Report on the status and conservation of the

Mountain Gorilla

Gorilla gorilla beringei

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1 Names

1.1 Scientific name

Gorilla gorilla beringei (Savage & Wyman, 1847)

Taxonomy

Up until very recently a single species of gorilla, *Gorilla gorilla,* with three subspecies, was recognised. This comprised two eastern subspecies, *Gorilla gorilla graueri* (eastern lowland gorilla) and *Gorilla gorilla beringei* (mountain gorilla) and one western subspecies, *Gorilla gorilla gorilla*. The taxonomy currently followed by CMS recognises *Gorilla gorilla beringei* as the mountain gorilla.

However, recently western and eastern populations have been recognised as separate full species, *Gorilla gorilla* and *Gorilla beringei* respectively. The eastern and western populations are separated by approximately 1,000 km (Garner and Ryder, 1996). Western and eastern populations can be distinguished based on external features (Groves, 2002) and clear geographic and morphological distinctions can also be seen (Garner and Ryder, 1996). In the western group, the isolated Nigeria-Cameroon gorillas are now recognised as a subspecies, Cross River Gorilla *G. g. diehli*, and the Western Lowland Gorilla, *G. g. gorilla*, though there is much divergence even within this subgroup. The eastern group includes both the Eastern lowland *G. beringei graueri* and the two mountain populations of *G. b. beringei*.

Following the newer taxonomic classification, among the mountain gorillas, the Bwindi mountain gorilla may form a third subspecies, *Gorilla beringei bwindi* (Sarmiento *et al*., 1996) although the taxonomic status of the populations is as yet unclear (McNeilage *et al*., 2001). Sarmiento *et al*. (1996) list a number of morphological and ecological differences between the gorillas of Bwindi-Impenetrable Forest and the Virunga volcanoes, and insist that Bwindi gorillas do not belong to *G. g. beringei* and so should not be called mountain gorillas. Stanford (2001) contests this and suggests that the evidence showing the Bwindi and Virunga gorillas to be taxonomically distinct is not well supported. Garner and Ryder (1996) found that the populations of mountain gorilla in the Virungas Volcanoes region and the Bwindi forest were indistinguishable using a particular mitochondrial DNA region.

1.2 Common name

English – Mountain Gorilla ;
Finnish - Gorilla ;
French - Gorille ;
German - Gorilla ;
Italian - Gorilla ;
Spanish - Gorila ;
Swedish - bergsgorilla; gorilla; låglandsgorilla

2 Biological data

Much of the information collected on the mountain gorilla comes from research studies conducted on the Virunga population, particularly studies from the Karisoke Research Centre in Rwanda. Comparatively few studies have been conducted on the diet, ecology and demography of the mountain gorillas in Bwindi (McNeilage *et al*., 2001).

The mountain gorilla of the Virungas lives in groups that range in size from two to 20 animals, and although group structure can vary, more than 60% of groups contain only one mature male or silverback (Harcourt *et al.,* 1981). Most mountain gorilla groups have one fully mature male (silverback), several reproducing females and juveniles of both sexes (Harcourt *et al.,* 1981) and complex group dynamics and interactions are exhibited (Sicotte, 1995; Watts, 1994; Yamagiwa, 1999; Robbins, 1996). However, all-male and multi-male groups also occur. Information from the study groups of the Karisoke Research Centre showed that females reached sexual maturity at 7 ½ years of age, although a two year period of adolescent sterility is experienced and that, although males in captivity can mature at 8 years of age, they generally do not breed in the wild

until about 15 years of age as a result of competition they face from older dominant males (Harcourt et al., 1981).

