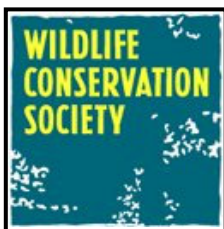


MBELI BAI STUDY - ANNUAL REPORT 2007



**Thomas Breuer
Nouabalé-Ndoki Project**



**Submitted to:
Brevard Zoo, Florida, USA
Busch Gardens, Florida, USA
Cincinnati Zoo & Botanical Gardens, Ohio, USA
Columbus Zoo, Ohio, USA
Toronto Zoo, Ontario, Canada
Woodland Park Zoo, Seattle, USA**



**Wildlife Conservation Society Africa Program, New York, USA
Wildlife Conservation Society Congo Program, Brazzaville, Congo
Wildlife Conservation Society, Nouabalé-Ndoki Project, Bomassa, Congo
Ministry of Forest Economy, Brazzaville, Congo**

Mbeli Bai Study Contact Information:

Thomas Breuer
Principal Investigator
Mbeli Bai Study
Nouabalé-Ndoki Project
Wildlife Conservation Society - Congo Program
BP 14537
Brazzaville
Republic of Congo
E-mail: mbeli@uuplus.com
Website: www.wcs-congo.org

&

PhD student
Department of Primatology
Max Planck Institute for Evolutionary Anthropology
Deutscher Platz 6
D-04103 Leipzig
Germany
Tel: ++49 (0) 341 3550 248
Fax: ++49 (0) 341 3550 299
E-mail: breuer@eva.mpg.de
Website: www.eva.mpg.de/primat/staff/thomas_breuer/

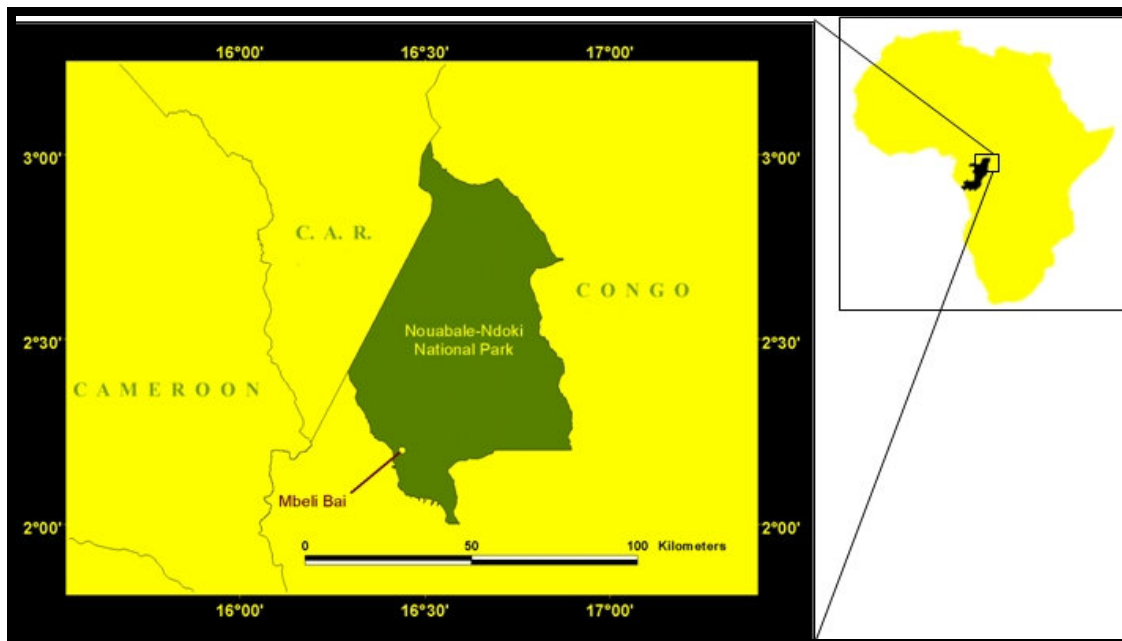
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INTRODUCTION

Western gorillas are a charismatic flagship species that capture the imagination of the general public and help raise public support for conservation of tropical rainforests. Due to pressure from increased logging activities, bushmeat hunting and devastating diseases such as Ebola hemorrhagic fever, gorilla populations in Western Equatorial Africa have undergone a dramatic decline leading to their reclassification by the IUCN as being critically endangered. Key

components of conservation strategies to prevent western gorillas from going extinct include research and monitoring, capacity building, conservation education programs, and habitat protection. The Mbeli Bai Study (MBS) is a conservation program in the southwest of the Nouabalé-Ndoki National Park (NNNP) (4,200km²) operating since 1995 with the overall goal of ensuring the long-term protection of gorillas and other forest mammals.



Location of Mbeli Bai within the Nouabalé-Ndoki National Park, Republic of Congo

Mbeli Bai is a 13ha large swampy forest clearing (*'bai'* in the local dialect) in the southwest of the NNNP, northern part of the Republic of Congo. The NNNP with its minimum levels of disturbance represents an important stronghold for western gorillas and other large endangered forest mammals. Together with the neighbouring Dzanga-Ndoki National Parks in Central African Republic, and the Lobéké National Park in Cameroon, it forms the core protected zone of the Sangha Trinational Conservation Landscape, which harbours one of the

largest remaining population of great apes in Africa.

Since the end of the 1980s the Wildlife Conservation Society (WCS) - Congo Program (<http://www.wcs-congo.org>) is working in the north of the Republic Congo and in 1993 together with the Ministry of Forest Economy and Environment (<http://www.minifor.com/>) has created the NNNP. MBS is part of the Nouabalé-Ndoki Project, a collaboration of WCS and the Government of Congo.

We are combining applied research on intact large mammal populations, habitat protection, capacity-building and conservation education in order to:

Enhance our knowledge of western gorillas and improve their conservation status in the Nouabalé-Ndoki National Park, Congo through applied research, national capacity building, international awareness raising and local community outreach programs.

The MBS is the only long-term demographic study on a large population of western gorillas using direct observations and has provided major and unique insights into the social organization and population dynamics of this elusive species. In addition to our applied research objectives, we are providing daily training and capacity building to Congolese research assistants. We also train educators to promote wildlife conservation and the role of the NNNP in particular through our conservation education program *Club Ebobo*. We work closely with WCS and its Nouabalé-Ndoki Project in facilitating ecotourism and media visits to Mbeli Bai and by publicizing our findings to a broad national and international audience to attract donor support for conservation activities in the NNNP.

As in the past, we hope that this report provides useful insights how this small project contributes to our understanding of rain forest wildlife, particularly gorillas and to the conservation of NNNP and its periphery. We aim to demonstrate how we have expanded our conservation activities as an important immediate and long-term response to mitigate the threats gorilla and other large mammals are facing in Western Equatorial Africa. We also provide an outlook of activities planned for 2008.



