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# Biodiversity Conservation at the Landscape Scale

A Program of the Wildlife Conservation Society
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# Ndoki-Likouala Landscape Conservation Area Semi-Annual Report October 2001 - March 2002

## I. Summary of Activity Status and Progress

### a. Introduction/Summary:

The Ndoki-Likouala Landscape Conservation Area, extending over approximately 30,000 km$^2$, comprises a vast stretch of lowland Guineo-Congolian forest, rich in African mahoganies and large mammals. Within the area, forest type varies from semi-deciduous forest in the northwest to swamp forest in the southeast. It is home to important populations of some of the continent's most endangered species: forest elephants, western lowland gorillas, chimpanzees and bongo. The region has an extremely low human population density, and has until recently been isolated from modern human influence. Biodiversity of the region is partially protected in two reserves: the Nouabalé-Ndoki National Park (NNNP) and the Lac Télé-Likouala Aux Herbes Community Reserve (LTCR). Yet these reserves alone do not provide sufficient habitat for wide-ranging or low-density species, nor is the capacity of the Ministry of Forest Economy (MFE) strong enough to effectively manage these areas. Consequently, the unique and extraordinary biological values of the region are threatened by the rapid development of logging throughout northern Congo, the export of massive volumes of bushmeat that follows in its wake, and the creation of logging communities who increase pressure on forest resources.

The principle goal of the BCLS program in Ndoki-Likouala is to conserve biodiversity through application of a landscape approach. To accomplish this goal, the program assesses the ecological status and requirements of landscape species (elephant, chimpanzee, bongo, buffalo and dwarf crocodile), develops management strategies across a mosaic of land-use zones that integrate their conservation, and helps to establish effective systems for this management. WCS works closely with staff from MFE charged with both wildlife protection and forest management, managers of logging companies that work around the reserves of northern Congo, and communities located in the region. In addition to upgrading the status and effectiveness of protected areas, the BCLS program is helping to design and establish systems of wildlife conservation and management on forestry concession lands under the auspices of the Projet de Gestion des Ecoystemes Peripheriques au Parcs (PROGEPP). This includes consultation to reduce the ecological impacts of logging operations (e.g., road placement, no-cut zones), prohibit the hunting of endangered species and the export of any bushmeat from the concession, control logging-based demographic growth and impacts, establish wildlife management systems for sustainable subsistence use by communities, and develop alternative sources of protein for community consumption.

During the reporting period, the LTCR team continued to make progress on their feasibility study for the future management potential of the Reserve. Congolese national assistants were recruited and trained for

the biological and socio-economic surveys, and these surveys were begun. More regular contacts were maintained with villages around the LTCR as part of ongoing efforts to provide useful information regarding the environment and wise use of natural resources. Anti-poaching activities increased during the period as well, as collaboration improved with regional authorities. NNNP management support continues to be provided by several partners (CARPE, USFWS, and WCS, among others). During this reporting period, funds from the BCLS/USAID program contributed to the operating costs for the National Park, with a focus on training Congolese nationals, law enforcement activities, and continued research and monitoring of landscape (and other) species.