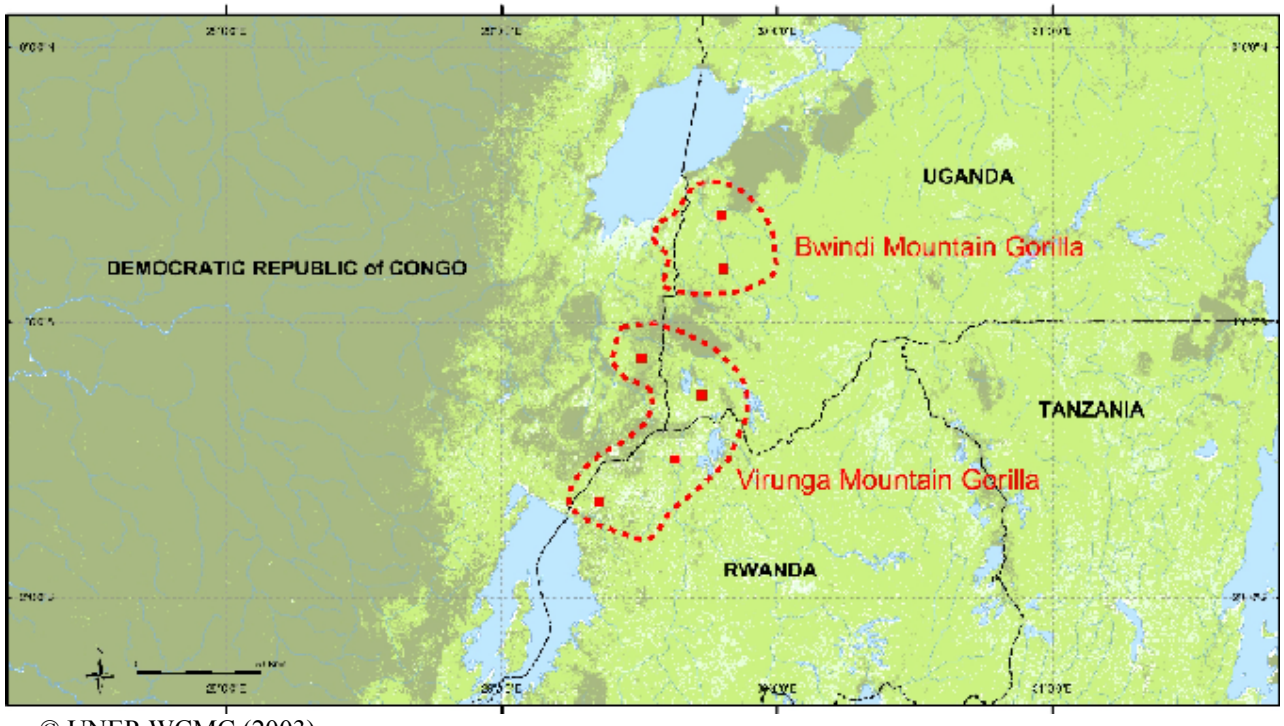
Upon reaching maturity, both the males and females leave the natal group. The females usually join another group or a lone young adult male, whereas the males remain solitary until they can attract females and establish their own groups (Masicot, 2003). After emigration, some males may spend a large proportion of their time in their natal group's home range (Harcourt *et al.,* 1981). It is unusual for adult males to migrate into other groups (Yamagiwa, 1987). Of the 15 changes in the size and composition of the two main study groups between 1972 and 1974 listed by Harcourt *et al*. (1981), 11 were due to migrations.

Mountain gorillas are folivores that specialise on plant parts, species and families (Watts, 1984). The leaves of *Galium ruwenzoriense, Arundinaria alpina, Rubus* spp. and the stems of *Peucedanum linderi* have been shown to be the preferred species of the mountain gorilla (Plumptre, 1995) with particular preference for *A. alpina* (bamboo) shoots (Vedder, 1984). Animal matter (Watts, 1984), sediment (Mahaney *et al*., 1990) and excrement (Graczyk and Cranfield, 2003) have been observed to be eaten infrequently. Bwindi mountain gorillas consume more fruit than the Virunga gorillas (Sarmiento *et al*., 1996).

2.1 Distribution (current and historical)

There are two known populations of mountain gorilla, all of which occur in national parks. One population occurs on the extinct volcanoes of the Virunga Massif along the borders of the Democratic Republic of the Congo (DRC), Rwanda (RW), and Uganda (UG) within the Virunga National Park of DRC, the Volcans National Park in Rwanda and to a lesser extent the Mgahinga National Park, Uganda, A separate population of mountain gorillas is found in the Bwindi-Impenetrable National Park in southwest Uganda, on the border of DRC (UNEP-WCMC and WWF, 2001). In this report these populations will be referred to as either the Virungas or Bwindi population of mountain gorillas.

Figure 1. The distribution of the mountain gorilla, *Gorilla gorilla beringei*



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Democratic Republic of the Congo: The mountain gorilla, *Gorilla gorilla beringei* occurs in the Virunga National Park of DRC. The Virunga National Park is 790,000 hectares in size and is contiguous to Rwenzori Mountains National Park, Uganda and Volcanoes National Park, Rwanda, the latter of which is also home to

mountain gorillas. It ranges in altitude from 798 m to 5,119 m. It is located in north-east DRC mostly in Kivu Province (95%) and also in Haut-Zaire (5%), on the border with Rwanda and Uganda (UNEP-WCMC, 2003b).

A gorilla population on Mt. Kahuzi in the Democratic Republic of the Congo has been referred to as *G. g. beringei* by some authors, although it is generally agreed that it is actually a population of *Gorilla gorilla graueri* (Nowak, 1999).

Rwanda: The mountain gorilla, *G. g. beringei* occurs in the Volcans National Park, which is 12,500-13,000 hectares in size and is contiguous to Virunga National Park in DRC and Gorilla National Park in Uganda. It ranges in altitude from 2,400 m to 4,507 m (UNEP-WCMC, 2003c). It is situated 15 km north-west of the town of Ruhengeri in the Virunga Massif on the Ugandan and DRC borders.

Uganda: The mountain gorilla, *G. g. beringei* occurs in the Mgahinga National Park, Uganda and Bwindi-Impenetrable National Park, Uganda.

The Mgahinga National Park is 2,899 hectares in size and is found in the extreme southwest of Uganda on the borders with DRC and Rwanda and was established strictly for the protection of mountain gorilla and chimpanzee, *Pan troglodytes* (UNEP-WCMC, 2003d). It ranges in altitude from 2,700 m to 4,127 m (UNEP-WCMC, 2003d) and consists of the partly forested slopes of three extinct volcanoes.

The Bwindi-Impenetrable National Park is 32,092 hectares and ranges in altitude from 1,190 m to 2,607 m. It is located in the Kigezi highlands of south-west Uganda, on the edge of the western rift valley and borders DRC to the west (UNEP-WCMC, 2003a).

