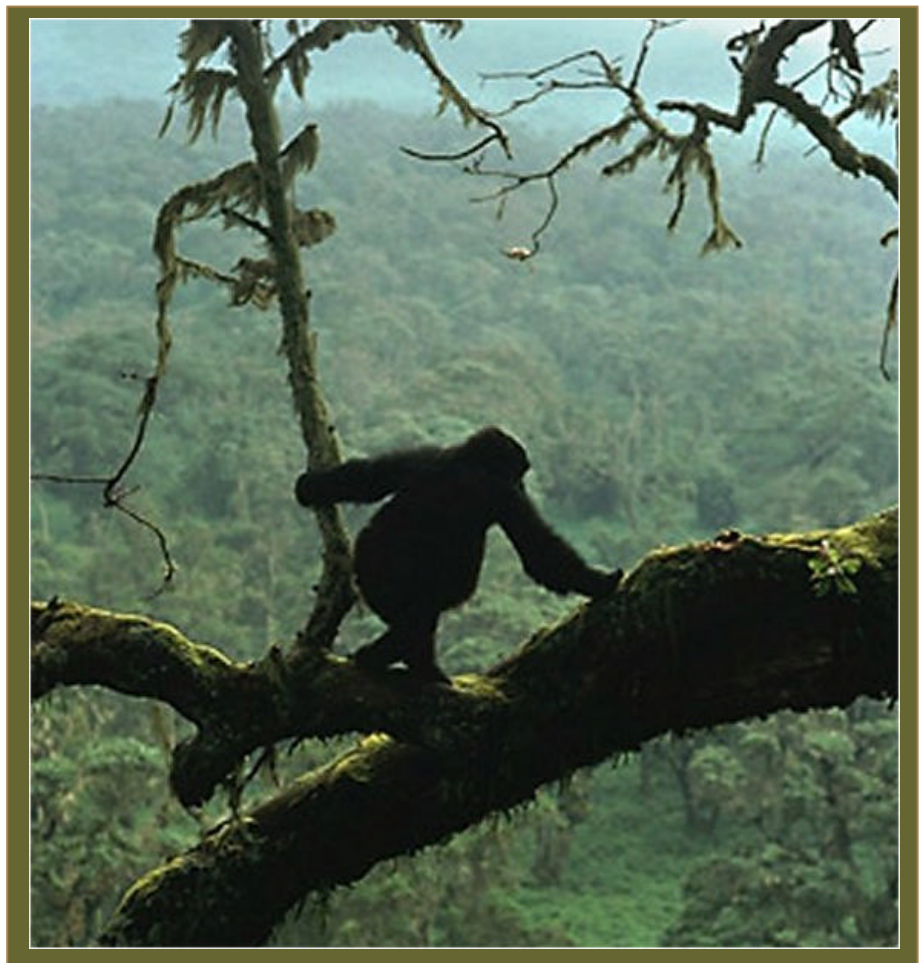


CMS Technical Series Publication N°17

GORILLA

Report on the conservation status of Gorillas.
Concerted Action and CMS Gorilla Agreement
in collaboration with the
Great Apes Survival Project-GRASP

Royal Belgian Institute of Natural Sciences
2008



Institut royal
des Sciences naturelles
de Belgique
museum



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Fore word by Mr. Robert Hepworth

Gorillas are at, one and the same time, highly charismatic and highly endangered in the wild. This guide is intended above all to be a practical tool for the organizations and individuals whose support is vital if we are to halt the slide to extinction of one of mankind's closest relatives.

Several gorilla populations span international borders. The Governments who are partners to the Convention on Migratory Species decided in 2005 to add lowland gorillas to Appendix I of the treaty alongside mountain gorillas which had been listed since 1979. Appendix I listing requires Parties to protect those species throughout their range, and not simply those particular animals which cross borders.

CMS then worked to develop a special agreement for gorillas with the support of the Great Apes Survival Partnership (GRASP), an alliance of Governments, UN agencies, voluntary bodies and scientists led by UNEP and UNESCO. Consultations with range states culminated in the negotiation in October 2007 of a legally-binding CMS Agreement – the first ever “Treaty for the Apes”. I was proud to have attended those negotiations in Paris where nine African range states hammered out the terms of the new Agreement, spurred on by the grim news that we were losing gorillas, alongside humans, as victims in the Congolese civil conflict.

Gorillas face threats from peacetime human activities as well as wars. New settlements, expanding agricultural areas, roads, illegal logging, charcoal production, mining, the bushmeat trade and disease have all contributed to the listing of all gorilla taxa as critically endangered on the IUCN red list. The main objective of the CMS Gorilla Agreement is to provide a framework for concerted action by the ten range states, and other supporters which will not only address these threats but provide a sustainable future for gorillas in their natural African habitats. One of the positive ways we can achieve this is by developing the potential for high-value, selective ecotourism which is already generating very substantial revenue in Rwanda and Uganda. As well as benefiting local communities, a portion of the tourist revenue is earmarked for practical conservation.

The success in stabilizing populations of mountain gorillas in recent years, in spite of civil conflicts, owes much to the revenue which the range states have been able to earn from this unique resource via ecotourism. My wife and I were privileged to be such ecotourists in 2005 and I can assure readers that my hour quietly watching a family of gorillas in the Virungas was one of the most inspiring and memorable events in my life. It was worth every pound I paid!

Our thanks and appreciation go to Roseline Beudels and her team who wrote this report which is Number 17 in the series of CMS Technical Publications. It is to be published in time for the 1st Meeting of Parties to the CMS Gorilla Agreement on 29 November 2008 in Rome. It will also be an early, and tangible, contribution to *Year of the Gorilla* in 2009, a global campaign which is being jointly steered by CMS, GRASP and the World Association of Zoos and Aquaria (WAZA). We hope that this year of media, educational and practical activities will generate even more worldwide support for the action needed to conserve gorillas and their ecosystems as irreplaceable components of our global heritage.

Robert Hepworth
Executive Secretary
CMS/PNUE



CMS Executive Secretary Robert Hepworth under observation by his wife and a Mountain Gorilla Silverback, Rwanda, 2005



Gorillas

Status and Perspectives



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Report on the conservation status of Gorillas

Gorilla gorilla gorilla
Gorilla gorilla diehli

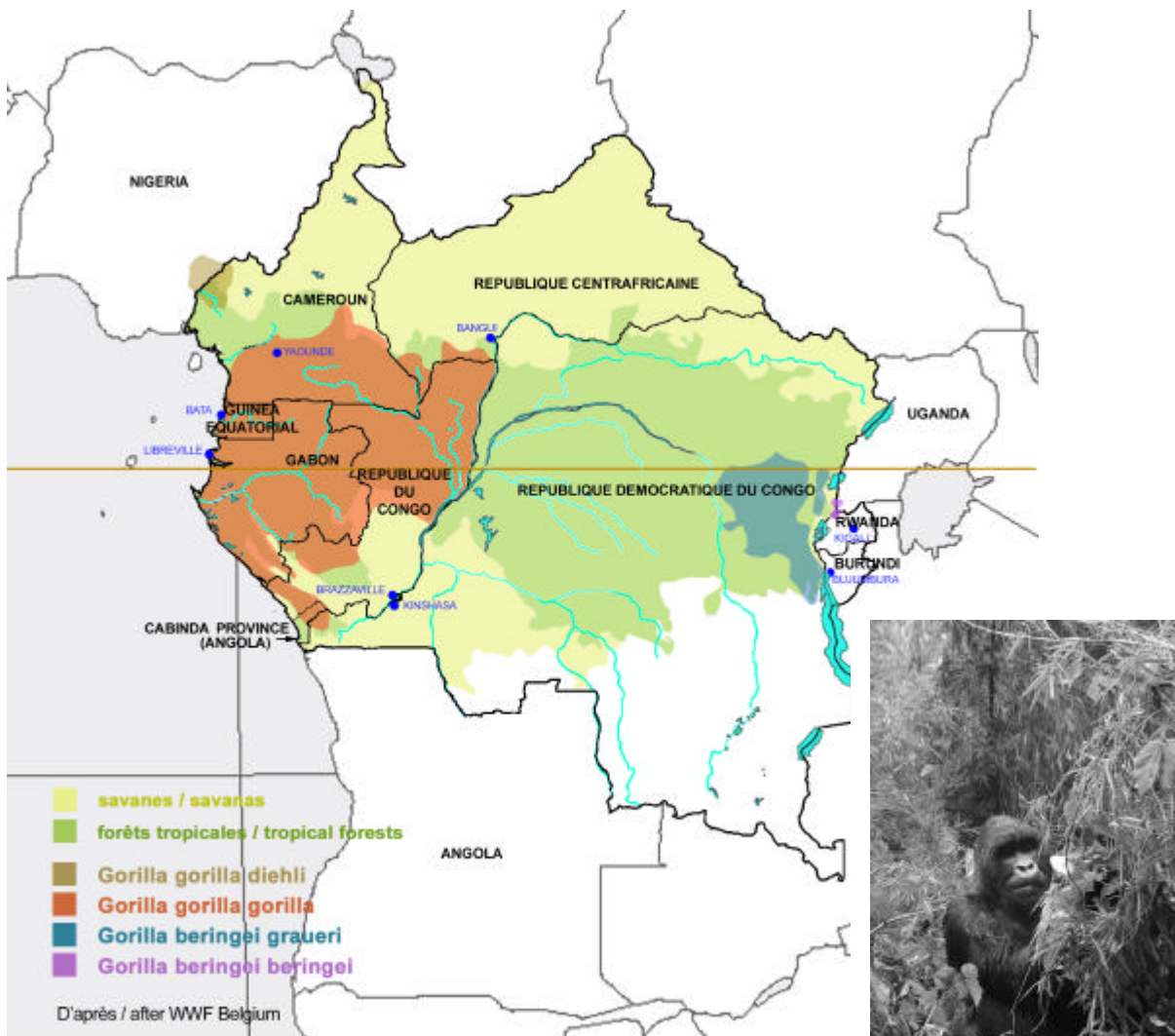


Gorilla beringei graueri
Gorilla beringei beringei

Royal Belgian Institute of Natural Sciences
with the collaboration of GRASP

Institut royal
des Sciences naturelles
de Belgique
museum 

2008



First edition. 2008



Mountain Gorilla.
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These documents concerning current conservation status of Gorillas were prepared by Roseline Cl. Beudels-Jamar, René-Marie Lafontaine, Pierre Devillers, Ian Redmond, Céline Devos and Marie-Odile Beudels.

These documents, prepared for the Convention on Migratory Species, were elaborated on the basis of the different National Strategies for the preservation of Great Apes, the World Atlas of Great Apes and their Conservation (2005), as well as numerous other publications and reports, published or not.

A preliminary version of these documents, prepared for the negotiation meeting of the CMS Gorilla Agreement (Paris, October 2007), has been accessible on the IRScNB website and modifiable online since <http://www.naturalsciences.be/science/projects/gorilla/>

Proposed amendments have been included in the current version.

We are very grateful to Liz Williamson, Fiona Maisels, Maryke Gray, Richard Bergl, Andrew Dunn, Aaron Nicholas, Jacqueline Sunderland-Groves, on their very useful comments and contributions on earlier drafts of this document. Our thanks and appreciation also goes to the *Belgian Group of Primatology (BGP)* for their important contribution. We are also very grateful to our colleagues Isabelle Bachy, Anne Devillers, Jean Devillers-Terschuren, Thibaut Delsinne, Maxime Romeyer and Liam Addis for their precious help and support. Completion of this document was made possible thanks to the generous contributions of the United Kingdom, Monaco and France.

Composition, lay-out, computer graphics and finalization of this document: Marie-Odile Beudels (IRScNB)



A future for wild Gorillas

Most famous among the species of the Green Heart of Africa, gorillas are the ultimate umbrella species that symbolize the predicament of biodiversity throughout the central African forests, including the great Congo Basin countries and their direct neighbours of the Central Albertine Rift. Highly charismatic, these gentle giants move regularly through the forest, ensuring sufficient time for herbaceous plants to re-grow between their visits. Thanks to their size, strength and intelligence, gorillas face almost no major threats from any other species - except human beings. As a result, they are now endangered.

Why are Gorillas now in a precarious state?

Globally, the main pressures and threats facing gorillas are hunting and poaching for bushmeat, disease, habitat degradation and loss through agriculture, timber extraction and mining, as well as the direct and indirect threats posed by civil unrest and wars.

Whilst forest habitats are being degraded and lost throughout the range of Gorillas, there are important geographical differences in the most immediate threats faced by the four currently recognized gorilla taxa, particularly those that occupy the two distant areas of the western and eastern ranges.

Western Gorillas:

- **Western lowland gorillas, *G.g.gorilla***, have suffered exceptionally high levels of hunting- and disease-induced mortality (over 90% in some large remote areas), which combined are estimated to have caused their considerable decline (more than 60%) over the last 20 to 25 years. Most protected areas have serious poaching problems and almost half of the habitat under protected status has been hard hit by Ebola. Commercial hunting and Ebola are both continuing (even accelerating) threats that are not readily mitigated. Because gorillas are long-lived and their reproductive rates are extremely low (maximum intrinsic rate of increase about 3%, Steklis and Gerald-Steklis 2001), they are particularly susceptible to even low levels of hunting. Even an immediate cessation of Ebola mortality and a drastic reduction in the rate of hunting (neither of which seem likely) would not result in rapid population recovery. Moreover, perhaps 20 to 30 years into the future, in addition to on-going habitat loss and degradation from agriculture, timber extraction, mining (GRASP, 2002), climate change may well become a major threat. (2008 IUCN Red List, Walsh, P.D., Tutin, C.E.G., Baillie, J.E.M., Maisels, F., Stokes & E.J., Gatti, S).

The decline of *G.g.gorilla* has been evaluated in various ways, using reference areas and reference periods which do not completely overlap. Previous estimates from the 1980s placed the entire population, which occurs in seven Central African nations, at fewer than 100,000. Since then, scientists believed that this number had dwindled by at least half, due to commercial hunting and disease, particularly outbreaks of the Ebola virus, which have virtually extirpated gorillas from a great deal of otherwise intact forest. In early 2008, the estimate of the world's population of critically endangered western lowland gorillas received a boost with the discovery by WCS teams of large gorilla numbers in previously unexplored remote and not easily accessible swamp forests in the northern part of the Republic of Congo, bringing the population estimates for north eastern Congo to 125,000. Current estimates of the total Western Lowland population are probably in the order of 150,000 -200,000 individuals.

- Intensive surveys over the last decade have found that approximately 250 to 300 *G. g. diehli* survive in a region of roughly 8,000 km², spread in at least 11 localities (Groves 2002, Beament 2004, Bergl 2006, Bergl and Vigilant 2007). Though the localities where the gorillas are found are geographically distinct, the majority of these areas are connected by forested land. Ebola has not been reported in the *G. g. diehli* population, but their close proximity to dense human populations puts them at high potential risk of acquiring human pathogens (Oates *et al.* 2007). Illegal hunting for bushmeat and habitat loss threaten the future of the Cross River gorilla. Logging and extensive agriculture fragment the forest into isolated blocks. Protected areas have now been created or extended to encompass the habitat of most Cross River gorilla subpopulations.

Eastern Gorillas:

Eastern Gorillas have been and still are severely affected by human activity, particularly since the 1990's when instability became civil war, and gorillas and forests conservation had to be conducted against a background of



violence, human tragedy and economic disintegration (IGCP). Law enforcement is one of the first casualties of war. Gorillas are hunted, more now than ever before in war-torn eastern DRC; and their habitat is being destroyed and degraded by mining, agriculture and charcoal production. Anecdotal evidence backed by limited data suggest a significant population reduction in the past 20-30 years and it is suspected that this reduction will continue for the next 30-40 years. The causes of the reduction, although largely understood, have certainly not ceased and are not easily reversible, taking into account the rapidly increasing human population density and the high degree of political instability in the region (IUCN Redlist, 2008. Robbins, M. & Williamson, L.). Long-term strategy often has to be sacrificed in favour of day-to-day survival. In Rwanda, Uganda and eastern DRC, 91% of the human population practice subsistence farming, which requires them to convert the forest into agricultural land. Over 96% of these people rely on firewood, often harvested unsustainably, as their main energy supply for warmth and cooking. Forested parks are for many of them the last remaining source of fuel.

- In the last decade, it is believed that the total population of *G. b. graueri* has declined dramatically, as the lowland populations have been progressively fragmented and reduced (Hart and Liengola 2005; Hart *et al.* 2007), and conservation efforts hampered by civil war. Their habitat continues to become fragmented and discontinuous. The corridor linking the lowlands of Kahuzi-Biega with the mountain sector has been illegally cut. Illegal miners, largely dependent on bushmeat for protein, have also entered the forest in search of valuable minerals such as gold, diamonds, tin and Coltan, a mineral used in the production of cell phones, computers and games consoles. Deforestation due to crop cultivation and the need for fuel wood also remains an ongoing threat to gorilla habitats.
- Although intensive conservation action since the 1970s has resulted in an increase in the Mountain Gorilla subspecies *G. b. beringei*, in the past decade, the rate of growth of the Virunga population is now lower than during the 1980s (Kalpers *et al.* 2003). Additionally, resurgence in poaching and killing of gorillas (approximately 3% of the entire Virunga subpopulation in 2007) directly limits population growth and emphasizes the fragile nature of this small population.

Ebola and other killers: epidemic diseases

In addition to severe impacts on human populations, several outbreaks of the Ebola virus since 2000 may have claimed thousands of great apes in Africa. Ebola hemorrhagic fever is a lethal human disease that kills about 80 percent of its human victims. This virus has an even higher mortality rate of 95-99 percent among gorillas and chimpanzees.

Disease is a potentially devastating threat to gorillas and other great apes. Gorillas are susceptible to many of the same diseases as humans, such as Ebola virus, common cold, pneumonia, smallpox, chicken pox, tuberculosis, measles, rubella, yaws, yellow fever, etc. Another potential threat to gorillas is exposure to human diseases and parasites, particularly for habituated gorillas that come into contact with humans, or close enough for droplet infection, in areas of gorilla tourism.

Bushmeat crisis

Although habitat loss is often cited as the primary threat to wildlife, commercial hunting for the meat of wild animals has become the most significant immediate threat to the future of wildlife in Africa and around the world; it has already resulted in widespread local extinctions in Asia and West Africa. This threat to wildlife is a crisis because it is rapidly expanding to countries and species which were previously not at risk, largely due to an increase in commercial logging, with an infrastructure of roads and trucks that link forests and hunters to cities and consumers. The bushmeat crisis is a human tragedy as well: the loss of wildlife threatens the livelihoods and food security of indigenous and rural populations most dependent on wildlife as a staple or supplement to their diet; moreover bushmeat consumption is increasingly linked to deadly diseases such as HIV/AIDS, Ebola, SARS and Avian Flu.

Forest erosion is driven by both poverty and prosperity

Deforestation is done by rich people and by poor people, with gains large (up to 3000 \$/ha) or small (80\$/ha) (K.Chomitz, 2008).

The Congo Basin contains the second largest continuous tropical rainforest in the world, about 240 million ha of dense forest, approximately 18% of the world's tropical forest. This forest is home to more than 20 million people



most of whom depend on natural resources for their livelihoods. The forest also harbours about 400 mammal species, more than 1,000 different species of birds, and upwards of 10,000 plant species of which about 3,000 are endemic to the region. The Congo Basin forests not only help store the world's carbon, but they also give people, plants, and animals what they need to survive. The Congo Basin tropical and swamp forests, savannas, mountains and volcanoes provide food, water and shelter for unique wildlife and human cultures that have co-existed for millennia. They also make up one of the most important wilderness areas left on Earth.

However tropical forests are disappearing before our eyes. All over Africa, indigenous forests are being cut down at a rate of more than 4 million hectares per year, twice the world's deforestation average. According to the United Nations Food and Agriculture Organization (FAO), more than 10 per cent of Africa's forests were lost between 1980 and 1995 alone (Africa Renewal, United Nations).

The main causes of deforestation are commercial logging (including illegal activities), with the often unsustainable rates practised by many companies, clearing for commercial and subsistence agriculture, and fuel wood harvesting. The improved access to forest areas, created by roads constructed for timber trucks, not only fragments the forests but also greatly facilitates commercial hunting, exploitation by local communities and resettlement by refugees, who eventually introduce wildfire through their various life-sustaining activities. In the absence of enforcement of regulations, previously inaccessible areas are opened up to poachers and hunters whose activities are supporting a lucrative bushmeat trade for wealthy urban-dwellers while seriously threatening wildlife and those who depend directly on it (WRI 2001).

Pressures on forests are driven by both wealth and poverty. A huge rural population relies on low-productivity agriculture for subsistence. A growing, increasingly wealthy urban population demands commodities produced at the forest's edge: beef, palm oil, coffee, soybeans, and chocolate. Forests are also under pressure from loggers. Poor people need fuel wood, and a wealthier world demands more wood. These demands are only partly met by plantations. Logging thins and degrades forests, opens up new networks of forest roads, and allows access by farmers who then burn the remaining trees to establish agriculture (Chomitz, 2007).

These pressures are set to increase over the next 20–30 years, driven by rapid population growth, poor social development, low employment opportunities, low-income levels, and lack of affordable alternative sources of energy. With more than 90% of households in Central Africa involved in agriculture, and the human population growing at 2–3% per year, demand for agricultural land is increasing, as is the scale of forest transformation.

Moreover, when forests are cleared, they release large amounts of carbon dioxide into the atmosphere, exacerbating the climate change problem. Currently, deforestation and degradation accounts for about 18 to 25 percent of global anthropogenic greenhouse gas emissions.

The current state of Gorilla conservation: challenges and opportunities

Under current management systems, great apes, and gorillas in particular, are disappearing in many Range States, mainly because:

- the political will to address vital conservation concerns is lacking, or not high enough
- forest governance remains insufficient
- necessary legal and institutional reforms have not been introduced
- conservation remains under-funded and a low policy priority. Legislation is often in place, but there is a huge enforcement deficit. Protection of endangered species vulnerable to poaching is a costly exercise, and these costs must be met.
- much too little attention is given to forest destruction as a major source of greenhouse gases. When forest are cleared, they release large amounts of carbon dioxide into the atmosphere, and reduce the amount of photosynthesis exchanging CO₂ for oxygen and sequestering carbon, thereby exacerbating the climate change problem in two ways.

Gorillas and their habitats must be turned into a living asset:

Developing instruments to finance conservation: Many natural habitats provide a wide spectrum of global services far more valuable, both in monetary and non-monetary terms, than the benefits derived from the direct, destructive, consumption of their products, but continue to be destroyed because of the lack of incentives for conservation.



Environmental service payments addressing climate change, if the market for carbon develops further, seem a very promising avenue; the opportunity should not be missed.

Ecotourism in the range states is still underdeveloped: Ecotourism is among the fastest growing industries in the world and has been widely used to generate resources for conservation; when developed well, it is one of the best ways to involve local inhabitants in conservation activities and sharing with them the benefits flowing directly from the presence of great apes. Ecotourism remains underdeveloped in some Gorilla range states partly because of the remoteness of many sites and the difficulties of seeing un-habituated gorillas in dense tropical rain forest. The most successful models for gorilla tourism can be found in Rwanda and Uganda. Ecotourism potential varies considerably across the range: further opportunities to develop it exist and a proactive approach is probably advisable.