## b. Highlights

- Key site monitoring using aerial videography continued to focus on use of bais in the region by elephants. Twenty-four bais are currently being monitored, half within the protected areas of Congo and CAR and half in the logging concessions of the landscape. During the reporting period, one bai monitoring cycle was completed for the bais outside the National Parks, and no new damage was noted since the last reporting period.
- Four radio-collared elephants were found to have ranged over 6000 $km^2$ of the landscape and regularly moved 50-100 km over periods of a few weeks. Detailed analysis of their smaller scale movements showed a dependence on swamps during the dry season. At times the elephants moved outside the protected areas of Congo and CAR into forestry concessions, where they may be more vulnerable to poaching.
- A full analysis of hunting data collected at Bomassa-Bon Coin between 2000 and 2001 was completed. Meat procurement remained essentially the same as in 1995, implying that there is still enough meat to go around (i.e. that hunting is sustainable). There was no significant difference between either the numbers of animals killed or the weight of meat harvested between the two years.
- Regular patrols inside the NNNP were undertaken by MFE and BCLS staff from both the Bomassa and Makao bases. During the reporting period, the Bomassa team completed five patrols in the west and south of the Park, four of which found little human sign and no seizures, with the fifth resulting in the seizure of 85 wire snares. A joint NNNP-CIB mission in February 2002 began to delimit the southern boundary of the Park to avoid problems during forestry prospection and exploitation. During the same period, the Makao ecoguards completed nine patrols, concentrating in the east and north of NNNP. These missions resulted in the seizure of three illegal 12-gauge shotguns and a box of cartridges, 236 cables and one python skin.
- Five monthly tri-national patrols took place on the Sangha River during the reporting period, along the limits of the NNNP, with partners from PROGEPP, Cameroon and Central African Republic. The numbers of seizures continues to drop during these tri-national patrols, as this regular pressure on the poachers along the river has led many to abandon their illegal camps. For the reporting period, tri-national seizures included only 42 cables and two canoes.
- The Nouabalé-Ndoki Project scientific advisor attended a workshop organized by WCS on Ecologically Functioning Populations. The Ndoki-Likouala site was used as a test site for the workshop, to explore ideas on how to better manage, monitor, and carry-out research into landscape species' requirements and ecology.
- Chimp density surveys were initiated during this reporting period in the whole of the Goualogo Triangle and in an adjoining area in the Kabo logging concession that will be logged in 2004. These surveys will be repeated in 2003/2004 after the latter area has been exploited, and the results analyzed for changes in chimp density and/or distribution. Chimps

are believed to be the species most vulnerable to the effects of disturbance caused by logging activities, but this is the first study specifically designed to test this hypothesis.

- Two protected species education and PROGEPP awareness meetings were held in Ouesso with 171 students and faculty participating. Participation in conservation education lessons at the Kabo and Ndoki 2 schools was 264 total participants, with an average of 29 participants per session. Public meetings were held with the Bambejele pygmy populations in the villages of Terres de Kaboungas, Mobangui, Dzèlo, Mossanguélé, Mbili, and Mossombo on wildlife management principles and hunting techniques. These meetings had a high participation rate with an average of 33 Bendjele participants (166 different community members in five meetings).
- Agents of the Regional Direction of Forest Economy-Likouala (RDFE-Likouala) implemented a series of wildlife conservation activities including bushmeat control at the airport, monitoring of markets, and public awareness meetings with technical assistance from PROGEPP and LTCR staff and funding from USFW Elephant Conservation Fund. Collaboration between the PROGEPP and the Regional Direction of Forest Economy-Sangha has improved with the arrival of a new Regional Director, M. Leonard Mouboundou. By the end of March, the responsibility for execution of the Ouesso airport bushmeat control operation was successfully transferred from PROGEPP to the RDFE.
- Dr. Nadine Laporte, assisted by Tiffany Lin, undertook a consultancy in February-March to produce a land cover vegetation map of the Kabo, Pokola, and Loundougou concessions and propose methods for monitoring the impact of forestry exploitation using remote sensing tools. This work, supported by ITTO funds, is built upon the efforts Nadine initiated with Fred Glannaz in 2001. A final report has been produced, and maps of the concessions are to be to be finalized by June.
- Wildlife protection efforts in the forestry concessions were challenged by events following the unfortunate accidental death of an elephant poacher in relation to an anti-poaching operation in southern Pokola in November 2001. The MFE, CIB, and WCS worked positively and collaboratively with local authorities and communities concerned by these events. His Excellency Mr. Henri Djombo, Minister of Forestry Economy personally met with the Pokola population shortly after the incident clarifying Government commitment to promotion of wildlife conservation in forest concessions. After a brief period of reduced activities, the PROGEPP patrol activities returned to former levels.
- Technical assistance was provided to farmers raising meat chickens in Pokola including facilitation of the supply of chicks and construction materials. CIB and PROGEPP supported the construction of a new chicken farm with an expected capacity of 8000 chickens/rotation. Assistance to local fishermen consisted of small loans in the form of 1800 m of fish net, 6 rolls of line, and 7100 fishhooks. Beef cattle importation was facilitated through construction of a butcher shop at the Kabo market and regular CIB transport of cattle from the Cameroon.
- Market surveys in the CIB concessions for this reporting period showed a shift in activities away from hunting to fishing during the dry season (February-March) following traditional patterns. Rates of snared animals entering the sites remained low (0-10%) in comparison with 1999 trends of 20-35%. Snare rates of 5.2% at Pokola, 2.8% at Ndoki 1 camp, 3.8% at Ndoki 2 camp, and 1.6% at Kabo were registered for all bushmeat entering the site. These data support the general observation of a substantial shift from illegal wire snares to the more selective and legal use of licensed shotguns for hunting small game species.
- Wet (September-November 2001) and dry seasons (January-March 2002) surveys covering 390 km in Kabo and Pokola concessions generated information on relative abundance of landscape (and other) species and human influence in relation to habitats, seasonality,