SECTION 1: PERSONNEL AND TRAINING

Our research team remains small with a total of five researchers and up to five local workers on the ground. The research team consists of:

- *Thomas Breuer*: Principal investigator since 2002: German
- *Mireille Ndoundou Hockemba*: Researcher since 2002: Congolese
- *Franck Barrel Mavinga*: Research assistant since 2006 Congolese
- *Julia Jenkins*: Research assistant since 2007: New Zealand
- *Harddy Massengo*: Research assistant since 2008: Congolese
- *Emelie, Jean-Claude*: Camp assistant and tracker since 2003: Congolese
- *Lazard, Limbanga*: Camp assistant and tracker since 2003: Congolese
- *Poungue, Maurice*: Camp assistant since 2006: Congolese
- *Pembe*: Camp assistant since 2007: Congolese
- *Mosombo, Felix*: Camp assistant and tracker since 2000: Congolese



MBS research team: Franck, Julia, Thomas, Mireille, and Harddy from left to right.

Securing the current and future wildlife populations is dependent on capacity in the country and an appreciation for the wildlife heritage by the Congolese people which the MBS works toward by training Congolese research assistants on a daily basis. We employ three Congolese nationals as research(er) / assistants with the aim to increase their capacity in all areas of research methodology and natural

resource monitoring. The Congolese research assistants are trained on a daily basis in data collection, analysis and presentation of results.

Training concentrates on the animals using Mbeli Bai, as well other areas of research methodology, such as phenological monitoring and ecological census methods. We improve English language skills, basic knowledge on ecology and evolution and facilitate the

participation at workshops. The research assistants are actively involved in the conservation education program “Club Ebobo”.

Thomas has continued writing up his PhD at the Max Planck Institute for Evolutionary Anthropology in Germany on “Sexual selection and factors influencing male reproductive success in western lowland gorillas” but has been present in the field for several months to train Julia and Franck. Mireille has been acting as the field coordinator in Thomas’ absence. She has also participated in various workshops, including a workshop on botanical inventories in the Congo Basin (funded by the Darwin Initiative).

Franck has continued the mammal monitoring at Mbeli Bai and has leaned the phenology survey from Mireille. Franck has been conducting most of the Club Ebobo sessions and he has particular skills in interacting with school kids (with over 9 years experience in teaching). Harddy has recently started at Mbeli Bai and will take over Franck’s job as assistant at Mbeli Bai and will learn all the data collection techniques as well as the phenology trail, and participate in Club Ebobo activities.

Penny Jarrett (American) left Mbeli in March 2007 and Julia took over Penny’s position as research assistant at the bai in July 2007. Julia

has a Masters Science Degree from University of Cape Town, South Africa and brings substantial experience in wildlife conservation to the MBS.

We continue to work with Mr. Elanda and Mr Koyas the teachers at the local school in Bomassa as representatives and entertainers for Club Ebobo. We have also continued to collaborate with various teachers (Mr. Nikez and Mr. Syve) in Makao and Thanry-Congo north-east of NNNP (for details see section 4).



We continue to permanently employ five villagers from the local village of Bomassa as camp workers who rotate every two weeks. For our other bai study we will employ two additional camp staff from the local community in Bomassa. We are supporting our workers with basic health care and improve their living conditions through purchasing basic housing material, such as mattresses.

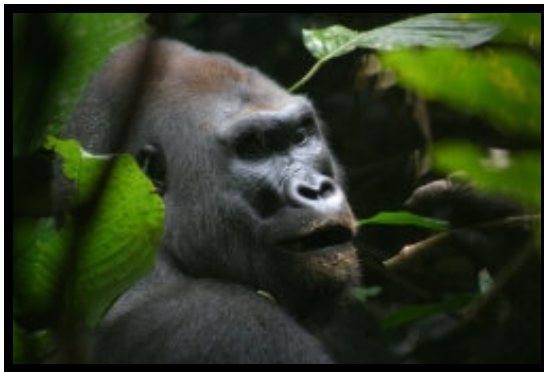


Figure 3: MBS camp workers and trackers: Emelie, Mosombo, Pounge, Lazard, Pembe (from left to right).

SECTION 2: RESEARCH

Western gorillas are amongst the mega-charismatic mammals with an important flagship role for conservation projects throughout the Central African forest. However, western gorillas are extremely difficult to study in the dense forest vegetation that comprises the majority of their habitat. The slow reproductive rate of gorillas makes the collection of life-history data in particular a time consuming process that demands a long term research investment.

The information gained from long-term studies on the population dynamics and demography of western gorillas is critical in assessing the vulnerability of populations to specific threats (logging, illegal hunting, diseases, such as Ebola) and predicting their ability to recover from decline. Our monitoring provides baseline life history data (birth rates, mortality rates, inter-birth intervals, age at first parturition) of an intact gorilla population that can be used to model the population dynamics of this gorilla population. Such data help to predict the effects of disturbances to these and other populations.



The MBS has provided major peer-reviewed scientific insights into the social organization, behaviour and population dynamics of western gorillas (Parnell, 2002; Stokes *et al.*, 2003; Robbins *et al.*, 2004; Stokes, 2004).

Furthermore the MBS has reported many spectacular behavioural observations such as twin births, silverback splash displays and the first observations of tool use and first photographic documentation of face-to-face copulation in free-ranging gorillas (Parnell & Buchanan-Smith, 2001; Breuer *et al.*, 2005; Breuer & Ndongou Hockemba, 2007); findings that have attracted significant international media attention.



Although 'bais' account for less than 5% of vegetation type in the Nouabalé-Ndoki National Park they are of extreme ecological importance to a number of large forest mammals including forest elephants (*Loxodonta africana cyclotis*), sitatungas (*Tragelaphus spekeii*) and forest buffalos (*Syncerus caffer nanus*). The MBS is currently providing the only long-term demographic study on sitatunga in Central Africa and the second longest demographic study on forest elephants (in collaboration with Dzanga Bai, Central African Republic and Mabale Bais in the north of the NNNP). Analyses of bai visitation and grouping patterns of other large mammals, i.e. elephants, is providing important information on the role of bais in determining large-scale associations and population structure.

Furthermore, the MBS aims to understand the ecological (e.g. density

and availability of food resources (fruiting trees, aquatic and terrestrial herbaceous vegetation)) and social importance of forest clearings for large mammals and its influence on large mammal density.

We investigate how gorillas use bays and how bays, in turn, shape gorilla population dynamics. These results will help to understand the ecological and social importance of forest clearings for those mammals, and therefore inform planning for habitat zoning (i.e. in logging concessions that are situated around NNNP).



Direct observations of gorillas and partially other wildlife (Huchzermeyer *et al.* 2001) at Mbeli Bai are used as a tool for monitoring wildlife health in collaboration with the WCS- Field Veterinary program (<http://www.fieldvet.org/>). This surveillance program is complemented by analysis of gorilla fecal samples to document and understand the impact of these little known diseases (with external symptoms) on wildlife. Health monitoring can therefore allow implementing preventative health programs or acting as a crucial early warning system in case of a disease outbreak (e.g. allowing rapid response to ape mortality). Through collaboration with various *ex-situ* conservation initiatives, including the WCS Field Veterinary Program, the MBS is contributing towards a great ape monitoring and surveillance program in the NNNP through visual health observations and parasitological analysis.

