colcheccio/Kisima
28
Isiolo
6
Mpala/
El Karama/
Ol Jogi/
W.Barsaloi
14
E. Barsalinga/
Mukogodo
17
W. Isiolo/Samburu
7
Segera
34
E. Ol Jogi/
Borana
Leva
23
ADC Mutara
35
Nanyuki
21
Suguroi
31
Ol Pajeta/
Solio
32
Legend
Cattle
1 - 100
101 - 200
201 - 450
451 - 1530
Laik-Samb Ecosystem
1:1450000
20 0 20 40 60 Kilometers
N
GIS Work and Map Production: Rose Mayienda, KWS GIS Section, IT Department
Source of Data: Laikipia Samburu Total Aerial Count June 2002, KWS
Date of Production : July 2002
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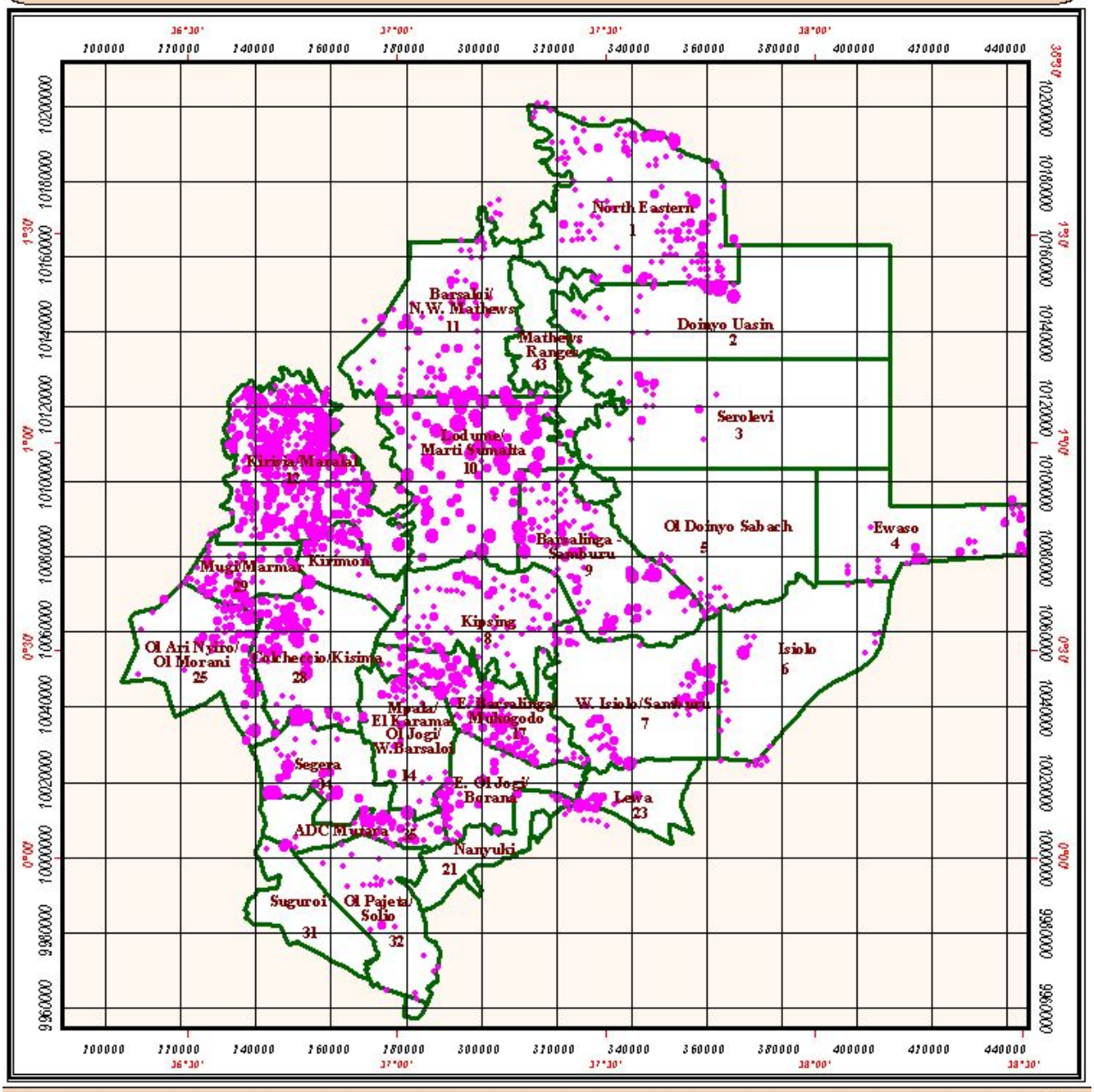
LAIKIPIA SAMBURU TOTAL AERIAL COUNT - JUNE 2002
FIG 7: SHOATS DISTRIBUTION