threats, and management efforts. All zones surveyed in the concessions, despite high human activity levels in several hunting zones, were found to have moderate-high presence of elephants, gorillas, and chimpanzees. However, further from the villages there were higher encounter rates of sign of these species. Bongo and buffalo relative abundance was low and patchily distributed. Spatial analyses of these data in relation to landcover and threats is being undertaken to better interpret these observed patterns and orient wildlife conservation efforts.

- Field patrol efforts of 4-6 MFE officers working with 25 ecoguards in the CIB concessions entailed: 478 patrol days at fixed posts controlling vehicles, 163 days of mobile patrols in the forest, 78 days controlling the Ouesso airport prohibiting export of bushmeat on flights to Brazzaville, and 17 days on tri-national patrols on the Sangha River in collaboration with the NNNP, Lobeke NP, and Dzangha-Sangha NP. All of these combined efforts resulted in the seizure of 1895 wire snares, 49 shotguns and four ivory tusks. CIB actively enforced its interior regulations governing wildlife management and conservation in its concessions. A series of disciplinary measures related to wildlife violations by employees were taken.
- Completion of an extensive baseline survey covering 4000 $km^2$ in three logging concessions to the north of NNNP. Data were collected on human, elephant and all other large mammal distribution and relative abundance. Results show an area of high conservation importance of roughly 2000 $km^2$ adjacent to the northern limit of the NNNP within which there are still important elephant and chimpanzee populations yet few signs of humans. In contrast, the north-western limits of elephant distribution can be defined by a line running north east from the most northerly point of the Nouabalé-Ndoki National Park. North and west of this line there was very few elephant sign recorded. In addition, little elephant sign was recorded within 15 km south of the Mokabi River, which has its headwaters in the extreme northwestern point of the Ndoki-Likouala landscape, and flows southeast. During the westernmost part of the survey (along the international Congo-Central African Republic border) it was clear that the illegal settlers and poachers predate logging activities by perhaps a decade.
- Incorporating more local officials (like the police chief in Bouanela) into LTCR conservation efforts, the knowledge of wildlife laws and the reserve's goals are increased, while making progress in the conservation of protected animal species. Collaboration has resulted in authorities seizing 4 pairs of elephant tusks and a total of 15 automatic weapons in the southern region of the Reserve.
- LTCR has entered into talks with the regional military commander to determine alternative means of feeding the military troops in Impfondo to stop hunting in order to feed military recruits. The military base poses one of the primary threats to the wildlife populations in and around LTCR.
- LTCR field staff created educational flyers that were distributed to villagers following educational seminars held in each of the 27 villages within the Reserve. In addition, LTCR is working closely with Mr. Ibayi from the Ministry of Forestry Economy, who is conducting a three phase educational campaign regarding Congo's wildlife laws and their impact on local communities. The first phase of this education campaign has been conducted.
- LTCR supported a Congo TV film crew to produce a news report on crocodile hunting and to create an education documentary on the Reserve. These films will raise national and regional awareness of conservation issues and of the importance of LTCR as a Congolese protected area. In addition, the Congo TV crew is creating a simplified educational documentary in the Bomitaba and Lingala languages, specifically for the educational needs of LTCR.

