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## Monitoring of Large Mammal Populations and Human Activity in the Lomako-Yokokala Faunal Reserve



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# I. EXECUTIVE SUMMARY

The Institut Congolais pour la Conservation de la Nature (ICCN) is the Democratic Republic of Congo's national wildlife and parks authority. In support of ICCN's management of the Lomako-Yokokala Faunal Reserve (RFLY), the African Wildlife Foundation - with the funding support of the Alexander Abraham Foundation and in collaboration with ICCN and the communities living along the Lomako and Yokokala Rivers - carried out the census of large mammal populations and anthropogenic activities in the RFLY.

In previous years all monitoring activities were fully led by the African Wildlife Foundation (AWF) and conducted by local community representatives. The 2007 survey highlights a distinct progression of this work, which is the entrustment of the supervisory role to ICCN (supplemented with AWF's technical and financial support). Furthermore, ICCN's participation incorporates the skills of the local community representatives who in August 2007 officially graduated from their training to become ICCN 'Eco-Guards' – charged with the management and protection of the RFLY, home to one of the most important populations of endangered bonobos. The 60 newly graduated Eco-Guards include eight women and represent different villages and ethnic groups of the Maringa-Lopori Wamba landscape including the indigenous Batswa (pygmies). Participants were trained in bio-monitoring, patrol tactics, fauna identification, military rules, intelligence, first-aid, physical education, and legislation.

Monitoring of large mammal populations and human activities is a primary activity of the management plan for the RFLY. Surveys are organized twice per year covering nine recce transects and a total of 450 sq. km. But, due to the forest patrollers'training (July 2007), only one census was organized during 2007 (September – December).

The most recent survey third survey revealed the following results:
- 22 species of large mammals belonging to 6 orders and 11 families have been inventoried;
- The presence of hunting traps has lessened considerably, indicating decreased hunting pressure;
- The number of bonobo (*Pan paniscus*) nests observed continues to increase and in fact has doubled since 2006;
- The Indices of Abundance per Kilometer (IAK) for elephants and for the colobus monkey is equally increasing.

In general, the census indicates a decrease in hunting activity in the RFLY and increase in the abundance indicators of certain key species, notably bonobos and forest elephants. The increased evidence of presence of elephants is especially encouraging. The results underscore the importance of collecting ecological and socio-economic data in the RFLY for identifying potential threats and developing solutions for mitigating them; as well as developing a comprehensive land-use planning and management strategy for protecting this faunal reserve.

# II. INTRODUCTION

The IUCN lists the bonobo(*Pan paniscus*) as endangered. The bonobo, Africa's least known great ape, is geographically confined to the left bank of the Congo River and only found in the Democratic Republic of Congo (DRC). AWF, as the designated leader for the USAID-funded Congo Basin Forest Partnership Initiative's Maringa-Lopori-Wamba (MLW) Landscape launched the Bonobo Conservation Project in 2004 to save this remarkable species. The forests of the MLW Landscape i.e., AWF's Congo Heartland, are home to what is believed to be one of the largest remaining bonobo populations.

As a first step we facilitated baseline data collection on the state of regional biodiversity as there was no up to date information available at the time. The acquired data indicated that bonobo populations are suffering from habitat fragmentation and threats of increased hunting and poaching largely motivated by political instability in DRC over the past decade. This information was the catalyst for AWF's collaboration with local villages to protect bonobo habitat that ultimately resulted in the creation of the DRC's LomakoYokokala Faunal Reserve (RFLY) . This protected area comprises 3,625km² and is to be managed in partnership with local communities.

Bonobos are listed as Endangered on the IUCN Red List 2007 (with a declining population trend) and CITES Appendix I (which includes species threatened with extinction). Conservationists estimate number of bonobo to 10 000 to over 100 000, with a cautious and tentative guesstimation of about 28,000animals left (Lacambra et al., World Atlas of Great Apes, 2005). With this being said, the Maringa-Lopori Wamba landscape, and especially the RFLY, appears to harbor remarkable densities of bonobos. As a result, it is absolutely necessary for AWF to focus on these areas to ensure the future of this species.

In 2004, AWF conducted two surveys of the RFLY. Each focused on an area of about 50 km² one survey in a known bonobo-rich area and the other in a known bonobo-poor area. Results confirmed patchy distribution but confirmed the potential of the areas for future Protected Area status (Omasombo et al, 2005). In 2006, the RFLY was finally gazetted officially. As a first priority for the management plan under development, we set up a "large mammal monitoring" system, covering the entire 3,600km² of the RFLY.

At this time we have no precise density numbers for bonobos in the RFLY. The primary reason that methodologies for great ape density estimation are very time and money expensive ,and that even results of the most detailed surveys are still questionable due to the inclusion of unknon parameters . The objective of our monitoring system is to evaluate the impact of our conservation program on large mammal abundances. While the regeneration time of any large mammal is lengthy , and thus the three-plus years of work in his landscape to date is not sufficient to draw any firm conclusions regarding the status of this species, the recent field visits confirm increased evidence of bonobos and other large mammals. - probably due to the reduced threat of hunting and a corresponding habituation of the species to the presence of humans. Bonobos are being seen on a daily basis and we feel confident that bonobos and other species are faring well and are indeed protected in the RFLY.

