

# Mountain Gorilla Census – 2006 Bwindi Impenetrable National Park Summary Report



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## Introduction

Periodic censuses of endangered populations of high-profile species help us to understand their population dynamics, to assess the success of conservation programmes aimed at ensuring their survival, and to ensure that they receive continued attention from the global conservation community. Mountain gorillas (*Gorilla beringei beringei*) are highly endangered, with just two small populations in Bwindi Impenetrable National Park in SW Uganda, and the nearby Virunga Volcanoes on the borders with Rwanda and the Democratic Republic of Congo. A survey of the Bwindi population was carried out in 2002, and results showed that the population had increased since the previous census in 1997 by approximately 7 %, to 320 individuals (McNeilage et al., 2006). The Virunga population currently numbers around 380 gorillas (Gray et al., 2006). A new census of the Bwindi gorilla population was carried out between April and June 2006 to determine the total population size and structure for the Bwindi mountain gorillas, their distribution across Bwindi and the potential impact of human disturbance on the population. This now provides us with park-wide information spanning 9 years.

To estimate the total population size for the gorillas, the park is intensively surveyed by teams with the goal to locate every gorilla group of the population. This method normally allows us to ensure that groups are not counted twice by different teams. However, during this census, several gorilla groups were found in close proximity to each other in one area of forest, such that we were unable to distinguish each on the basis of trails and nest counts alone. In previous census we have generally been able to distinguish groups on the basis of trails and nest sites, but we were unlucky this time in having so many groups in a relatively small area of forest.

Therefore to ascertain that we were not double-counting groups, and to ensure that we were able to distinguish and identify each group, we used genetic analysis of fecal samples to create genotypes, or unique genetic identifications, of the gorillas in each group. Fecal samples of all groups were collected for genetic analysis, and this work was carried out at the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany. Individuals from the groups for which identifications were not clear from the field data on nest sites and trails were treated as priorities. DNA analysis for these has now been completed, allowing us to calculate a final total and other population parameters from this census.

## Methods

The census used the same methods as previous exercises. The park was divided into small sectors, centered around campsites and access points. Teams of trackers, rangers, and researchers traversed the park systematically sector by sector. One team was assigned to census each sector, proceeding such that no more than three days were left between the completion of work in one sector and the beginning of work in the next contiguous sector. Each sector was searched by walking an irregular network of reconnaissance routes across the area. The actual route walked was determined largely by the terrain and the availability of existing trails, while ensuring that the routes were sufficiently dense so that no area was missed which could be large enough for a gorilla group to spend more than one week in it. Gorillas construct a fresh nest each night to sleep in, and when recent gorilla trail (less than 5-7 days old) was found, it was

followed until nest sites were located. Using the topographic maps, along with GPS readings every 250m, compass and altimeter readings, each census team mapped as accurately as possible all paths taken and gorilla trails followed. By covering the area in this way, mapping and dating all gorilla trails and nest sites, and by marking nest sites once they had been counted, it was possible to ensure that all groups are found and that none were counted twice, and to distinguish similar sized but distinct gorilla groups found close to each other. At each nest site, nests were counted and measurements of dung size were made and, along with the presence of silver hairs, used to establish the age-sex composition of the group. Teams aimed to find at least three nest sites for each group to confirm the composition of each group, since individual nests or dung could be missed at one nest site.

