



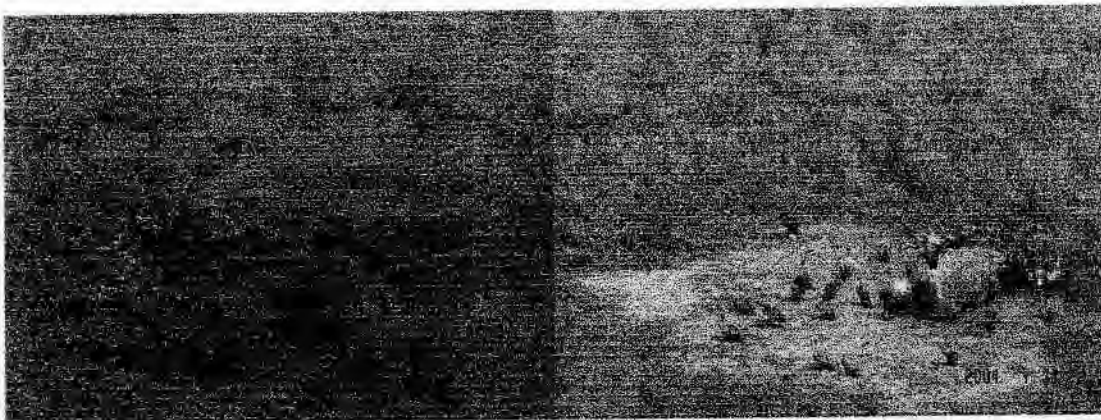
GARAMBA NATIONAL PARK

SYSTEMATIC AERIAL SAMPLE COUNT OF LARGE MAMMALS, APRIL 2004

and

TOTAL BLOCK SURVEYS OF RHINOS AND THREATS JULY & NOVEMBER 2004

**Kes Hillman Smith, Amube Ndey, Fraser Smith, Paulin Tshikaya, Guy Mboma,
Serge Ibiliabo, Giningayo Panziama**



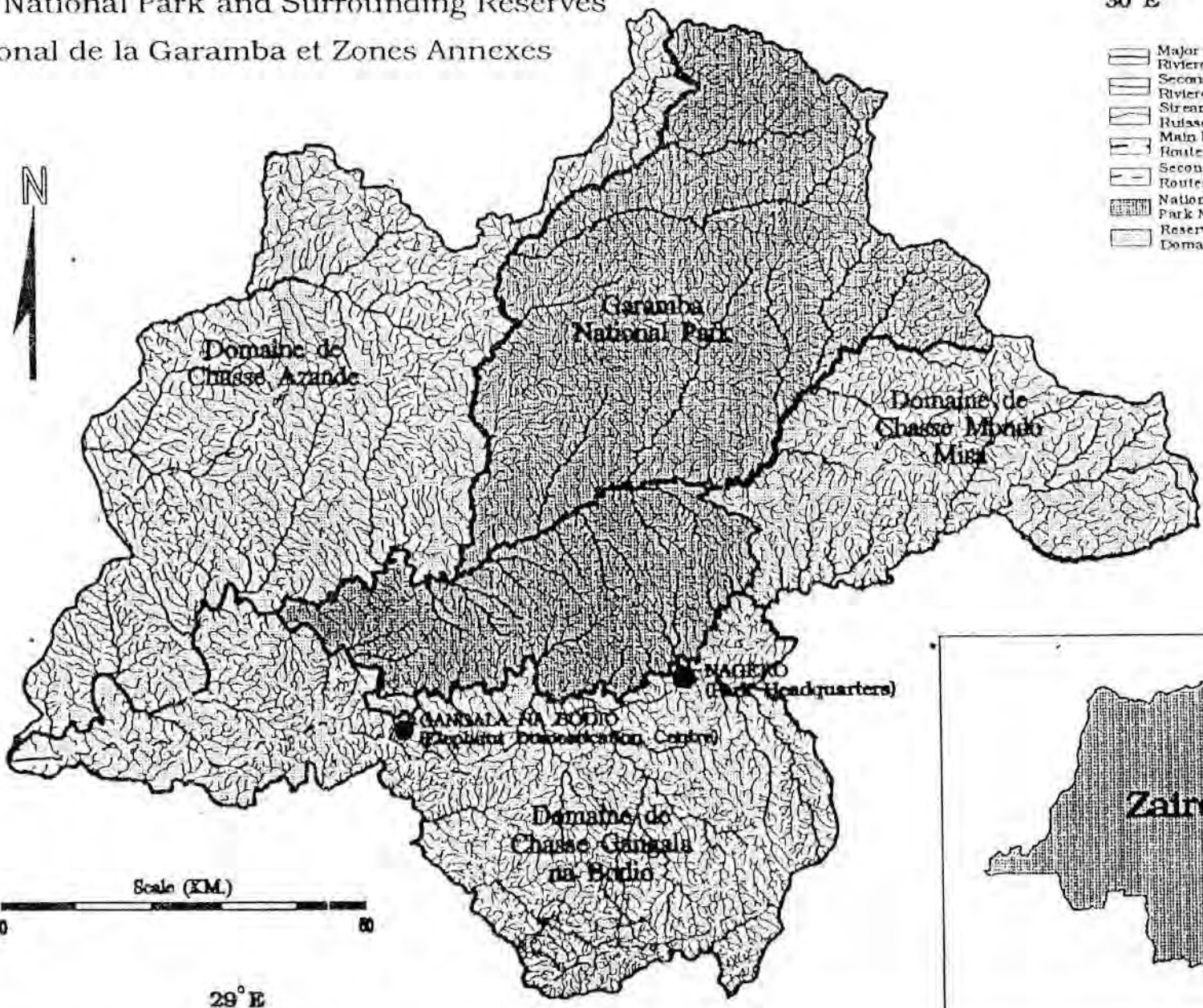
*Garamba National Park Project report
IRF, ICCN, FZS, UNESCO/UNF*

Garamba National Park and Surrounding Reserves

Park National de la Garamba et Zones Annexes

30° E

-  Major Rivers
Rivieres Principales
-  Secondary Rivers
Rivieres Secondaires
-  Streams
Ruisseaux
-  Main Roads
Routes Principales
-  Secondary Roads
Routes Secondaires
-  National Park
Park National
-  Reserves
Domaines de Chasse



4° N

4° N

Scale (KM.)

0 80

29° E



Zaire

GARAMBA NATIONAL PARK AND RESERVES

SYSTEMATIC AERIAL SAMPLE COUNT OF LARGE MAMMALS 2004

INTRODUCTION

General all species systematic aerial sample surveys of the Garamba National Park and surrounding Domaines de Chasse are carried out annually as part of the ecosystem monitoring programme. This is a report of the count carried out in April 2004, with discussion on the status of the ecosystem and the effects of the poaching during this period.

Total block count surveys of rhinos and signs of illegal activities have also been carried out regularly as part of the monitoring programme and guidance to anti-poaching. These have been curtailed in frequency during the civil war and general instability in DRC, but those carried out in 2004 will also be included in the report, as they are a more accurate record of the rhino status than the sample counts.

The Garamba National Park (4,900 km²) is situated between 4° and 3° north and 29° and 30° east in the north east of the Democratic Republic of Congo (DRC). It is surrounded on three sides by reserves, the Domaines de Chasse Azande, 2,892 km² to the west, Gangala na bodio, 2,652 km² to the south, and Mondo Misa, 1,983 km² to the east. All these areas were counted in the past, but with limited resources this count covered only the park. On the north east, within Sudan, the park is bordered by the Lantoto game reserve.

The park is situated within the sudano-guinean savanna biome. The southern two thirds of the park comprises long grass savanna dominated by *Loudetia arundinacea* with *Hyparrhenia* species. The reserves are dominated by a complex of deciduous *Combretum* woodland and gallery forest. Within them is limited human settlement and gold mining.

The first aerial census of the area was carried out in 1976 (Savidge et al 1976) by an FAO project. Since then the ecosystem has been censused in 1983 during a survey of northern white rhinos (*Ceratotherium simum cottoni*) (Hillman et al 1983) and since 1984 as part of the Garamba National Park Project. (Hillman Smith 1990, Smith et al 1993, Hillman Smith et al 2003).

The counting technique and basic analysis have remained standard throughout, based on the systematic aerial sample count method described by Norton Griffiths (1978) and Jolly Method 2 analysis (In Norton Griffiths 1978), but the process of analysis has varied. Analysis is now carried out with a system developed using the commercial software programme Quattro pro 4 (Borland 1992) for the 1993 count (Watkin et al 1995). It is equally applicable to Microsoft Excel. The method of counting and analysis as applied at Garamba has been written up as a paper and a handbook in both English and French (Hillman Smith et al 1995) to guide long term standard application of the technique in the monitoring programme at Garamba. We hope it may also contribute a few guidelines for easy analysis of aerial counts elsewhere.

A UTM (universal transverse mercator) compatible system of coordinates, which was based on the transect lines used since the 1983 count has been used to locate all animal and habitat observations since 1983 and all law enforcement monitoring observations since 1992. In conjunction with the establishment of a geographic information system (GIS) at Garamba in 1993, this has now been expanded to cover the surrounding reserves and is maintained as the basis for the positioning of the flown transects.

Counting method

The counting method is the standard aerial systematic reconnaissance flight (SRF) using parallel transect sampling as described by Norton Griffiths (1978) and widely used for aerial counting of wildlife and livestock. Heights, strip widths and general application of the method have been consistent throughout the series of counts since 1983. Analysis is carried out using Jolly's method II (Norton Griffiths 1978) in the spreadsheet programme Quattro Pro, and shaded vegetation mapping uses the GIS programme Idrisi.

Aircraft:	Cessna 206, 9Q-CBR
Pilot:	Fraser Smith
Front seat obs.:	Kes Hillman Smith
Middle seat obs.:	Amube Ndey L Paulin Tshikaya R
Rear seat obs.:	Guy Mboma L Serge Ibiliabo R
Analysis design:	John Watkin & KHS,, re-design for EW transect re-orientation K H.S & Kerin Adcock
Analysis:	Amube Ndey, Kes H. Smith, based on Hillman Smith et al (1995) and Watkin et al (1995)
Census zone:	Garamba National Park Total area 4,900 km ²
Timing:	

For greatest accuracy in population estimation the period April to mid June, just at the start of the long wet season offers best visibility. The grass is short and the air is cleared by the rain. The preparation, calibrations and counts reported here were carried out from 12th to 16th April 2004

Stratification, transects and sub-units:

The count was stratified in relation to animal distribution. Very few animals remain in the north and central sectors and these are flown east – west at a target sample intensity of 10% as transects spaced 5 km apart. The southern sector is where over 90% of the animals are currently distributed. This was flown at a target 20% intensity of 20%, as transects spaced 2.5 km apart. The strata were analysed separately and results combined. They are flown east/west as shown on the map **projected transect lines**. The co-ordinates for the start and end points of each transect flown alternately north and south are given on the table **GPS waypoints** in annex.

Sub-units are spaced at 5 km intervals along the transects, as measured using the GPS. The waypoints and routes are pre-set in the GPS according to the table of waypoints. A table is prepared in multiples of 5 km intervals down the length of the transect depending on whether it is being flown EW or WE (**Tables of transect and subunits in Annex**). As each position is reached the pilot calls out the sub-unit change, which observers record into their tape recorders, so that the animal and other observations recorded in between fall into the correct sub-units.

The stratification that has been adopted since 1993 is based on the elephant distribution observed from 1983 to 1993. is as follows. The count boundaries are based on sub-unit boundaries rather than those of the park and reserves. Hence they are slightly larger than the actual boundaries:

park:	5,500 km ²
Low density:	1,400 km ² 14 transects, 55 sub-units
Medium density:	1,925 km ² 12 transects, 77 sub-units
High density:	2,200 km ² 16 transects, 88 sub-units
Domaines de chasse:	9,600 km ² 37 transects, 384 sub-units

The counts carried out since the first war in DRC have included only the park as the objectives have been an assessment of the status of the park, and fuel has always been a limiting factor.

Equipment:

Aircraft (Cessna 2006) ,King radar altimeter, Garmin global positioning system (GPS) , marker rods, cameras, tape recorder per observer, tapes and batteries, stopwatch, data sheets, computer for analysis.

Fibreglass fishing rod blanks mounted on a support fitting designed for the wing strut were used as marker rods.

Duties of crew

Pilot:

Piloting the aircraft, navigating to the ends of transects and along transects using GPS, calling out transects and sub-units at 5km intervals based on the data sheet subunits (Table in Annex). The GPS was pre-programmed with the beginning and end waypoints of the transects, which are listed in the table GPS waypoints. Examples of habitat types are also photographed.

Front seat observer:

Recording the time and speed of each transect and maintaining the transect summary sheet (in annex). Within each sub-unit recording height a.g.l. from the radar altimeter and all habitat type and condition classifications as defined below. (FSO data sheet in Hillman Smith et al 1995 and annex)

Middle seat observers:

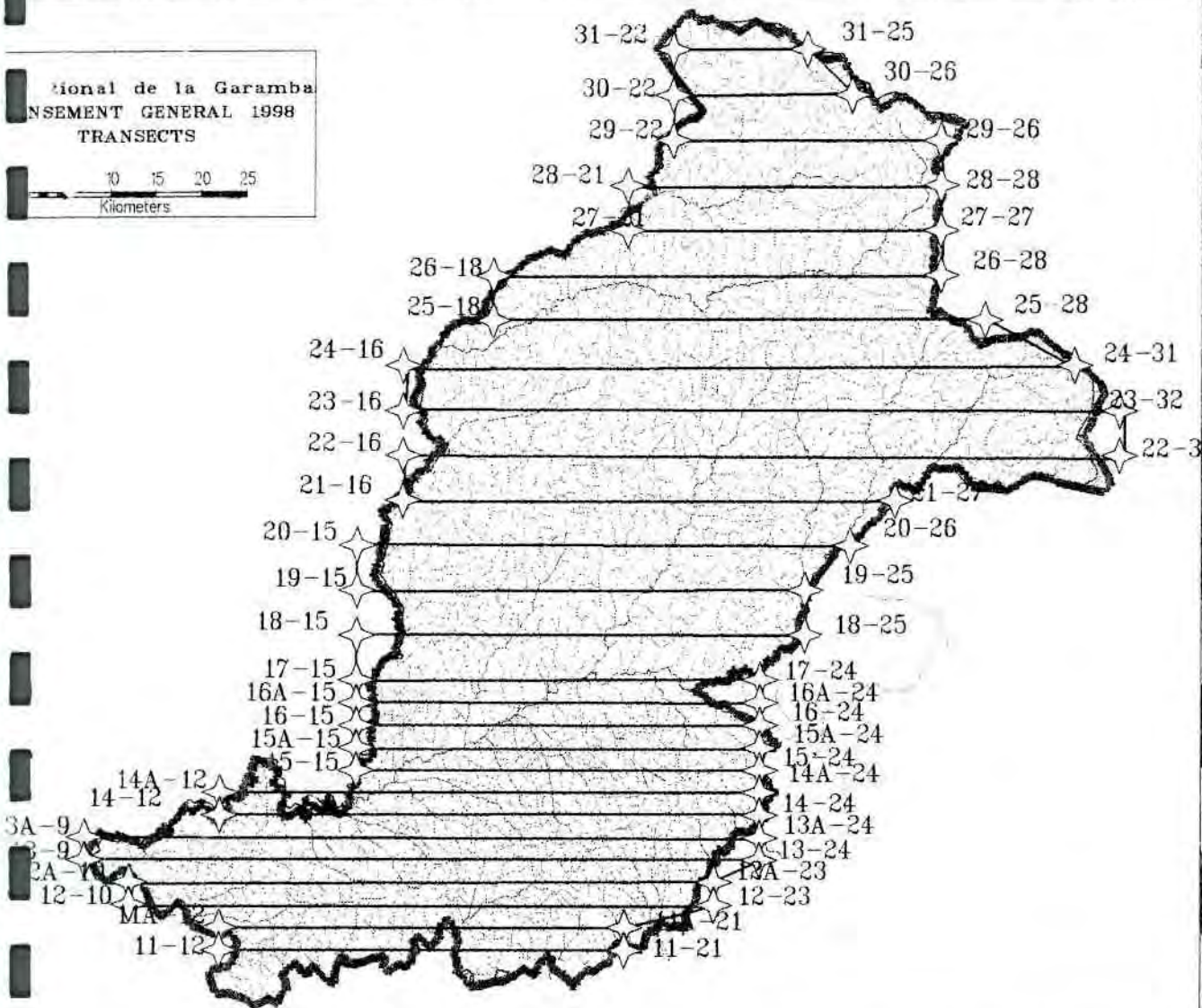
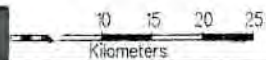
Counting and recording into the tape-recorders all animal species and signs of human occupancy, as listed on the table: *code des espèces* , that are seen within the strips, plus noting parts of any of the same herds that occur both out and in the strip. For the more vulnerable species for which management focus is important eg rhinos and elephants the habitat they are in is also recorded. On return from each flight the observations are transcribed onto RSO data sheets (example in Hillman smith et al 1995). The middle seat observers also noted the habitat in which the animals were seen. Cameras were used for large groups as well as estimations.