2.1 Mbeli Bai Gorillas

2.1.1 Achievements in 2007

- Continued daily monitoring at Mbeli Bai on a nearly daily basis (n=362 days): documentation of group membership, births, deaths, transfers, health status,...
- Habituation of more than 310 western gorillas and 13 years data collection on their social behavior and group dynamics comprising the largest database of demography and social behavior so far accumulated on this species
- Large phenological circuit (~450 trees) with eight years monitoring data
- Establishment of demographic database, including all individual histories, group memberships and transfer patterns
- Current visiting population: ~130 gorillas in 10 breeding groups, 4 non-breeding groups, and 13 solitary males
- Scientific publications in peer-reviewed journals
- Publication in various popular journals and magazine

2.1.2 Gorilla analysis and publications

BREUER, T., ROBBINS, M.M. & BOESCH, C (2007) Using photogrammetry and color scoring to assess sexual dimorphism in wild western gorillas (*Gorilla gorilla*). *American Journal of Physical Anthropology* 134: 369–382.

ABSTRACT Investigating sexual dimorphism is important for our understanding of its influence on reproductive strategies including male–male competition, mate choice, and sexual conflict. Measuring physical traits in wild animals can be logistically challenging and disruptive for the animals. Therefore body size and ornament variation in wild primates have rarely been quantified. Gorillas are amongst the most sexually dimorphic and dichromatic primates. Adult males (silverbacks) possess a prominent sagittal crest, a pad of fibrous and fatty tissue on top of the head, have red crest coloration, their saddle appears silver, and they possess a silverline along their stomach. Here we measure levels of sexual dimorphism and within male variation of body length, head size, and sexual dichromatism in a population of wild western gorillas using photogrammetry. Digital photogrammetry is a useful and precise method to measure sexual dimorphism in physical traits yielding sexual dimorphism indices (ISD), similar to those derived from traditional measurements of skeletal remains. Silverbacks were on an average 1.23 times longer in body length than adult females. Sexual dimorphism of head size was highest in measures of crest size (max ISD: 60.4) compared with measures of facial height (max ISD: 24.7). The most sexually dimorphic head size measures also showed the highest within-sex variation. We found no clear sex differences in crest coloration but there was large sexual dichromatism with high within male variation in saddle coloration and silverline size. Further studies should examine if these sexually dimorphic traits are honest signals of

competitive ability and confer an advantage in reproductive success.

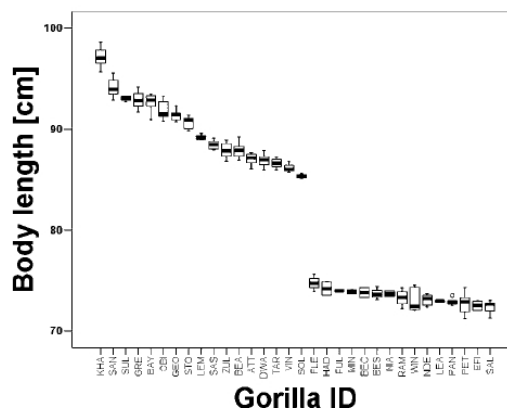


Fig. 3. Box-Whisker-plots showing body length of silverbacks (from KHA-SOL) and adult females (FLE-SAL). Whiskers show minimum and maximum values; boxes show lower and upper quartile, midlines show medians and circle shows one outlier. Individual gorillas are ordered by average body length estimate.

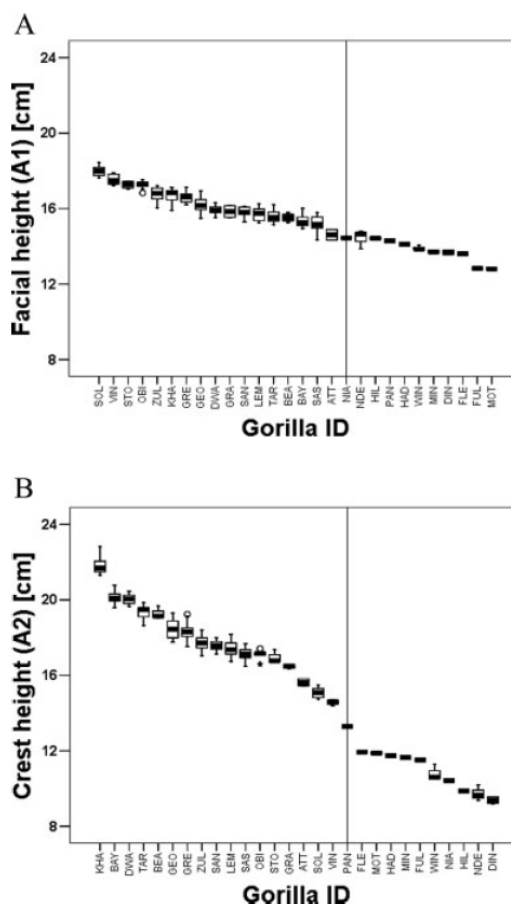


Fig. 5. Box-Whisker-plots showing head size measurements with lowest ISD (Index of sexual dimorphism) for (A) facial height of silverbacks (from SOL-ATT) and adult females (NIA-MOT) and highest ISD for (B) crest height of silverbacks (from KHA-VIN) and adult females (PAN-DIN). Whiskers show minimum and maximum values; boxes show lower and upper quartile, midlines show medians and circles and stars show outliers. Individual gorillas are ordered by average head measure estimate.

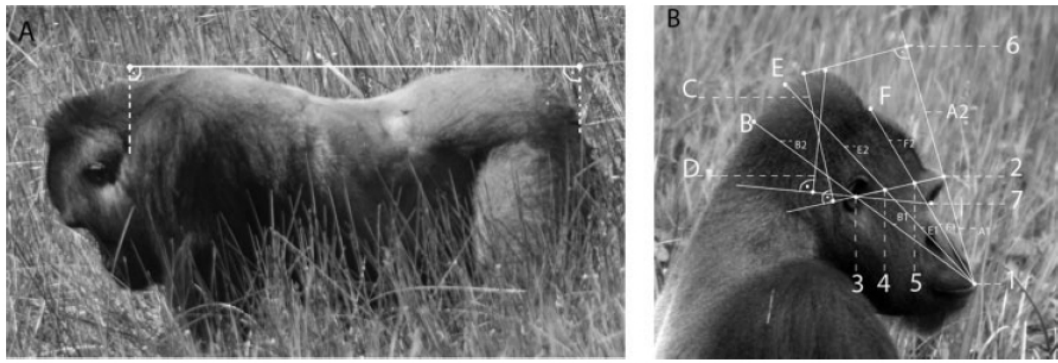


Fig. 1. Photo showing landmarks and linear measurements of (A): body length, (B): head size. For description of landmarks and measurements see Table 1. (Photos by Thomas Breuer).



Fig. 2. (A) Photo showing individual differences of red crest coloration of two silverbacks; silverback to the left has a red crest (score 3) and silverback to the right has a dark red crest (score 2), (photo by Vicki Fishlock). (B) Appearance of saddle coloration from different viewing angles and possible scoring of the same silverback photographed under similar light conditions; left: back seated—scoring 3; middle: back quad—scoring 3; right: side—scoring 5. (C) Appearance of silverline: from left to right: absence (Silverback OBI), thin (Silverback ZUL), broad (Silverback SAN). (Photos by Thomas Breuer). [Color figure can be viewed in the online issue, which is available at www.interscience.wiley.com.]

