

Tsavo Elephant Research  
Tsavo East National Park  
P.O. Box 14  
Voi 30300, Kenya

Dear Earthwatch volunteers,

Thank you for your participation in the 2006 *Elephants of Tsavo* research. With your help we were able to cover a larger area, in a shorter period of time and thus were able to collect more data and find more known elephants, than I could on my own.

For many of you this was your first time to observe elephants and wildlife in Tsavo. As you found out, patience, a bit of luck and attention to detail are requirements for a successful study of elephants. I appreciate the many long hours you spent in the field helping to collect the data, sometimes under difficult conditions.

I am happy to say we accomplished all of our goals for the 2006 season. We made some discoveries about elephants - identification through the photographs you took found some individuals I've not seen in many months, and in some cases, years. Known bulls: Saturn, Tobius, Thaddeus, Keyhole, Ragamuffin and females: Miranda, Cleo and Tundra. And some individuals were sighted in locations that I've never seen them in before: Livingstone, Zulu, Nolanna and Marelda. We were also able to identify two elephants that were translocated from Shimba in September 2006; a female, Rotem, and a bull, Yair.

Our wildlife data provides a baseline data set that we can build on to determine the status of wildlife in the area. Some discoveries we made were the rare sightings of wild dogs, ratel, steenbok and an "albino" dik-dik. Although our boundary transect did not show elephant paths due to livestock tracks, we were able to provide empirical evidence to KWS of their encroachment into the national park. This will help them address this pressing issue.

Thank you again for making our first year a real success.

Warm regards,

Dr. Barbara McKnight  
Dr. Samuel Kasiki

## EARTHWATCH INSTITUTE FIELD REPORT 2006

**Project Title:** Elephants of Tsavo

**Principal Investigators:**

Dr Barbara McKnight, Tsavo Elephant Research, KWS Affiliation  
Dr Samuel Kasiki, Senior Scientist, Kenya Wildlife Service

**Research Sites:**

Tsavo East National Park. The national park is located in the southern region of Kenya. The study site south of the Galana River is 4,000km<sup>2</sup>.

Rukinga Wildlife Sanctuary. The sanctuary (325km<sup>2</sup>) is privately owned land adjacent to the south-western boundary of Tsavo East National Park.

**Scientific name of primary species being studied:** African elephant – *Loxodonta africana*

**Key Research Objectives**

- Define elephant temporal and spatial distribution, group size and composition related to habitat utilisation
- Photograph and identify individually recognised elephants and add new individuals to the database
- Determine individually recognised elephant seasonal range and boundary crossings
- Map and determine seasonal availability of water
- Survey and map elephant paths across park and private land boundaries
- Wildlife census and distribution

**Data Collection and Results**

All of the data the volunteers collected were used to meet the objectives of the research.

- *Elephant Identification* – Table 1. During this 2006 season we photographed and re-identified 70 known individuals; 32 bulls and 38 adult females with their offspring. We sighted two bulls and one female and her offspring in areas of the national park that have not been recorded in before. In addition, we photographed one female and one bull that were translocated from Shimba to Tsavo National Park in September 2005. In Rukinga we recorded a bull previously sighted in the national park (boundary crossing) and three bulls and one female originally photographed and identified in 2001.
- *Elephant Surveys* - Road transects were conducted to determine the location, number of individual elephants, group composition and group size. These data will be compared to next year's data to determine spatial and temporal distribution. Table 1 shows the number of groups sighted with the total number of individuals, per survey month.
- *Water Resources* – During the road transects the status of natural waterholes (dry, mud, full) and artificial (boreholes/tanks/troughs; full, filling, dry) were recorded on the map. In addition, we recorded the GPS coordinates of all water resources in the national park for the KWS-Tsavo Conservation Area Management Plan.

- *Boundary Paths* - Although our park boundary transect did not show elephant paths due to livestock tracks, we were able to provide empirical evidence to KWS of livestock encroachment into the national park. This will help them address this pressing issue.
- *Wildlife* – The wildlife data provides a baseline data set that we can build on to determine the distribution, diversity and abundance of wildlife. In addition to relatively common wildlife sightings we recorded rare species: wild dogs, ratel, steenbok and an “albino” dik-dik.  
Tables 2 and 3.

**What progress have you made towards achieving your original objectives?**

- The research objectives were met. We photographed and identified more elephants than I expected but we could do better. The objective of the boundary transects was to determine elephant paths and although we were not able to map paths due to livestock encroachment, we were able to describe the extent of the problem to park management with empirical data.

**Summary of your results**

Table 1. Known bulls and females sighted per team. Elephant Surveys: Group composition, number of groups and total number of individuals counted.