2.2 Habitat

The habitat of *Gorilla gorilla beringei* consists of subtropical/tropical Moist Forest (IUCN, 2002). Forest edges and regenerating or secondary forest are favoured gorilla habitat (IUCN, 1982). A number of vegetation zones have been identified in the mountain gorilla habitat of the central Virungas Volcano region, which mostly consist of *Hagenia-Hypericum* woodland with a relatively open canopy and extremely dense herbaceous understorey (Watts, 1997). Mountain gorillas range up to 3400 m in altitude with occasional forays even higher (IUCN, 1982). Bwindi gorillas tend to live in lower elevations, warmer temperatures and are more arboreal than Virunga gorillas (Sarmiento *et al*., 1996). The area of habitat occupied by the mountain gorilla in the Virungas is approximately 375 km^2 and the Bwindi gorillas occupy an area of approximately 215 km^2 (Butynski, 2001).

2.3 Population estimates and trends

Population counts and estimates of mountain gorillas are commonly carried out on the basis of nest or sleeping site counts (e.g. Inogwabini *et al.,* 2000). Adults and immature weaned animals build new nests to sleep in each night. The nests are counted and any dung adjacent to each nest examined gives a reliable indication of group size as well as age of animal, particularly when the counts are repeated over several nights.

The number of mountain gorillas declined throughout the 1970s and early 1980s, and some declines were seen into the 1990s (e.g Binyeri *et al.,* 2002). IUCN (1982) described a decline in the mountain gorilla numbers in the Virungas, from 400-500 in the late 1950s, to 275 in 1973 to 250 by 1981, with most of the decline occurring in the DRC section. However, by the mid 1980s the mountain gorillas of the Virungas had started to very gradually increase again. The 1989 count of mountain gorillas in the Volcans National Park, Virunga National Park and Mgahinga National Park was about 306 animals (Plumptre and Harris, 1995). Most recently a population estimate, based on repeated observations of 17 habituated groups and information on 15 unhabituated groups, has shown the population of the Virunga mountain gorilla to be between 359 and 395 (Kalpers *et al*., 2003).

1979 estimates showed there to be 95-130 mountain gorillas in the Bwindi Impenetrable Forest Reserve (IUCN, 1982). Harcourt *et al*. (1981) noted a total population size of c.155 in Bwindi (where 33% of the population was counted). More recently McNeilage *et al*. (2001) estimated the population in Bwindi-Impenetrable National Park in 1997 to be 292 individuals and note that this population appeared to be stable. At least 300 individuals were reported in Bwindi Impenetrable Forest National Park (Uganda Wildlife Division, 2002a).

The mountain gorilla appears to be gradually increasing in numbers. Based on recent estimates (Kalpers *et al*., 2003 and McNeilage *et al*., 2001), the total number of mountain gorillas may be between 651 and 687, or according to Plumptre *et al.* (2003) there are a total of approximately 650-700 mountain gorillas. According to WWF (2002) the Virunga population of mountain gorilla has increased by 14% in the last 12 years. The Bwindi population is stable and may also be increasing (Uganda Wildlife Division, 2002a; WWF, 2002; McNeilage *et al*., 2001).

2.4 Migratory patterns

The mountain gorillas of the Virunga volcanoes inhabit an area that is shared between three countries, the Democratic Republic of the Congo, Rwanda and Uganda. Gorillas have a home range of between 5 and 30 km^2 (UNEP-WCMC and WWF, 2001), which may include land in more than one country and hence daily foraging movement may involve crossing international borders. The area of habitat occupied by the Virungas mountain gorilla is approximately 375 km^2 and that occupied by the gorillas of Bwindi-Impenetrable National Park is approximately 215 km^2 (Butynski, 2001).

A study by Vedder (1984) in Volcans National Park of Rwanda showed within each of the dietary seasons (October-November and December to September), gorillas responded to decreases in food abundance by expanding their range and travelling further by day, as well as by altering their diet. This group of gorillas travelled through an area of 8.56 km^2 during a 12 month period. Solitary male mountain gorillas travel further and expand their home range as long as they are unmated, and mountain gorilla home ranges typically overlap extensively (Watts, 1994). Watts (1998) found that they used areas less than or equal to 25 km^2 and that annual home range size and core area size varied considerably both with groups and across years. Food and male mating competition can influence the home range and core area selection and size.

3 Conservation status

The IUCN Red List classifies the mountain gorilla as *G. beringei beringei*. The mountain gorilla is classified as Endangered (EN A2cd), on the basis that a reduction in population size has occurred, based on an observed, estimated, inferred or suspected population size reduction of ≥50% over the last 10 years or three generations, whichever is the longer, where the reduction or its causes may not have ceased or may not be understood or may not be reversible, based on a decline in area of occupancy, extent of occurrence and/or quality of habitat and actual or potential levels of exploitation. It was assessed in 2000, by T. Butynski and Members of the Primate Specialist Group, and evaluated by R.A.Mittermeier, W.R. Konstant and A.B. Rylands (Primate Red List Authority) (IUCN, 2002). However, IUCN (2002) also assessed the two populations of mountain gorilla separately due to the taxonomic uncertainty that currently surrounds them. When considered separately (i.e. the Virungas and the Bwindi population as separate entities) each population is considered Critically Endangered (IUCN, 2002).

Despite the low numbers of gorillas and the severe threats they face, overall population numbers would appear to be stable and possibly slowly increasing (See section 2.3 for further details of these trends).

