

Caught in the crossfire: the forest elephant and law enforcement in a region of political instability, eastern Democratic Republic of Congo

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Abstract

Although much research has been conducted that has generated a wealth of information on basic elephant biology, information on law enforcement and illegal killing has not yet been systematically collected over sufficient time in most areas of Africa, including in Kahuzi-Biega National Park. Attempts are now under way under the auspices of the Monitoring of Illegal Killing of Elephants (MIKE) programme to address this gap by training law-enforcement personnel in how to better collect data at selected sites across Africa and accordingly by gathering and consolidating law-enforcement data. This paper reports on law-enforcement efforts in Kahuzi-Biega National Park and its adjacent hinterlands and provides current information on an endangered elephant population. It also suggests possible conservation strategies to protect the species from further slaughter.

Résumé

Bon nombre de travaux ont déjà été effectués sur la biologie de l'éléphant alors que la collecte systématique de l'information sur le monitoring de l'application de la loi et sur les activités illégales fait encore défaut dans la plupart d'Afrique, y compris le Parc National de Kahuzi-Biega. Sous les auspices du programme MIKE (*Monitoring of Illegal Killing of Elephants*), quelques initiatives sont présentement en cours à dessein de former le personnel dans la collecte et la consolidation des données en rapport avec le monitoring de l'application de la loi. Ce document livre l'information sur l'effort de protection versus les activités humaines au Parc National de Kahuzi-Biega et dans son hinterland en période de conflits armés, ainsi que sur la population d'éléphant en danger. Bien plus, il suggère une stratégie de conservation de l'éléphant pour mieux protéger l'espèce.

Introduction

Ivory poaching has been a serious problem for African forest elephant (*Loxodonta africana cyclotis*) populations. Reliable records of elephants killed and ivory harvested within range states are generally unavailable, particularly where parks have been run on a hand-to-mouth basis. In the Democratic Republic of Congo (DRC), unreliable data on resources allocated for law enforcement and on levels of illegal activity often result in limited information to guide law-

enforcement operations. This is particularly the case in Kahuzi-Biega National Park (KBNP).

Although much research has been conducted on elephants, information on law enforcement and illegal killing has not yet been systematically collected over sufficient time in most areas of Africa (Dublin and Jachmann 1992; Barnes et al. 1999; MIKE 1999). Attempts are now under way under the auspices of the Monitoring of Illegal Killing of Elephants (MIKE) programme to address this gap by training law-enforcement personnel at selected sites across Africa in

how to collect data. Indeed, given that around 90% of the staff of African wildlife authorities are employed in the field as law-enforcement staff, particularly to protect large and economically important species like the elephant (Cumming et al. 1984), wildlife managers must place high priority on monitoring them. This paper reports on law-enforcement efforts in KBNP and its adjacent hinterlands. It provides current information on an endangered elephant population, and suggests possible conservation strategies to protect it.

Study area

Kahuzi-Biega National Park was gazetted in 1970 to conserve the eastern lowland gorilla (*Gorilla beringei graueri*). It covers an area of 6000 km² and protects a mountain forest in the heavily populated Kivu region (fig. 1). Open cultivated areas dominated by banana (*Musa parasidiaca* or *Musa sapientum*) plantations, bean, irish potato and cabbage surround the eastern side of the park. The area is predominantly montane forest with a low canopy and abundant herbaceous vegetation with large areas of bamboo (*Arundinaria alpina*) forest, primary forest, secondary forest, *Cyperus latifolius* swamps, and mountain transition forest (Steinhauer-Burkhart et al. 1995). The upland sector has two dry seasons (January–February and June–August) and two wet seasons (March–May and September–December) (Bultot and Griffiths 1972). The annual precipitation at Tshivanga, the park headquarters, is 1200 ± 1300 mm; however, precipitation increases with altitude, reaching a peak of 3000 mm (Bultot and Griffiths 1972).

KBNP lies between 1°36'–2°37' S and 27°33'–28°46' E. Two extinct volcanoes, Kahuzi (3308 m) and Biega (2790 m), have given the national park its name. The ecosystem is divided into two zones that are connected by a narrow corridor (ICCN/PNKB 2000). On one side is mountain forest covering 600 km² with altitudes between 1800 m and 3308 m and on the other side covering 5400 km² is tropical forest with altitudes between 600 m and 1200 m. The rich biodiversity of this region situated in the Albertine Rift makes it a hotspot of the biological and geographical history of eastern DRC, a natural crossroad where a dense human population and wildlife have lived in harmony for years, making it one of the most important tropical moist forest areas within the Albertine Rift region and a centre of endemism in

Africa (Mittermeier et al. 1998). Much of the region supports densities of over 300 inhabitants per square kilometre (Hall et al. 1998), and overall it experienced a 4% rate of growth between 1950 and 1984 (Wils et al. 1976; Institut National de la Statistique 1984).

