



Fewer than

Today, the total population of Cross River gorillas may number fewer than 300 individuals

300 left

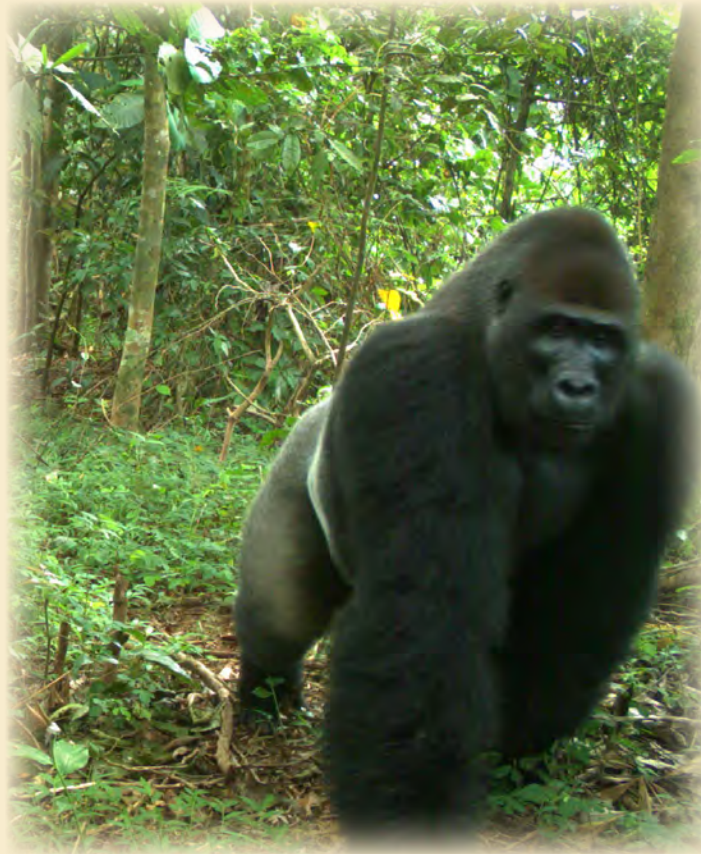
Revised Regional Action Plan for the Conservation of the Cross River Gorilla (*Gorilla gorilla diehli*) 2014–2019

Hope

Understanding the status of the changing threats across the Cross River gorilla landscape will provide key information for guiding our collective conservation activities

Survival





Camera trap image of a Cross River gorilla at Afi Mountain

Cross River Gorilla
(*Gorilla gorilla diehli*)

This plan outlines measures that should ensure that Cross River gorilla numbers are able to increase at key core sites, allowing them to extend into areas where they have been absent for many years.

Revised Regional Action Plan for the Conservation of the Cross River Gorilla (*Gorilla gorilla diehli*) 2014-2019

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Executive Summary

THE CAMEROON-NIGERIA border region where the Cross River gorilla occurs is a biodiversity hotspot of global significance. The Cross River gorilla can therefore play a role as a ‘flagship’ species; the actions proposed in this plan ensure the survival of both this Critically Endangered ape and the region’s immense biological wealth. This document represents the consensus of experts who met at a workshop in February 2012, in Limbe, South West Region, Cameroon,

to formulate a set of priority actions to improve the conservation status of the Cross River gorilla (*Gorilla gorilla diehli*)—the most threatened of the African apes and classified by IUCN as Critically Endangered. Found only in a small area in the mountainous headwaters of the Cross River straddling the border of Cameroon and Nigeria, it is the most westerly and northerly of the gorillas. Due to past hunting, less than an estimated 300 survive in approximately nine sites spread



Sunrise over Kagwene Gorilla Sanctuary

“We believe that the outlook for the conservation of the Cross River gorilla is increasingly positive”

across an area of about 12,000 km². Although Cross River gorillas are legally protected in Nigeria and Cameroon, and five of the sites where they occur are designated as protected areas, hunting to supply the bushmeat trade is still common throughout the region, and gorillas are poached on occasion. Although poaching remains the primary threat to the survival of the Cross River gorilla, ongoing habitat loss and forest fragmentation are reducing connectivity between several sites, isolating them and reducing gene flow.

Participants in the 2012 workshop included representatives of forestry and wildlife conservation agencies from the two range countries, local and international non-governmental conservation and development organizations, and university-based researchers. They reviewed the previous plan (2007–2012) and outlined a set of priority actions. A key feature of this revised action plan is the emphasis on monitoring the most important threats faced by the Cross River gorilla over the course of the next five years. Understanding the trends in the changing threats across the Cross River gorilla landscape will provide key information for guiding our collective activities from 2014 to 2019.

We believe that the outlook for the conservation of the Cross River gorilla is increasingly positive. Our understanding of its range and habitat requirements has improved considerably since the last action plan was drawn up. The area known to be occupied by the Cross River gorilla is more than twice that presented in the previous plan as a result of a series of intensive surveys. Significant areas of forest still exist throughout the Cross River gorilla’s range, and our analysis suggests that the landscape could support a much larger population if poaching could be reduced. Although some poaching still occurs, the network of protected areas has expanded, and new approaches to conservation such as the Gorilla Guardian program and the creation of a community wildlife sanctuary in the Mbe Mountains provide some hope for those gorillas located in forests that lack formal protected area status. This plan outlines measures that should ensure that Cross River gorilla numbers are able to increase at key core sites, allowing them to extend into areas where they have been absent for many years. The recommended actions are estimated to cost \$10,556,000 over a five-year period from 2014 to 2019.

Résumé

LA ZONE FRONTALIÈRE ENTRE LE CAMEROUN ET LE NIGERIA, où l'on rencontre les gorilles est un « point chaud » pour la biodiversité, d'une importance globale. Le gorille de la rivière Cross pourrait ainsi agir comme porte étendard, avec les actions proposées dans ce plan pour assurer la survie de cette espèce gravement en danger et la biodiversité globale de la région. Ce plan d'action représente le consensus auquel sont parvenus les experts réunis au cours d'un atelier organisé au mois de Février 2012 à Limbe Région du Sud Ouest Cameroun, pour formuler et définir les actions prioritaires qui devraient améliorer l'état de conservation du gorille de la rivière Cross (*Gorilla gorilla diehli*). Le gorille de la rivière Cross est reconnu par UICN comme très gravement en danger, et est le grand singe le plus menacé d'Afrique. Cette race de gorille aux confins nord-ouest de l'aire de distribution des gorilles, se rencontre uniquement dans les zones montagneuses sources de la rivière Cross, à cheval sur la région frontalière entre le Cameroun et le Nigeria. En raison de la pression de chasse, moins d'environ 300 gorilles survivent dans à peu près neuf sites différents repartis sur une superficie d'environ 12000 km². Bien que le gorille de la rivière Cross soit totalement protégé aussi bien au Cameroun qu'au Nigeria et que cinq des neuf sites où ils sont présents soient des aires protégées, la chasse pour approvisionner le commerce de la viande de brousse reste une activité très commune à travers la région et le gorille est occasionnellement tué par les chasseurs. Bien que

la chasse est la principale menace à la survie du gorille de la rivière Cross, la perte et la fragmentation croissante de la forêt menacent aussi la connectivité entre plusieurs sites.

Les participants à l'atelier de 2012, comprenant les représentants des agences en charge de la conservation de la forêt et de la faune des deux pays, les organisations non-gouvernementales locales et internationales pour la conservation et le développement, ainsi que des chercheurs en provenance des universités, ont procédé à la revue du plan précédant (2007–2012) et ont formulé des recommandations pour les actions prioritaires. Un aspect clef de ce plan d'action révisé est le fait d'insister sur la nécessité du suivi au cours des cinq prochaines années des principales menaces auxquelles font face les gorilles. Comprendre le statut et la dynamique des menaces à travers l'aire de distribution des gorilles devrait mettre à disposition des informations clefs pour guider nos activités collectives entre 2014 et 2019.

Nous croyons que les perspectives pour la conservation du gorille de la rivière Cross sont de plus en plus positives. Depuis l'élaboration du précédant plan d'action, notre compréhension de l'aire de distribution et paramètre de l'habitat du gorille de la rivière Cross a été sérieusement améliorée. Le domaine connu pour être occupé par le gorille de la rivière Cross a augmenté de plus de 100%, en tant que résultats des séries des inventaires intensifs. Des zones importantes de forêts existent encore à travers l'aire de distribu-

tion du gorille de la rivière Cross, et les analyses suggèrent que le paysage pourrait abriter une population beaucoup plus importante de gorilles si la pression de chasse était réduite. Bien que la chasse existe encore, le réseau des aires protégées a été élargi et de nouvelles approches à la conservation, telles que le programme Gardiens des Gorilles et la création d'un sanctuaire communautaire pour le faune dans le Montagnes Mbe, offrent de l'espoir aux gorilles qui se trouvent dans les forêts qui ne détiennent pas le statut formel d'aire protégée.

Ce plan décrit le programme d'action qui devrait assurer que le nombre de gorilles augmente dans un certain nombre de sites clefs pour s'étendre progressivement à des sites où ils avaient été absents pendant de nombreuses années. Les actions recommandées devraient coûter environ \$10,556,000 au cours des cinq prochaines années, 2014–2019.



Forests of Kagwene Gorilla Sanctuary

Introduction

THE CROSS RIVER GORILLA (*Gorilla gorilla diehli*) is the most endangered of the African apes. Its distribution is the most northern and western of the four gorilla subspecies. It is restricted to the hilly rainforest region along the Nigeria-Cameroon border that forms the headwaters of the Cross River (Figure 1). The Cross River gorilla population is separated by about 300 km from the nearest population of western lowland gorillas (*Gorilla gorilla gorilla*) south of the Sanaga River, and by about 200 km from a small gorilla population in Cameroon's Ebo Forest, the taxonomic position of which is not yet resolved. Based on the small number of Cross River gorillas remaining, their fragmented distribution across a large complex landscape, and ongoing threats to their survival from habitat destruction and poaching, the subspecies is listed as Critically Endangered on the IUCN Red List of Threatened Species (IUCN 2013).

Gorillas in this region first became known to science in 1904, when the German taxonomist Paul Matschie described skulls collected from what is now Takamanda National Park (TNP) in Cameroon as representing a new species, *Gorilla diehli*. Subsequent studies of gorilla anatomy and taxonomy reclassified Cross River gorillas as a subspecies *Gorilla gorilla diehli* (Rothschild 1905, 1908), and Coolidge (1929) later grouped them with all western gorillas, then known as the subspecies *Gorilla gorilla gorilla*. New studies of museum specimens, in combination with a reanalysis of existing data, led to a realization in the 1990s that the skeletons of gorillas in the Cross River region are sufficiently different from those of western lowland gorillas to merit their recognition as the subspecies *G. g. diehli* (Stumpf *et al.* 1998; Sarmiento & Oates 2000). Differences in skull anatomy, including

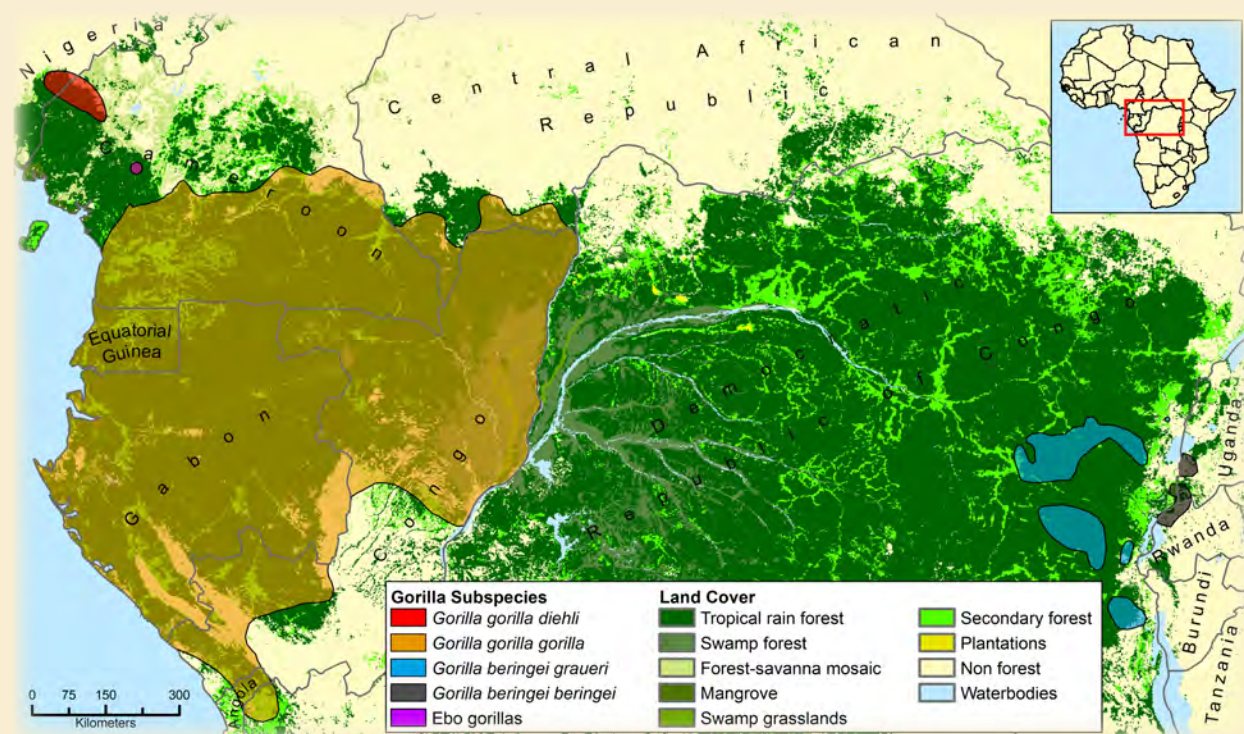


Figure 1. Gorilla distribution across Africa

shorter palates and short, strong jaws, may have an ecological significance as field research shows that Cross River gorillas often resort to feeding on tough bark during the lean long dry seasons (McFarland 2007). Recent genetic analysis has also provided evidence for the divergence of *G. g. diehli* from *G. g. gorilla* (Thalmann *et al.* 2011).

Today, the total population of Cross River gorillas is thought to number fewer than 300 individuals. Their populations are spread across a broad landscape, including a more-or-less continuously forested area from Afi Mountain Wildlife Sanctuary (AMWS) in the west to Kagwene Gorilla Sanctuary (KGS) in the east, with an isolated outlying locality in the Tofala Hills near Bechati to the southeast. Across the landscape, gorillas are concentrated in rugged

hilly areas that are difficult for people to reach, so there is less disturbance from farming and poaching. Genetic studies (Bergl 2006; Bergl & Vigilant 2007) and sightings suggest that these gorillas occasionally move between their core habitats in this landscape and may thus be considered as one Afi-to-Kagwene population (see pp. 16–17).

This document is the product of a process launched in early 2012 to review the previous *Regional Action Plan for the Conservation of the Cross River Gorilla*, which covered the period 2007–2012 (Oates *et al.* 2007). A set of revised recommendations for conservation action were formulated based on this review, the inclusion of new information about the gorillas, and the current conservation situation in the region.

Threats to Cross River Gorilla Survival

RATHER LITTLE IS KNOWN ABOUT the historic distribution and abundance of Cross River gorillas, but a few reports suggest that their numbers were higher in the past (e.g., March 1957) and that they were previously more widespread. Genetic evidence suggests that the Cross River gorilla population has undergone a marked reduction in size, perhaps within the last 100 to 200 years (Bergl 2006). This decline is probably the result of the increasing availability and use of guns. Additional factors contributing to the decline include habitat loss and fragmentation caused by the spread of agriculture, cattle grazing and road construction.

Poaching

Although Cross River gorillas are a protected species across their range, they are still occasionally killed by poachers. Given the small numbers present at each locality, the loss of even a few individuals to poaching poses a serious threat to the viability of the population. Poaching was identified as a major threat to the future of the gorillas as far back as the 1930s (Anon 1934). In this region, as elsewhere, it is not purely for subsistence; gorilla meat is eaten, their bones are used in traditional medicine and as fetishes, and infants have been sold as pets. Because gorillas are such impressive animals, poachers often keep the skulls as trophies. Although poaching of Cross River gorillas was thought to have declined, at least seven have been killed in recent years: one at Amebisu (Mone) in 2009, three at Afi in 2011–2012, one at Pinyin (Fossimondi) in March 2013, one at Kakpenyi (Mbulu) in May 2013, and one at Basho (Takamanda) in June 2013.

While poaching has certainly had a significant impact on this subspecies, traditional practices in some localities may have deterred the poaching of gorillas. For example, in certain areas there is a traditional prohibition on the sale of gorilla meat, and hence hunters do not target this species. Similarly, people in the Kagwene Mountains and Bechati-Fossimondi forest region of Cameroon and some on the Obudu Plateau in Nigeria observe a traditional ban on eating gorillas. In other areas, poachers are rewarded and traditional dances organized in their honor whenever they kill a gorilla or chimpanzee. The long-term presence of research projects at some Cross River gorilla localities, coupled with conservation education activities and increased law enforcement, have undoubtedly helped to reduce gorilla poaching in recent years. However, even in those areas where gorillas are not specifically targeted by hunters, they may still fall victim to wire snares set to trap small mammals and ungulates. It is therefore likely that the impact of poaching on Cross River gorillas is currently underestimated.