Governmental agencies/NGOs synergies: Where government agencies are under-resourced, joint management between the government and other conservation actors including NGOs can improve conservation efforts. Such partnerships are new and promising avenues for large protected areas management and conservation. These arrangements recognize that ultimate responsibility for resources rests with governments but that other agencies can mobilise means and expertise that may not be readily available in government institutions.

Biodiversity-sensitive development must be part of the solution: Range States should adopt and implement known guidelines for best practices in sustainable development, e.g. the IUCN/SSC Primate Specialist Group Best Practice Guidelines for reducing the impact of logging on great ape populations.

The Role of CMS

CMS received a broad mandate to develop a Gorilla Agreement, and, together with GRASP, to assist Range States in developing and implementing a Gorilla Action Plan:

CMS can facilitate partnerships among Range States, international NGOs, and the scientific community to assist countries in developing sustainable conservation solutions.

Actions by any one country in isolation may not be sufficient to save a species like the Gorilla, and genuine commitment and partnership are needed to achieve this objective. To implement this vision of Gorilla conservation, CMS and GRASP propose to facilitate a global alliance to develop more effective conservation strategies in consultation with country experts and governments, and to tackle problems that transcend national boundaries.

The way forward

As part of the Gorilla Action Plan, Range States and international partners will be asked to:

- Establish additional protected areas: networks of connected protected areas are a tried and tested approach to conserve species and habitats, and maintaining forest environmental services. Well managed protected areas do not normally suffer deforestation;
- Ensure connectivity of natural habitats, by establishing corridors that provide a biological linkage between protected areas; this can be achieved through land use management of otherwise unprotected land adjacent to or between protected area;
- Establish buffer zones around protected areas;
- Improve ecosystem management in all forest concessions;
- Establish forest monitoring schemes; plan and reduce forest road development;
- Considerably reduce or halt deforestation and promote sustainable agriculture.
- Raise awareness of the importance of public goods such as biodiversity, carbon sequestration, and other environmental services from forests;
- Take all necessary measures for the conservation of globally significant biodiversity;
- Enhance national and global efforts to monitor forests and evaluate the impacts of forest projects and policies—including devolution of forest control;
- Enhance transboundary, regional and international collaboration on forest conservation, notably through the use of remote sensing and independent monitoring of logging concessions

?



To conserve globally significant biodiversity and forest habitats, much higher financial support than that currently available must be mobilised at a global level. This is a real challenge for which several avenues must be explored.

First and foremost, one can hope that decision-makers will increasingly recognize that the conservation of the natural heritage is a responsibility of all humanity and future generations, not just of the people today who happen to live where this heritage is located. Concomitantly, the obligations and the financial burden engendered by that conservation must also be shared by all. The costs required, to implement the appropriate regulatory and incentive legislations by Range States, the capacity-building that their enforcement demands, the proper construction, management, surveillance and monitoring of protected areas, should, as much as possible, be shared by global public funds, channelled through multilateral or bilateral agreements.

This indispensable effort of public responsibility can be supplemented by private support, mobilised by the appeal of charismatic species. Excellent examples exist in various parts of the world of tools accessible to NGOs, such as the buying of long-term logging rights in forest areas, or participation in the duties of protected area management.

Where outright subordination of forest management to conservation interests is impossible or undesirable, it may be possible to ensure that users integrate biological diversity and flagship species in their work-plans, through effective impact assessment and compensation legislation, i.e. applying to the natural heritage a form of “Polluter Pays Principle”. Other methods may exist to involve logging corporations in heritage conservation such as “Business and Biodiversity Offsets Programmes (BBOP)”, conservation actions designed to compensate for the unavoidable residual impact on biodiversity caused by infrastructure projects, to ensure “no net loss,” and, preferably, a net gain in biodiversity. Other potentially useful initiatives exist, such as the EBI (Energy and Biodiversity Initiative). These programmes could be explored to evaluate if and how they can be used to negotiate with logging companies, or with other businesses, new deals for the conservation of biodiversity of global significance. It appears that biodiversity offsets can contribute to conservation and deliver livelihood benefits for local communities while also generating business benefits. Under the BBOP scheme companies would quantify their impacts on biodiversity and seek to offset them through activities that advance conservation goals at the landscape scale.

Finally, some market-related tools could be considered to mobilise funds. Thus, *global carbon finance* offers a promising opportunity for mitigating climate change, and conserving forests. About a fifth of global CO₂ emissions comes from tropical deforestation. Yet carbon markets, such as those under the Kyoto Protocol and EU Emissions Trading Scheme, do not yet reward forest holders for reduced emissions from avoided deforestation. However, reduced deforestation helps reduce the global cost of arresting rising atmospheric CO₂. Maintaining the world’s remaining forests requires multiple strategies. If verifiable and credible emission reductions can be generated, carbon markets could provide one important source of revenue for REDD (Reducing Emissions from Deforestation and Degradation) (WRI, 2007). In addition to carbon-market based solutions for REDD, policymakers must also consider creating new, separate REDD funds:

- Create a system of financial incentives: developing countries would receive payments tied to measured reductions in deforestation
- Develop national infrastructure for forest carbon, including institutions and policies to monitor it and reduce deforestation, particularly of old growth forests.

Payments for eco-system services other than carbon should also be explored, with the ultimate goal of making natural forests worth more standing than cut down. The role of keystone species such as gorillas in maintaining the health of the forest should be integral to such mechanisms.

Conclusion

Saving Africa’s forests from the chainsaw and axe of encroaching humanity is essential to the health and productivity of much of the continent’s economy. Forests are essential to generate rain, for water catchments, to prevent soil erosion and, as one of the world’s most efficient living storehouses of carbon, to help regulate global climate.

The challenge of saving Gorillas and the forests of central Africa has become a global one and calls for a global commitment. The successful conservation of these forests biodiversity and the natural and cultural heritage that sustains them are probably the best key indicators of sustainable development and require greater global resources.



Note: Best Practices for Great Apes Conservation, by the IUCN/SSC Primate Specialist Group:

The first three reports in the series have now been published, and are available in PDF format on the pages below:
(see following page for titles soon to be published)

[Best Practice Guidelines to Reduce the Impact of Logging](#)

[Best Practice Guidelines for Great Ape Re-introduction](#)

[Best Practice Guidelines for Surveys and Monitoring of Great Ape Populations](#)



**IUCN/SSC
PRIMATE SPECIALIST GROUP**

Best Practices for Great Ape Conservation

The IUCN/SSC Primate Specialist Group is developing a series of guidelines to address critical issues in great ape conservation, drawing on the expertise of PSG members to create a consensus of best practices for field conservationists. Each publication in the new series will provide up-to-date guidance for scientists working on a daily basis with great apes, as well as for the many development organizations, donors and government agencies that are involved in great ape conservation.

Each of these publications will be focused on a specific issue affecting the immediate survival of great ape populations, including:

- Reduced Impact Logging
- Reintroduction
- Survey Methods & Population Monitoring
- Disease Monitoring
- Human/Great Ape Conflict
- Tourism

Based on the most current information, each publication is designed to give a clear, comprehensive overview of an issue, and to provide expert recommendations on how to address it. Particular emphasis will be placed on which practices have or have not proven successful in the field.

The first three reports in the series have now been published, and are available in PDF format on the pages below:

[Best Practice Guidelines to Reduce the Impact of Logging](#)

[Best Practice Guidelines for Great Ape Re-introduction](#)

[Best Practice Guidelines for Surveys and Monitoring of Great Ape Populations](#)

Additional reports will be produced on a regular basis, with the eventual goal of providing a comprehensive framework for natural resource managers working in great ape habitat. For more information, please contact Dr. Liz Williamson, Coordinator of the PSG Section on Great Apes, at [sga_coordinator {at} conservation.org](mailto:sga_coordinator@conservation.org).



Gorilla gorilla gorilla

Conservation Status Report



Institut royal des Sciences naturelles de Belgique



GORILLA GORILLA GORILLA

1. TAXONOMY AND NOMENCLATURE



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1. Remarks on taxonomy

The taxonomy currently followed by CMS (Wilson & Reeder, 2005) recognises two species of gorilla. The Western Gorilla *Gorilla gorilla* has two subspecies *Gorilla gorilla gorilla* and *Gorilla gorilla diehli*.

The eastern and western species are separated by approximately 1,000 km (Garner & Ryder, 1996). Western and eastern gorillas can be distinguished by external features (Groves, 2002), together with clear geographic and morphological distinctions (Garner & Ryder, 1996).

We present here a status report for the Western Lowland Gorilla, *Gorilla gorilla gorilla* (Savage & Wyman, 1847) the nominal form of western gorilla living in the western Congolian forest, west of the Congo/Oubangi Rivers and south of the Sanaga River.

1.2 Nomenclature

The American physician and missionary Thomas Staughton Savage first described the Western Gorilla (he called it *Troglodytes gorilla*) in 1847 from specimens obtained in what is now Gabon. The name was derived from a Greek translation of the word Gorillai (a "tribe of hairy women"), described by Hanno the Navigator, a Carthaginian explorer who led a voyage (circa 480 BC) around the coast of West Africa, passing an active volcano (only Mt Cameroon fits the description) before encountering the 'Gorillai. There is much academic debate over whether the 'hairy women' he saw are what we know as gorillas today.

1.2.1 Scientific name

Gorilla gorilla gorilla (Savage & Wyman, 1847)

1.2.2 Synonyms

Troglodytes gorilla, *Troglodytes savagei*, *Gorilla gina*, *Pseudogorilla gorilla*, *Satyrus adrotes*, *Satyrus africanus*, *Pithecus gesilla*, *Gorilla castaneiceps*, *Gorilla mayema*, *Gorilla gorilla matschiei*, *Gorilla gorilla halli*, *Gorilla jacobi*, *Gorilla gorilla schwarzi*, *Gorilla hansmeyeri*

1.2.3 Common names

English – Western Lowland Gorilla, Coast Gorilla

French – Gorille de plaine de l'ouest

Spanish - Gorila de llanura del oeste *ou* Gorila de planicie occidental



1.2.4 Description

Very large, the largest living primates. Barrel-chested ape with relatively even hair (longer on the arms), a bare black face and chest and small ears. The bare protruding brows are joined and the nostril margins are raised. Females are much smaller than males. Adult males range in height from 165-175 cm (5 ft 5 in-5 ft 9 in), and in weight from 140-200 kg (310-440 lb). Dominant adult males, called silverbacks, have a prominent sagittal crest and striking silver coloration from their shoulders to rump. Adult females are often half the size of a silverback, averaging about 140 cm (4 ft 7 in) tall and 100 kg (220 lb). Occasionally, silverbacks of over 183 cm (6 feet) and 225 kg (500 lb) have been recorded in the wild. Gorillas move around on the ground by quadrupedal locomotion, knuckle-walking on their hands but with their feet flat. Although predominantly terrestrial, they climb well, if cautiously, aided by the grasping big toe on their feet. The belly of wild gorillas is much larger than in captive specimens.

The western lowland gorilla is the smallest and lightest of the four subspecies, and also the one in which sexual dimorphism is more pronounced (Gautier & al, 1999). The shape of the nose provides a point of difference between the eastern and western forms; the western race has an overhanging tip to its nose that is absent in the eastern forms. Western lowland gorilla have chestnut-brown, not black, hair on their heads though the extent is variable. Western gorillas have more rounded faces and slender chests than eastern gorillas (Rowe 1996; Nowak 1999).

2. BIOLOGY OF THE SUBSPECIES

2.1 General Biology

Gorillas are mainly terrestrial. The gorilla's large size and folivorous habits mean that the animals must spend long hours feeding everyday to maintain their body weight. Of all the great apes, the gorilla shows the most stable grouping patterns. The same adult individuals travel together for months and usually years at a time. It is because gorillas are mainly foliage eating that they can afford to live in these relatively permanent groups. Foliage, unlike fruit (especially the ripe fruits that the ape gut requires), comes in large patches than can in turn support large groups of animals. In West Africa, where fruits form a far higher proportion of the gorilla's diet than in the East, gorilla groups tend much more often to split into temporary feeding subgroups than they do in east Africa, as animals range far apart searching for the relatively scarce ripe fruit. Sleeping subgroups have also been reported but are anecdotal and seem to occur in the process of permanent splitting of a multi-male group into two one male groups. Lowland gorilla groups usually number 5 to 10 individuals, but some groups can count as many as 20 to 32 animals (Bermejo, 2004).

2.1.1 Habitat

The Gorilla is a forest species.

Western lowland gorillas inhabit dense primary rainforest, swamp forest, thicket, secondary vegetation, forest edges and clearings, riverine forests and abandoned cultivated fields within or adjacent to forest. Western lowland gorillas have occasionally been observed nesting along savannah-forest edges or in the savanna itself, but they do not live permanently in these savannah habitats. They have also been observed feeding in seasonally fruiting trees in coastal forests.

Western lowland gorillas inhabit primary and secondary lowland tropical forests at elevations from sea-level to 1300 m (e.g. in Monte Alen and Monte Mitra in Equatorial Guinea). Gorilla occurrence and density seems to be positively correlated with terrestrial herbaceous vegetation, particularly monocotyledonous plants (including gingers and palms).

Western lowland gorillas experience unimodal or bimodal pattern of rainy season depending of their location. Average rainfall is around 1500 mm with the greatest amount of rain falling between August and November and diminishing during December through March (Poulsen & Clark 2004).



Western gorillas appear to be absent from areas close to human settlement and disturbed secondary forests, avoiding utilised roads and plantations (Tutin & Fernandez, 1984). Gorillas favour areas where edible herbs are more abundant and it is often the case in old secondary forest. The fairly high density of western gorillas seen in the Dzanga Sector of the Dzanga-Ndoki NP in Central African Republic has been attributed to the presence of moderately disturbed or secondary forest, which is rich in nutritious folivore food such as herbs (Blom et al., 2001).

In the Odzala-Koukoua NP in Congo, western lowland gorilla occupies a large variety of habitats. Here they primarily live in open-canopy forest with a richly understory vegetation of Marantaceae. This forest type is dominant in the northeastern part of the park. The ground vegetation is dominated by an almost impenetrable thicket of Marantaceae species, including *Haumania liebrechtsiana*, *Megaphrynium macrostachyum*, and *Sarcophrynium* spp. Western lowland gorillas are also found in more closed-canopy primary forests. In and around the northern part of the Odzala-Koukoua NP there are more than 100 forest clearings. They have a particularly sodium-rich herbaceous vegetation and are known as saline or bais. Gorillas are known to visit these clearings on a regular basis to feed on plants from families such as *Cyperaceae* and *Asteraceae*. Swamp forests are now considered important habitats and feeding areas for western gorillas, supporting them in high densities both in the wet and the dry season (Fay et al., 1989). The soils of these swamps tend to be waterlogged or permanently flooded and the aquatic plants such as *Hydrocharis* spp. provide an important food resource for western gorillas (Nishihara, 1995). High densities of gorillas in swamp habitat in northern Congo were recently reported at the International Primatological Society Congress (Stokes et al. 2008).

Common plant species in swamp forest include those belonging to the genera *Xylopia*, *Raphia*, *Klaineanthus*, *Trichilia*, *Lophira*, *Guibourtia* and *Aframomum* gingers (Bermejo, 1999; Fay et al., 1989). In Northern Congo western gorillas favour swamps forests where *Raphia* is common, a palm used both for food and nest construction (Blake et al, 1995). In south-western CAR the distribution of gorillas seems to be influenced by the availability of *Aframomum* spp. (Carroll, 1988).

2.1.2 Adaptation

Gorillas are closely related to humans and are considered highly intelligent. It is possible that western gorillas have a food culture, with learned preferences passed on between individuals and generations (Nishihara, 1995). Use of tools has also recently been observed in the wild (Breuer, 2006).

Gorillas are largely herbivorous (plant-eating). Plant material contains cellulose which is indigestible to many non-herbivorous animals. With regard to digestion, herbivorous animals that do not ruminate (re-chew their food as part of the digestive process) rely solely on the microbes (microscopic bacteria) living in their colon. The bacteria function to breakdown the indigestible plant cellulose and turn it into valuable digestible carbohydrates through the fermentation process.

Food availability affects both diet and foraging behaviour of gorillas. High quality herbs that are easily digestible and rich in proteins and minerals are scarce and patchily distributed in western gorilla habitat, outside swamp forest areas. Fruit is relatively widely available in their habitats and forms an important part of the diet of western lowland gorillas, at least in comparison with their eastern counterparts. The seasonal importance of fruit and herbs in the diet of the western gorilla has been much discussed. The availability of seasonal fruit appears to shape the foraging and ranging patterns of western gorillas (Remis, 1997). When fruit is abundant seasonally, it may constitute most of the diet. High-quality herbs (rich in minerals and proteins contents) are eaten all year round, while low-quality herbs are eaten only when fruit is scarce. More leaves and woody vegetation are consumed during the dry season (January-March) when few fleshy fruits are available, more fruit is eaten at other times. In habitat where the leguminous tree *Gilbertiodendron dewevrei* is present, gorillas feed heavily on its seeds and can travel some distance during mass fruiting events (occurring at five years intervals) to congregate in stands of *G. dewevrei* (Blake & Fay, 1997). Insects are also part of their diet (termites and ants), although their relative importance is still undetermined (Tutin & Fernandez 1992; Remis, 1997; Deblauwe, 2003; 2006).

Western gorillas travel farther when more fruit (and termites) are available in the forest and have shorter day ranges when they must rely on leaves and woody vegetation (Goldsmith, 1999).



2.1.3 Social behaviour



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As far as group structure is concerned, gorillas form harems. Reproductive groups of western gorillas almost always contain only one dominant silver-back male plus three or four females and four or five offspring (Fay, 1989). Groups that contain more than one silverback have only very occasionally been reported among western lowland gorillas. Adult females in any group are mostly unrelated, and the social ties that exist between them are weak. In contrast to many other primates, it is the bond between each individual female and the silverback, rather than bonds between the females that hold the group together. Upon reaching maturity, both 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 (Parnell, 2002).

Western Lowland Gorillas generally form stable cohesive groups. The takeover of a group in which its silverback is ousted by another from outside has never been reported, and group fission has been reported on only one occasion (Remis, 1997). However, western gorillas do not appear to be as cohesive on a daily basis as their eastern counterparts. In some groups, members spread out with distances of over 500m between them, other groups split up during the day and then reunite at the nest site. Recent studies at bais also suggest that around those particularly attractive locations, population dynamics might be more active than previously thought (Gatti et al, 2004), with frequent migration and exchange of individuals between groups. All-male groups have been observed in bais (Levrero et al, 2006) which is the first report of that kind in lowland gorillas.

The very large groups sometimes observed among eastern gorillas have not been reported to occur in western gorillas. Group size appears to be influenced by the size of the foraging patches and fruit abundance. Western gorillas eat considerably more fruit than eastern gorillas, and this preference for clumped food resources may constrain their group size. Total group size ranges from two to 32 individuals with an average of four to six adults. Larger groups typically contain a higher proportion of adult females, as most groups are single male harems.



2.2 Distribution (current and historical)

Historical distribution was probably very close to the current distribution: the western lowland gorilla inhabits the tropical forests of Cameroon, Central African Republic, Gabon, Congo, and Equatorial Guinea. It is also reported to be present in the Mayombe forests in extreme south-west DRC, with at least some groups said to migrate seasonally across the Angola (Cabinda) border, north of the Congo River (Redmond, 2006).



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The Congo/Oubangi River seems to be the eastern limit of the distribution, the Sanaga River represents the northern limits of the closed forest and concomitantly of the western lowland gorillas, nevertheless a small population¹ exists North of the river in Ebo Forest (Morgan et al., 2003). The Atlantic Ocean represents the western boundary of the distribution and the southern edge of the western lowland gorilla's distribution is defined by the forest-savanna ecotone.

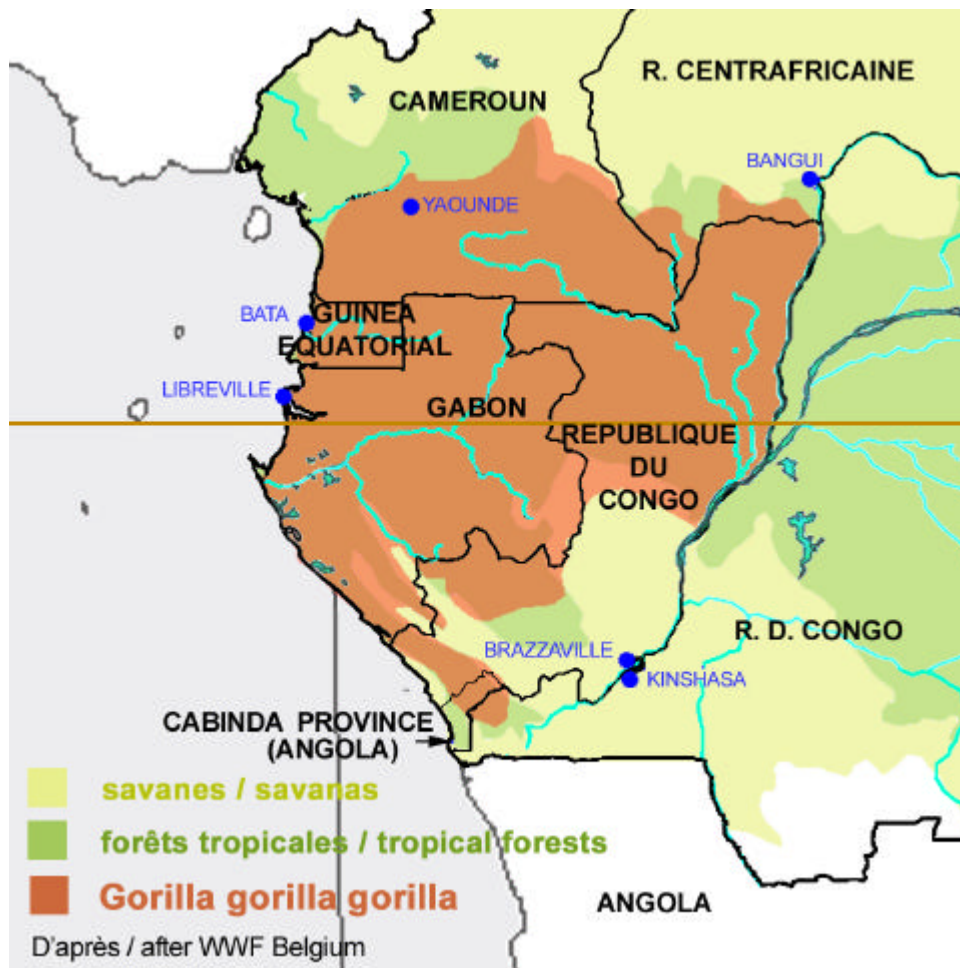
The western lowland gorilla is still a relatively widespread species. Distribution has been reduced locally and local extinction was suspected in the extreme western tip of DRC, but recent data suggest that the species is still present, even there.