A general sense of bonobo numbers is beginning to emerge from the work of AWF and others in this landscape. However, as noted above additional monitoring and analysis is needed to gain a

more complete understanding of the status of bonobos and other species in this remote, ecologically-rich landscape. The following pages summarize AWF's finding from the most recent survey, including promisingly an indication of a growth trend in the bonobo population.

## A. CENSUS SURVEY OBJECTIVES

The purpose of the census is to monitor relative abundance and distribution of different key large mammal species in the RFLY. Additionally, AWF monitors the type of anthropogenic (i.e., human) activities and their spatial distributions, and evaluates potential links between the distribution of large mammals, type of vegetation and human activities.

### 1. General objectives

The objective of this activity is to monitor the status and distribution of large mammals, with emphasis on the bonobo, and of human activities in the RFLY. The results inform AWF, ICCN, (the Protected Area Authority) and community partners about the conservation status of the Reserve, potential threats or conflicts and ways to solve management problems. Because of continuous monitoring and protection efforts this past year, we expected the 2007 survey to reveal a decrease in human activities and an increase with certain animal populations.

### 2. Specific goals

- Evaluate both quantitatively and qualitatively the abundance and distribution of the large mammals in the RFLY ,
- Identify the types of human activities exercised in the RFLY and establish their spatial distribution.

## B. METHODOLOGY

### 1. Biological Inventory

The census was carried out over the course of 83 days from September 24 - December 20, 2007. The methodology used to collect data was that of the recces or the reconnaissance walks (Walsh and White, 2000). It consisted of reconnoitering the forest on foot, following a set direction. We opted for 44°, which is parallel to the Reserve's East – West boundaries and perpendicular to its north – south boundaries. The recce method allows the research team to efficiently estimate of animal populations and human activities in remote and relatively vast areas and to map different types of vegetation).

Considering the position of the Reserve's water bodies, we have divided the area into two blocks. The northern block contains a forested sector bounded by all the tributaries of the Yokokala River. The southern is a forested sector bounded by tributaries to the Lomako River.

In total, the research team covered nine recces representing a total distance of 391 Km, during the 12-week period of the census. The census team was composed of 13 people: 2 transect cutters, 2 compass guides, 6 porters, 1 fauna observer, 1 bonobo nest observer and 1 team leader.. Members of the team represented all population groups living in the region such as the traditional chiefs, indigenous pygmies, Kitawalistes, former employees of bonobo researchers who are/have worked in this landscape, and the head of the AWF team.

## 2. Data Gathered on the Recces

The following data were collected:
- Indicators of large mammals' presence
- Indicators of human activities
- Changes in vegetation

Each observation was geo-referenced using Global Positioning System (GPS) technology – GPS12XL.

## 3. Survey of Large Mammals

The identification of target species was done in the field by local assistants. The vernacular names were cross-checked with a list of vernacular and scientific names. The description of the species by the local assistant was equally cross-checked with those described by Kingdom (1997).

For the bonobos, the nests were recorded. For the other species, the team recorded the feces and other signs or traces of the animal
See **Annex I** for a full description of this methodology.

## a) Terrestrial Mammals:

Data gathered relative to large mammals, collected footprints and dung samples. The age of each dung sample was determined according to standard field classification. (REFERENCE?)

### (1) Smaller Primates:

Data was collected by visual or auditive observation. When observation is visual, the number of individuals is estimated.

### (2) Bonobo (Pan paniscus):

Bonobos are rarely visibly observed nor heard. Nests are the best quantitative indicator of bonobo presence. Bonobos build typically one new nest per night per individual, and the numbers of nests remain visible. We recorded each nest group and all nests within one nest group .Nests that belong more or less to the same age category and that are within 50 m of each other are considered to belong to the same nest group.

All nest sites encountered are georeferenced and the following parameters are recorded:
- o The number of nests and the type of vegetation on the nest site;
- o The height of each nest in relation to the ground;
- o The height of the tree in which a nest is found;
- o The circumferences of the trees housing the nests;
- o The type and estimated age of the nests.

The different categories of recognized nest age (Tutin and Fernandez, 1984) are:
- o Category 1: all the nest leaves are green with dung or urine under the nest;
- o Category 2: all the nest leaves are green but with no dung or urine under the nest;
- o Category 3: the nest leaves are brown but with a few green leaves;
- o Category 4: the nest leaves are brown but the nest itself remains intact;
- o Category 5: the nest is decayed, reduced in size, with holes in it.