Habitat Loss and Fragmentation

In the north of the Cross River gorilla's range and in the Bamenda Highlands to the east, much of the montane forest that probably harbored gorillas in the past has been lost to agriculture or, through burning by pastoralists, converted to grassland. This process continues at the margins of the subspecies' present range where there are high human population densities. Many small human-settlements are scattered throughout the gorillas' range (some in the form of legal enclaves within protected areas) and the continuing expansion of these settlements has the potential to further fragment the forest and make it impossible for gorillas to migrate between their mountain strongholds. New and

The Illegal Pet Trade

A recent analysis of the extent of the trade in live apes suggests that two to three thousand African apes (primarily chimpanzees) enter this illegal trade annually (Stiles *et al.* 2013). While these numbers are relatively small compared to the scale of the bushmeat trade, Nigeria was identified in the report as a hub for the trade in apes and has been the focus of high-profile ape smuggling cases in the past. For the Cross River gorilla, any potential illegal trade in live animals would most likely be a byproduct of poaching for meat. However, the growth of the global trade in wildlife, combined with increasing affluence in countries which are markets for live apes, suggests that the threat posed by illegal trafficking should be closely monitored.

upgraded roads in the gorillas' range are also contributing to habitat loss and fragmentation, as they open up new areas for settlement and cultivation, and act as possible barriers to migration. In addition, larger-scale industrial expansion of forestry and oil palm plantations is a growing threat across the landscape, particularly in Cameroon.

Disease

Cases of devastating epidemic diseases such as Ebola and anthrax have not yet been recorded among apes in the Cross River region of Cameroon and Nigeria as they have in other parts of Central Africa. But with humans, domesticated animals, and gorillas living comparatively close together and often using the same habitat, there is a serious

Introduction, *continued*

risk of pathogens and parasites spreading to the gorillas. The small size of the Cross River gorilla subpopulations makes them extremely vulnerable to the effects of introduced disease, and groups could be effectively eliminated by virulent infections. This risk is a major factor in considering options for potential ecotourism and habituation.

Legislation Protecting Cross River Gorillas

CAMEROON AND NIGERIA ARE SIGNATORIES TO various international conventions that commit them to protecting threatened wildlife; these include the Convention on International Trade in Endangered Species of Wild Fauna and Flora (1973), the Convention on Biological Diversity (1992), the Convention on Migratory Species of Wild Animals (1979) and the Agreement on the Conservation of Gorillas and their Habitats (2007). In addition, national legislation in both countries provides for the full protection of gorillas. Unfortunately the enforcement of these laws is generally inadequate.

Nigeria

Responsibility for the management and protection of forests and wildlife in the Federal Republic of Nigeria is shared between different government organizations at both the federal and state level. States exercise control over game reserves, forest reserves and wildlife sanctuaries, while the federal government is responsible for national parks. Seven national parks were established under the National Parks Decree (No. 36) of 1991, which was superseded by the National Park Service Decree (No. 46) of 1999. The parks are administered by the National Park Service (a parastatal under the Federal Ministry of Environment).

Great apes are fully protected by both federal and state laws; however, implementation of these laws remains a cause for concern among conservationists. All wildlife in national parks is protected by law as, theoretically, are all species listed in the Endangered Species (Control of International Trade and Traffic) Act of 2004. The Endangered Species Act is currently being reviewed to make it more effective. The National Environmental (Protection of Endangered Species in International Trade) Regulations were published in 2011. The National Environmental Standards and Regulations Enforcement Agency (NESREA) is authorized to enforce CITES, as well as the provisions of the Endangered Species Act and subsequent regulations. In 2012, NESREA established an office in Calabar, Cross River State.

State wildlife laws vary greatly, depending on the extent to which colonial-era legislation has been upgraded. Gorillas in Nigeria occur only in Cross River State, in which wildlife conservation law was recently reviewed. In 2009, the Governor of Cross River State, Senator Liyel Imoke, imposed a ban on all logging in the state and established an Anti-Deforestation Task Force to enforce the ban. A law passed in 2010 provides full protection for Cross River gorillas and all other primates in the state, with strict penalties for violations.

Cameroon

In Cameroon, the management of all wildlife resources, including great apes, is the responsibility of the Ministry of Forestry and Wildlife (MINFOF). Specific legislation protecting gorillas is contained in the Forestry and Wildlife Law of 1994. Research in protected areas is controlled by MINFOF, which issues permits upon presentation of research authorization obtained from the Ministry of Scientific Research and Innovation (MINRESI).

Under the 1994 Forestry and Wildlife Law, wildlife species were categorized as Class A, B or C according to their rarity; this categorization was updated in 2006. Gorillas are listed as Class A animals and as such are supposed to be fully protected: it is strictly forbidden to pursue, capture or kill them, except in rare and exceptional cases (such as for research purposes with special authorization issued by the Minister, or in self-defense that has to be proven). Possession of a Class A species or products derived from them can be grounds for prosecution, and those convicted can be fined and/or jailed.

Cameroon has a National Anti-Poaching Strategy that was adopted in 1999 and revised in 2000, the goal of which is to help improve implementation of the 1994 Forestry and Wildlife Law. This strategy emphasizes law enforcement as well as the development of livelihood alternatives, cooperation with partners, and the promotion of sport hunting. A Forest and Wildlife Control Strategy has also been developed to better enforce the Forestry and Wildlife Law. Cameroon formulated a National Action Plan for the Conservation of Great Apes in 2005 and is a member of the Central African Forests Commission (COMIFAC).



Declaration of the Kagwene Gorilla Sanctuary

History of Cross River Gorilla Conservation and Planning

THE RUGGED TERRAIN INHABITED BY CROSS RIVER gorillas combined with generations of exposure to hunting have resulted in gorillas being rare, wary of humans and exceedingly difficult to study. A few anecdotal accounts of their natural history were published between 1932 and 1957 (e.g., Allen 1932; March 1957) but it was not until the early 1980s that the outside world began to show serious interest in this unique gorilla population. In 1987, the first systematic population survey was conducted, although it was restricted to Nigeria. Coordinated by the Nigerian Conservation Foundation (NCF), the survey produced a series of conservation recommendations, including the creation of sanctuaries to protect the core area of each of the gorilla subpopulations (Harcourt *et al.* 1989).

Formal planning for Cross River gorilla conservation in Nigeria was initiated in 1990 by the World Wide Fund for Nature (WWF), working in partnership with NCF and the government of Cross River State. A feasibility study led to the production of a plan for the establishment of the Okwangwo Division within the new Cross River National Park (CRNP), which would protect the majority of Nigeria's gorillas (Caldecott *et al.* 1990). The plan called for the Mbe

There is now a broad program of conservation and research on Cross River gorillas in both Nigeria and Cameroon involving government agencies, non-governmental conservation organizations, and local and overseas universities and zoos.

Mountains to be included in the park and for about 100 km² in the northwest of the Afi River Forest Reserve (ARFR) to be made into a wildlife sanctuary. CRNP was created in 1991 and included only the former Okwangwo, Boshi and Boshi Extension Forest Reserves, but not the Mbe Mountains. In 1996, long-term ecological research began on the gorillas of Afi Mountain (McFarland 2007), and in 2000 the Afi Mountain Wildlife Sanctuary (AMWS) was gazetted by the Cross River State Government (CRSG). In 1997 a Cross River gorilla survey program commenced in Cameroon (Groves 1999; Oates *et al.* 2003), leading to the development of concentrated research at several sites and eventually to the creation of Kagwene Gorilla Sanctuary (KGS) and Takamanda National Park (TNP) (Nicholas 2008). In 2005, nine communities surrounding the Mbe Mountains established the Conservation Association of the Mbe Mountains (CAMP) to protect the area and its wildlife and to promote local development (SPACE 2005). With support from WCS, this community conservation initiative has successfully reduced levels of poaching in recent years and numbers of gorilla sightings are gradually increasing (Eban *et al.* 2013).

The Environment and Rural Development Foundation (ERuDeF) was established in 1999 to protect gorillas and chimpanzees in the Lebiale Highlands of Cameroon and is currently assisting the government of Cameroon to create the Tofala Hill Wildlife Sanctuary. The Gorilla Guardian program was introduced by WCS in 2008 (Nicholas & Stott 2008) to provide better protection and monitoring of gorillas in Cameroon's unprotected forests (areas lacking any formal protection status). This successful program has now been extended to 10 communities, with plans to expand it further. In recent years there has been growing emphasis on developing transboundary links between CRNP in Nigeria and TNP in Cameroon, the largest and most important Cross River gorilla sites in the landscape. This has led to regular joint patrols, joint training exercises, exchange visits, and an annual transboundary workshop (Nicholas &



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Cross River gorilla

Dunn 2010; Dunn 2012a). Another key development was the introduction, by the North Carolina Zoo (NCZ), of CyberTracker¹ as a monitoring tool in 2009. This has considerably improved the standard of data collection at many sites and has increased levels of protection by strengthening law enforcement monitoring.

There is now a broad program of conservation and research on Cross River gorillas in both Nigeria and Cameroon involving government agencies, non-governmental conservation organizations, and local and overseas universities and zoos. Since 2001 these stakeholders have convened in a series of workshops to plan for the more effective conservation of Cross River gorillas throughout their range. These workshops led to the development of the first regional action plan in 2007 and to the subsequent review and revision of this action plan in 2012. Finally, there is growing awareness and commitment by donors for Cross River gorilla conservation, and annual planning workshops have strengthened information exchange and improved collaboration and coordination of conservation activities (Dunn 2012b).

¹ <http://CyberTracker.org/>

Introduction, *continued*

Socioecology of Cross River Gorillas

UNDERSTANDING THE BASIC ECOLOGICAL NEEDS

Understanding the basic ecological needs of Cross River gorillas is essential for making informed decisions about their conservation. Cross River gorilla ecology has been studied at several sites, starting at Afi Mountain in Nigeria (by K. McFarland) and KGS in Cameroon (where an ongoing long-term project was initiated by J. Sunderland-Groves). More recently, research has been conducted by Imong at multiple sites in Nigeria, and by Etiendem in Mawambi Hills and Sawyer in northern Mone Forest Reserve-Mt. Oko in Cameroon. This research is producing a broad understanding of patterns of variation in the gorillas' socioecology across their range. Cross River gorilla diet, ranging behavior and grouping patterns differ from those of western lowland gorillas and may also vary significantly within the Cross River gorilla population.

Cross River gorillas live in an area with a more markedly seasonal climate than any western lowland gorillas; the area experiences a more intense dry season and higher wet season rainfall. Compared to western lowland gorillas, Cross River gorillas feed more on liana and tree bark throughout the year and consume less fruit due to periods of seasonal fruit scarcity that are prolonged and more severe. However, when fruit is available, a wide variety of species is eaten. Terrestrial herbs are a dietary staple throughout the year and studies at Afi, Kagwene and Mone-Mt. Oko have found that at certain times of the year gorillas preferentially use areas with higher densities of herbs (McFarland 2007; De Vere *et al.* 2011; Sawyer & Brashares 2013). Despite overall similarities in feeding ecology between study locations, the composition of species in the diet varies between sites. For example, little overlap of important food species was observed between Mone and Afi, with fewer than half of the important food species being shared, and more

than half of the important species not even appearing in the other subpopulations diet (S. Sawyer unpublished data). Differences in diet composition between Afi and Kagwene have also been observed (WCS unpublished data). Dietary differences may impact ranging behavior at different sites: at Afi gorillas traveled longer distances when consuming large amounts of fruit, while at Kagwene daily path lengths were shorter when fruit was abundant, and in the Mawambi hills no effect of fruit availability on the daily path length was observed (McFarland 2007; J. Sunderland-Groves, unpublished data; D.N. Etiendem unpublished data).

Group size in Cross River gorillas varies widely between sites, with groups of 1–18 nests reported (Ekinde & Warren 2007; Nicholas *et al.* 2010; WCS Nigeria unpublished data). Single nests and groups of 4–8 nests are most frequently recorded, although larger groups occur, with one group of 18 individuals reported at Afi (McFarland 2007) and 12–16 routinely recorded at Kagwene (Sunderland-Groves *et al.* 2009; De Vere *et al.* 2011). Cross River gorillas construct night-nests in trees more often than has been reported among western lowland gorillas (McFarland 2007; Sunderland-Groves *et al.* 2009; Etiendem 2013b). At Afi and Kagwene, gorilla groups range over relatively large areas (10–30 km²). The wide variation seen in nest group sizes may be related to flexible grouping patterns, high home range overlap, and frequent re-use of nest sites (McFarland 2007; Sunderland-Groves *et al.* 2009; Sawyer 2012). These factors, combined with the lack of any habituated groups of Cross River gorillas, have made accurate determination of group size and home range challenging; however, it should be noted that the apparently flexible grouping patterns of western lowland gorillas is actually the result of individuals building multiple nests, and of nest sites from two or more days being incorrectly counted as one (Bradley *et al.* 2008).



Field team measures a gorilla nest



Inaoyom Imong studying vegetation in the Mbe Mountains

Distribution of the Cross River Gorilla

The Cross River Gorilla Landscape

THE LANDSCAPE OCCUPIED BY CROSS RIVER GORILLAS has a surface area of approximately 12,000 km² and ranges in elevation from less than 200 m in the valleys of some of the major Cross tributaries (such as the River Oyi) to 2,037 m at Kagwene on the edge of the Bamenda Highlands. The lowlands of this region are characterized by moist semi-deciduous tropical forest which transitions to submontane for-

est at around 700–800 m, and to montane forest at about 1,500 m. A mosaic of farmland, farmbrush and secondary forest occurs where there are human settlements. Most of the upper elevation forest has now been converted to grassland, which is maintained through annual burning by pastoralists and farmers along the northern fringe of the landscape. Within the landscape, nine areas can be delineated as sites of action for Cross

River gorilla conservation, several of which contain more than one locality where gorillas occur: the Afi Complex, Mbe Mountains and Okwangwo Division of CRNP in Nigeria; Kagwene Gorilla Sanctuary, Mawambi Hills, Mbulu Forest, Mone River Forest Reserve, Takamanda National Park and the Tofala Hills Complex in Cameroon (Table 1).

TABLE 1. KEY SITES AND ABUNDANCE ESTIMATES FOR CROSS RIVER GORILLAS

Country / Site	Status	Gorilla range (km ²)	Altitude (m)	Estimated gorilla numbers	Estimate source
Nigeria					
Afi Mountain Wildlife Sanctuary	Wildlife Sanctuary	105	130–1,300	25–30	WCS recce surveys
Mbe Mountains	Community Reserve	45	110–900	25–30	Ecoguard monitoring and genetic census
Cross River National Park–Boshi Extension	National Park	55	300–1,700	20–25	WCS recce surveys
Cross River National Park–Okwa Hills (Nigeria) + Central Takamanda National Park (Cameroon)	Transboundary; two National Parks	80	150–800	15–30	WCS transboundary survey
Subtotal Nigeria:				85–115	
Cameroon					
Takamanda National Park–East (Kekpane area)	National Park	50	175–900	8–12	WCS recce surveys
Takamanda National Park–North (Atolo area)	National Park	20	300–1,500	10–15	WCS recce surveys
Mawambi Hills	Unprotected forest	25	125–550	20–30	D. N. Etienden unpub. data
Mone Forest Reserve (northern half)	Forest Reserve	100	150–1,200	20–30	WCS Gorilla Guardian Program
Mount Oko Area	Unprotected forest	60	250–1,700	6–15	WCS recce surveys
Eastern Mone Forest Reserve	Unprotected forest	20	250–1,600	9–12	Very limited surveys
Upper Mbulu	Unprotected forest	100	500–2,000	20–25	WCS recce surveys and Gorilla Guardian Program
Kagwene Gorilla Sanctuary	Wildlife Sanctuary	25	1,700–2,000	20–25	Long-term monitoring
Tofala Hills	Unprotected forest	25	500–1,200	20–30	ERuDeF surveys
Subtotal Cameroon:				132–194	
TOTAL				218–309	

Regional Non-Site-Specific Priority Actions, *continued***Improved Understanding of the Cross River Gorillas' Range**

Previous Cross River gorilla conservation efforts have been hindered by an incomplete understanding of the gorillas' distribution. While knowledge of the gorillas' range is still evolving, an increasing number of new records of gorillas in areas not previously known to be occupied have emerged since 2005. Using habitat models as a guide, a series of targeted surveys in both Nigeria and Cameroon resulted in 71 new records of gorillas outside of their known range (Bergl *et al.* 2012). Ongoing monitoring by protection and research staff (e.g., Mbe Mountains and KGS) and by the community-based Gorilla Guardian program (see p. 28) have yielded additional records. Based on these data, the known range of Cross River gorillas (approximately 700 km²; see Figure 2) is now twice the size of the estimate presented in the 2007 action plan and more than five times larger than when previous efforts were made to map the subspecies' distribution (Oates *et al.* 2003). Significantly, many of the new records fall outside of existing protected areas (especially in Cameroon), reinforcing the need to establish stronger links with local communities and to develop new approaches for conserving areas without legal protected status.

Whether this "increase" in the gorilla range represents a larger population than previously estimated, a range expansion as a result of decreased hunting pressure, or simply an improved understanding of which areas are used by the gorillas remains uncertain. However, it is clear that many gorilla localities previously considered to represent separate subpopulations are actually parts of a single more-or-less continuous population. In many areas, forest blocks previously identified as potential corridors are at least occasionally occupied by gorillas, and genetic evidence of migration has been corroborated by evidence from the field. The larger area of known occupation also indicates that suitable habitat exists across the landscape, which may support a larger population of gorillas (see p. 18 for a discussion of how to better assess the extent of potential gorilla habitat).