But if the recent decline of western gorillas continues, more reduction in their distribution shall soon be noted. Surveys conducted in the 1980s indicated that healthy populations existed in many areas remote from human settlements until then. However, despite the fact that western equatorial Africa has one of the lowest human population densities of any tropical forest area in the world, gorilla (and chimpanzee) populations in this region are, today, in dramatic decline. This is due to increased commercial hunting, the spread of logging, which alters forest structure and facilitates poaching, and outbreaks of Ebola haemorrhagic fever. Figures in areas where studies have taken place are frightening: the average annual rate of decline in Gabon between 1983–2000 (Walsh et al., 2003) was 4.7% and the high mortality (>80%) recorded in two known populations affected by Ebola (Bermejo et al., 2006; Caillaud et al., 2006) underline a critical state for conservation and the need for urgent reinforcement of their protection.

¹ but from genetic information it is suspected that these, as any others north of the Sanaga, may be members of a separate subspecies already known from the Cameroon-Nigeria border, the Cross River Gorilla (*G. g. diehli*)



Figure 1. The distribution (brown areas) of the Western Lowland Gorilla, *Gorilla gorilla gorilla*



2.3. Evaluation and evolution of populations

Accurate population estimates for gorillas are often difficult to establish, because their vast range has not yet been thoroughly surveyed. Population counts and estimates of gorillas are commonly carried out on the basis of nest or sleeping site counts (Kühl et al., 2008). Normally all weaned individuals build new nests to sleep in each night. The procedure of ape population estimation is first to estimate nest density (number of nests, or nest groups per square kilometre). The estimate is then divided by the product of the mean number of days that the average nest remains visible *at that site, in that season, in that vegetation type* and the number of nests produced per weaned individual, per day (normally 1). If the original estimate was individual nest density, the resulting number is the estimated individual ape density at that site. If nest group density was the original number, then the result has to be multiplied by the mean nest group size at the site (using only fresh or recent nests). More detail can be found in Kühl *et al.* (2008).

Because surveys of Western Lowland Gorillas are usually carried out on a site basis it has been difficult to assess population status and trends. However the recent paper of Walsh *et al.* (2003) used two country-wide surveys twenty years apart to show that roughly half of Gabon's gorillas vanished between 1983-2000. A recent set of surveys encompassing much of Northern Congo showed that there are very high densities in Raphia swamps and that well protected logging concessions can also have medium densities (Stokes et al., 2008). However these studies also showed that (i) not all swamps harbour high gorilla densities and (ii) gorilla numbers are low to very low in logging concessions that have no effective antipoaching. These confirm other more site-based reports from the region as a whole. .

Previous estimates of western lowland gorillas were based on habitat suitability (Harcourt 1996) but unfortunately in this region, even good habitat type does not necessarily mean that there are gorillas present. Hunting and Ebola have



taken their toll (and continue to do so) and in 2007 it was estimated that at most half of these survived. Numbers have been boosted by additional populations discovered in previously unsurveyed swamps in northern Congo, but it should be remembered that of the oft-quoted 125,000 gorillas in that area, at least 46,000 were already known about, in the Nouabale-Likouala landscape (Stokes *et al* 2008). The tally of northern Congo's gorillas incorporates 73,000 found in the Ntokou-Pikounda region and 52,000 from the Ndoki-Likouala landscape, and a previously unknown population of nearly 6,000 gorillas was discovered in an isolated raphia swamp. Many of them live outside of existing protected areas, and their survival is essentially due to remoteness (from villages) of the areas recently surveyed.

The vast majority of western lowland gorillas occur in Congo and Gabon, followed by Cameroon (in the southwest corner). Southern Congo harbours a reasonable (transboundary with Gabon) population in the Conkouati-Douli National Park. Equatorial Guinea still harbours some, but there is no country estimate. There is a population in the Dzanga-Sangha area of southwest Central African Republic, shared with the contiguous Nouabale-Ndoki area of Congo. There was a population in the Ngotto forests of southern CAR in the early 2000's but there have been no recent surveys and numbers are unknown for either of these two sites. Finally, gorilla numbers in the contiguous Cabinda province (Angola) and Mayombe (Bas-Fleuve region) are unknown but probably very low - perhaps a few tens - as a result of the combined effects of habitat loss, fragmentation, and poaching (Redmond 2006)



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The Western Lowland Gorilla (*Gorilla gorilla gorilla*) is listed as Critically Endangered on the IUCN Red List (IUCN 2008, CR A4cde) even though the taxon occurs over a wide area with relatively low human population densities. The subpopulations generally occur at low densities and their distribution is patchy. It has been estimated that 80% of the population live outside protected area (Harcourt 1996).



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2.4. Migrations - movements

Western lowland gorilla groups travel within a home range averaging 5 to 30 km². Gorillas do not display territorial behaviour, and neighbouring groups often overlap ranges (Bermejo, 2004, Doran et al., 2004). The group usually favours a certain area within the home range but seems to follow a seasonal pattern depending upon the availability of ripening fruits and, at some sites, localised large open clearings (swamps and "bais"). Gorillas normally travel 0.5-3.0 km per day (Remis, 1997b, Doran et al., 2004).

Food availability affects the foraging behaviour of western lowland gorillas. Populations feeding on high-energy foods that vary spatially and seasonally tend to have greater day ranges (average distance travelled by a group per day) than those feeding on lower-quality but more consistently available foods. Western gorillas fit this pattern as they travel farther when more fruit and termites are available in the forest, and have shorter day ranges when they must rely on leaves and woody vegetation. At Bai Hokou in the Dzangha-Ndoki complex (CAR), daily distance travelled varies between about 3 km during frugivorous months, and 2 km during folivorous months. Larger groups travel greater distances in order to obtain sufficient food (Remis, 1997b). Human hunters and leopards (*Panthera pardus*) also influence the movement patterns of some western gorilla groups.

The annual home-ranges (the areas used by a group over a year) of western gorillas are larger than those of mountain and eastern lowland gorillas and the home-ranges of different groups overlap quite extensively. Estimated minimum home-range is 22.9 km² in Bai Hokou (CAR).

Wherever these home-ranges are divided by international boundaries, the movement of gorillas back and forth across the border in search of seasonally available food plants is considered migratory under the terms of the Convention on Migratory Species.

Transboundary populations of western lowland gorillas occur between Gabon and Equatorial Guinea, Gabon and Cameroon, Gabon and Congo, Cameroon and Equatorial Guinea, Congo and the Central African Republic, Congo and Angola (Cabinda) and DRC.



3. CONSERVATION STATUS, BY PARTY

Angola (Cabinda enclave) status unknown: The western lowland gorilla is found in the northern part of the Cabinda enclave of Angola in the Mayombe forests. Probably only a few tens of individuals remain. They are suspected to range between Angola and neighbouring DRC.

Cameroon (Critically Endangered): The nominate form (*Gorilla gorilla gorilla*) is distributed in Cameroon south of ca 3° North, south-east of the Sanaga River. The vast majority of Cameroon's gorillas (several thousand) are found in the humid tropical forests of the southeast, with strongholds in the Lobeke, Boumba-Bek and Nki National Parks. There are also gorilla populations in Deng Deng Forest, the Dja Faunal Reserve and the Mengame Gorilla Sanctuary, the latter contiguous with the northern Gabon border.

They are currently threatened by hunting, and all of the areas surrounding these Parks are currently either attributed to logging companies or are designated as "local hunting concessions" There is a small population of gorillas in the Ebo forest, north of the Sanaga, but from genetic information it is suspected that these, and any others north of the Sanaga, may be members of a separate subspecies already known from the Cameroon-Nigeria border, the Cross River Gorilla (*G. g. diehli*).

Central African Republic (Critically Endangered): The nominate form of Gorilla is found in the southwestern corner of Central African Republic. It is present in Dzanga-Ndoki National Park and in the Dzanga-Sangha Reserve (ca 5000 km²). This area is contiguous with good habitats in the Congo (Nouabale-Ndoki National Park and its buffer zone (Sangha Region). Although on maps it appears that the Cameroon population is contiguous with this population, in reality the two are separated by the Sangha River and recent genetic evidence has shown that they have been geographically isolated from each other for a very long time (Clifford, Anthony et al. 2001). In addition, gorillas still occurred in the Ngotto forests further to the east within the last decade (Brugiere & Sakom, 2001).

Congo (Critically Endangered): The western lowland gorilla still occurs in the Republic of Congo north of the Equator, particularly in the well-protected areas of the Nouabale-Ndoki National Park and its buffer zone, the Lac Tele Community Reserve (especially in the patches dominated by *Raphia* swamp forests), and the area east of the Odzala National Park known as the Ngombe-Pikounda area. The Odzala National Park itself, once the stronghold of many thousands of apes, has suffered from the Ebola outbreaks of the early 2000's in which large numbers of apes have died. However there are still important gorilla populations in this Park, especially in the southern and eastern sectors. Recent surveys by WCS (2007-2008) indicate that perhaps half of the world population of western lowland gorillas live in the forests of northern Congo. Unfortunately they are very close to the areas affected by Ebola in the last few years and so these animals are still under a very high risk of extinction from Ebola.

In the south of the Republic of Congo gorillas are still present in healthy populations in the Conkouati-Douli National Park (contiguous with the Mayumba National Park in Gabon: see below) although the increasing pressure of industrial logging is an increasing threat. They may still also be present in some of the unprotected forests of the rest of the south-west of the country.

Democratic Republic of Congo (formerly considered Probably Extinct): The western lowland gorilla was until very recently considered as probably extinct in the Mayombe forests (Bas-Congo, extreme western DRC). Recent reports (Redmond, 2006) suggest that a small (transboundary) migrating population of a few tens of animals might subsist.

Gabon (Critically Endangered): Western lowland gorillas used to occur throughout Gabon's forests, but in the last two decades their distribution has shrunk alarmingly and about half of the population has disappeared. The northeast of the country was hit by Ebola haemorrhagic fever between 1996-2003 and almost all apes in that area died. In addition they are absent from all areas around larger towns (Libreville, Oyem, Port Gentil...) and are quasi-absent in most of the the northwest of the country (Wolou-Ntem) due to hunting pressure over many years. Recent surveys have shown that they are still present in the National Parks of Mayumba, Moukalaba-Doudou, Loango, Ivindo, Lope-Okanda, Monts de Cristal, Waka, Birougou, Bateke and Pongara (although very rare in the last two). They are absent from the National Parks of Akanda (due to its proximity to Libreville and hunting pressure) almost completely absent from Minkebe and Mayumba (due to Ebola).



Equatorial Guinea (Critically Endangered):

The western lowland gorilla still occurs in Rio Muni, the continental part of the country but no recent surveys have taken place. In the 1990s, gorillas occurred in Monte Alen National Park just across the border from the Monts de Cristal in Gabon (Garcia & Mba 1997). In 1999 gorillas were still present in Parque Nacional de Los Altos de Nsork. During a survey by Larison et al (1999), no sign of gorillas was recorded at Rio Campo or Montes Mitra, although, local people claimed they were present.

4. ACTUAL AND POTENTIAL THREATS

In evaluating threats to gorillas in western equatorial Africa it is useful to think on two time scales. In the short term, by far the most serious threats are poaching and disease epidemics. In the longer term, habitat loss and disturbance will increase as a threat and are likely to become, in perhaps three to five decades, as serious a threat as hunting and disease. All these traditional threats may be superseded or exacerbated by climate change and possible changes in rainfall patterns and higher temperatures, which may result in significant changes in forest cover.

Although still widely distributed across a large forested region, and occurring in numerous Protected Areas, the western lowland gorilla is listed as Critically Endangered because of a series of cumulative threats of increasing scale: poaching and commercial hunting is identified as a major real or potential threat for every site of the Gorilla's range; diseases, and Ebola hemorrhagic fever epidemics in particular, are identified as a potent actual threat for the Odzala-Lossi-Pikounda-Ngombe-Ntokou complex and a potential future threat to gorillas elsewhere (particularly where they are found at high densities, which facilitates transmission). Logging has emerged as one of the greatest future threats, especially in concessions surrounding protected areas, without strict control, the roads and transport opportunities created by industrial logging systematically lead to a massive increase in commercial bushmeat hunting; commercial and artisanal mineral exploitation affect some areas and require specific responses; lack of knowledge regarding numbers and distribution, and acute insufficiency in biological information.

4.1 Direct exploitation

Western lowland gorillas are hunted for their meat, for sale to private collections, for trophies and for traditional ritual or medical purposes. Although this is illegal everywhere, the regulations in most range states are poorly enforced. Such poaching has been reported in every western gorilla range state.

The intensity of hunting of western lowland gorillas varies throughout their range. Factors affecting bushmeat hunting are local taboos, enforcement of legislation, availability of ammunition and guns, and access. Logging roads contribute to this by allowing greater access to remote areas, making the entire fauna more vulnerable to hunting in areas under exploitation or previously exploited.

- **The bushmeat trade**

In the forested region of western Africa, bushmeat hunting for subsistence is a major threat to western gorillas. Although bushmeat in general has been and still is culturally and nutritionally important in many regions, the impact of bushmeat hunting is now more widespread and seriously impacting many species. Hunting is increasing rapidly with increasing access into remote areas, and new markets are developing to serve a rising demand among urban human populations, where bushmeat is considered a delicacy. Gorilla meat forms only a small proportion of the commercial bushmeat trade, but the impact on ape populations is disproportionately great because of their slow reproductive rate and the social consequences of silverbacks being killed (infanticide may ensue when nursing mothers join a new male).



There is no estimates of either the overall western lowland gorilla population losses specifically due to hunting, nor of its impact on population trends, although the negative impact of hunting on other gorilla populations is well known.

In the northeast of Congo (Motaba River region) it has been estimated that about 5 percent of the western lowland gorilla population is killed each year by hunters, despite the low density of local human populations. This level of offtake is unsustainable for a slow breeding animal like the Gorilla (Kano & Asato, 1994).

In contrast, effective controls of hunting are in place in Nouabaé-Ndoki NP (Congo) and its buffer zone, in Odzala-Koukoua NP (Congo) and in the Dzanga Sector of Dzanga-Ndoki NP (Cameroon) where gorillas are rarely hunted (Blom et al., 2001). The controls are the result of successful collaborations between national administration and international agencies or NGOs.

- **Other forms of direct exploitation**

In the past, gorillas have been killed for their heads, hands, and feet, which were sold to collectors. This probably grew out of expatriates showing interest in gorilla body parts on sale in traditional medicine stalls (Redmond, 1989). Infants were sold to zoos, researchers, and people who wanted them as pets. Both these trades – live infants and body parts for traditional medicine or amulets - continue to this day, either as a by-product of bushmeat hunting or sometimes, when a trader commissions hunters to kill a gorilla and/or capture an infant, in the exaggerated belief that there is a market for great apes. The abduction of infants generally involves the death of at least two adults, as members of a group will fight to protect their young. Gorilla infants are susceptible to post-traumatic stress and poor nutrition; as a result, mortality rates of 80 per cent have been reported among confiscated infants (Redmond, 1989). These losses create a startling multiplier effect, because if four out of five infants die, and each infant is captured by killing two adults, this means that every infant that survives to reach a zoo or sanctuary probably represents a loss of 15 gorillas to the population (5x2 dead adults, four dead infants and one live one).

4.2. Diseases

Disease is a potentially devastating threat to gorillas and other great apes. Gorillas are susceptible to many of the same diseases as humans, such as Ebola, common colds, pneumonia, smallpox, chicken pox, tuberculosis, measles, rubella, yellow fever, and yaws.

Beside severe impacts on human populations, several outbreaks of the Ebola virus since 2000 might have claimed thousands of great apes in Africa. Ebola haemorrhagic fever is a highly infectious, usually fatal disease that affects humans and non-human primates, such as monkeys, gorillas and chimpanzees. Many scientists believe Ebola is transmitted to humans through the butchering and handling of primate bushmeat. This disease has been confirmed in six African nations: the Democratic Republic of Congo, the Republic of Congo, Gabon, Sudan, Ivory Coast, and Uganda.

Ebola haemorrhagic fever is an incurable human disease that kills about 80 percent of its human victims. This virus has an even higher mortality rate of 95-99 percent among western gorillas (and chimpanzees). Recent Ebola epidemics in western equatorial Africa have affected the gorilla in Gabon and Congo. Ebola outbreaks are thought to have strongly contributed to the decline of great ape populations in Gabon, where four outbreaks are known to have occurred, two of which occurred in the Minkébé NP. Farther East, declines in Western Gorilla populations attributed to Ebola have also been reported in the Lossi Gorilla Sanctuary of Congo (Walsh et al., 2003; Bermejo et al., 2006), and has lately decimated a gorilla population in the Odzala-Koukoua NP (Caillaud et al., 2006; Devos et al., 2008).

Another potential general threat to gorillas is exposure to human diseases (e.g Graczyk et al., 2001; Graczyk et al., 2003; Mudakikwa, 2001) particularly for habituated gorillas that come into contact with humans, in areas of gorilla tourism (Butynski, 2001). Gorilla tourism exposes gorillas to humans, sometimes close enough for droplet infection by sneezing or coughing, and hence to any diseases that humans may be carrying, some of which the gorillas may never have been exposed to before (Homsy, 1999).

At present, this threat is not significant for the western lowland gorilla. The western lowland gorilla has proved to be difficult to habituate, particularly as the dense vegetation of its habitat does not allow it to be tracked easily (Williamson & Feistner, 2003). Gorilla tourism is therefore not as well established as it is with eastern gorillas. However the discovery that Western lowland Gorilla could easily be seen at *bais* has increased the likelihood of successful gorilla tourism and could, if unregulated, lead to increased contacts with humans as happens in Rwanda or Uganda.



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In Rwanda, strict rules are in place to regulate tourist visiting times (one hour per day). The number of tourists per group must not exceed 8 (fewer if the gorilla group is small – there should never be more tourists than gorillas), no tourist showing signs of illness is allowed to visit. Other measures are in place and include limiting the approach of humans to 7 m, burying human excrement deeper than 30 cm and chasing gorillas from private lands surrounding the parks (Homsy, 1999).

Such regulations must be adopted as soon as possible in areas where western lowland gorilla tourism is being, or is planned to be established.

4.3 Degradation and decline of habitats

Throughout the western lowland gorilla's range, the forests on which it depends for survival are being cut down for timber and to make way for agriculture. Habitat loss is a major threat to gorillas as forests are rapidly being lost to commercial logging interests and subsistence agriculture. As the global demand for palm-oil continues to rise, both for food and bio-fuels, land to be converted into oil palm plantations is now being sought in Africa by oriental companies.

Until recently, there has been relatively little habitat degradation over much of the Congo Basin, with low conversion to agricultural land. As late as the 1980s West and Central African timber was considered to be of low commercial value which limited the pressure posed by selective logging. This situation changed dramatically during the 1990s.

By 2000, more than half of Gabon's forests had been allocated as logging concessions, and log production increased to some 3 million m³/year (Anon, 1999). In Cameroon, over 170,000 km² of the country's forests have either been



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logged or allocated for logging. Satellite images have revealed that networks of new logging roads have now spread into what had previously been considered the least accessible forests in the country (Minnemeyer et al., 2002). Other parts of the range of western lowland gorilla to have undergone extensive logging include Cameroon, Congo, Rio Muni (continental Equatorial Guinea) and the Congolese Mayombe forests.

Logging roads and access routes fragment forest and improve access for hunters. Forest fragmentation poses a potential threat to western lowland gorillas in that it can block transfers between groups and access to seasonal food resources.



4.4 Impact of Conflict

The impacts of wars and political conflicts, particularly well documented for the mountain and eastern lowland gorilla, could have affected the western lowland gorilla in a similar way. Civil wars and unrest also increase hunting levels by exacerbating poverty and dependence on natural resources, particularly among displaced peoples and refugees. Angola, the Republic of Congo, Central African Republic and the DRC have all suffered periods of instability in recent decades; Congo-Brazzaville in 2007, for example, received 34,000 refugees from DRC, 2,000 from Angola and is still hosting 6,500 refugees from Rwanda, who have been there since the 1990s.

In addition to influxes of refugees, the forests that are home to gorillas have served as hiding places and retreats for rebel forces, leading to disturbance and hunting. This is a common phenomenon in times of war, particularly in forests close to international borders.

4.5 Other threats

Lack of fundamental knowledge regarding numbers and distribution, and acute insufficiency in biological information crucial to assessing population viability and actual mechanisms of population decline.

Accidental entrapment in wire snares used to trap other wild animals is also an ever-present threat to western gorillas. Plumptre *et al.* (1997) stated that the setting of snares for ungulates in the Volcanoes National Park, Rwanda is one of the greatest threats to *Gorilla beringei beringei*. This threat needs to be assessed over the whole distribution area of the western lowland gorilla.

International trade in live gorillas and gorilla parts, which used to be a major threat, has declined since the gorilla was listed in Appendix I of CITES, although cases are still reported such as the shipment of four Cameroonian gorillas to Malaysia under forged 'captive bred' papers in 2002 (eventually repatriated in 2007) and the gorillas recently photographed in a desert enclosure in Egypt, allegedly shipped from Cameroon via Nigeria (Ammann, 2006).

5. REGULATORY PROVISIONS



Monte Alén. © Manuel Merinoo. .

5.1 International

CMS : Gorilla gorilla sl is registered on the Appendix I of the CMS since 2005.

CITES: The Gorilla is in the Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 1975.

ACCNNR : Gorilla is also enumerated in A class in The African Convention on the Conservation of Nature and Natural Resources in 1969.

The Gorilla Agreement: a treaty under the CMS, negotiated in October 2007, came into force 1st June 2008.

5.2 National

Gorilla gorilla sl is fully protected by law in all the countries of its distribution area.

National laws for control of hunting and capture exist in all countries with gorilla populations, but a lack of funds and inaccessibility make widespread enforcement of this legislation rare.

In **Angola**, Article 24 of the National Constitution invests the state with responsibilities for environmental protection, and it was consolidated by decree n°40040 of 1955. Since 1998, all biodiversity conservation and protected area management has been governed by Law 5/98 “basic law of environment”. Biodiversity protection and management are under the responsibility of the Ministry of Urban affairs and Environment, but in practice the Forestry Development Institute (IFD) remains in overall charge of the forest sector, with the National Directorate of Agriculture and Forest (DNAF) with which it shares responsibilities in relation to policy formulation and guidance. But it is reported that wildlife protection laws are scarcely enforced either inside or outside Protected Areas, and poaching, harvesting and settlements inside Protected Areas occur regularly.

In **Cameroon**, law n° 94/01 (1994) sets out the country’s forestry, wildlife and fishery regulations, and list gorillas as a Category A species, which are fully protected by law against hunting, capture, or sale; in whole or in part. Protected areas such as national parks and wildlife reserves may be established under the auspices of the “Direction de la Faune et des Aires Protégées” (DFAP) of the Ministry of Environment and Forestry (MINEF), which is also responsible for the protection of the country’s biodiversity in general.

In **Central African Republic**, the Ministry of the Environment, Waters, Forests, Hunting and Fishing is responsible for wildlife conservation and the use of natural resources in CAR. These are governed by Ordinance n°84.045 (1984) and Law n°90.003 (1990). Great Apes are listed in Category A as ‘completely protected’ under Ordinance N° 84.045.

In the **Republic of the Congo**, the main laws dealing with wildlife conservation and use are Law 48/83, Law 49/83 and Decree 85/879. The Ministry of Forest Economy and the Environment (MFEE) is responsible for wildlife conservation and regulated use, including the management of protected areas.

In **Gabon** the Ministry of Water and Forests is responsible for the management of natural resources. Under Law 1746/PR/MEFCR, Gabon set up a wildlife management service and an anti-poaching service. Gorillas (and chimpanzees) are now fully protected species under Gabon’s law, having had temporary protected status since 1981 under a previous law.