It is indeed because of its extraordinary natural beauty that this park was declared a UNESCO World Heritage Site in 1980. Unfortunately, however, escalating wars have laid waste to it, and it with others in the eastern part of the country are now World Heritage Sites in Danger.

Methods

The two main elements of law enforcement are patrols and investigations. Scouts supported by carriers carried out the patrols; investigations were carried out primarily in Bukavu town and in villages outside the conservation area (fig. 1), following up information concerning illegal activity back to its source. By their nature, investigations are non-standard and unpredictable, which makes them easier to quantify than patrols.

An initial one-week training session on law-enforcement monitoring (LEM), both theoretical and in the field, sponsored by a United Nations Foundation/UNESCO fund in 2002 was held at park headquarters in Tshivanga. This course was reinforced with an additional week of actual fieldwork and debriefing exercises in plenary sessions. Field trials with compass, tape measure and GPS (global positioning system) were undertaken to equip the guards to handle the fieldwork later at different patrol posts. The principle applied throughout this programme was to train trainers—supervisors would train team leaders—who in turn would train rangers, guides and trackers. This training was further enhanced with a Wildlife Conservation Society/PNKB programme in collecting and managing data using GPS, compass and maps.

A patrol was usually issued with a *bulletin de service*, patrol forms, a map of the area to be covered, a patrol summary, various ancillary recording sheets, simple instruction guidelines, and a notebook and pen. The basics were recorded on patrol but more detailed records were completed from notes on return; they were verified, corrected or enriched during the debriefing as necessary. On return from patrol, the patrol leader and the patrol secretary scout who kept records were debriefed to ensure that the patrol route was correctly defined and that all necessary information