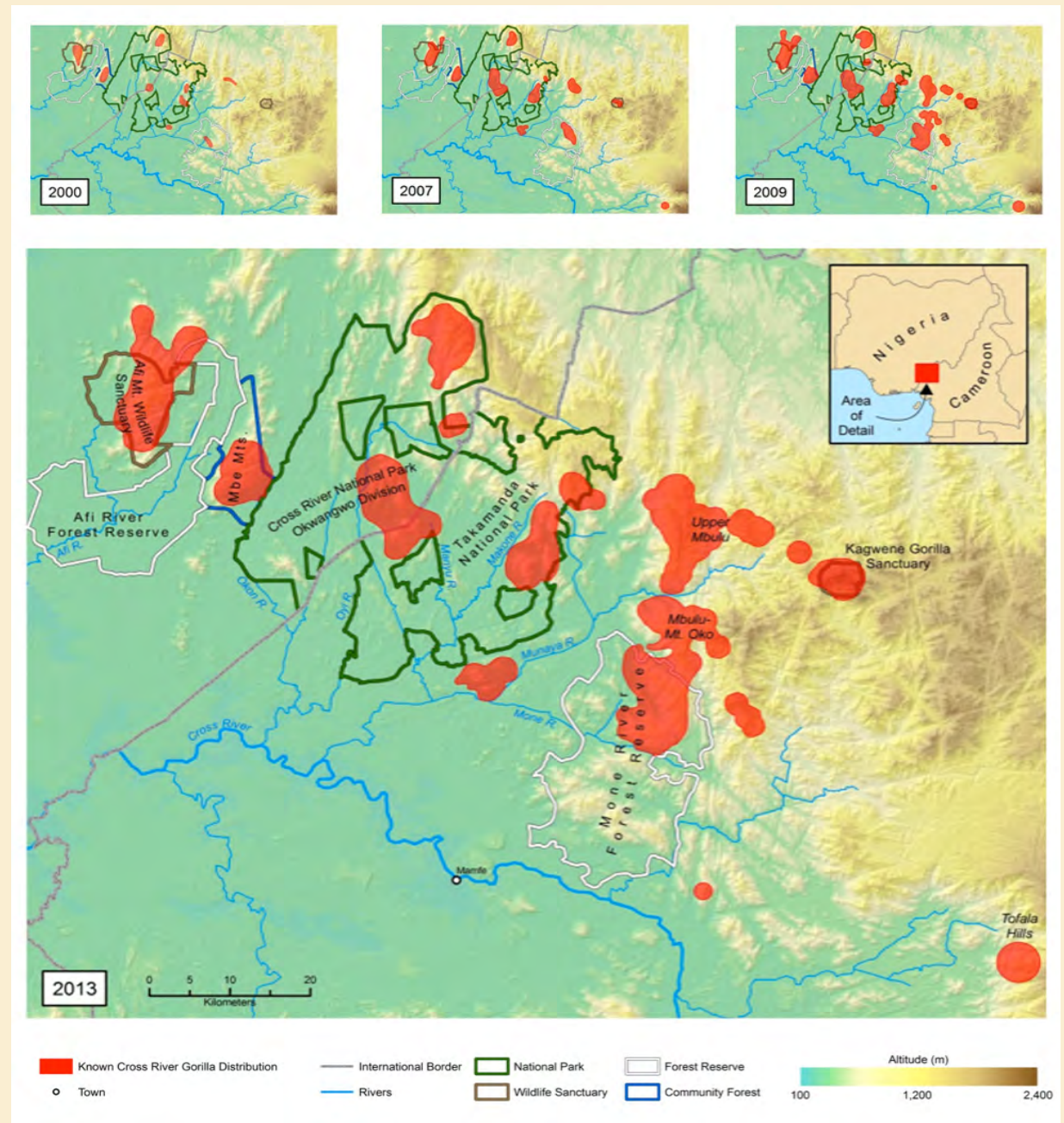


Figure 2. Changing extent of estimated Cross River gorilla distribution over time

Site Descriptions

Nigeria



Afi Mountain



Mbe Mountains

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ABOUT ONE-THIRD OF THE LANDSCAPE OCCUPIED BY CROSS RIVER GORILLAS IS IN NIGERIA. Here, gorillas are found in three areas, all in Cross River State: the Afi Mountain Wildlife Sanctuary (AMWS) and surrounding areas of community forest (referred to as the “Afi Complex” in this plan), the Mbe Mountains and the Okwangwo Division of the CRNP.

Afi Complex

In this plan, the Afi Complex refers to AMWS, Afi River Forest Reserve (ARFR), Olum Hills and the Kakwagom-Irruan-Bitiah area situated on the northern boundary of AMWS, and the Buanchor enclave in ARFR to the east of AMWS. Managed by the Cross River State Forestry Commission (CRSFC), AMWS is the westernmost Cross River gorilla locality. Formerly part of ARFR, the sanctuary was established in 2000 to improve protection of important populations of several endangered species, including Cross River gorillas. AMWS covers 100 km² of lowland and sub-montane forest in the northwestern corner of ARFR. Rocky peaks with sparse vegetation rise to an elevation of 1,300 m in the hilliest eastern sections of AMWS. While gorillas range over an area of 100 km² centered in AMWS but occasionally extending north into the Olum Hills and Kakwagom-Irruan-Bitiah area, the wider Afi Complex is important for maintaining the corridor with the Mbe Mountains to the east.

AMWS is surrounded by 16 villages, with a population of about 27,000 people. Farms originating in these settlements adjoin, and in many cases encroach upon, much of the sanctuary’s boundary. Scattered logging has occurred in lowland areas, but not in the

mountainous parts of AMWS. Although the steep slopes of the sanctuary have largely protected it from logging, the forest is frequently damaged by dry-season bush fires, set to clear new farms or to flush game. Areas opened up by fire are quickly colonized by the herb species that are important staple foods for gorillas. In 2012, some parts of AMWS were devastated by a series of major landslides (Bassey & Okeke 2013).

Despite improved conservation awareness among local communities, many people still hunt illegally on Afi Mountain. Ranger patrols focused on reducing levels of poaching and snaring had been infrequent and ineffective until recently, when the ranger program at Afi was reorganized under a new partnership between the Cross River State Forestry Commission, the Wildlife Conservation Society (WCS) and NCZ. However, an almost total lack of enforcement of hunting laws in previous years has led to high levels of resistance to stricter policing among the communities surrounding Afi.

Mbe Mountains

Immediately to the east of the Afi Complex are the Mbe Mountains, an area of community forest that has received attention from conservationists since surveys found gorillas there in 1983. Mbe is adjacent to the ARFR but is separated from it by a paved road running from Ikom to Obudu. Covering about 85 km², with hills rising to 900 m, the area forms an important link with Afi to the west and the Okwangwo Division of CRNP and Cameroon to the east. Lacking any formal conservation status, the Mbe Mountains are traditionally owned by the nine communities (total population estimated at approximately 10,000 people)

Site-Descriptions — *continued*

located close to the northern, western and southern edges of Mbe.

Since 2007, the area has been managed by the Conservation Association of the Mbe Mountains (CAMM) with support from WCS. Thirteen ecoguards from the surrounding communities, all of whom are ex-hunters, are employed and supervised by WCS. These ecoguards patrol the mountain every day from three camps in the mountains. Pressure from hunting, farming and logging is lower than in surrounding areas, perhaps partly as a result of strong community support for conservation and a greater sense of local ownership.

Gorillas in the Mbe Mountains are concentrated in about 45 km² of ridges and valleys in the center of this community forest, though they occasionally use the lowlands to the south. The Mbe Mountains also harbor important populations of Nigeria-Cameroon chimpanzees, drills, leopards and forest elephants.

Cross River National Park (CRNP), Okwangwo Division

To the east of the Mbe Mountains, and separated from them by the Okon River, lies the Okwangwo Division of CRNP, established in 1991. Managed by the Nigeria National Park Service, the Okwangwo Division is one of two widely-separated divisions of the national park (the other being the Oban Division to the south), although gorillas are only found in the Okwangwo Division. Okwangwo was created by amalgamating three former forest reserves and covers an area of 640 km². Elevation ranges from 150 m in river valleys in the south to around 1,700 m on the edge of the Obudu Plateau in the north. Within the park, there is

a rare continuum, ranging from lowland to submontane and montane forest. Gorillas are known from two areas of Okwangwo: (1) the former Boshi Extension Forest Reserve (established in 1958 to protect gorillas) that occupies ridges and valleys extending northwest from the Obudu Plateau, and (2) the Okwa Hills in the central region of Okwangwo, immediately west of Cameroon's TNP. Boshi Extension is the most northern Cross River gorilla locality and covers roughly 55 km², centered on the Mache, Asache and Enyimayi river valleys, and extending further east and south. The Okwa Hills are the most lowland Cross River gorilla locality and the area frequented by gorillas appears to be quite large (about 80 km²), but it is unclear how much of this area is habitually occupied. The gorillas found in the Okwa Hills area are part of a subpopulation which ranges across the border into the Obonyi area of TNP in Cameroon.

At least 39 villages with an estimated population of 29,000 live along the edge of the Okwangwo Division of CRNP. The large villages of Okwa 1, Okwa 2 and Okwangwo are enclaved within the park, and the expansion of village farmland outside of the enclave boundaries threatens to bisect the forests of the Okwangwo Division and further isolate two gorilla subpopulations unless a remedy is found. The Balegete cluster of villages south of the Obudu Plateau and neighboring Matene communities in Cameroon provide a potential barrier between the forests of Boshi Extension and northern Takamanda, but evidence of gorillas in this area has recently been reported. Although CRNP and its wildlife are in theory fully protected, poaching in the park is still widespread and its montane

forests on the edge of the Obudu Plateau are being eroded by fire. Recently joint patrols between CRNP rangers and WCS staff have destroyed numerous hunting camps and wire snares in the park, but poaching continues. Okwangwo also contains a number of other important species, such as the Nigeria-Cameroon chimpanzee, drill, Preuss's guenon, forest elephant and the grey-necked rockfowl (*Picathartes oreas*).



Rangers on patrol in the Okwangwo Division, Cross River National Park

Cameroon



Traps confiscated in Kagwene Gorilla Sanctuary

ALL CROSS RIVER GORILLAS IN CAMEROON ARE LOCATED IN THE SOUTH WEST REGION, with the exception of those in the Kagwene Gorilla Sanctuary (KGS), which extends a few kilometers into the North West Region. Approximately two thirds of the entire Cross River gorilla population is found in Cameroon. In contrast to Nigeria, many of these gorillas occur in areas that have no formal protected status.

Takamanda National Park (TNP)

TNP covers an area of 676 km² at the most northern point of the South West Region. Takamanda Forest Reserve was created in 1934 to protect watersheds and to conserve the area for future timber production. It was upgraded to a national park in 2008 to protect the gorillas. The western boundary of TNP adjoins similar forests of CRNP's Okwangwo Division in Nigeria. Most of the lowland forest area in the southern and central parts of the park lies between 100–400 m elevation. The terrain is rolling in the lowlands but rises sharply to 1,700 m in the north of the park, where slopes are extremely steep. Small hills reaching 500–700 m lie at the eastern, western and southern fringes of the park and are inhabited by gorillas. The settlements of Obonyi 1 and 3, Matene and Kekpane are enclaved within TNP. Road access to the area is poor and local communities rely almost entirely on forest products (such as bushmeat and non-timber plant products) and farming for subsistence and income. Many of the forest products harvested are traded across the border in Nigeria.

Gorillas occur in three localities of TNP. They occupy about 25 km² in the east of the park, in the hills north

of Kekpane, west of the Basho villages and east of the Makone River. An extremely steep and rocky area in the northeast of TNP, just south of the grassland-forest border and close to the village of Atolo, is the smallest of the known Cross River gorilla localities, covering about 15 km². A third site lies north of the Obonyi villages and straddles the Nigeria-Cameroon border into Okwangwo. The designation of Takamanda as a national park brought increased protection in the form of a new ranger force, a Conservator and park infrastructure. However, levels of poaching and logging remain relatively high as a result of the formerly low levels of law enforcement intervention.

Mawambi Hills

Referred to in the 2007 action plan as 'Takamanda South', Mawambi Hills is a small (43 km²) unprotected forest located on the southeastern edge of TNP and, along with Okwangwo-Takamanda, is one of the lowest altitude sites occupied by Cross River gorillas. Three small communities (Takpe, Assam and Awurri; approximately 400 people) surround this area, which is bounded by the Ebe River in the southeast.

The gorillas of Mawambi Hills occupy an area of approximately 25 km² and may be divided into two social groups (Etiendem *et al.* 2013). The close proximity of villages and the unprotected status of Mawambi Hills mean that the forest experiences high levels of human activity. Threats to Mawambi Hills include land conversion for agriculture, hunting and logging. The small size of the site means that significant human impacts are seen throughout the forest. A small popula-

Site-Descriptions — *continued*

tion of Nigeria-Cameroon chimpanzees is also found in Mawambi, in addition to Preuss's guenon.

Mone River Forest Reserve (MRFR)

MRFR is approximately 7 km southeast of Takamanda and covers an area of 538 km². Although Mone is characterized by vegetation similar to that of Takamanda, the landscape is more topographically diverse, with scattered hills rising from 350 m to almost 1,000 m. No villages are enclaved within MRFR, but uncontrolled hunting, timber exploitation and extraction of other forest products occur throughout the reserve. There is little to no law enforcement presence, although WCS has been monitoring gorillas here through surveys and the Gorilla Guardian program for several years.

The existence of gorillas in Mone was only confirmed in 2000, when a population was discovered in a mountainous region in the extreme northeast of the reserve, close to the village of Mbu (J. Groves 2001). Gorillas are now known to occur in a few different areas in and around MRFR. Recent surveys in the north of MRFR have determined that gorillas use a relatively large area (100 km²), extending from the center of the reserve to the northern boundary and continuous with the range of gorillas in the Mbulu-Mt. Oko region (Ikfuingei 2012a). A few gorilla nest sites have recently been found at two sites outside the boundaries of MRFR. The first is a small area to the northeast, which may be continuous with gorilla range in northern Mone and Mbulu. A second is southwest of the reserve, located in an extremely steep and rocky area covering about 20 km² close to the Amebisu village. This area is connected to

Mone by contiguous forest that has not yet been thoroughly surveyed for gorillas.

Mbulu Forest

The hilly area referred to as Mbulu stretches from the eastern boundary of Takamanda to the northern boundary of Mone, and to the edge of the forest zone in the Bamenda Highlands (including the rugged and remote Mt. Oko area). This forested region links the northern end of TNP, northern MRFR and KGS. These forests currently have no formal protected status. Elevations reach up to 1,800 m with the south and central sectors dominated by mature forest and the north containing significant areas of grassland. Gorillas have been found throughout the region, even in close proximity to villages, though most evidence of their presence comes from the highlands surrounding Mt. Oko, just north of the Mone border, and from a long highland ridge between the villages of Ashunda, Bachama, Ote, and Bandolo. The gorillas are found in an area estimated to be 160 km². Small villages are scattered throughout Mbulu and, with almost no road access, local communities rely on farming, hunting, logging and harvesting of non-timber forest products (NTFPs). There is currently little control of land use by communities or government.

Kagwene Gorilla Sanctuary (KGS)

Kagwene lies at the far eastern edge of Mbulu Forest and extends into the Njikwa forests of the North West Region. Reaching elevations of over 2,000 m, KGS consists of a mosaic of submontane and montane forest interspersed with areas of grassland. It is the eastern-most part of the Afi-to-Kagwene landscape and the

highest altitude site at which Cross River gorillas are found. Gorillas could travel through the forest that connects Kagwene to Mbulu, about 6 km to the northwest.

Although the gorillas occupy only a small area (the sanctuary is 19 km²), the population appears to be relatively large, numbering 20–30 animals (Ikfuingei 2012b). Nine human settlements surround the base of Kagwene and hunting of wildlife and the collection of other forest products were common until recently. A traditional ban on the hunting and consumption of gorillas has protected them from poaching, but habitat loss due to pastoralism and farming threatens to seriously reduce their habitat. WCS established an ongoing gorilla research project at Kagwene in 2002 and was instrumental in the creation of the KGS in 2008. The Kagwene research project is the longest running Cross River gorilla research site. Following the creation of the sanctuary, MINFOF rangers and a Conservator have been working to limit illegal activities and to inform local communities about the regulations associated with the new sanctuary.

Tofala Hills Complex (THC) (previously Bechati-Fossimondi-Besali)

Gorillas were recently rediscovered in a small forest area of 80–100 km² between Bechati, Fossimondi and Besali, 25 km southeast of MRFR. The forest is about 41 km from the nearest known Cross River gorilla locality, southeast of Mone. The area rises from 500 m to 1,900 m with a gradual transition from lowland to submontane forest. ERuDeF initiated gorilla surveys, together with a conservation education effort targeted at local communities and government. Ten human set-



Kagwene Gorilla Sanctuary



Schoolchildren demonstrate their support of Cross River gorilla conservation in the Tofala Hills

© ERuDeF

lements surround and use the forest of the Tofala Hills and farm significant areas of land between Tofala and the southern border of Mone. The area is also threatened by the close proximity of a logging concession and by the expansion of locally-owned oil palm plantations. However, a local ban on gorilla hunting has been in place since conservation activities began in 2003. ERuDeF is working towards creation of a wildlife sanctuary in the Tofala area and hopes to re-establish a corridor linking the Tofala gorillas with southern Mone.