Democratic Republic of the Congo: Seven habituated families in the Congolese parts of the Virunga Massif show an overall increase in the number of these gorillas from 66 to 86 between 1998 and 2002 (Binyeri *et al.,* 2002). Other reports indicate that the Virunga population of mountain gorilla has increased in the last 12 years (WWF**,** 2003).

Rwanda: Reports indicate that the Virunga population of mountain gorilla has increased in the last 12 years (WWF**,** 2003).

Uganda:
Mgahinga National Park: Reports indicate that the Virunga population of mountain gorilla has increased in the last 12 years (WWF, 2003).

The population of Bwindi-Impenetrable National Park is stable and possibly increasing (Uganda Wildlife Division, 2002a; McNeilage *et al*., 2001).

4 Actual and potential threats

The major threats to mountain gorillas are (1) habitat loss or modification (e.g. through infrastructure development, wood extraction, human settlement and agricultural crops (IUCN, 2002)) and forest encroachment (Muruthi *et al*., 2000), (2) hunting or poaching, (3) disease transmission from humans and (4) war or political unrest (Plumptre *et al*., 2003; Muruthi *et al*., 2000; IUCN, 2002). Other threats include the risk of inbreeding (Muruthi *et al*., 2000) and ongoing disturbance from tourism (IUCN, 2002). The mountain gorilla populations are separated by densely populated land and intense human land use is putting intense pressure on both populations (GROMS, 2002). Increasing human settlement contributes to virtually all the threats listed above such as demand for land to live on and to farm, and demand for fuel and for food. Gorillas are Critically Endangered, slow reproducing animals which means that sustained levels or even small numbers of mortalities can have devastating impacts.

4.1 Exploitation

Ongoing harvesting, hunting and gathering for food is a threat to the mountain gorilla (IUCN, 2002). In the Virunga and Volcano National Parks of DRC and Rwanda, infant gorillas may be captured for sale, and adult males killed so that their skulls can be sold as souvenirs to tourists. Adults may also be killed in order to gain access to the infants. An infant can reportedly fetch as much as £86,000 on the black market (Vesperini, 2002).

Hunting of mountain gorillas has occurred, particularly in DRC in the conflicts of the 1960s, but in the last 20 years good protection and support has reduced hunting of this subspecies (Plumptre *et al.*, 2003). However, many incidents of gorilla poaching have been reported. Poaching in the Virunga National Park increased as a result of the armed conflict in Rwanda (UNEP-WCMC and WWF, 2001). Six gorillas have been killed by poachers and at least three infants stolen in the Virunga Volcano Region in 2002 (Anon., 2002). Binyeri *et al.* (2002) reported a number of incidents in the Virunga National Park of DRC in which infant gorillas were abducted for sale, and adults killed to gain access to the infants. In addition, they report that one or maybe two gorillas were killed and partly eaten by Rwandan militia in the Rwandan side of the Virungas (Volcans National Park). Poaching of apes in Uganda is increasing for local consumption as well as to supply a growing market as a delicacy (Kaiza, 2001). Three poachers have recently (January, 2003) been fined and sentenced to four years in prison, after killing two adult gorillas and stealing a baby one (AWF, 2003). Six others that were also involved were fined and sentenced to two years in prison (AWF, 2003).

There was some hunting of the gorilla in the Bwindi Forest Reserve (IUCN, 1982) and in 1995 four adult gorillas were killed, and there have been reports of infant gorillas been taken to sell to private collectors (UNEP-WCMC, 2003a). However, in general there is no evidence of gorilla hunting in the park (UNEP-WCMC, 2003a).

4.2 Habitat degradation/loss

The mountain gorilla lives in an area where there is a high human population. In Burundi, Rwanda and Uganda, including Bwindi Impenetrable Forest Reserve, fragments of forest form part of a landscape that supports one of the highest densities of rural human populations in Africa (Taylor *et al*., 1999).

The main threat to gorillas in **DRC** is forest clearance and, although no land has been appropriated from the habitat of the Virunga gorillas there, declines may be due to the presence of livestock in the Virungas (IUCN, 1982). Deforestation to supply refugees' demand for fuelwood has affected 105 km^2 of the park, of which 35 km^2 has been completely stripped (UNEP-WCMC, 2003b). Plumptre *et al* (2003) comment that when the civil war in DCR ends, it is likely that logging companies will quickly move into DRC. However,

they also note that gorillas often favour areas of secondary vegetation and so could coexist with logging, but hunting of gorillas within the concessions could threaten populations (Plumptre *et al*, 2003).

Forest clearance also threatens the population of mountain gorillas in the Volcans National Park of **Rwanda** (IUCN, 1982). More than one third of this national park was excluded from the boundaries of the national park in 1968 to be used in an agricultural project (Kemf and Wilson, 1997). However, habitat loss has been close to zero here recently (Plumptre *et al*., 2003).

In Gorilla (Mgahinga) National Park, **Uganda**, agricultural and pastoral activities are major threats. Incursions by local people and their livestock are common in the Mgahinga Forest Reserve of Uganda (IUCN, 1982). The boundary of the park has been raised from 2,425m to 2,730m, decreasing the area of the park and removing an important gorilla habitat from the reserve (UNEP-WCMCd, 2003). Deforestation by residents of the lower slopes is destroying more gorilla habitat and this was further exacerbated by allowing restricted bamboo cutting annually in the reserve before 1982. The area seems to be less well protected than neighbouring protected areas in DRC and Rwanda. There are about 400 gorillas in this whole region, but only one group is found in the Ugandan sector (UNEP-WCMC, 2003d).