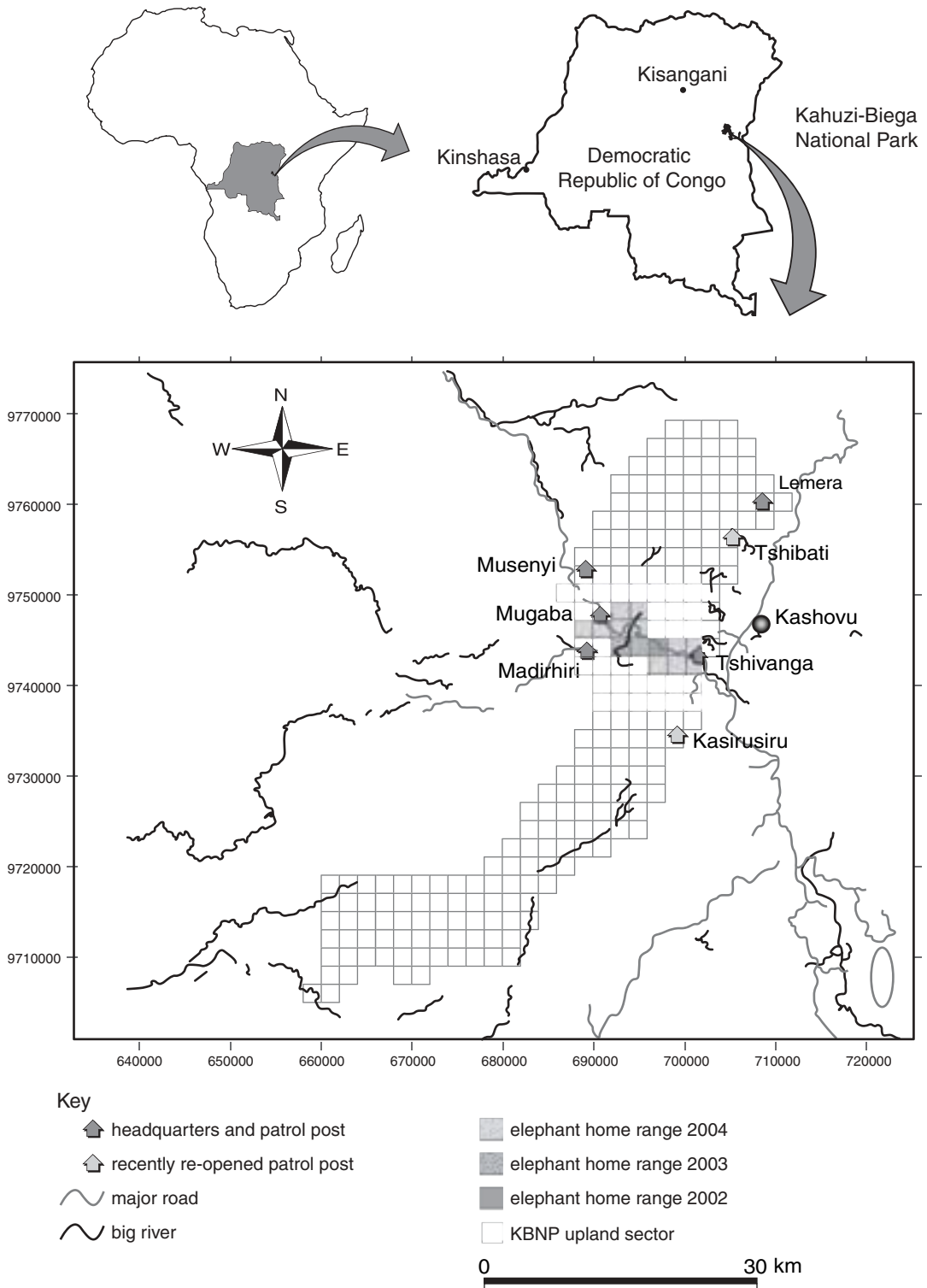


Figure 1. The study area and elephant home range in Kahuzi-Biega National Park, 2002–2004.



Figure 2. The patrol leader and patrol secretary scouts are debriefed at Epulu headquarters in the Okapi Faunal Reserve.

was entered in the report, which would give a ‘big picture’ of the controlled sector. The debriefing interview was conducted with the wildlife officer responsible for the surveillance unit and the MIKE site officer and the information incorporated in the monthly report (fig. 2).

Trained scouts and guides used two daily data sheets (fig. 3). The standardized patrol data sheet listed the main observations on human activity, key species activity and phenological events; the gorilla data sheet detailed visits made to habituated gorilla groups.

Data on law enforcement and illegal activity were collected from various sources including from exist-

ing reports and by assessing the extent of illegal activity. The number of operating patrol posts varied between six and eight, depending on the security situation. Each scout patrol team produced monthly reports that included details of their patrol routes and patrol efforts, law-enforcement activities, sighting or signs of both small and large mammals, and any problems encountered. All available monthly scout reports were carefully read, from all operating scout patrol posts, for the period 2002–2004. From these,

data were collated on poaching incidents, sightings of elephant signs or carcasses, and patrol efforts. Out of an expected 4420 original handwritten scout reports, 3924 were on file. Each patrol had a leader and a secretary.

Indicators were rounded to the nearest decimal and multiplied by 100 to facilitate interpretation of the data, thus providing encounter rates of illegal activity per 100 effective patrol days (Jachmann 1998). The effective time spent by each staff member on foot patrol measured the commitment of anti-poaching units (Bell 1986). Patrol lengths were counted as the number of days that scouts were patrolling on foot in the forest. The patrol effort and score for each class of each illegal activity was then compiled by surveyed area (grid of 2 x 2 km), and by time (month or year). The catch per unit effort index (C/E index), derived from the data, measured the encounter rate of a particular type of illegal activity per unit of law enforcement.

All these LEM data were compiled on standard data sheets and entered into a computerized database for analysis. The information collected was of immediate use in the field to examine trends in wildlife distribution and illegal activity through averaging the catch per unit effort indices. However, for the formal analysis used for this paper a complex statistical analysis was necessary using StatView software, all the more so because the data on the index of sightings contained many zeros and were therefore termed skewed. Accordingly, corrections needed to



Figure 3. To replicate and compare the results generated by the law enforcement monitoring programme, a structured data collection system that makes it possible to compare results from various sites is essential.

be made for patrols of different lengths and in different seasons (Leader-Williams et al. 1990).

At the monitoring unit office in Bukavu, patrol distances and encounters with illegal activity, together with the grid coordinates, were computerized to visualize patrol intensity and illegal wildlife use for each grid square in PNKB. The user-friendly ESRI ArcView 3.2a was used to better understand spatial relationship in law-enforcement monitoring data related to the distribution of elephant and human activities, as taken from the sample patrols. Areas of elephant occurrence and those of high human impact were modelled using a GIS overlay (figs. 1, 4 and 5).

Results and discussion

Background on population status, trends and current human threats

Originally considered 'fairly common to common' over much of their range, the number of KBNP elephants has fluctuated dramatically over the last decades, principally as a result of their being hunted for meat and ivory. These elephants occupied both low-altitude and mountainous forests. In 1995, their more-or-less straight travel routes could be seen on steep slopes. As elephants contributed to the rejuvenation of the forest, they were important landscape architects. The gaps they created were usually occupied by light-loving plants, which cannot grow in the gloom of the forest. In this way, elephant browsing helped to increase plant diversity. But beginning in 1996, a wave of poaching swept KBNP, and elephant distribution was determined by the intensity of poaching, the distribution of roads and settlements, and the distribution of secondary forest. Population figures varied extensively, from 1350–3600 animals (Hart and Hall 1996) to 3720 in 1997 (Hall et al. 1997), and then went down to 771 three years later (Inogwabini et al. 2000), and further to respectively only 25 and 10 elephants in the upland sector (Blanc et al. 2003). Figures in the lowland sector were still estimated to vary between 1900 elephants (Hall et al. 1997) and 1125 (Blanc et al. 2003); recent explorations in 2001 showed no elephant sign in the lowland sector (ICCN/PNKB 2002). The report is extremely disturbing and suggests that both pongid and elephant species are at severe risk if conservation efforts are not intensified. Density per square kilometer in 1994–1995 was estimated at 0.40 in the upland sector and 0.24 in the

hinterland. Given the drastic decrease in elephant numbers, many donors assumed that under war-torn circumstances it would be impossible for such a large and vulnerable mammal to survive. The challenge now is to link protection of the remaining elephants with conservation of the entire park.