Ebo Forest

Ebo forest includes the proposed Ebo National Park (ENP), which covers a 1,186 km² mosaic of lowland and submontane forest less than 50 km from the city of Douala and only 150 km from Yaoundé and Edéa—both large centers of human population. Ebo consists of a series of steep valleys with rocky outcrops and supports a number of rare and endangered species, including a small western gorilla population of uncertain taxonomic affinity and a significant population of Nigeria-Cameroon chimpanzees.

The Ebo gorillas are over 200 km from any extant Cross River gorilla subpopulation and separated from the nearest western lowland gorillas at Deng Deng by the Sanaga River (the Sanaga River separates two subspecies of chimpanzee, with Nigeria-Cameroon chimpanzees found north of the river and central chimpanzees south of the river). Only one Ebo gorilla skull has been studied and although this skull has similarities to those of western lowland gorillas (Groves 2005), the final taxonomic determination of the Ebo

gorillas is not yet confirmed. For the purposes of this action plan, Ebo is considered to be part of the Cross River landscape and therefore action for Ebo gorilla conservation is included here.

Long-term research and conservation of apes in the Ebo forest, initiated in 2005, is conducted from two permanently-manned research stations operated by the San Diego Zoo Global (SDZG) Ebo Forest Research Project (EFRP). The gorillas occupy a range of steep mountains covering around 25 km² in the northeast of the Ebo forest; current estimates suggest a total population of 15–25 individuals. The current gorilla range is only partially encompassed by the proposed ENP; the remaining area has been subject to recent proposals for extractive logging.

Population Structure, Genetic Diversity and Demographic History of the Cross River Gorilla



Cross River gorilla

© Annare Ibioga

GENETIC DATA HAVE BEEN USED EFFECTIVELY to investigate population structure, demographic history, and patterns of migration both within the Cross River gorilla population and between Cross River and western lowland gorillas. DNA data have shown that the Cross River gorilla population is composed of three subpopulations (western, central and eastern) and that migration between the subpopulations has occurred in the current generation (four migrant individuals were detected, along with individuals that were the result of reproduction between animals from different subpopulations; Bergl & Vigilant 2007). Analysis of levels of genetic diversity found that, according to some measures, the Cross River gorilla population has somewhat reduced diversity relative to a larger and continuous western lowland gorilla population (Mondika; Bergl *et al.* 2008). This finding was further supported by a comparison of contemporary Cross River gorilla DNA samples with those extracted from ca. 100-year-old museum specimens (Thalmann *et al.* 2011). However, no significant differences in genetic diversity were found between Cross River gorillas and the two mountain gorilla populations (Bergl *et al.* 2008).

Recent genetic data (Thalmann *et al.* 2011; Prado-Martinez *et al.* 2013) confirm the divergent evolutionary history of Cross River gorillas suggested by morphological studies (e.g., Sarmiento & Oates 2000; Groves 2001). Prado-Martinez *et al.* (2013) examined the population history of all great ape taxa and their analysis demonstrated that Cross River gorillas could be clearly differentiated from other gorilla populations. In a detailed simulation-based analysis of data from

museum specimens and modern populations of both Cross River and western lowland gorillas, Thalmann *et al.* (2011) determined that the western lowland and Cross River populations diverged approximately 18,000 years ago. This split was followed by low levels of gene flow between the populations until roughly 400 years ago, when the populations became totally isolated. Genetic data also suggest a significant decrease in the size of the Cross River gorilla population around this time. This reduction is likely related to changing and increasing levels of human activity in the region during this period.

Population and Habitat Continuity

Significant areas of forest exist throughout the Cross River gorilla landscape (Figure 3): over 2,000 km² of forest remain in protected areas and forest reserves, and another 500 km² fall in areas outside of protected areas where gorillas have been detected (Bergl *et al.* 2012). Forest in this landscape can be considered as four “blocks”, each of which has varying degrees of connectivity with the others: 1) the Afi complex, 2) Mbe-Okwangwo-Takamanda (including Mawambi), 3) Mone-Mbulu (including Kagwene), and 4) Tofala. The largest intact forests occur in the contiguous TNP and CRNP (Okwangwo Division), and in MRFR. In addition, large areas of relatively undisturbed submontane and montane forest occur in the Mbulu region, north of Mone, which currently has no legal protection.

Increasing loss and fragmentation of forest in the Cross River gorilla’s range threatens connectivity between sites where the gorillas are found. The most vulnerable connections are those between Afi and

Population Structure, Genetic Diversity and Demographic History—continued

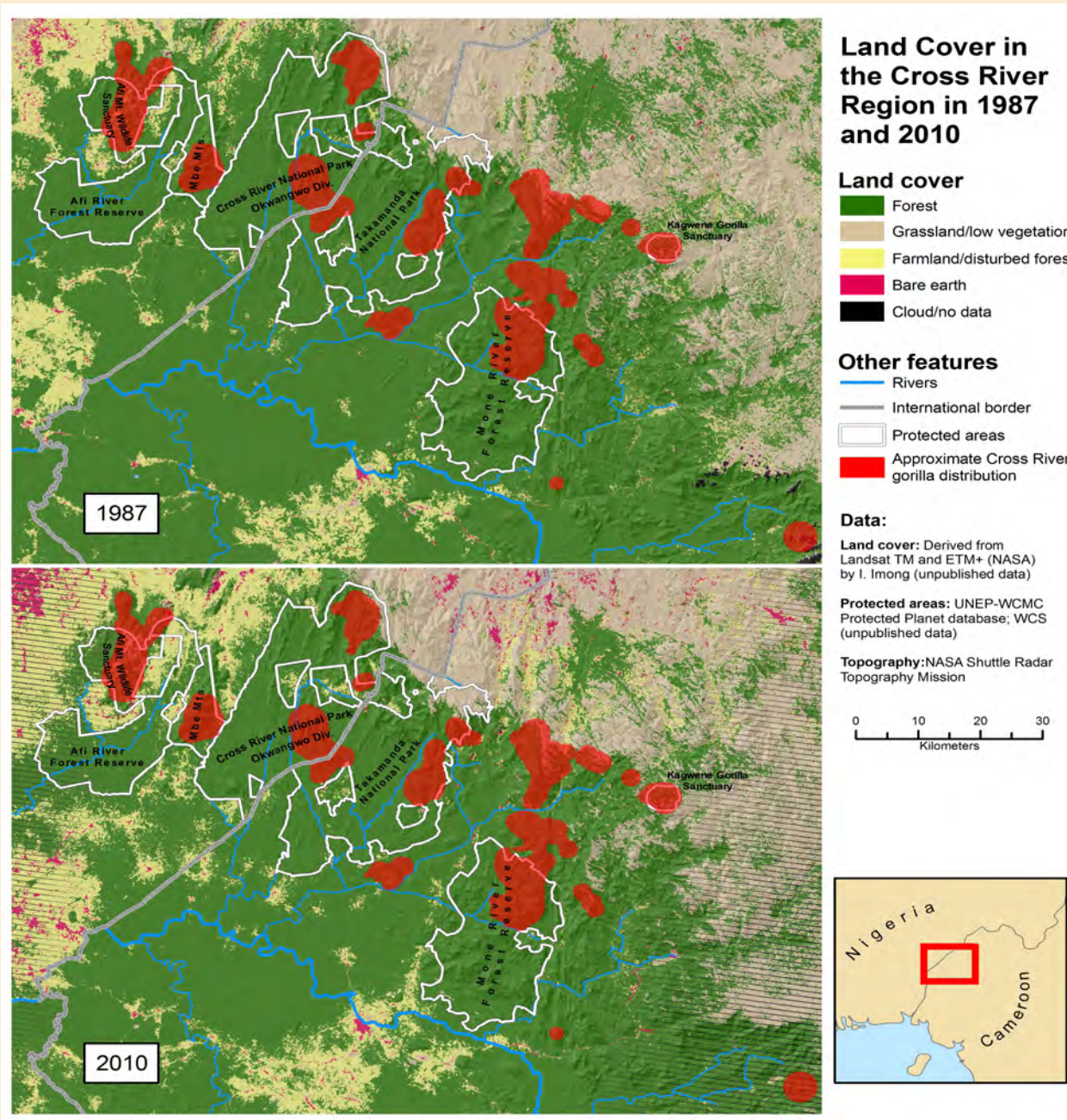


Figure 3. Land cover in the Cross River landscape 1987-2010

Mbe, between Kagwene and the rest of Mbulu, and between Tofala and Mone. The Afi-Mbe corridor is especially at risk due to the existence of a paved road and increasing conversion of forest to farmland along the road and around the Buanchor community enclave. The effectiveness of the Tofala-Mone corridor is also unclear, as the distance involved is considerable (almost 40 km) and there is an intervening large paved road.

While tenuous connections persist between most, if not all, of the sites where Cross River gorillas are found, forest loss in the region is occurring at an alarming rate. In the last 15 years, the area of the Cross River landscape that is under cultivation has increased dramatically, especially in Nigeria. A recent study in Nigeria calculated that the rate of deforestation in the Afi-Mbe-Okwangwo landscape had increased from 0.09% per annum from 1986–2000 to 2.22% per annum from 2000–2012 (Okeke 2013). In particular, farming around enclave communities and along roads is a major threat to habitat connectivity and the movement of gorillas. Hunting and other human activities in corridor areas also appear to act as a barrier to dispersal, even when the forest is more-or-less intact. Urgent protection measures are needed to maintain connectivity between these gorilla localities.

Population Structure, Genetic Diversity and Demographic History—*continued*

Ecological and Anthropogenic Influences on Gorilla Distribution

Given the disparity between the current somewhat fragmented distribution of Cross River gorillas and the relative continuity of forest across the landscape, it is important to understand which factors influence the presence or absence of gorillas to effectively target conservation efforts. The relative importance of ecology (e.g., food availability) versus human activities (e.g., encroachment, poaching) in driving gorilla distribution will have important implications for determining the focus of conservation interventions and predicting the future trajectory of the Cross River population.

Early research at Afi suggested that habitat preference is significantly influenced by the availability of staple food species, especially terrestrial herbs (McFarland 2007). The availability of staple foods during periods when preferred fruit is scarce was suggested as an important factor limiting population density. Abundance of preferred herb species may therefore indicate areas of greater conservation value for extending the Cross River gorilla's range.

In addition to food availability, human disturbance plays an important role in determining Cross River gorilla distribution (Bergl *et al.* 2012; Bucknell & Groves 2002; Sunderland-Groves 2008). Based on extensive field surveys and remote sensing analysis in Nigeria, Imong and colleagues found that human activities have an overriding influence relative to food availability (Imong *et al.* 2013). Some areas not currently occupied by gorillas contain high densities of preferred food species, but are also subject to high levels of human disturbance. Similarly, Etiendem

observed that in the Mawambi Hills gorilla presence correlates negatively with distance to villages and positively with elevation and slope (Etiendem *et al.* 2013a). Etiendem also found that preferred food species were less abundant in the hill areas where gorillas were found. Both studies indicate that unoccupied lowland areas may be of higher quality in terms of food availability compared to occupied hill areas. These findings suggest that if poaching and other human activities could be controlled, the gorillas could possibly inhabit a much larger area than they currently occupy and that the size of the population has the potential to expand.

The relationship between gorilla presence, food availability and human disturbance may not, however, be entirely straightforward. Recent work in the Mone-Mt. Oko region of the Mbulu forest suggests that the factors affecting Cross River gorilla habitat-use may vary depending on the scale considered. Habitat selection at the broader landscape-scale was influenced by localized measures of habitat quality, whereas human activity and food availability were the primary factors influencing habitat selection when viewed at a finer scale (Sawyer & Brashares 2013). At the subpopulation level, the gorillas exhibited a preference for areas at mid-elevation with low- to mid-slope, likely representing a compromise between attraction to staple food species and avoidance of human activity. Strategies to preserve habitat and connectivity among Cross River gorilla sites may therefore need to adopt an integrative approach that considers the influences of large-scale landscape characteristics, human-use patterns and food availability.

Modeling the Cross River Gorilla Population

Habitat and population modeling are tools that can inform more efficient, evidence-based conservation planning for the Cross River gorilla by predicting the effects of various factors on the potential growth and distribution of the population based on existing data. Habitat modeling studies so far have provided insights into which factors influence the current range of the gorillas and their habitat use at different spatial scales. Ongoing and future modeling work that assesses spatial and temporal patterns of habitat availability and connectivity in the Cross River gorilla landscape and evaluates the potential impacts of alternative management interventions could further inform conservation decision-making. In particular, such studies result in a better understanding of the impacts of habitat fragmentation, predict the relative importance of different threats, and project how the Cross River gorilla population may grow or decline under a range of possible scenarios. Although modeling studies have the potential to greatly improve understanding of important factors affecting Cross River gorilla survival and guide conservation action, such studies must be mindful of the assumptions inherent in these models and results must be interpreted with caution. For example, a recent estimate of the extent of loss of suitable habitat conditions for Cross River gorillas (59%) in the last 15–20 years (Junker *et al.* 2012) does not accord with observations on the ground.

Action Planning Process



Participatory conceptual modelling of the gorilla range



Participants from the 2012 Limbe workshop

THIS DOCUMENT IS THE PRODUCT OF A PROCESS LAUNCHED IN EARLY 2012 to review the first *Regional Action Plan for the Conservation of the Cross River Gorilla*, which covered the period 2007–2012 (Oates *et al.* 2007). In February 2012, 42 experts from seven countries, including government wildlife authorities, national and international conservation organizations and gorilla researchers attended a three-day workshop in Limbe, Cameroon. During the workshop, participants reviewed the extent to which activities listed in the original plan had been implemented, and analyzed the factors affecting the degree of implementation. Uncompleted activities that were still considered as priorities for conservation were included in the new plan together with a number of additional activities. The revised plan for 2014–2019 was developed based on this updated information and priorities for conservation action. The action plan includes a series of recommendations produced by workshop participants through a participatory ranking process, along with estimated costs of implementation over a five-year period.

Review of the 2007–2012 Action Plan

Almost half of all actions planned for 2007–2012 have been fully completed, with a further third in progress. Most of the remaining uncompleted actions were not implemented due to funding constraints or different government priorities. Non-site-based actions were most fully implemented, with all education/awareness, research, transboundary conservation and community-based conservation activities completed or in progress. Completion of site-based actions was less successful, though actions for Takamanda and Kagwene were all completed or are underway. Key factors supporting implementation included:

- Level of government commitment towards completion of actions
- Extent of donor commitment and partnerships
- Level of support from local communities for conservation activities
- Availability of research data to inform and support management actions
- Degree of involvement of Nigerian and Cameroonian nationals in conservation activities.

The previous plan led to a number of notable achievements.

- **Establishment of two protected areas, KGS and TNP, in Cameroon in 2008:** Both of these sites now have management plans in place, rangers deployed and Conservators appointed.
- **Improvement of wildlife laws in Nigeria:** A new forestry and wildlife law was passed in Cross River State in 2010. At the federal level, the CITES ban on Nigeria has been lifted and the Endangered Species Decree is being reviewed.

Regional Non-Site-Specific Priority Actions, *continued*

- **Transboundary conservation strengthened:** Transboundary conservation has been greatly strengthened through the drafting of a Cooperative Agreement by the governments of Nigeria and Cameroon. Joint patrols are conducted along the border and joint training programs are being carried out.
- **Greater levels of government commitment to protect AMWS, Nigeria:** Rather than relying solely on NGOs, CRSFC has recognized the need to improve conservation of the sanctuary and posted additional protection staff to Afi.
- **Gorilla Guardian program involves local communities in gorilla monitoring and protection in Cameroon:** The Gorilla Guardian program, established in 2008, has provided a mechanism for local communities to be involved in the monitoring and conservation of gorillas. The program improves protection and monitoring of gorilla populations outside formally protected areas.
- **Creation of a community wildlife sanctuary in the Mbe Mountains, Nigeria:** Establishment of the Conservation Association of the Mbe Mountain (CAMM) has reduced illegal activities in this previously unprotected area. CAMM was legally registered in 2013 and is now seeking a formal mandate to manage the Mbe Mountains.
- **Improved understanding of the ranging and habitat requirements of Cross River gorillas:** A number of different research projects have refined our understanding of the areas occupied by the gorillas and suggest that the landscape could support a larger population if poaching were reduced.
- **Enhanced wildlife and law enforcement monitoring:** Introduction of the CyberTracker monitoring program has resulted in increased effectiveness of law enforcement and monitoring patrols.
- **Increased conservation activity in the Tofala Hills complex:** Establishment of a conservation and research program has resulted in improved conservation of this area formerly known as the Bechati-Lebialem highlands.
- **Greater support from international agencies:** The Convention on Migratory Species (CMS) and the Great Ape Survival Partnership (GRASP) have provided new and significant funding for several initiatives in the landscape.
- **Greater donor awareness and involvement:** Donors, including the United States Fish & Wildlife Service (USFWS), the German Development Bank (Kreditanstalt für Wiederaufbau, KfW) and the Arcus Foundation, are now more involved in decision-making and the joint implementation of conservation programs.

