



Section 3: National Survey results



Male chimpanzee in Kalinzu Forest Reserve. T. Furuichi

Introduction

The results obtained from the surveys allowed us to estimate chimpanzee populations in each forest and also measure the variation in distribution of chimpanzees within the larger forests. The results of distribution within forests are given for each forest reserve in the appendix at the end of the report. In this section we combine the results for each forest in order to estimate a total number of chimpanzees in Uganda.

Density estimates from transects

Chimpanzee nesting habits tended to be similar in all the forests surveyed. As was found in Budongo Forest, they tended to nest in the understory trees more often than in the canopy (Plumptre and Reynolds, 1996,1997; Brownlow et al. 2001). A few nests were found on the ground in Bwindi Impenetrable National Park and Itwara Forest Reserve but these were rare. The marked nest count method is particularly useful for including ground nests because decay rates of ground nests are very variable.

The estimates of average density per forest based on surveys from transects are given in Table 3.1. A total of 2,956 kilometres were walked along the various transects in eight of the major forests surveyed. Average density was calculated by estimating the density of chimpanzees for each site within a

forest that was surveyed with transects and calculating a mean for these sites. For most forests it was possible to estimate separate detection curves from perpendicular distance data for each site within the forests. In forests where observations were lower than 50 nests we combined data for several sites to obtain one detection curve for the forest as a whole. The perpendicular distances were combined in this way in Bwindi Impenetrable National Park, Itwara Forest Reserve, and Kagombe Forest Reserve.

Table 3.1 Estimates of population sizes with 95% confidence limits for forests surveyed with transects.

Forest	Distance walked (Km)	Density (no km ⁻²)	Population in Forest	95% confidence limits
Budongo FR	513.7	1.36	584	356-723
Bugoma FR	511.2	1.90	570	424-769
Kagombe FR	165.8	0.71	80	29-218
Itwara FR	126.6	1.35	120	67-215
Kibale NP	564.1	2.32	1,298	817-1,615
Kasyoha-Kitomi FR	477.7	0.92	370	250-530
Kalinzu FR	311.0	1.55	220	120-380
Bwindi NP	285.6	0.43	140	49-566

The density obtained in Kibale National Park, at 2.32 km⁻² was the highest of any forest surveyed in Africa. As this is one of Uganda's largest forests it is therefore the forest that contains the largest population of chimpanzees in this country.

Correlations with reconnaissance walks

Most correlations between the encounter rates of chimpanzee nests from reconnaissance walks beside individual transects and the encounter rates derived from the transects were highly significant (Plumptre et al., 1999,2001,2002). Variation was high though when comparing individual transects and their associated reconnaissance walks rather than combining the transect and reconnaissance encounter rates for one site within a forest. Given

the number of sectors within forests which had transects (34) it was possible to obtain an encounter rate for each sector. The data for all the reconnaissance walks adjacent to these transects was combined and correlated with the densities of chimpanzees obtained from the analysis of the transect data. Given the significant variations in altitude in the forests surveyed (600 metres – 5,100 metres above sea level) correlations were made for forests that are higher than 1,500 metres and forests lower than this altitude. The results did not differ greatly between forests, however (Fig. 3.1), and the gradients were not significantly different ($t=0.442$, $P=ns$). Regressing encounter rate on density and forcing it through the origin gave a highly significant correlation for all data combined ($F=198.2$; $df=1,33$; $P=0.000$; $R^2_{adj}=0.8530$).