Table 1. Elephant Sightings

Group Composition - Number of groups (individual - totals)

Name/total number of Known Adult Individuals Sighted

KEY: Boundary Crossing-B; Translocated from Shimba-T; Rukinga-R

Earthwatch Teams May-November 2006

Team II May

Group Composition

Lone Bulls - 17      Bull Groups - 6 (18)      Family - 78 (639)      Mixed Groups - 2 (33)

ID-11	Bulls	6	Sandstone	David	Mathius	Neptune	Merlin	Thaddeus-R
	Females	5	C.T.	Gardenia	Novia	Elmira	Rotem-T	

Team III June

Group Composition

Lone Bulls - 21      Bulls Groups - 6 (16)      Family - 57 (435)      Mixed Groups - 7 (135)

ID-4	Bulls	2	Darwin	Equator				
	Females	2	Miranda	Cleo				

Team IV July

Group Composition

Lone Bulls - 18      Bull Groups - 12 (39)      Family - 85 (700)      Mixed Groups - 4 (102)

ID-12	Bulls	2	Livingstone	Dart				
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	Females	10	Nolanna Heloise	Aquarius Diana	Cleo Delia	C.T. Panama	Gardenia	Aleta
Team V August								
Group Composition								
Lone Bulls - 16			Bull Groups - 16 (58)		Family - 75 (683)		Mixed Groups - 3 (27)	
ID-13	Bulls	5	Darwin	Dart	Ripley	Sunray	Equator	
	Females	8	Lea Skye	Nolanna Panama	Chrystal	Aquarius	Moonstone	Eldora
Team VI September								
Group Composition								
Lone Bulls - 25			Bull Groups - 14 (50)		Family - 76 (559)		Mixed Groups - 4 (38)	
ID-9	Bulls	4	Darwin	Blaze	Rasputin	Sunray		
	Females	5	Aquarius	Chrystal	Spirit	C.T.	Magnolia	
Team VII October								
Group Composition								
Lone Bulls - 14			Bull Groups - 10 (26)		Family - 57 (496)		Mixed Groups - 0	
ID-8	Bulls	3	Tobius	Monsoon	Saturn			
	Females	5	Eldora	Skye	Miranda	Novia	Anna	
Team VIII November								
Group Composition								
Lone Bulls - 45			Bull Groups - 25 (69)		Family - 73 (643)		Mixed Groups - 14 (422)	
ID-13	Bulls	10	Livingstone Eli	Arrow Zulu-B	Saturn Sirius	Rudolf Yair-T	Keyhole-R	Ragamuffin-R
	Females	3	Marelda	Courtney	Tundra-R			

Table 2. Elephant/Wildlife Total Count within Tsavo East National Park, south of Galana River, and the western park boundary.

Table 2. Elephant/Wildlife Total Count - Tsavo East National Park - Park Boundary

		May 4 <sup>1/2</sup> days	June 4 <sup>1/2</sup> days	July 5 days	August 5 days	September 5 days	October 5 days	November 5 days
Season - State of vegetation		Rain Mixed	Dry Mixed	Dry- Dry	Dry- Dry	Dry-Dry	Rain Mixed	Rain Green
Herbivore	<b>Elephant</b>	<b>705</b>	<b>607</b>	<b>842</b>	<b>740</b>	<b>643</b>	<b>521</b>	<b>1088</b>
	Buffalo	11	392	138	260	302	501	31
	Dik-dik	144	229	127	245	182	184	275

	Duiker			1				
	Eland	58		31	17	17	4	6
	Gazelle	143	114	178	119	228	324	221
	Gerenuk	21	19	28	49	56	29	62
	Giraffe	64	28	82	88	124	25	152
	Hartebeest-Coke's	75	30	46	87	68	134	80
	Hartebeest-Hirola					7	3	1
	Hippo		1	24	19	53	18	17
	Impala	224	134	231	133	171	141	330
	Lesser Kudu	9	25	13	34	19	8	18
	Oryx	25	47	11	17	20	69	17
	Reedbuck	2				3		
	Steenbok				3	2		1
	Topi					7	2	1
	Warthog	32	5	41	37	54	13	36
	Waterbuck	14	9	89	50	102	57	48
	Zebra-Grevy's							
	Zebra-Plains	133	120	421	413	688	129	191
Birds	Kori Bustard						9	5
	Ostrich		6	22		3	32	27
	Ostrich - Maasai			2	2			3
	Ostrich - Somali			15	5	20	29	13
Reptile	Crocodile			20	5	25	11	3
Primates	Baboon	46	27	180	88	151	149	11
	Vervet Monkey		4	19	30	18	17	4
Carnivore	Bat-eared Fox				1	2		2
	Caracal	1					1	1
	Cheetah				4		2	
	Jackal				1			
	Jackal Black-backed			1	2		1	
	Jackal Silver-backed		3					2
	Leopard				1			
	Lion	8		4	16	20		11
	Ratel-Honey							
	Badger					2		
	Serval							
	Serval-Melonistic					1		
	Wild Dogs					15		
Livestock	Cattle/goats/camels	125	345	1,140	470	597	855	no boundary survey 0

Table 3. Elephant/Wildlife Total Count within Rukinga Wildlife Sanctuary and private land boundary.