WALSH, P., BREUER, T., SANZ, C., MORGAN, D., & DORAN-SHEEHY, D. (2007) Potential for Ebola transmission between gorilla and chimpanzee social groups. *American Naturalist* 169(5): 684-689.

Abstract: Over the past decade Ebola hemorrhagic fever has emerged repeatedly in Gabon and Congo, causing numerous human outbreaks and massive die-offs of gorillas and chimpanzees. Why Ebola has emerged so explosively remains poorly understood. Previous studies have tended to focus on exogenous factors such as habitat disturbance and climate change as drivers of Ebola emergence while downplaying the contribution of transmission between gorilla or chimpanzee social groups. Here we report recent observations on behaviors that pose a risk of transmission among gorilla groups and between gorillas and chimpanzees. These observations support a reassessment of ape-to-ape transmission as an amplifier of Ebola outbreaks.

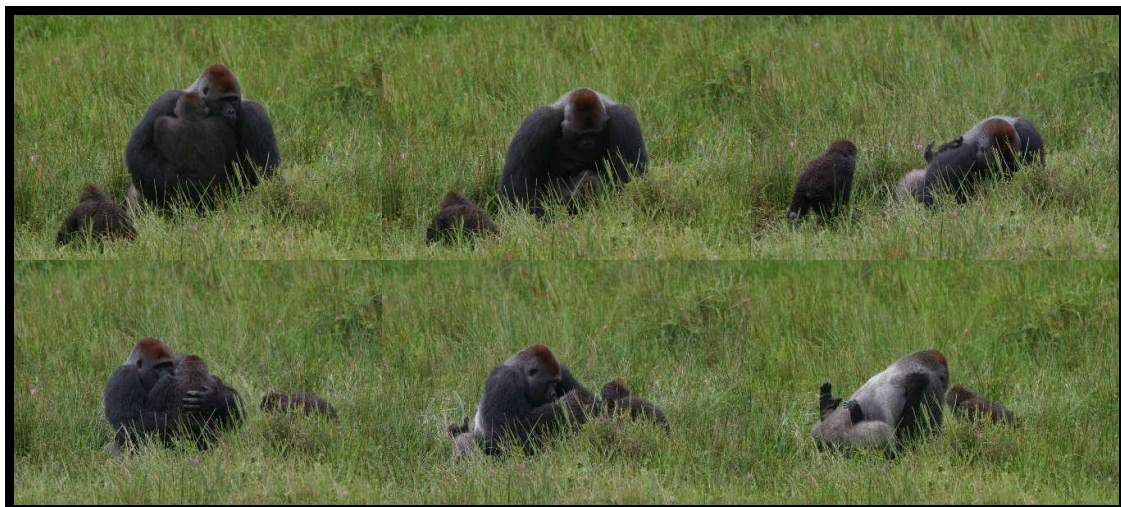


Video 1: Still photograph from a video (available in the online edition of the *American Naturalist*) depicting a juvenile gorilla sniffing, tasting, and discarding *Nauclea* fruits. Apes are often very choosy about the fruits they eat, which can result in many discarded food items at "magnet" resources that have been handled or tested by previous visitors. Video by Thomas Breuer (Max Planck Institute and Wildlife Conservation Society).



Video 2: Still photograph from a video (available in the online edition of the *American Naturalist*) showing a lone silverback gorilla named Campo arriving at a *Chrysophyllum lacourtianum* tree. He collects and feeds on several fruits near the path. Twenty-seven minutes later, another lone silverback (Vince) arrives at the same location and smells the location where Campo had been feeding. He then proceeds to consume the feeding remains that were left behind by Campo. Video by Thomas Breuer (Max Planck Institute and Wildlife Conservation Society).

BREUER, T. & NDOUNDOU-HOCKEMBA, M. (2007) Ventro-ventral copulation in gorillas. *Gorilla Gazette*, 20(1): 47-49.

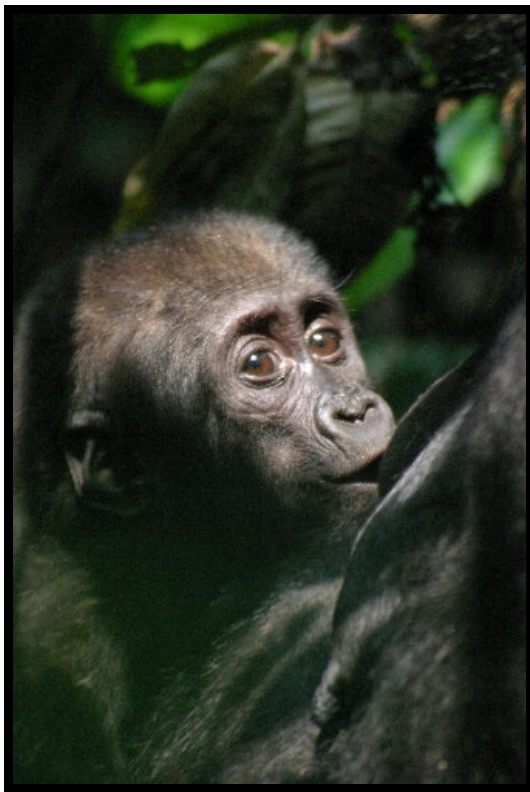


Female Leah and silverback George (both known since 1995) during a ventro-ventral copulation at Mbeli Bai – these are the first and only photographs of wild gorillas copulating in such a way.

NOWELL, A. A. & FLETCHER, A. W. (2007) Development of independence from the mother in *Gorilla gorilla gorilla*. *International Journal of Primatology* 28: 441-455.



Abstract: In gorillas, the mother takes full responsibility for carrying and feeding offspring, and lactational amenorrhea prevents her from investing in another offspring while suckling. Therefore, mothers should encourage immature gorillas to become gradually more independent until they are physically able to acquire sufficient resources, travel independently, and manage social relationships unaided.



We investigated the development of independence in a population of wild western gorillas (*Gorilla gorilla gorilla*) at Mbeli Bai, Nouabalé-Ndoki National Park, Republic of Congo. We observed the spatial proximity, the development of travel, patterns of suckling and weaning, and the nature of mother-offspring interactions for 42 immature gorillas to investigate the nature of the relationship between mother and offspring.



Though mother-offspring distance and independent travel increased during immaturity, with few active interactions between the dyads, offspring still continued to suckle until a median age of 4.6 yr, longer than in mountain gorillas. The tolerance of the mother toward suckling by older offspring may reflect the importance of continued nutritional investment: the temporal nature of the diet of western gorillas means that succulent fruits—likely to be preferred weaning foods—are not always available. We propose that to buffer against potential fruit shortage, mothers continue to nurse their offspring to decrease the likelihood of death from care-dependent factors and to improve an offspring's chances of survival.