In **Equatorial Guinea**, conservation issues are administered by the Instituto Nacional de Desarrollo Forestal y Gestion del Sistema de Areas Protegidas (INDEFOR), within the Ministry of Infrastructure and Forests. The Law on Protected Areas of EG was passed in 2000, and the number of PAs increased to 13 in total, out of which 10 are located in Rio Muni: 2 NP (Monte Alen and Los Altos de Nsok), 5 Natural Reserves, one scientific reserve and 2 natural monuments. Many of the priority populations identified by GrASP for western lowland gorillas are at least partly protected and occur within (proposed) National Parks, Biosphere Reserves or Community Managed Nature Reserves, but many are also, at least partly, in logging concessions.



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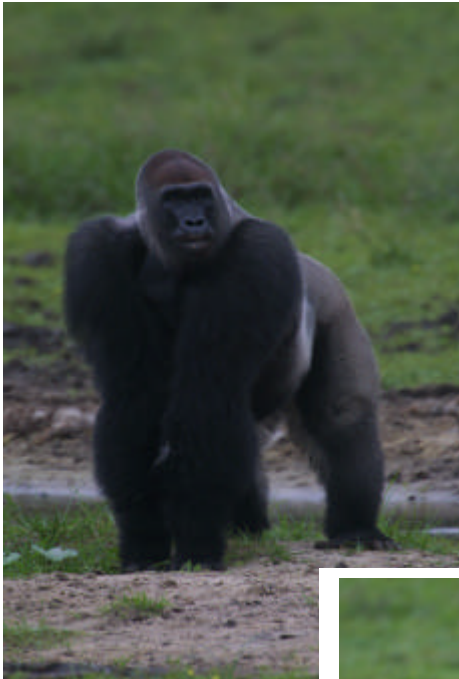
6. CONSERVATION MEASURES

6.1 Anti-poaching and law enforcement



The taxon is legally protected in all the seven countries of its distribution. The killing or sale of live or dead gorillas or of their body parts, and the disturbance of them in the wild is illegal throughout their range. Nevertheless, poaching and the illegal capture of live individuals are an important problem in all of these countries. Great efforts must be made by the range states to enforce their laws concerning gorillas, including not only effective antipoaching and seizure of gorilla parts or live individuals on the ground, but follow-up of the legal process through arrest, the passage of each case through the tribunal, and eventually to prosecution of all cases judged guilty.

6.2 Habitat conservation



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IRScNB Odzala . 2003. Silverback and, above, a female.



© Celine Devos. IRScNB. Odzala. Silverbacks, females and youngs



Table 1. Priority Populations for Western Lowland Gorillas (*G. g. gorilla*) and Central Chimpanzees (*P. t. troglodytes*) (Sep 2005)

Country Countries	Population Name	Pop. Size	Area km2	Habitat Type(s)	Habitat or Biogeographic Uniqueness	Land Use Status	Scientific Importance	Other Important Conservation Features	Major Threats	Rationale for Prioritization
Republic of Congo	Odzala/Lossi/Pikounda/ Ngombe/ Ntokou complex	>4000 ***	4190 0	Lowland forest		National park, Logging concessions	Gorilla research at 'bais' or forest Clearings	High faunal diversity; particularly large and endangered mammals	Ebola, commercial hunting, commercial logging	Large population and area, protected area, research
Republic of Congo	Lac Tele/Likouala complex	>4000 ***	2954 5	Swamp, riparian & lowland forest, savanna		Community Reserve, Unzoned land		High faunal diversity; particularly large and endangered mammals	Commercial and subsistence hunting	Large population and area
Republic of Congo, Central African Republic, Cameroon	Sangha Trinational complex	>4000 ***	2790 8	Lowland forest		National Park, Special Reserve, Logging concessions	On-going gorilla and chimpanzee research	High faunal diversity; particularly large and endangered mammals	Commercial hunting, commercial logging, artisanal mining	Large population and area, protected area, research
Gabon	Loango/Moukalaba-Doudou/Gamba complex	>4000 ***	1306 2	Lowland coastal forest, savanna		National Park, Reserve	On-going gorilla research	High faunal diversity; particularly large and endangered terrestrial and aquatic mammals	Commercial hunting, oil exploitation, subsistence hunting	Large population and area, protected area, research
Cameroon	Dja conservation complex	>4000 ***	6,238	Lowland forest		Biosphere Reserve, Logging and mining concessions, community -use forests, agroforestry zones	Gorilla research	High faunal diversity; particularly large and endangered mammals	Commercial hunting, commercial logging, habitat fragmentation	Large population, protected area, research
Cameroon	Boumba Bek/Nki	>4000 **	6,110	Lowland forest		National Park		High faunal diversity; particularly large and endangered mammals	Commercial hunting and logging, illegal trafficking of military weapons	Large population, protected area
Gabon	Lopé/Waka complex	>2000 **	10,12 9	Lowland forest/savanna mosaic		National park, Logging concessions	Long-term gorilla and chimpanzee research	High faunal and floral Diversity (importance as pleistocene refugia); archeological interest of > 400,000 years	Commercial hunting, commercial logging, disease	Large population and area, protected area, research
Gabon	Ivindo complex	>2000 **	6,527	Lowland forest		National park, Logging concessions	Gorilla research	High faunal diversity; particularly large and endangered mammals	Commercial hunting, commercial logging	Large population, protected area, research



Equatorial Guinea, Cameroon	Rio Campo/ Campo Ma'an complex	>2000 ***	5,843	Lowland coastal forest		National Park, Reserve, Logging concessions, agroforestry zones	Site of prior gorilla research	Rich faunal and floral diversity; several endemic plant species	Commercial hunting, habitat destruction due to develop. projects	Large population, protected area, research
Gabon	Belinga-Djoua	>2000 *	5,843	Lowland forest		Unzoned		High faunal diversity; particularly large and endangered mammals	Mineral exploitation, Ebola, commercial hunting	Large population
Cameroon	Mengamé	>2000 **	1,219	Lowland forest		Proposed sanctuary forest reserve, logging concessions		High faunal diversity; particularly large and endangered mammals	Commercial and subsistence hunting, habitat destruction due to agriculture	Large population
Gabon, Republic of Congo	Conkouati/ Mayumba complex	>2000 **	7,066	Lowland coastal forest, savanna		National Park		High faunal diversity; particularly large, endangered terrestrial & aquatic mammals; world's largest nesting population of leatherback turtles	Commercial hunting, commercial logging, artisanal mining	Large population, protected area
Cameroon	Ebo/Ndokbou conservation complex	>1000 *	2,677	Lowland to mid-altitude forest	Unknown taxonomy - possible range extension for western lowland gorillas	Proposed National Park, logging concession	Gorilla research	High faunal and floral diversity; high degree of endemism	Commercial hunting, commercial logging and road development	Relatively large population; unknown taxonomy - possible range extension for western lowland gorillas, research, proposed NP
Angola (Cabinda), DRC, Republic of Congo	Maoimbe Forest Trans-boundary Initiative	> 500 *	8,000	Lowland forest	Fragmented populations at limits of geographic range	Biosphere Reserve, unzoned		Faunal and floral diversity poorly documented	Commercial and subsistence hunting, illegal mining and logging, armed conflict	Fragmented populations at limits of geographic range; Biosphere Reserve

Accuracy of population estimate is scored as follows: *indicates the estimate from good transect surveys spread over areas or habitats of population; **indicates estimate based on adequate set of transects from one location, and estimate extrapolated to the rest of the areas/habitats of population; *no scientific estimate of ape density from any location**



6.3 Maintaining transboundary links for gorillas

Although current habitats are not yet fragmented in Central Africa compared with areas in West Africa or the Albertine Rift, they will become so in the next few decades. Particular attention to protecting existing transboundary protected areas, the creation of new ones, and the protection of ungazetted forest corridors between range states will allow the long-term maintenance of genetic flow between gorillas living in neighbouring countries.

6.4 Regulation concerning other harmful factors

Implementation of recommendations concerning disease transmission (Homsy, 1999) and specifically regarding Ebola (Tutin et al 2005).

6.5 Other measures

7. ADDITIONAL REMARKS

Western Lowland Gorillas are a keystone species in their forest habitat, and so their protection is essential to the long-term management of the Congo basin, now recognised as a globally important factor in inter-continental weather patterns and for maintaining climate stability. The COMIFAC Convergence Plan and the efforts of the Congo Basin Forest Partnership, which aim for the co-ordinated management of the whole Congo Basin Eco-system, must recognise that gorilla conservation is integral to their programme of work. Now that payment for the eco-system services provided by the Congo Basin to the rest of the planet – including carbon sequestration and storage, rainfall generation and bio-diversity – is being seriously considered, it is essential that the ecological role of gorillas is taken into account.

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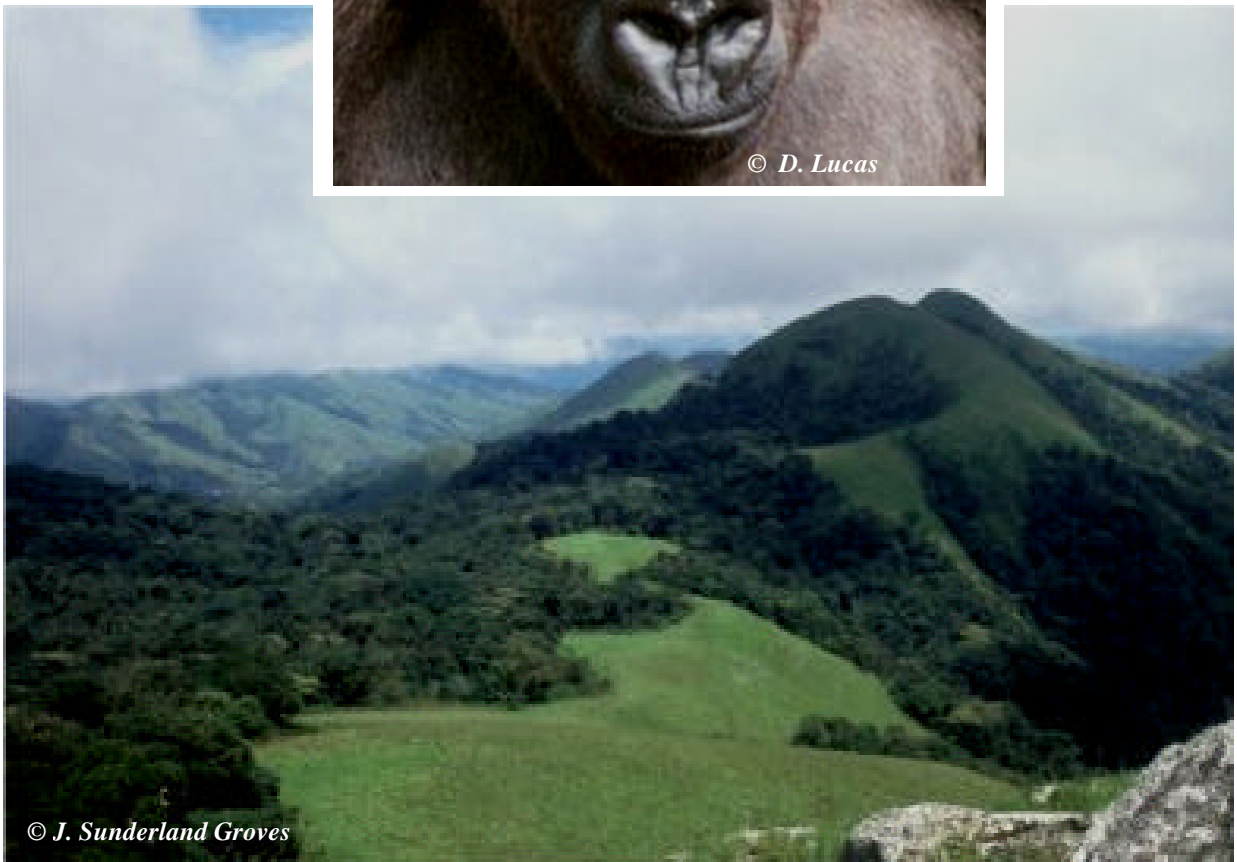
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Gorilla gorilla diehli

Conservation Status Report



Institut royal des Sciences naturelles de Belgique



GORILLA GORILLA DIEHLI

TAXONOMY AND NOMENCLATURE

1.1. Taxonomical remark



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The taxonomy currently followed by CMS (Wilson & Reeder, 2005) recognises two species of gorilla. There are two subspecies of western gorilla *Gorilla gorilla*: the western lowland gorilla *Gorilla gorilla gorilla* and the Cross River gorilla *Gorilla gorilla diehli*.

The eastern and western species are separated by approximately 1,000 km (Garner & Ryder, 1996). Western and eastern gorillas can be distinguished by external features (Groves, 2002), together with clear geographic and morphological distinctions (Garner & Ryder, 1996).

The following document summarises the conservation status of the Cross River Gorilla, *Gorilla gorilla diehli*, a recently recognised subspecies of western lowland gorilla living in the northern Cameroon-Nigerian border area (Sarmiento & Oates, 2000).

1.2 Nomenclature

The American physician and missionary Thomas Staughton Savage first described the Western Gorilla (he called it *Troglodytes gorilla*) in 1847 from specimens obtained in what is now Gabon. The name was derived from a Greek translation of the word Gorillai (a "tribe of hairy women"), described by Hanno the Navigator, a Carthaginian explorer who led a voyage (circa 480 BC) around the coast of West Africa, passing an active volcano (only Mt Cameroon fits the description) before encountering the 'Gorillai'. There is much academic debate over whether the 'hairy women' he saw is what we know as gorillas today.

1.2.1 Scientific name

Gorilla gorilla diehli (Matschie, 1904)

In 1904, Paul Matschie, a mammalian taxonomist working at the Humboldt University Zoological Museum in Berlin described a new species of gorilla inhabiting the watershed of the Cross River in what was then German Cameroon. Matschie named the species *Gorilla diehli* in honour of Mr. Diehl, an employee of the German Northwestern Cameroon Company, who had collected the gorilla skulls on which Matschie based his new species. According to Matschie the 1) short skull, 2) short molar row, 3) palate shape, 4) and skull base shape distinguished *Gorilla diehli* as a new species separate from *Gorilla gorilla*. Matschie also noted in his description that one of the female skulls collected by Diehl from the same area was not *G. diehli*, but *G. gorilla*, and claimed both species existed together in the Cross River catchment's area. The potential occurrence of two morphologically distinct gorillas from the same locality supported Matschie's claims that the two were distinct species. Two gorilla populations could not possibly inhabit the same isolated area and remain morphologically distinct.

Subsequent classifications by Rothschild in 1904 and Elliot in 1912 agreed that the Cross River gorillas were not a new species and demoted the population to the subspecies *Gorilla gorilla diehli*. Neither author examined the specimens described by Matschie, or tested Matschie's claim that two morphologically distinct gorillas inhabited the Cross River watershed.

Harold Coolidge's revision of the genus *Gorilla* in 1929 placed what was then recognized as *G. g. diehli* into the subspecies *G. g. gorilla*. He based his decision largely on anecdotal accounts of gorilla distribution, believing Cross

River gorilla populations were continuous with those of other western lowland gorillas. Coolidge, like his earlier counterparts, failed however, to address Matschie's claims.

Although Colin Groves in 1970 revised gorilla taxonomy and added a subspecies (*Gorilla gorilla graueri*) to the eastern gorilla populations, Matschie's claims remained unchallenged and Coolidge's taxonomy remained by and large the framework of the currently accepted classification. By now, the Cross River gorillas were known to occur in eastern Nigeria as well as south-western Cameroon, and they had at least been recognized by Groves as a distinctive far-western population.

Working on primate distribution and behaviour in West Africa for the past 30 years, John Oates had long ago recognized the Cross River watershed, the Cameroon highlands and Bioko island as an area of primate endemism. The Sanaga river to the south of this area seems to act as a barrier to primate migrations from the extensive forests of western equatorial Africa, which cover most of southern Cameroon, Gabon, Equatorial Guinea, northern Congo and south-western Central African Republic and are inhabited by *G. g. gorilla*.

1.2.2 Synonyms

Gorilla zenkeri?

1.2.3 Common names

English – Cross River Gorilla

French – Gorille de Cross river, Gorille de Diehl

German – Cross-River-Gorilla

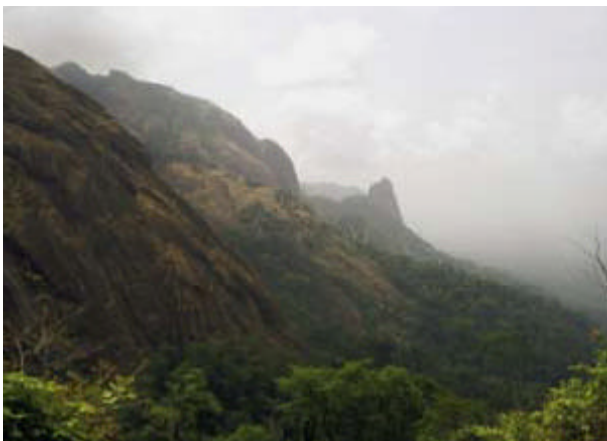
Spanish - Gorila del Cross River

1.2.4 Description

The largest living primates. Barrel-chested ape with relatively even hair, a bare black face and chest and small ears. The bare shaped brows are joined and the nostril margins are raised. Females are much smaller than males. Gorillas locomote by knuckle-walking. Adult males range in height from 165-175 cm (5 ft 5 in-5 ft 9 in), and in weight from 140-200 kg (310-440 lb). Adult females are often half the size of a silverback, averaging about 140 cm (4 ft 7 in) tall and 100 kg (220 lb). Occasionally, silverbacks (adult males) of over 183 cm (6 feet) and 225 kg (500 lb) have been recorded in the wild.

Cross River gorillas do not seem to be very easy to identify from others western gorillas except that they differ significantly in their skull measurements and in particular in mean cheek tooth surface and the usual absence, or relatively poor development, of the sagittal crest in many male.

This differences have been associated with shifts to more open habitats, and could also be associated with lower fruit abundance in habitats at high elevations, or/and fruit scarcity periods during prolonged dry seasons. It is however unclear how the distinctive morphology of Cross River gorillas relates to food specialisation in the habitats they presently occupy or if it is due to the habitats in which they originally differentiated and/or to which they are best suited. In this regard the extensive and unique montane forest ecosystem of the Obudu Plateau and other areas of Bamenda Highlands (Keay, 1979) which once existed may be a better representation of the habitat in which the taxon evolved.





Jacqueline Sunderland-Groves & John F. Oates



2. BIOLOGY OF THE SUBSPECIES

2.1 General Biology

Gorillas are mainly terrestrial. Their large body size and folivorous habits mean that the animals must spend long hours feeding everyday to maintain their body weight. Of all the great apes, the gorilla shows the most stable grouping patterns with the same adult individuals travelling together for months and usually years at a time. Because gorillas are mainly foliage eating they can afford to live in relatively permanent groups. Foliage, unlike fruit generally and especially the ripe fruits that the ape gut require, comes in large patches than can in turn support large groups of animals. In west Africa, where fruit form a far higher proportion of the gorilla's diet than in the east, gorilla groups tend more frequently, to split into temporary subgroups that they do in east Africa, as animals range far apart searching for the relatively scarce ripe fruit. Gorilla groups can include up to 30-40 animals, but more usually number 5-10.

2.1.1 Habitat

The Gorilla is a forest dwelling species. Cross River gorillas inhabit low-lying and submontane tropical and subtropical broadleaf forests at elevations from 200 to 2000 m (Sarmiento & Oates, 2000, Sarmiento 2003, Oates *et al.*, 2007).

Sarmiento & Oates (2000) describe the habitat occupied by Cross River gorilla in the lower elevation as moist semideciduous forest. The forest has probably been disturbed by people for many generations and should therefore best be considered an old secondary forest. Much of the forest, however, has not been recently disturbed, and large trees are relatively abundant in the areas furthest from human settlements. *Lophira alata*, *Cylicodiscus gabunensis*, *Piptadeniastrum africanum*, *Berlinia bracteosa*, *Brachystegia nigerica*, and *Terminalia spp.* are among the more common species of large trees. In younger forest, species as *Pycnanthus angolensis* and *Musanga cecropoides* are common. The latter tree is found in secondary and disturbed forest throughout tropical Africa and bears fruit commonly consumed by African apes and monkeys. At higher elevation, above approximately 700 m the

composition and height of the forest canopy change; at these intermediate altitudes large mahoganies and *Santiria trimera* are frequently seen. Above 1000 m there are distinctly montane elements in the flora, including *Cephaelis mannii* and *Podocarpus milanjanus*, and at the highest elevations (up to 2000m) there is montane forest with smaller trees and abundant epiphytes.

Much of the forest at higher altitude (1500 to 1800m), where the taxon possibly evolved or for which it is possibly best suited, has been converted to grassland by a long period of human occupation (cultivation, burning, cattle grazing) and so is no longer available.

It is not obvious that the Cross River gorillas have strong habitat preferences within their present range. They occur at altitudes between 100-2,000m but their present distribution seems to correlate more with human pressure and slope than with habitat types. In Nigeria they live primarily in the rugged terrain of the Afi and Mbe mountains and at the headwaters of the Asache and Mache rivers below the Obudu Plateau of Nigeria; in these areas the forest is often broken by sheer rock faces or rocky outcrops. In Cameroon their nests are found in high concentrations only in a number of hilly areas (200-2,000m) in the Takamanda, Mone and Mbulu forests. Among these areas the localities where they were first collected by Diehl. This distribution may be the consequence of long term hunting pressure.

2.1.2 Adaptation

Gorillas are closely related to humans and are considered highly intelligent. Cross River gorillas are rare and wary of humans as a result of hunting.

2.1.3 Social behaviour

Only a handful of direct sightings of Cross River gorillas have been made, almost all the information on their ecology and behaviour derives from observations of sleeping nests, feeding trails, and reports by local hunters. Nest clusters suggest that group size is typically small (fewer than 6 weaned individuals) although much larger groups occur. At Afi mountain nesting patterns suggest that a group as large as 20 individuals will sometimes divide into smaller foraging parties. No attempts to habituate gorillas have been made given the animals are so few and still vulnerable to hunting.