- LTCR began the second phase of its biological surveys, which will be completed in mid-June. Analysis of the distribution and density of large mammals in terra firma habitats has already been completed. The second phase of biological studies will determine the density and distribution of large mammals throughout the Reserve and in all habitats. In addition, these studies will determine if mammals are pushed onto specific habitats during the wet season increasing their vulnerability to hunting.
- LTCR completed the first phase of socio-economic surveys that included a complete census of all of the villages within the Reserve, the creation of village maps and historical calendars, and the determination of primary household activities.
- Between October - December 2001, a wet season survey was completed to determine the amount of bushmeat in village markets, the diets of the local people, and the quantity of bushmeat leaving the Reserve through two major transport axes - the paved road between Epéna and Impfondo and the river from Epéna to Brazzaville. Results of this study will be compared to data collected between March – May 2001 (the Reserve's dry season) to determine seasonal variation in the diets of the local population and hunting pressures on wildlife populations within Reserve boundaries.
- LTCR field staff advised and supported a Congolese master's student, Gilbert Madouka. Mr. Madouka's thesis examined resource use by local communities in the LTCR. In addition, research assistants were trained to conduct large mammal transects, water bird surveys, and socio-economic surveys.

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## II. Detailed Description of Progress

### a. Key program objectives for reporting period (October 2001 – March 2002)

The goals of the second half of FY 2002 included continued baseline data surveys, and monitoring the landscape species and human influences in the landscape. We aimed to continue work with neighboring logging companies in the Pokola, Kabo, Loundougou and Mokabi concessions for sound management of wildlife resources. Our goal was to integrate local communities, government and logging companies where appropriate in the management of natural resources across the landscape, and influence national policy in the forestry and protected areas sectors. Finally, we intended to further the process of the elaboration of an integrated landscape conservation action plan through adoption of the Nouabalé-Ndoki National Park Management Plan (under separate funding this year), and drafting of chapters and interior regulations for CIB concession management plans for Kabo, Pokola and Loundougou concessions. In addition we pursued the development of preliminary wildlife management guidelines for integration into the Rougier company interior regulations for management of the Mokabi concession.

### b. Activity Description

**OBJECTIVE 1: Establish baselines and monitor landscape species and the landscape context in which they are found.**

**Activity 1.1. Landscape Species Monitoring**
On track

**Reconnaissance Forestry Concessions north of the NNNP:**
A series of reconnaissance walks over the area to the north of the Nouabalé-Ndoki National Park were completed by Patrick Boudjan in March 2002. The objective of this survey was to assess the conservation status of the area to the north of the Nouabalé-Ndoki National Park. Data were collected on all large mammal species, vegetation, topography, and human activities. The survey covers almost all the land within 50 km of the NNNP boundary in the adjacent logging concessions.

Similar to the last reporting period, a highly significant negative relationship was shown to exist between elephant sign and human sign; and between elephant sign and distance to the nearest human settlement, indicating the elimination of elephants within about 15-20 km of all villages in the area. In addition, there were almost no elephant sign within fifteen kilometers of the Congo-Central African Republic international border, as illegal CAR immigrants have settled in this border zone during the last couple of decades and hunt both bushmeat and elephants. There is also a significant negative relationship between the numbers of elephant sign and increasing distance from the limits of the National Park (Figures 1-3).

As reported in the last period, the zones near the villages of this region show that all other large mammal species have been impacted by hunting, especially chimpanzees. Large parts of this area were untouched by human disturbance, however, so the paucity of bongo and buffalo sign are probably due to habitat type (closed-canopy terra firma forest) rather than due to hunting pressure.

The construction of a major logging road through the middle of the surveyed area, currently further advanced than in the last reporting period, will result in an upsurge of poaching unless anti-poaching measures are rapidly implemented. The data collected in this reporting period show that logging activities (timber prospection) are already underway only 5 km from the northern border of the NNNP, and that the nearest road is now only 20 km from the northern Park limit (Figures 4 and 5). The road also now goes

right into the village of Makao, which until February 2002 had only river and footpath access, and which had previously never had a road within 100 kilometers.