The Bwindi-Impenetrable Forest National Park population is relatively well protected. Only manual extraction of timber is permitted, and hence logging is very selective although it is allowed throughout the whole forest reserve (now National Park) (IUCN, 1982) and only about 10% of the forest remains free from human disturbance (UNEP-WCMC, 2003a). However, relatively intensive logging and the extraction of gold and charcoal does occur in certain areas, although most illegal activity has been reduced to sustainable levels. Agricultural encroachment is the major threat to forest integrity (UNEP-WCMC, 2003a).

4.3 Impact of Conflict

The early 1990s saw the outbreak of fighting in Rwanda, which by April 1994 had expanded into DRC and resulted in a stream of refugees pouring into gorilla habitat. Indeed, approximately 50% of Rwanda's civilian population were displaced during this conflict, of which 860,000 refugees were concentrated in the vicinity of Virunga National Park (Dudley *et al*., 2002). Shortly after the influx of Rwandan refugees in 1994/1995 into DRC, came the 1996 war between the armed forces of DRC and the rebel movement of Kabila, backed by Angola, Rwanda and Uganda. Subsequently fighting again broke out in 1998 between Rwandan and Ugandan troops and the DRC army.

The streams of refugees that were displaced during these conflicts led to uncontrolled firewood harvesting, and increased poaching in the Virungas National Park and the death of more than four silverback mountain gorillas (UNEP-WCMC and WWF, 2001) and disruption of natural animal migration patterns (UNEP-WCMC, 2003b). Three of the four refugee camps in North Kivu were located in or near to the park buffer zone, and it is estimated that at least 500,000 ha of the park have been affected by wood harvesting or poaching (UNEP-WCMC, 2003b). After the refugees left in 1996, conflict in the DRC led to looting and destruction of infrastructure in the Park, as well as the possible death of 15 Virunga mountain gorillas (UNEP-WCMC and WWF, 2001). Kalpers *et al*. (2003) report that between 12 and 17 gorillas are known to have died between 1992 and 2000 in the Virungas volcanoes region as a direct result of military activity. Concern for the protection and management of the site, especially with regards to recurring encroachments, deforestation, poaching, population growth, and the refugee related problems that have arisen due to civil unrest in Rwanda, led to the site being placed on the World Heritage in Danger List in 1994 (UNESCO, 1994). The situation around Virunga is unstable, militia groups may still be active in the region, aerial census of the area has not been possible since 1995 and there are frequent reports of poaching, deforestation and illegal gold mining in the park (UNEP-WCMC, 2003b). Much of the Virungas has clearly been severely affected by conflict.

4.4 Other threats

Accidental entrapment in snares used to trap other wild animals is also a threat to the mountains gorillas. Plumptre *et al*. (1997) stated that the setting of snares for ungulates in the Volcans National Park, Rwanda is

one of the greatest threats to *Gorilla gorilla beringei*. However, Williamson (1999) reported that at least 99% of the three research groups in the Volcans National Park, Rwanda were in good physical shape.

A potential threat to gorillas is exposure to human diseases (e.g Graczyk *et al*., 2001a; Graczyk *et al*., 2001b) particularly for habituated gorillas that come into contact with humans, in areas of gorilla tourism (UNEP-WCMC and WWF, 2001). Gorilla tourism exposes gorillas to humans and hence to any diseases that humans may be carrying, some of which the gorillas may never have been exposed to before.

An outbreak of scabies in a habituated group of gorillas in Bwindi Impenetrable National Park in 1996 led to the death of an infant male, and the treatment by injections of three others, all of whom survived (Kalema-Zikusoka *et al*., 2002). A subsequent outbreak of scabies occurred in Bwindi National Park in 2000, though fortunately this outbreak did not involve any mortalities (Mudakikwa, 2001). The source of this disease is unknown, but there would appear to be a high prevalence of the disease in the people living around the Park (Kalema-Zikusoka *et al*., 2002). Williamson (1999) reported that in Volcans National Park the most serious threat to the gorillas may be the acquisition of human parasites and disease and recently a number of gorillas in this Park have died of an unknown illness (UNEP-WCMC, 2003c). An outbreak of a respiratory disease, with the possibility of measles as the primary infection, in the Parc National des Volcans in Rwanda claimed sixgorilla lives, and 27 other gorillas were successfully treated (Wallis and Lee, 1999). However, there are few data on the impacts of disease, particularly outside the Virungas (Plumptre *et al.*, 2003).

In Rwanda, strict rules are in place to regulate tourist visiting times and the number of tourists per group (Plumptre *et al*, 2003). In Uganda, veterinary intervention is limited to diseases caused by human beings or life-threatening conditions (Kalema-Zikusoka *et al*., 2002). Other measures are in place and include limiting the approach of humans to 5 m, burying human excrement deeper than 30 cm and chasing gorillas from private lands surrounding the parks (Kalema-Zikusoka *et al*., 2002).

The isolation and low numbers of mountain gorilla populations have given rise to concerns about inbreeding (Garner and Ryder, 1996). The mitochondrial DNA of the Virunga and the Bwindi mountain gorillas exhibited low variability further strengthening this concern, although more extensive sampling is required (Garner and Ryder, 1996).