Rear seat observers:

The rear seat observers made the same observations as the middle seat observers. There were three main objectives to the second row of animal observers:

- comparison of the two data sets to verify and improve the data and to enable other methods of analysis to be applied,
- back-up if a tape-recorder fails and

Parque Nacional de la Garamba
DISEÑO GENERAL 1998
TRANSECTS



➤ training.

To make the first two objectives valid, the strip widths were adjusted to be as near as possible to covering the same strip on the ground as seen by the middle observers. Their strip markers were cords stretched from the wing struts to the tail.

Sample intensity:

Sample intensity: Target Low Intensity: 10%, Actual 9.9% ,

Target High Intensity: 20% Actual 19.2%

Transect spacing - Low 5km

High 2.5 km

Sub-unit spacing: 5 km

Target flying height: 350' a.g.l.

Overall mean actual flying height 354' a.g.l.

Target strip width: 400 -500 m total.(200-250 metres each side)

Actual strip width: @ 354' agl = 500m.

Strip widths are preset according to Norton Griffiths (op.cit.) and calibrated by flying at different heights over markers spaced at 20 metre and 100 metre intervals on the airstrip, simultaneous with radar altimeter readings. Observers count the numbers of spaces between markers included within the strip widths, to calculate the observed widths. These passes were carried out both during training, before counting began and at the beginning and end of each counting flight. The results, analysed and plotted in quattro pro 4.0 are shown in the graph **calibrations**, and were used combined with measured altitudes per sub-unit to calculate strip widths for each transect and sub-unit. On the basis of this the combined strip widths for middle seat observers are calculated per sub-unit and the sample areas per sub-unit are calculated and used in the calculation of population estimates from animals of each species seen per sub-unit:

Species:

Animal species were counted by both middle and rear seat observers, as listed on the table: **codes des espèces**. Signs of human habitation and land use were also counted. Carcasses of Elephant and other species are classified as:

1. Fresh, with flesh present
2. Recent bones, with rot patch present
3. Bones white, no rot patch
4. Bones grey old

(Douglas-hamilton & Hillman 1981)

in this high rainfall, high scavenger density environment, fresh recognisable rot patches remain for a considerably shorter time than in East Africa. Carcasses monitored have usually remained at stage 2. less than two months.

Habitat factors :

Within each sub-unit the front seat observer recorded the height a.g.l. as measured by the radar altimeter and estimates percentages of the following habitat parameters in units of 10% intervals:

- tree cover, as percent of sub-unit
- tree greenness as percent of trees present
- bush cover, as above
- bush greenness, as above
- grass cover, as above

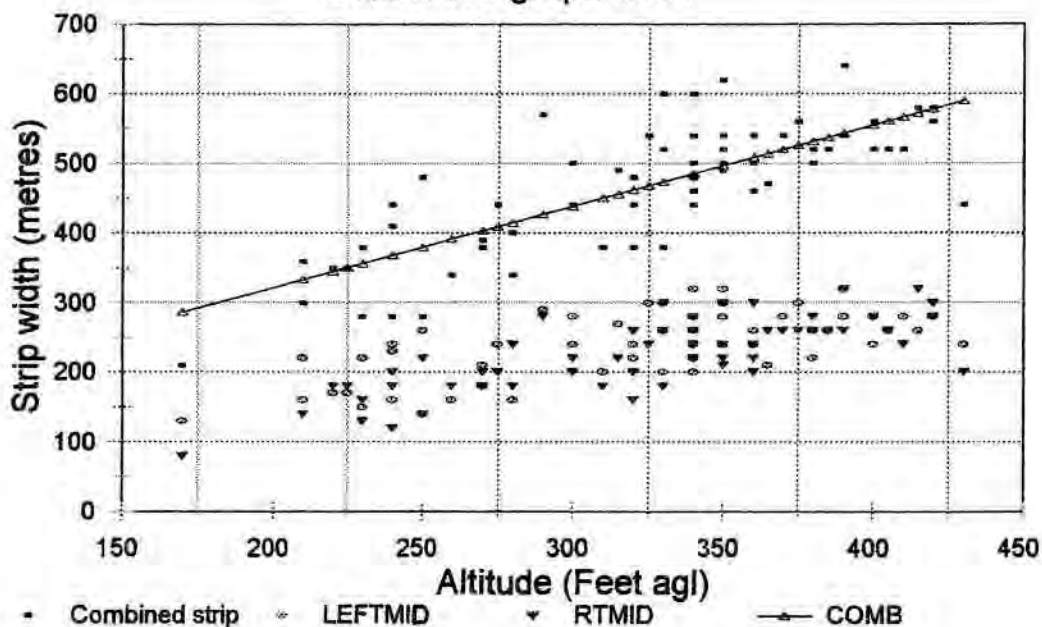
grass greenness, as above
 long old grass, as percent of grass present
 burn, as percent in sub-unit
 water availability,
 0 = none
 1 = available to humans and livestock
 2 = limited availability
 3 = unlimited availability
 4 = running water
 5 = floods
 agriculture, as percent in sub-unit
 Vegetation zones are classified within each sub-unit.

Analysis

Analysis was carried out in Quattro pro according to the method described in detail in Watkin et al (1995) and Hillman Smith et al (1995). The method is based on entering the animal and habitat observations and the altitudes per sub-unit onto separate versions of a spreadsheet, which is laid out like a map of the census zone, in which each cell represents a subunit. This is printed directly, as a map of the distribution of animal observations, and with conversion, to map density distributions. Habitat data was entered in the same way. To produce the shaded mapping it can be transferred to drisi. The overlay map of the park and reserves was created in Arcinfo and they were combined in Coreldraw.

A graph of strip width calibrations was created in Quattro and the resulting regression applied to the map of altitudes per sub-unit. This enables transect width correction per sub-unit, as opposed to an average applied to whole transects as previously. Superimposition of this on the map of animal observations calculates the densities. Within the map spreadsheet the transect and strata totals are summed and these data were transposed to a second spreadsheet, which was laid out with the formulae from Jolly (1969) and Norton Griffiths (1978) for calculating population estimates and confidence limits. This is printed directly with the details of the observed numbers, stratified population estimates and confidence limits.

P.N.Garamba
 Calibration graph 2004



Flying time

A total of 16 hours were flown over the 5 days of the survey including calibrations and testing. At 55 litres per hour in the C.206, this used 880 litres or 4.5 drums of fuel.

The pilot summary sheet is in Annex.

Results

Distribution maps in the spreadsheet formats are given for each species and for signs of threat, ie carcasses and poaching camps.

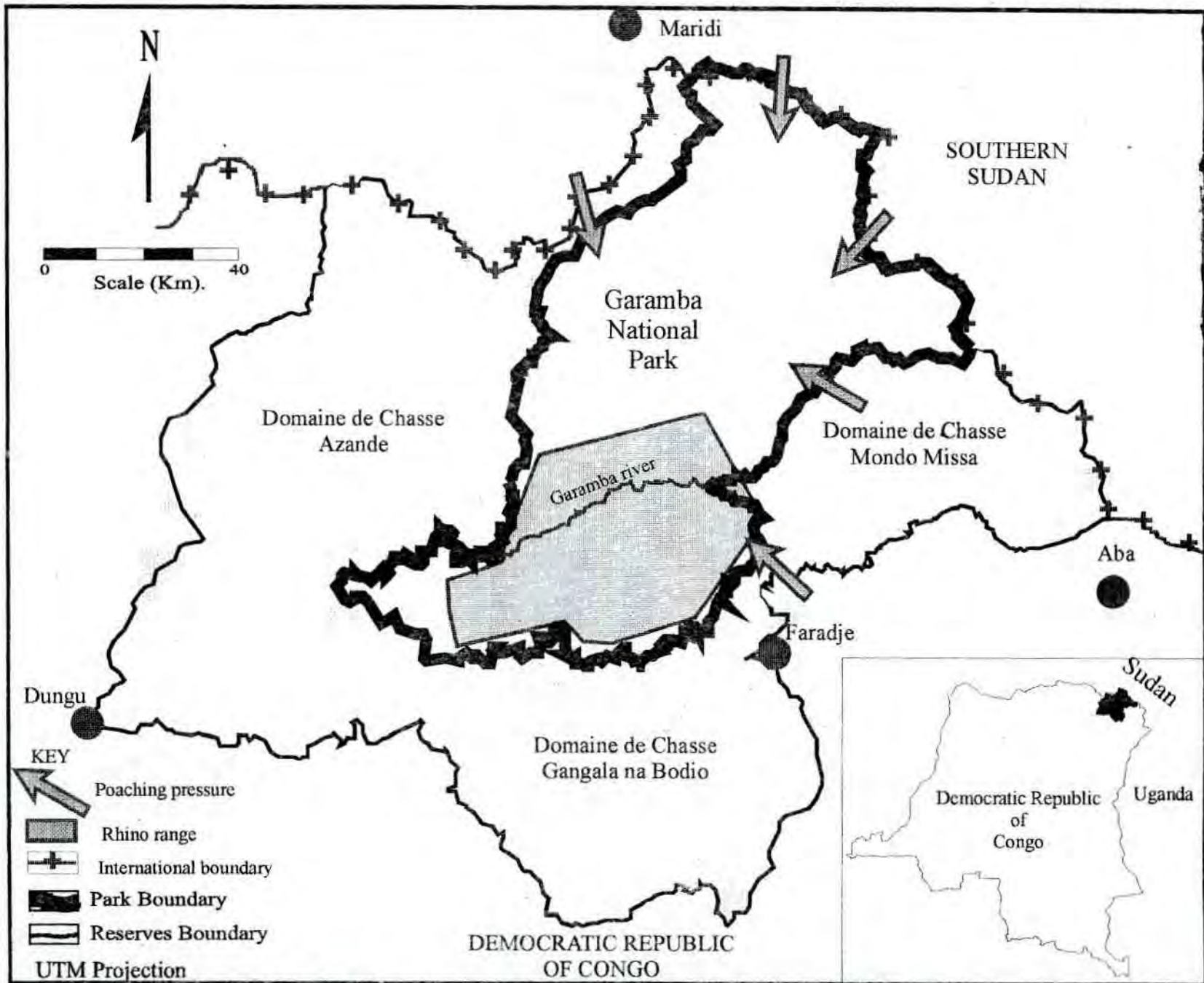
These are followed by the tables calculating population estimates, Standard Errors and 95% Confidence limits for each species.

Tree cover and bush cover are mapped. Tree cover is dense in the north of the park and relatively dense in the Domaine de Chasse, but very sparse in the south of the park due to the effects of fire and elephants. Bush cover is increasing further and further south each year as the elephants and other large mammals are pushed down or poached out from the north and now even from the centre of the park. (Hillman Smith et al 1993, 2003)

The **summary table** gives population totals and standard errors for the period 1995 until 2004, since the start of the wars in DRC .

Table 1 Population estimates from SRF April 2004

Species	Population calculation 2004	Standard Error
Elephant	6,354	2082
Buffalo	12,230	4717
Hippopotamus	2,321	1083
Giraffe	185	152
Rhino <i>Sample (April)</i>	20	15
Rhino <i>Total (July)</i>	17+	
Waterbuck	660	286
Hartebeest	1,204	393
Kob	5,730	1375
Warthog	623	340
Roan	281	443
Reedbuck	80	31
Oribi	312	115
Bushbuck	107	69
Grimm's duiker	10 +	16
Red-flanked duiker	38	31
Dead elephants	385	101
Dead buffalo + unidentified	70	33
Poachers camps	20	40



GARAMBA NATIONAL PARK AND RESERVES

Discussion

The vulnerable species, elephants and rhinos have remained relatively concentrated in the southern sector of the park since the heavy poaching from 1978 to 1984 before the start of the project. Most commercial poaching was eliminated when the project began but limited meat poaching continued in the north of the park, discouraging their spread north again. The poaching has gradually been moving down through the park since the civil war in Sudan became a serious presence on and across the border following 1991. It penetrated the southern sector during the 1997 war in DRC, with losses of roughly half the elephants between the 1995 and 1998 surveys (Hillman Smith et al 2003). As the distribution maps show, virtually no elephants were seen on this survey north of the Garamba river. The maps of bush and tree cover show a progression south of bush cover increasing as elephants and other species became more concentrated in the south. (c.f. Hillman Smith et al 1995)

Table 2 shows the trends in numbers of large mammals. Following the liberation war in 1997 a rapid effort was made to re-equip the park and regain control of the southern sector, pushing the poaching back out. The Garamba Project, supported largely by the International Rhino Foundation at this time, remained fully committed to supporting and working with ICCN throughout and with the development of the UNESCO project and the additional financial and diplomatic support, large mammal numbers were held stable to increasing until 2003.

Population Estimations from Aerial Counts, Parc National de Garamba 1995-2002

Impact of the wars 1996/97 et 1998 to present

Espèces	1995 Pop. calc.	SE	1998 Pop calc.	SE	2000 Pop. Calc.	SE	2002 Pop. Calc.	SE	2003 Pop. Calc	SE	2004 Pop. calc	SE
Elephant	11,175	3,670	5,374	1,339	6,022	1046	5,983	1,184	6,948	1995	6,354	2082
Buffalo	25,242	8,299	7,772	2,063	13,115	3066	13,281	3,930	14,480	4231	12,230	4717
Hippopotamus	3,601	1,299	786	207	967	485	948	787	3,036	1191	2,321	1083
Giraffe	178	108	144	73	118	64	62	13	62	75.4	185	152
Rhino <i>Sample</i>	55	39	5		19	17	50	40	43	30	20	15
Rhino <i>Total</i>	28		29		30		30		30		17+	<i>july</i>
Waterbuck	1,680	669	1,362	433	1,058	363	797	316	421	210	660	286
Hartebeest	2,819	590	1,685	398	1,065	218	1,139	232	1,224	260	1,204	393
Kob	6,601	1,495	6,505	1,558	3,902	984	3,587	991	6,235	2121	5,730	1375
Warthog	5,606	1,261	4,765	668	1,075	213	990	254	789	155	623	340
Roan	81	78	8	7	0		0		57	67	281	443
Reedbuck	271	88	120		101	44	193	103	54	26	80	31
Oribi			89	55	38	19	39	31	58	21	312	115
Bushbuck	133	39	187	46	87	25	143	53	62	34	107	69

The sharp drop in buffalo numbers in the 1998 survey followed by an increase in subsequent surveys may also have been linked to movements out of the park and back in. Prior to 1996/7 buffalo for meat had been the main prey of poachers and numbers had fallen steadily even while elephants and rhinos in the southern sector were increasing. Once poaching was able to penetrate the southern sector more easily, which was especially facilitated by the installation of a battalion of SPLA (Sudan People's Liberation Army) forces in the Domaine de Chasse Mondo Missa, elephants and rhinos became more favoured than buffalo since they provided both meat and ivory or horn.