Over the past several years, the wildlife populations in eastern DRC (Garamba National Park, KBNP, Okapi Wildlife Reserve) have been severely depleted through poaching by refugees, guerillas and army forces in the ongoing civil war in the region (Plumptre et al. 2000). In December 1997, six elephants were killed and the poachers arrested. Between April and June 1999, two infamous poachers alone, both from Kashovu village, killed 17 elephants (ICCN/PNKB 1999). A new word, 'ecocide', has been added to our vocabulary to define destruction of the environment for military purposes (McNeely 2003).

Assessment of law-enforcement efforts

The objective of law enforcement is to reduce illegal offtake or at least keep it at a low level. In PNKB the acceptable C/E level is set at 0.0012 encounters per 100 effective patrol days or 1 encounter per 8.33 effective days (table 1, figs. 6–7). The least amount of elephant lifetime range (Jewell 1966; Osborn 2004), calculated by ArcView version 3.2a software using X Tool extension was estimated at 100 km² to over 6000 km², can explain this given the small portion of the vast forest of KBNP that has been patrolled. However, the small elephant lifetime range varied from 28 km² in 2002 up to 24 km² in 2003 and then 48 km² during six months in 2004 (fig. 4). This trend towards larger range should not be explained as an increase in elephant movement but rather as the result of extensive deployment of scout teams over a larger area after three patrol posts were reopened: Lemera, Musenyi and Kasirusiru (figs. 1 and 5). Elephant signs were concentrated around Musisi Swamp in an elephant landscape 'haven' controlled by Tshivanga, Mugaba and Madirhiri sectors (fig. 4). In fact, the overall rate of decline in numbers of elephants was 99.73% between 1995 and 2000, following rapid increases in human pressure and incursions into the park. This decline clearly arose from illegal activity, as is evidenced by 150 skulls recovered and stored in the aptly named Elephant Museum at Tshivanga.

Only a small portion of the vast forest of KBNP has been patrolled (fig. 1) and the LEM data are in too pre-