International trade in live gorillas and gorilla parts, which used to be a threat, has declined since the gorilla was listed in Appendix I of CITES.

5 Legislation

5.1 International

The mountain gorilla, *Gorilla gorilla beringei*, is listed in Appendix I of the Convention on Migratory Species (CMS). Rwanda is not a Party to CMS. The gorilla, *Gorilla gorilla*, was listed in CITES Appendix I on 1st July, 1975, and all Range States are Parties. The gorilla is listed in Class A of the African Convention on the Conservation of Nature and Natural Resources (1969). Both Virunga National Park and Bwindi-Impenetrable National Park are World Heritage Areas. The Democratic Republic of the Congo has ratified and Uganda and Rwanda have accepted the Convention Concerning the Protection of the World Cultural and Natural Heritage (the World Heritage Convention).

5.2 National

As all mountain gorilla populations occur within national parks, they and their habitat afford some degree of protection. However, political and institutional instability as well as illegal hunting and poaching may undermine such protection. National laws in all range states exist for the control of hunting and capture of the gorillas, although wide enforcement of the legislation is difficult due to lack of funds and inaccessibility (Nellemann and Newton, 2002).

Democratic Republic of the Congo: The mountain gorilla is given total protection in the DRC through the Décret relatif à la chasse et à la pêche of 1937 (Decree on hunting and fishing) - possession, transport, and/or

national trade is prohibited or regulated. It is also referred to in the Hunting Act of 1982 and in the 1973 Departmental Order regulating the issuance of special elephant hunting permits and listing protected animals (ECOLEX, 2003). In addition, under Ordonnance-Loi relative à la conservation de la nature of 1969, any person that takes gorillas in a strict nature reserve is liable to a penalty of imprisonment of 1-10 years.

Rwanda: The mountain gorilla is given total protection in Rwanda through the Ordonnance-loi portant création de l'office Rwandais du tourisme et des parcs nationaux (Ordinance establishing the Office of Tourism and National Parks of Rwanda) of 1973 - possession, transport, and/or national trade is prohibited or regulated (ECOLEX, 2003).
The Volcans National Park in Rwanda is a Biosphere Reserve.

Uganda: The taking of mountain gorillas is prohibited by national legislation (Uganda Wildlife Division, 2002a). Relevant legislation includes the Uganda Wildlife Statute, No. 14 of 1996, and the National Environment Statute, No. 3 of 1995. The Uganda Wildlife Statute, No. 14 of 1996 states that "species which migrate to or through Uganda which are protected under any international convention or treaty to which Uganda is party and which section 91 applies shall be protected species under this Statute" (ECOLEX, 2003); the mountain gorilla is included.

In Bwindi-Impenetrable National Park, protection is total, although extractive use may be sanctioned by the Board of Trustees (UNEP-WCMC, 2003a). When Bwindi-Impenetrable National Park and Mgahinga National Park were created, entry to the parks by anyone except authorised researchers was prohibited, thus stamping out large scale logging and gorilla poaching (Nowak, 1995). The parks were later opened to regulated tourism.

6 Conservation measures

A large number of international, national and local Non Governmental Organisations (NGOs), Inter Governmental Organisations (IGOs) as well as national authorities have been involved in various gorilla and ape action plans, conservation initiatives and programmes, which deal with a range of issues. Some of the main activities are described below but there are countless others.

The Great Apes Survival Project (GRASP) is an ambitious project of UNEP and UNESCO in collaboration with a whole range of partners which aims to lift the threat of imminent extinction faced by gorillas, chimpanzees, bonobos, *Pan paniscus*, and orangutans, *Pongo* spp. (GRASP, 2003). GRASP will develop Great Ape Survival Plans (GASPs), raise funds to implement plans and develop a global strategy to co-ordinate efforts. In addition, an Atlas of Great Apes is being produced to provide up to-date information on the distribution status and conservation of the great apes, including the mountain gorilla.

The International Gorilla Conservation Programme was formed in 1991, by three international conservation organisations and three protected area authorities: the African Wildlife Foundation (AWF),
Fauna and Flora International (FFI) and the World Wide Fund for Nature (WWF); the Institut Congolais pour la Conservation de la Nature (ICCN), the Office Rwandais de Tourisme et des Parcs Nationaux (ORTPN) and the Uganda Wildlife Authority (UWA). Its goal is the sustainable conservation of mountain gorillas and their habitats. It aims to strengthen conservation of mountain gorillas in the Democratic Republic of the Congo, Uganda, and Rwanda, to develop a regional approach to mountain gorilla conservation, and to increase cooperation between the protected area authorities of the three mountain gorilla range states. This project has been successful in protecting mountain gorillas in the Virunga range, despite civil unrest and other setbacks. The IGCP has run a number of projects and is involved in population censuses. It works with national institutions and agencies to support conservation efforts, strengthen resources and build capacity. For example, it helps the Institut Zaïrois pour la Conservation de la Nature (IZCN) develop contacts with donor countries (Kemf and Wilson, 1997).

'Open Initiative' has been established by UNESCO and all International Space agencies, to assist developing countries in the monitoring of world heritage sites through satellite images. A pilot project will use satellite images to provide a land cover change assessment during the last ten years – "Surveillance of Gorilla Habitat" project will focus on four existing or proposed World Heritage sites in the Albertine Rift covering

border areas of DRC, Rwanda and Uganda - simple but accurate maps should be the main output of this project (UNEP, 2002).