## 4. Human Activities

Data has been collected on the presence of the following human activities:
- o Hunting (snares, encampments)
- o Agriculture (fallow fields, cultivated fields)
- o Passages indicating human presence (human trails, wood cuttings ,machete traces)

## 5. Vegetation

Along each walked transect, each change in vegetation was recorded. The vegetation types recorded are:
- o Mixed primary forest
- o Homogeneous primary forest dominated by *Gilbertiodendron dewevrei*
- o Mixed forest permanently inundated
- o Mixed forest temporarily inundated
- o Secondary forest
- o Fallow areas

## 6. Data Analyses

The relative abundance of each species of large mammal, as well as human activities, was measured by using the kilometric abundance indicator (IKA) for each species or for each type of human activity. The IKA provides one with information about the presence, relative abundance, and spatial distribution (Bousquet, 1996) of each species and type of human activity. The IKA also allows one to monitor population trends over time (Blake et al, 1996).

The following formula was used:

**IKA esp. X = N exp .x / L**

N esp .x = number of indicators of the species *x*.

L = search effort (length of the recce in kilometers)

For a better understanding of spatial distribution, we compared relative abundance of mammal species, of human activities and of vegetation in five different sub areas of the RFLY. We evaluate through visual inspection of the results whether there is any correlation to expect between the intensity of human activities, relative abundance of large mammals, or importance of preferred vegetation types in each subarea

# III.                    RESULTS

## A. Biological Inventories

Comparison of the evolution of Indices of Abundance per Kilometer for large mammals show an increase in observed Bonobo nest sites, and traces of forest elephants, observation of colobus groups (Table 1).

**Table 1: IAK Comparison of ALL (Three) RFLY Surveys**

| Order | Family | Species | IKA-R2006. 1 | IKA-R2006. 2 | IKA-R2007 |
|---|---|---|---|---|---|
| Artiodachyles | Bovidae | Cephalophus callipygus | 1.19 | 0.93 | 1.10 |
| | | Cephalophus dorsalis | 0.86 | 0.70 | 0.78 |
| | | Cephalophus nigrifrons | 0.39 | 0.31 | 0.28 |
| | | Cephalophus sylvicultor | 0.44 | 0.44 | 0.46 |
| | | Cephalophus monticola | - | 0.27 | 0.29 |
| | | Tragelaphus eryceros | 0.02 | 0.05 | 0.02 |
| | | Tragelaphus spekei | 0.20 | 0.20 | 0.18 |
| | Suidae | Potamochoerus porcus | 0.61 | 0.73 | 0.77 |
| | Tragulidae | Hyemoschus aquaticus | - | 0.06 | 0.12 |
| Proboscidiens | Elephantidae | Loxodonta africana | 0.11 | 0.09 | 0.22 |
| Carnivores | Felidae | Panthera pardus | 0.01 | 0.03 | 0.02 |
| | Viveridae | Felis aurata | - | 0.10 | 0.08 |
| | | Civettictis civetta | 0.01 | 0.10 | 0.13 |
| Primates | Pongidae | **Pan paniscus** | **0.27** | **0.34** | **0.68** |
| | Cercopithecidae | Cercopithecus ascanius | | 0.04 | 0.042 |
| | | Cercopithecus wolfi | | 0.11 | 0.088 |
| | | Cercopithecus neglectus | | 0.01 | 0.011 |
| | | Lophocebus atterimus | | 0.12 | 0.10 |
| | | Allenopithecus nigroviridis | | 0.01 | 0.004 |
| | Colobidae | Colobus angolensis | | 0.02 | 0.035 |
| Pholidotes | Manidae | Smutsia gigantea | 0.26 | 0.35 | 0.15 |
| Tubilidenta | Orycteropidae | Orycteropus afer | 0.04 | 0.57 | 0.99 |
| Traps lines | | | 0.5 | 0.2 | 0.1 |

| | | | 0.1 | 0.07 | 0.03 |
|---|---|---|---|---|---|
| Active Hunting camps | | | 0.1 | 0.07 | 0.03 |
| Passive Hunting | | | 0 | 0 | 0.066 |
| Track /passage | | | 0.46 | 0.39 | 0.37 |
| Agriculture | | | 0.4 | 0.07 | 0.04 |

**Legend:**

| | |
|---|---|
| − | Species not previously surveyed |
| IKA-R1 | IAK Results from Survey 1 in 2006(June- July) |
| IKA-R2 | IAK Results from Survey 2 in 2006(September-December) |
| IKA-R3 | IAK Results from Survey 3 in 2007(September-December). |

In total 306 bonobo nests were recorded, belonging to 88 nest groups. Mean nest group size is 3.4 nests. In addition, bonobos were directly observed on two occasions. The party sizes were of 12 and 8 individuals. Direct observation of Bonobos is encouraging as the species seems to be much less stressed about potential human stress.

Increase of traces of elephants and of observation of colobus groups is encouraging too. These increases might be explained by decreased hunting pressure. The number of observed snares and of active hunting camps decreased significantly.

The same is true for agricultural activities, with an increased number of fields being abandoned.