The northern white rhinos (*Ceratotherium simum cottoni*) have been at a low density since the start of the project and are therefore not ideally censused by systematic sample counts. Throughout the project they have been monitored by both ground work and by regular aerial total block counts throughout the southern sector and recording of all observations on other reconnaissance work. Individual recognition has enabled this approach to build a very accurate record of the population and to follow its dynamics. The aerial total count surveys also have a protective function by seeking signs of illegal activities and providing information to guide the anti-poaching. During the wars it has not been possible to carry this out as frequently as before, but the method was still applied at least twice a year, and all observations at any time continued to be recorded. The table gives both the sample count and total count results for the period 1995 onwards. The known minimum totals show a stable population throughout the period until 2003. However reproduction continued at an average of around 10% so offtake existed.

A rhino survey in August 2003 revealed heavy poaching in the central eastern part of the southern sector. Eighteen fresh and 29 recently dead elephant carcasses were found in what had been a rhino sub-population concentration area. One dead rhino and no live were seen there and only 22 rhinos in total were seen on the survey. An Emergency Strategy was developed at the park and refined with the Administrateur Directeur General of ICCN and with IRF as the main donor and put into immediate effect, with guard training and diplomatic initiatives as key factors. This period coincided with the cease fire in Sudan and the poaching increase may have been facilitated by a reduction of control of unoccupied armed SPLA forces in camps along the border, a desire to benefit as much as possible before peace constrained lawlessness and the opening up of trade routes to the north and Khartoum (Bradley Martin & Hillman Smith (2003) and the penetration of northern Sudanese horsemen poachers through previously southern held lines. The survey in November 2003 found only 19 rhinos minimum.

During 2004 rhino total block surveys were carried out in July and November, and are reported in annex here. The minima seen in the park on each of these were 15 and 4 respectively, but there were several reports of rhinos or tracks seen out of the park in the Domaine de Chasse to the south, some of which were verified and therefore estimates were > 17 in July, 4-10 in November, with an agreed official estimate of about 10 in January 2005. Nine rhinos were found dead during 2004 with a further 2 from that period in early 2005.

The sample large mammal survey reported here started two days after the first detection of northern Arab poachers mounted on horseback in the park on 10th April 2004. Expert, well

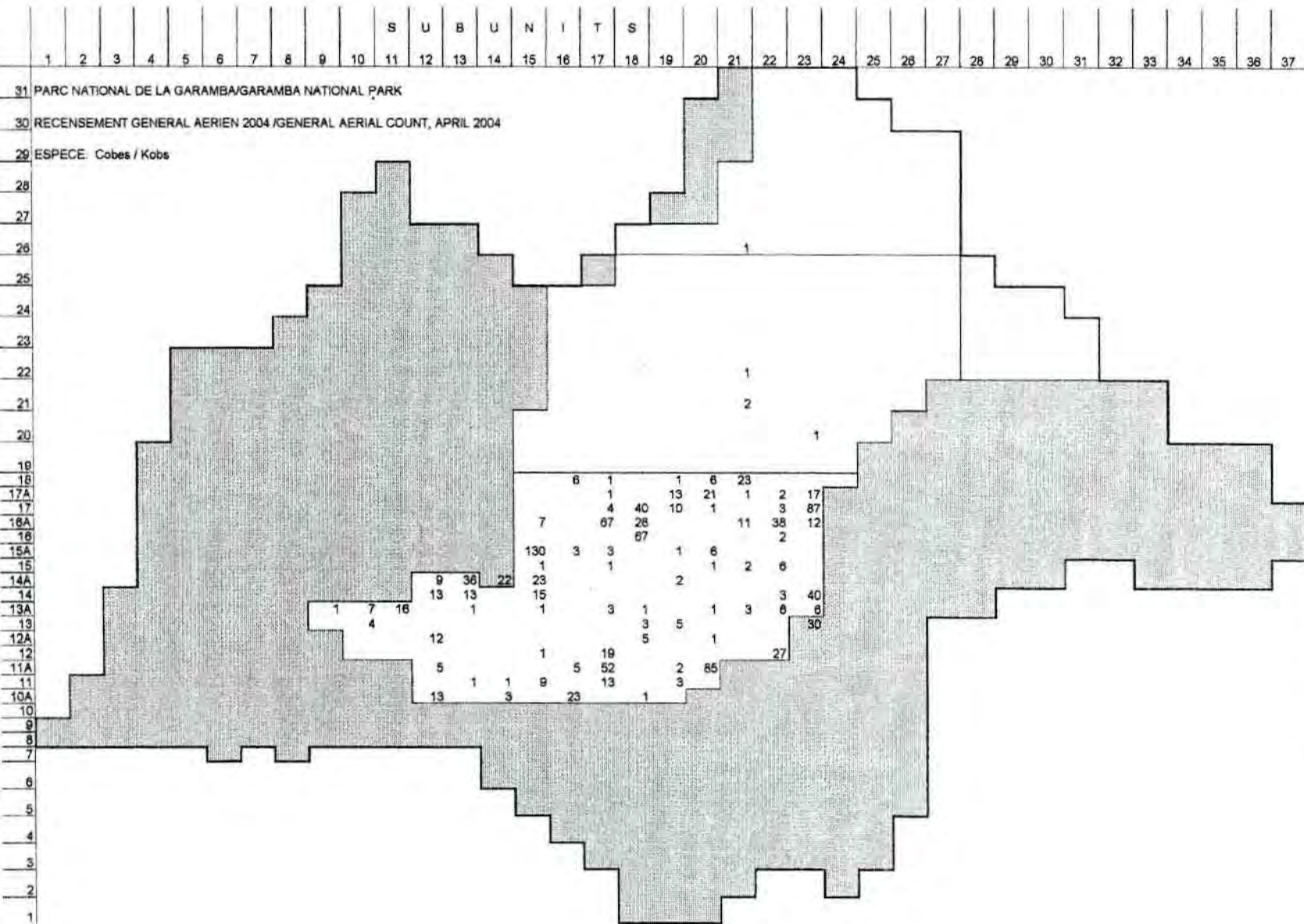
armed and mobile poachers, with back up donkey trains for transporting ivory and horn, they caused massacres among the elephants and rhinos and also killed the unique Congo giraffes (*Giraffa camelopardalis congoensis*) another of Garamba's famous endemics. This is not reflected as strongly in the survey results as had been expected. Remaining elephants had a tendency to amalgamate into large herds which were more difficult to count and observers used were not very experienced with cameras and no fast acting digitals were available, therefore observer bias and general clumped distribution could have contributed to slight over estimations. However the dead to live ratios are very indicative. Fresh and recently dead elephants (stages 1 & 2 only) to live were in the proportion of 1 :17. The highest previously recorded of all stages of dead to live were 1 :8 in 1983 and 1 :23 in 1984 when the project started. By 1991 they were 1 : 576 and in 1995 1 : 431. The killing continued and subsequent surveys will be crucial. The dead elephants were usually being gunned down in whole family groups. (Smith & Smith, IRF 2003 and 2005)

Giraffe figures have been dropping gradually throughout, although in the past they were relatively protected from local poaching by beliefs that their meat gave people leprosy. The northern Arab horseman favour giraffes as their tails are need for bridal dowries. The population estimate of 185 in this count may be inaccurately high due to their very clumped distribution. One group alone was recorded as 22. There may also have been an unintentional observer bias here too. Giraffes tend to feed fairly widely separated and to get 22 all in one transect would be unusual. They have become so important in view of the threats in recent years that the whole crew becomes excited when giraffes or rhinos are seen and in counting them there could have been an unconscious ignoring of the count rods. Subsequent total counts will also help to verify numbers.

The survey showed that there are still substantial populations of key species in this spectacular park and World heritage Site, but that it is seriously under threat and needs all resources brought to bear positively to conserve it.

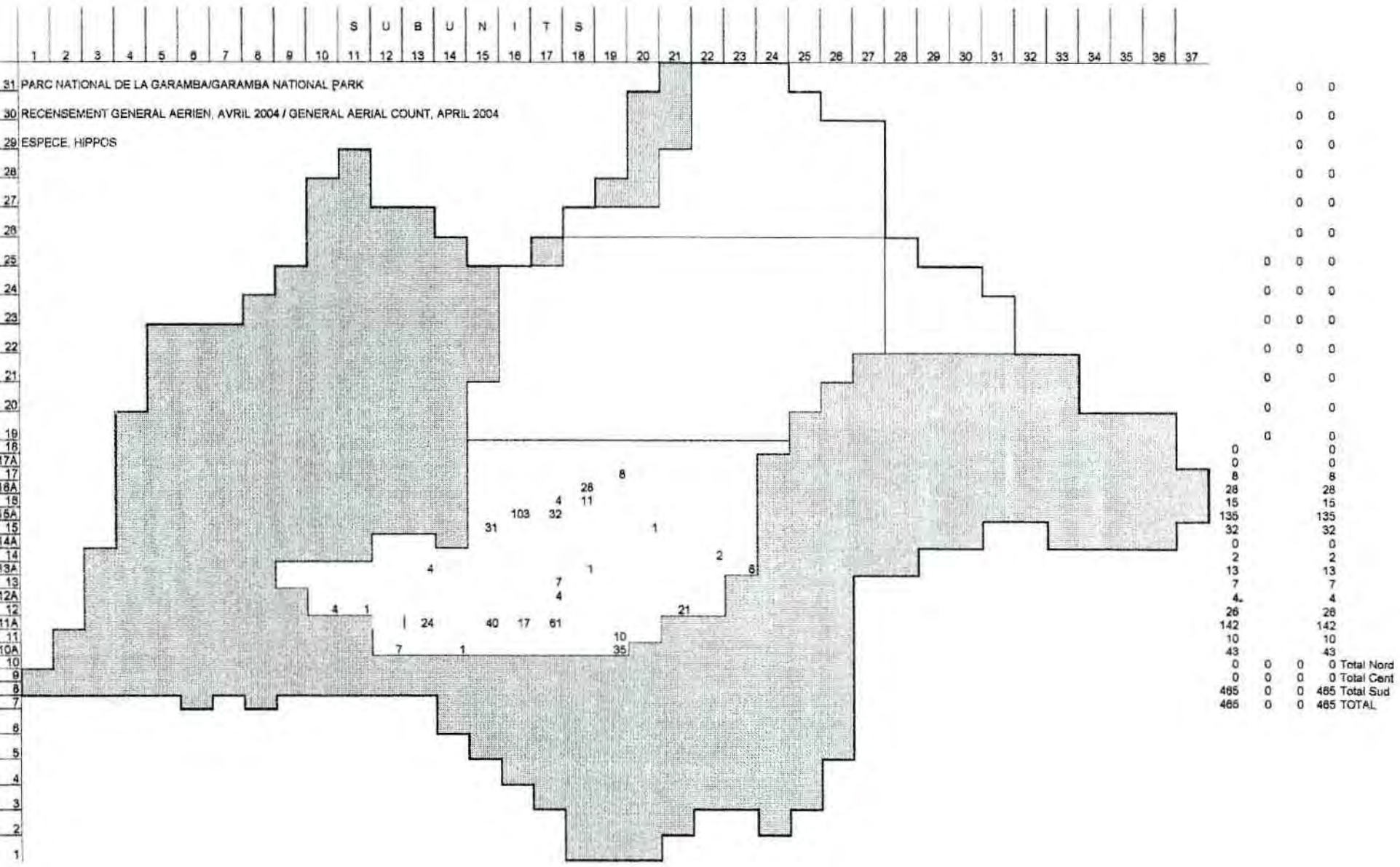
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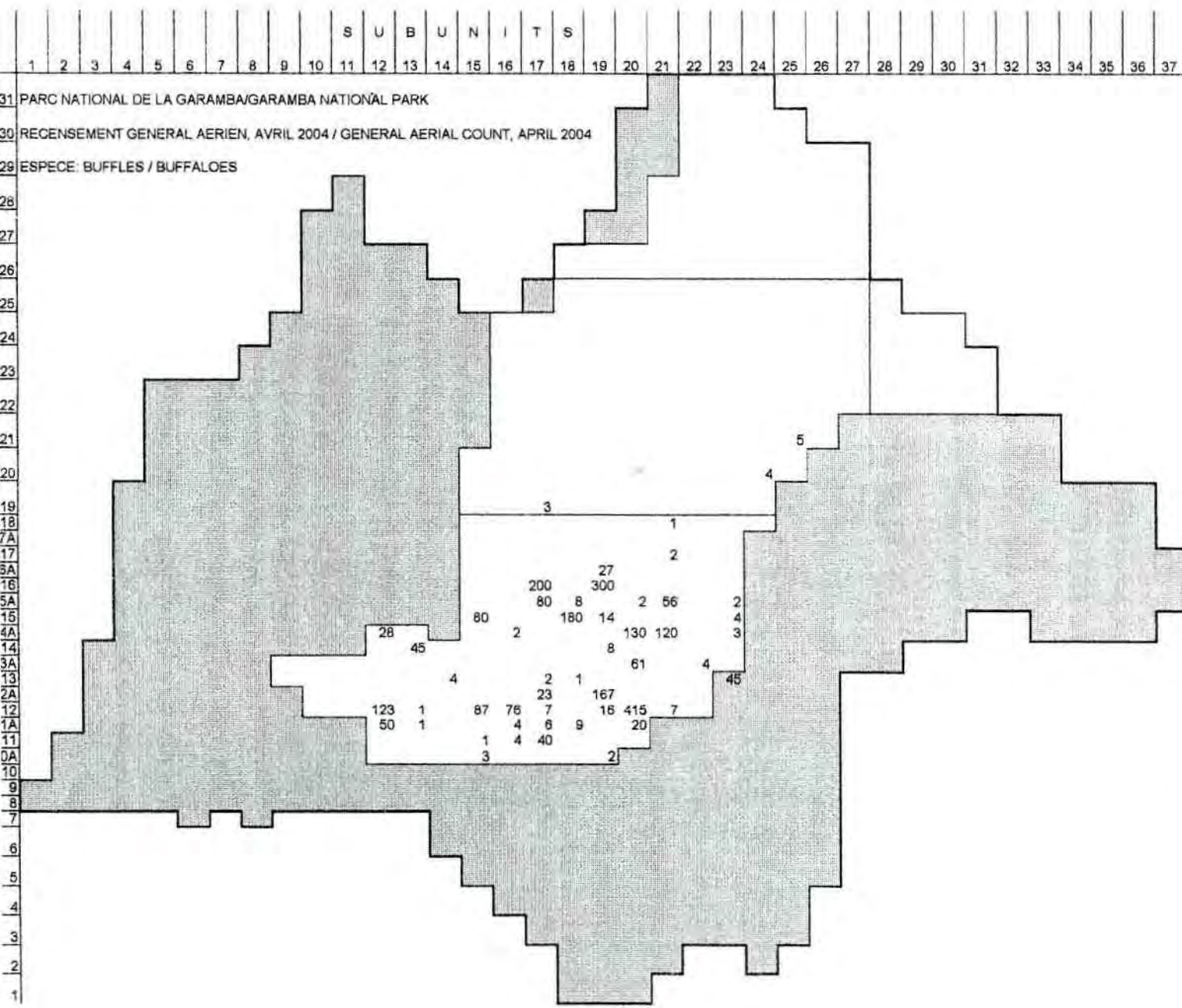
We should like to thank the Institut Congolais pour la Conservation de la Nature (ICCN) for many years of partnership in the conservation of Garamba National Park and the surveys and monitoring of it. Very many thanks indeed to the International Rhino Foundation for our support in so many ways and the support of all the senior staff who took part in these counts, throughout the wars, the back up of UNESCO/UNF and to the Frankfurt Zoological Society for 9Q-CBR for so many useful years in the conservation of Garamba. Vary many thanks also to the Wildlife Conservation Fund (Rick and Diana Kasper) for their support towards 5Y-KEZ for all its rhino and anti-poaching work. Many thanks indeed to all who have worked with us on the surveys both ICCN and project and supporters, especially Amube for so much data analysis and Njele and Sindani for looking after us all.