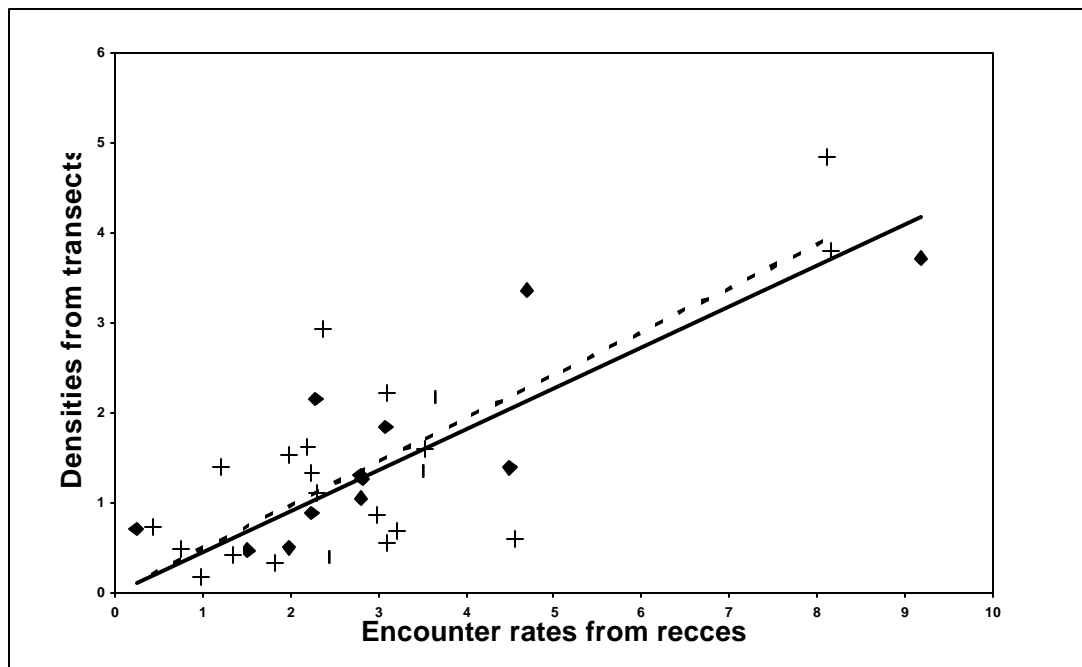


Figure 3.1 The relation between encounter rates obtained from reconnaissance walks adjacent to transects and densities obtained from those transects for 34 sites. The high (dotted line and crosses) and low altitude forests (solid line and diamonds) have been separated in the figure but do not differ significantly.

Using this regression we can derive an equation to estimate chimpanzee density from encounter rates obtained from reconnaissance walks in forests as follows:

$$\text{Density of chimpanzees} = 0.471 (\text{Encounter Rate})$$

Using this equation we were able to estimate chimpanzee densities in the forests where we were unable to use transects. Future monitoring of chimpanzees may be possible without the need to cut transects in these forests as encounter rates from reconnaissance walks can be used to calculate population density from the equation. This will increase the errors of the estimate, however, and more analysis is needed to assess how much this will affect the ability to detect changes in the populations estimated.

Population estimates for all forest sites in Uganda

The population estimates for all forests surveyed with transects and/or reconnaissance walks indicate that about 4,500 nest-building chimpanzees occur in Uganda (Table 3.2). The encounter rate data for Bwindi Impenetrable National Park were used in this table because only two sites had been surveyed with transects (estimate in Table 3.1) and one of these was a particularly low-density area for chimpanzees. The revised estimate for Bwindi became 198 km² which appears to be more similar to estimates being generated by counting habituated chimpanzees and assessing their home range in Bwindi (C.Stanford pers. comm.). Estimates were also made for some areas where the numbers of chimps are known to be low. These included Semuliki Wildlife Reserve (estimate from K. Hunt and C. Allan (2000)); Kyambura Wildlife Reserve (estimates from semi-habituated community in the Kyambura gorge); and the large areas of forest patches between Bugoma and Budongo and south of Bugoma (estimates based on surveys in Kasato, Wambabya, Kanaga and Ruzaire Forest Reserves). The estimated population density for Kagorra Forest Reserve is low because chimpanzees have not been reported frequently.

We also calculated the total estimated chimpanzee numbers using the following correction factors:

1. Dividing the number of chimpanzees by 1.09 to correct for the number of nests built per day by weaned chimpanzees (Plumptre and Reynolds, 1997)
2. Multiplying the number of chimpanzees by 1.20 to correct for the percentage of infants aged four or younger that do not build nests (20 percent was taken as an average of habituated communities in Budongo

and Kalinzu Forest Reserves and Kibale and Semuliki National Parks – Data contributed by S. O’Hara, C.Stanford).