Table 3. Elephant/Wildlife Total Count - Rukinga Wildlife Sanctuary - Private Land Boundary

Season - State of vegetation		May	June	July	August	September	October	November
		<i>4 days</i>	<i>4 days</i>	<i>3 days</i>	<i>3 days</i>	<i>3 days</i>	<i>3 days</i>	<i>3 days</i>
		Rain Mixed	Dry Mixed	Dry - Dry	Dry- Dry	Dry-Dry	Rain Mixed	Rain Green
Herbivore	<b>Elephant</b>	<b>1</b>	<b>0</b>	<b>17</b>	<b>44</b>	<b>29</b>	<b>15</b>	<b>91</b>
	Buffalo	12	7	44		3	3	52
	Dik-dik	153	278	119	142	143	129	116
	Duiker		2		1	4		
	Eland	10				18	10	3
	Gazelle	23	21	5		3	13	24
	Gerenuk	7	26	9	21	18	18	6
	Giraffe	7	7	4	15	9	12	12
	Hartebeest-Coke's			7		10		7
	Hartebeest-Hirola							
	Hippo							
	Impala	27	15	8	46	61	26	3
	Lesser Kudu	11	14	15	23	30	19	3
	Oryx	26	3	2	14	1		44
	Reedbuck							
	Steenbok							
	Topi							
	Warthog	5	25	9	10		10	9
	Waterbuck							
	Zebra-Grevy's	1						1
	Zebra-Plains	42	74	35	9	24	5	99
Birds	Kori Bustard							
	Ostrich		2					
	Ostrich - Maasai					1		1
	Ostrich - Somali							
Primates	Baboon	22	21	73	14	102	45	107
	Vervet Monkey				1	5	5	5
Carnivore	Bat-eared Fox		2				1	
	Caracal							
	Cheetah		1					
	Jackal			1		1	2	
	Jackal Black-backed							
	Jackal Silver-backed							
	Leopard							
	Lion		1			4	4	

	Ratel-Honey Badger							
	Serval							
	Serval-Melonistic			1			1	
	Wild Dogs							
<b>Livestock</b>	<b>Cattle/goats/camels</b>	<b>82</b>	<b>130</b>	<b>438</b>	<b>885</b>	<b>750</b>	<b>3,189</b>	<b>340</b>

### Significance/Benefits of Research

What is/are the significance/benefits of your research at the following levels?

#### Local

- Tsavo National Park and Rukinga management – This research provides temporal and spatial distribution of the elephants that utilise these areas that will help in conservation efforts. Conflict between elephants and humans is a major concern in this region. A current management theory to reduce conflict between humans and elephants is to provide water. Our data provide a baseline data set of seasonal water resources and elephant utilisation of this resource in this area, which will assist management in making decisions about water development. Our data contributed to the KWS-Tsavo Conservation Management Plan – Water Resources.
- Tsavo East Research Station (KWS) is monitoring the Shimba translocated elephants. Our photographs, identification and GPS-locations help in these efforts.

#### National

- The Tsavo National Park comprises the largest protected area in Kenya, occupying about 52% of the total protected areas in the country, and about 3.9% of Kenya's surface area. The Tsavo elephant population within the Tsavo Conservation Area is the largest population in Kenya and therefore important.
- The data collected benefits KWS management in providing data to address the country-wide livestock encroachment issues inside national parks. Furthermore, the data complements the periodic Tsavo Elephant Aerial Count conducted by KWS.

#### International

- Tsavo is one of the 45 regions in Africa chosen by CITES (Convention on the International Trade in Endangered Species) as a MIKE (Monitoring the Illegal Killing of Elephants) site. This research complements and contributes to the data set on monitoring the elephants in an important ecological zone which contains the largest of Kenya's free ranging elephant populations.

### How do your findings contribute to issues of sustainability?

- Knowledge of elephant distribution, population density, size and rate of change and age/sex structure are all parameters that vary in time and over space which are critical for management and conservation of a viable population. Diversity, abundance and distribution of other wildlife are indicators of a healthy ecosystem and required for conservation management planning.

### Dissemination of Results

Have you provided details of results from your research to or within: scientific papers

- To be submitted at a later date - after another field season.