Current gorilla population visiting Mbeli Bai (left: adult females; right: silverback males)

2.1.3 Workplan and Outlook for 2008

- Continue with the daily monitoring at Mbeli Bai and monthly phenology studies
- Establish gorilla monitoring at two other bays (population size, structure, dispersal,...)
- Application of photogrammetric methods to investigate gorilla growth patterns
- Revision of age-boundary for western gorilla life history classes
- Full demographic analysis of an undisturbed gorilla population initiated
- Gorilla group spread analysis and comparison with that of mountain gorillas initiated – collaborators: Dr. Allison Fletcher and Dr. Joanna Hutchinson - Chester University
- Gestural communication in western gorillas - collaborators: Prof. Richard Byrne, Dr. Emelie Genty - University of St. Andrews
- Genetic analysis of Mbeli Bai gorillas - collaborators: Dr. Linda Vigilant and Militia Arandjelovic (PhD candidate) – MPI-EVAN
- Hormonal Analysis of Mbeli Bai gorillas - collaborators: Dr. Tobias Deschner – MPI-EVAN
- Nutritional analysis of bai plants and comparison with forest plants – collaborators: Dr. Shelly Masi – MNHN - Paris

2.2 Large mammal monitoring at Mbeli Bai

In 2007 we continued the daily data collection on bai visiting patterns and demographics of all other mammals visiting Mbeli Bai. In addition to the gorilla data, this provides us with unique inside information on the importance of forest clearing for these mammals.



2.2.1 Achievements in 2007

- Unique long-term data on over 80 sitatungas since 1995 (life history, birth and mortality data, dispersal, male-male competition, mating patterns, detailed data on bai-visiting patterns)
- Unique long-term data on ~250 forest elephants after a period of intensive poaching (life history data, birth and mortality data, dispersal, intra-sex competition, detailed data on bai-visiting patterns)
- Long-term data on ~20 forest buffaloes (2 groups, 1 solitary) since 1995 (life history data, birth and mortality data, detailed data on bai-visiting patterns)
- Data on bai-visiting patterns on Congo clawless otter, spot-necked otter, Guereza colobus, Giant forest hog, red river hog, ...
- Scientific publications in peer-reviewed journals



2.2.2 Large mammal analysis and publications

BREUER, T. & NDOUNDOU HOCKEMBA, M. (2008) Fatal interaction between two male sitatungas at Mbeli Bai. *African Journal of Ecology* 46(1):110-112.



FISHLOCK, V., LEE, P.C., & BREUER, T. (submitted) Quantifying forest elephant social structure in Central African bai environments. *Pachyderm*.



Abstract: Relatively little is known of social dynamics in forest elephants (*Loxodonta africana cyclotis*), although the fission-fusion model of sociality known in savannah elephants (*Loxodonta africana africana*) is used as a template. Until fission-fusion sociality or an alternative model is demonstrated, our understanding of how elephants use their environment remains incomplete. To date, there have been no published studies of associations between individuals in forest elephants. Direct observations of forest elephants made at forest clearings (*bais*) are here used as an approach to studying these questions. Bais represent a special environment, providing mineral and food resources, as well as potential social opportunities.



We show that forest elephants at Mbeli Bai in Nouabalé-Ndoki National Park have association patterns that are consistent over time, and that certain conspecifics are preferred as associates in the bai environment. Coupled with significant differences in the group size and composition across age-sex classes, and a high proportion of sightings of lone individuals, we argue that the fission-fusion model of elephant sociality appears to hold for the bai environment. The extent of this system and the importance of bais as social resources remain to be explored.



2.2.3 Workplan and Outlook for 2008

- Continue with the daily monitoring of large mammals at Mbeli Bai
- Determining the ecological and social factors influencing the use of Mbeli Bai by large mammals
- Establish monitoring of large mammals at two other bays (population size, structure, dispersal,...)
- Demographic analysis of elephants initiated
- Elephant association, grouping and displacement patterns; analysis of elephant stature – collaborators: Prof. Phyllis Lee and Victoria Fishlock – University of Stirling
- Investigate growth patterns to define life stages and population structure (forest elephants)
- Demographic analysis of sitatungas initiated
- Basic life history patterns of forest buffaloes
- Investigate the potential to study other mammals at Mbeli Bai (e.g. radio-telemetry studies of otters)



2.3 Improving large mammal census methods

Large mammals, particularly primates and ungulates are the most important protein source in tropical forests and make up a large proportion of the mammalian biomass. However large mammal populations are declining throughout African forests mainly due to habitat loss and illegal bushmeat hunting which is often facilitated by increased access through logging roads. Large mammals play an important role in the rainforest (e.g. seed disperser) so that their decline can have far-reaching consequences not only for the protein

supply of local communities but also for tropical forest dynamics. Monitoring of mammal populations to quantify human impact and describe population trends is crucial to make adequate management decisions. Unfortunately there is still limited knowledge about the distribution and density of wildlife, because commonly used census techniques, such as aerial surveys and line transects methods using direct counts of large mammals are impossible to conduct in the dense African rainforest.

2.3.1 Achievements in 2007

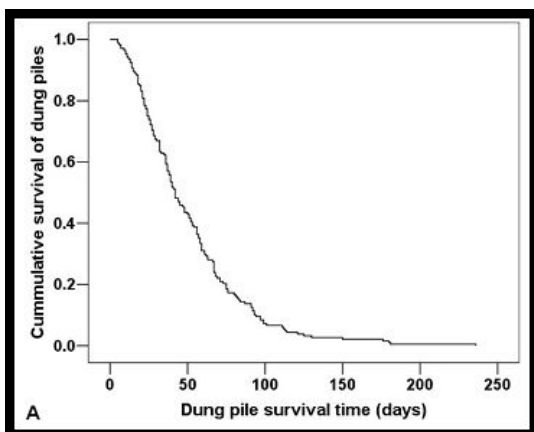
- Continuation of mammal encounter study along the forest path to Mbeli Bai
- Continuation of elephant, duiker,... dung decay study
- Scientific publications in peer-reviewed journals

2.3.2 Large mammal census analysis and publications

BREUER, T. & NDOUNDOU
HOCKEMBA, M. (accepted) Dung
decay of forest elephants in northern
Congo. *Pachyderm*.



Abstract: The decay of elephant dung piles has been shown to be a complex process. Rainfall has been attributed as the main factor influencing elephant dung pile survival in various central African forests. This study monitored elephant dung piles from deposition to disappearance to show that dung survival in the Ndoki Forest in northern Congo is mainly influenced by the intensity of irradiance and minimum temperature in the days after deposition.



This could lead to substantial differences of dung decay in pristine forest compared with logged forest with a disturbed canopy, and care should be taken when applying rainfall models to calculate dung decay rates. On-site surveying of elephant dung piles covering all habitat types should

therefore be undertaken before any elephant dung survey is conducted.

BREUER, T. & NDOUNDOU
HOCKEMBA, M. (submitted) Factors
affecting the encounter rate of tropical
forest mammals in northern Congo.
Biotropica.