Table 3.2 Estimated chimpanzee density and total population size for each forest surveyed. Corrections for percentage of weaned chimpanzees and number of nests built per day have also been made. Nb. Bwindi density uses reconnaissance data.

Forest	Density	Nest building chimps	With correction factors	95% confidence limits
Budongo FR	1.36	580.80	639.41	392-796
Wambabya FR	3.62	123.84	136.34	117-156
Bugoma FR	1.90	570.00	627.52	467-847
Kasato FR	0.08	2.15	2.37	2-3
Kagombe FR	0.71	80.44	88.56	32-240
Kitechura FR	0.00	0.00	0.00	0
Ibambaro FR	0.00	0.00	0.00	0
Matiri FR	0.00	0.00	0.00	0
Muhangi FR	0.65	13.30	14.64	13-17
Kibego FR	0.75	9.58	10.54	9-12
Itwara FR	1.35	116.64	128.41	71-230
Semuliki NP	0.21	45.55	50.15	43-57
Ruwenzori Mountains NP	0.46	454.18	500.01	428-573
Kibale NP	2.32	1298.08	1429.08	899-1,778
Kasyoha-Kitomi FR	0.92	368.68	405.88	275-363
Kalinzu FR	1.55	212.62	234.08	132-418
Maramagambo Forest	0.46	202.01	222.39	190-255
Bwindi Impenetrable NP	0.60	193.24	212.74	182-243
Echuya FR	0.00	0.00	0.00	0
<i>Estimates for low density sites</i>				
Otzi FR		25	27.52	20-40
Semuliki WR		60	66.06	40-90
Kyambura WR		50	55.05	30-70
Kagorra region	0.3	12.90	14.20	10-40
South of Bugoma	0.04	40.56	44.65	40-54
Between Bugoma & Budongo	0.03	62.67	68.99	62-83
Total		4,505	4,962	4,000-5,700