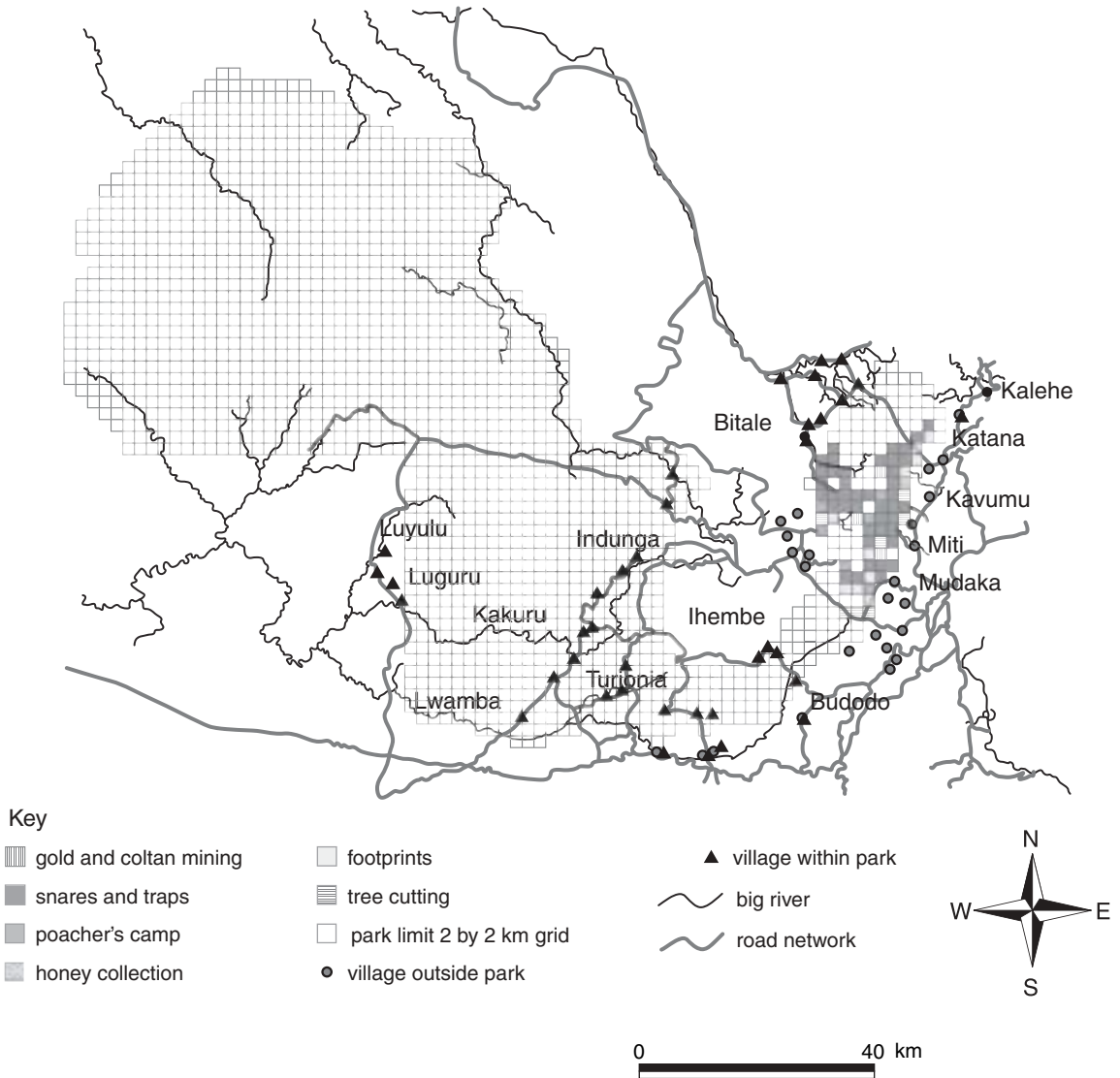


Figure 4. Illegal activity in Kahuzi-Biega National Park, 2004.

liminary a state to be useful in designing an effective elephant management programme (table 2). However, from 2000 to 2004 the number of effective man-patrol days markedly increased as park management initiated a major recovery programme of the lowland sector with 30 new scouts being recruited and trained. The recovered park extension area provides ideal conditions in which elephant populations can recover, should their security continue to be guaranteed. Over 15,000 people were estimated to be moving inside the park itself, associated with over 90 colombo-tantalite (coltan) and gold-mining camps. They were living off the land and no

traces of elephants and very few of other species could be found (ICCN/PNKB 2001).

Indicators for arrests on patrol showed a steady decline from 4.19 encounters per 100 effective man-days in 2000 to 0.76 in 2001 and 0.04 in 2002, a decline of 18.13% in 2001 and 1% in 2002. The upland sector of the park was occupied from June to December 2002 by two competing factions—the Rwandan-backed Congolese Rally Gathering for Democracy rebel army, and the Mai Mai militia. It was therefore difficult for park scouts to control all sectors through overnight patrols, especially those identified with the

highest rate of illegal incidents. The indicator for confiscated snares, firearms recovered and footprints followed a similar pattern, with a steady decline from 9.23 for the snare in 2000 to 0.09 in 2003.

Most staff in anti-poaching units spent about half of each month patrolling on foot under difficult conditions. They covered 376 km² in 2002, 316 km² in 2003, and 304 km² in the first half of 2004 (fig. 1). Signs of illegal activity, such as poachers' footprints and camps, snares, and coltan artisanal mining were encountered throughout the year. Encounters of illegal activity generally showed consistent trends within different areas, but most trends showed complex changes over time.

Poachers and camps tended to be seen less often in more heavily patrolled areas even though these held the remaining elephants. The detection of illicit activities within the upland sector generally increased as patrol units contained a greater number of staff as well as spent much more time on the ground (figs. 8 and 9). The staff density for KBNP was clearly insufficient to protect a large area (Leader-Williams et al. 1990). Indeed, the minimum KBNP number of 0.014 guards per square kilometre does not begin to measure up to the IUCN recommendation of 1 guard per 40 km² in an area with human population density exceeding 350 inhabitants per square kilometre (Hall et al. 1998). The average guard density in the central and eastern sectors of Virunga National Park was one guard per 10 km² (Mubalama 2000; Mubalama and

Mushenzi 2004). Following staff shortfall, wildlife authorities need to direct manpower into a more effective intelligence network outside protected areas (Bell 1986; Leader-Williams et al. 1990), all the more so since the likelihood of detection is a better deterrent than a severe penalty, especially in a region with poor law enforcement and a declining economy.

Leader-Williams et al. (1990) demonstrated the relative efficiency of investigation operations over conventional patrols, in terms of ivory and ammunition recovered. For PNKB in 2001, the encounter rates of ivory recovered on investigation operations varied between 1 and 248 times that of patrols, while it varied between 1 and 65 times that of patrols for the recovery of ammunition (figs. 6 and 7). Building upon recorded intelligence data in KBNP and as things stand now, the investigation approach does not seem to be effectively operating as it did the previous four years, due to underfunding and inadequate security. In the future, investigations should be more effective and more efficient than is possible with conventional field patrols.