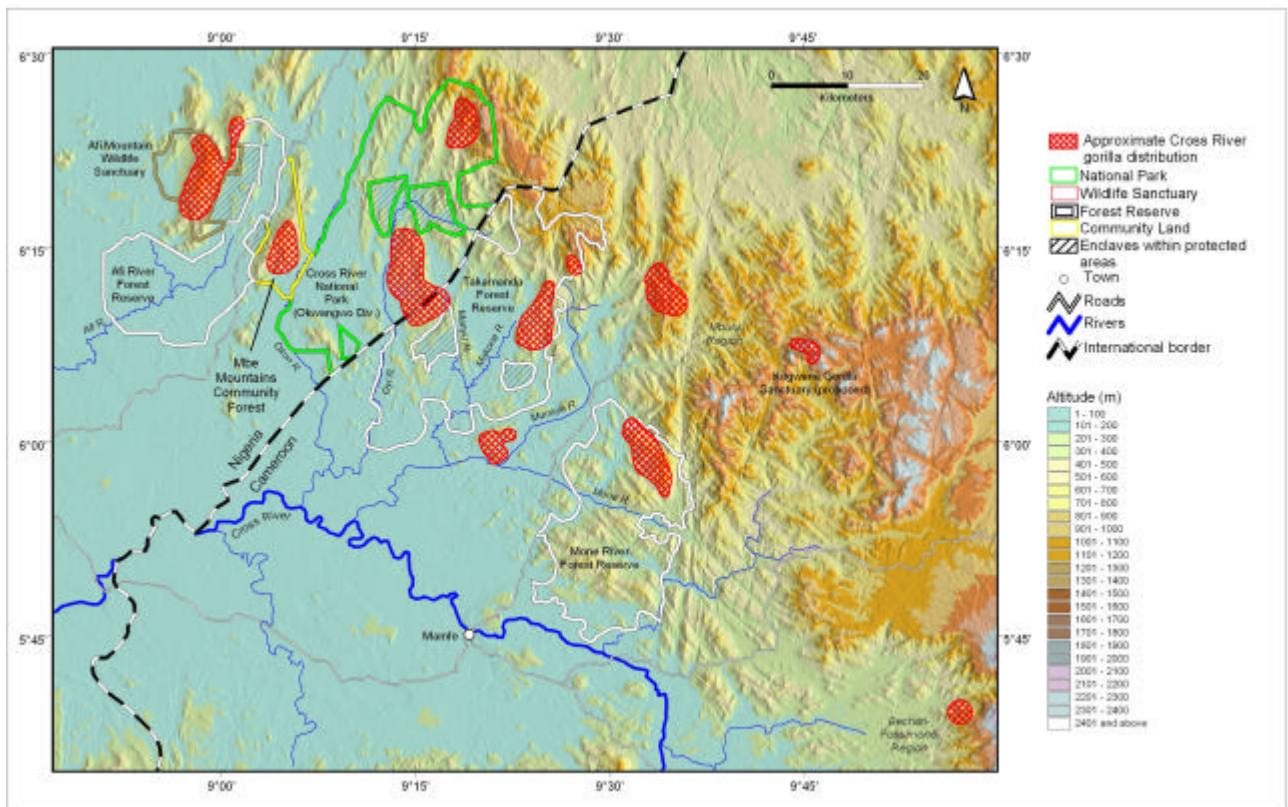
As far as group structure is concerned, gorillas do form harems. Adult females in a social group are mostly unrelated, and the social ties that exist between them are weak. Groups typically contain one adult male (a silverback). In contrast to many other primates, it is the bond between each individual female and the silverback, rather than bonds between the females that hold the group together. 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 (Parnell, 2002).

2.2 Distribution (current and historical)

© R. Bergl



Figure 1. The distribution of the Cross River Gorilla, *Gorilla gorilla diehli* (original map by Richard A. Bergl)



Cross River gorillas are restricted to a limited area (<10000 km²) of southwest Cameroon and neighbouring parts of Nigeria, between 5°55'-6°25'N and 8°50'-10°00' E. The Cross River gorillas are said to have ranged into the relic montane forests of the Obudu plateau (1500-1700m elevation) until the recent past (Harcourt *et al.*, 1989). There are now eleven known discrete localities where Cross River Gorilla exist. Recent genetic studies suggest that gorillas at 10 of these localities (extending east from Afi Mountain in Nigeria to Kagwene Mountain in Cameroon) constitute one population, divided into three subpopulations which still occasionally exchange individuals (Bergl and Vigilant 2007). Potential gorilla habitat still connects all of these localities, although sometimes tenuously (Bergl & Vigilant, 2007; Oates *et al.*, 2007).

The Cross River gorillas are the most northern and western of all gorilla populations and are separated from the nearest *Gorilla gorilla gorilla* population to the south by approximately 250 km. They are distributed in and around a set of escarpments whose peaks rise above the low-lying coastal forests and reach a maximum elevation of 1600-2000m. Interspersed between the Cross River area and the nearest outpost of western equatorial African forest

occupied by western lowland gorillas are the grasslands and fragmented forests of the Cameroon highlands, and the relatively densely settled lowlands of western Cameroon, which effectively isolate the Cross River gorillas from the other west African gorilla populations.



2.3. Evaluation and evolution of populations

Accurate population estimates for gorillas are often difficult to establish, because of their small population size and their vast range. Population counts and estimates of gorillas are commonly carried out on the basis of nest site counts (e.g. Kühl *et al.*, 2008). Adults and immature weaned

© Cross-River Gorilla habitat. African Conservation

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 Cross River gorilla has probably had a restricted range for some time. From the early 1930s to the late 1960s there were scattered reports on the distribution and abundance of Cross River gorillas. The 1966-1970 Nigerian civil war and lack of information meant that by the late 1970s, a general view had developed that the Cross River gorillas had been extirpated at least from Nigeria if not from Cameroon.

In 1983 surveys by Clement Ebin of the Cross River State Forestry Department obtained evidence of gorilla populations living in Nigeria's Mbe Mountains. Estimations were very low, with only around 100-200 believed to be remaining in the wild. Further surveys in Nigeria and Cameroon in the 1990s suggested that there were probably no more than 200 individuals in four isolated subpopulations. Following long-term surveys established in the late 1990's (Sunderland-Groves & Maisels, 2003) it is now thought that up to 300 of these animals survive. Within Cameroon they are more widespread than previously thought (Oates *et al.* 2007). Although the discovery of new localities is encouraging, some of these localities are quite isolated, and therefore pose conservation challenges.

The Cross River gorilla (*Gorilla gorilla diehli*) is listed as Critically Endangered (IUCN 2008, CR A4cd) and is found in 11 localities on the Nigerian-Cameroon border, most of them connected by large tracts of continuous forests.

2.4. Migrations

Some patterns of seasonal movements are observed. Hunters who frequent the forests below the Obudu Plateau report that gorillas use higher elevations in the wet season and retreat to valley bottoms in the dry season (Oates *et al.*, 1990). Most of observations at other location suggest that the gorillas tend to stick to a relatively stable range across the seasons (Sunderlands, comm pers.).

Transnational dispersion should at least have occurred in the past when distribution was more continuous and recent field surveys, in border locations, suggest that Cross river gorillas still regularly cross the border between Nigeria and Cameroon.

Genetic data suggest movements between several of the areas in which Cross River gorillas are found (Bergl & Vigilant, 2007).

Information from the Cross River gorilla's closest relative the western lowland gorilla indicate that group home ranges average 5.6 to 15.4 sq. km. Gorillas do not display territorial behaviour, and neighbouring groups often overlap ranges (Bermejo, 2004, Doran *et al.*, 2004). A group usually favours a core area within the home range but seems to follow a seasonal pattern depending upon the availability of ripening fruits. Gorillas normally travel 0.5-2.0 km per day (Doran *et al.*, 2004). Of the two long-term ecological studies on Cross River gorillas at Afi Mountain in Nigeria and at Kagwene Mountain in Cameroon, mean day range at both sites was roughly 1km per day. Annual range at Afi was 31km² and at Kagwene approximately 19km² (with some areas infrequently used).

The remaining populations are now confined to highland areas within a larger area of more-or-less continuous forest. This large forest block is becoming fragmented in some areas. Transboundary protected areas and corridors between the isolated populations have been proposed as important conservation measures.

3. CONSERVATION STATUS, BY PARTY

Nigeria (Critically Endangered): the isolated Nigeria-Cameroon gorillas have recently been recognised as a subspecies, the Cross River gorilla (*Gorilla gorilla diehli*). In Nigeria there are approximately three localities and a fourth shared with Cameroon. There are estimated to be approximately 75-110 individuals remaining in Nigeria (Oates *et al.*, 2007).

Cameroon (Critically Endangered): Results from surveys undertaken in 2000 and 2001 indicated that there may be up to 180 Cross River gorillas remaining on the Cameroon side of the border. Before that, the Cross River gorilla (*Gorilla gorilla diehli*) was only known from the 100 individuals in the Takamanda Forest Reserve, located in the South West Province of Cameroon. However, as research extended into the adjacent Mone River Forest Reserve and



the Mbulu Forest in 2000, the presence of gorillas was discovered in these contiguous forest areas and subsequent studies were undertaken to estimate their population density (Groves, 2002). Recently the number of Cross River gorilla in Cameroon has been estimated at 125-185 individuals (Oates *et al.*, 2007)

Although surveys to clarify gorilla distribution are still ongoing and this figure may be subject to change, these results confirm that the Cross River gorilla population is indeed larger than previously believed.

4. ACTUAL AND POTENTIAL THREAT

The major threats affecting or having affected Cross River Gorilla populations are (1) habitat loss or modification, (2) direct killing (for the bushmeat trade), (3) the population is at risk due to its very small size and its highly fragmented distribution.

These gorillas still face an uncertain future as threats to their habitat and from hunting continue to further fragment gorilla groups. Over 1998 to 2002, conservation efforts undertaken by the local people in collaboration with the Cross River Gorilla Research Project (Cameroon) and the Ministry of Forestry and Wildlife (MINFOF) project PROFA have markedly reduced gorilla hunting in these areas. However, other threats to the gorillas such as encroachment into their preferred habitat will certainly have an effect in further isolating already existing sub-populations (J. Groves, 2002).

If lowland forest corridors cannot be secured and if gorillas are deterred from using lowland corridors to reach gorilla groups in other highland sites, inbreeding and loss of genetic variation may imperil isolated groups.

4.1 Degradation and decline of habitats

Habitat loss is a major threat to gorillas as forests are rapidly being lost to local illegal logging and subsistence agriculture.

In 2000, it was estimated that 135,170 km² of forest remained in Nigeria, with an average annual decrease of forest cover of about 4,000 km² or 2.6 percent. There are logging concessions in almost all forest reserves in Nigeria, although not all are being actively logged. Much illegal logging also occurs. By 1987, around 24 percent of Nigeria's protected land area had already been converted into farmland, plantations, and bush-fallow.

In Nigeria and in Cameroon the expansion of agriculture, oil palm plantations, and road networks has led to the widespread degradation and fragmentation of great ape habitat .



4.2 Direct exploitation

Hunting has historically threatened the survival of Cross River gorillas. In 1989, it was suggested that in Nigeria twice as many were killed each year as were being born (Harcourt et al., 1989). At that time a single gorilla carcass could fetch as much as twice the monthly salary. About 15 communities hunted in the gorilla's range, and in 1986 just one of these was reported to have killed eight gorillas. The hunting of gorillas is now much reduced. This is largely due to increased conservation in Nigeria, beginning with a Nigerian Conservation Foundation (NCF) project, followed by the Okwangwo program of the WWF and, most recently, by a Wildlife Conservation Society (WCS) programme. There is an occasional report of a gorilla being killed by hunters in the Okwangwo Division of Cross River NP, but there is no direct evidence of any gorillas having been killed at Afi or Mbe in the last five years (Oates et al., 2002).

- **The bushmeat trade**

If habitat loss or degradation is the major threat to the Cross River gorilla population, much recent concern has been focused on the bushmeat trade. Forest is being converted to crop production and livestock grazing in many parts of Africa. Where new routes are opened up for timber or mineral extraction, exploitation of forest animals for food use (bushmeat) rises in order both to support the incoming labour force and to export bushmeat to urban markets. Although bushmeat has been, and still is culturally and nutritionally important in many regions, the impact of bushmeat hunting is now more widespread and serious on many species because it is increasing rapidly with increasing access into remote areas, and new markets are being developed to serve rising demand among urban populations, where it is considered a delicacy. Gorilla meat forms only a small proportion of the commercial bushmeat trade, but the impact on ape populations is disproportionately great because of their slow reproductive rate and the social consequences of silverback's being killed (infanticide may ensue when nursing mothers join a new male).

- **Other forms of direct exploitation**

Gorillas have been killed for consumption, but in Cameroon local tradition dictates that gorilla meat cannot be sold and therefore less emphasis was placed on gorilla hunting. Bones are used in traditional medicines in both Cameroon and Nigeria and skulls are typically retained as a trophy with much kudos attached to the hunter responsible. Hands or feet do not seem to be particularly valued. Infants have been sold (Nyango at the Limbe Wildlife Center is an example) but it seems to be more of an opportunistic event.

4.3 Diseases

Another potential general threat to gorillas is exposure to human diseases, particularly for habituated gorillas that come into contact with humans, in areas of gorilla tourism (Butynski, 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. At present, this threat is not yet effective for the Cross River gorilla, but an evaluation of habituation for ecotourism has recently been completed at Afi Mountain Wildlife Sanctuary (Andrew Dunn, comm. pers.). Strict rules will be needed to regulate tourist visits, including the number of tourists per group, limiting the approach of humans to 7 m, burying human excrement deeper than 30 cm (Homsy, 1999). Similarly, the WCS Global Health Program is also helping evaluate and suggest ways to minimize the risks of disease transmission between humans (including villagers and researchers) and livestock and the gorillas of the Kagwene Gorilla Sanctuary in Cameroon.

Beside severe impacts on human populations, several outbreaks of the Ebola virus since 2000 might have claimed thousands of great apes in Africa. Ebola hemorrhagic fever is a severe, often fatal disease that affects humans, gorillas and chimpanzees. Many scientists believe the disease is spread through the butchering and handling of primate bushmeat. The disease has been confirmed in six African nations: the Democratic Republic of Congo, the Republic of Congo, Gabon, Sudan, Ivory Coast, and Uganda. So far Cross River gorillas have not been affected by Ebola but this could change.

4.4 Impact of Conflict

The 1960s-1970s Nigerian civil war could have negatively affected the Cross River gorilla but there is no evidence of this.



4.5 Other threats

Road development between Mamfe and Akwaya will possibly split the Cross River gorilla populations in Mone Forest Reserve and the proposed Takamanda National Park.

Accidental entrapment in wire snares used to trap other wild animals can also threaten gorillas. Plumptre *et al.* (1997) stated that the setting of snares for ungulates in the Volcanoes National Park, Rwanda is one of the greatest threats to *Gorilla gorilla beringei*. This threat needs to be assessed in Nigeria-Cameroon border region.

The potential isolation of some localities and low numbers of Cross River gorilla populations have given rise to concerns about inbreeding but recent genetic data suggest that exchange between subpopulations persists (Bergl & Vigilant, 2007) and that genetic diversity remains at an acceptable level (Bergl et al. 2008).

International trade in live gorillas and gorilla parts has declined since the gorilla was listed in Appendix I of CITES.

5. Regulatory provisions

5.1 International

International trade in live gorillas and gorilla products, formerly a significant threat to the species, has greatly declined since the gorilla was listed on Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 1977.

5.2 National

Nigeria ratified the African Convention on the Conservation of Nature and Natural Resources in 1968, the Convention of International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 1973, and the Convention on Biological Diversity (CBD) in 1996.

In Nigeria the Endangered Species Act of 1985 is the legal instrument through which the international treaties are enforceable. All wildlife in National Parks is protected by law.

In Cameroon, law n° 94/01 (1994) sets out the country's forestry, wildlife and fishery regulations, and list gorillas as Category A species, which are fully protected against hunting, capture, or sale; in whole or in part. Protected areas such as national parks and wildlife reserves may be established under the auspices of the Direction de la Faune and des Aires Protégées (DFAP) of the Ministry of Forestry and Wildlife (MINFOF), which is also responsible for the protection of the country's biodiversity in general.

6. Conservation measures

6.1 National protection status

National laws for control of hunting and capture exist in all countries with gorilla populations, but lack of funds and inaccessibility make wide enforcement of this legislation rare.

Most Cross River gorillas occur within forest reserves, wildlife sanctuaries and national parks, they and their habitat have some degree of protection. However, some localities (Mbe in Nigeria and Mbulu, Tapke/Awuri and Bechati areas in Cameroon) currently lack any formal protection status.

In Cameroon, the Takamanda Forest Reserve, Mone Forest Reserve and Kagwene Gorilla Sanctuary are all formally protected, although to differing degrees on the ground. Takamanda and Mone were created as Forest Reserves during the colonial period for future timber exploitation. The Takamanda Forest Reserve is currently being proposed to be a National Park. The status of the Mone Forest Reserve is being reviewed (it has been selected as a GrASP pilot study site to evaluate potential REDD mechanisms).

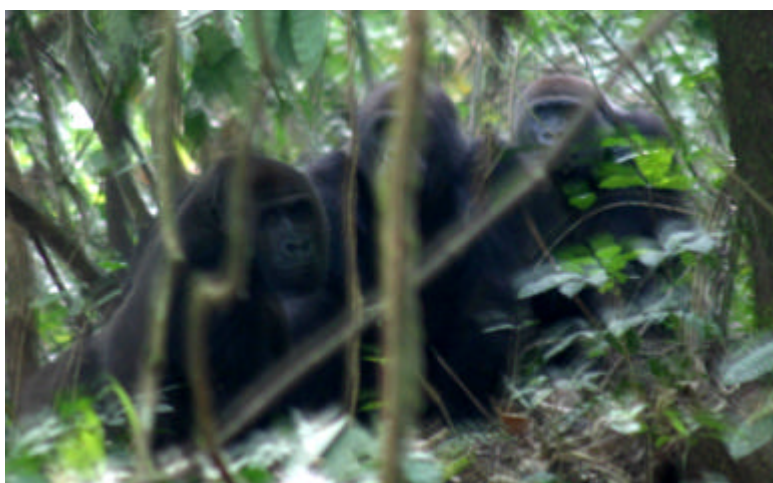
In Nigeria, Cross River gorillas are found in the Afi Mountain Wildlife Sanctuary of the Afi River Forest reserve, in the Mbe Mountains community forest, and in the Okwangwo Division of the Cross River NP.

A transboundary protected area has been proposed which would unite the Okwangwo Division of Cross River National Park with Cameroon's (proposed) Takamanda National Park.

6.2 International protection status

The gorilla, *Gorilla gorilla sl*, is listed in CITES Appendix I since 1st July, 1975, and all Range States are Parties. The gorilla is listed on Class A of the African Convention on the Conservation of Nature and Natural Resources (1969).

The Cross River gorilla, *Gorilla gorilla diehli*, is part of *Gorilla gorilla sensu lato* and as such listed on Appendix I of the Convention on Migratory Species (CMS).



© J. Sunderland-Groves.

One of the only pictures of Cross River Gorilla taken in the wild

6.3 Additional protection needs

Establishment of a transboundary protected area for the Takamanda-Okwangwo complex, upgrading the protection status of the Takamanda Forest Reserve, developing land-use plans for the Takamanda-Mone-Mbulu area in Cameroon, including a network of protected areas and corridors and a plan for the conservation of Afi-Mbe-Okwangwo area in Nigeria, including some formal conservation status for the Mbe Mountains (most likely a community wildlife sanctuary) and the maintenance of forested connections between gorilla habitats.

Strengthening protection and law enforcement measures for all Cross River gorilla populations.

Maintaining and expanding basic research into the ecology, distribution and population biology of the Cross River gorilla, building the capacity of relevant institutions in Nigeria and Cameroon (including Government departments, universities, NGOs).

Strengthening and expanding conservation education and awareness programmes at all levels, incorporating local community needs into the development of management strategies, including the study of alternative livelihoods options.



Table 1. Priority Populations for Cross River Gorillas (*G. g. diehli*)

Country Countries	Population Name	Pop. Size	Area Km2	Habitat Type(s)	Habitat or Biogeographic Uniqueness	Land Use Status	Scientific Importance	Other Important Conservation Features	Major Threats	Rationale for Prioritization
Nigeria	Afi Mountain	Approx 25-30	100	Lowland to montane forest	Westernmost of all <i>G. gorilla</i> populations	Wildlife Sanctuary	Long-term Monitoring	Part of global hotspot for species richness And endemism for a wide range of taxa; Many endangered and Vulnerable species; sympatric with <i>P. t.vellerosus</i>	Hunting, Conversion of forest for agriculture, isolation, habituation	Westernmost gorilla pop; protected area; sympatric with Chimpanzees; potential for habituation; support of state government
Nigeria	Mbe Mountain	Approx 3035	85	Lowland to submontane forest		Proposed Community Wildlife Sanctuary	Long-term Monitoring	Part of global hotspot for species richness And endemism for a wide range of taxa; Many endangered and Vulnerable species; sympatric with <i>P. t.vellerosu s</i>	Hunting, Conversion of forest for agriculture,	Support of local communities, acts as a corridor linking Afi to Okwangwo, sympatric with Chimpanzees,
Nigeria/ Cameroon	Takmanda-Okwangwo	Approx 70-115	1,325	Lowland to montane forest, montane grassland	Contains an Altitudinal gradient from 100m to above 1600m; largest continuous block of habitat	Mixed National Park, Forest Reserve, and Ungazetted land	Long-term Monitoring of Mbe and Boshi Extension Subpopulations in Nigeria	Part of global hotspot for species richness And endemism for a wide range of taxa; Many endangered and Vulnerable species; sympatric with <i>P. t. vellerosus</i>	Hunting, Conversion of forest for Agriculture, Fragmentation	Largest CR gorilla Population; large legally Protected area, largest Continuous block of habitat; sympatric with Chimpanzees; potential for population Expansion; support of state and federal Government
Cameroon	Mone-Mbulu-Kagwene	Approx 60-90	1550	Lowland to montane forest, montane grassland	Contains an altitudinal gradient from 100m to 2000m Contains highest altitude <i>G.g.diehli</i> population	Forest reserve, Wildlife sanctuary and Ungazetted land	On-going Research	Part of global hotspot For species richness and endemism for a wide range of taxa; many endangered and vulnerable species; sympatric with <i>P. t. vellerosus</i>	Hunting, Conversion of forest for Agriculture, Fragmentation	Second largest pop; High altitude; some protection; low levels of human disturbance; ongoing Research and Potential for habituation; Sympatric with Chimpanzees; potential for pop expansion; Support of state and federal government
Cameroon	Kagwene	Approx 17-19	19.4	Montane forest	High quality montane forest up to 2,000m	Wildlife Sanctuary	Daily monitoring presence since 2002	Exceptional bird diversity, botanical surveys planned for near future and likely to also highlight important species	Habitat loss and fragmentation as a result of farming and grassland burning	Long-term study site. Eastern genetic sub-division. High quality montane habitat and strong local support for conservation
Cameroon	Bechati	20-30	80-100	Lowland to mid-elevation forest		Ungazetted land		Part of global hotspot For species richness and endemism for a wide range of taxa; many endangered and vulnerable species; sympatric with <i>P. t. vellerosus</i>	Hunting, Conversion of forest for Agriculture, isolation	Important survey area; Sympatric with Chimpanzees



7. ADDITIONAL REMARKS

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Gorilla beringei beringei

Conservation Status Report





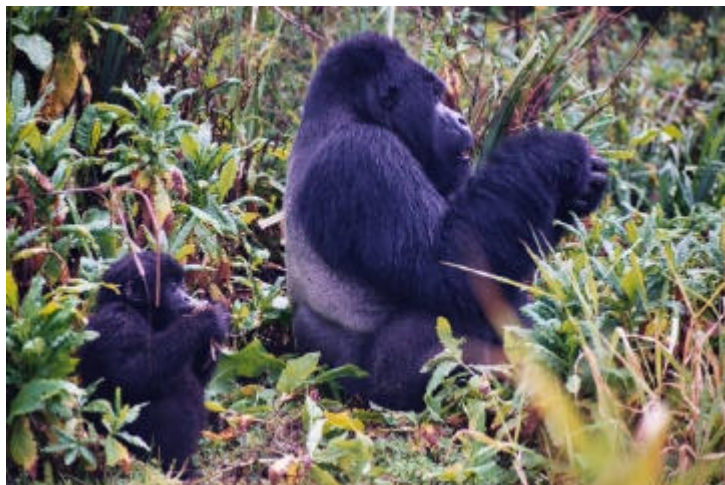
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GORILLA BERINGEI BERINGEI

1. TAXONOMY AND NOMENCLATURE

1.1. Taxonomical remark



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The taxonomy currently followed by CMS (Wilson & Reeder, 2005) recognises two species of Gorilla. The eastern species includes both the eastern lowland *G. beringei graueri* and the two mountain populations of *G. b. beringei*.