Synergy with the Nigeria-Cameroon Chimpanzee Regional Action Plan

Cross River gorillas share much of their range with Nigeria-Cameroon chimpanzees (*Pan troglodytes ellioti*). Partners working to conserve this subspecies of chimpanzee recently developed a five-year regional action plan for conservation across Cameroon and Nigeria (Morgan *et al.* 2011). Conservation efforts on behalf of each of these endangered apes will be mutually beneficial, and thus we can identify a number of synergies between the two plans.

Overlapping geographic range: Cross River gorillas are sympatric with Nigeria-Cameroon chimpanzees at all sites where Cross River gorillas occur, with the exception of KGS.

Conservation action at sympatric sites: The two action plans set out priority actions for conservation of their respective ape subspecies. While some conservation activities recommended in each plan will apply to only one of these apes, the majority of actions benefit the conservation of both taxa.

Funding invested in one plan will benefit conservation implementation in the other: The overlap in range between Cross River gorillas and Nigeria-Cameroon chimpanzees is an opportunity to leverage increased financial support for conservation.

Threats Monitoring Plan



© Richard Bergl

CyberTracker is used at sites across the Cross River gorilla landscape to collect data on threats and gorilla presence

THIS ACTION PLAN PROVIDES A NUMBER OF STRATEGIES AND PRIORITY ACTIONS aimed at increasing the Cross River gorilla population. In the past, evaluation of action plans has largely focused on whether ‘outputs’ or activities have been achieved, with little attempt to determine whether the outputs had a meaningful impact on the ultimate conservation outcome—the target species. Ideally, a range-wide gorilla census would be conducted often enough to determine whether project activities and strategies are improving the status of the population. At present this type of census is too costly due to the fragmentation and low densities of the gorilla population. Therefore, we propose to evaluate the success of this strategy over the course of the next five years by monitoring the key threats impacting Cross River gorillas. To do this, the following threats monitoring framework is proposed (Table 2). Understanding the status of the changing threats across the Cross River gorilla landscape will provide key information for guiding our collective activities.

Mobile Computer-Based Monitoring of the Cross River Gorilla Population and Illegal Activities

In partnership with protected area authorities, NCZ and WCS have developed a wildlife and law enforcement monitoring system for the Cross River gorilla landscape. This system uses the software package CyberTracker and ruggedized handheld computers with GPS capability to record data on wildlife, threats and law enforcement action. Introduced in 2009, this system provides standardized and consistent monitoring data plus automatic collection of GPS coordinates and date/time information for each data point. Automatic track-logs also allow performance monitoring of field teams. The software has built-in database, analysis and mapping functions that allow data to be easily accessed by staff working on the ground. The mapping component of the software enables users who lack GIS skills to conduct spatial analyses and create maps of a wide range of phenomena. All field data at CyberTracker sites are collected systematically and share a common format, resulting in a growing database of conservation-relevant data at the landscape scale. The system allows managers to better monitor the implementation and effectiveness of law enforcement and monitoring patrols, and they can use this information to make appropriate management decisions for deployment of further effort. Field staff motivation has also increased as a result of the deployment of this system. The CyberTracker system has been implemented for wildlife and law enforcement monitoring at sites in Cameroon (Kagwene and Takamanda) and Nigeria (Afi, Mbe and Okwangwo). It has also been used for data collection during wildlife surveys at multiple sites in both countries.

Future plans for the continued evolution of the CyberTracker system will involve integration and compatibility with SMART¹ (Spatial Monitoring and Reporting Tool); a tool currently under development by a consortium of partners including WWF, WCS, CITES, NCZ, Frankfurt Zoological Society and the Zoological Society of London.

¹ <http://www.smartconservationtools.org>

TABLE 2: THREAT-BASED MONITORING THROUGH MEASURES OF PROTECTION EFFECTIVENESS – POACHING STATISTICS, GORILLA DEATHS RECORDED

Direct Threat	Afi	Mbe	CRNP	TNP	KGS	Mone	Mbulu	Mawambi	Tofala / Leb	Potential / Existing Indicators	Existing Monitoring	Proposed Monitoring
Poaching with guns	1,2	1,2	1,2	1,2	1,2,3	2	2	2	2	# cartridges, # people encountered, # arrests, # prosecutions, penalties/ fines attributed	CyberTracker monitoring at 3 Nigeria sites and 2 Cameroon sites	CyberTracker/SMART 1) ranger-based and 2) annual biomonitoring surveys 3) regular biomonitoring surveys
Poaching with snares	1,2	1,2	1,2	1,2	1,2,3	2	2	2	2	# snares (traps) encountered, # snares (traps) removed, type of snare/trap	CyberTracker monitoring at 3 Nigeria sites and 2 Cameroon sites	CyberTracker/SMART 1) ranger-based and 2) annual biomonitoring surveys 3) regular biomonitoring surveys
Farming	1,2,3	1,3	1,3	1,2,3	1,3	2,3	3	3	1,3	Increase of new farms, size of the farms, # of farms	CyberTracker monitoring at 3 Nigeria sites and 2 Cameroon sites	1) Expand CyberTracker monitoring of farms to Mbulu and Tofala; 2) encroachment/farming expansion survey (collect data according to set protocols) in Takamanda, N Mone and Afi; 3) remote sensing analysis every 3 years (assuming imagery can be obtained) (protected and non-protected areas)
Settlement expansion	1	1	1	1	1	1	1	1	1	# of structures, area of structures, area of settlement		1) remote sensing analysis every 3 years (assuming imagery can be obtained) (protected and non-protected areas)
Logging	1,2	1,2	1,2	1,2	1,2,3	2	2	2	2	# of stumps, # of logs, # of planks, volume of cut timber, law enforcement: # chainsaw confiscated/seen, # arrests and other confiscation	Incidents: CyberTracker at 3 Nigeria sites and Takamanda that record encounters of logging incidents and monitoring effort	CyberTracker/SMART 1) ranger-based and 2) annual biomonitoring surveys 3) regular biomonitoring surveys

TABLE 2 (continued): THREAT-BASED MONITORING THROUGH MEASURES OF PROTECTION EFFECTIVENESS – POACHING STATISTICS, GORILLA DEATHS RECORDED

Direct Threat	Afi	Mbe	CRNP	TNP	KGS	Mone	Mbulu	Mawambi	Tofala / Leb	Potential / Existing Indicators	Existing Monitoring	Proposed Monitoring
Fire	1,2	1,2	1,2	1,2	1,2,3	2	2	2	2	# of incidents of fire, (area burned if feasible)	CyberTracker monitoring at 3 Nigeria sites and 2 Cameroon sites	Combine CyberTracker data with Global Fire Monitoring Center http://www.fire.uni-freiburg.de/current/globalfire.htm ?
Grazing	1,2	1,2	1,2	1,2	1,2,3	2	2	2	2	# of grazing incidents, # of livestock, type of livestock, transhumance activities, presence of grazing huts, bomas/corrals	CyberTracker monitoring at 3 Nigeria sites and 2 Cameroon sites	CyberTracker/SMART 1) ranger-based and 2) annual biomonitoring surveys 3) regular biomonitoring surveys in N Takamanda and Kagwene, N Okwangwo
NTFP collection	1,2	1,2	1,2	1,2	1,2,3	2	2	2	2	# of people, bundles/# of NTFPs (cattle stick, chewing stick, bush mango, etc), # of bush sheds, species	CyberTracker monitoring at 3 Nigeria sites and 2 Cameroon sites	CyberTracker/SMART 1) ranger-based and 2) annual biomonitoring surveys 3) regular biomonitoring surveys
Plantation development, mining and other extractive industries (potential)	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	Lease agreements, concessions, plantation plans		1) Maintain communication with government, regional authorities, private stakeholders, etc. 2) identify area of potential plantation development based on agreements
Disease	3	1,2,3	3	3	1,2,3,4	3	3	1,3	3	# sick animals, # carcasses, lab analysis of samples: presence/type of pathogens		1) Generate baseline for some sites based on lab analysis (particularly where habituation is being considered – Kagwene, Mbe, Mawambi); CyberTracker/SMART 2) ranger-based and 3) annual biomonitoring surveys 4) regular biomonitoring surveys

Numbers listed under each site correspond to the monitoring method as indicated under the “Proposed Monitoring” column

Regional Non-Site Specific Priority Actions

Research Priorities

IN ADDITION TO ENHANCING SCIENTIFIC KNOWLEDGE, research can play a major role in promoting and sustaining conservation. Research can provide data to guide conservation management, help to determine the conservation status of target species, inform the creation of new protected areas, and foster the development of future generations of conservationists. The presence of research projects has been demonstrated to have a positive conservation impact and in many areas, a research presence has enabled conservation efforts to continue, even during periods of insecurity.

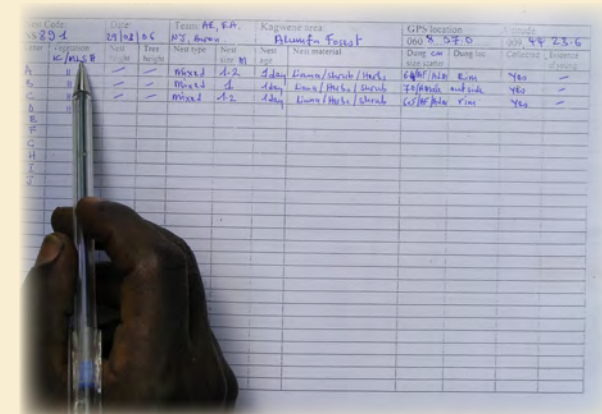
Our understanding of the Cross River gorilla population and the availability of conservation-relevant data have increased considerably since the production of the 2007 action plan. We now have a more accurate picture of the gorillas' distribution and socioecological data from

multiple sites with different local ecological conditions. We are beginning to be able to assess the extent of suitable gorilla habitat, and have already tested new field methods for gorilla research. However, looking ahead there are still many questions to be answered. Genetic sampling of all known gorilla sites would shed further light on fine-scale population dynamics, something especially important given the apparent isolation of sites such as the Tofala Hills in Cameroon and the rapid development of roads and agricultural lands in many lowland areas. Modeling of habitat suitability may also be able to take account of these land-use changes and examine how the availability of habitat is likely to change in the future. If habitat conversion and human presence in the forest continue to increase and plans for gorilla-based tourism are developed, zoonotic and anthroponotic disease transmission should be studied and monitored.

Tracking change in patterns of land cover is also essential to inform corridor conservation efforts. Additional systematic and targeted surveys must also be conducted to further refine knowledge of the range of the gorillas, improve the accuracy of population estimates, and monitor changes in abundance over time.



KGS staff recording gorilla feeding signs using CyberTracker



Although no Cross River gorillas have been habituated, behavioural and ecological data is collected based on signs they leave behind

Priorities for research	Potential implementing partners	Time frame	Time frame	Desired outcome
<ul style="list-style-type: none"> Conduct further gorilla distribution and abundance surveys, including use of novel approaches such as the Gorilla Guardian program 	WCS, MPI, NCZ, CRSFC, CRNP, MINFOF, ERuDeF	5 years	\$200,000	More accurate estimate of gorilla range and numbers
<ul style="list-style-type: none"> Modeling of future scenarios to predict changes in habitat distribution, connectivity and population size 	WCS, MPI, GRASP	3 years	\$50,000	Data on which factors are most important to address in conservation planning
<ul style="list-style-type: none"> Assess the use of genetics to calibrate nest-count population estimates 	WCS, MPI, NCZ	2-4 years	\$100,000	New tool for generating accurate population size estimates
<ul style="list-style-type: none"> Continue and expand long-term socioecological research 	WCS, MPI, NCZ, CRSFC, CRNP, SDZG, MINFOF, ERuDeF	Ongoing	\$250,000	Better understanding of habitat needs; permanent research presence at multiple sites

Regional Non-Site Specific Priority Actions, *continued*

Promoting Community Participation



Community meetings are frequently held to discuss the threats to the Cross River gorilla



Snail farmer in Afi



IN MUCH OF CENTRAL AND WEST AFRICA, local communities have traditionally depended on forest resources for food and medicine. However, recent human population increases and mass commercialization of forest resources have led to their unsustainable harvesting. Hunting of wildlife for local consumption and to supply the bushmeat trade has resulted in significant depletion of large mammal populations and to the widespread occurrence of the 'empty forest' syndrome. A significant portion of the Cross River gorilla's range occurs on community land with no formal protected status. Greater local responsibility for protection and other forms of forest and wildlife management must be developed at these sites. Wherever possible, the maintenance of local customs and traditions that support wildlife conservation should be encouraged. Community-based initiatives at the Mbe Mountains and gorilla monitoring through the Gorilla Guardian program provide potential mechanisms for empowering communities to take on a greater role in protecting Cross River gorillas. In the long-term, promoting community participation in conservation is critical for the survival of Cross River gorillas at all sites.

Priorities for promoting community participation in conservation	Potential implementing partners	Time frame	Funding needed	Desired outcome
<ul style="list-style-type: none"> • Develop models for community-based conservation of gorillas, incorporating lessons learned from existing initiatives 	CAMM, WCS, PSMNR-SWR, CRSFC, ERuDeF	5 years	\$50,000	Clear and tested guidelines for community-based conservation initiatives available
<ul style="list-style-type: none"> • Encourage local participation in protected area management activities 	MINFOF, CRNP, CRSFC, WCS, PSMNR-SWR, CAMM, SDZG, ERuDeF	5 years	\$100,000	Local communities directly participating in established co-management activities in parks
<ul style="list-style-type: none"> • Develop alternative livelihood activities to reduce pressure on forest resources (e.g., ecotourism, non-extractive resource use and income generating activities such as micro-enterprises) 	MINFOF, CRNP, CRSFC, WCS, PSMNR-SWR, SDZG, CAMM, ERuDeF	5 years	\$500,000	Communities engaged in successful alternative livelihood activities that do not deplete natural resources
<ul style="list-style-type: none"> • Promote land-use planning, improved agricultural practices and community forestry in areas surrounding gorilla habitat to act as a buffer zone to core gorilla sites 	MINFOF, CRNP, CRSFC, WCS, PSMNR-SWR, SDZG, CAMM, ERuDeF	5 years	\$100,000	Detailed assessment report of productivity of key potential agro-forestry trees/NTFPs and implementation plan for various communities; at least one Technical Note completed for one community forest in a gorilla habitat

Regional Non-Site Specific Priority Actions, *continued*

Promoting Education and Awareness

.....➔ **G**IVEN THE LARGE NUMBERS OF PEOPLE LIVING IN AND AROUND THE CROSS RIVER GORILLA RANGE, raising awareness about the value of conservation in general and the uniqueness of these gorillas in particular must be a major component of a long-term conservation program. Education and awareness efforts already undertaken at a number of sites in Nigeria and Cameroon have contributed to a reduction in gorilla poaching. These efforts should be continued and expanded.



Conservation club in the Mbe Mountains



Showing films on gorillas to the community is one of the most effective ways to reach a large audience and engage communities in discussions about protecting the Cross River gorilla

Priorities for promoting education and awareness	Potential implementing partners	Time frame	Funding needed	Desired outcome
<ul style="list-style-type: none"> Further develop and expand conservation education and outreach programs throughout the Cross River gorilla range based on school conservation clubs, use of radio and TV broadcasts, and conservation/ape film showings to local communities 	CRNP, CRSFC, MINFOF, WCS, PCI Media Impact, ERuDeF, SDZG	5 years	\$200,000	>50,000 people are engaged in communities and schools
<ul style="list-style-type: none"> >15 school clubs participate in radio/TV broadcasts 	MINFOF, CRNP, CRSFC, WCS, PSMNR-SWR, CAMM, SDZG, ERuDeF	5 years	\$100,000	Local communities directly participating in established co-management activities in parks
<ul style="list-style-type: none"> Develop locally-made Cross River gorilla conservation film/DVD for use in villages 	WCS, PCI Media Impact, ERuDeF, NCZ, SDZG	1 year	\$20,000	At least two gorilla films produced locally
<ul style="list-style-type: none"> Update education materials and produce a regular newsletter 	MINFOF, CRNP, CRSFC, WCS, PCI Media Impact, ERuDeF, Pandrillus, SDZG	5 years	\$50,000	Quarterly production of stickers, flash-cards, leaflets and posters
<ul style="list-style-type: none"> Expand current "Communication for Behavior Change Campaign" throughout the Cross River Gorilla range 	PCI Media Impact, WCS	2 years	\$200,000	An additional 52 episodes of entertainment-education radio serial drama created and aired; an additional 52 episodes of radio call-in shows created and aired in both Cameroon and Nigeria

Regional Non-Site Specific Priority Actions, *continued*

Improved Law Enforcement and Legislation



Rangers assemble in Afi Mountain

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Ranger training by Conservation Outcomes

.....→ **C**ROSS RIVER GORILLAS ARE DESIGNATED AS A FULLY PROTECTED SPECIES in both Nigeria and Cameroon; they are protected by an assortment of international, regional and national legislation. This legislation is poorly enforced, however, and in some cases it is now outdated. A new law enforcement agency, NESREA, has been created in Nigeria although it has yet to tackle conservation issues such as the presence of endangered species in the bushmeat trade. There are two national parks, two wildlife sanctuaries and two forest reserves in the Cross River gorilla range. These protected areas provide refuge to more than half of the known Cross River gorilla population. Unfortunately most of these protected areas are poorly managed and some exist on paper only. Although the habitat in these protected areas has been relatively well preserved (with some notable exceptions), the hunting of large mammals, including ungulates and anthropoid primates, remains a widespread problem. Well-developed bushmeat trade routes exist, fuelled by a strong demand in the Nigerian border region. A number of measures are needed to improve law enforcement and in many sites (especially in Cameroon) additional protection staff are required. In all sites, improved monitoring, law enforcement capacity and agility are needed. Effective law enforcement also involves building greater awareness and support amongst other law enforcement agencies and the judiciary.