31	PARC NATIONAL DE LA GARAMBA/GARAMBA NATIONAL PARK	0	0
30	RECENSEMENT GENERAL AERIEN 2004 /GENERAL AERIAL COUNT, APRIL 2004	0	0
29	ESPECE: Cobes / Kobs	0	0
28		0	0
27		0	0
26		1	1
25		0	0
24		0	0
23		0	0
22		1	0
21		2	2
20		1	1
19		0	0
18		37	37
17A		55	55
17		145	145
16A		163	163
16		89	89
15A		143	143
15		11	11
14A		92	92
14		84	84
13A		46	46
13		12	12
12A		18	18
12		47	47
11A		149	149
11		27	27
10A		40	40
10		0	0
9		0	0
8		4	4
7		1138	0
6		1138	4
5			
4			
3			
2			
1			

0 0 1 1 Total Nord
 4 4 0 4 Total Cent
 1138 0 0 1138 Total Sud
 1138 4 1 1143 TOTAL



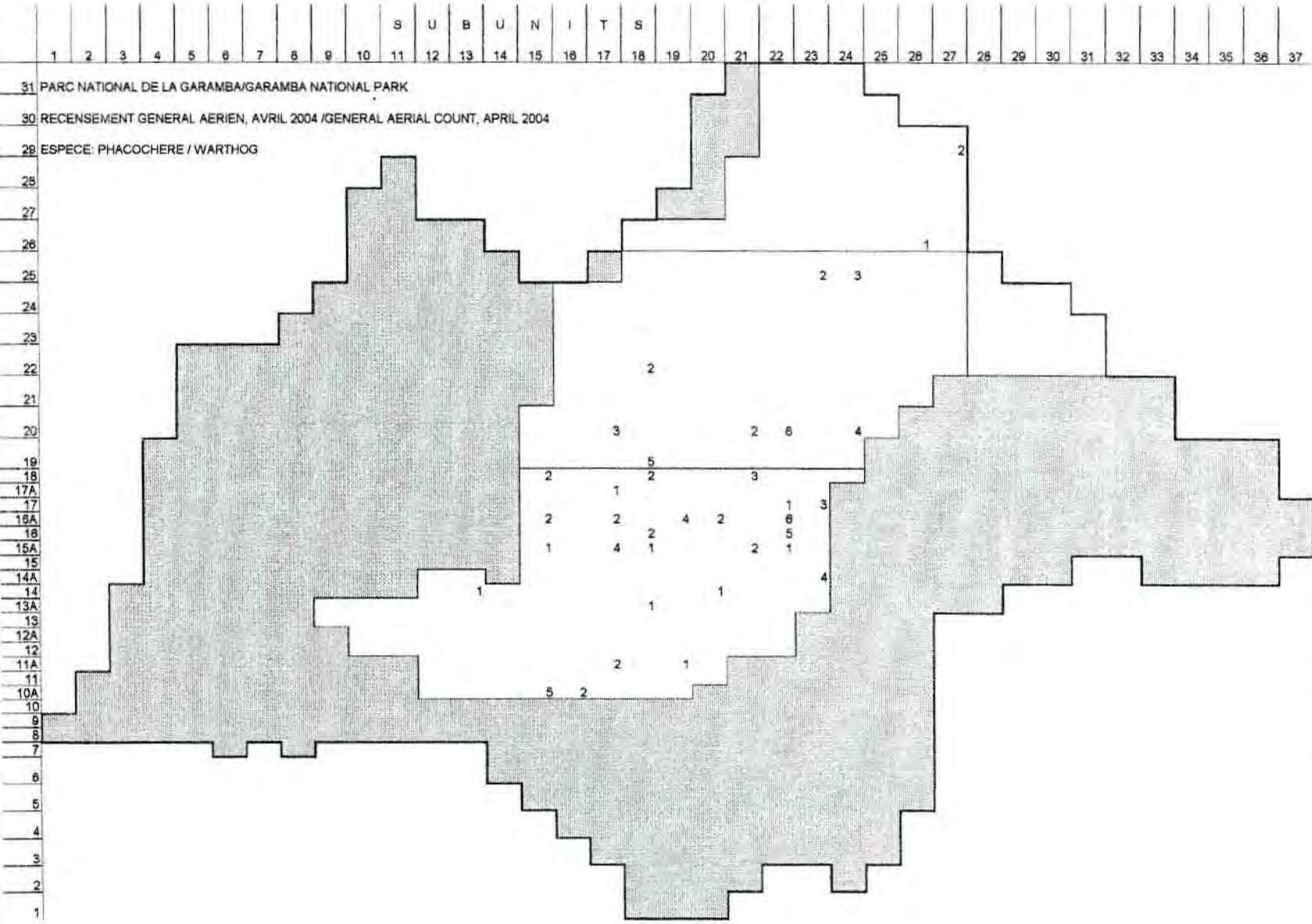


31 PARC NATIONAL DE LA GARAMBA/GARAMBA NATIONAL PARK

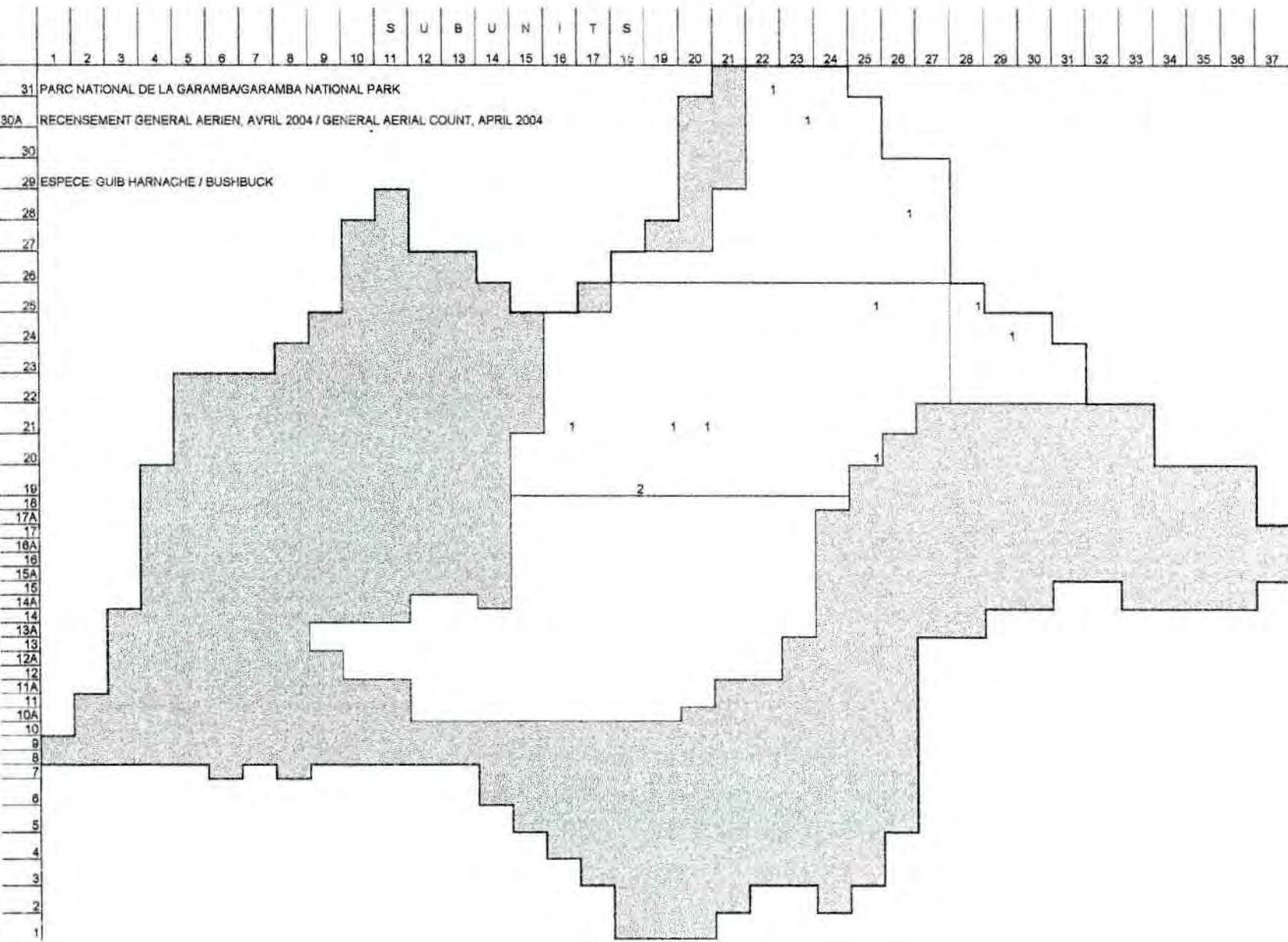
30 RECENSEMENT GENERAL AERIEN, AVRIL 2004 / GENERAL AERIAL COUNT, APRIL 2004

29 ESPECE: BUFFLES / BUFFALOES

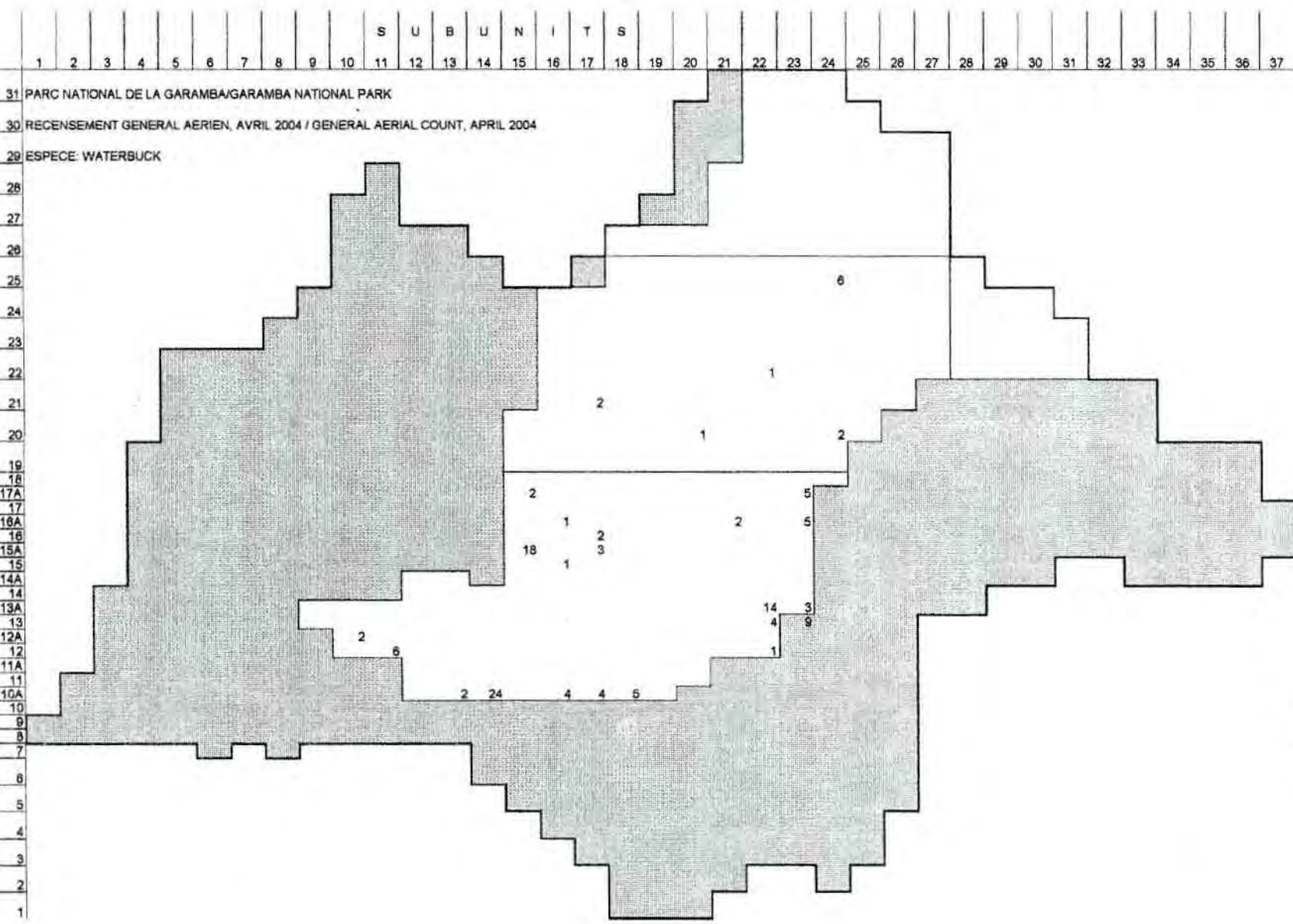
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
5	5	5	5
4	4	4	4
3	3	3	3
1	1	1	1
0	0	0	0
2	2	2	2
27	27	27	27
500	500	500	500
148	148	148	148
278	278	278	278
283	283	283	283
53	53	53	53
65	65	65	65
7	7	7	7
190	190	190	190
732	732	732	732
90	90	90	90
45	45	45	45
5	5	5	5
0	0	0	0 Total Nord
12	12	0	12 Total Cent
2426	0	0	2426 Total Sud
2426	12	0	2438 TOTAL



31	PARC NATIONAL DE LA GARAMBA/GARAMBA NATIONAL PARK	0	0
30	RECENSEMENT GENERAL AERIEN, AVRIL 2004 /GENERAL AERIAL COUNT, APRIL 2004	0	0
29	ESPECE: PHACOCHERE / WARTHOG	2	2
28		0	0
27		0	0
26		1	1
25		5	0
24		0	0
23		0	0
22		2	0
21		0	0
20		17	17
19		5	5
18		7	7
17A		1	1
17		4	4
18A		18	18
16		7	7
15A		9	9
15		0	0
14A		4	4
14		2	2
13A		1	1
13		0	0
12A		0	0
12		0	0
11A		3	3
11		0	0
10A		7	7
10		0	0
9		0	0
8		29	0
7		81	0
6		61	28
5			
4			
3			
2			
1			
		3	3
		29	29
		81	81
		61	28
		3	3
		93	93
			TOTAL
			Total Nord
			Total Cent
			Total Sud



31	1	1	
30A	1	1	
30	0	0	
29	0	0	
28	1	1	
27	0	0	
26	0	0	
25	1	1	2
24	0	1	1
23	0	0	0
22	0	0	0
21	3	3	
20	1	1	
19	2	2	
18	0	0	
17A	0	0	
17	0	0	
16A	0	0	
16	0	0	
15A	0	0	
15	0	0	
14A	0	0	
14	0	0	
13A	0	0	
13	0	0	
12A	0	0	
12	0	0	
11A	0	0	
11	0	0	
10A	0	0	
10	0	0	
9	0	3	3 Total Nord
8	7	2	9 Total Centre
7	0	0	0 Total Sud
6	0	7	5 12 TOTAL