The Bwindi mountain gorilla could be 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. b. 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 & 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.

The following document summarizes the conservation status of the mountain gorilla, *Gorilla beringei beringei* (Matschie, 1903), the nominal subspecies of eastern gorilla. The mountain gorilla is found in two small isolated populations, one among the volcanoes of the Virunga Massif at the border of DRC, Rwanda and Uganda, the other in Bwindi Impenetrable National Park in southwest Uganda on the border with DRC.

1.2 Nomenclature

The American physician and missionary Thomas Staughton Savage first described the Western Gorilla (he called it *Troglodytes gorilla*) in 1847 from specimens obtained in what is now Gabon. The name was derived from a Greek translation of the word Gorillai (a "tribe of hairy women"), described by Hanno the Navigator, a Carthaginian explorer who led a voyage (circa 480 BC) around the coast of West Africa, passing an active volcano (only Mt Cameroon fits the description) before encountering the 'Gorillai'. There is much academic debate over whether the 'hairy women' he saw are what we know as gorillas today.

1.2.1 Scientific name

Gorilla beringei beringei (Matschie, 1903)

The name *beringei* was first given by Paul Matschie in 1903, a mammalian taxonomist working at the Humboldt University Zoological Museum in Berlin. He described a new species of gorilla inhabiting the Kirunga (= Virunga) Volcano. Matschie named the species *Gorilla beringei* in honour of Captain von Beringe the finder of the specimen.

1.2.2 Synonyms

Gorilla gorilla beringei, *Gorilla beringei*, *Gorilla beringeri*, *Gorilla beringei mikenensis*

1.2.3 Common names

English – Mountain Gorilla

French – Gorille de montagne
German – Berggorilla
Spanish - Gorila Montañés

1.2.4 Description

Very large, the largest living primates. Barrel-chested ape with relatively even hair, a bare black face and chest and small ears. The bare shaped brows are joined and the nostril margins are raised. Females are much smaller than males. Adult males range in height from 165-175 cm (5 ft 5 in-5 ft 9 in), and in weight from 140-200 kg (310-440 lb). Adult females are often half the size of a silverback, averaging about 140 cm (4 ft 7 in) tall and 100 kg (220 lb). Occasionally, silverbacks of over 183 cm (6 feet) and 225 kg (500 lb) have been recorded in the wild. On the ground, gorillas locomote by knuckle-walking.

The mountain gorilla is very black and densely furred, with a broad face and massive jaws. It has a long blue-black coat and the small of the back, or 'saddle' of mature males becomes grey or white with ages, hence the name of 'silverback' for mature males.

2. BIOLOGY OF THE SPECIES

2.1 General Biology

Gorillas are mainly terrestrial. The gorilla's large size and folivorous habits mean that the animals must spend long hours feeding everyday to maintain their body weight. Of all the great apes, the gorilla shows the most stable grouping patterns. The same adult individuals travel together for months and usually years at a time. It is because gorillas are mainly foliage eating that they can afford to live in these relatively permanent groups. Foliage, unlike patchy fruit sources generally and ripe fruit in particular, is widespread and abundant and supports large groups of animals.

Gorilla groups can include up to 30-40 animals, but more usually number 5-10 individuals.



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2.1.1 Habitat

The characteristic habitat of the mountain gorillas (*Gorilla beringei beringei*) is high-altitude montane forests with a dense herb layer and abundance of fruit (reviewed in Doran & McNeilage, 1998, 2001). A number of vegetation zones have been identified in the mountain gorilla habitat of the central Virunga Volcanoes 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 450 km² and the Bwindi gorillas occupy an area of approximately 215 km².

2.1.2 Adaptation

Gorillas are herbivorous (plant-eating). Plant material contains cellulose which is indigestible to many non-herbivorous animals. With regard to digestion, herbivorous animals that do not ruminate (re-chew their food as part of the digestive process) rely solely on the microbes (microscopic bacteria) living in their colon. The bacteria function to breakdown the indigestible plant cellulose and turn it into valuable digestible carbohydrates through the fermentation process.



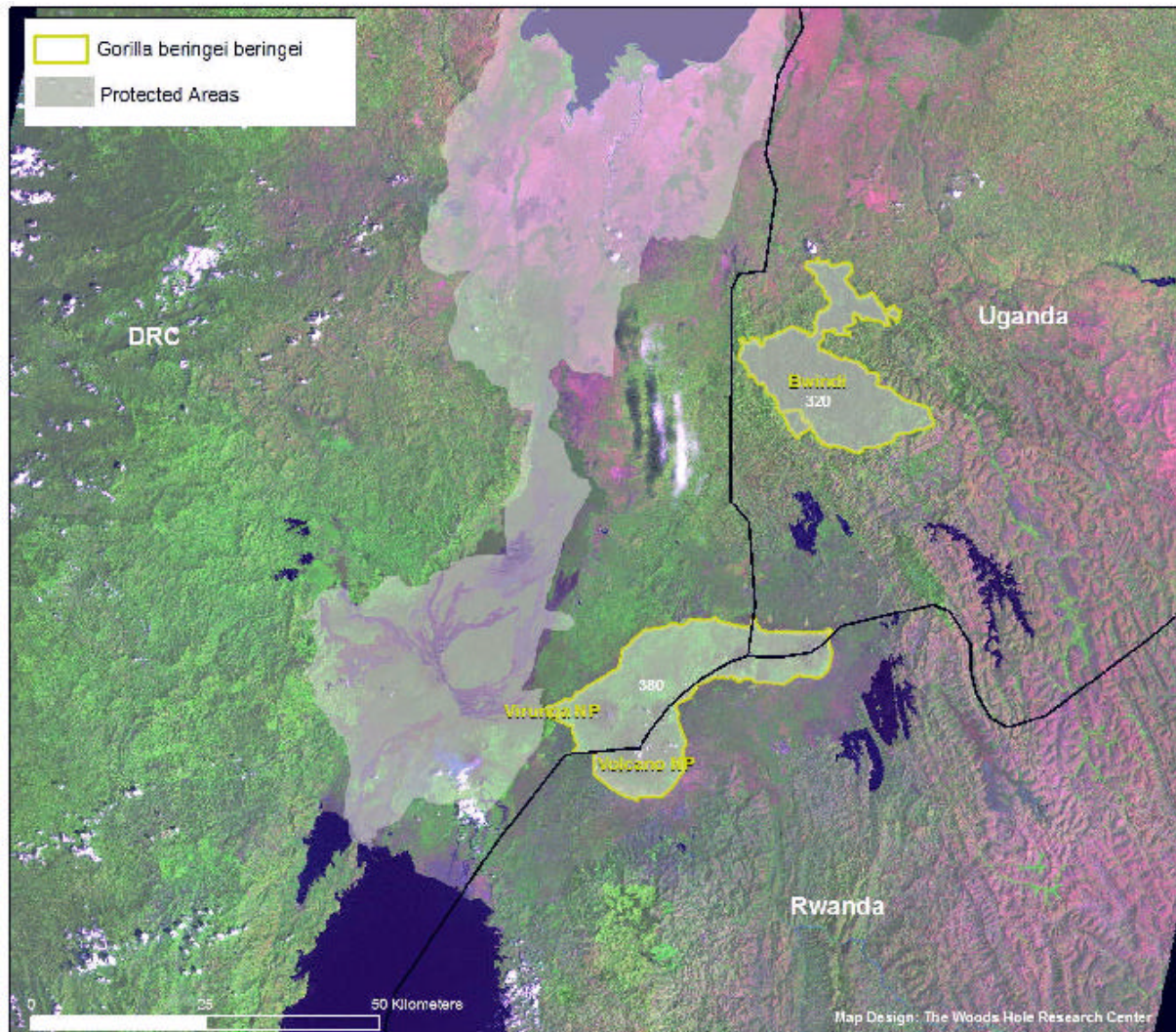
2.1.3 Social behaviour

As far as group structure is concerned, gorillas form harems. It was once thought that gorilla groups contained only one adult male, but around one third of groups in Albertine Rift have been found to host two full-grown males. Adult female in any one silverback's (dominant adult male) harem are mostly unrelated, and the social ties that exist between them are weak. In contrast to many other primates, it is the bond between each individual female and the silverback, rather than bonds between the females that hold the group together. 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 (Robbins, 1995).

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

(from http://www.whrc.org/africa/prioritypops/images/gorilla_beringei_beringei_ls.gif)

Map from "The Wood Hole Research center"



2.2 Distribution (current and historical)

There are two known populations of mountain gorilla, both of which occur in protected areas (national parks and reserve). 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 Volcanoes National Park in Rwanda and to a lesser extent the Mgahinga Gorilla 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 & WWF, 2001). In this report these populations will be referred to as either the Virungas or Bwindi population of mountain gorillas.

Gorillas are found in two widely separated areas of Africa. The western and eastern populations were probably

originally separated first by the massive inland Congo basin lake of the Miocene, and then, from about 5 million years ago, by the gradual drying of the region and the retreat of forest to higher areas. Subsequently, gorillas have not spread back into the central Congo basin, either because they have not had time, or because the heavily shaded primary forest there does not allow the growth of sufficient ground vegetation to support such a large, predominantly terrestrial animal (MacDonald ed., 2001).

2.3. Evaluation and evolution of populations

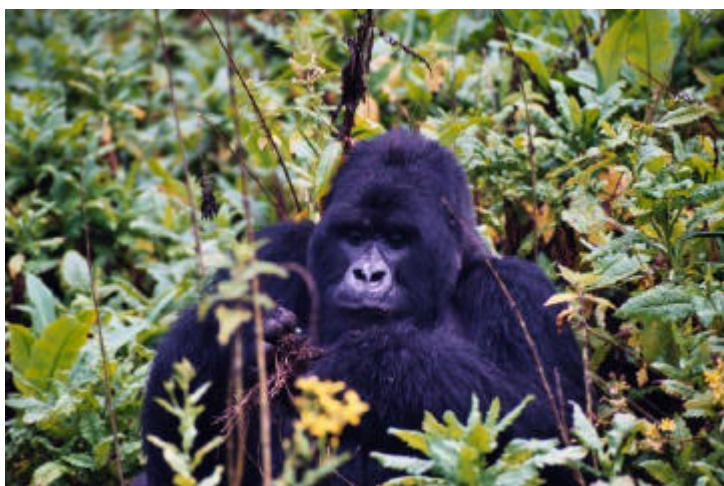
Based on recent estimates (Gray et al., 2003 and McNeilage et al., 2001), the total number of mountain gorillas is between 650 and 680, living in two isolated populations. Both populations are entirely located within protected areas. The number of mountain gorillas declined throughout the 1970s and early 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 Democratic Republic of Congo section. However, since the mid 1980s, the mountain gorilla appears to be gradually increasing in numbers.

A census of the Virunga Volcanoes mountain gorilla population carried out in 2003 shows a 17% increase in population size since 1989. Their number is now estimated as a total of 380 gorillas. Their night nests are used to establish the number of gorillas in each group. 269 gorillas were counted in 16 habituated groups, 80 gorillas in 12 unhabituated groups and 11 solitary silverback males. Among the unhabituated animals, several infants potentially were missed as they slept together with their mothers in the same nest; or even whole groups might have been missed. Therefore, this number was corrected and the total number was calculated - 380 gorillas. 71% of these animals is habituated (1989 this was the case only in 57%).

A census conducted in Bwindi in 1997 resulted in an estimate of 292 gorillas from 28 groups, along with 7 lone silverback males. A similar number (290-310) had also been found during the period of 1987 to 1993 when all groups were identified and monitored by Thomas Butynski and his team. The Bwindi population is stable and may also be increasing (McNeilage et al., 2001).

The mountain gorilla (*G.g. beringei*) is listed as Critically Endangered on the IUCN Red List of Endangered Species (IUCN 2008, CR C1). It faces an extremely high risk of extinction in the wild due to its very small population level, habitat loss, poaching, human disease, and war.

2.4. Migrations



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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 km² (UNEP-WCMC & WWF, 2001), which may include land in more than one country and hence daily foraging movements may involve crossing international borders. The area of habitat occupied by the Virungas mountain gorillas is approximately 450 km² and that occupied by the gorillas of Bwindi-Impenetrable National Park is approximately 215 km² (Butynski, 2001).

A study by Vedder (1984) in Volcanoes National Park of Rwanda indicated that, 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. One group of gorillas travelled through an area of 8.56 km² during a 12 month period. Solitary male mountain gorillas travel further and expand their home range, and mountain gorilla home ranges typically overlap extensively (Watts, 1994). Watts (1998) found that they used areas less than or equal to 25 km² and that annual home range size and core area size varied considerably both between groups and across years. Food and male mating competition influence home-range use and core area selection and size.



3. CONSERVATION STATUS, BY PARTY

Democratic Republic of the Congo (Critically Endangered): The mountain gorilla occurs in the Mikeno sector of Virunga National Park. The Virunga National Park is 7,900 km² in size and is contiguous with the Ruwenzori Mountains and Mgahinga Gorilla National Parks, Uganda and Volcanoes National Park, Rwanda.

Rwanda (Critically Endangered): The mountain gorilla occurs in the Volcanoes National Park, which is 160 km² in size and is contiguous to Virunga National Park in DRC and Mgahinga Gorilla National Park in Uganda. It ranges in altitude from 2,400m to 4,507m (UNEP-WCMC, 2003c).

Uganda (Critically Endangered): The mountain gorilla occurs in the Mgahinga Gorilla National Park and in Bwindi-Impenetrable National Park. The Mgahinga Gorilla National Park is 33.7 km² in size and is found in the extreme south-west of Uganda on the borders with DRC and Rwanda. It ranges in altitude from 2,700m to 4,127m. The Bwindi-Impenetrable National Park is 331 km² hectares and ranges in altitude from 1,190m to 2,607m.

4. ACTUAL AND POTENTIAL THREAT

The major threats affecting or having affected mountain gorilla populations are (1) habitat loss or modification and forest encroachment (Muruthi et al., 2000), (2) disease and disease transmission from humans and (3) war or political unrest (Plumptre et al., 2003; Muruthi et al., 2000; IUCN, 2002).



Habitat, Rwanda © Danny Bizimana

4.1. Degradation and decline of habitats

The mountain gorilla lives in a region where there is a very high human population. In eastern RDC, Rwanda and Uganda 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 by refugees and, although no land has been appropriated from the habitat of the Virunga gorillas, declines may be due to the presence of livestock in the Virungas (IUCN, 1982). Deforestation to supply refugees' demand for fuelwood affected 105 km² of the park in 2003, of which 35 km² has been completely stripped but this wasn't Mikeno sector so not directly relevant to gorilla habitat (UNEP-WCMC, 2003b).

Relatively intensive illegal wood cutting and the extraction of gold and charcoal does occur in certain areas. In long or middle terms agricultural encroachment is the major threat to forest integrity (UNEP-WCMC, 2003a).

The Bwindi-Impenetrable National Park population is relatively well protected. Historically, only about 10% of BINP remained free from human disturbance (UNEP-WCMC, 2003a).

4.2. Direct exploitation

- **The bushmeat trade**

Mountain gorillas are not usually hunted for bushmeat, but they are frequently maimed or killed by traps and snares intended for other animals (Plumptre & Williamson, 2001). Very recent information suggests that a few mountain gorillas have been killed for their meat ([Wildlife Direct, 2007](#)).

- **Other forms of direct exploitation**

In the past mountain gorillas were killed for their heads, hands, and feet, which were sold to collectors, and a few infants have been captured for potential illegal sale to zoos. 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 several adults killed to gain access to the infants, Williamson and Fawcett (2008) reported similar incidents in Rwanda.

4.3. Diseases

Another potential threat to gorillas is exposure to human diseases (e.g Graczyk et al., 2001; Graczyk et al., 2003) particularly for habituated gorillas that come into contact with humans, in areas of gorilla tourism (Homsy 1999). 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 a respiratory disease, with the possibility of measles as the primary infection, in the Volcanoes NP in Rwanda claimed six gorilla lives, and 27 other gorillas were successfully treated (Wallis & Lee, 1999). Strict rules are in place to regulate tourist visiting times, the number of tourists per group, limiting the approach of humans to 7 m, and burying human excrement deeper than 30 cm (Homsy 1999).

Beside severe impacts on human populations, several outbreaks of the Ebola virus since 2000 might have claimed thousands of great apes in Africa. Ebola hemorrhagic fever is a severe, often fatal disease that affects humans, gorillas and chimpanzees. Many scientists believe the disease is spread through the butchering and handling of primate bushmeat. The disease has been confirmed in six African nations: the Democratic Republic of Congo, the Republic of Congo, Gabon, Sudan, Ivory Coast, and Uganda. Up till now mountain gorillas have not been affected, but this could change in the future.

4.4. Impact of Conflicts

The impact of wars and political conflicts is particularly well documented for the mountain gorilla. The early 1990s saw the outbreak of fighting in Rwanda, which by April 1994 resulted in a stream of refugees pouring into gorilla habitat in DRC. Indeed, approximately 50% of Rwanda's civilian populations were displaced during this conflict, of which 860,000 refugees were concentrated in the vicinity of Virunga National Park (Dudley et al., 2002). Shortly afterwards came the 1996 war between the armed forces of DRC and a rebel movement backed by Angola, Rwanda and Uganda. Subsequently fighting again broke out in 1998 between Rwandan and Ugandan troops and the DRC



army. The displacement of refugees during these conflicts led to uncontrolled firewood harvesting, increased poaching in the Virunga National Park 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, and it is estimated that at least 500,000 ha of the park were 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. 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 Virunga National Park being placed on the World Heritage in Danger List in 1994 (UNESCO, 1994). The situation around the Virungas remains unstable, militia groups are still active in the region 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 this civil war, the continuous political unrest and economic instability. The ongoing conflict has caused the death of several guards in the last two years, it has made wardening of the area extremely difficult and dangerous, and has been the reason of the killing of at least 9 gorillas in 2007. This conflict remains a threat to the Virungas gorillas and to the protected areas.

4.5. Other threats

Accidental entrapment in wire snares used to trap other wild animals is also a threat to the mountain 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 beringei beringei*.

The isolation and low numbers of mountain gorillas has given rise to concerns about inbreeding (Garner & 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 & Ryder, 1996).

The two populations of mountain gorilla are too small to meet theoretical survival criteria, and are vulnerable to stochastic catastrophic events such as outbreaks of disease, sudden wide loss of habitats, and would quickly be reduced by poaching if the vigilance of conservationists were to be relaxed.

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. REGULATORY PROVISIONS

5.1 International

CMS: Gorilla gorilla sl is registered on the Appendix I of the CMS since 2005.

CITES: Gorilla on Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) since 1975.

ACCNNR: Gorilla listed in A class of The African Convention on the Conservation of Nature and Natural Resources since 1969.

5.2 National

In DRC the Nature Conservation Act of 1969 (Ordinance-Law 69.041) defines national parks. The 1982 hunting act (Law 82.002) defines faunal reserves and game reserves and lists animals for which hunting and trapping are prohibited. Since 1985, regional governments have had the right to set their own regulations on species protection and to specify hunting seasons, bypassing this law. Management of National Parks, faunal reserves, and game reserves is delegated to the Institut Congolais pour la Conservation de la Nature (ICCN), which also manages scientific research. Effective control of many protected areas in the east of the country has been in the hands of rebel authorities in recent years.

Mountain gorilla is totally protected in DRC by the decree relating to hunting and fishing of 1937, owning, transport and/or national trade is forbidden or regulated. It is also mentioned in the hunting law of 1982 and in departmental order of 1973 setting the establishment of special conditions for elephants hunting and listing the protected animals (ECOLEX). Besides, in accordance with the Order Law relating to the preservation of nature, each person who captures or kills gorillas in a strict nature preserve is exposed to imprisonment penalty from 1 to 10 years.

In Rwanda Ordinance 18/6/73 modified by Law-Decree 26/4/1973 and Law 34/2000, established the Rwandan Office of Tourism and National Parks (ORTPN), and governs the creation and functioning of protected areas and hunting arrangements. ORTPN has direct responsibility for management of national parks and matters relating to ecotourism. The Volcanoes NP is therefore under its responsibility. The Department of Environment has overall responsibility for biodiversity conservation.

The mountain gorilla is totally protected in Rwanda by the Ordinance Law (18/6/1973). Owning, transportation and/or national trade is forbidden or regulated (ECOLEX). Volcanoes National Park in Rwanda is a biosphere reserve.

In Uganda there are two main statutes that concern protection of gorillas (and great apes): the Forests Act (1964) and the Uganda Wildlife Statute (1996), respectively executed through the National Forestry Authority (INFA) and the Ugandan Wildlife Authority (UWA), in the Ministry of Tourism, Trade and Industry. The Uganda Wildlife Statute provides tools for the establishment of wildlife conservation areas, which fall under two categories: wildlife protected areas (national parks or wildlife reserves) and wildlife management areas (wildlife sanctuaries and community wildlife areas).

It is forbidden by the national legislation to capture mountain gorillas (Uganda Wildlife Division, 2002a). Among the appropriated legislation is Uganda Wildlife Statute, n° 14 of 1996, and the National Environment Statute, n°3 of 1995. Uganda Wildlife Statute, No 14 of 1996 states that species that migrate into Uganda and that are protected by terms of any international convention or treaty to whom Uganda is part and to which section 91 is applied, will be protected species by this text of law (ECOLEX), and the mountain gorilla is included in that text.

As all mountain gorilla populations occur within protected areas (national parks and reserve), they and their habitat have 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 gorillas, although wide enforcement of the legislation is difficult due to lack of funds and inaccessibility (Nellemann & Newton, 2002).

In the Bwindi Impenetrable National Park, extractive use may be authorised (UNEP-WCMC, 2003a). When Bwindi Impenetrable and Mgahinga Gorilla National Parks were created, access to the park was forbidden for everyone except authorised researchers, which resulted in an important fall in illegal activities (Nowak, 1995).

In Bwindi Impenetrable National Park extractive use of non-timber forest products is allowed in certain zones (multiple-use zones) of the park.