Priorities for improved law enforcement and legislation	Potential implementing partners	Time frame	Funding needed	Desired outcome
<ul style="list-style-type: none"> • Revise existing legislation including the 1994 Forestry and Wildlife Law (Cameroon) and the Endangered Species Decree (Nigeria) 	MINFOF, FGN, NESREA	2–3 years	\$50,000	Revised legislation accepted
<ul style="list-style-type: none"> • Establish a LAGA-type collaboration in Nigeria with MOU between NGOs and government 	NESREA, WCS, LAGA	5 years	\$250,000	LAGA-type MOU established in Nigeria
<ul style="list-style-type: none"> • Strengthen law enforcement monitoring at all sites and implement SMART 	MINFOF, NNPS, CRSFC, WCS, NCZ, ERuDeF, CAMM, SDZG	5 years	\$250,000	Increased capacity to target enforcement activities
<ul style="list-style-type: none"> • Training program to raise awareness of laws and process of wildlife law enforcement by park rangers, ecoguards, conservation workers, community leaders, judicial personnel and law enforcement agencies 	MINFOF, CRSFC, CRNP, WCS, NESREA, LAGA, ERuDeF	3 years	\$100,000	>100 staff trained on current wildlife legislation

Regional Non-Site Specific Priority Actions, *continued*

Capacity Development



CONSERVATION REQUIRES EFFECTIVE CONSTITUENCIES AND RELEVANCE in the societies where we work. The long-term success of our work ultimately depends on the capacity and the desire of national and local partners to sustain conservation efforts. Our efforts to conserve priority species and landscapes must, therefore, be supported by building the capacity of individual conservationists and conservation institutions, by helping to develop constituencies for conservation, and by encouraging good and effective governance in the wider societies in which we work.



Training of Afi rangers in the use of CyberTracker

Priorities for training and capacity building	Potential implementing partners	Time frame	Funding needed (USD)	Desired outcome
<ul style="list-style-type: none"> • Seek funding for a Cross River gorilla conservation graduate scholarship fund 	WCS, NCZ, SDZG, FFI, ERuDeF	5 years	\$240,000	At least two students enrolled in graduate program under scholarship
<ul style="list-style-type: none"> • Strengthen links with universities in Cameroon and Nigeria; provide opportunities for student internships and volunteer programs 	MINFOF, CRNP, CRSFC, WCS, ERuDeF, SDZG, Universities of Calabar, Buea and Dschang	5 years	\$50,000	At least 10 students complete field internship
<ul style="list-style-type: none"> • Promote inter-site staff exchange programs to other gorilla research sites across Africa 	Gorillas Across Africa program, NCZ, MPI, WCS, SDZG	5 years	\$20,000	At least 10 exchange visits to established sites in East and Central Africa (e.g., Rwanda, Republic of Congo)



The Gorilla Guardian program is a successful example of directly engaging community participants in the conservation and promotion of Cross River gorillas

Gorilla Guardian Program

About half of all Cross River gorillas found in Cameroon inhabit forests that lack formal protection status. In these areas, gorillas are particularly vulnerable to human threats such as poaching and habitat destruction. Many of these sites are remote and rugged, making survey and monitoring work difficult. Even though gorillas are legally protected wherever they occur, the government in Cameroon has only limited ability to engage in law enforcement activities in remote areas.

WCS's Gorilla Guardian program was established as a way to better monitor and protect gorillas in remote and poorly protected areas. Gorilla Guardians are community members (often ex-hunters) who collect information on gorilla distribution and human activities in the forest. Gorilla Guardians also serve as conservation ambassadors and act as liaisons between their communities, government and WCS, forming a network for sharing information and raising awareness. Gorilla Guardians are selected by their communities and undergo training in gorilla ecology and nest identification, monitoring and data collection, and Cameroon wildlife law.

The Gorilla Guardian program began in six communities in three forest areas adjacent to important Cross River gorilla sites (Mbulu, northern Mone and Mawambi Hills). In 2011, two additional communities were added to the program in the area between Mbulu and Mone. Interest from other communities in the area led to the expansion of the program to two communities east of Mone in 2012. The growth of and interest in the Gorilla Guardian network suggests that it has the potential to develop into a broader program of community support and protection for Cross River gorillas and their habitat.

Regional Non-Site Specific Priority Actions, *continued*

Transboundary Conservation Planning



Rangers from Takamanda National Park, Cameroon, and the Okwangwo Division of Cross River National, meet at the international boundary for a joint patrol



CRNP staff on a field visit to TNP

THE LARGEST AND MOST IMPORTANT SITE FOR CROSS RIVER GORILLAS is the transboundary area between the Okwangwo Division of CRNP in Nigeria and TNP in Cameroon, which supports roughly one-third of the known gorilla population. Transboundary cooperation between protected areas can provide several benefits for conservation, including improved control of threats such as poaching and illegal transboundary trade in bushmeat, timber and NTFPs, as well as stimulating national commitment to conservation when this is seen as a component of international cooperation, and the facilitation of more effective research. Transboundary cooperation between Okwangwo and Takamanda has been strongly promoted in recent years with regular joint anti-poaching patrols, an annual transboundary workshop, exchange visits and information sharing to capture poachers who attempt to evade arrest by slipping across the international border. A framework cooperation agreement has been drafted between the governments of Cameroon and Nigeria for the joint implementation of transboundary conservation and research activities in four transboundary national park complexes.

Priorities for transboundary conservation	Potential implementing partners	Time frame	Funding needed	Desired outcome
<ul style="list-style-type: none"> Establish a transboundary Takamanda-Okwangwo protected area complex and investigate options for World Heritage Site status 	GoC and FGN, MINFOF and NNPS, with WCS support	3 years	\$30,000	Takamanda-Okwangwo Protected Area Complex approved
<ul style="list-style-type: none"> Workshop to sign transboundary agreement by relevant ministries in Nigeria and Cameroon 	MINFOF, FGN, with WCS support	1 year	\$10,000	Signed Cooperation Agreement available
<ul style="list-style-type: none"> Conduct regular joint patrols and exchange visits between Okwangwo and Takamanda 	NNPS, MINFOF, PSMNR, CRNP, TNP, WCS	5 years	\$100,000	Coordinated regular patrols implemented; greater capacity, standardization and information sharing across the landscape
<ul style="list-style-type: none"> Facilitate joint biological surveys and data exchange 	MINFOF, NNPS, CRSFC, WCS	5 years	\$50,000	Increased understanding of biodiversity and baseline values for monitoring established
<ul style="list-style-type: none"> Continue to develop a regional GIS database as a planning tool for conservation 	WCS, TNP, CRSFC, CRNP, NCZ	5 years	\$50,000	GIS database available in each of the park sites and relevant offices in Nigeria and Cameroon
<ul style="list-style-type: none"> Conduct annual range-wide Cross River gorilla partners meeting 	USFWS, NNPS, MINFOF, CRSFC, Arcus, KfW, WCS, WWF, CAMM, NCZ, ERuDeF	5 years	\$100,000	Greater cooperation and coordination in implementing conservation across the transboundary landscape

Regional Non-Site Specific Priority Actions, *continued*

Health Monitoring and Disease Prevention



Trained detection dog locates a gorilla fecal sample for genetic analysis and health monitoring

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.....→ **CROSS RIVER GORILLA CONSERVATION EFFORTS** have focused primarily on reducing poaching and habitat loss. However, a growing number of incidents of disease transmission between humans and primates in other locations suggest that disease could be a serious conservation concern in the future. Pathogens to which the gorillas have not previously been exposed could have a devastating effect on entire subpopulations, and gorillas in environments where there are high levels of human and livestock activity may be particularly at risk. Increasing interest in gorilla habituation and tourism underscores the need for a better understanding of disease risks. Very little information exists on the epidemiology of Cross River gorillas. Preliminary work to assess the threat posed by disease is underway as part of a collaboration between NCZ, WCS, and Emory University. The scope of this assessment needs to be expanded to other areas and used as the basis for protocols to minimize the likelihood of disease negatively impacting Cross River gorilla populations.

Priorities for health monitoring and disease prevention in Cross River gorillas	Potential implementing partners	Time frame	Funding needed	Desired outcome
<ul style="list-style-type: none"> • Assess disease threat posed by humans and livestock and determine which factors are most important in determining severity of risk 	Emory University, Robert Koch Institute, WCS, NCZ, Pandrillus, MINFOF, CRSFC, CAMM, CRNP	2 years	\$150,000	Disease risk analysis completed, particularly at potential habituation sites
<ul style="list-style-type: none"> • Develop and implement employee, researcher, and community health measures to reduce risk of disease transmission 	Emory University, MINFOF, WCS, Pandrillus, CAMM, CRNP, CRSFC, ERuDeF	3 years	\$20,000	Health protocols developed and implemented
<ul style="list-style-type: none"> • Conduct awareness raising campaign to increase understanding regarding risks of disease transmission to gorillas 	Emory University, WCS, Pandrillus	3 years	\$15,000	Greater awareness of disease risks among communities in the landscape
<ul style="list-style-type: none"> • Establish in situ accredited laboratory with molecular capacity (Limbe WILDlab of the Limbe Wildlife Centre) 	SDZG, Pandrillus, MINFOF, WCS, USFWS, Morris Animal Foundation	5 years	\$220,000	Increased capacity for detection and monitoring of pathogens and parasites

Regional Non-Site Specific Priority Actions, *continued*

Development of Ecotourism



The canopy walkway in Afi Mountains offers a unique tourist attraction

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CROSS RIVER GORILLAS ARE FOUND IN A REGION OF OUTSTANDING BEAUTY with a variety of natural and cultural attractions of potential interest to tourists. Given the potential to generate revenue to support conservation, tourism could be an important component of the overall Cross River gorilla conservation program. Visitors to the region include overland/adventure travellers, foreign residents, expatriates in Cameroon and Nigeria for work, and nationals engaging in domestic tourism. Although current levels of tourism are quite low, tourism activities have the potential to be expanded and more effectively marketed. A regional circuit could be developed around nature and cultural tourism, adventurous exploration of remote and rugged forest sites, and the appeal of unique fauna, including Cross River gorillas, drills and Nigeria-Cameroon chimpanzees.

While opportunities to develop a diverse set of tourism activities exist, considerable attention has focused on gorilla-based tourism and, therefore, habituation of gorillas. The risks associated with tourism to habituated gorillas demand a cautious approach (e.g., Homsy 1999). Additionally, given market factors and infrastructure requirements, it is unlikely that tourism based on the viewing of Cross River gorillas would ever replicate the extremely successful mountain gorilla tourism programs. However, carefully planned and implemented gorilla tourism could succeed, as outlined in a feasibility study conducted in Nigeria (Macfie 2007).

Government agencies and conservation NGOs in both Nigeria and Cameroon have expressed interest in pursuing gorilla habituation; however, a number of concerns remain regarding the lack of progress towards meeting the preconditions for habituation specified in the feasibility study (Macfie 2007). If gorilla habituation, and subsequently tourism, proceed, all partners must agree to adopt and adhere to best practice as outlined in the IUCN guidelines (Macfie & Williamson 2010).

Priorities for ecotourism development	Potential implementing partners	Time frame	Funding needed	Desired outcome
Assess Cross River gorilla range for potential development of: i) general ecotourism; ii) tourism based on the presence of gorillas (unhabituated); and possibly iii) habituated gorilla tourism	MINFOF, NNPS, CRSFC, CRSTB, WCS, ERuDeF, FFI	1 year	\$15,000	Regional tourism feasibility assessment and market survey, identifying potential sites and circuits
Assess completion of recommendations from the 2007 Afi gorilla tourism feasibility study. Implement recommendations not yet achieved (or consider another pilot site in Nigeria)	CRSFC, CRSTB, WCS	1 year	\$45,000	Recommendations of 2007 plan implemented at Afi or an alternative site
Identify one site in Cameroon with the best potential for gorilla habituation. Carry out gorilla tourism feasibility study	MINFOF and partners	1 year	\$20,000	Market survey and feasibility study carried out for potential gorilla-based tourism at one site in Cameroon
Develop guidelines for tourism operations (gorilla or other), including health and hygiene issues and staff training programs	MINFOF, NNPS, CRSFC, WCS, Pandrillus	1 year	\$5,000	Tourism guidelines developed and staff training programs in place

Site-Based Actions

Afi Complex



Pillar Rock, AMWS



A view of the Afi Complex

THE AFI COMPLEX includes the AMWS, the ARFR, the Olum Hills and the Olum-Buanchor enclave. Gorillas are found only in the AMWS, which is managed by the Cross River State Forestry Commission (CRSFC). Gorillas occasionally stray into the Olum Hills and the Kakwagom-Irruan-Bitia area outside of the wildlife sanctuary.

There are estimated to be more than 1,000 illegal farms within the boundaries of AMWS and, despite recently-renewed protection efforts, hunting is widespread, particularly trapping with wire snares set for small mammals such as hyrax and porcupine. The large numbers of wire snares in AMWS pose a threat to Afi's gorillas. In 2010, an infant gorilla was found in a wire snare and released, but later died. In 2012, the carcasses of two gorillas were discovered at a hunter's camp, allegedly killed when one of the gorillas was inadvertently caught in a wire snare. A further threat to the viability of the Afi gorilla population is the isolation of Afi Mountain due to the expansion of the human population and the spread of farms within the Olum-Buanchor enclave, which threaten to sever the habitat corridor linking Afi to the Mbe Mountains. There have been no serious dry-season fires since 2008 but a series of major landslides in July 2012 damaged large areas of the sanctuary's vegetation and negatively affected the water supply for many local communities. There have been no confirmed cases of crop raiding by Afi gorillas since 2005.

A 2007 feasibility study set out a number of preconditions for gorilla tourism in AMWS. Since none of these recommendations have been implemented, habituation has not begun. The Sanctuary is also the site proposed for the reintroduction of drills (*Mandrillus leucophaeus*) by the NGO Pandrillus.

Action needed — Afi Complex (AMWS and ARFR including Olum Hills and Olum-Buanchor enclave), Nigeria	Potential implementing partners	Time frame	Funding needed	Desired outcome
<ul style="list-style-type: none"> • Eradicate all illegal farms in AMWS and ensure no new farms are allowed to develop 	CRSFC	5 years	\$300,000	All farms eliminated from AMWS
<ul style="list-style-type: none"> • Strengthen protection by increasing the number of anti-poaching patrols; effective prosecution of all poachers arrested to serve as a deterrent 	CRSFC, WCS, Pandrillus, NCZ	5 years	\$250,000	Patrols doubled, leading to reduction in illegal activities
<ul style="list-style-type: none"> • Review existing boundaries of AMWS and possible extension to include Olum Hills and Kagwagom-Irruan area 	CRSFC, Pandrillus, WCS	1 year	\$3,000	Boundaries extended for greater protection of gorilla habitat
<ul style="list-style-type: none"> • Clearly demarcate boundaries of AMWS and ARFR 	CRSFC, WCS, Pandrillus	1 year	\$4,000	Boundaries clearly demarcated to reduce illegal infractions
<ul style="list-style-type: none"> • Assess implications of drill reintroduction/release; adherence to IUCN reintroduction best practices and RSG guidelines 	CRSFC, Pandrillus, WCS	1 year	\$2,000	Impact assessment of and strategy for drill release determined

Mbe Mountains



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Research and monitoring camp at Mbe Mountains

•.....➔ **T**HE MBE MOUNTAINS ARE PART OF AN IMPORTANT HABITAT corridor linking the Afi Complex to CRNP and the larger block of gorilla habitat in Cameroon. Traditional ownership of the mountains is claimed by the nine surrounding communities. In 2005 these communities formed CAMM to manage the area themselves, both for conservation and to provide benefits to local people. Although Mbe lacks any formal conservation status, pressure from hunting, farming and logging is lower than in surrounding areas, perhaps partly as a result of strong levels of community support for conservation and a greater sense of local ownership.

However, CAMM is not yet an effective, independent organization, and requires additional capacity building and financial support. WCS currently employs 13 ecoguards from the surrounding communities, all of whom are ex-hunters and are supervised by a project manager. These ecoguards patrol on a daily basis from three camps located in the mountains. This system provides a relatively high degree of informal protection for the gorillas and other wildlife. Expectations are high among local communities that conservation will bring tangible benefits and there is growing interest in REDD, particularly since Mbe was proposed as a pilot REDD site by the Cross River State Government (CRSG). There is also increasing interest in developing tourism with gorillas, although this has not yet been fully assessed.