31 PARC NATIONAL DE LA GARAMBA/GARAMBA NATIONAL PARK
 30 RECENSEMENT GENERAL AERIEN, AVRIL 2004 / GENERAL AERIAL COUNT, APRIL 2004
 29 ESPECE: WATERBUCK

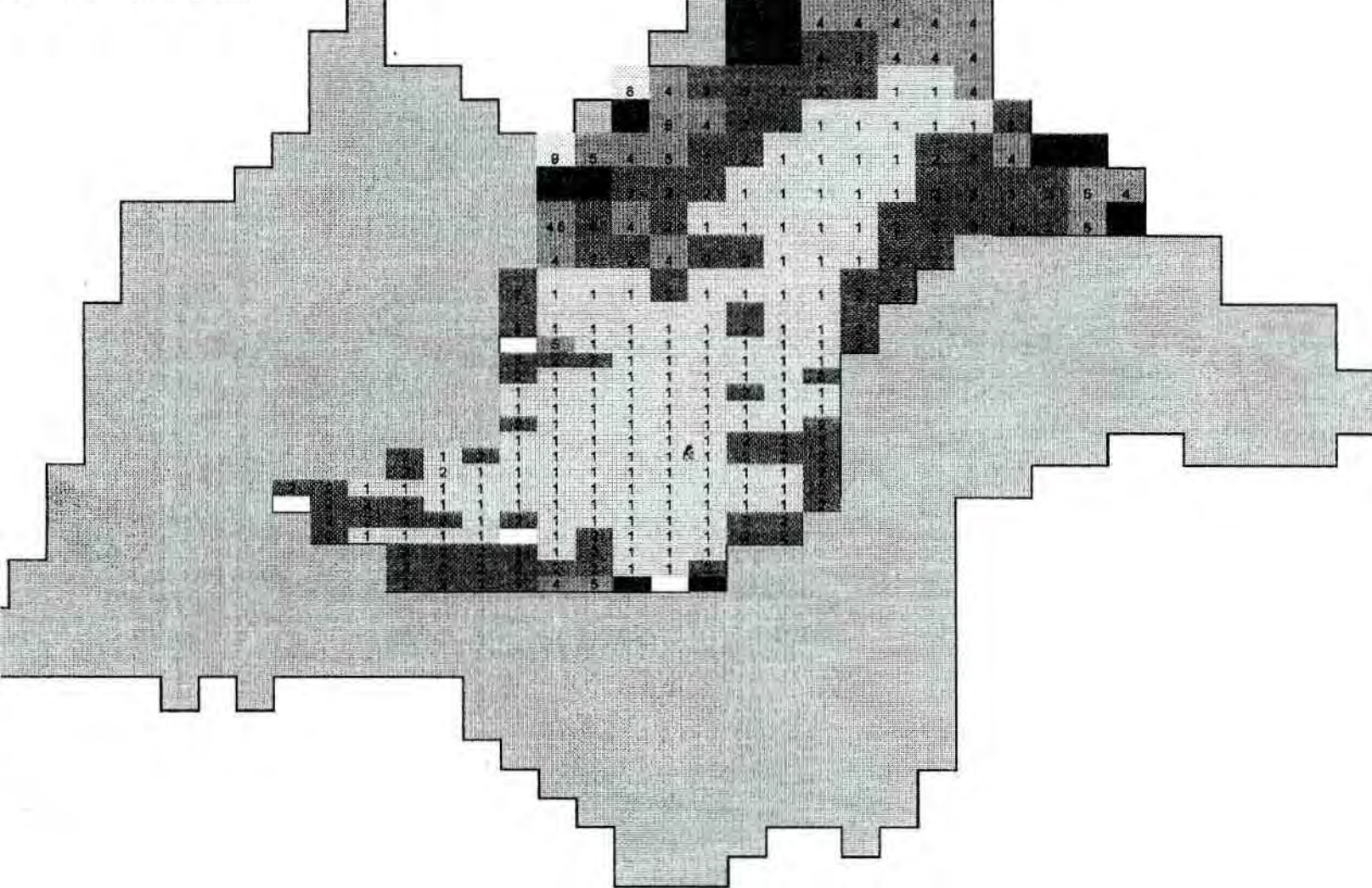
0	0	0
0	0	0
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0	0	0
0	0	0
6	0	6
0	0	0
0	0	0
1	0	1
2		2
3		3
0		0
0		0
7		7
0		0
8		8
2		2
21		21
1		1
0		0
0		0
17		17
4		4
2		2
7		7
0		0
0		0
39		39
0	0	0 Total Nord
12	12	0 12 Total Cent
108	0	0 108 Total Sud
108	12	0 120 TOTAL

2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

C NATIONAL DE LA GARAMBA/GARAMBA NATIONAL PARK

ENSENEMENT GENERAL AERIEN/GENERAL AERIAL COUNT, AVRIL 2004

CE: Tree cover Couverture des arbres



17	17			
21	21			
38	36			
34	34			
31	31			
30	30			
24	3	27		
37	17	54		
30	32	45		
25.5	17	42.5		
23	23			
15	15			
14	14			
14	14			
13	13			
12	12			
10	10			
9	9			
11	11			
12	12			
17	17			
15	15			
18	18			
16	16			
20	20			
16	16			
15	15			
16	16			
24	24			
0	0	169	169	Total Nord
169	169	69	221	Total Centre
238	0	0	238	Total Sud
238	169	238	628	TOTAL

0	0	0	0	0	0	0	0	0	2	2	5	8	12	9	10	6	19	21	21	4	3	9	15	29	28	21	13	18	14	12	16	10	0
0	0	0	0	0	0	0	0	0	2	4	5	12	12	9	25	46.5	38	36	40	33	45	56	55	37	30	22	28	14	12	16	10	0	0

TRANS	AREA				ELEPHANTS				TOTAL	BUFFALO				TOTAL	KOB				TOTAL	
	HIGH STH	MID NTH	LOW NTH	TOT. NTH	HIGH STH	MID NTH	LOW NTH	TOT. NTH		HIGH STH	MID NTH	LOW NTH	TOT. NTH		HIGH STH	MID NTH	LOW NTH	TOT. NTH		
31			7.86	7.86			0	0				0	0				0	0		
30			10.23	10.23			0	0				0	0				0	0		
29			15.26	15.26			0	0				0	0				0	0		
28			17.74	17.74			0	0				0	0				0	0		
27			17.45	17.45			0	0				0	0				0	0		
26			24.96	24.96			0	0				0	0				0	0		
25		24.96	2.48	27.45		0	0	0			0	0	0			0	1	1		
24		29.81	7.22	37.03		0	0	0			0	0	0			0	0	0		
23		29.99	20.52	40.22		0	0	0			0	0	0			0	0	0		
22		30.16	10.29	40.45		0	0	0			0	0	0			1	0	1		
21		27.21		27.21		0		0			5		5			2		2		
20		27.27		27.27		0		0			4		4			1		1		
19		24.82		24.82		0		0			3		3			0		0		
18	24.79			24.79	0			0			1		1			37		37		
17a	22.36			22.36	0			0			0		0			55		55		
17	22.94			22.94	0			0			2		2			145		145		
16a	22.54			22.54	0			0			27		27			163		163		
16	22.24			22.24	0			0			500		500			69		69		
15a	21.84			21.84	5			5			148		148			143		143		
15	22.19			22.19	126			126			278		278			11		11		
14a	29.87			29.87	369			369			283		283			92		92		
14	30.05			30.05	119			119			53		53			84		84		
13a	36.68			36.68	98			98			65		65			46		46		
13	35.89			35.89	195			195			7		7			12		12		
12a	33.00			33.00	141			141			190		190			18		18		
12	32.18			32.18	64			64			732		732			47		47		
11a	22.36			22.36	91			91			90		90			149		149		
11	23.06			23.06	52			52			45		45			27		27		
10a	21.22			21.22	13			13			5		5			40		40		
Total	423.2	194.2	134.0	318.0	1273.0	0.0	0.0	0.0			2426.0	12.0	0.0	12.0		1138.0	4.0	1.0	5.0	
Sum squ	11648.4	5421.4	1641.6	9120.6	248983.0	0.0	0.0	0.0			1019168.0	50.0	0.0	50.0		122162.0	6.0	1.0	7.0	
				Sum (Z')	38319.7	0	0	0.0			66866.0	319.6	0.0	319.6		28348.7	111.9	25.0	147.1	
				R=Sy/Sz	3.0	0.0	0.0	0.0			5.7	0.1	0.0	0.0		2.7	0.0	0.0	0.0	
				Var y	9846.7	0.0	0.0	0.0			43421.7	4.9	0.0	3.2		2748.1	0.6	0.2	0.4	
Var z	30.3	5.3	36.9	112.0					STRAT.										STRAT.	
Covar zy					309.9	0.0	0.0	0.0	TOTAL		179.8	-13.8	0.0	0.1	TOTAL	-116.8	-3.5	1.3	1.3	TOTAL
				Pop.est.(Y)	ESPECE	ELEPHANT				ESPECE	BUFFALO				ESPECE	KOB/COB				
					6,354	0	0	0	6,354	12,110	120	0	120	12,230	5,680	40	9	50	5,730	
				SE(Y)	2082	0	0	0	2082	4716	92	0	78	4717	1374	31	9	27	1375	
				95% C.L.	4247	0	0	0	4081	9620	189	0	159	9246	2803	64	19	54	2694	
				95% C.L.as %	67	0	0	0	64	79	157	0	132	76	49	160	211	109	47	

TRANS	AREA				GIRAFES				TOTAL	HIPPOS				TOTAL	RHINOS				TOTAL			
	HIGH STH	MID NTH	LOW NTH	TOT.NORTH	HIGH STH	MID NTH	LOW NTH	TOT.NTH		HIGH STH	MID NTH	LOW NTH	TOT.NTH		HIGH STH	MID NTH	LOW NTH	TOT.NTH				
31			7.86	7.86			0	0				0	0			0	0					
30			10.23	10.23			0	0				0	0			0	0					
29			15.26	15.26			0	0				0	0			0	0					
28			17.74	17.74			0	0				0	0			0	0					
27			17.45	17.45			0	0				0	0			0	0					
26			24.96	24.96			0	0				0	0			0	0					
25		24.96	2.48	27.45		0	0	0			0	0	0			0	0	0	0			
24		29.81	7.22	37.03		0	0	0			0	0	0			0	0	0	0			
23		29.99	20.52	40.22		0	0	0			0	0	0			0	0	0	0			
22		30.16	10.29	40.45		0	0	0			0	0	0			0	0	0	0			
21		27.21		27.21		0		0			0		0			0		0	0			
20		27.27		27.27		0		0			0		0			0		0	0			
19		24.82		24.82		0		0			0		0			0		0	0			
18	24.79			24.79	0			0		0		0		0		0		0	0			
17a	22.36			22.36	0			0		0		0		0		0		0	0			
17	22.94			22.94	0			0		8		8		8		0		0	0			
16a	22.54			22.54	0			0		26		26		26		0		0	0			
16	22.24			22.24	0			0		15		15		15		0		0	0			
15a	21.84			21.84	0			0		135		135		135		0		0	0			
15	22.19			22.19	22			22		32		32		32		0		0	0			
14a	29.87			29.87	0			0		0		0		0		0		0	0			
14	30.05			30.05	0			0		2		2		2		0		0	0			
13a	36.68			36.68	0			0		13		13		13		0		0	0			
13	35.89			35.89	0			0		7		7		7		0		0	0			
12a	33.00			33.00	0			0		4		4		4		2		2	2			
12	32.18			32.18	0			0		26		26		26		2		2	2			
11a	22.36			22.36	0			0		142		142		142		0		0	0			
11	23.06			23.06	0			0		10		10		10		0		0	0			
10a	21.22			21.22	15			15		43		43		43		0		0	0			
Total	423.2	194.2	134.0	318.0	37.0	0.0	0.0	0.0		465.0	0.0	0.0	0.0		4.0	0.0	0.0	0.0				
Sum squ	11648.4	5421.4	1641.6	9120.6	709.0	0.0	0.0	0.0		43349.0	0.0	0.0	0.0		8.0	0.0	0.0	0.0				
			Sum (Z*)		806.4	0	0	0.0		10881.1	0.0	0.0	0.0		130.4	0.0	0.0	0.0				
			R=Sy/Sz		0.1	0.0	0.0	0.0		1.1	0.0	0.0	0.0		0.0	0.0	0.0	0.0				
Var z	30.3	5.3	36.9	112.0	41.6	0.0	0.0	0.0		1989.0	0.0	0.0	0.0		0.5	0.0	0.0	0.0				
Covar zy					-11.5	0.0	0.0	0.0	STRAT. TOTAL	-94.6	0.0	0.0	0.0	STRAT. TOTAL	1.6	0.0	0.0	0.0	STRAT. TOTAL			
		Pop.est.(Y)			ESPECE GIRAFES	185	0	0	0	185	ESPECE HIPPOS	2,321	0	0	0	2,321	ESPECE RHINOS	20	0	0	0	20
		SE(Y)			152	0	0	0	152	1083	0	0	0	1083	15	0	0	0	15			
		95% C.L.			309	0	0	0	297	2209	0	0	0	2122	31	0	0	0	30			
		95% C.L.as %			168	0	0	0	161	95	0	0	0	91	155	0	0	0	149			

Moitier dans Domaines de Chasse

TRANS	AREA				BUBALES				TOTAL	PHACOTHERES				TOTAL	REDUNCA				TOTAL
	HIGH STH	MID NTH	LOW NTH	TOT.NTH	HIGH STH	MID NTH	LOW NTH	TOT.NTH		HIGH STH	MID NTH	LOW NTH	TOT.NTH		HIGH STH	MID NTH	LOW NTH	TOT.NTH	
31			7.86	7.86			0	0			0	0				0	0		
30			10.23	10.23			0	0			0	0				0	0		
29			15.26	15.26			0	0			2	2				0	0		
28			17.74	17.74			0	0			0	0				0	0		
27			17.45	17.45			17	17			0	0				0	0		
26			24.96	24.96			0	0			1	1				0	0		
25		24.96	2.48	27.45		1	0	1		5	0	5		1	0	0	1		
24		29.81	7.22	37.03		8	0	8		0	0	0		0	0	0	0		
23		29.99	20.52	40.22		0	0	0		0	0	0		0	0	0	0		
22		30.16	10.29	40.45		0	0	0		2	0	2		0	0	0	0		
21		27.21		27.21		0		0		0		0		0		0			
20		27.27		27.27		5		5		17		17		0		0			
19		24.82		24.82		0		0		5		5		0		0			
18	24.79			24.79	17			17	7		7		0			0			
17a	22.36			22.36	3			3	1		1		1		1		1		
17	22.94			22.94	14			14	4		4		1		1		1		
16a	22.54			22.54	0			0	16		16		0		0		0		
16	22.24			22.24	24			24	7		7		0		0		0		
15a	21.84			21.84	17			17	9		9		0		0		0		
15	22.19			22.19	0			0	0		0		0		0		0		
14a	29.87			29.87	6			6	4		4		0		0		0		
14	30.05			30.05	48			48	2		2		2		2		2		
13a	36.68			36.68	29			29	1		1		4		4		4		
13	35.89			35.89	2			2	0		0		2		2		2		
12a	33.00			33.00	0			0	0		0		2		2		2		
12	32.18			32.18	17			17	0		0		0		0		0		
11a	22.38			22.38	0			0	3		3		2		2		2		
11	23.06			23.06	5			5	0		0		0		0		0		
10a	21.22			21.22	0			0	7		7		0		0		0		
Total	423.2	194.2	134.0	318.0	182.0	14.0	17.0	31.0	61.0	29.0	3.0	32.0	14.0	1.0	0.0	1.0			
Sum squ	11648.4	5421.4	1641.6	9120.6	4858.0	90.0	289.0	379.0	531.0	343.0	5.0	348.0	34.0	1.0	0.0	1.0			
			Sum (Z*y		5134.3	0	0	756.7	1432.3	772.8	55.5	861.3	434.6	25.0	0.0	27.4			
			R=Sy/Sz		0.4	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0			
Var z	30.3	5.3	36.9	112.0	185.9	10.3	48.2	25.4	19.9	37.1	0.7	22.4	1.5	0.1	0.0	0.1			
Covar zy					21.4	-80.6	-25.3	-5.9	-12.1	-33.2	1.7	1.2	4.3	-1.5	0.0	0.1			
			Pop.est.(Y)		ESPECE	BUBALES/HARTEBEEST				ESPECE	PHACOTHERES/WARTHOGS				ESPECE	REDUNCA / REEDBUCK			
					908	141	155	310	1,204	304	291	27	320	623	70	10	0	10	80
			SE(Y)		301	174	182	223	393	112	247	20	204	340	25	14	0	12	31
			95% C.L.		615	355	371	455	769	229	503	40	415	665	51	29	0	24	61
			95% C.L.as %		68	0	0	0	64	75	173	0	130	107	73	290	#####	244	77