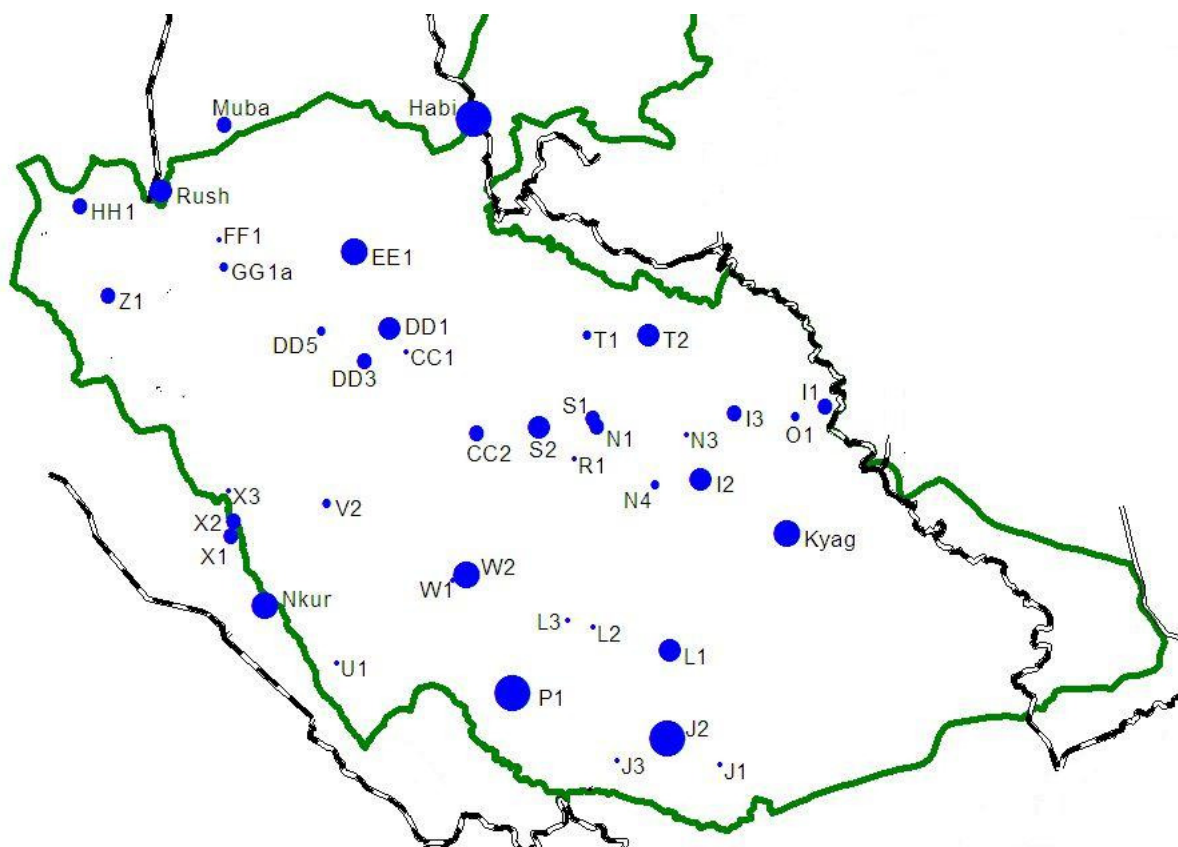
The irregular network of trails walked while looking for gorilla trail during a census covers a large portion of the park and provides an excellent opportunity as reconnaissance routes to collect data on other mammals, as well as signs of human use. While walking these trails signs of other large mammals and signs of human disturbance were recorded and the distance walked on each trail measured using hip-chains. Analysis of large mammal and human disturbance data is underway.

## **Results**

The five habituated groups in Bwindi contained a total of 76 individuals at the time of the census. In addition to these, 25 unhabituated groups were found, containing 227 individuals along with 11 lone silverback males, giving a total uncorrected population count of 314 individuals. Experience shows that approximately one in three infants is not found from nest counts. A total of 40 infants were counted in the unhabituated groups, so that we predicted that another 20 would have been missed because they were too young for their dung to be visible in the nests. This brings the corrected total to 334 individuals, and as with the previous census in Bwindi, we round this figure up to 340 as our best estimate of the population size, since experience shows that a small number of small groups or lone silverbacks can be missed with these methods. The distribution of groups found during the census is shown in Figure 1. A complete list of the groups found during the census is provided in the Annex.