Action needed — Mbe Mountains, Nigeria	Potential implementing partners	Time frame	Funding needed	Desired outcome
<ul style="list-style-type: none"> • Define legal status and complete gazettement as a community forest or wildlife sanctuary 	CRSFC, CAMM, WCS	1 year	\$10,000	Mbe Mountains officially gazetted and afforded greater legal protection
<ul style="list-style-type: none"> • Strengthen existing community patrol system, including introduction of more effective penalties 	CAMM, WCS, CRSFC	5 years	\$250,000	Decrease in illegal activities due to greater surveillance and enforcement
<ul style="list-style-type: none"> • Examine existing community-based land-use plans and investigate how they can be implemented to protect the buffer zone and habitat corridors 	DIN, CRSFC, CAMM, WCS	1 year	\$5,000	Increased protection of buffer zone and corridors
<ul style="list-style-type: none"> • Provide necessary support and capacity building to CAMM 	DIN, WCS, CRSFC	5 years	\$25,000	CAMM able to effectively manage Mbe Mountains
<ul style="list-style-type: none"> • Review and demarcate Mbe boundaries 	CAMM, WCS, CRSFC	1 year	\$5,000	Mbe boundaries reinforced

Site-Based Actions — *continued*

Cross River National Park (CRNP): Okwangwo Division



Patrol by Cross River National Park rangers in the Okwangwo Division

.....→ **C**ONTIGUOUS WITH TNP IN CAMEROON, the Okwangwo Division of CRNP is the largest and most important site for Cross River gorillas in Nigeria. Unfortunately rangers are poorly supervised and the park lacks basic equipment such as vehicles. Hunting is widespread throughout the park, particularly in the more accessible lowland areas, and trapping with wire snares is common in the highland areas frequented by gorillas. A major problem is the presence of illegal ‘bush sheds’ or camps established throughout the park to collect bush mango (*Irvingia gabonensis*) and other NTFPs—camps that are also commonly used by poachers. The large numbers of wire snares and bush sheds in Okwangwo present a significant threat to the gorillas. The lack of an approved management plan and management committee has also contributed to the neglect of this park in recent years.

Unfortunately there has been no progress concerning the continued presence of three large enclaves since the National Park was created in 1991. These enclaves were created to accommodate existing villages during the establishment of the former Okwangwo Forest Reserve in 1930. Inevitably the villages have increased greatly in size since then and large areas of forest have been cleared for farming, expanding beyond the original enclave boundaries. These farmlands threaten to divide the park and thereby isolate the forest and gorillas of the Boshi Extension from the rest of the Okwangwo Division. There is also some agricultural encroachment by cocoa farmers on the edge of the park at Bashu, Obonyi and Mbuli, and illegal farming in the Boshi Forest is a significant problem. Local peoples’ expectations were unrealistically high when the park was created and many people feel that the park has failed to provide promised development. As a result, levels of support for conservation are low, particularly in the enclaves.

Action needed — CRNP Okwangwo Division, Nigeria	Potential implementing partners	Time frame	Funding needed	Desired outcome
<ul style="list-style-type: none"> • Review all practical options for the resettlement of people living in the existing enclaves 	NNPS, FGN, CRSG	2 years	\$50,000	Strategy for resettlement completed
<ul style="list-style-type: none"> • Strengthen levels of protection through improved management, removal of all bush sheds, monitoring, ranger training in anti-poaching techniques, construction of ranger posts and provision of essential equipment, including vehicles 	NNPS, WCS	5 years	\$1,000,000	Increased protection results in decrease in illegal activities
<ul style="list-style-type: none"> • Review draft management plan and ensure ratification by National Parks Board 	NNPS	1 year	\$10,000	Document formally approved and implemented
<ul style="list-style-type: none"> • Improve levels of local support for conservation through an education outreach program, expanded alternative livelihood projects and the creation of a park management committee 	WCS, NNPS	5 years	\$150,000	Greater buy-in from local communities, resulting in increased commitment to conservation and reduction in illegal activities

Takamanda National Park (TNP)



Enrichment planting nursery near TNP

•.....→ **T**NP COVERS 676 KM² and is situated at the northernmost point of Cameroon's South West Region. The area comprises mostly lowland and montane forests that transition to rolling grasslands in the north. Its legal status was elevated from forest reserve to national park in 2008 due to its biological and transboundary importance. In 2010, a 5-year park management and business plan was developed and is currently being implemented. A Program for Sustainable Management of Natural Resources - South West Region (PSMNR-SWR) is co-financed by the Federal Republic of Germany through KfW and the German Agency for International Cooperation (GIZ). Through this program, WCS is providing technical and management support to MINFOF for the implementation of all conservation-related activities in the park.

In spite of improved management and the provision of resources, TNP remains under considerable threat from human activities because of local community demands for natural resources and its close proximity to the border with Nigeria. The combination of increasing human population in the area and increasing accessibility by road is leading to escalating pressures on the park and other nearby forests. The transboundary location of the park, contiguous with the Okwangwo Division of CRNP, provides additional challenges for enforcement of forestry and wildlife laws. The trafficking of bushmeat across the porous international border with Nigeria, as well as to other parts of Cameroon, is rapidly depleting wildlife populations. Additional threats to the park include illegal logging and unsustainable harvesting of NTFPs, driven particularly by high demand from the Nigerian side of the border.

Action needed — TNP, Cameroon	Potential implementing partners	Time frame	Funding needed	Desired outcome
• Coordination of law-enforcement patrols	MINFOF, WCS, CRNP, PSMNR	5 years	\$500,000	Regular park patrols
• Convene meeting to bring together agencies to create inter-ministerial taskforce to address poaching and transboundary trade in illegal timber	MINFOF, WCS, CRSFC, NNPS, Chamber of Commerce (Cameroon and Nigeria), CAFECO	3 years	\$150,000	Functional taskforce in place
• Training and support to VFMCs to increase surveillance and improve intelligence	PSMNR, WCS, MINFOF, VFMCs	3 years	\$60,000	Communities participate in patrols and provide useful information on illegal activities in the park
• Feasibility studies of tourism and sustainable financing	MINFOF, PSMNR, WCS, consultants	1 year	\$50,000	At least two sustainable financing plans developed

Site-Based Actions — *continued*

Mawambi Hills



Mawambi Hills

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THIS SITE WAS REFERRED TO AS ‘TAKAMANDA SOUTH’ IN THE 2007 ACTION PLAN; it has been renamed the Mawambi Hills since it is outside TNP. The gorillas in Mawambi Hills are threatened by intense and widespread poaching for bushmeat and NTFP extraction. Human activities in the area are increasing as a result of improved accessibility to the region and the growing interest in cash-crop farming. Gorillas are mainly restricted to a small area of forest on rugged terrain (10 km²), but even these areas have been subjected to human encroachment, most likely due to the depletion of resources in the surrounding lowlands. The forest remains loosely connected to TNP, but this corridor is threatened by agricultural activities expanding from Takpe village. Further research is needed to understand the ecology of these gorillas and investigate the impacts of human activities on the gorillas’ habitat use in order to design long-term conservation management plans.

Action needed — Mawambi Hills, Cameroon	Potential implementing partners	Time frame	Funding needed	Desired outcome
<ul style="list-style-type: none"> • Develop and support community management strategy for conservation of Mawambi Hills forest, including law enforcement and sustainable financing 	WCS, GIZ, MINFOF, KfW, universities, local communities	5 years	\$100,000	Community commitment to protect the remaining gorillas obtained
<ul style="list-style-type: none"> • Explore formal designation options for Mawambi Hills and implement designation with local communities 	WCS, MINFOF, local communities	3 years	\$100,000	Community forestry project with clear conservation plan initiated and supported by local and administrative authorities
<ul style="list-style-type: none"> • Strengthen Gorilla Guardian network through training and additional support 	WCS	5 years	\$200,000	At least five additional communities join the Gorilla Guardian network
<ul style="list-style-type: none"> • Long-term research and monitoring presence including a community-managed research station 	WCS, GIZ, MINFOF, KfW, universities	5 years	\$150,000	Research station operational

Mone River Forest Reserve (MRFR)



Gorilla Guardians measure a gorilla nest in the Mone Reserve, Cameroon

MONE RIVER WAS CREATED AS A FOREST RESERVE IN THE 1950s. Although there are no human settlements within the boundaries of the reserve, local people harvest timber, wildlife and other forest products unsustainably from the forest. In a 2003 review (“Plan de Zonage”), it was suggested that Mone River’s status be upgraded to that of wildlife sanctuary. However, the future status of Mone is now in doubt as the government is considering allocation of the southern section of MRFR to commercial timber exploitation. There is an urgent need to develop a conservation plan that will provide protection for the gorillas in central and northern Mone, while recognizing the needs of the local people. The main threats to the gorillas in this area are poaching and habitat loss. In 2009, a hunter was arrested for killing a gorilla in Amebisu. The recent rise in the international market price of cocoa has prompted many young people in the villages adjacent to MRFR to establish cocoa farms in the forest reserve. The arrival of the Cameroon Development Cooperation in the Manyu Division has also encouraged the establishment of small-scale palm plantations which may infringe on the Forest Reserve. There is therefore a need for the current boundaries of MRFR to be reinforced. The existing Gorilla Guardian and conservation education programs also need to be strengthened and the newly created Village Forest Management Committees (VFMCs) trained to assist with information gathering and law enforcement.

Action needed — MRFR, Cameroon	Potential implementing partners	Time frame	Funding needed	Desired outcome
<ul style="list-style-type: none"> • Expand the Gorilla Guardian approach, including livelihood initiatives, to adjacent communities 	WCS	3 years	\$150,000	At least five communities added to the Gorilla Guardian network
<ul style="list-style-type: none"> • Improve law enforcement, including the recruitment of enforcement staff and the establishment of regular patrols 	MINFOF	5 years	\$250,000	Regular patrols completed, resulting in reduction of illegal activities
<ul style="list-style-type: none"> • Conduct detailed survey of southern and eastern Mone to assess gorilla distribution and population size 	WCS	3 years	\$140,000	Gorilla population size in southern and eastern Mone determined
<ul style="list-style-type: none"> • Establish and train VFMCs to assist with information gathering for law enforcement 	MINFOF, WCS	3 years	\$80,000	Increased success of law enforcement and prosecution efforts based on information network
<ul style="list-style-type: none"> • Clarify management strategy, including land-use management plan and finalize boundaries for MRFR accordingly 	MINFOF	3 years	\$10,000	Agreed-upon boundaries demarcated
<ul style="list-style-type: none"> • Update baseline data on wildlife, illegal activities and socio-economics in support of a review of conservation status of MRFR and surrounding areas 	WCS, MINFOF	3 years	\$110,000	Baseline data on gorilla population status available; threats monitored

Site-Based Actions — *continued*

Mbulu Forest



MBULU CURRENTLY HAS NO FORMAL PROTECTION STATUS and as a result local people from various surrounding communities exploit its resources. The main threats to gorillas in this area are poaching and habitat loss. In early May 2013, the Gorilla Guardians from Bachama village reported that a hunter from Kakpenyi village had killed a gorilla in Bachama forest in the northwestern part of Mbulu. At Kakpenyi a hunter who kills a gorilla or chimpanzee is regarded as a hero and a dance is organized in the village in his honor. There is an urgent need for such traditional beliefs and practices in the landscape to be discouraged.

The creation of a road from the town of Mamfe in the south to Akwaya in the north presents a further threat to conservation of this area. The road will allow greater access to, and facilitate habitat loss in, the forested areas that link Takamanda with Mbulu. Rising international demand for cocoa in recent years has encouraged most young people in the villages adjacent to Mbulu to clear medium to large areas of forest to farm cocoa. Exploring options of forming either community or council forest areas and/or a network of protected areas and corridors in Mbulu would help to halt habitat loss and fragmentation. The existing Gorilla Guardian and conservation education programs should be strengthened, especially in the northwestern part of Mbulu forest.



Mbulu Forest

Action needed — Mbulu Complex, Cameroon	Potential Implementing Partners	Time Frame	Funding Needed	Desired Outcome
<ul style="list-style-type: none"> • Develop and support a community management strategy for the conservation of Mbulu forest, including law enforcement and sustainable financing 	WCS, MINFOF	5 years	\$220,000	Mbulu forest effectively managed by local community
<ul style="list-style-type: none"> • Explore management options for connectivity between known gorilla sites in Mbulu, Kagwene and Mone 	MINFOF, WCS	3 years	\$40,000	Strategy for protection of key sites for connectivity developed
<ul style="list-style-type: none"> • Strengthen Gorilla Guardian network through training and additional support 	WCS, MINFOF	5 years	\$110,000	At least four communities added to the Gorilla Guardian network
<ul style="list-style-type: none"> • Explore options for formal designation of Mbulu forest and implement designation with local communities 	MINFOF, WCS	2 years	\$15,000	Mbulu forest granted protected status

Kagwene Gorilla Sanctuary (KGS)



Kagwene Gorilla Sanctuary

KGS WAS CREATED IN 2008 TO PROTECT ITS RESIDENT GORILLA POPULATION. It is home to the longest-standing Cross River gorilla research and monitoring program in Cameroon, initiated in 2002. The small size of Kagwene, combined with its relative isolation from other forested areas and the large number of local communities, means that wildlife is under considerable threat. Prior to the creation of the KGS, intense hunting resulted in the extirpation of most large and medium-sized mammals with the exception of the gorillas, which survived because of local taboos against gorilla hunting. The presence of monitoring staff and MINFOF ecoguards has helped curtail illegal activities in the sanctuary, but some snaring and clearance of forest for farming still occurs and fires started by local grazers continue to be a threat. Improved law enforcement is needed—an increase in the numbers of ecoguards and more effective application of the law. Exploring land-use management in the area between KGS and the adjacent Bantakpa forest is also important for maintaining habitat connectivity. In 2011, it was noted that a clerical error had been made in the drafting of the public decree regarding the location where one of the boundary markers was to be installed. Although the gazettelement documentation and maps are correct, this error needs to be rectified at the level of the MINFOF and the Prime Minister's office for two final boundary markers to be placed correctly.

Action needed — KGS, Cameroon	Potential implementing partners	Time frame	Funding needed	Desired outcome
<ul style="list-style-type: none"> • Strengthen law enforcement and anti-poaching activities by increasing the number of MINFOF ecoguards and conducting additional training in anti-poaching techniques 	MINFOF, WCS	5 years	\$150,000	Decreased illegal activities resulting in reduced pressure on KGS
<ul style="list-style-type: none"> • Continued enforcement of existing prefectorial orders regarding illegal grazing and farming in KGS 	MINFOF	5 years	\$10,000	Reduction of illegal grazing and conflicts with grazers, resulting in reduced pressure on the gorilla population
<ul style="list-style-type: none"> • Correct and implement the KGS gazettelement decree and boundary demarcation 	MINFOF	1 year	\$2,000	Decree rectified with the Prime Minister's office to reflect correct boundaries
<ul style="list-style-type: none"> • Reorganize and support VFMCs 	MINFOF, WCS	5 year	\$10,000	Re-engagement with local communities leading to improved relations, fewer conflicts, better awareness and improved involvement in sanctuary activities
<ul style="list-style-type: none"> • Develop and implement a management plan for KGS, including plan for fire management and recovery of areas that have been damaged by fire 	MINFOF, WCS	5 years	\$25,000	Strategic plan developed and implemented, resulting in improved management and regeneration of fire damaged areas

Site-Based Actions — *continued*
Tofala Hills Complex (THC)


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Tofala Hills

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 HREATS TO THE CONTINUED SURVIVAL of Cross River gorillas in Tofala Hills (formerly referred to as Bechati-Fossimondi-Besali or Lebiale) are similar to those in other localities; they include subsistence and commercial hunting, habitat fragmentation, forest clearance for farming, road development and ignorance of wildlife laws. One pressing issue is that local communities are asking traditional rulers to allow re-farming of the steep mountain slopes of Fossimondi. Another concern is whether parts of the area might be assigned to production forestry. A concerted and collaborative effort is needed to draw up a conservation plan for this area to mitigate the growing threats.

Action needed — THC, Cameroon	Potential implementing partners	Time frame	Funding needed	Desired outcome
<ul style="list-style-type: none"> • Update biological and socio-economic information for THC and investigate connectivity to eastern Mone 	ERuDeF, FFI, Tusk Trust, ACF	2 Years	\$50,000	Baseline biological and socio-economic data for THC available, with options for connecting to eastern Mone
<ul style="list-style-type: none"> • Draw up a management strategy for THC and investigate connectivity to eastern Mone 	ERuDeF, FFI, Tusk Trust, ACF	2 Years	\$50,000	Detailed management strategy developed, adopted and implemented in THC and eastern Mone
<ul style="list-style-type: none"> • Improve law enforcement, including increasing numbers of enforcement staff, and develop community-based wildlife law enforcement mechanisms to reduce illegal activities, including poaching 	ERuDeF, FFI, MINFOF, Tusk Trust, ACF	5 Years	\$250,000	Law enforcement infrastructure and operational mechanism established, including adequate staffing levels, and fully functional in all areas of high conservation value across the landscape
<ul style="list-style-type: none"> • Produce a land-use assessment map of THC 	ERuDeF, FFI	2 Years	\$20,000	Detailed land-use assessment of THC produced and baseline spatial data established for future long-term land-use change assessment and monitoring
<ul style="list-style-type: none"> • Expand livelihood alternatives to minimize trade-offs through the creation of a proposed Tofala Hills Wildlife Sanctuary (THWS) 	ERuDeF, Man and Nature, Tusk Trust	3 Years	\$100,000	Replicable livelihood alternative models supportive of gorilla conservation and other species of conservation significance developed and implemented across THWS
<ul style="list-style-type: none"> • Organize workshops to raise awareness of the impacts of farming in gorilla habitat across the THC 	ERuDeF, FFI, Man and Nature	5 Years	\$50,000	Locally-relevant awareness-raising materials produced and distributed across the landscape
<ul style="list-style-type: none"> • Explore the best conservation management options for logging concession FMU 11-002 with key stakeholders 	ERuDeF, FFI	3 Years	\$30,000	Alternative and environmentally-sustainable management model identified and implemented for logging concession FMU 11-002

Proposed Ebo National Park (ENP) →



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View of Ebo Forest from Iboti



© Daniel Mfossa/ZSSD

Club des Amis des Gorilles, Ebo Forest

GORILLAS ARE ONLY FOUND IN THE NORTHEAST CORNER OF THE PROPOSED ENP, in an area of less than 25 km². Only half of the current gorilla range is within the proposed national park, with the remaining area found close to several villages, most of which are well known for their role in the commercial bushmeat trade. The main threats in the Ebo forest stem from this trade, which is particularly severe given the proximity to large urban centers. Research in Ebo began in 2002 and two permanently-manned research stations to the east and west of the Ebo River provide daily monitoring patrols to collect data on threats—acting as both surveillance and deterrent in the absence of official government protection. The EFRP, supported by SDZG, is reinforcing conservation through relationship building within and between the communities of the Ebo region, with increasing support for the creation and development of the ENP from the traditional chiefs. Two of the communities have developed ‘Club des Amis des Gorilles,’ a program supported by the EFRP, which actively monitors and protects the gorilla habitat and initiates community awareness programs and livelihood initiatives. It is hoped that collaboration with the WWF Coastal Forest Program, which is also supporting the development of the ENP with the Government of Cameroon (GoC), will lead to the entire range of the Ebo gorillas being protected.