Motier dans Domaines de Chasse

TRANS	AREA				WATERBUCK				ROAN				ORIBI						
	HIGH STH	MID NTH	LOW NTH	TOT. NTH	HIGH STH	MID NTH	LOW NTH	TOT. NTH	TOTAL	HIGH STH	MID NTH	LOW NTH	TOT. NTH	TOTAL	HIGH STH	MID NTH	LOW NTH	TOT. NTH	TOTAL
31			7.86	7.86			0	0				0	0				0	0	
30			10.23	10.23			0	0				0	0				0	0	
29			15.26	15.26			0	0				0	0				0	0	
28			17.74	17.74			0	0				0	0				0	0	
27			17.45	17.45			0	0				0	0				0	0	
26			24.96	24.96			0	0				0	0				0	0	
25		24.96	2.48	27.45		6	0	6		0	0	0	0		0	0	0	0	
24		29.81	7.22	37.03		0	0	0		0	0	0	0		1	0	0	1	
23		29.99	20.52	40.22		0	0	0		0	0	0	0		0	2	0	0	
22		30.16	10.29	40.45		1	0	1		25	0	0	25		2	2	0	4	
21		27.21		27.21		2		2		3		0	3		2		0	2	
20		27.27		27.27		3		3		0		0	0		4		0	4	
19		24.82		24.82		0		0		0		0	0		3		0	3	
18	24.79			24.79	0			0		0		0	0		0		0	0	
17a	22.36			22.36	7			7		0		0	0		9		0	9	
17	22.94			22.94	0			0		0		0	0		0		0	0	
16a	22.54			22.54	8			8		0		0	0		4		0	4	
16	22.24			22.24	2			2		0		0	0		1		0	1	
15a	21.84			21.84	21			21		0		0	0		7		0	7	
15	22.19			22.19	1			1		0		0	0		0		0	0	
14a	29.87			29.87	0			0		0		0	0		2		0	2	
14	30.05			30.05	0			0		0		0	0		3		0	3	
13a	36.68			36.68	17			17		0		0	0		4		0	4	
13	35.89			35.89	4			4		0		0	0		1		0	1	
12a	33.00			33.00	2			2		0		0	0		0		0	0	
12	32.18			32.18	7			7		0		0	0		0		0	0	
11a	22.36			22.36	0			0		0		0	0		0		0	0	
11	23.06			23.06	0			0		0		0	0		0		0	0	
10a	21.22			21.22	39			39		0		0	0		0		0	0	
Total	423.2	194.2	134.0	318.0	108.0	12.0	0.0	12.0		0.0	28.0	0.0	28.0		31.0	12.0	4.0	14.0	
Sum squ	11648.4	5421.4	1641.6	9120.6	2438.0	50.0	0.0	50.0		0.0	634.0	0.0	634.0		177.0	34.0	0.0	46.0	
			Sum (Z ²)		2748.0	0	0	341.4		0.0	835.8	0.0	1093.0		799.0	328.1	0.0	436.8	
			R=Sy/Sz		0.3	0.1	0.0	0.0		0.0	0.1	0.0	0.1		0.1	0.1	0.0	0.0	
			Var y		113.9	4.9	0.0	3.2		0.0	87.0	0.0	47.8		7.8	2.2	0.0	2.6	
Var z	30.3	5.3	36.9	112.0					STRAT.					STRAT.					STRAT.
Covar zy					-7.2	-77.7	0.0	2.1	TOTAL	0.0	-14.1	0.0	31.9	TOTAL	-1.4	-12.1	-6.0	6.0	TOTAL
			Pop.est.(Y)		ESPECE	WATERBUCK				ESPECE	ANTELOPE ROAN				ESPECE	ORIBI			
					539	120	0	120	660	0	281	0	280	281	155	120	37	140	312
			SE(Y)		251	137	0	76	286	0	343	0	281	443	65	70	15	62	115
			95% C.L.		511	279	0	155	560	0	699	0	573	869	134	142	31	126	225
			95% C.L.as %		95	0	0	0	85	0	249	0	205	309	86	118	85	90	72

TRANS	AREA				CEPHALOPHE GRIMM					RED-FLANKED DUIKER					GUIB HARNACHE/BUSHBUCK									
	HIGH	STH	MID NTH	LOW NTH	TOT. NTH	HIGH	STH	MID NTH	LOW NTH	TOT. NTH	TOTAL	HIGH	STH	MID NTH	LOW NTH	TOT. NTH	TOTAL	HIGH	STH	MID NTH	LOW NTH	TOT. NTH	TOTAL	
31				7.86	7.86				0	0					0	0					1	1		
30				10.23	10.23				0	0					0	0					0	0		
29				15.26	15.26				0	0					1	1					0	0		
28				17.74	17.74				0	0					1	1					1	1		
27				17.45	17.45				0	0					0	0					0	0		
26				24.96	24.96				0	0					0	0					0	0		
25			24.96	2.48	27.45			0	0	0				0	0	0				1	1	2		
24			29.81	7.22	37.03			0	0	0				0	0	0				0	1	1		
23			29.99	20.52	40.22			0	0	0				0	0	0				0	0	0		
22			30.16	10.29	40.45			0	0	0				1	0	1				0	0	0		
21			27.21		27.21			0	0	0				0	0	0				3	3	3		
20			27.27		27.27			0	0	0				1	1	1				1	1	1		
19			24.82		24.82			1	1	1				0	0	0				2	2	2		
18	24.79				24.79	0				0			0			0			0			0		
17a	22.36				22.36	0				0			0			0			0			0		
17	22.94				22.94	0				0			0			0			0			0		
16a	22.54				22.54	0				0			0			0			0			0		
16	22.24				22.24	0				0			0			0			0			0		
15a	21.84				21.84	0				0			0			0			0			0		
15	22.19				22.19	0				0			0			0			0			0		
14a	29.87				29.87	0				0			0			0			0			0		
14	30.05				30.05	0				0			0			0			0			0		
13a	36.68				36.68	0				0			0			0			0			0		
13	35.89				35.89	0				0			0			0			0			0		
12a	33.00				33.00	0				0			0			0			0			0		
12	32.18				32.18	0				0			0			0			0			0		
11a	22.36				22.36	0				0			0			0			0			0		
11	23.06				23.06	0				0			0			0			0			0		
10a	21.22				21.22	0				0			0			0			0			0		
Total	423.2	194.2	134.0		318.0	0.0	1.0	0.0		1.0			0.0	2.0	2.0	4.0			0.0	7.0	4.0	11.0		
Sum squ	11648.4	5421.4	1641.6		9120.6	0.0	1.0	0.0		1.0			0.0	2.0	2.0	4.0			0.0	15.0	2.0	21.0		
				Sum (Z ²)		0.0	0	0		24.8			0.0	57.4	33.0	100.7			0.0	183.5	25.6	276.1		
				R=Sy/Sz		0.0	0.0	0.0		0.0			0.0	0.0	0.0	0.0			0.0	0.0	0.0	0.0		
Var z	30.3	5.3	36.9	Var y	112.0	0.0	0.1	0.0		0.1			0.0	0.2	0.3	0.2			0.0	1.3	0.3	1.0		
Covar zy						0.0	-6.5	0.0		-0.2	STRAT. TOTAL		0.0	-1.5	0.7	-0.5	STRAT. TOTAL		0.0	-8.6	-3.1	-1.4	STRAT. TOTAL	
				Pop.est.(Y)		ESPECE	GRIMMS	DUIKER				ESPECE	RED-FLANKED	DUIKER				ESPECE	GUIB HARNACHE/BUSHBUCK					
						0	10	0		10	10	0	20	18		40	38	0	70	37		110	107	
				SE(Y)		0	16	0		12	16	0	19	12		21	31	0	50	17		45	69	
				95% C.L.		0	34	0		25	32	0	38	25		43	60	0	103	35		91	136	
				95% C.L.as %		0	0	0		0	321	0	189	0		109	158	0	146	95		83	127	

TRANS	AREA				DEADELE				BUFF +UNKNOWN CARCASSES										
	HIGH STH	MID NTH	LOW NTH	TOT.NTH	HIGH STH	MID NTH	LOW NTH	TOT.NTH	TOTAL	HIGH STH	MID NTH	LOW NTH	TOT.NTH	TOTAL	HIGH STH	MID NTH	LOW NTH	TOT.NTH	TOTAL
31			7.86	7.86			0	0				0	0						
30			10.23	10.23			0	0				0	0						
29			15.26	15.26			0	0				0	0						
28			17.74	17.74			0	0				0	0						
27			17.45	17.45			0	0				0	0						
26			24.96	24.96			0	0				0	0						
25		24.96	2.48	27.45		0	0	0			0	0	0						
24		29.81	7.22	37.03		0	0	0			0	0	0						
23		29.99	20.52	40.22		0	0	0			0	0	0						
22		30.16	10.29	40.45		0	0	0			0	0	0						
21		27.21		27.21		0		0			1		1						
20		27.27		27.27		1		1			0		0						
19		24.82		24.82		3		3			1		1						
18	24.79			24.79	0			0		0			0						
17a	22.36			22.36	2			2		0			0						
17	22.94			22.94	2			2		0			0						
16a	22.54			22.54	8			8		0			0						
16	22.24			22.24	7			7		1			1						
15a	21.84			21.84	10			10		0			0						
15	22.19			22.19	6			6		0			0						
14a	29.87			29.87	9			9		0			0						
14	30.05			30.05	6			6		3			3						
13a	36.68			36.68	3			3		3			3						
13	35.89			35.89	2			2		1			1						
12a	33.00			33.00	2			2		0			0						
12	32.18			32.18	10			10		1			1						
11a	22.36			22.36	2			2		0			0						
11	23.06			23.06	0			0		1			1						
10a	21.22			21.22	0			0		0			0						
Total	423.2	194.2	134.0	318.0	69.0	4.0	0.0	4.0		10.0	2.0	0.0	2.0		0.0	0.0	0.0	0.0	
Sum squ	11648.4	5421.4	1641.6	9120.6	495.0	10.0	0.0	10.0		22.0	2.0	0.0	2.0		0.0	0.0	0.0	0.0	
			Sum (Z*)		1841.6	0	0	101.7		313.6	52.0	0.0	52.0		0.0	0.0	0.0	0.0	
					0	0													
			R=Sy/Sz		0.2	0.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	
			Var y		13.2	1.3	0.0	0.7		1.1	0.2	0.0	0.1		0.0	0.0	0.0	0.0	
Var z	30.3	5.3	36.9	112.0					STRAT.					STRAT.					STRAT.
Covar zy					1.1	-25.9	0.0	-0.4	TOTAL	3.3	-2.5	0.0	-0.1	TOTAL	0.0	0.0	0.0	0.0	TOTAL
			Pop.est.(Y)		ESPECE	DEAD ELE (Recent)				ESPECE	BUFF +UNKNOWN CARCASSES				ESPECE				
					344	40	0	40	386	50	20	0	20	70	0	0	0	0	0
			SE(Y)		85	55	0	37	101	22	19	0	16	33	0	0	0	0	0
			95% C.L.		172	112	0	76	198	45	40	0	33	66	0	0	0	0	0
			95% C.L.as %		50	0	0	0	51	89	197	0	166	94	0	0	0	0	0

14.9 15.3 14.9 15.0

ANNEXES

Technical details of Systematic Sample Survey

Reports of rhino and illegal activities surveys July and November 2004

Parc National de la Garamba

CODES DES ESPECES

CODE	NOM FRANCAIS	ENGLISH NAME
ELE	Elephant	Elephant
RHI	Rhinoceros	Rhino
HIP	Hippopotame	Hippo
COB	Cobe de Buffon	Kob
BUF	Buffle	Buffalo
GIR	Girafe	Giraffe
BUB	Bubale	Hartebeeste
WAT	Waterbuck	Waterbuck
ROA	Antelope rouane	Roan antelope
RED	Redunca	Reedbuck
ORI	Oribi	Oribi
GUI	Guib hamache	Bushbuck
CEG	Cephalophe Grimm	Grey duiker
CEJ	Cephalophe à dos jaune	Yellow-backed duiker
CER	Cephalophe à flancs roux	Red-flanked duiker
ELA	Eland de Derby	Eland
SIT	Sitatunga	Sitatunga
PHA	Phacochere	Warthog
HYL	Hylochere	Giant forest hog
POT	Potamochere	Bushpig
LIO	Lion	Lion
HYE	Hyene	Hyena
LEO	Leopard	Leopard
BAB	Babouin	Baboon
SIC	Singe Colobe	Black and White Colobus
SIP	Singe Patas	Patas monkey
SIB	Singe de Brazza	de Brazza's monkey
SIV	Singe vervet	Vervet monkey
CRO	Crocodile	Crocodile

Carcases ou des os d'éléphant, ou d'autres espèces

Registrez l'espèce comme ES:Squellète d'éléphant, BS:Squellète de buffle

US:Squellète non identifié etc

1	Carcasse fraîche	Fresh carcass
2	Os récent avec aire de pourriture	Recent bones with rot patch
3	Os blanc sans pourriture	White bones without rot patch
4	Os gris	Grey bones

Signes humains

VAC	Vaches	Cattle
SHO	Chevres/moutons	Shoats
MAH	Maison d'habit'n	Living hut
MAA	Maison abandonnée	Abandoned hut
ASH	Ancien site d'habitation	Old living site
Sous notes classifiez tous les trois au-dessus comme partie du village ou famille, et en route ou en sentier.		
RTE	Route	Road
SEN	Sentier	Footpath
CBO	Campement braconniers occupé	Poachers'camp, occupied
CBR	Campement braconniers, récent	Poachers' camp, recent
CBA	Campement braconniers ancien	Old poachers camp
PEC	Peche	Fishing
MIN	Mine	Mine
MIA	Mine abandonné	Abandoned mine