Legend

Shoats
- 1 - 220
- 221 - 560
- 561 - 1500
- 1501 - 3918

Laik-Samb Ecosystem

1: 1450000

20 0 20 40 60 Kilometers

N

GIS Work and Map Production: Rose Mayienta, KWS GIS Section, IT Department
Source of Data: Laikipia Samburu Total Aerial Count June 2002, KWS
Date of Production : July 2002

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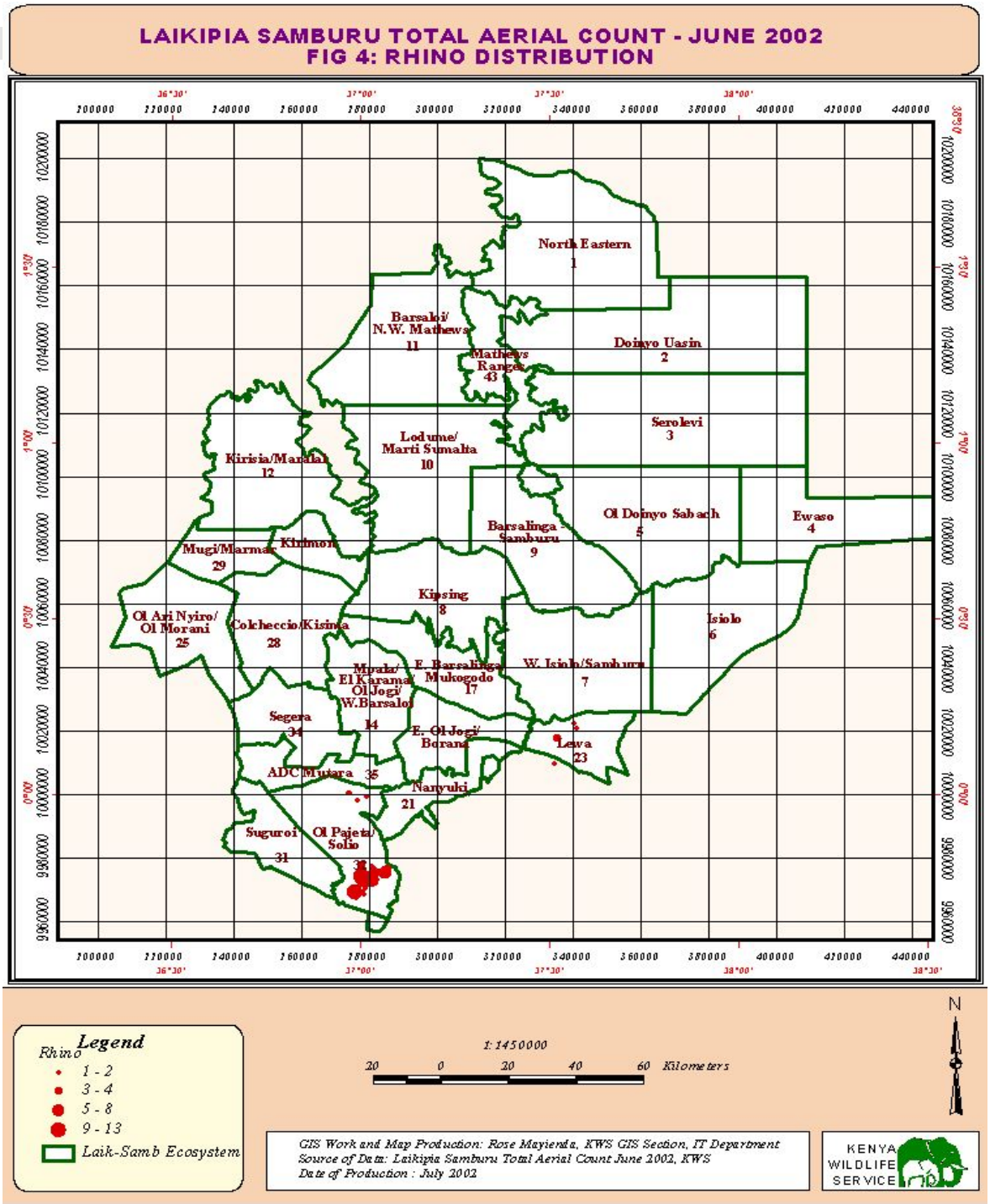
Rhino

A total of 138 rhinos were counted in the Laikipia/Samburu ecosystem (fig 4). Block 22 (Solio) had the highest concentration (128 or 92.7%). Lewa Downs followed (block 23) with seven or 5% of the total counted. In Ol Pajeta, only three rhinos were counted. All other blocks had no rhinos.