Law enforcement operational budget

The total annual budget allotted to PNKB for the years 2000 to 2003 varied substantially from one year to another. In 2000, park management used USD 51,028. This means USD 8.50 per km². The amount in 2002 was USD 41,560 with USD 6.93 per km² and in 2003 USD 55,832 or USD 9.30 per km². When considering that during the same period the average staff density of guards per square kilometre was 0.011 in 2000 and 2001, 0.013 in 2002, and 0.014 in 2003, it becomes apparent that the severe lack of workforce can be linked to an insufficient operational budget. This budget for law enforcement contrasts with USD 46.50 per km² a year (Jachmann 1998) allocated to elephant protection for the Luangwa Integrated Resource Development Project in Zambia and is slightly less than the USD 11 per km² (Yirmed Demeke 2003) for Omo National Park in Ethiopia.

Table 1. The catch per unit effort (C/E) index of encounter rates of serious and minor offences per 100 effective patrol days, and serious offences encountered per 100 effective investigation days, 2001–2004

Event or item	2000	2001	2002	2003	2004
Serious offences (patrol)					
Elephants killed	< 0.01	0.49	< 0.01	< 0.01	< 0.01
Arrests	4.19	0.76	0.04	0.05	< 0.01
Poachers encountered	< 0.01	0.35	0.05	0.01	0.23
Firearms	0.21	< 0.01	0.01	0.01	0.01
Ammunitions	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Serious offences (investigation)					
Ivory	< 0.01	2.48	< 0.01	< 0.01	< 0.01
Other animals confiscated	< 0.01	< 0.01	0.04	< 0.01	< 0.01
Ammunition	< 0.01	0.65	< 0.01	< 0.01	< 0.01
Minor offences (patrol)					
Snares recovered	9.23	2.28	1.84	0.09	4.72
Camps found	< 0.01	< 0.01	0.02	0.01	< 0.01
Footprints sited	< 0.01	0.98	0.02	0.04	< 0.01

Table 2. Law-enforcement effort and illegal activity

Event	2000 ^a	2001 ^a	2002 ^a	2003	2004 ^b
Elephants killed by poachers	0	150	0	0	0
Ivory recovered	0	5	0	0	0
Ammunition captured	0	197	6	163	0
Firearms captured	15	0	6	13	0
Effective man-patrol days	18,960	30,090	53,641	198,660	115,584
Estimated coverage (km)	11,250	13,210	36,555	41,015	39,772
Total patrol days	1,299	1,224	679	2,365	1,376
Total arrests	289	76	34	92	42