#### *Management plans, reports, presentations*

- Quarterly reports with data are submitted to KWS and Rukinga management.
- Tsavo Conservation Area Management Plan – Ecology Group. (9, 17-18 August 2006) Results from this research project were included in discussion and the report.
- KWS-Tsavo Livestock Encroachment Workshop (17 November 2006). Data on livestock and elephant distribution were included in the discussion.

#### *Popular articles or films*

Journalist participation on the research team

- Diski, Jenny. Team II. Guardian-Observer-UK (4 June 2006).  
*Saving Africa's elephants, one holiday at a time.*
- Hubbard, Kim. Team V. *Audubon Society*. Proposed publication 2007 June

#### *Books, chapters, illustrations*

- None

### **Volunteer Tasks and Accomplishments**

*How did the volunteers contribute ideas, skills, expertise and motivations beyond that which you anticipated?*

Many of the volunteers helped me see the research and tasks through their eyes. This perspective helped to design the research so that the data was collected concisely and accurately. I was impressed with the level of interest volunteers had in learning about Tsavo and the elephants. In addition, their willingness to work long hours in the field was a bonus.

*How have volunteers helped you to achieve your research or educational objectives?*

Due to the large study area, having two vehicles cover different areas in a short period of time provided data I could not collect on my own. Known elephants I had not seen in many months were sighted, as well as individuals sighted in previously unknown locations. With volunteer participation data on wildlife could also be collected while searching for elephants.

### **Project Development**

The logistical challenge for this research was the size of the study area. However, many volunteers said that if the data is useful they didn't mind the long hours in the field. We had some difficulty estimating distance from the road for elephant and other wildlife. However, I requested and acquired a *Range Finder* from Earthwatch for each vehicle, which solved that issue. The scientific challenge for the 2006 field season was photographing and completing the data sheet for individual elephants for identification. I have redesigned the identification data sheet that will make this task easier. I will spend more time next year on training and perfecting this aspect of the research.

The second year of research will be almost identical to the first for continuity of the data and future analysis. With the exception of new elephant identification data sheets and the additional volunteer task of the range finders, the format, tasks and schedule will remain the same.

### **Educational Opportunities**

*Does your project directly or indirectly involve the following groups in your research topic?*

- *Local communities-students-early career scientists*  
The project involved the participation and employment of a field assistant from the local community.

*Has your project helped lead to the completion of Masters' theses, or other educational research findings?*

Not during the 2006 field season. It is my goal for the new field assistant for the 2007 season to have skills and aspirations for further scientific study.

## **Partnerships**

*List partnerships or collaborations with other organisations that you have developed or maintained in the past season.*

- KWS - Park Management, Community Wildlife Service, Research Station; Rukinga Wildlife Sanctuary Management -
  1. Temporal/spatial distribution of elephants – prepare for potential conflict with humans
  2. Water Development Plan – provided status of seasonal availability of water.
  2. Empirical evidence of livestock encroachment
  3. Assisted in locating and identifying/photographs of Shimba to Tsavo translocated elephants

*Please tell us the ways your research helps these groups better understand the conservation of a sustainable environment. How have these organisations contributed to your project objectives?*

- The Tsavo elephant research provides data to KWS and Rukinga management to assist them in meeting their objectives on protecting wildlife and the habitat.
- Complementary partnership with KWS, which is the wildlife authority in Kenya and has the legal mandate to conserve and manage wildlife in the country and enforce related laws and regulations. KWS's mission and values are to sustainably conserve and manage Kenya's wildlife and its habitats scientifically, responsibly and professionally, in collaboration with stakeholders for posterity.

*How do you anticipate these organisations will use the results generated by the project, and in what timeframes?*

- Long term – Elephant – the data on known individuals provide information on demography, reproductive patterns, ranging behaviour and boundary crossing. These population parameters assist management in protecting this important elephant population.
- Long Term – Wildlife - the data provide a baseline data set from which to monitor the health of the Tsavo wildlife population.
- Seasonal – Elephant - the data provide information of the movements of groups of elephants that will potentially alert the Community Wildlife Service to issues of elephant-human conflict.
- Seasonal – Water resources - these data provide for future management decisions on supplemental water development.
- Immediate – Livestock - the data on livestock provided empirical data on livestock encroachment into the national park.
- Immediate – Water resources - provided GPS coordinate data for the Tsavo Conservation Area Management plan.

## **Acknowledgements**

We are grateful to Earthwatch Institute for recruiting volunteers and financial support to conduct this research. We thank the research staff; Samuel Chege, Ben Ndambuki and Patrick Kodi for their long hours in the field and ensuring that the first season was a success. We appreciate the support of the Kenya Wildlife Service and Rukinga Wildlife Sanctuary and their permission to conduct this research.