The conclusion of phase I of this study is that there is an important conservation area north of the Nouabalé-Ndoki National Park. This area still has abundant large mammal populations, especially elephants, and as yet there is little human sign (Figure 6). Chimps seem to be most abundant within this zone (Figure 5). WCS will be working with the DRFE Likouala and the forestry companies in these concessions, in conjunction with its Mokabi concession activities with the MEF and Rougier (Activity 4.3) to minimize impacts of logging on wildlife.

An area that needs rapid attention from antipoaching teams and from government personnel concerned with illegal immigration is the Congolese territory within 30 kilometers of the Central African Republic border. Many Central African Republic nationals are currently living and hunting in this area. The whole of the area surveyed is in the process of being opened up by three different forestry companies. (Activity 4.3.)

**Mokabi concession:**
Mr. Richard Malonga produced a final report on the joint Regional Direction of Forest Economy/PROGEPP reconnaissance surveys providing important information on relative abundance of large mammals and human demographics and activities in the Mokabi concession. These surveys along with information generated from Patrick Boudjan's work have established baselines for monitoring and contributed to the development of strategies included in a preliminary wildlife management program proposed to the Rougier logging company and MFE authorities (Activity 4.3). Although the area currently has a relatively low human population density and still supports important large mammal populations and habitat in the southern parts of the concession, the opening of roads across Mokabi to access the Lopola, Ipendza, Mimbeli, and other concessions have greatly increased the potential for demographic growth and commercial hunting. Pressures from Central African commercial bushmeat hunters were noted in several key areas of the concession. Over the coming year, a hunting pressure and demographics monitoring program will be established in collaboration with Rougier following standard methods employed in the CIB concessions (Activity 1.4).

**Reconnaissance surveys in the Kabo and Pokola Concessions:**
Wet (September-November 2001) and dry season (January-March 2002) reconnaissance surveys were undertaken in the village hunting and protected zones of the Kabo and Pokola concessions. The surveys traversed the various land-use management zones in the concessions to collect information on large mammal abundance and human activities in relation to habitats, seasonality, threats and management efforts. Due to perturbations in work programs only five of nine routes (95 km) were surveyed in the wet season. All nine designated routes (295 km) were surveyed in the dry season.

Wet season surveys indicated moderate to high levels of elephants, gorillas, and chimpanzees (Figure 7). Encounter rate of buffalo and bongo sign was relatively low with the exception of the Lombe and Mombongo areas. The Lombe area in the Kabo hunting zone presented a high encounter rate of human sign, and also had moderate to high levels of elephant sign. Leme hunting zone demonstrated a high level of small game hunting and low elephant sign, but with a high chimpanzee encounter rate. High levels of gorilla, chimpanzee, and elephant sign and little human activity was observed in the safari area (150,000 ha. in the center of the Kabo and Pokola concessions closed to hunting).

Dry season surveys recorded in elephant, chimpanzee, and gorilla presence in all areas surveyed (Figure 8). Bongo and buffalo sign encounter rate was relatively low and patchily distributed. The highest encounter rates of elephant and gorilla sign were observed in the Ikelemba area of southern Pokola. This area has a high density of forest clearings and Marantaceae forest (covering 40% of the distance surveyed). The Nyangui and safari surveys showed no sign of human activity while the Mboule area of the Kabo hunting zone had both high levels of hunting and elephant sign. East Ndoki, in proximity of the Goualogo triangle, had high levels of chimp and elephant sign. These data served to guide ecoguard protection team missions to key habitat areas and monitor respect of zoning plans (Activity 2.3).

All zones surveyed in the concessions, despite relatively high human activity levels in several hunting zones, were found to have moderate-high presence of elephants, gorillas, and chimpanzees. However, the further the zone was from the villages, the higher the rate of encounter of sign. Bongo and buffalo relative abundance was low in the majority of areas surveyed and patchily distributed. Spatial analyses of these data in relation to landcover and threats is being undertaken to better understand these patterns.