Group sizes of small monkey species are not yet optimal when comparing with literature. We hope to see an increase in group sizes over the next 1-2 years.

Table 2. Lesser monkday group sizes

| Species | Number of observed groups | Min.group size | Max. group size | Mean group size |
|---|---|---|---|---|
| C . ascanius | 19 | 7 | 20 | 7.9 |
| C. wolfi | 40 | 3 | 21 | 8.6 |
| L. atterimus | 47 | 4 | 20 | 10 .2 |
| C. neglectus | 5 | 1 | 5 | 3 |
| C .angolensis | 16 | 1 | 7 | 3.9 |
| Allenopithecus nigrovoridis | 2 | 10 | 12 | 11 |

## B. Evaluation of Human Activities in the RFLY

The number of active hunting camps decreased from 45 to 15. At the moment of writing this report, ICCN guards are destroying the abandoned hunting camp sites.

This goes together with a sharp decrease in encountered lines of snares, from 198 in early 2006 to 10 lines of snares in 2007 (Table 3).

The same is true for active agricultural fields.

Table 3. Human activities in the RFLY.

| Human activity | 2006 .1 | | 2006.2 | | 2007 | |
|---|---|---|---|---|---|---|
| | active | passive | active | passive | active | passive |
| Line of snares | 198 | 52 | 91 | 32 | 10 | 33 |
| Campsite | 45 | _ | 35 | _ | 15 | 30 |
| Agriculture | 150 | 50 | 22 | 13 | 11 | 9 |
| Human track | 436 | _ | 147 | - | 72 | 98 |

Tableau 4. Description of recorded hunting camps during the 2007 survey

| N° | Name of camp | Ethnic group | Administrative origin | Numbre of inhabitants d'hab. |
|---|---|---|---|---|
| 1 | Ngingi | Mongo | Befale | 12 |
| 2 | Lofofa | Mongando | Djolu | 47 |
| 3 | Bongengo | Mongo | Bongandanga | AB |
| 4 | Molanga | Mongo et ngombe | Bongandanga | AB |
| 5 | Booya | Mongo | Bongandanga | 6 |
| 6 | Soolo | Mongando | Djolu | AB |
| 7 | Bosolomwa | Mongo | Befale | 9 |
| 8 | Bohua | Mongo | Befale | 11 |
| 9 | Bakumba | Mongo | Befalle | 18 |
| 10 | Ndele | Mongo | Befale | Site de recherche |
| 11 | Weko-source | Mongo | Befale | 7 |
| 12 | Bitabe | Ngombe | Bongandanga | AB |
| 13 | Pete 2 | Ngombe | Bongandanga | AB |
| 14 | Pete 1 | Ngombe | Bongandanga | AB |
| 15 | Lowa | Ngombe | Bongandanga | AB |
| 16 | Bokungu | Ngombe | Bongandanga | AB |
| 17 | Pete 3 | Ngombe | Basankusu | AB |
| 18 | Luka-nonga | Mongo | Bongandanga | AB |
| 19 | Camp ekombe 1 | Mongo | Bongandanga | AB |
| 20 | Camp ekombe 2 | Mongo | Bongandanga | AB |
| 21 | ISrael | Mongo | Bongandanga | AB |
| 22 | Sopingua 2 | Ngombe | Basankusu | AB |
| 23 | Sopingua 1 | Ngombe | Basankusu | AB |
| 34 | Bowano | Ngombe | Bongandanga | 27 |
| 25 | Atandele | Ngombe | Basankusu | AB |
| 26 | Emoniseli 1 | Ngombe+ Mongo | Bongandanga | 22 |
| 27 | Emoniseli 2 | Ngombe + | Bongandanga | AB |

| | | Mongo | | |
|---|---|---|---|---|
| 28 | Ite | Mongo | Befale | AB |
| 29 | Bomanga 1 | Mongo | Befale | 200 |
| 30 | Genese | Ngombe | Basankusu | 8 |
| 31 | Bomanga 2 | Mongo | Befale | 50 |
| 32 | Ikane-ikane | Mongando | Djolu | AB |
| 33 | Bakeko | Mongo +Ngombe | Bongandanga+ Befale | AB |
| 34 | Tosongo | Ngombe | Bongandanga | AB |
| 35 | Camp mumu | Mongando | Djolu | AB |
| 36 | Camp pika | Mongando | Djolu | AB |
| 37 | Camp Bompio | Mongo | Befale | AB |
| 38 | Bomponde | Mongo | Befale | 500 |
| 39 | Nkungu | Mongo | Befale | 130 |
| 40 | Booko | Mongando | Djolu | AB |
| 41 | Bompio 2 | Mongo | Befale | AB |
| 42 | Banganga | Mongo | Befale | AB |
| 43 | Lotono | Mongando | Djolu | AB |
| 44 | Iyofele | Mongo | Befale | AB |
| 45 | Omboya | Mongando | Djolu | AB |

Légende :
AB : abandoned . The abandonded camps currenttly being destroyed by the ICCN monitoring guards during the 4th survey ( june / August 2008) .