Land-use issues are a serious potential threat in the wider landscape of the Ebo forest, with plans for major oil palm plantations extending to the west of the proposed national park boundaries, and current legal and illegal logging to the north and south of the forest. The landscape has potential for REDD or other economic incentives, and local politicians in the area are enthusiastic to follow up on these opportunities.

Action needed — ENP, Cameroon	Potential implementing partners	Time frame	Funding needed	Desired outcome
<ul style="list-style-type: none"> Legally gazette the national park and develop a management plan, install ecoguards and demarcate the boundary 	MINFOF, WWF, SDZG	5 years	\$300,000	ENP gazetted and ecoguards in place
<ul style="list-style-type: none"> Stem the regular flow of bushmeat between ENP and surroundings to Douala, Edea and Yaoundé 	MINFOF, WWF	5 years	\$200,000	Reduction in bushmeat trafficking
<ul style="list-style-type: none"> Continue conservation and research activities and determine the taxonomic status of Ebo gorillas 	SDZG	5 years	\$500,000	Better understanding of Ebo gorillas
<ul style="list-style-type: none"> Establish and support ‘Clubs des Amis des Gorilles’ in three villages to monitor habitat and regulate illegal activities and establish ‘no go’ areas in ENP 	Communities, SDZG	5 years	\$100,000	Clubs established in the three villages
<ul style="list-style-type: none"> Increase community knowledge of ENP status, establish VFMCs 	MINFOF, WWF	5 years	\$100,000	VFMCs created

Site-Based Actions — *continued*

Landscape Connectivity and Management



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Farmland between Afi and Mbe Mountains



Chiefs from the nine communities surrounding Mbe Mountains with CMM registration certificates

MOST CROSS RIVER GORILLA CONSERVATION EFFORTS have focused on sites known to be occupied by gorillas. However, action must also be taken to preserve and maintain dispersal corridors and unoccupied putative habitat. These areas are critical to the long-term survival of the Cross River subspecies, as they allow movement between core areas and have the potential to allow the population to expand. Many important corridors and habitat blocks exist in formally protected areas. Although there are challenges to conserving these areas, the legal frameworks for their protection are in place. Government agencies, community groups and NGOs must therefore work together to ensure that laws governing land use and extractive activities are enforced.

A much greater challenge will be conserving key habitat and corridors that exist outside the boundaries of protected areas. In Cameroon, in particular, large areas of important habitat and corridors have no legal protection. In these cases, new and creative approaches may be required to maximize the extent and connectivity of Cross River gorilla habitat. Community-based approaches have shown a degree of success in both Nigeria (Mbe Mountains) and Cameroon (the Gorilla Guardian program) and these should be built upon. Other non-traditional approaches such as REDD+ are also being explored and may provide a means to conserve these areas.

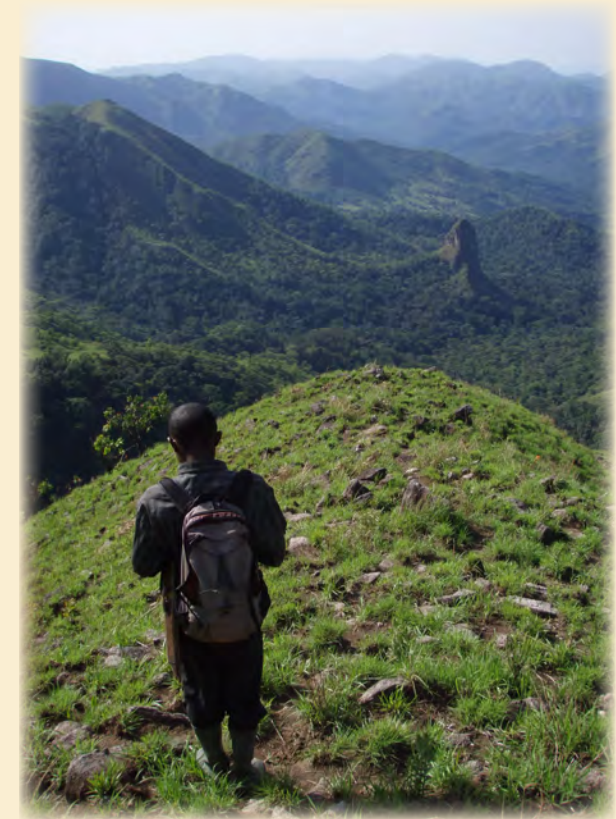
Ultimately, a more holistic approach to Cross River gorilla habitat conservation is needed. Individual gorilla sites cannot be considered in isolation. Instead, conservation of known gorilla localities, corridors and areas for potential expansion must be managed and protected from a landscape-scale perspective.

Priorities for connectivity and corridors	Potential implementing partners	Time frame	Funding needed	Desired outcome
<ul style="list-style-type: none"> • Complete threat assessment and management options for priority connectivity areas 	MINFOF, CRSFC, WCS, NCZ, Pandrillus, CAMM, ERuDeF	2 years	\$50,000	Strategy for maintaining areas of connectivity developed
<ul style="list-style-type: none"> • Manage and protect priority areas of connectivity, including unoccupied habitat into which the gorilla population could expand given greater protection 	MINFOF, CRSFC, WCS, ERuDeF, NCZ, Pandrillus, CAMM	5 years	\$250,000	Contiguous gorilla habitat protected in and around protected areas
<ul style="list-style-type: none"> • Enforce laws to protect corridors that exist in formally protected areas (e.g., Afi-Mbe, Boshi-Okwa) 	NNPS, MINFOF, CRSFC	5 years	\$200,000	Legal protection extended to corridors, resulting in fewer illegal activities

REDD+ in Nigeria and Cameroon

Expectations are high that REDD+ initiatives will provide long-term financial incentives to governments and communities to maintain standing forests and thus protect important Cross River gorilla habitat, although there is also growing scepticism and many local communities remain suspicious. Cameroon is in the process of developing a national REDD+ strategy, including legal and institutional frameworks for REDD+ implementation. A REDD+ feasibility study has been completed in the Takamanda-Mone landscape, including TNP, MRFR and surrounding areas such as KGS, the Ambelle Protection Forest, FMU 11004 and areas of non-designated forest (Burren *et al.* 2011). Logging, legal and illegal, is considered the major cause of deforestation in the area. Logging concessions in MRFR are due to be awarded soon. Within the project area proposed, an annual deforestation rate of 0.25% was estimated for the period 2000 to 2008. A sub-national approach to REDD+ was recommended, integrating aspects of both protection and sustainable use through participatory land-use planning, community consultation, piloting of mitigation activities, and regional measurement, recording and verification. Next steps will focus on building and testing strategies and measures to benefit both biodiversity and carbon conservation, including ecotourism, improved agricultural practices, and social benefits arising from capacity building and improved governance.

A REDD+ program is particularly appropriate for Nigeria, as the country suffers a national deforestation rate of 3.7%, one of the highest in the world. Deforestation in the Cross River gorilla landscape was estimated at 2.2% per annum during the period from 2000 to 2010 (Okeke 2013). With pioneering efforts by the CRSG, Nigeria's UN-REDD National Program was signed on 28 August 2012, and is intended to be a catalytic endeavor in the country, part of a new vision for green development and a means to halt deforestation. The program has an innovative, two-track approach consisting of actions at both federal and state levels. At the federal level, the program will instill technical capacities, develop strategic and policy frameworks for REDD+, and support the alignment of Nigeria with international climate change and environmental negotiations and agreements. At the state level, the program will conduct strategy-development and demonstration activities on REDD+ in Cross River State, as this state has shown a determined political commitment for green development. Cross River State is also a member of the Governors' Climate and Forests Task Force (<www.gcftaskforce.org>), the only member state in Africa.



WCS monitoring staff at Kagwene Gorilla Sanctuary

Implementation of the 2014–2019 Action Plan

THE VALUE OF THIS REVISED ACTION PLAN will depend on the extent to which it can be implemented and result in improved conservation of Cross River gorillas. To measure the impacts of our efforts, standardized indicators are needed, and impact monitoring must be addressed and collectively reviewed by partners on an annual basis to ensure progress as well as the ability to address emerging threats across the landscape. Systematic monitoring and data collection using CyberTracker and SMART, in addition to regular partner meetings and sharing of data will facilitate evaluation of the activities planned.

A key long-term indicator will be the estimated size of the gorilla population. While abundance is difficult to estimate due to the challenges of sampling such a small and scattered population, the quality of and confidence in the baseline data have significantly improved since the 2007 Action Plan was published. Through repeated monitoring and standardized surveys of known and potential gorilla habitats, we have updated and refined the subpopulation size estimates that form the current baseline.

Other indicators for assessing impact include:

- Threat-based monitoring through measures of protection effectiveness—poaching statistics, gorilla deaths recorded (see Table 2)
- Amount of habitat under protection
- Number of sites and the size of areas benefiting from community management or improved community involvement

- Area of critical corridors under some form of management or easement agreement
- The number of joint patrols and transboundary agreements, and progress towards a bilateral treaty
- Decreasing reliance on donors and increasing commitment from government and local communities.

Sustainable Financing

Existing financial commitments to Cross River gorilla conservation are entirely inadequate to support the activities required to ensure a significant increase in the subspecies' population size. New commitments by the government of Cameroon through the gazettement of both Takamanda and Kagwene have increased the probability of the gorilla's survival. However, existing budgets and staffing allocations for protected areas across the Cross River gorilla's range are still insufficient to meet the rising threats of habitat degradation and poaching. Ideally, national and state governments would fully fund the costs of maintaining key protected areas as well as appropriate management interventions in key unprotected habitats. Until this time, external funding partners will be needed to make up the shortfall in management costs.

Conservation funding is currently provided by a small number of donors without certainty of renewal. Many donors provide funding in small amounts, increasing the overall administrative costs to conservation organizations, and reducing impact and efficiency. Longer-term



Field teams crossing the Manfi River

stable sources are required to ensure that conservation activities are maintained and adequate training is provided.

To improve conservation finance in the Cross River landscape, we make the following recommendations:

- 1) Wherever possible, donors make long-term commitments of at least 3–5 years to ensure stability of project activities.
- 2) Creation and endowment of a trust fund with annual payments to support conservation activities. Maintenance of a fund will allow smaller donors to pool support to streamline assistance and reduce management burden of implementing organizations.
- 3) Increased budgets in protected areas—Afi, Okwangwo, Takamanda, Kagwene and Mone—for ranger patrols, equipment and infrastructure.
- 4) Monetizing environmental assets through mechanisms such as REDD+.

Conclusions

THE CROSS RIVER GORILLA is classified as Critically Endangered; nonetheless, we believe that the conservation status of the subspecies has improved since publication of the 2007 Action Plan. There have been some major conservation achievements, including the creation of KGS and TNP in Cameroon; revision of the Cross River State wildlife law in Nigeria; strengthening of transboundary conservation between the two range states; the successful introduction of a Gorilla Guardian program in Cameroon; increased conservation activity in the Tofala Hills complex in Cameroon; and the creation of a community wildlife sanctuary in the Mbe Mountains, Nigeria. At the same time, a number of research projects have greatly improved our understanding of the ranging and habitat requirements of Cross River gorillas and suggest that the landscape could support a larger gorilla population if poaching were reduced. An important development has been the introduction of a CyberTracker monitoring program, which has improved the effectiveness of law enforcement patrols and monitoring efforts.

The success of conservation and research efforts to date also highlights the challenges that remain. Much of the newly documented range of the gorillas occurs outside of existing protected areas (especially in Cameroon), reinforcing the need to establish stronger links with local communities and to develop new approaches for conserving areas that do not have legal protected

status. Despite these new records, our estimate of the total gorilla population in known localities is still fewer than 300 individuals, broadly similar to the 2007 estimate. While estimates of the size of the population remain stable, previous assessments may have under-estimated the level of poaching of Cross River gorillas. With such a small population, the loss of even a few individuals each year represents a very serious threat to their long-term survival. Although significant areas of forest still exist throughout the Cross River gorilla landscape and tenuous connections persist between most, if not all, of the gorilla areas, increasing loss and fragmentation of forest within the Cross River gorilla range threaten connectivity between gorilla sites. Much of this forest loss is driven by increases in the area under cultivation, especially in Nigeria. The expansion of enclaved settlements in CRNP and TNP, at the heart of the Cross River gorilla range, is a particular threat. The solution to this problem of enclaves remains elusive. Ensuring the survival of Cross River gorillas will thus require a sustained, committed and comprehensive conservation effort involving scientists and conservationists working in collaboration with government agencies and local communities in the region. Conservation initiatives must focus on eliminating poaching, securing remaining habitat and maintaining connectivity between gorilla areas. Thanks to a new generation of young scientists and conservationists,

understanding of the gorillas' socioecology and commitment to their conservation is steadily increasing. This commitment, combined with growing local awareness of the gorillas' importance and participation in their conservation, offers renewed hope for the future.

This Action Plan outlines a set of recommended priority actions considered crucial for the survival of Cross River gorillas. These actions include continued research to learn more about the basic distribution and biology of Cross River gorillas, promoting models of community-based conservation, measures to safeguard habitat corridors between core sites, support for improved management of existing conservation areas, health monitoring and disease prevention, development of ecotourism and gorilla viewing, support for transboundary conservation and expanded efforts to spread awareness of the value of conservation. Recognizing that conservation must involve and have the support of local people to be effective, the plan's recommendations also address local livelihood issues, including support for land-use planning that balances human needs with wildlife conservation, as well as training in alternative livelihoods for local hunters.

Over a five-year period, the total cost of implementing the recommendations in this plan is estimated to be \$10,556,000. We hope that this plan will assist in both raising those funds and guiding conservation actions that will greatly improve the long-term survival prospects for these unique apes.

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Camera trap image of a Cross River gorilla at Afi Mountain

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Acronyms

ACF	African Conservation Foundation	LAGA	Last Great Ape Organisation
AMWS	Afi Mountain Wildlife Sanctuary	MINFOF	Ministry of Forestry and Wildlife, Cameroon
ARFR	Afi River Forest Reserve	MINRESI	Ministry of Scientific Research and Innovation
CAFECO	Cameroon Agriculture and Forest Exploitation Company Limited	MPI	Max-Planck Institute for Evolutionary Anthropology
CAMM	Conservation Association of the Mbe Mountains	MRFR	Mone River Forest Reserve
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora	NCZ	North Carolina Zoo
CMS	Convention on Migratory Species of Wild Animals	NCF	Nigerian Conservation Foundation
CRSFC	Cross River State Forestry Commission	NESREA	National Environmental Standards and Regulations Enforcement Agency
CRSG	Cross River State Government	NGO	Non-Governmental Organization
CRNP	Cross River National Park	NNPS	Nigeria National Parks Service
CRSTB	Cross River State Tourism Bureau	NP	National Park
DIN	Development in Nigeria	NTFP	Non Timber Forest Product
EFRP	Ebo Forest Research Project	PCI	Population Communications International
ENP	Ebo National Park	PSMNR-SWR	Program for Sustainable Management of Natural Resources – South West Region
ERuDeF	Environment and Rural Development Foundation	REDD	Reducing Emissions from Deforestation and Forest Degradation
FFI	Fauna and Flora International	REDD+	Reducing Emissions from Deforestation and Forest Degradation Plus
FGN	Federal Government of Nigeria	RSG	IUCN/SSC Reintroduction Specialist Group
FMU	Forest Management Unit	SDZG	San Diego Zoo Global
GIS	Geographic Information System	SMART	Spatial Monitoring and Reporting Tool
GIZ	German Agency for International Cooperation (Deutsche Gesellschaft für Internationale Zusammenarbeit)	THC	Tofala Hills Complex
GoC	Government of Cameroon	THWS	Tofala Hills Wildlife Sanctuary
GPS	Global Positioning System	TNP	Takamanda National Park
GRASP	Great Ape Survival Partnership	USFS	United States Forest Service
IUCN	International Union for Conservation of Nature	USFWS	United States Fish & Wildlife Service
KfW	Kreditanstalt für Wiederaufbau—German Development Bank	VFMC	Village Forest Management Committee
KGS	Kagwene Gorilla Sanctuary	WCS	Wildlife Conservation Society
		WWF	World Wide Fund for Nature

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This action plan is dedicated to the memory of Dr. Ymke Warren.

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