Bwindi Forest



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6. CONSERVATION MEASURES

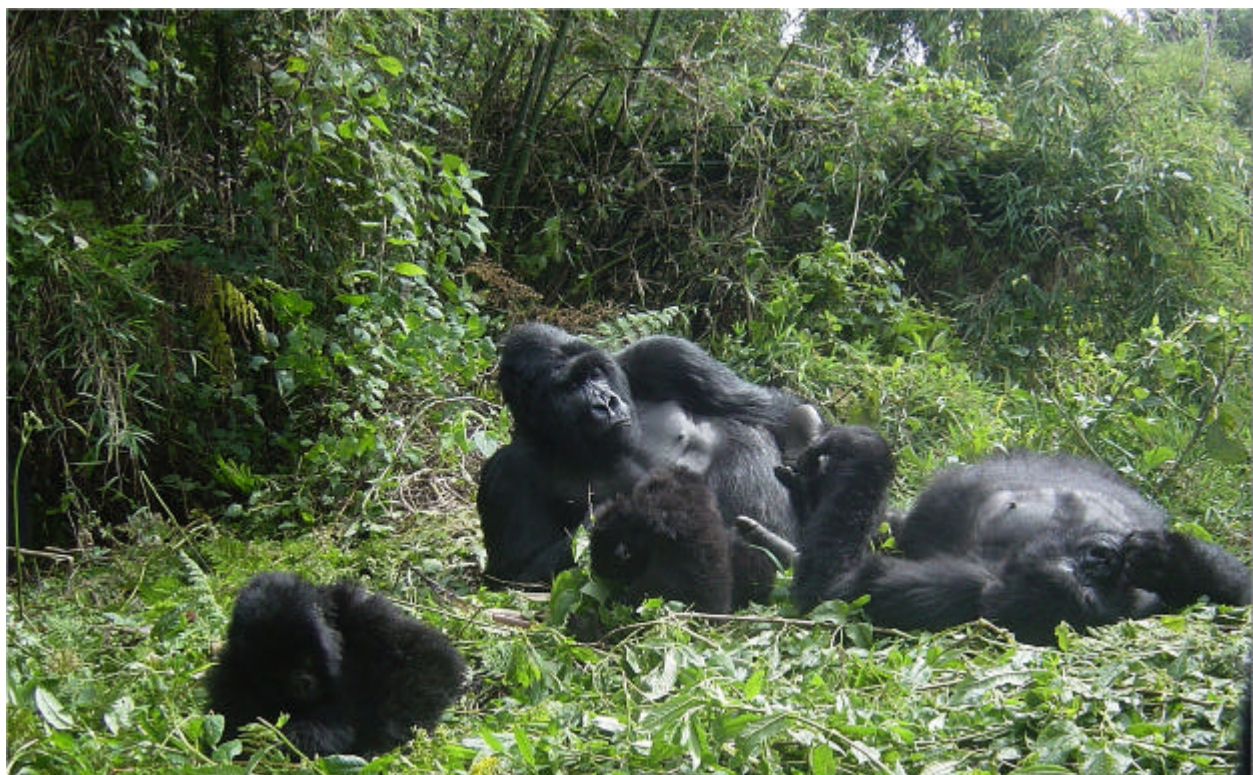
6.1 Anti-poaching and law enforcement

The taxon is legally protected in all three of its ranging states. Great efforts must be made by the range states to enforce their laws concerning gorillas, including not only effective antipoaching, but also follow-up of the legal process through arrest, and eventually the prosecution of all cases judged guilty.

6.2 Habitat conservation



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Table 1. Priority Populations for Mountain Gorillas (*G. b. beringei*)

Country/ Countries	Population Name	Pop. Size	Area (km ²)	Habitat Type(s)	Land Use Status	Scientific Importance	Other Important Conservation Features	Major Threats	Rationale for Prioritization
Uganda	Bwindi Impenetrable NP	320 ***	331	Montane to lowland forest	National Park	Long-term gorilla research	Major site of local Endemism; <i>P. t.</i> <i>schweinfurthii</i> Present	Hunting, sawing, diseases	One of two major mountain gorilla populations; protected area; long-term research; sympatric with chimpanzees
DRC, Rwanda, Uganda	Virunga NP, Volcanoes NP, Mgahinga Gorilla NP	380 ***	450	Montane Forest	National Park	Long-term gorilla research	Virunga NP also contains pops of <i>G. b.</i> <i>graueri</i> and <i>P. t.</i> <i>schweinfurthii</i>	Trafficking of infant gorillas, hunting, encroachment by agricultural and development projects, diseases	One of two major mountain gorilla populations; protected area; long-term research ; sympatric with other great apes

Accuracy of population estimate is scored as follows: ***indicates the estimate from good transect surveys spread over areas or habitats of population; **indicates estimate based on adequate set of transects from one location, and estimate extrapolated to the rest of the areas/habitats of population; *no scientific estimate of ape density from any location



6.3 Maintenance of habitat and corridors

The level of legal protection given to mountain gorillas and their habitat is appropriate. Mountain gorillas surviving in two small populations are apparently stable. The four national parks are managed and supported by the governments of DRC, Rwanda and Uganda, by international conservation NGOs, and partially financed through tourism based on gorillas viewing. These gorillas are highly vulnerable to disease and poaching but, in comparison with the other gorilla subspecies, they are for the moment relatively secure although given the current insecurity in eastern DRC this situation is precarious and could change quickly.

6.4 Regulation concerning other harmful factors

Implementation of recommendations from Homsy (1999), concerning disease transmission.

7. ADDITIONAL REMARKS

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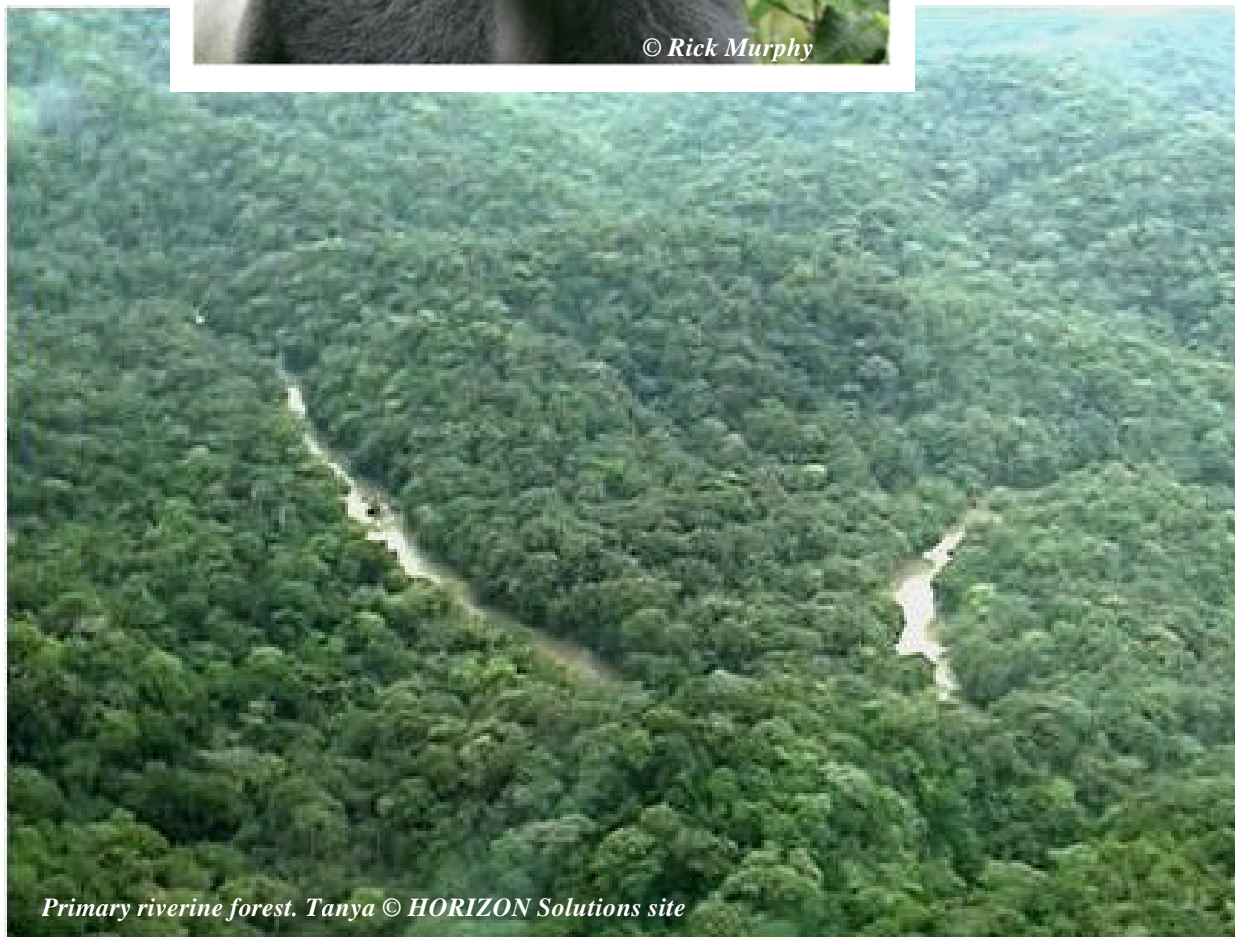


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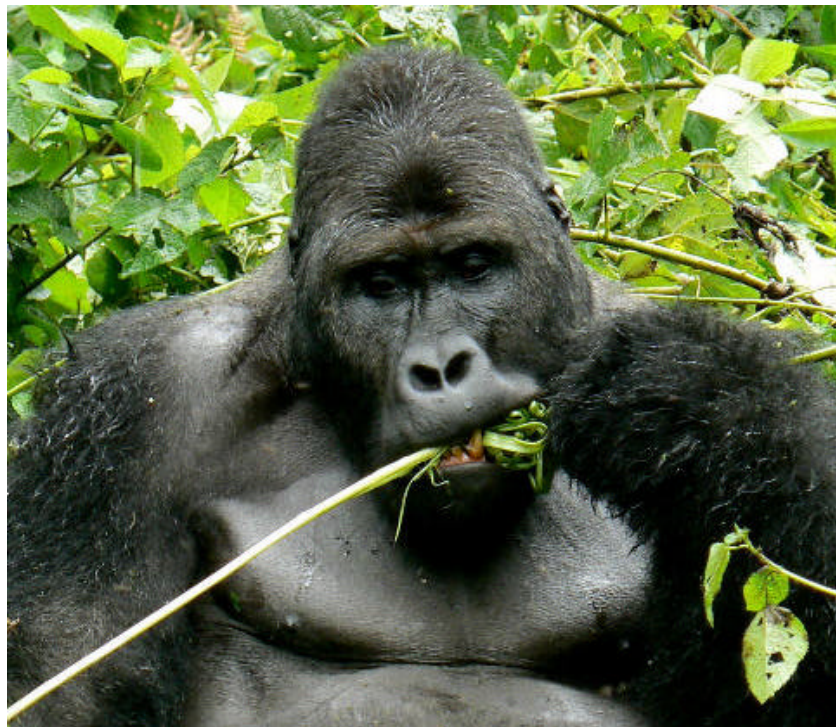


Gorilla beringei graueri

Conservation Status Report



Institut royal des Sciences naturelles de Belgique



*Silverback. Eastern lowland gorilla.
Congo rangers blog*



GORILLA BERINGEI GRAUERI

1. TAXONOMY AND NOMENCLATURE

1.1. Taxonomical remark



Eastern lowland gorilla. Kahuzi-Biega NP. © Marc Moreau

The taxonomy currently followed by CMS (Wilson & Reeder, 2005) recognises two species of Gorilla. The eastern species includes both the eastern lowland *G.beringei graueri* and the mountain gorilla *G.b.beringei*.

The following document is a summary of the conservation status of the Eastern Lowland Gorilla (or Grauer's Gorilla), *Gorilla beringei graueri*, recognised as a subspecies distinct from the Mountain Gorilla since as long as 1914 (Matschie, 1914). It is an endemic taxon found only in eastern Democratic Republic of the Congo.

1.2 Nomenclature

The American physician and missionary Thomas Staughton Savage first described the Western Gorilla (he called it *Troglodytes gorilla*) in 1847 from specimens obtained in what is now Gabon. The name was derived from a Greek translation of the word Gorillai (a "tribe of hairy women"), described by Hanno the Navigator, a Carthaginian explorer who led a voyage (circa 480 BC) around the coast of West Africa, passing an active volcano (only Mt Cameroon fits the description) before encountering the 'Gorillai'. There is much academic debate over whether the 'hairy women' he saw are what we know as gorillas today.

1.2.1 Scientific name

Gorilla beringei graueri (Matschie, 1914)

In 1914, Paul Matschie, a mammalian taxonomist working at the Humboldt University Zoological Museum in Berlin described as a new species the gorilla inhabiting the lowlands of eastern Belgian Congo. Colin Groves in 1970 revised gorilla taxonomy and recognised (*Gorilla gorilla graueri*) the lowland population of eastern gorilla as a subspecies different to the mountain gorilla.

1.2.2 Synonyms

Gorilla graueri, *Gorilla beringeri* ?, *Gorilla uellensis*, *Gorilla gorilla rex-pygmaeorum*

1.2.3 Common names

English – Eastern Lowland Gorilla, Grauer's Gorilla
French – Gorille de plaine de l'Est, Gorille de Grauer
German – Grauer-Gorilla
Spanish - Gorila de Grauer

1.2.4 Description

The two gorilla species have numerous similarities. Both are very large, the largest living primate, barrel-chested ape with relatively even hair, a bare black face and chest and small ears. The bare shaped brows are joined and the nostril margins are raised. Females are much smaller than males. Adult males range in height from 165-175 cm (5 ft 5 in-5 ft 9 in), and in weight from 140-200 kg (310-440 lb). Adult females are often half the size of a silverback, averaging about 140 cm (4 ft 7 in) tall and 100 kg (220 lb). Occasionally, silverbacks over 183 cm (6 feet) and 225 kg (500 lb) have been recorded in the wild. On the ground, gorillas move by knuckle-walking.

The eastern gorilla tends to be larger than the western. Differences between the two species include: longer, blacker hair for the eastern; the head hair tends not to have red-chestnut tones as is usually the case with adult western males; eastern has a more developed sagittal crest along the midline of the skull, indicative of a more powerful jaw musculature; the saddle of silver hair tends to stand out more clearly against the darker hair and to be clearly delineated.

There are few if any absolute physical differences between the two recognised subspecies of eastern gorilla. The mountain gorilla tends to have very black and longer hair making it densely furred, with a broad face (larger cranium and wider facial skeleton), hairy brow-ridge, massive jaws as well as less rounded and more angular nostrils.

Mitochondrial DNA comparisons confirm genetic divergence of the two subspecies, but interpretation of the results is still subject to discussion. Nevertheless it is estimated that the two species diverged some 400,000 years ago (Vigilant & Bradley, 2004).

2. BIOLOGY OF THE SUBSPECIES

2.1 General Biology

Gorillas are mainly terrestrial. The gorilla's large size and folivorous habits mean that the animals must spend long hours feeding everyday to maintain their body weight. Of all the great apes, the gorilla shows the most stable grouping patterns. The same adult individuals travel together for months and usually years at a time. It is because gorillas are mainly foliage eating that they can afford to live in these relatively permanent groups. Foliage, unlike patchy fruit sources generally and especially the ripe fruits that the ape gut requires, is widespread and abundant and supports large groups of animals.

In the East, fruit forms a far lower proportion of the gorilla's diet than in West Africa. Correlated to that, in the East gorilla groups tend much less often to split into temporary subgroups such as they do in West Africa, as animals range far apart searching for the relatively scarce ripe fruit. Gorilla groups can include up to 30-40 animals, but more usually number 5-10.

2.1.1 Habitat

The Gorilla is a forest species. The eastern lowland gorilla has the widest altitudinal range of any of the gorilla subspecies, living in montane, transitional, and lowland tropical forests. They have been reported at a range of densities from 0.25/km² in Maiko NP, 0.55/km² at Mount Tshiaberimu to 1.03-1.26/km² in Kahuzi-Biega (Hall et al., 1998a; Plumptre et al., 2003; Yamagiwa et al., 1993).

One of the best studied populations occupies the highlands of Kahuzi-Biega. Here habitats vary from dense primary forest intermixed with bamboo stands, to moderately moist woodland, to areas of *Cyperus* swamp and peat bog, with alpine and subalpine grassland at higher altitudes, some patches of more open vegetation also occur at lower elevations.

2.1.2 Adaptation

Gorillas are closely related to humans and are considered highly intelligent.

The varied diet of the eastern lowland gorilla includes a wide range of plants, fruits, seeds, leaves, stems and barks as well as ants, termites and other insects. Seasonality in diet and habitat use is greater for Grauer's gorillas in low-altitude forests than for mountain gorillas. Grauer's gorilla eats more fruit than Bwindi's mountain gorilla but not as much as western gorillas. When fruit is scarce, eastern lowland gorillas travel less and increase their consumption



of herbaceous vegetation. Large quantities of bamboo shoots, as well as several types of fruits are eaten seasonally by eastern lowland gorillas of the upper altitudinal reaches of KBNP. These gorillas also occasionally feed on ants, but have not been observed eating insects as often as their congeners in lowland forests. Insects are never more than a minor part of the diet for any gorillas. The ant-feeding sites have all been found in primary or ancient secondary forest on ridges or slopes. Most plant parts are eaten on the ground, although leaves, bark, and fruit are sometimes eaten in trees. Signs of feeding activity have more often been observed along gorilla trails in valleys and swamps.

2.1.3 Social behaviour

Less is known about the social behaviour, feeding ecology, life history and demography of eastern lowland gorillas, compared with the extensive data gathered on the mountain gorilla.

As far as group structure is concerned, gorillas form harems. It was once thought that gorilla groups contained only one adult male, but around one third of groups in East Africa have been found to host two full-grown males. In eastern lowland gorilla only about 10 percent of groups are multimale (Yamagiwa et al. 2003). Adult females in any one silverback's (dominant adult male) harem are mostly unrelated, and the social ties that exist between them are weak. In contrast to many other primates, it is the bond between each individual female and the silverback, rather than bonds between the females that hold the group together.

The sex ratio at birth is approximately 1:1. Upon reaching maturity, most males and females leave the group in which they were born. 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 (Yamagiwa, 2003). Both natal dispersal and secondary dispersal (subsequent transfer yet to another group) occur among female eastern gorillas. Female eastern lowland gorilla sometimes transfers with another female and their offspring. The structure and group cohesion seems to keep mainly to avoid predators (Yamagiwa & Kahekwa, 2001).

In general, median group size is similar for both eastern and western gorillas, across various habitat types and the different diets associated with them. In the highland sector of Kahuzi Biega NP mean group size is almost 10 (Inogwabini et al., 2000). But other studies indicate a mean group size of seven animals in Kahuzi-Biega but only three in the adjacent Kasese region (Hall et al., 1998b).

2.2 Distribution (current and historical)

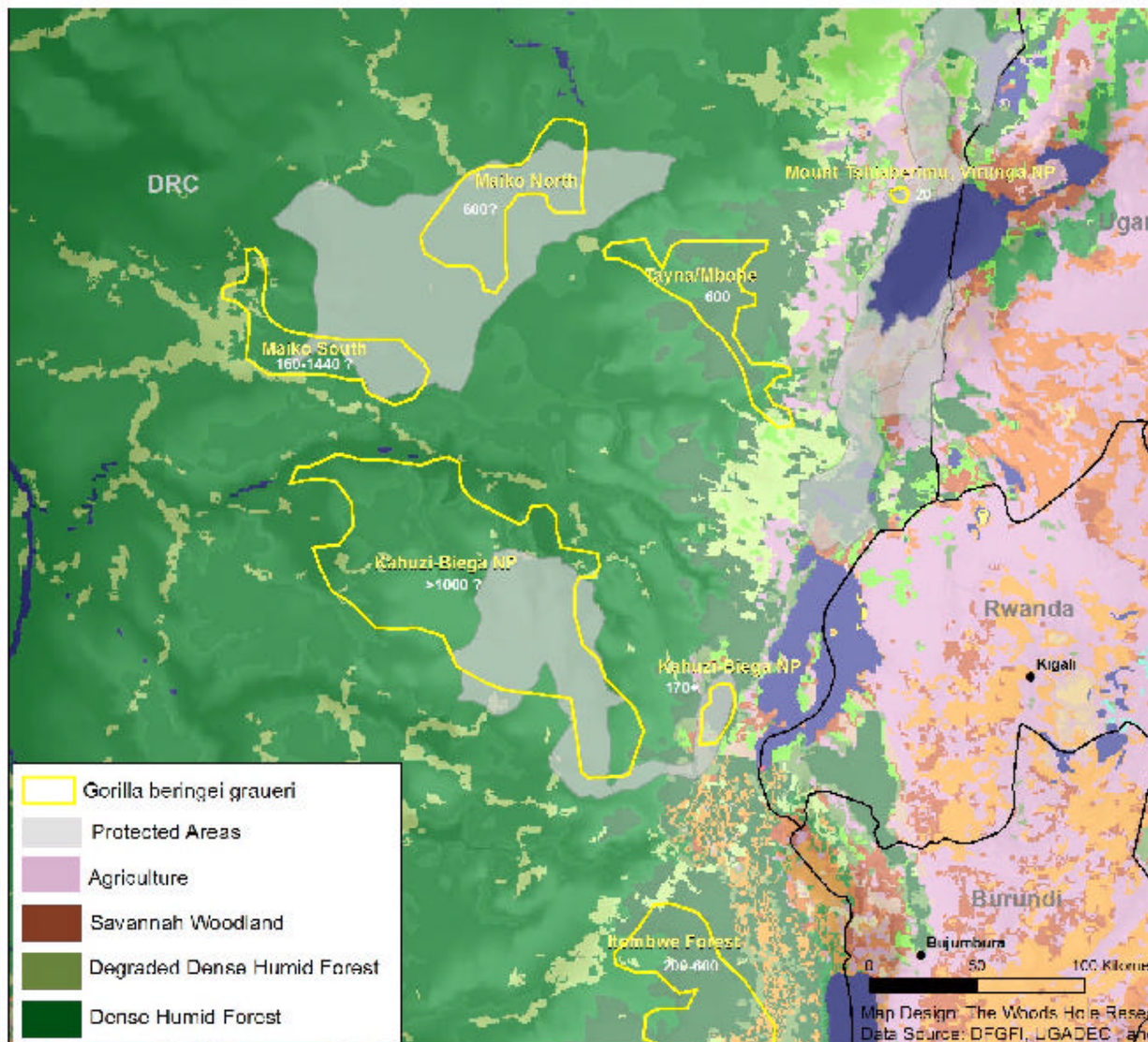
The eastern lowland gorilla occurs only in eastern Uganda border. Its distribution is limited to an area estimated 21,600 km² in five regions:

- ? Kahuzi-Biega national Park and the adjacent Kasese region;
- ? Maïko National Park and adjacent forest
- ? Itombwe Forest
- ? Tayna
- ? North Kivu Mbohe

Charcoal production near Kahuzi Biega NP. Rwanda. Dec. 2007. © Lucy Spelman-MGVP



Figure 1. Distribution of the eastern lowland gorilla, *Gorilla beringei graueri*. Map after Woods Hole Research Center, data source DFGFI, UGADEC and WCS.



The Kahuzi-Biega NP covers an area of 6000 km², ranging in altitude from 600 to 3400m. The Park is divided in two parts, a montane sector (ca 600 km²) and a lowland sector (5400 km²), connected by a recently fragmented forested corridor. Gorillas occur in both sectors, in the region of Lake Kivu and Mount Kahuzi in the montane sector, and the Kasese region of the lowland sector.

Maïko National Park and nearby forests are located in the upland region between the central Congo basin and the mountain ranges of the west side of the Rift. The park has an area of about 10,800 km² and ranges in altitude from 700 to 1300m.