Abstract: Monitoring programs are essential for an adequate management of large mammal populations. Unfortunately due to the elusive nature of these animals and the associated difficulties in directly observing them, researchers have to rely on indirect methods to count large mammals in tropical rainforest. Whereas many studies have demonstrated that there is large variation in production and decay rate of mammal signs, such as dung or ape nests, we currently have little knowledge on the factors affecting sign encounter rates. Here we fill this gap, by investigating how observer skill and different environmental factors influence large mammal encounter rates in a pristine rainforest in the Nouabalé-Ndoki National Park, Republic of Congo. Our results show large daily and monthly variation in encounter rates of various large mammals. We found that some large mammal signs, such as those of forest elephant, were more common closer to the Mbeli Bai forest clearing and that there were significant differences in encounter rates between different habitat types and seasons. Furthermore observer skill had a strong effect on encounter rates leading us to conclude that using encounter rate as a measure of large mammal abundance is of limited use for comparison between sites and seasons. We recommend the use of distance sampling techniques along line transects to obtain density estimates of large mammals. Whenever possible, studies should combine various sampling methods which might be particularly interesting for large mammals that are difficult to survey because of their elusive behaviour, habitat preference or their low abundance.

2.3.3 Workplan and Outlook for 2008

- Analysis and publication of large mammal line transect study – collaborator: Dr. Samantha Strindberg, Living Landscapes Program, Wildlife Conservation Society
- Publication of duiker dung decay information
- Comparison of estimates of gorilla population size from three bays with results from line transect nest surveys (survey conducted in 2005)
- Application of other innovative methods (remote video camera) to estimate gorilla population size
- Collection of fecal sample for genetic approach of estimating gorilla density



Study area with location of line transects; remote video camera that were tested during a pilot study; mammal inventory team; team leader Mireille during a break and while noting gorilla nest information (from top left to bottom right)

SECTION 3: CONSERVATION EDUCATION

Conservation education can play a vital role in changing local attitudes to the value of wildlife and is an important long-term action to mitigate the threats that wildlife and rain forests are facing in northern Congo. The MBS as part of the Nouabalé-Ndoki Project is currently running a conservation education program, “Club Ebobo”, in local primary schools around the NNNP with the aim to increase the knowledge on wildlife and forest and change children’s attitude and behavior. Activities of Club Ebobo are designed to encourage creativity amongst students rather than using the learning-by-rote system that is popular in Congo’s schools. Club Ebobo has the objectives:

- To teach the school children about the fauna and flora of the region’s ecosystem, so that they appreciate and take pride in the biodiversity that exists in their region:
- To promote the conservation and research activities undertaken within NNNP, within a population that would otherwise have very little contact with the protected area.
- To provide basic school material, such as pencils, note blocks and Club Ebobo t-shirts.



Such changes in attitudes will discourage the trade in illegal bushmeat by reducing the likelihood that the current generation of schoolchildren will consume or trade bushmeat in the future. Club Ebobo is open to any children in the village and through participation in Club session many children who have formerly not visited the school are now regularly seen during school hours.



Researchers of the MBS established Club Ebobo 1998 in Bomassa the village near the park’s headquarters (currently reaching around 100 children in Bomassa). In the recent years we have continuously expanded this education activity and Club Ebobo has reached the local town of Makao (the second base of the NNNP) in 2005). Makao is. In 2007 we expanded Club Ebobo to the logging town Thanry-Congo which is situated 5 km from Makao (reaching around 400 children).



The forest around Thanry-Congo was once extremely remote and

home to several different indigenous groups of hunter-gatherers. Due to increased logging activities the region has undergone a complete demographic and economic transformation over the past five years. It is important that the traditional values once attributed to wildlife are not totally lost in this area. Furthermore bushmeat consumption in Thanry-Congo appears to be extremely high, so that we aim to promote sustainable harvesting and law enforcement (no hunting of protected species and with cable snares).



Through broadening our conservation education activities, we aim to influence both adult and children's attitudes and behavior towards wildlife and to raise awareness and understanding of the role of conservation projects like the Nouabalé-Ndoki Project. To evaluate the success of Club Ebobo we have recently included questionnaires that quantify the knowledge of pupils in all three education centers. This approach will also be expanded including pre-post tests and comparison with schools that did not had visits by the Club Ebobo team.



During Club Ebobo sessions, researchers of the MBS together with Congolese educators teach the local children about gorillas and their behavior, and explain the importance of the research being conducted at Mbeli Bai with an emphasize on the importance of conserving wildlife and their habitat. Some sessions deal with more complicated matters on the complexities of the ecosystem and on more complex conservation issues. This encourages children to see animals and the ecosystem as a complex and interesting web of interactions, rather than just a natural resource to be exploited. Due to past experience we have put particular emphasis on the ecological and economic role of rain forest and its animals.



At the beginning of the school year we distributed basic school material. Sessions were held on a monthly basis and at the end of year we were offering drinks and biscuits in each school.

We used materials donated by zoos and created by ourselves and other innovative approaches such as video presentations and collaboration (<http://www.incef.org>). We have also started collaboration with other conservation education projects such as those of WCS-Gabon (www.wcsgabon.org) and Club P.A.N. a schools education program of the wild chimpanzee foundation (<http://www.wildchimps.org>).

3.1 Achievements in 2007

- Continuation of Club Ebobo in Bomassa and Makao-Lingaga; Establishment of Club Ebobo in Thanry-Congo
- Support of the ecotourism and media visits to Mbeli Bai
- Production of a gorilla history booklet for Mbeli Bai visitors

The NNNP, and in particular Mbeli Bai, has received considerably tourism and media interest and is internationally renowned as a site of extreme conservation and biological importance. Through collaboration with WCS-Congo and the Congolese Government, the MBS facilitates the development of ecotourism activities and to visits by international and national media crews into the NNNP. We closely work together with the Nouabalé-Ndoki Project by facilitating international and national ecotourism and media visits, continuing to keep western gorillas in

the hearts and minds of Congolese and the international community alike. The insight information from our team has been appreciated by all visitors in the past years and has shown that research and ecotourism can work hand in hand.

Following tour operators are currently organizing visits to Mbeli Bai:

- <http://www.discoveryinitiatives.co.uk/>
- <http://www.worldprimatesafaris.com/>
- <http://www.african-silver-safaris.com/>
- <http://www.diamir.de/>
- <http://www.quetzal-tours.de/>
- <http://www.kananga.com/>