A summary of the gorilla population size and structure found during this census is shown below, in comparison with previous censuses in 1997 and 2002. While the total population size has increased slightly, the other population parameters, group size and percentage of immatures (infants plus juveniles) in the population are comparable with those found in 1997 and 2002 (Table 1). The current age composition of the population (Figure 2) indicates healthy distribution of individuals in the adult and immature age classes. While the number of lone silverback males found during 2002 and 2006 seems to be higher than in 1997, lone silverbacks are more difficult to locate and to identify using these methods, so this may simply reflect sampling errors. The proportion of the groups that are multimale has declined from approximately 45% in the previous two censuses to 23%. This may be a result of normal dispersal patterns of males (some remain in their natal group and others emigrate) or it may be a result in sampling error in estimating the presence of silverbacks from nests. Regardless, this fluctuation in multimale groups is normal and has been observed similarly in the Virunga Volcano population (Gray et al., 2006).

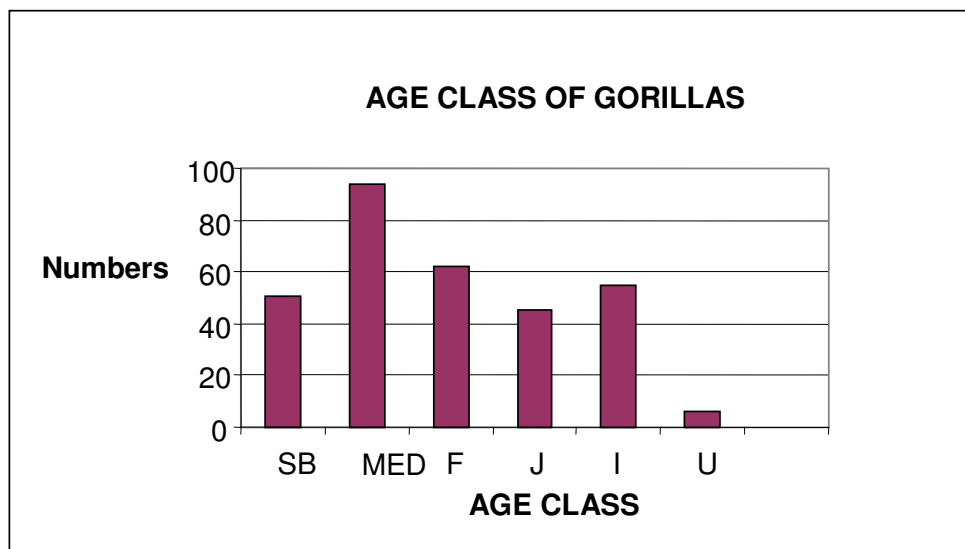
**Figure 1.** Distribution of gorilla groups in found during the Bwindi 2006 gorilla census. Each circle represents one group, with the size of the circle proportional to the size of the group. The number above the circle is the group size in each case, and the code below is a unique identifier for each group, as given in Table 2. Kyag, Muba, Habi, Rush, and Nkur are the habituated groups.



**Table 1.** Comparison of population size and structure across censuses.

	<u>1997</u>	<u>2002</u>	<u>2006</u>
Total population estimate	300	320	340
Number of groups	28	27	30
Number of solitary males	7	10	11
Mean group size	10.2	11.3	10.8
- range	2 to 23	3 to 25	3 to 28
Proportion immatures	37%	36%	36%
Proportion Multimale Groups	46%	44%	23%
Number of habituated groups	3	5	5
Individuals in habituated groups	52	72	76
Proportion of population habituated	17.3%	22.5%	22.4%

**Figure 2.** Age composition of the population. SB- Silverback male, MED-Medium size (adult female or black back male), F- Adult Female, J- Juvenile, I-Infants, U-unknown.