Ten out of 15 active camps are inhabited by people coming from Befale , while Bongandanga represents 50% of the abandoned camps. This confirms statements by the representatives of Bongandanga that they organized to ask hunters to leave the protected area. It indicates also the efforts are needed at the Befale side for mitigation of hunting pressure.

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**Map 1. Distribution of Human activities in RFLY**
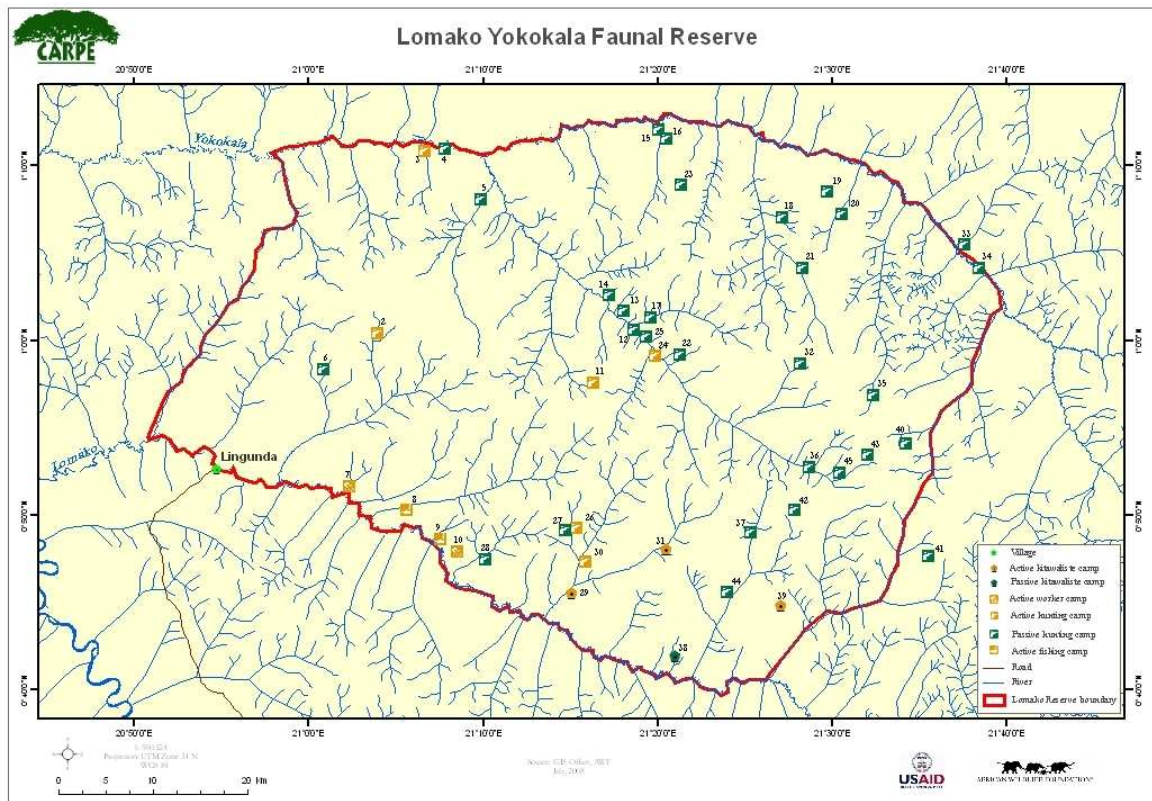


Map 1 shows that mainly hunting camp sites in the northern part have been abandoned. Active camp sites are mainly situated in the southern part with 4 out of 15 being situated along the Lomako river. Attention will have to be given to the hunting camps that persist in the interior of the RFLY, with most of them being situated close to the research site. This explains the distribution of recorded Bonobo nests in the RFLY (see below).

We subdivided arbitrarily the RFLY into 5 subzones. Visual inspection of the table informs us about the patchy distribution of some species.