DISCUSSION

Elephant Trends

Elephants population estimates (sample counts) and total counts in the Laikipia/Samburu ecosystem have continued to show some fluctuations as comparisons between 1990 and 2002 indicate (table 3a and fig.3b). The comparisons however should be treated with caution since total counts are likely to lead to an underestimate while sample counts tend to give overestimates (Kahumbu et al 1999). The population trends in the ecosystem as compared to previous counts show some significant differences. In 1990, 2045 elephants were recorded in Laikipia alone however by 1996, they had increased to 2392 animals. Between 1996 and 1999, the population declined by 32 individual.

Table 3: Elephant population estimates (Sample counts (s.c) and total counts (t.c)1990-2002 in Laikipia/Samburu Ecosystem

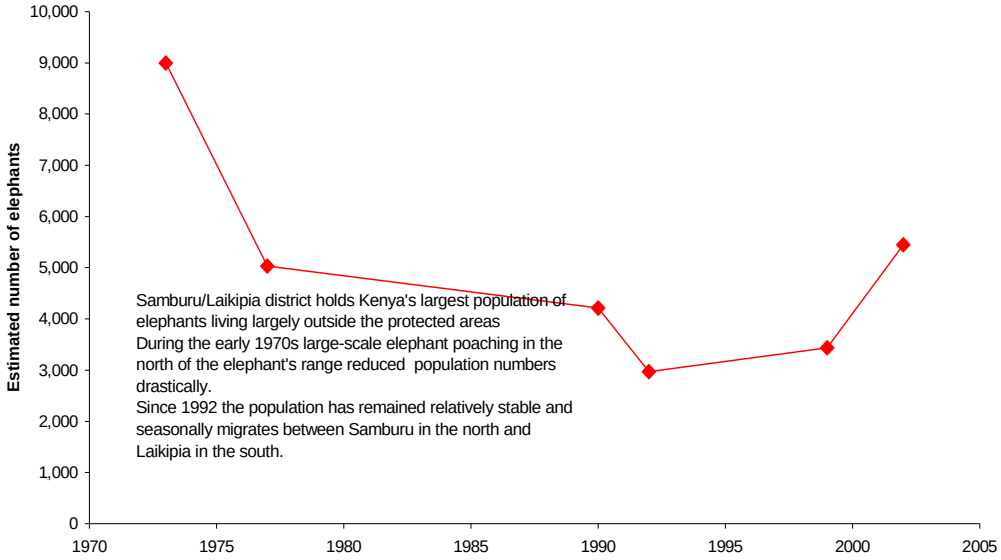
Elephant	Sep 1990 (t.c)	April 1992 (t.c)	Sep. 1996 (t.c)	Feb. 1997 (s.c)	June 1997 (s.c)	Feb 1999 (s.c)	June 1999 (t.c)	July 2002 (t.c)
Samburu	-	1513	-				1076	2206
Laikipia	2045	1456	2392	1847±450	3435±860	2645±521	2360	3241
Overall		2969					3436	5447

In the Samburu ecosystem, of the three total aerial counts (1992,1999 & 2002) that have been carried out, the 2002 count recorded the highest numbers. In 1992, 1,513 elephants were counted (Thouless, 1992) however by 1999 the population had decreased to 1,076 (Kahumbu et al). During the same period (1992 &1999), Laikipia District had 1,456 and 2,360 elephants respectively. It is evident from this that in 1992 the two districts

(Samburu and Laikipia) had almost similar elephant population sizes (1513 and 1456 respectively), however by 1999 the difference had widened by 904 individuals. This suggests that the sporadic poaching of elephants in the Samburus in the 90's may have caused a southward movement of elephants into Laikipia. Wittmeyer, (1999) observed this trend when over 100 elephants moved into the protected areas of Samburu and Buffalo Springs as a result of increased poaching incidences in other parts of Samburu.

The carcass ratio of 1.16% was a decrease as compared to 1999 when the figure was 2.8% while the percentage of recent carcasses was 6.25%. The decline between 1999 and 2002 as in many other parts of the country should be treated with caution

Fig. 3b: Samburu/Laikipia: Estimated Elephant Population 1973-1999



because of the effects of lush green vegetation in some parts of the ecosystem that might have reduced visibility. As in Meru ecosystem, records from ground patrols indicated a much higher number of recent elephant carcasses attributed to

poaching especially in the northern and north-eastern parts of Samburu district.

Other wildlife species such as the buffalo have continued to decline in the ecosystem. The cause of the decline (32.3%) has not been established however, the general insecurity in some parts of the ecosystem may have resulted in poaching t.

CONCLUSION

Elephant and other wildlife distribution in the Laikipia/Samburu ecosystem continue to be influenced by changes in landuse practises. In areas where human elephant interactions are high, elephant numbers were low. This was evident in areas with high concentrations of livestock and human settlements. Such spots have been known to be hot spots of human-elephant conflicts in the ecosystem. With the continued increase in human population and subdivision of land into individual parcels, the elephant range will continue to shrink leading to more conflicts. With this scenario and the continued increase in elephant numbers as observed in this count (5447) there is an urgent need to address the issue of landuse in the ecosystem so as to come up with a plan that will allow the coexistence of man and wildlife.