^a Only the original sector of the park under park management control

^b From January to June 2004

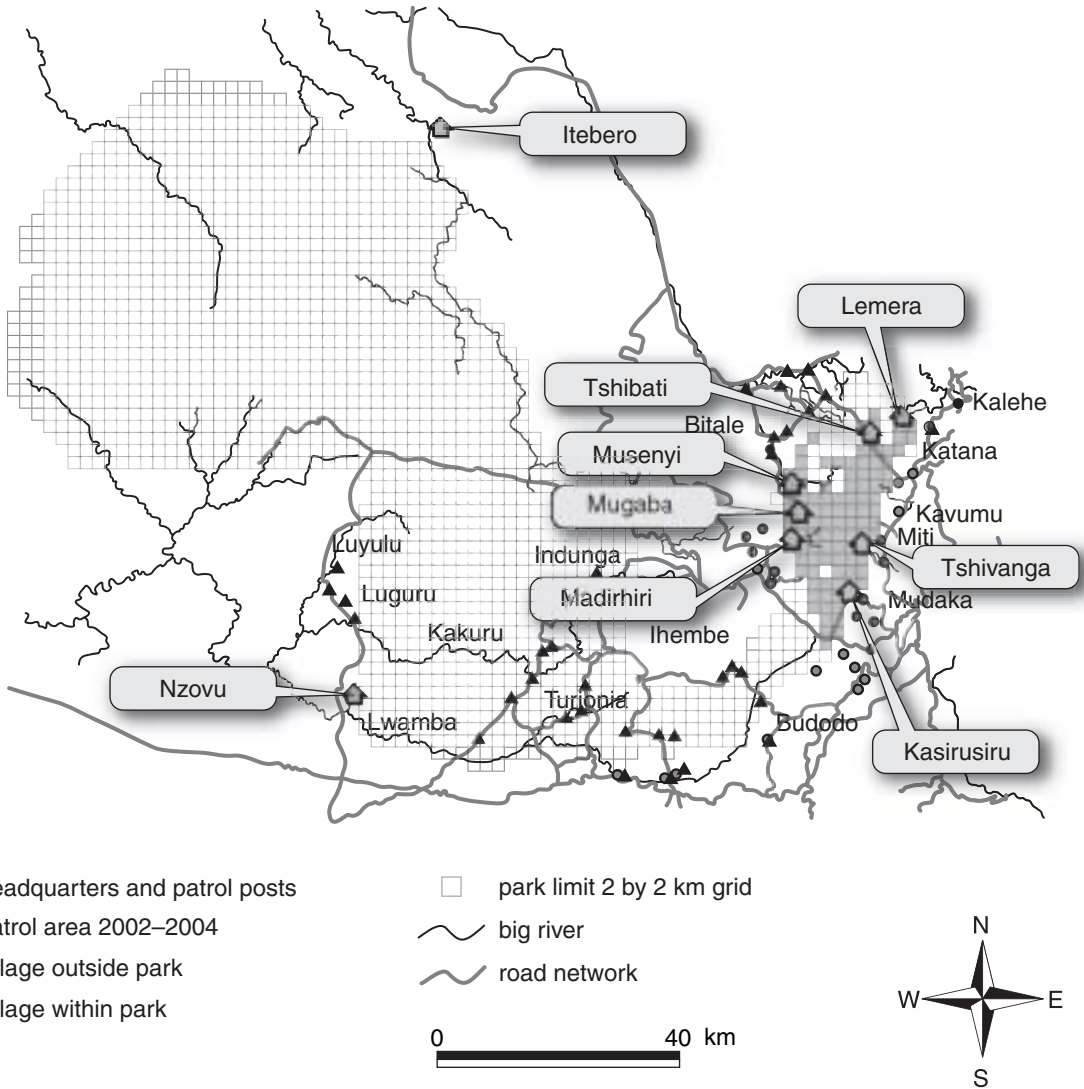


Figure 5. Protection effort in the upland sector of Kahuzi-Biega National Park.

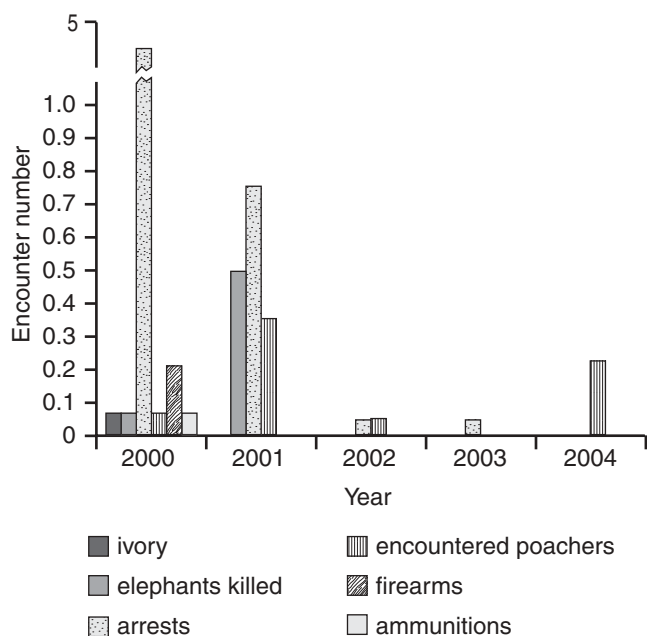


Figure 6. Encounter rate of illegal activity: serious offences per 1000 effective patrol days, 2000–2004.

We suggest that law-enforcement staff should have been deployed at an effective density of at least one man per 40 km² of protected area to have prevented the decline of elephants. If we are to avoid further mass slaughter of wildlife and a drastic reduction in elephant population in PNKB and surrounding areas, we recommend that an annual operational budget of USD 300,000 be allocated for PNKB. This means an average of USD 50 per km².

Conclusion and recommendations

Elephants in KBNP are facing a severe, unprecedented crisis. We conclude that the available workforce for law enforcement was reasonably effective in capturing minor offences in a very limited protected area but was too small to provide effective protection to the large populations of elephants over such a vast and challenging area as KBNP. This situation calls for immediate action to find and control the causes to save some of the local wildlife populations from extinction. Today, the law-enforcement budget to protect wildlife has plummeted and sophisticated weapons in wrong hands

have escalated elephant poaching. Evidence of such poaching was encountered throughout the patrolled areas, suggesting that small populations of elephant continue to be at severe risk of being killed for both ivory and meat.

The future of the African elephant involves much more than maintaining an international moratorium on ivory trade for the foreseeable future. We are convinced, however, that any resumption of legal trade will threaten the elephant throughout its range and the ban should continue to be enforced. Uncovering and checking new information on the movement of poachers and smugglers should be the highest priority of the anti-poaching intelligence unit, as receiving advance information on poacher and smuggler activities is extremely important for apprehending criminals engaging in such nefarious activities. A strong site-based conservation program is needed to sustain long-term conservation efforts in a region under civil war. Dedicated national staff should receive regular hands-

on training, developing them professionally to manage their natural resources. Greater emphasis should be placed on developing methods to ensure proper documentation of informant sources and the information they provide.