**Table 4: Comparison of IAK by Zone**

| No. | SPECIES | IKA | | | | |
|---|---|---|---|---|---|---|
| | | ZONE A ( 86km) | ZONE B (128.16km) | ZONE C (48.82km) | ZONE D (60.15km) | ZONE E (68.28km) |
| **1** | **Pan paniscus** | **0.82(0.37)** | **0.60(0.13)** | **0.49(0.18)** | **0.77(0.2)** | **1.3(0.26)** |
| 2 | Loxodonta africana | – | – | 2.10 | – | – |
| 3 | Tragelaphus spekei | 0.02 | 0.21 | 0.32 | 0.24 | 0.29 |
| 4 | Tragelaphus eryceros | 0.05 | 0.01 | – | – | – |
| 5 | Potamochoerus porcus | 1.12 | 0.73 | 1.04 | 0.79 | 0.82 |
| 6 | Orycteropus afer | 0.50 | 0.30 | 0.32 | 0.26 | 0.26 |
| 7 | Cephalophus callipygus | 1.19 | 0.84 | 1.16 | 0.83 | 1.04 |
| 8 | Cephalophus sylvicultor | 0.66 | 0.49 | 0.51 | 0.53 | 0.42 |
| 9 | Cephalophus nigrifrons | 0. 31 | 0.22 | 0.36 | 0.23 | 0.27 |
| 10 | Cephalophus dorsalis | 1.04 | 0.71 | 1 | 0.76 | 0.82 |
| 11 | Cephalophus monticola | 0. 37 | 0.31 | 0.26 | 0.39 | 0.29 |
| 12 | Panthera pardus | 0.05 | 0.02 | 0.04 | – | – |
| 13 | Felis aurata | 0.09 | 0.08 | 0.14 | 0.08 | 0.07 |
| 14 | Cercopithecus ascanius | 0.046 | 0.015 | 0.10 | 0.13 | 0 |
| 15 | Cercopithecus wolfi | 0.034 | 0.015 | 0.16 | 0.16 | 0.16 |
| 16 | Cercopithecus neglectus | 0 | 0 | 0 | 0.033 | 0 |
| 17 | Colobus angolensis | 0.023 | 0.015 | 0.061 | 0.083 | 0.058 |
| 18 | Lophocebus atterimus | 0.10 | 0.07 | 0.18 | 0.08 | 0.21 |
| 19 | Allenopithecus nigroviridis | 0.10 | 0.06 | 0.12 | 0.06 | 0.08 |
| 20 | Civettictis civetta | 0 .02 | 0 | 0.04 | 0.06 | 0.04 |
| 21 | Hyemoschus aquaticus | 0.16 | 0.10 | 0.12 | 0.18 | 0.11 |
| 22 | Smutsia gigantea | 0.19 | 0.14 | 0.18 | 0.21 | 0.14 |