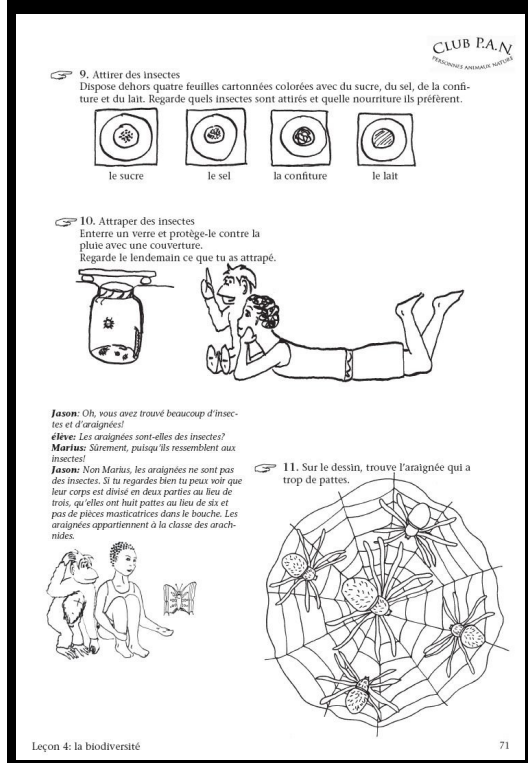
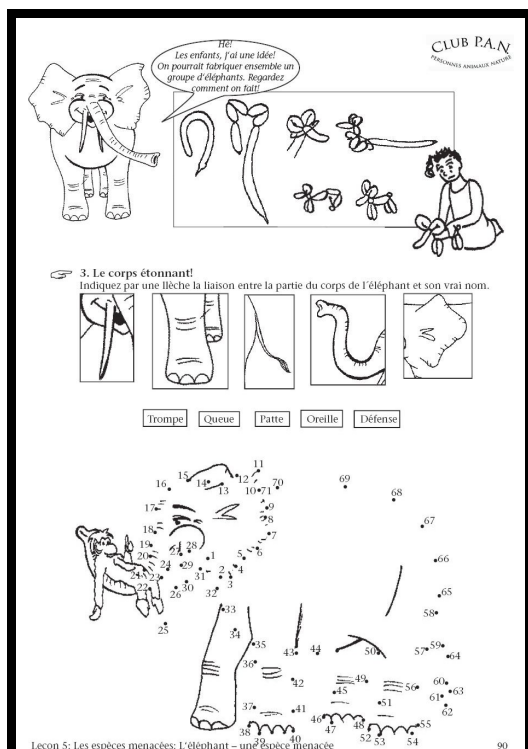


Mbeli Bai provides opportunities for viewing of wildlife that would otherwise be difficult to observe in the dense forest. The logistics and accommodation allows visitors to have a comfortable and easy stay in the middle of the rain forest: from top: local villagers, governmental representatives, and international tourists.

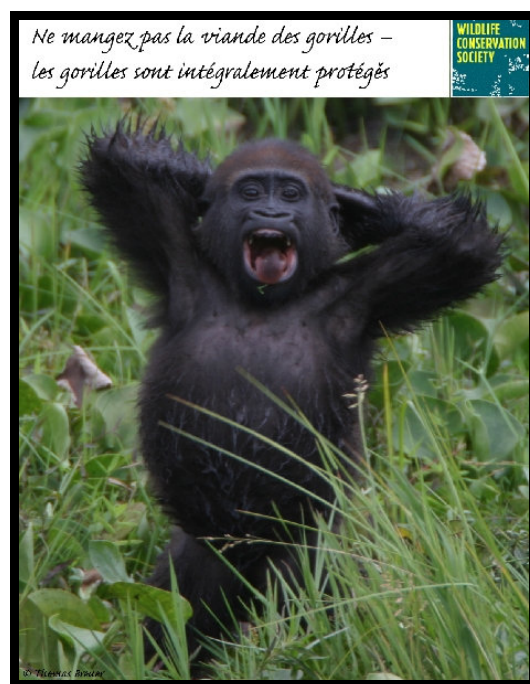
3.2 Workplan and Outlook for 2008

- Hold Club Ebobo sessions and train educators in the three ‘education centres’
- Provide Club Ebobo t-shirts and basic school material to all pupils
- Club Ebobo manual and education book completed and printed
- Standard evaluation schemes incorporated
- Facilitate visits to Mbeli Bai by pupils and local villagers

- Produce poster that inform local people about the legal status of protected species, such as gorillas and elephants
- Collaboration with other environmental education programs (WCS-Gabon, INCEF, Club P.A.N. (WCF),...) and zoos (e.g.: “wild research”)
- Explore the potential of a nation-wide Club Ebobo program
- Continue support of ecotourism program at Mbeli; facilitate media visits



Examples of lessons that will be used to create the activity book – versions of this activity book are also used in another conservation education project (Club P.A.N.) in Ivory and have been created by the Primate Conservation group of the Max Planck Institute for Evolutionary Anthropology.



Examples of posters that can be used for awareness campaigns about the conservation status of gorillas and other protected species



SECTION 4: HABITAT PROTECTION

Achievements in 2007

The researchers' presence acts as an early warning system for illegal human activities and population perturbations in the western part of the NNNP. A permanent research presence at the bai continues to provide an effective deterrent to poaching for what is a highly strategic location.

We work closely together with the park staff of the NNNP and are in frequent contact in case of any sign of illegal activities. Mbeli Bai was a major elephant poaching area, prior to the creation of the NNNP in 1993.

Since the creation of the Park and the initiation of the Mbeli Bai Study that followed, poaching levels in and around the bai have been maintained at zero. The monitoring program is therefore not only contributing directly to *in-situ* conservation efforts in NNNP, but is also providing valuable insight on elephant population recovery in the zone.

We are also employing several BaNgombe pygmies from the local villagers as camp staff some of which have formerly been poachers. Five camp assistants (all BaNgombe

pygmies) and several temporary guides and porters are employed by the MBS. It is anticipated that the other bai studies will result in the employment of additional staff this year and we will expand the study area and therefore enlarge the direct habitat protection.

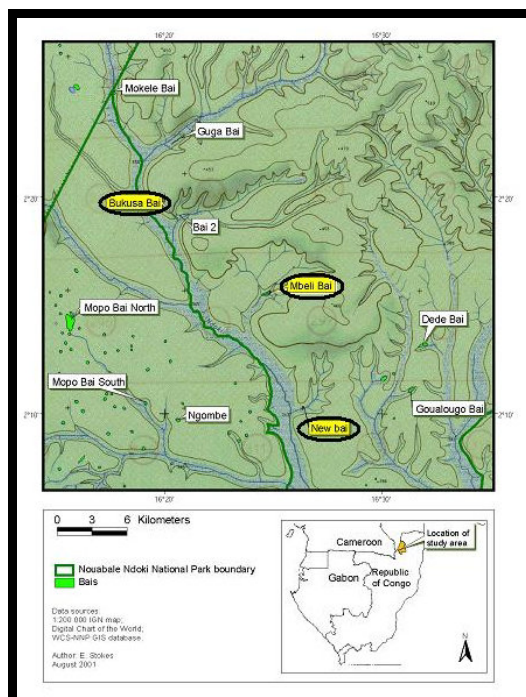


Figure showing the approximate study area around Mbeli Bai with the two bays approximately 10km north and south of Mbeli Bai that will be monitored in 2008.



Researcher presence in the study area acts as deterrence and an early warning system against illegal human activities and therefore contributes directly to habitat protection.

SECTION 5: COMMUNICATION AND PUBLICATIONS

Achievements in 2007

- Scientific publication in peer-reviewed journals (see research section)
- Publication in various popular journals and magazine

BREUER, T. (2007) The importance of long-term studies for the conservation of western gorillas – examples from Mbeli Bai, Nouabalé-Ndoki National Park. *Gorilla Journal*, 35: 18-20.

- conference presentations

BREUER, T., STOKES, E.J., PARNELL, R.J., ROBBINS, A. & ROBBINS, M.M. (2007) Male life history and reproductive success in western gorillas – insights from Mbeli Bai, Republic of Congo. 2nd Congress of the European Federation of Primatology, Prague, September 2007.

BREUER, T. (2008) The Mbeli Bai Gorilla Study: 13 years of success in research, education and capacity building. Invited keynote speaker at the 6th gorilla workshop, Kissimmee, Florida, January 2008.