## Discussion and Conclusions

These results show a continued steady increase in the population of mountain gorillas in Bwindi Impenetrable National Park, Uganda. The increase to 340 gorillas represents a 6% increase in total population size since 2002 and a 12% increase since 1997. Overall the gorilla population has been increasing at an approximately 1% annual growth rate. While research in the Virunga Volcanoes has shown that gorilla populations are capable of growing at a higher rate than this, a 1% annual growth rate over nearly a decade is still indicative of a reasonably healthy and well protected population.

More in-depth analysis of the spatial and temporal trends in the population will be carried out. The change in population size results will be compared with life history data from the monitored groups to better understand how birth and mortality rates are influencing population dynamics. An additional point to note is that the habituated groups have not increased much in size over the past four years. Further investigation of the group compositions is necessary to determine if this is due to few surviving births or because of natural emigration out of the groups or a combination of the two. Population distribution will be analyzed relative to habitat types and human disturbance, and compared over time. However, a number of important points can be noted already. Firstly, there is still no indication of gorillas using the eastern part of the park (Figure 1). Work is currently underway to assess the suitability of this habitat for gorillas. Secondly, gorillas are expanding their use of the park in other areas, notably by moving into the area known as 'the neck' and the southern portion of the northern sector (Habinyanja group). Therefore further work should be done to assess the suitability of the entire northern sector for gorillas. Both the eastern and northern sections of the park have had high levels of human disturbance in the past, and this must be taken into account in assessing their potential as gorilla habitat.

Lastly, we would like to stress the value of this exercise as a collaborative effort among UWA staff, researchers, and conservationists as well as among participants from Uganda, Rwanda and the Democratic Republic of Congo. This was the fourth census carried out in Bwindi and the Virungas in the past decade and many participants had also gained training and experience through the Ranger Based Monitoring Program. As a result, the level of knowledge, skills and motivation of all participants was very high and helped make this census a success.

## **Acknowledgements**

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**Annex.** Composition of groups found during the 2006 Bwindi gorilla census. SB = silverback male, MED = Medium size (ie adult female or blackback male), Unknown = nests for which the dung size and therefore age class could not be determined.

Group ID	Group type	SB	MED	Female	Juvenile	Infant	Unknown	Total
I1	Unhabituated	1	4		1			6
O1	Unhabituated	1	1		1			3
I2	Unhabituated	1	2	3	2	3		11
I3	Unhabituated	1	2	1	1	1		6
N1	Unhabituated	1	1		3		3	8
L1	Unhabituated	1	6	2		2		11
N4	Unhabituated	1	2		1			4
T1	Unhabituated	1	1		2			4
T2	Unhabituated	2	2	2	1	2		9
W2	Unhabituated	2	7	2	4	2		17
S1	Unhabituated	1	4		3			8
S2	Unhabituated	1	4	3	3	3		14
J2	Unhabituated	3	12	4	4	5		28
CC2	Unhabituated	1	1	2		2		6
DD1	Unhabituated	1	5	1	2	1		10
DD3	Unhabituated	1	2	2	1	2		8
DD5	Unhabituated	1	1	1		1		4
EE1	Unhabituated	3	6	4		4		17
GG1a	Unhabituated	1	2					3
P1	Unhabituated	1	6	4	3	4	3	21
V2	Unhabituated	1	1	1		1		4
X1	Unhabituated	1	1	2		2		6
X2	Unhabituated	1		2		3		6
HH1	Unhabituated	2	1	1	1	1		6
Z1	Unhabituated	1	2	1	2	1		7
Kyag	Habituated	1	4	6	2	3		16
Nkur	Habituated	3	6	4	1	4		18
Habi	Habituated	2	7	5	2	4		21
Rush	Habituated	1	0	5	3	4		13
Muba	Habituated	1	1	4	2	0		8
J1	Lone SB	1						1
J3	Lone SB	1						1
L2	Lone SB	1						1
L3	Lone SB	1						1
N3	Lone SB	1						1
R1	Lone SB	1						1
W1	Lone SB	1						1
CC1	Lone SB	1						1
U1	Lone SB	1						1
X3	Lone SB	1						1
FF1	Lone SB	1						1