SPECIES NAMES/NOMS LATIN

NOM FRANCAIS

ENGLISH NAME

SPECIES/ESPECES

Elephant	Elephant	<i>Loxodonta africana</i>
Rhinoceros	Rhino	<i>Ceratotherium simum cottoni</i>
Hippopotame	Hippo	<i>Hippopotamus amphibius</i>
Cobe de Buffon	Kob	<i>Kobus kob thomasi</i>
Buffle	Buffalo	<i>Synceros caffer brachyceros</i>
Girafe	Giraffe	<i>Giraffa camelopardalis congoensis</i>
Bubale	Hartebeeste	<i>Alcelaphus buselaphus lelwelli</i>
Waterbuck	Waterbuck	<i>Kobus defassa hamieri</i>
Antelope rouane	Roan antelope	<i>Hippotragus equinus bakeri</i>
Redunca	Reedbuck	<i>Redunca redunca diana</i>
Oribi	Oribi	<i>Ourebia ourebi</i>
Guib hamache	Bushbuck	<i>Tragelaphus scriptus diana</i>
Cephalophe Grimm	Grey duiker	<i>Cephalophus grimmia roosevelti</i>
Cephalophe à dos jaune	Yellow-backed duiker	<i>Cephalophus silvicultor</i>
Cephalophe à flancs roux	Red-flanked duiker	<i>Cephalophus rufilatus</i>
Eland de Derby	Eland	<i>Taurotragus derbianus</i>
Sitatunga	Sitatunga	<i>Tragelaphus spekii</i>
Phacochere	Warthog	<i>Phaocoerus aethiopicus</i>
Hylochere	Giant forest hog	<i>Potamochoerus porcus ubangensis</i>
Potamochere	Bushpig	<i>Hylochoerus meinertzhageni ituriensis</i>
Lion	Lion	<i>Panthera leo</i>
Hyene	Hyena	<i>Crocuta crocuta</i>
Leopard	Leopard	<i>Panthera pardus</i>
Babouin	Baboon	<i>Papio anubis</i>
Singe Colobe	Black & White Colobus	<i>Colobus polykomos uellensis</i>
Singe Patas	Patas monkey	<i>Erythrocebus patas pyrrhonotus</i>
Singe de Brazza	de Brazza's monkey	<i>Cercopithecus neglectus</i>
Singe vervet	Vervet monkey	<i>Cercopithecus aethiops</i>
Crocodile	Crocodile	<i>Crocodylus niloticus</i>

PARC NATIONAL DE LA GARAMBA. RECENSEMENT GENERAL 2004
PILOT SUMMARY SHEET

Survey area : Garamba National Park

Dates : 12th April – 16th April 2004

Pilot : Fraser Smith

Aircraft : 9Q-CBR Cessna 206

DATE	HOURS	PURPOSE	FUEL
12.4.04	0.7	Test & calibrations	
13.4.04	2.6	10A,11,11A,12,12A	
13.4.04	1.5	13,13A	
14.4.04	1.7	14,14A,15	
14.4.04	2.2	15A,16,16A,17,17A,18	
15.4.04	3.0	19,20,21,22,23	
15.4.04	2.0	24,25,26	
16.4.04	2.3	27,28,29,30,31	
TOTAL : 5 days	16 hrs		880 litres

COUNT EAST-WEST WAYPOINTS

EAST		NORTH	
-29	31.84957	4	37.94531 31-22
-29	39.96121	4	37.94466 31-25
-29	42.66391	4	35.24904 30-26
-29	31.84957	4	35.25033 30-22
-29	31.84989	4	32.55535 29-22
-29	48.06996	4	32.55246 29-28
-29	48.06449	4	29.85877 28-28
-29	29.14204	4	29.86263 28-21
-29	29.14204	4	27.16797 27-21
-29	48.06352	4	27.16379 27-28
-29	48.05902	4	24.47010 26-28
-29	21.03007	4	24.47815 26-18
-29	21.03007	4	21.78317 25-18
-29	50.76011	4	21.77352 25-29
-29	56.15972	4	19.07307 24-31
-29	15.62145	4	19.09109 24-16
-29	15.62145	4	16.39612 23-16
-29	58.85984	4	16.37584 23-32
-29	58.85727	4	13.68118 22-32
-29	15.62113	4	13.70114 22-16
-29	15.62017	4	11.00616 21-16
-29	45.34312	4	10.99683 21-27
-29	42.63849	4	8.30314 20-26
-29	12.91714	4	8.31248 20-15
-29	12.91231	4	5.61750 19-15
-29	39.93031	4	5.61010 19-25
-29	39.92903	4	2.91512 18-25
-29	12.91264	4	2.92252 18-15
-29	12.93291	4	1.57487 17A-15
-29	37.24789	4	1.56876 17A-24
-29	12.91264	4	0.22754 17-15
-29	37.22600	4	0.22175 17-24

ROUTE SOUTH 4

-29	37.22472	3	58.87443 16A-24
-29	12.91264	3	58.88022 16A-15
-29	12.91264	3	57.53289 16-15
-29	37.22472	3	57.52678 16-24
-29	37.22343	3	56.17945 15A-24
-29	12.91264	3	56.18524 15A-15
-29	12.91264	3	54.83792 15-15
-29	37.22343	3	54.83180 15-24
-29	37.22182	3	53.48190 14A-24
-29	4.80904	3	53.49220 14A-12
-29	4.80871	3	52.14487 14-12
-29	37.22150	3	52.13457 14-24
-29	37.21957	3	50.78209 13A-24
-28	56.70544	3	50.79787 13A-9
-28	56.70576	3	49.45054 13-9
-29	37.21924	3	49.43477 13-24
-29	34.51654	3	48.09130 12A-23
-28	59.40621	3	48.10289 12A-10
-28	59.40621	3	46.75556 12-10
-29	34.51654	3	46.74365 12-23
-29	29.11339	3	45.40180 11A-21
-29	4.80743	3	45.40759 11A-12
-29	4.80743	3	44.05994 11-12
-29	29.11339	3	44.05447 11-21
-29	29.09151	3	42.70553 10A-21
-29	4.78908	3	42.71133 10A-12

P.N.Garamba RECNSEMENT GENERAL 2003 Sud

1998,2000,2002,2003

17A	W-E	17	E-W	16A	W-E	16	E-W	15A	W-E	15	E-W	14A	W-E
Dist(km)	Subunit	Dist(km)	Subunit	Dist(km)	Subunit	Dist(km)	Subunit	Dist(km)	Subunit	Dist(km)	Subunit	Dist(km)	Subunit
45	start17A-15		goto 17-24	45	start16A-15		goto 16-24	45	start15A-15		goto 15-24	80	start 14A-12
40	16	45	start 23	40	16	45	start 23	40	16	45	start 23	55	13
35	17	40	22	35	17	40	22	35	17	40	22	50	14
30	18	35	21	30	18	35	21	30	18	35	21	45	15
25	19	30	20	25	19	30	20	25	19	30	20	40	16
20	20	25	19	20	20	25	19	20	20	25	19	35	17
15	21	20	18	15	21	20	18	15	21	20	18	30	18
10	22	15	17	10	22	15	17	10	22	15	17	25	19
5	23	10	16	5	23	10	16	5	23	10	16	20	20
0	end17A-24	5	15	0	end16A-24	5	15	0	end15A-24	5	15	15	21
		0	end 17-15			0	end 16-15			0	end 15-15	10	22
												5	23
												0	end14A-24

Parc National de la Garamba
REPORT OF SOUTHERN SECTOR RHINO AND ANTI-POACHING SURVEY

Introduction

Intensive aerial surveys have been carried out regularly in the southern sector of Garamba, to assess the rhino populations and signs of threats to it and other species and to provide information for anti-poaching. The method is total block counts using individual recognition and mapping all key observations. Although six to eight such surveys were carried out per year before the war, there have only been one to three per year since the start of the war.

From 7 to 11 July 2004 a survey series was carried out, with the proximal aim of providing an up-to date assessment for the Garamba stakeholders meeting.

Method

All blocks from 1 to 11 were surveyed (Fig. 1), although blocks 10 and 11 north of the Garamba river were not covered as far north as in the past since virtually no animals were found in this area.

Aircraft : Cessna 206 5Y-AHZ

Pilot : Fraser Smith

FSO : Kes Smith

Middle and rear seat observers : Amube Ndey, Giningayo Panziama, Chyulu Smith

Results

Table 1 summarises the observations of poaching signs and search effort in terms of flying time per block.

Fig. 2 maps the distribution of rhinos observed and the distribution of recent poaching signs.

SUMMARY

An intensive aerial survey of the southern sector of Garamba was carried out from 7th to 11th July 2004, with the purpose of assessing the status of the northern white rhino population and of seeking signs of threat and poaching to guide anti-poaching activities. Fifteen rhinos were seen, including 4 calves born within 2004. This type of survey of total block counts using individual recognition never sees all rhinos present at one time, but has been found to on average see about 75%. There could therefore have been a maximum of 20 present. There have also been reported to be 2 rhinos in the Domaine de Chasse Gangala na Bodio south of the park and tracks had been confirmed there within the preceding two weeks. This indicates a possible 17-22 live rhinos.

In April 2003 a comprehensive rhino survey before the ivory and rhino horn poaching accelerated could account for 30 rhinos seen in April and March. Since then two calves were born in July and October 2003 and 4 in 2004. This gives a potential population if none had been lost of 36 now. In August 2003 22 were seen and in November 19,

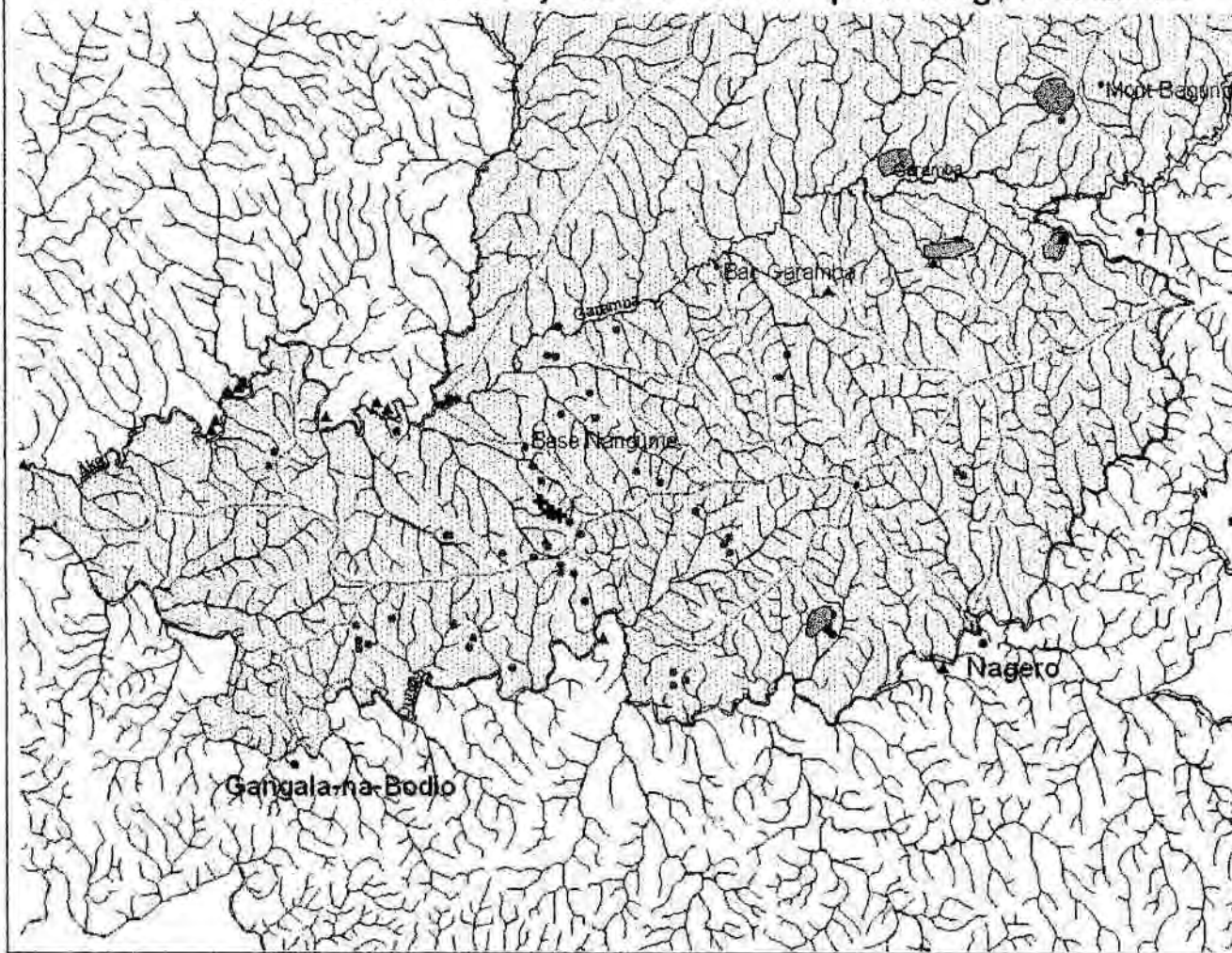
including the calves. I therefore estimate that we have lost between 14 and 19 rhinos in the last 14 months.

On 7th July a freshly killed rhino was seen south of the Willibadi II, less than 8 km from the km15 radio relay base occupied by guards and a group of 6 recently dead elephants was within 4 km. Examination of the rhino on the ground next day indicated that it was a young adult female aged 7-9 years, who had probably been killed on the 5th or 6th July. Her horn had been hacked off and her lower jaw smashed by automatic fire from AK 47s. She was either « Kasi » 1eF, « Aligaru » 3ff or « Kito » 4caF.

The male « Kondo Akatani » M3 was seen on the Willibadi I with a large very fresh wound in his forehead. Fortunately he was found again the next day still alive, with the wound looking dryer and a bit closed. He is the last territorial male left alive. Bolete Moke 4aM/1aM disappeared with the wave of poaching in his territory in July/August 2003. Elikya 6bM died in January close to Km15. Notch M9 was wounded by the Arab horsemen in April and died on the Willibadi I out of his normal range. Sifa 4eM has not been seen in his territory since April 2003 and Mpiko and Bonne Annee, who were not real territory holders yet have also not been seen. Kondo Akatani, the oldest male left is in the most vulnerable position in the area where the horsemen enter. There were no patrols in that area.