**Wali bai monitoring:**
Wali bai is located approximately four kilometers on foot from the NNNP Headquarters in Bomassa, in the Kabo FMU. This bai has been closely monitored since late 1999 and the information is vital to understanding whether or not important landscape species (elephant, buffalo and bongo) visit the bai regularly. This information in turn is an indicator of whether or not the agreement between WCS and the community not to hunt in the bai is being respected.

Two 3-km trails connecting Wali bai with the village of Bon-Coin/Bomassa continued to be monitored each week for human and animal sign (23 visits during the reporting period). Four species made up 80% of all sign: elephant (39%) followed by red duiker (4 species lumped together) (27%), gorilla and blue duiker (7% each). Human sign made up less than 1% of the total during this reporting period. When the same period for the previous year was compared with this reporting period (using the Mann-Whitney Test), there were significantly more elephant sign this year than last year (P=0.001) (as for elephant sign around Wali Bai), and more gorilla sign (P=0.03) but there were no significant differences for the other species recorded (Figures 9-10).

Buffalo, elephant, black and white colobus and bongo all visit Wali to ingest the *Spirogyra* algae that grows, year-round, in the lake. Buffalo seem to prefer the lake during the dry season, although their visits were less frequent in 2001 than in 2000. Elephants use the lake intensively, and mostly at night, between dusk and about midnight. The addition of afternoon and night monitoring has contributed both to the general dataset of the lake's visitors, and also to individual elephant identification in the Bomassa/Wali bai area. The general relaxed behavior and the frequency of visits to the lake by these large mammals confirms that the people of the villages of Bomassa and Bon Coin continue to respect the Project request to leave the lake undisturbed.

**Elephant monitoring in bais:**
Congolese research assistant Clement Inkamba-Nkulu continued his long-term elephant identifying and monitoring study during the reporting period. Results from the first year (March 2001- March 2002) indicated that Mr. Inkamba-Nkulu had identified 505 individual elephants over 223 days of observations, of which about 63% were females (all ages). Large adult males appeared to come to the clearings only during the dry season, and during the rest of the year they only visited at night. About half (45%) of the individuals observed were adults, followed by infants (23%); juveniles, (19%) and subadults (14%). Only 6% of all elephants were seen at more than one bai (most of these were females and their families); only 3% of all elephants moved between the two closest bais that were five kilometers apart (Mabale and Mingingi). Nocturnal observations at these and the other bais monitored within the NNNP area (Mbeli

and Wali) show that elephant visitation increases markedly in the late afternoon and evening, with elephants leaving the bais at or around daybreak. These data will be compared to data from the early 1990s in order to assess the impact of protection efforts on large mammal populations. It will also contribute importantly to our understanding of the large-scale movements and spatial requirements of this landscape species. It is clear that elephants are the most requiring of space among the species present in the region, and therefore their needs will be the greatest as a sufficient wildlife landscape is determined.

In the next reporting period Inkamba-Nkulu, Emma Stokes (who can identify 150 individual elephants from Mbeli Bai) and Fiona Maisels (who can identify 12 individual elephants from Wali Bai) cross into Central African Republic to visit the Dzanga Bai, where Andrea Turkalo can identify 2800 individual elephants. The objectives will be to compare known elephants from each site. We know, from the collared elephants, that they regularly travel up to 100 kilometers in a few weeks. Do they use all bais to the same degree, or do they have "favorite" bais? How vulnerable is the elephant population of the landscape if one particular bai is destroyed or subject to poaching? The results will be reported on in the next reporting period.

**Aerial videography:**
Twenty-four bais are being monitored within the region using aerial videography, inside the protected areas of Nouabalé-Ndoki (Congo) and Dzanga-Sangha (Central African Republic) and in the Kabo and Pokola concessions adjacent to NNNP. A bai monitoring cycle of the bais in the Kabo and Pokola forest concessions was carried out in November 2001. Aerial monitoring of these clearings allows WCS and its regional partners to verify if the clearings continue to be used by large mammals, in particular elephants. The presence or absence of animal activity in forest clearings is easily detectable from the air. Three main differences were noted between active and inactive bais.