**Map 2: Abundance and Distribution of Bonobos in the RFLY by Zone**
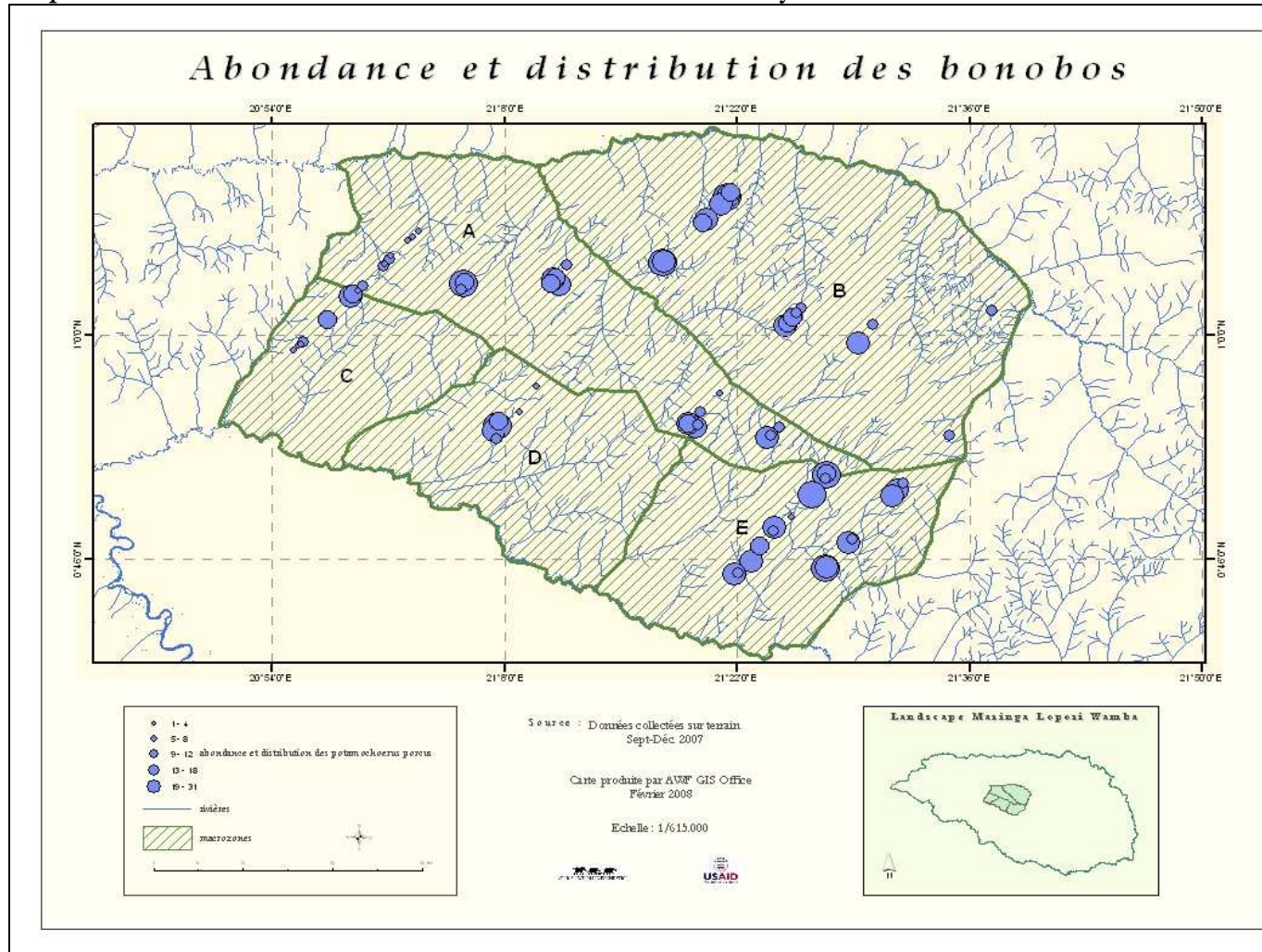


As **Map 2** delineates, the division of the RFLY into five zones is a first attempt in understanding the spatial distribution of different faunal species. Further analysis of potential relationships between the distribution of species and the distribution of vegetation types and human activities is needed. Visual inspection of table 4 shows that some species are present in only a portion of RFLY. The bongo is only present in northern part. This confirms earlier observations (Dupain et al, 2000) . Traces of elephants are only recorded in the south western part just opposite the ICCN basis at Lingunda .The highest number of Bonobos nests is encountered in bloc E . Interestingly, this part of the RFLY in inhabited by Kitawalist, notorious hunters, also Bonobos. Whether this is an indication that kitawalist decreased hunting activities in the hope to be allowed to stay living in their large and permanent settlements remains to be seen.

Distribution of other species seems to be mainly vegetation oriented, esp. distribution of distribution of mammals that prefer swamp forest ( Sitatunga , water chevrotain, Allen's swamp monkey) .As mentioned above , more in depth analysis is needed for more solid conclusions.

**Zone A** is located between the Lotono and Lokomo Rivers. The Lotono River feeds into the Yokokala River and the Lokomo River into the Lomako River. This zone refers to the "middle forest" between both rivers, that is at a slightly higher altitude and thus drier. **Zone B** is situated between the Lotono River and the eastern RFLY boundary. **Zone C** includes the forest that surrounds the different scientific study sites. **Zone E** refers to the Forest where the majority of Kitawalists are living. In this area , most active camps are situated (6 ). Although it seems that this population is respecting rules of not killing bonobos, they are still hunting and developing slash and burn agriculture for subsistence and for commercial reasons. **Zone D** is situated between the scientific sites and the Kitawalists' territory.

In former surveys , Zone B was characterized by a high number of hunting camps, inhabitated by the notorious Ngombe hunters . Since the creation of the reserve , the hunting camps are more and more abandoned and a bonobo population is re colonizing this part of the RFLY

Concerning the bonobos, contrary to the hypothesis that they are most abundant in the scientific study zone, the greatest concentration of nests was observed in the Kitawalistes' *Zone E*.

According to the Kitawalist , a tabou for consumption of Bonobo meat by women is respected . Kitawalist hunters are not that keen on huntig Bonobos, in addition, they are refusing the arrival of the Ngombe hunters. The latter group of hunters is famous for the use of poisoned arrows and are well known for skills to kill Bonobos.

**Table 5: Comparison of ALL (Three) RFLY Surveys by IAK and Zone**

| Species | IKA (2006)1 | | | | | IKA (2006)2 | | | | | IKA (2007) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | A | B | C | D | E | A | B | C | D | E |
| **Bonobo** | **0.32** | **0.18** | **0.4** | **0.5** | **0.4** | **0.4** | **0.07** | **0.2** | **0.2** | **0.5** | **0.82** | **0.60** | **0.49** | **0.77** | **1.3** |
| **Elephant** | 0.04 | _ | 1.2 | _ | _ | 0.06 | _ | 0.4 | _ | _ | _ | _ | 2.10 | _ | _ |
| **Duikers** | _ | _ | _ | _ | _ | 1.5 | 1.8 | 2.1 | 0.9 | 2.1 | 3.6 | 2.6 | 3.3 | 2.7 | 2.8 |
| **Small monkeys** | 0.2 | 0.2 | _ | 0.4 | 0.6 | 0.1 | 0.1 | _ | 0.01 | 0.2 | 0.12 | 0.10 | 0.7 | 0.6 | 0.43 |
| **Bushpig** | 1.1 | 0.6 | 1 | 0.5 | 0.5 | 0.5 | 0.4 | 0.5 | 0.1 | 0.5 | 1.1 | 0.7 | 1 | 0.8 | 0.8 |

Observations of small monkeys increased significantly in zone D and E, as is the case for bonobos.