There are also several community reserves around the area of Maïko, Virunga and Kahuzi-Biega National Parks which host between 700 and 1,400 gorillas. One of these community reserve encompasses the Itombwe Forest –an area of montane, transitional and lowland tropical forest west of Lake Tanganyika. This nucleus covers an area of 11,000 km² in which gorillas are found in four separate sub-populations.

Gorillas also occur in Tayna/Mboke community reserve, and in the Masisi region in North Kivu.

2.3. Evaluation and evolution of populations



Eastern lowland gorillas have probably been isolated from mountain gorillas for 400,000 years and it is estimated that the two eastern taxa separated from their western counterparts at least 2,000,000 years ago.

The total area known to be occupied by eastern lowland gorillas has declined to about 21,600 km². The overall geographic range calculated from historical locality data was 112,000 km² (Butynski, 2001) compared to the estimated 90,000 km² of today. This illustrates the degree of fragmentation of populations.

In the mid-1990s there were estimated to be about 17,000 (9,000-25,000) eastern lowland gorillas in at least 11 subpopulations, with about 86 percent living in the Kahuzi-Biega NP and the adjacent Kasese region of DRC.

Table 1. Estimated sizes of the 11 Grauer's gorilla populations in the mid 1990s (Summary from Hall et al. 1998a)

Kahuzi-Biega Park lowland sector + Kasese	14,659
Kahuzi-Biega Park mountain sector	262* ¹
Maiko Park north	826
Maiko Park south	33**
Itombwe Forest A	67
Itombwe Forest B	211
Itombwe Forest C	791
Itombwe Forest D	86
Lowa River	13
Mt. Tshiaberimu	16
Masisi (1988)	28
Total	16,902

* 168 in 2004, after the war (Hart & Liengola, 2005)

** Tentative estimate

Recent results show that populations corresponding to all those identified by Emlen & Schaller still persist in this region and that gorillas currently have a wider distribution and are more abundant than previously estimated. Authors believe that this area is an important and overlooked site for the conservation of Grauer's gorilla. (Nixon et al., 2005)

Recent events in Kahuzi-Biega and the surrounding region, however, indicate that the taxon has undergone a substantial decline in numbers. Access to much of the gorilla range has been difficult in recent years, and is only just becoming possible again (Hart & Liengola, 2005). The available information is very limited, but there is consensus among field workers that a drastic decline in total population has occurred. This is attributed to the combined effects of the rise in demand for coltan ore and the warfare that engulfed the whole of the eastern lowland gorilla range from the late 1990s onwards; armies, rebels, refugees and miners all lived off the land and consumed bushmeat (Redmond, 2001).

Even if the decline is not well documented, the best data come from the montane sector of Kahuzi-Biega where only 130 gorillas remained in 1999 down from the 245-262 in the same location in 1996. A small recovery has been observed since with 168 individuals estimated in 2004 (Hart & Liengola, 2005). The conflict has prevented field surveys in the lowland sector of Kahuzi-Biega, but it is hoped that future surveys will provide an estimate of remaining numbers.

Accurate population estimates for gorillas are often difficult to establish, because their vast range has not been thoroughly surveyed. Population counts and estimates of 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 an indication of group size as well as age of animal, particularly when the counts are repeated over several nights.

The eastern lowland gorilla (*G. b. graueri*) is listed as Endangered on the IUCN Red List (IUCN 2008, EN A4a-d) although if the feared declines are verified this taxon would qualify for Critically Endangered.

2.4. Migrations - Ranging behaviour

The ranging behaviour of gorilla groups is mainly determined by the distribution and abundance of fruit and herbaceous vegetation in the environment (Robbins & McNeillage 2003) which are intrinsically seasonal phenomena. Ranging behaviour may also be influenced by social factors such as competitions for mates or the mate-guarding tactics of silverbacks (Watts, 1994).

Eastern lowland gorilla groups in the highlands of Kahuzi-Biega NP have home ranges of 13-17 km² (Yamagiwa et al. 2003). Although the size of their home range in the lowlands is unknown they are likely to be larger, as eastern lowland gorillas are known to have longer average day journeys in lowland forest than in montane forest.

3. CONSERVATION STATUS, BY PARTY

Democratic Republic of the Congo (Endangered): the Grauer's gorillas is a strict DRC endemic and its national conservation status is equivalent to the global one. Although no firm figures are available, the eastern lowland gorilla seems to have been badly affected towards the end of the 20th century. Due to war and conflict large areas of forest previously occupied by gorillas were cleared and the high demand of fuelwood and food led to human/refugees incursions into protected areas. The high price of coltan (columbium and tantalum) ore led to a further invasion (estimated at 10,000 people), of Kahuzi-Biega NP – the single most important site for eastern lowland gorillas.

4. ACTUAL AND POTENTIAL THREAT

The major threats affecting or having affected eastern lowland gorilla populations are (1) habitat loss or modification (e.g. through deforestation, wood extraction, infrastructure development, human settlement and agricultural crops (IUCN, 2008)) and forest encroachment (Muruthi et al., 2000), (2) direct killing (for the bushmeat trade), or hunting (for live animals trade), (3) effects of war and political unrest, and disease (4).

4.1 Degradation and decline of habitats

Throughout the gorilla's range, the forests on which it depends for survival are being cut down for timber or destroyed to make way for people. It has been suggested that the rate of habitat loss for the eastern lowland gorilla is the highest of any of the gorilla subspecies (Wilkie et al., 2000). It now occupies only about 13 percent of its former geographic range, which at least reflects the extent of the fragmentation of the population involved.

Eastern lowland gorillas live in close proximity to (and are sometimes surrounded by) some of the densest rural human populations in Africa, with up to 300-600 per km² and a correspondingly high demand for land and food. As a result, gorillas are increasingly confined to more isolated forests. The increasing human population and the corresponding need for land is a serious and ongoing pressure (Hall et al., 1998a). The small isolated Masisi and Mount Tshiaberimu populations are particularly vulnerable to extensive encroachment

The relative remoteness of prime timber areas and the country's poor transportation infrastructure mean that until now, only low-volume, selective logging has been profitable, and then only in limited areas along large rivers. As DRC becomes more stable, it is likely that commercial logging companies will quickly move into its forests. This could seriously impact eastern lowland forest and its gorillas.

4.2 Direct exploitation

Hunting has historically threatened the survival of gorillas. Gorillas are hunted for their meat, for body parts for traditional African medicine/magic, as specimens (particularly infants) for collections, and as trophies. The hunting of gorillas for sale as trophies (skins, heads, skulls, feet and hands) emerged in the mid-1970s, and continued until quite recently. Infant gorillas were sold to collectors and people who want them as pets. The abduction of infants generally involves the loss of at least one adult, as members of a group will fight to the death to protect their young. Many adults have been killed while trying to protect their infants from this fate. The capture of infant gorillas was a serious threat in the 1970s although it declined greatly through the 1980s and the 1990s, but has re-emerged in recent years during the chaos of war



Various armies active in DRC are systematically exploiting natural resources either to finance themselves or to exchange for weapons. The most important resources are diamonds, copper, cobalt, gold, tin and coltan. The high values of cobalt, coltan, tin and gold have attracted miners to locations in eastern DRC where they are abundant, including streams in Kahuzi-Biega NP. Professional hunters joined the miners to provide meat for them, and the eastern lowland gorillas of Kahuzi-Biega have been severely affected. Traditionally, gorillas were rarely eaten in the eastern Congo Basin, which has given eastern gorillas a certain degree of protection. These traditions are weakest in areas inhabited by the eastern lowland gorilla and, as seen in KBNP, are becoming a thing of the past.

4.3 Impact of Conflict

The early 1990s saw the outbreak of fighting in Rwanda, which by April 1994 resulted in a stream of refugees pouring into gorilla habitat in DRC. 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) and a further 332,000 fled into DRC near Kahuzi-Biega. Shortly after the influx of Rwandan refugees came the 1996 war between the armed forces of DRC and a rebel movement 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. Hunting for gorilla meat in Kahuzi-Biega has increased greatly as a result of war and displacement (Plumptre et al., 2003; Redmond, 2001).

In addition to the influx of refugees, the forests that are home to gorillas have served as hiding places and retreats for rebel forces leading to disturbance and hunting. This is a common phenomenon at times of war in forests close to international borders.

The long-term impacts of the recent wars in eastern DRC are unclear. The lowland areas where most of eastern lowland gorillas occur remain largely inaccessible to researchers so it is difficult to assess their status. The population of large mammals in the area around Tshivanga in Kahuzi-Biega was relatively stable between 1990 and 1996 but since then two rebellions have occurred and large numbers of gorillas have been killed. Over just 4 years the highland sector of Kahuzi-Biega NP lost more than 95 percent of its elephant population and an estimated 50 percent of its gorilla population.

Conflict has also deterred international conservation organizations, aid agencies and governments from investing in affected areas, leading to frozen budgets, withdrawal of staff, reduction in antipoaching efforts and closure of projects. Protection of the gorillas in many areas has proved extremely difficult and often hazardous in war time. Ten staff members of ICCN (Institut Congolais pour la Conservation de la Nature), for example, were murdered by militiamen who had been hiding in DRC after the genocide in Rwanda, while surveying Kahuzi-Biega boundaries to re-establish the park limits. These are not the first nor the only park employees to be kidnapped or killed while they were attempting to protect the area and its wildlife. In all 92 Congolese park staff are reported to have been killed between 1996 and 2004 (IGCP, 2004; Inogwabini et al., 2000; Iyomi & Schuler, 2002; Iyomi & Schuler, 2003).

4.4 Diseases

Another potential threat to gorillas is exposure to human diseases (e.g Graczyk et al., 2001; Graczyk et al., 2003; Mudakikwa, 2001) particularly for habituated gorillas that come into contact with humans, in areas of gorilla tourism (Homsy, 1999). Gorilla tourism exposes gorillas to humans and hence to diseases that humans may be carrying, some of which the gorillas may never have been exposed to before. At present, this threat is limited for the eastern lowland gorilla, but groups habituated for tourism exist (or at least existed) in the highland sector of Kahuzi-Biega NP. Strict rules must be observed to regulate tourist visiting times, the number of tourists per group, limiting the approach of humans to 7 m, and burying human excrement deeper than 30 cm (Homsy 1999).

Beside severe impacts on human populations, several outbreaks of the Ebola virus since 2000 might have claimed thousands of great apes in Africa. Ebola hemorrhagic fever is a severe, often fatal disease that affects humans, gorillas and chimpanzees. Many scientists believe the disease is spread through the butchering and handling of primate bushmeat. The disease has been confirmed in six African nations: the Democratic Republic of Congo, the Republic of Congo, Gabon, Sudan, Ivory Coast, and Uganda. Up till now eastern lowland gorillas had not been affected by Ebola but this could change.

4.5. Other threats

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

Accidental entrapment in wire snares used to trap other wild animals is also a threat to gorillas. The impact of this threat needs to be assessed in eastern lowland gorilla area. In 1998, in the highland sector of KBNP, at least one individual in each of the then habituated gorilla group had lost a hand to snares (Yamagiwa, 2003).

Occasionally individuals that raid the crops of local people are killed.

5. REGULATORY PROVISIONS

5.1 International

CMS: Gorilla gorilla is registered in the Annex I of the CMS since 2005.

CITES: Gorilla is on the Annex I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 1975.

ACCNNR: The Gorilla is also enumerated in A class of the African Convention for the Conservation of Nature and Natural Resources in 1969.



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5.2 National

National laws for the control of hunting and catching exist in all the countries where we find gorilla populations, but the lack of funds and the inaccessibility has made the strict application of that legislation infrequent.

DRC ratified or acceded to the Convention on Migratory Species in 1990, the Convention on Biological Diversity in 1994, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 1976, the UN Convention to Combat Desertification in 1997, the African Convention on the Conservation of Nature and Natural Resources in 1976, and the World Heritage Convention in 1974. There are five World Heritage Sites in DRC: Garamba NP, Kahuzi-Biega NP, Salonga NP, Okapi Faunal Reserve and Virunga NP. All are listed as World Heritage Sites in Danger to human pressures. DRC also participates in UNESCO's Man and Biosphere (MAB) Programme.

The Ministry of Environment, Nature Conservation, and Tourism is the government body responsible for nature conservation, although ICCN (the Congolese Institute for Nature Conservation) the National Parks authority now reports directly to the Office of the President.

6. CONSERVATION MEASURES

6.1 Anti-poaching and law enforcement

The taxon is legally protected in its only range state. Great efforts must be made to enforce laws concerning gorillas, including not only effective antipoaching, but also follow-up of the legal process through arrest, and eventually the prosecution of all cases judged guilty.

6.2 Habitat conservation



Table 1. Priority Populations for Eastern Lowland Gorillas (*G. b. graueri*) (All the populations are in DRC)

Population Name	Pop. Size	Area km2	Habitat Type(s)	Habitat or Biogeographic Uniqueness	Land Use Status	Scientific Importance	Other Important Conservation Features	Major Threats	Rationale for Prioritization
Kahuzi-Biega NP Lowland + Kasese & Walikale	unknown (prob >1000) (large prewar)	~12,000 km2 (with fragmentation)	Congo Basin Forest	Still relatively intact forest block	National Park and developing Community Managed Nature Reserves	Scientific studies of metapopulation dynamics in large area	Endemic primate And possibly bird Spp; sympatric with <i>P.t.schweinfurthii</i> elephants	Mining, local bushmeat trade; agricultural conversion, illegal animal trade	Major pop of <i>G. b. graueri</i> , protected area, sympatric with chimpanzees
Tayna	600 (367 - 1169) ***	~1300	Afromontane transitional forests (1100-2000 m)	Transition: Congo Basin forests to higher altitude Afromontane habitat	DRC - Recognized Community managed Nature Reserve	Long term gorilla research- Tayna and DFGFI staff	Endemic primate and bird spp; sympatric with <i>P.t.schweinfurthii</i> elephant, okapi	Subsistence hunting, Agricultural Conversion, illegal animal trade, small Mining activity	Major Population ,protected area, research, sympatric with chimpanzees
Maiko South	600 (418-1737) ***	>= 2125	Congo Basin forest and mountainous - quite steep topography	Lower altitude but rugged mountainous Congo Basin forests with bais and swamp areas	Includes National Park, and Developing Community nature reserves projects outside boundaries	microhabitat use and biogeographic barriers	okapi, elephant pop crashed, but still other fauna for recovery; sympatric with chimpanzees	Mining and Accompanying local bushmeat trade; Park controlled by rebel group, illegal animal trade	Major pop of <i>G. b. graueri</i> (contiguous with Maiko North populations?) protected area, sympatric with chimpanzees
Maiko North	unknown (160-1440 pre-war)	1600	Congo Basin Forest some steep topography	Large intact forest block	National Park	microhabitat use and biogeographic barriers	Sympatric with <i>P.t.schweinfurthii</i> and forest elephant, okapi	Mining and accompanying local bushmeat trade; Park controlled by rebels	Large intact forest block; protected area; sympatric with chimpanzees
Itombwe Forest	200-600 **	1000-1200	Afromontane and Transitional Forests	Western edge of Albertine Rift, southernmost population of Grauer's	Communities Interested in Establishing Community Nature Reserve	High biodiversity area-transition between Basin & Albertine Rift	High local bird endemism; sympatric with <i>P.t.schweinfurthii</i>	Armed poaching, snaring,no legal protection of area, mining	Sympatric with chimpanzees, area of high biodiversity and endemism
Kahuzi-Biega NP Highland	170+	300	Afromontane and bamboo forests	Important highland area of Albertine Rift	National Park	High altitude gorilla population and Albertine Rift endemics	Endemic bird spp; sympatric with <i>P.t.schweinfurthii</i>	Illegal wood cutting, invasive plants, fire, subsistence hunting	High altitude pop of <i>G. b. graueri</i> , protected area, sympatric with chimpanzees
Mt. Tshiaberimu Virunga NP	20	60 km ²	Montane and bamboo forests; geographic outlier	High altitude and forms part of Albertine Rift	National Park	Long-term research on dynamics of small, isolated populations	Montane and bamboo forests -- Albertine Rift	Subsistence hunting of mammals, agricultural conversion, illegal animal trade	Protected area, sympatric chimpanzees?

Accuracy of population estimate is scored as follows: ***indicates the estimate from good transect surveys spread over areas or habitats of population; **indicates estimate based adequate set of transects from one location, and estimate extrapolated to the rest of the areas/habitats of population; *no scientific estimate of ape density from any location

6.3 Maintenance of habitat and corridors

The creation of a network of protected areas may ensure security of movement of gorillas in the medium term.

Strengthen existing laws for the protection of great apes and improvement of awareness amongst agencies responsible for its application and amongst the courts.

Readjustment (?) of the Maiko NP has been identified as one of the most pressing actions needed to protect an important eastern lowland gorilla (and chimpanzee) population.

Conservation efforts should concentrate on the lowland sector of Kahuzi Biega and Kasese. The restoration and maintenance of a forest corridor between the two sectors of Kahuzi-Biega NP is considered to be essential.

The Itombwe forest has also been recommended as needing particular attention for the conservation of eastern lowland gorillas.

6.4 Regulation concerning other harmful factors

Implementation of recommendations from Homsy (1999), concerning disease transmission.

6.5 Other measures

7. ADDITIONAL REMARKS

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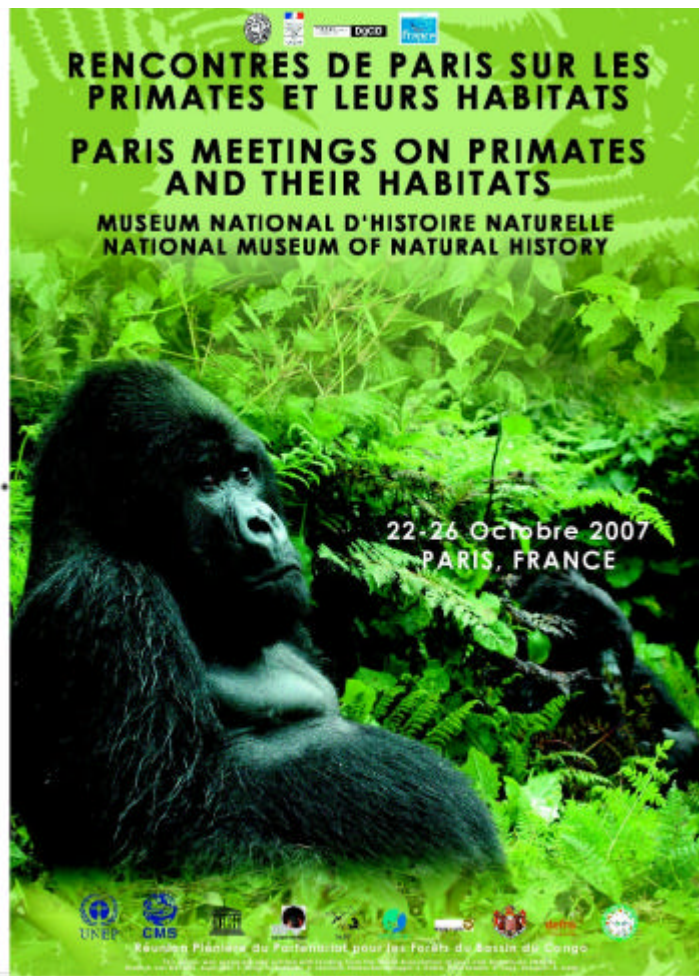
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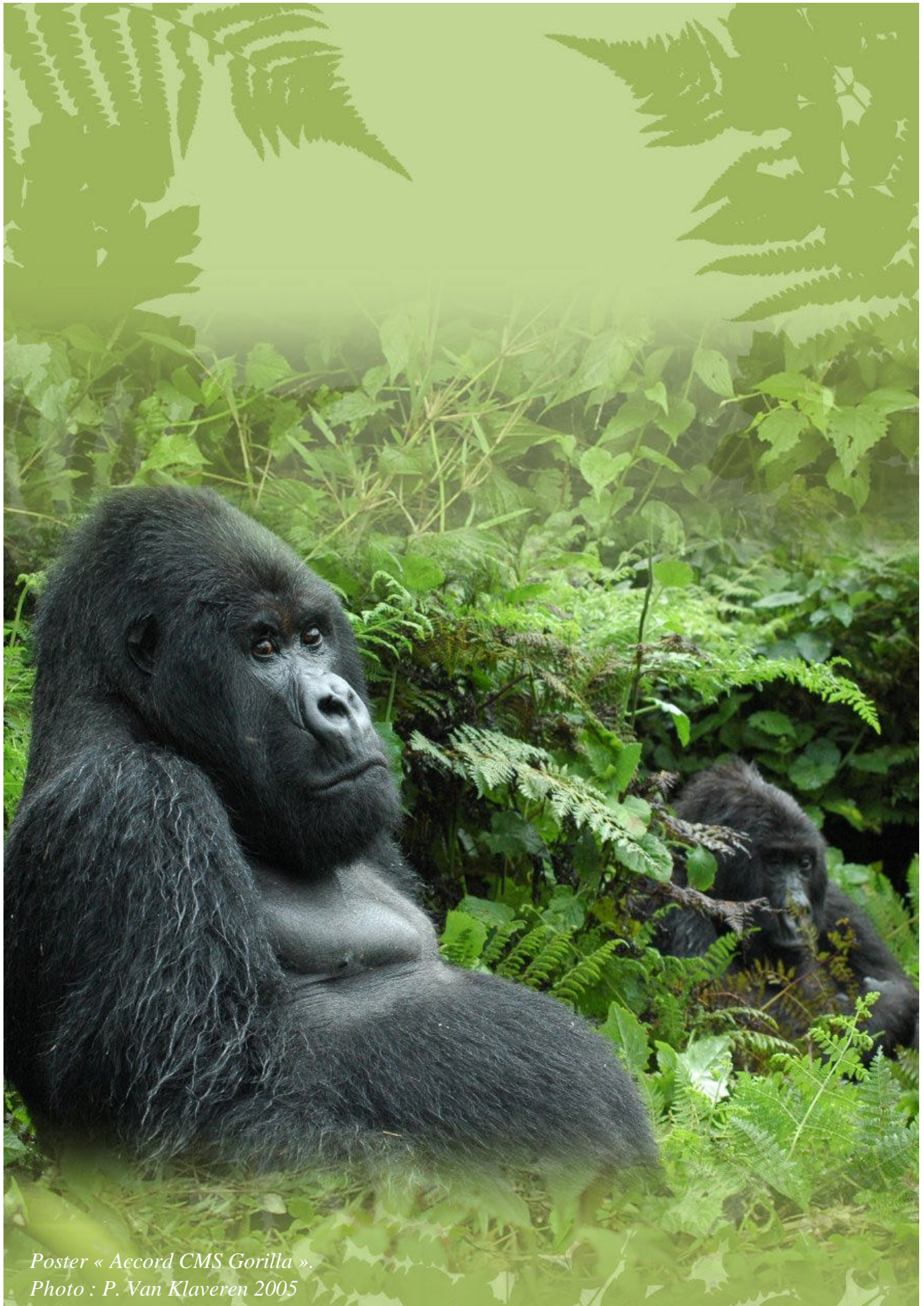
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Monte Alén. © Manuel Merino.









*Poster « Accord CMS Gorilla ».
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