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Appendix 1 – List of Participants

List Of Participants In The Laikipia/Samburu/Meru Total Aerial Elephant Count

	NAME	RESPONSIBILITY	INSTITUTION
1.	Anthony Kiroken	Pilot	KWS
2.	Godwin Wachira	Pilot	DRSRS
3.	Donno Dunn	Pilot	Meru N.P, KWS
4.	Bongo Woodley	Pilot	KWS
5.	Richard Moller	Pilot	Lewa Conservancy
6.	Iain-Douglas Hamilton	Pilot (Pilot Briefing)	STE
7.	Andrew Nagel	Pilot	Yellow Wing – Hanger
8.	Peter Zenetti	Pilot	Volunteer
9.	Toby Dunn	Pilot	STE
10.	Patrick Omondi	Project Coordinator	KWS
11.	Winnie Kiiru	RSO	Born Free Foundation
12.	Edwin Mwangi	Data Downloading	KWS
13.	Hilde Vanleeuwe	Data Downloading	ERF Research, Mt. Kenya
14.	Julian Blanc	GIS	AfESG
15.	Claire Geddes	GIS	STE /MIKE
16.	Christian Lambret	GIS	UNEP
17.	Rose Mayienda	GIS	KWS
18.	Naser Olwero	GIS	Mplala Research Centre
19.	Quentine Rob	FSO	Mpala Research Centre
20.	George Muriuki	FSO	KWS
21.	Alex Rhodes	FSO	Lewa Conservancy
22.	Moses Litoroh	FSO	KWS, Shimba Hills
23.	Andrew Francombe	Pilot	Laikipia Wildlife Forum
24.	Bernard Raburu	FSO	DRSRS
25.	Joseph Gathua	FSO	DRSRS
26.	Charles Musyoki	FSO	KWS, Mweiga Research
27.	Elphas Bitok	FSO	KWS Hqs.
28.	Onesmus Kahindi	FSO	STE
29.	Patrick Ogola	Data Downloading	STE, Meru
30.	Robert O'Brien	Pilot	KWS, Airwing
31.	Timothy Marangu	RSO	KWS, Meru N. Park
32.	Hudson Makangu	FSO	DRSRS
33.	Tom Letiwa	RSO	Namunyak Wildlife Conservancy
34.	Paul Kipkoech	RSO	KWS, Isiolo Complex Site
35.	Mohammed Turbi	RSO	Officer
36.	David Kones	RSO	Isiolo County Council
37.	Abdul Kadir Biru	RSO	KWS, Mweiga Research
38.	Julius Kimani	RSO	KWS, D/Warden Laikipia
39.	Gabriel Lepario	RSO	KWS, Isiolo/Meru S/Warden
40.	Peter Leshakwet	RSO	Samburu Game Reserve
41.	David Deballen	RSO	Kalama Conservancy
42.	Julius Muriuki	RSO	STE
43.	Mikiko Hagiwara	Data Downloading	KWS Hqs, Intern
44.	Christoper Mwithya	Aircraft Attendant	ERF Research Mt. Kenya
45.	Leonard Mwangangi	Aircraft Attendant	KWS Airwing
46.	Jonathan Nganga	Aircraft Technician	DRSRS
47.	Lawrence Okoth	Aircraft Technician	KWS Airwing
48.	Edwin Nyoike	Driver	KWS Airwing
49.	Patrick Maundu	Driver, Mweiga Research station	KWS Hqs
50	Paul Macharia	Driver	KWS Hqs
51	Robinson Wandetto	Driver	KWS Hqs
52	Rino Lentiyo	RSO	KWS Hqs
53	Mose Lelesit	RSO	Lorogki/Kirisia Conservancy
54	Anne-Rose Waceke	Data Downloading	KWS, Meru NP, Site Officer
55	Kennedy Shamalla	RSO	KWS, Mweiga Intern
56	Sergent Duncan Lekisha	Aircraft security	KWS Isiolo Complex
57	Zachary Ongeri	Aircraft security	KWS Isiolo complex
58	Linda Leo	Data entry	KWS Isiolo complex
59	Mark Kinyua	Aircraft security	CITES MIKE KWS Isiolo complex

Appendix 2 – Scanning Rates

SUMMARY OF FLIGHT TIMES FOR BLOCKS

	FERRYING TIMES		COUNT TIME		TOTALS		**Scanning Rates (Km^2/hr)**
BLOCK	**HRS**	**MINS**	**HRS**	**MINS**	**HRS**	**MINS**	
LAIKIPIA	20	17	42	56	63	13	236.3
SAMBURU	22	31	82	50	105	21	242.18