BREUER, T. (2007) Mbeli Bai – Forschung auf Waldlichtungen im tropischen Regenwald Afrikas. *Zeitschrift des Kölner Zoos*, 4: 147-160.

BREUER, T. (2007) Forest clearing and the long-term research of gorillas, elephants, and other African forest mammals – examples from Mbeli Bai, Nouabalé-Ndoki National Park, Republic of Congo. 10th International Zoo and Wildlife Research Conference on Behaviour, Physiology and Genetics, Berlin, October 2007.

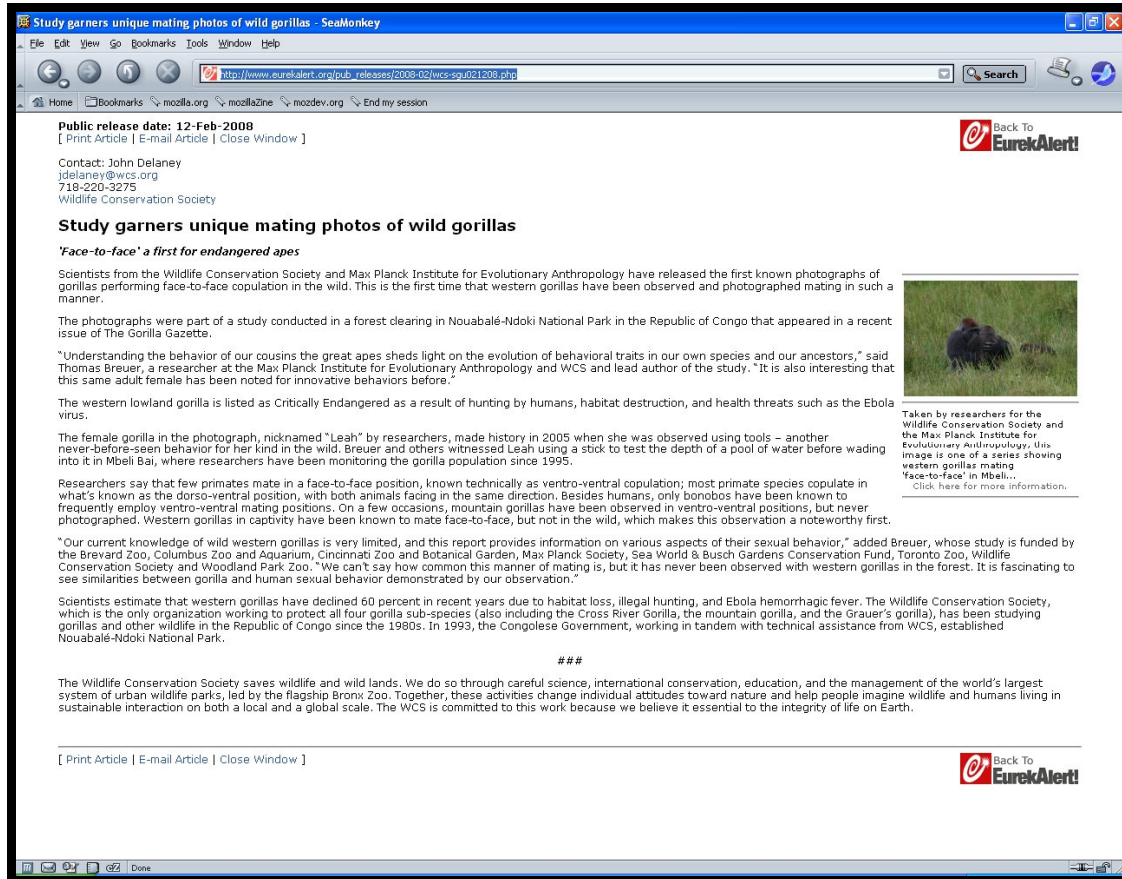
BREUER, T. (2008) Gorillas, elephants and other large mammals – 12.5 years of monitoring and conservation activities at the Mbeli Bai clearing in northern Congo. Barrows Conservation Lecture Series, Cincinnati, January 2008.

- Providing journal cover photos



- Annual report 2006 and updating donors by regular emails and phone calls
- Updating personal web-page: <http://email.eva.mpg.de/~breuer/>
- Providing photos and information to update WCS-Congo webpage

- Successful press release on the first photos of face-to-face copulation in gorillas http://www.eurekalert.org/pub_releases/2008-02/wcs-sgu021208.php



Nature: <http://www.nature.com/news/2008/080214/full/news.2008.578.html>

New York Times: <http://tierneylab.blogs.nytimes.com/2008/02/14/the-ultimate-valentine-card-full-frontal-gorilla-love/#more-218>

Time Magazine: <http://www.time.com/time/health/article/0,8599,1713215,00.html>

National Geographic: <http://news.nationalgeographic.com/news/2008/02/photogalleries/gorilla-pictures/index.html>

Spektrum Direkt : <http://www.wissenschaft-online.de/artikel/942712&z=859070>

RTL – German television ; Bild am Sonntag: largest German newspaper; Radio interviews: FM4

- facilitating donor visits

In 2007 Ron Evans, the primate center team leader of the Cincinnati Zoo and Botanical Gardens visited Mbeli Bai. Ron and Cincy Zoo have been supporting our study since many years and Ron had the occasion to see our on the ground operating first hand. Such visits have been extremely successful and enforce the strong relationship between the Mbeli Bai

Study and its long-term donors.



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We are indebted to Emma Stokes and her dedication for great ape conservation whose support during the absence of the principal investigator from the field site was crucial to maintain the continuation of our study and education campaign. Special thanks also to all the field assistants.

We also thank the WCS-Congo Brazzaville office, particularly Bryan Curran and Mamadou Faye for logistical support throughout the year and Mr. Pierre Ngouembe the conservator of the Nouabalé-Ndoki National Park for administrative assistance.

Without the logistical support of many people in Makao and Thanry-Congo, holding Club Ebobo session would have been an extremely challenging task – we thank you all, particularly Mr. Cyriac for

making this possible. We are indebted to the ‘commisaire’ of the Ouesso airport who generously allowed us to put up posters in his restaurant at the airport.

Thomas Breuer would like to thank the Max Planck Institute for Evolutionary Anthropology (MPI) and the members of the Department of Primatology, especially Christophe Boesch and Martha M. Robbins for supporting his PhD. His study was also supported by DAAD, the Leakey Foundation and the Max Planck Society. Andrew Robbins is thanked for crucial help with the gorilla demographic database.

Thomas especially likes to thank Beth Armstrong for invitation to attend the gorilla workshop and thanks all zoo staff and WCS-Africa Program for having a wonderful time while visiting them in January and February 2008.

The conservation group of the MPI was crucial for the establishment of the activity book that will be produced in 2008.

The Mbeli Bai Study thanks all its supporters who believe in this long-term study. For continuous support we thank Busch Gardens, Columbus Zoo, Cincinnati Zoo, Toronto Zoo, Wildlife Conservation Society and Woodland Park Zoo. We would also like to thank Brevard Zoo for supporting Club Ebobo. Various people gave donations to the Mbeli Bai Study and we thank them.