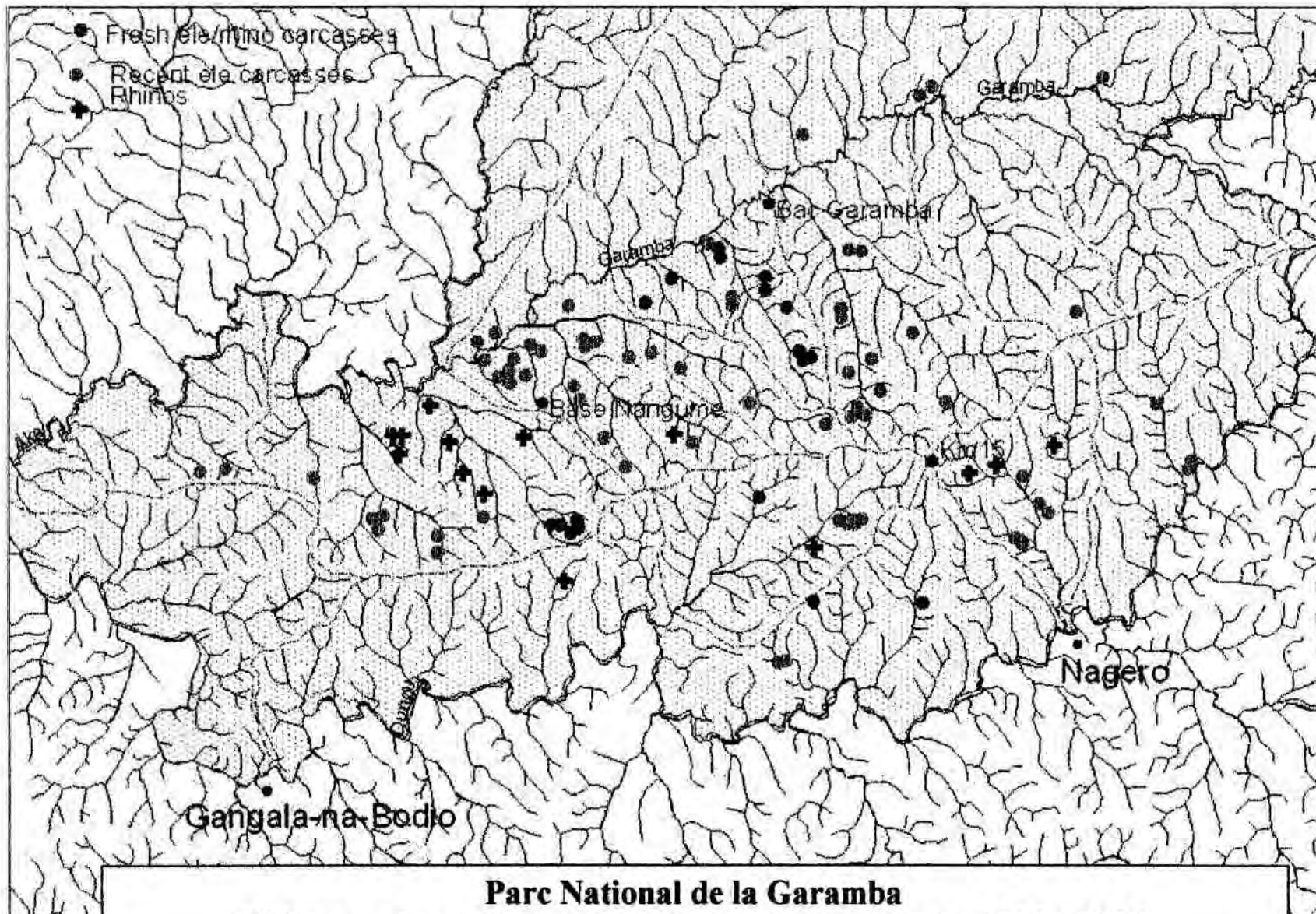
Groups of very fresh elephant carcasses were found on the Kpodo river south west of Base Nangume and south and south west of km15. Recent elephant carcasses (over a week old) were more widely distributed. All are mapped. The far western end of the park was the least disturbed and live elephants were found there and along the southern border, and are known to be moving into the Domaine de Chasse a lot. No rhino were found to have moved far west despite very intensive searching.

Parc National de la Garamba,
Southern sector survey for rhinos and poaching, Nov.2004



- + Live Rhinoceros
- Fresh elephant carcasse
- Recent elephant carcasse
- Fresh hippo carcasse
- ▲ Occupied poaching camp
- ▲ Recent poaching camp
- Fresh burn (poachers)
- Recent burn (poachers)

- + Rhinot1104.shp
- Hippotfresh1104.s
- ▲ Campoc1104.shp
- Feupousse.shp
- Feu.shp
- ▲ Campbiac1104.sl
- Elecatfresh1104.l
- Elecatc1104.shp
- Pngpp96.shp
- ▲ Pngriv1.shp
- ▲ Pngriv2.shp
- Town2.shp
- ▲ Park roads.shp
- ▲ Rivers.shp
- Png.shp
- Bound utm.shp



Parc National de la Garamba
Rhinos et carcasses observées recensement aeriene Juillet 2004
Rhinos and elephant and rhino carcasses observed, aerial total count July 2004

Parc National de la Garamba

RAPPORT DE SURVOL AERIEN – SECTEUR SUD,

Le 27^{ieme} novembre – 1^{ere} décembre 2004

OBJECTIFS

- Recensement des Rhinocéros Blancs du Nord
- Reconnaissance pour signes de braconnage pour guider la lutte anti-braconnage

METHODES

- Recensement total par bloque, avec identification individuelle des rhinos
- Enregistrement sur carte et fiches
- Avion Cessna 206
- Pilote : Fraser Smith
- Observateurs (pour différentes vols) Dr Kes Smith, Giningayo Panziama, Ir Amube Ndey, Kumbaboyo, Francois Soudain, Fred Salama, Nicholas Loire.
- 12.5 heures de vol dans le parc, avec une heure de reconnaissance dans le Domaine de Chasse GnB.

RESULTATS

Rhinos

Observations des rhinos: le 30 novembre et 1 décembre 2004

Groupe de 1 : Jeune Femelle Sub-adulte SAF1 (2.5-4 ans) (*Steps ou Sanza*)

Groupe de 3 : AdF (*Euf de Pacque 6aF ?*) + SAF2 & SAM2 (*Boboto & Sasalia ?*)

Les deux groupes étaient dans la même région entre les rivières Nangume et Kpodo – la ou entrent les cavaliers du nord de Soudan. Ils étaient très nerveux.

Selon rapports de la population il y a au moins deux rhinos, peut être deux ou plus groupes de deux (une femelle et juvénile et deux jeunes adultes) dans le Domaine de Chasse Gangala na Bodio. Une reconnaissance aérienne a été faite et une partie de l'Equipe Rhino sera envoyée dans la région pour investiguer.

L'herbe est très longue pendant cette saison. Il est possible qu'il y a quelques plus qu'on n'a pas encore vus mais en général le parc semble très vide, et dans le même mois de l'année passée nous avons retrouvés 19 rhinos. Le nombre vu est toujours un minimum, normalement environs 75% du totale présent, mais si on considère le minimum vus dans le parc par le même méthode, il a évolué comme suite :

2003	Avril	30
	Aout	22
	Novembre	19
2004	Juillet	15 (et +-2 dans le DdeC)
	Novembre	4 (et +- 4 dans le DdeC)

Neuf rhinos ont été trouvés morts pendant l'année 2004 et ça aussi c'est un minimum de tous les morts.

<i>Date dec.</i>	<i>Age/sex</i>	<i>ID</i>	<i>Region</i>	<i>Cause et Notes</i>
25.1.04	Jeune Ad Male 14-20 ans	Elikya 6bM	Willibadi II	Braconnage
09.04.04	Ad.Male 25-30 ans	Notch M9	Willibadi I	Blessé par Braconnage. (cornes recuperées)
13.04.04	Adulte	Crane pas encore récupérée.	Willibadi I	Braconnage. Dans l'eau
07.07.04	Jeune femelle adulte 7-9 ans	Kito 4caF, Kasi 1eF ou Aligaru 3fF	Dinakpio pres de Willibadi II	Braconnage. Vu de l'air
01.08.04	Ad. Male c. 28 ans	Kondo Akatan M3	Willibadi I	Braconnage et blessure
29.08.04	Jeune Ad Femelle 8- 9ans	Kito 4caF, Kasi 1eF ou Aligaru 3fF	Willibadi II	Braconnage
30.09.04	Jeune Ad Femelle 8-11 ans + Enfant male +- 4 mois	Kasi 1eF ou Aligaru 3fF + 1ea ou 3fa	Willibadi II	Braconnage
08.10.04	Ad Femelle enciente	Crane pas encore recuperée	Source Nakule dans le triangle	Braconnage

La population de rhinos blancs du nord dans le PNG et Domaine de Chasse Gangala na Bodio est presque certainement moins de 10 rhinos.

Autres Especies

Des éléphants vivants étaient comptés à une coté de l'avion. Ce n'était pas un recensement des éléphants, mais simplement pour avoir une mesure de la distribution comparative. Leur densité est très réduite, et distribution limitée et particulièrement dans le bloc 5 à l'est de Bac Garamba. L'herbe est très longue et ils se cachent dedans. On dit qu'il y a plusieurs dans le Domaine de Chasse, mais ce n'était pas faisable de l'inclure dans un recensement pendant cette saison. Un recensement en Avril peut fournir un résultat plus précis.

Six girafes ont été vues près de la rivière Dungu, dans le bloc 7.

Signes de Braconnage

Bloques	Heures de vol	Carcasses	Etapes	Nombre	Campements	No.	Animaux vivants
1	0.8	Ele ·Enfant Buff	1 Frais 2 Recents	1 2	Pechers/Brac Recents	6	
2	1	Ele Hippo	2 Recents 1 Frais	11 3	Brac/Pech recents	3	8 eles 4 rhinos
3	1	Ele	2 Recents	11			8 eles
4	1.2	Ele Ele Hippo	2 Recent 3 1 frais	8 4 4	Braconniers Occ Brac recent	1 1	16 eles
5	1.3	Ele	2 recent	1	Brac.recent	1	76 eles
6	1.8				Brac. Occ Brac.recent	1 2	4 eles
7	1	Ele	2 recent	6	Brac recent	1	6 girafes 10 eles
8	0.9	Ele	2 recent	2			26 eles
9	1						15 eles
10	0.8	Ele	2 recent	1	Brac recent	1	
11	0.8	Ele	2 recent	1			
DdeC GnB	1	Recce only					3
TOTALS	12.6	Ele Hippo Ele	Frais Frais Recent	1 7 53	Brac/pech recent Brac.occ.	15 2	158 eles x2 min 4 rhinos 6 girafes

NB Recce not intensive survey in 10 & 11

La plus part du braconnage le plus frais étaient pour la viande avec des campements pour le boucaner. Les gardes disent que ça peut être motivé par l'approche de Noël, ou même la développement de l'instabilité vers l'est.

Conclusions

La situation pour les rhinos et l'écosystème est très grave et le braconnage n'est pas encore contrôlé. La décision pris par l'ICCN et ses partenaires a garder un noyau des rhinos d'ailleurs au même temps que l'augmentation de la lutte anti-braconnage semble d'être très nécessaire et tres urgent. La saison sèche commence en Décembre /Janvier. Les cavaliers peuvent arriver et augmenter encore le braconnage. Si la capture prend place il doit être en Janvier/Février

Parc National de la Garamba
NORTHERN WHITE RHINOCEROS (*Ceratotherium simum cottoni*)
POPULATION STRUCTURE APRIL 2003 & OBSERVATIONS AUGUST & NOVEMBER 2003
And MARCH & APRIL 2004

0 = Un marked x= potentially to immobilise for semen/markings

ADULT MALES	STATUS	AGE	LAST SEEN
M3 x 'Kondo akatani' (<i>Cut tail, Li</i>)	dominant since 09.88	Age +25	4.03, 8.03, 11.03, 4.04
M9 x 'Notch' (<i>Notched horn</i>)	dominant	Age >20	4.03, 11.03
4aM/1aM x 'Bolete moke' (<i>Hairy Ears</i>)	dominant male, born c. 08-09.1983	Lost post horn 02	4.03
6bM x 'Elikya' (<i>Hope, Li</i>)	male, born 06.88	02-03 challenging HE	4.03, 8.03, 11.03, Poached, 10.4
1bM 0 x 'Mpiko' (<i>Perseverance, Li</i>) (<i>Curly Horn</i>)	male, born 03-04.89		4.02
3aaM x 'Bonne Annee' (<i>New Year Fr</i>)	male, born 12.90 (M6 sire?)		4.02
4eM 0 x 'Sifa'	male, born 01.92		4.03
ADULT FEMALES			
F3 'Kunalina' (<i>1st seen w. Kuni</i>)	with CALF c.6m	Age >20	3.03
F6 'Pacque' (<i>Easter Fr.</i>)	with J	Age >19	4.03, 8.03, 11.03
6aF 0 'Oeuf de Pacque' (<i>Easter Egg Fr</i>)	female, born 03.86 With J		4.03, 11.03, 4.04
4cF 'Noel' (<i>Christmas Fr.</i>)	female, born 10-11.87 (M2 sire ?), With SF?		4.03, 8.03, 4.04
4dF 'Minzoto' (<i>Star, Li.</i>)	female, born 08-09.89, with I		4.03, 8.03, 11.03, 3.04
5dF 'Jengatu' (<i>Sunday, Lo</i>)	female, born 07.91 (M3 sire?) With I		4.03, 8.03, 11.03
3eF 'Etumba' (<i>War Li.</i>)	female, born 7.93, With J		4.03, 8.03, 11.03
1eF 0 x 'Kasi' (<i>River</i>)	female, born 8.95 Calf 2002 (?)		3.03,) 3.04
3fF 0 'Aligaru' (<i>River</i>)	female 9.95 Calf 2002 (?)		4.03?) 8.03, 11.03 ?
SUB-ADULTS			
1dM 0 x 'Almeje' (<i>Initials</i>)	S3, male, born 6.93		4.02, 5.03 Died 7.03 ?
6dM 0 x 'Willibadi' (<i>River</i>)	S3, male born 9.95		4.03)
4daM 0 x 'Mbolifue' (<i>God given Az</i>)	S3, male, born 6.96		4.03) 8.03, 4.04
4caF 0 x 'Kito' (<i>Rainy season, Az.</i>)	S2, female, born 9.96		4.03, 8.03, 11.03
6cM 0 x 'Congo'	S2, male, born 8.97		4.03, 8.03, 11.03
3gM 0 x 'Laurent' (<i>Muhindo</i>)	S1, male born 12.97		4.03, 8.03 ?
1fM 0 x 'Fraise' (<i>Fraser, strawberry</i>)	S1, male born 3.98		3.02, 8.03 ?
6fM 0 x 'Fin de siecle' (<i>end of century</i>)	S1, male born 12.99-1.00		4.03, 8.03, 11.03
6aaM 0 'Pascal' (<i>Easter family</i>)	S1, male born c.9.99		3.03, 8.03, 11.03, 4.04
3eaF 0 'Boboto' (<i>Peace, Li.</i>)	S1, female, born c.11.99		4.03, 8.03
4cbM 0 'Sasalia' (<i>Rain starting-Joy, Lo</i>)	S1, male, born c.12.99		4.03, 8.03, 11.03
JUVENILES			
5daM 0 'Millenium' (<i>Thursday Lo.</i>)	J3, male born c2-.3.00		4.03, 8.03, 11.03, 4.04
4dbF 0 'Sanza' (<i>Moon, Li.</i>)	J3, female, born c.2.00		4.03, 8.03, 11.03
3ebF 0 'Steps' (<i>Steps forward, Steppie</i>)	J2 female, born 11/12. 01		4.03, 8.03, 11.03
6abF 0 'Chocolat' (<i>Easter family</i>)	J3 female born c.Feb.2002		4.03, 8.03,
1ea/3fa 0 'Kombolani' (<i>Az Gen'n contin</i>)	J3 female, born 4/5.2002		4.03, 8.03, 11.03
3i 0 'Lisungi' (<i>Li Support</i>)	J2 born c.8.02		3.03
3f/1ea? 0 '?'	J2, born c. 9.02 Younger than 3i, need confirm other		3.03
INFANTS			
5ab 0 'Keba' (<i>Ba Beware</i>)	J1, born end 7.03		8.03, 11.03
3eb 0	I2, born 10.03		11.03
6ac 0	J1, born 1.04/12.03		3.04
1ea 0	I2 born 2.04		3.04
4dc 0	I2, born 1.04		3.04

TOTAL INDIVIDUALS (seen 2003 to April)		to Nov 03	To 3.04
Male adults (MA)	5 (+2)	3	2
Female adults (FA)	9	6	8
Male sub-adults (SM)	5 (+1)	4	4
Female sub-adults(SF)	1	1	1
Male juveniles (JM)	4	1	1
Female juveniles (JF)	5	3	3
Unsexed	1 (+1)	2	5
			-2
TOTAL	30 confirmed 3&4.03	19 conf.	Poss 22
Sex Ratio	14M : 15 F + 1U	8M : 10 F + 2U	7M : 12F + 5 -2