CITES, CBD and CMS have focussed on the great apes. CMS is focussing on the eastern species of gorilla, which crosses mountainous border areas between UG, RW, and DRC – strengthened cooperation between the 3 governments would aid the survival of mountain gorillas, and a formal accord could be considered under Article IV of the Convention (UNEP, 2002).

All of the current known populations of Eastern gorilla live in National Parks and this has afforded some protection against habitat destruction and other pressures. In addition, the high levels of revenue provided by gorilla tourism has meant that quite a lot of resources have been generated which can be invested in the protection of gorillas and their habitat. Indeed many warring factions actually invested resources to help protect the gorillas in the Virungas, and extensive educational and outreach programmes were developed some of which continued throughout the conflicts (Kalpers *et al*., 2003).

Other projects include that of a computer simulation of the Virungas Mountains as a virtual reserve which is being developed for the Diane Fossey Gorilla Fund International. It aims to plot the gorillas' movements through the virtual reserve, to show habitat preferences, to deduce the carrying capacity of the reserve and assist in the management of the national parks for the conservation of the mountain gorilla (Whitfield, 2002). It will also help keep track of human activities such as poaching and farming (Whitfield, 2002).

Democratic Republic of the Congo: In Virunga National Park, an 'integral conservation policy' has been in operation for over 50 years whereby savanna fires, which maintain the fire-climax vegetation, are managed by the park authorities (UNEP-WCMC, 2003b). WWF is operating a *Virunga Environmental Programme* to raise awareness among communities of the value of conservation (WWF, 2002). Although its activities have been disrupted on several occasions due to civil unrest, more than a million tree seedlings were planted in 1996 with the help of the United Nations High Commission for refugees (UNEP-WCMC and WWF, 2001). The International Gorilla Conservation Programme in conjunction with the Congolese park authorities have undertaken a Ranger-based Monitoring Programme (RBM) which acts as a tool for the rangers to collect information, which in turn helps to inform park management decisions.

Uganda: According to the Uganda Wildlife Division (2002a), Uganda has undertaken the rationalisation of wildlife Protected Areas System Plan through the 1996 to 1998 Scientific Study, and administered special enforcement programmes in the Species Range Protected Areas (Mgahinga and Bwindi Impenetrable National Parks). In addition, Site Action Programmes have been undertaken by the Government, Regional Action Plans are being developed through the International Gorilla Conservation Programme, and a National Action Plan for conservation and monitoring of the population is being initiated through the Great Apes Survival Project, funded by UNDP.

Hamilton *et al.* (2000) and Tamale (1996) described schemes that have been established in Bwindi-Impenetrable National Park to try to mitigate the loss and resentment felt by local people by the establishment of the Park and the concern at the loss of access to local resources. This includes agreements which allow controlled harvest of the park's resources, receipt of some of the tourism revenue and a trust fund to be used partially for community development (Hamilton *et al.,* 2000). Bwindi-Impenetrable National Park opened for mountain gorilla tourism in 1993 (IUCN, 1996) and since 1991 about 3,600 tourists have been visiting the park per year generating approximately US $1 million per year (UNEP-WCMC, 2003a). An overall management plan was prepared jointly by the Institute of Tropical Forest Conservation, CARE Development through Conservation (DTC), and Uganda National Parks although a tourism-specific plan has been in use since the beginning of 1993 (UNEP-WCMC, 2003a). A management plan for Bwindi National Park has been developed, and actions for tourism development, biological inventories *etc* are now in place (IUCN, 1996).

A gorilla conservation project was started in Mgahinga in 1992, which included ecological surveys, training of rangers, cessation of illegal activities and the development of tourism (IUCN, 1996).

According to Uganda Wildlife Division (2002a) a number of actions are being undertaken in Uganda which include

Rwanda: The Volcans National Park has a research zone, a tourism zone and a strict reserve zone but it does not have a buffer zone. A management plan for the park is being developed. The Mountain Gorilla Project has involved habituating four gorilla families to the presence of humans so that visitors can be guaranteed close-up views, and it is jointly financed by the African Wildlife Foundation (AWF), Flora and Fauna International (FFI), Peoples Trust for Endangered Species (PTEF) and WWF who have worked to improve tourism so as to achieve economic independence for the park (UNEP-WCMC, 2003c).

The extensive work and research that has been conducted in and from Karisoke Research Centre has contributed vast amounts of knowledge to assist gorilla conservation. In addition, a Veterinary Centre was established in the Virungas to monitor the health of the gorillas, in particular in response to habituation and increasing contact with humans. However, the work of both these institutions has been severely disrupted as a result of the conflict in the area.

7 Research activities

The mountain gorillas have been well studied, and research is ongoing, despite a number of setbacks due to armed conflict. A number of the programmes and initiatives described in the previous section have or will have research components as an integral part of conservation actions and efforts. However, a number of other research activities are also ongoing. In addition, studies such as research into gorilla taxonomy, which are ongoing, may have serious implications for gorilla conservation, particularly in the light that the Bwindi gorilla may be genetically distinct from the mountain gorilla of the Virungas, as suggested by Sarmiento *et al*., (1996).