# IV.       DISCUSSION AND INTERPRETATION

The bonobo (*Pan paniscus*) and Peter's duiker (*Cephalophus callipygus*) and Mangaby (*Lophocebus atterimus*) have the highest IAK of all species surveyed. The IAK of bonobo has increased from **0.34 nests/km** to **0.70 nests/km**, which is essentially a doubling since the previous 2006 survey. Quite simply, the increased presence of bonobo underscores the significance of AWF's efforts to safeguard this endangered species by firstly obtaining official protected status for the RFLY and secondly by maintaining monitoring activities of the forest in tandem with local economic development.

**Map 2**, which shows the abundance and distribution of the RFLY's bonobo population clearly illustrates that the bonobos are most concentrated in Zone E, followed by Zone B. Zone E is the region occupied by the ethnic group, the Kitawalistes, who in the past have allegedly traded bonobo meat on the illegal bushmeat market. For this, four of them were involved in monitoring activities ., These representatives contribute significantly to the awareness building among their peers on the potentials and importance of the RFLY for the well being of the population that depands on this forest block .

The data results from this past year and when compared to the previous surveys, indicates an increased IKA for elephants (cyclotis) in Zone C, which could be explained by the presence of the nearby ICCN ranger base signifying that this zone is potentially best protected. Further surveying is needed to confirm this exact hypothesis. Today, rumours are increasing about military poachers getting ready to start hunting on the elephants. ICCN is considering specific protection of the forest pocket in which the elephants are currently ranging.

An important event is the fact that the market of Molanga , situated at the northern periphery of the RFLY is no longer organized . This market was a famous meeting place for exchange of goods between hunters (bush meat) and family employees of logging company Siforco (medicines, clothes, soap, salt, etc….). This was organized twice by month. Halting the organization of this meeting place might have equally the hunting pressure in the RFLY.

# V. CONCLUSION

DRC' remarkable biodiversity is under tremendous strain from a variety of factors including habitat degradation and destruction, poaching and other human-wildlife conflicts, and disease. Widespread poverty as well as political instability and civil strife place added pressure on natural resources to the detriment of the continent's ecological and economic well-being.  Under these circumstances, conserving DRC's wildlife is a daunting challenge.  Nonetheless, AWF's experience demonstrates that conservation success can be achieved with a strategy that factors in the needs of people and wildlife alike, along with an unwavering persistence to see this work through.

The results of the 2007 survey denote that in the RFLY there is an observable reduction in hunting activities, a firm growth trend among bonobo and several other large mammal species.

The African Wildlife Foundation envisions a Congo Heartland where the bonobo can flourish, under the watchful and protective eye of the people who share this remarkable landscape.  We hope the Alexander Abraham Foundation will continue to join us in making this vision a reality

The results of this census will be of highest importance for development of the management plan of this reserve, planned to be discussed in September 2008.

# VI.                    BIBLIOGRAPHY

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**ANNEX I: Bonobo Conservation Project: Field Methodology**

AWF uses the recce methodology to collect field data, an efficient collection procedure. This method allows the community-based teams involved in the proposed project to cover a larger zone in less time than the linear transect method. While the latter methodology allows one to estimate mammal densities, the recce methodology offers some other advantages:

- The observers are not delayed by the necessity to open a correct transect, which allows them to cover 10-15Km per day, instead of 2-3 Km on a transect;
- As the speed increases, a larger distance can be covered at the same time;
- A smaller team can cover a large surface, a more time and cost effective method;
- Under this method, observers usually cut less vegetation.

The survey teams are trained by a combination of AWF staff and Congolese teams already trained elsewhere in the region. Instruction on the census technique takes approximately one month. The surveys take approximately 6 months, including data entry and analysis). Two teams of 13 people each carry out the surveys. Along line transects and recces, information is collected on traces of large mammals, bonobo nests, human activities, topography and vegetation. AWF's Landscape Ecologist uses Global Positioning Systems (GPS) and Geographic Information Systems technology to construct project area maps.

The identification of target species is done in the field by local assistants. The vernacular names are cross-checked with lists of vernacular and scientific names. Equally, the descriptions of the species by the local assistant are cross-checked with those described by Jonathan Kingdon[1]. Each species' CITES status is referenced by using the protected species list of the DRC (www.mecnefrdc.org). The team also collects signs of the following types of human activity: hunting (with firearms and snares - signs of encampments); agriculture/farming (fallow farming, fields); and paths and trails. Along each recce, each change in vegetation and topography is recorded accurately.

The relative abundance of each species of large mammal, as well as human activities, is measured by using the Kilometric Abundance Indicator (IKA) for each species or for each type of human activity. The IKA provides information about the presence, relative abundance, and spatial distribution of each species and type of human activity. The IKA also allows one to monitor population trends over time.

Landscape surveys serve to enhance our understanding of the distribution of bonobos and other conservation targets throughout the Maringa-Lopori Wamba landscape. Survey results are discussed with the local population and other conservation stakeholders to maximize the transfer of knowledge and further refine the involvement local communities will play in future bonobo research and conservation initiatives.

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