Enduring peace remains elusive for DRC national parks, including KBNP. Racketeers, mercenaries and *interahamwe* continue to terrorize the local human

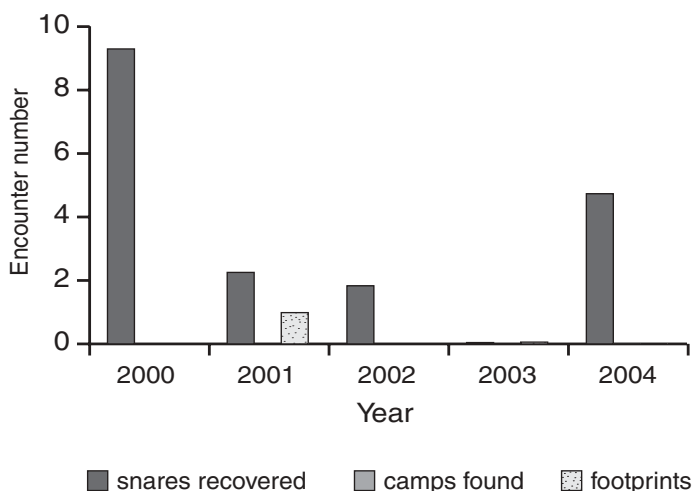


Figure 7. Encounter rate of illegal activity: minor offences per 1000 effective patrol days, 2000–2004.

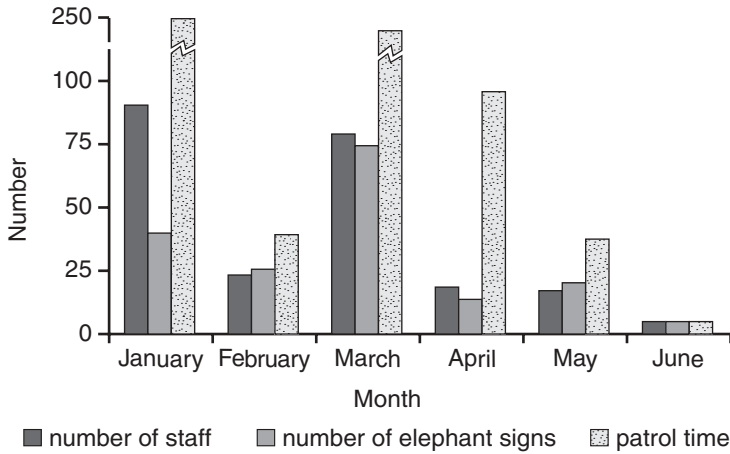


Figure 8. Detection of elephant signs related to number of field staff and amount of patrol time, January–June 2004.

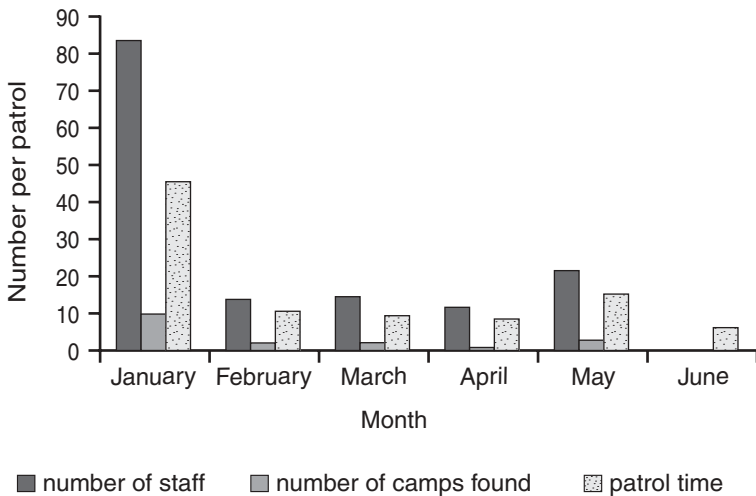


Figure 9. Detection of poacher camps related to number of field staff and amount of patrol time, January–June 2004.

population and plunder wildlife, minerals and forests. But we can still draw hope for these war-torn protected areas by looking at Uganda. Throughout the 1970s and much of the 1980s, the Ugandan government completely lost control of its parks and wildlife with highly placed government officials and security officers sponsoring elephant and rhino poaching in the parks. When peace came, much of Uganda’s wildlife and natural environment recovered, and the national government now publicly endorses conservation and promotes collaborative forest management with local communities.

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We take this opportunity to express our sorrow over the deaths of dedicated staff who died on duty in KBNP, including Méthode Ruboneka, Chimanka Baganda, Misarhi Mastaki, Masumbuko Musharamina, Kasigwa Kaboyi and recently Busasa Byanjira. Their sacrifice will not be in vain.

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