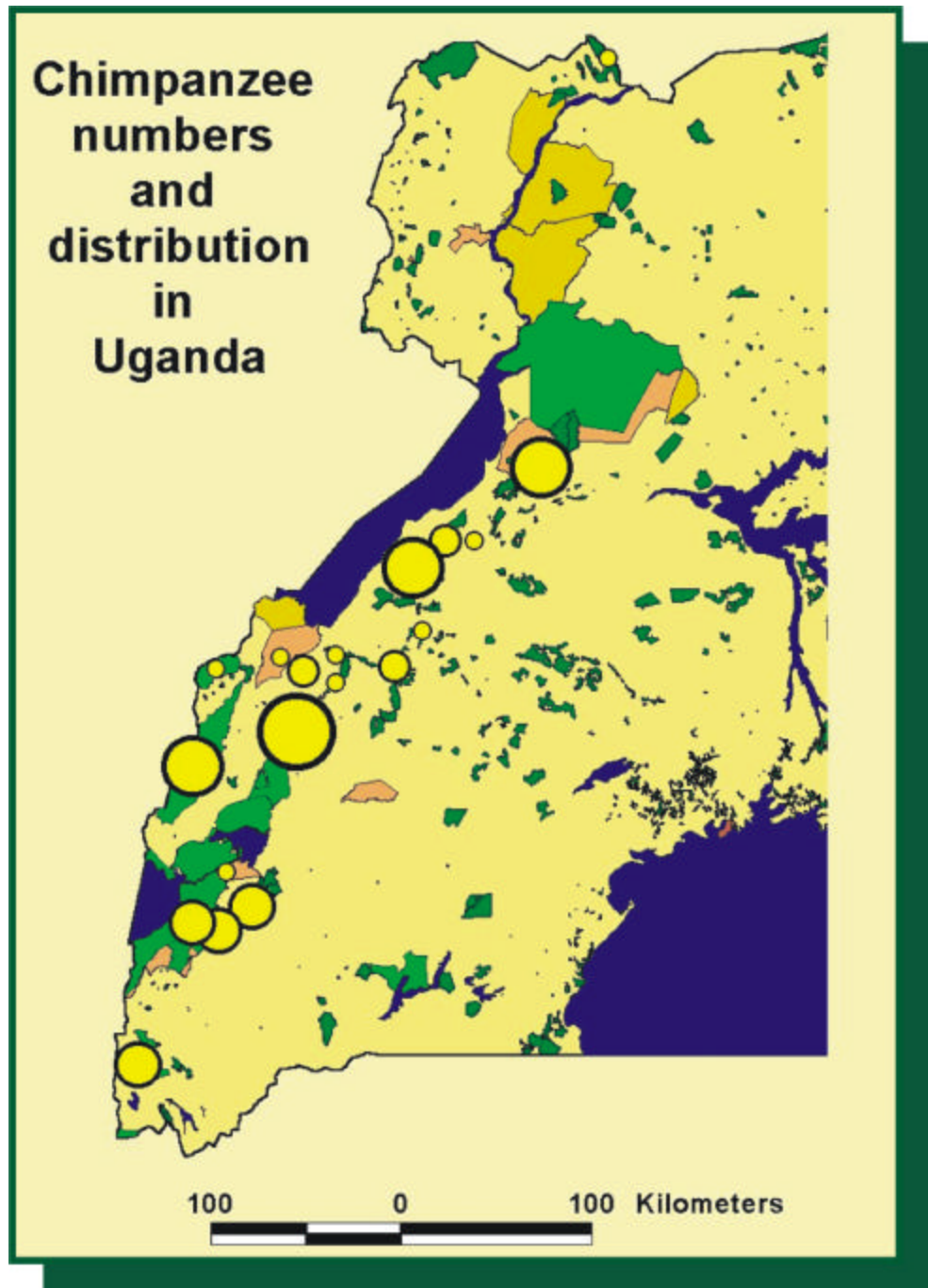


Figure 3.2 The relative abundance of chimpanzees in each of the protected areas where they occur in Uganda. The larger the yellow circle, the larger the number of chimpanzees present. Otzi Forest Reserve is shown in the top of the figure on the Sudan border.

The distribution and relative abundance of chimpanzees is depicted in Figure 3.2. This figure highlights the importance of Kibale National Park and the larger forest reserves for chimpanzee conservation in Uganda. If we accept the value of 500 individuals as a minimum population size for long-term viability then only four forests in Uganda have viable populations (Kibale, Budongo, Bugoma and Ruwenzori Mountains). However viability can be enhanced greatly if occasional immigrations can take place. Maintaining the connectivity between many of the smaller forests will be vital if chimpanzees are to survive in the long-term for many populations. The GEF Albertine Rift project aims to develop a corridor linking Budongo Forest to Bugoma forest and through to Kagombe, Muhangi and Itwara forests down to Semuliki Wildlife Reserve by working with private landowners and others to maintain forest on their land. If successful this project will greatly enhance the viability of chimpanzees in many of the smaller forest patches in this region. Similarly, ensuring that the connections between Kalinzu forest, Kasyoha-Kitomi forest, Queen Elizabeth National Park, Kyambura Wildlife Reserve, Maramagambo forest, and Kibale Forest are maintained will ensure the viability of chimpanzees in this landscape of savannah woodlands and forests.

The total number of chimpanzees, 4,950, is higher than previous estimates. Teleki (1989) estimated about 4,000 chimpanzees for Uganda and this was revised down to 3,300 at the chimpanzee PHVA in 1997 (Edroma et al., 1997). It is encouraging therefore that the population in Uganda is not as low as was first thought.

The 2002 human population census was completed recently and it makes an interesting comparison with the chimpanzee census presented here. The total human population in Uganda is over 24 million people as compared with about 5,000 chimpanzees. All Districts and counties in Uganda have more people than the total chimpanzee population in Uganda and 98.4% of all the subcounties in Uganda have more people than the chimpanzee population of the country.