DRC: Virunga National Park was set up primarily for scientific research during Belgian colonial rule and much detailed work was carried out on specific taxa, from insects to mammals, particularly in the 1930s and 1950s (UNEP-WCMC, 2003b). IUCN/WWF Project 1941 aims to carry out a survey of the status of the gorilla and provide necessary data for their improved preservation and protection of their habitat.

Rwanda: Intensive research on the mountain gorilla and its habitat has been carried out for the past 15 years, including a census in 1980 funded by WWF and New York Zoological Society (UNEP-WCMC, 2003c). In addition, the mountain gorilla project was initiated in 1978 and the Virunga Veterinary Centre was formed in 1987 (UNEP-WCMC, 2001). Populations have been monitored from the Karisoke Research Centre in the Virunga Volcano region of north-western Rwanda and eastern DRC since 1967. This research has involved the collection of valuable population data and long and short term census studies (e.g. Robbins, 1995), studies on social structures (e.g. Robbins, 1996), group dynamics (e.g. Sicotte, 1995), feeding behaviour and habitat use (e.g. Byrne and Byrne, 1993; Watts, 1998) and reproduction (Robbins, 1999). The Karisoke Research Centre has a resident director, research scientists, about 15 trackers, and camp staff.

Uganda: In 1986, the Impenetrable Forest Conservation Project (IFCP) was set up at Ruhija and the site now contains a library, laboratory equipment, and accommodation and facilities for up to 60 people. It has nowhave been developed into the Institute of Tropical Forest Conservation to act as a field station for the Mbarara University of Science (UNEP-WCMC, 2003a). The main aims of the Institute are to systematically inventory the fauna and flora, initiate conservation programmes, and assess the population, distribution and particular requirements of the mountain gorillas (UNEP-WCMC, 2003a).

Following the establishment of Impenetrable Forest Conservation Project in 1986, the main achievements to date are law-enforcement and also in the areas of inventory and monitoring, research, staff training, and demarcation and securing of park boundaries. In combating the threat of agricultural encroachment from the densely populated areas surrounding the Park, the Uganda Wildlife Authority is assisted by the CARE Development Through Conservation (DTC) and MBIFCT project, which is promoting good relations with the local community via a large-scale agro-forestry programme. In addition to its out-forest work, DTC has also studied in-forest resource use and zoning strategy (UNEP-WCMC, 2003a).

The Bwindi-Impenetrable Great Ape Project was established in 1996 and aims to achieve a better understanding of the ecological relationship between the Mountain gorillas and chimpanzees (*Pan*

troglodytes schweinfurthii) that both occur in the forest. It involves the study of the behaviour, ecology and habitat of both species. A research station, Camp Kashasha, was built in 1998 (Stanford, 1999).

In collaboration with Uganda Wildlife Authority, Makerere University runs the Makerere University Biological Field Station in Kibale National Park and Mbarara University runs the Institute of Tropical Forest Conservation in Bwindi Impenetrable National Park (Uganda Wildlife Authority, 2002b).

8 Needs and recommended actions

a) Policy and legislation

- The mountain gorilla is a protected species in all its Range States, and so enforcement of existing legislation and provision of adequate staff and resources is essential, particularly in the face of lack of funds and inaccessibility. Enforcement of existing legislation needs to be strengthened.
- Tourism must be adequately regulated to ensure it is sustainable, and that disturbance and threats to the gorillas are minimal.
- Ensure that moneys generated from gorilla tourism are invested in local communities and in gorilla conservation.
- Policies to ensure the sustainable use of all natural resources should be developed which should minimise damage to gorilla habitat.
- Standards should be developed which minimise the opportunites for disease transmission from humans to gorillas, which could include a health education programme for local residents, good hygiene and waste disposal practice by researchers, tourists and officials in contact with gorillas.
- Complementary policy and legislation in range states should be developed and transboundary agreements made.
- Rwanda should be encouraged to become a Party to CMS and all range States should be encouraged to participate in intergovernment agreements such as the CBD, and with FAO.

b) Species and habitat protection

There are a number of areas that need consideration to ensure adequate protection of *Gorilla gorilla beringei* and its habitat. These include:

- Ensure that there is no further encroachment of agriculture into national parks.
- The effectiveness of protected areas should be strengthened and any ongoing illegal activities should be stopped.
- Rebuild and mitigate damage caused in gorilla habitat as a result of conflict and war.
- Species legislation in each country should be reviewed to ensure that adequate protection is provided to the mountain gorillas.
- Sufficient staff should be employed to ensure adequate protection from poaching and hunting, to regulate tourism and manage gorilla habitat.
- Gorilla Action Survival Plans should be developed by all national authorities.

c) Monitoring and research

There are a number of areas that need further research in order to ensure effective and appropriate conservation management. These include:

- The taxonomy of the mountain gorilla needs to be clarified to ensure effective conservation and management of the species and subspecies.
- The impact of selective logging, resource harvesting and agricultural encroachment in gorilla habitat should be assessed.
- Continued monitoring of the population numbers and status should be ensured.
- The impacts of tourism, including the risk of transfer of parasites and disease from humans to gorillas should be assessed.

d) Public awareness and training

- Community conservation projects and sustainable use projects in the management of gorilla habitat and gorilla tourism should be developed.
- Developed countries and aid agencies should be encouraged to support conservation initiatives for the mountain gorilla.

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