- Animal trails in active bais are clearly visible and are lines of either bare ground or of open water.
- Areas of bare ground are clearly visible in active bais, but are absent in inactive bais.
- The boundary between the forest and the bai vegetation is clearly visible in active bais and ill-defined within inactive bais.

During this reporting period all images for the first annual cycle were mosaiced and digital versions distributed to the three participating projects: Nouabalé-Ndoki project, PROGEPP, and the Dzanga-Sangha project (WWF-Central African Republic). Instructions were included in the report that accompanied the images, to guide management authorities in the use of the images and the proper interpretation of the intensity of large mammal use.

**Lac Télé Community Reserve (LTCR):**
During the first half of FY 2002, two LTCR researchers and four LTCR research assistants continued baseline surveys of large mammal abundance within the LTCR. Large mammal surveys include four of the five chosen landscape species (all but dwarf crocodiles). The first phase of surveys, focusing specifically on the terra firma habitat, began during the last reporting period with a two-month biological training of four national research assistants. Large mammal transects were carried out in November and December 2001, and data analysis has recently been completed. Though the terra firma habitat of the Reserve shows relatively low population densities of elephants and buffalo, and recorded a complete absence of bongo, we estimate a population density of 0.75 weaned chimpanzees per $km^2$. Using the area of the terra firma (436 $km^2$), we obtained an abundance estimate of 327 weaned chimpanzees in this habitat type.

The second phase of large mammal transects began in February 2002. As of March 31, a total of 150 km of straight line transects have been completed. The surveys will be completed in June 2002, and will sample over 400 km of transects, stratified among all habitat types. Preliminary analysis of this survey demonstrates the presence of all landscape species except bongo (which may still be encountered in the currently un-sampled regions in the south of the Reserve).

In the LTCR, market, airport, road and river surveys continue to demonstrate that the dwarf crocodile is abundant, yet heavily hunted in the region. The research on crocodiles scheduled for this reporting period was not accomplished due to financial and logistical problems encountered by the outside researcher who had planned to conduct the research. A program for monitoring crocodiles is still in the planning stages, and will be initiated in the next fiscal year.

**Activity 1.2. Focal Ecological Studies on Landscape Species**
On track

**Elephants:**
*GPS telemetry on elephants*
The final results from 4 GPS-collared elephants deployed in 2001 by NNNP researcher Steve Blake, along with WCS Field Veterinarian Dr. Sharon Deem came in during this reporting period. The data confirmed that the elephants are able to move rapidly across NNNP in the *Gilbertiodendron* forest (80 km in 3 days); and that the four elephants showed varied patterns of bai visitation (Table 1 and Figure 11). Elephant home ranges were shown to be up to 2214 $km^2$. Two of the elephants showed home ranges over 100 km wide; the smallest home range was 40 km wide. The combined ranging area of the four elephants is over 6000 $km^2$, which is larger than any one of the protected areas of the region. Thus, individual elephants leave the safety of the national parks in order to find the resources they need throughout the year. Elephants continued to use bais intensively, sometimes every night for up to a month at a time. This underlines the importance of protecting bais in the region, which are not only a magnet for elephants but also for elephant poachers. This information provide further justification for the orientation of management and protection activities to conserve bai habitat in landscape and forest management planning.

| | Hours of most activity | Maximum distance traveled from collaring site | Maximum diameter of zone used by an individual | Distance traveled outside a National Park | Minimum convex polygon estimate of home range (km2) |
|---|---|---|---|---|---|
| **Spikey** | 08:00-18:00 | 83 km | 101 km | 2 km | 2214 |
| **Kumu** | 08:00-18:00 | 40 km | 59 km | 23 km | 1579 |
| **Sparky** | 08:00-18:00 | 105 km | 105 km | 19 km | 1140 |
| **Sue** | 09:00-18:00 | 32 km | 40 km | 7 km | 647 |

**Table 1. Collared elephant activity from October 2000 to March 21, 2002**

*Elephant food study*
The phenology study, aimed at understanding elephant movements in relation to seasonal food availability, continued during this reporting period. Two hundred trees from twenty different species known to be important to elephants are monitored on a monthly basis for the presence of fruits. The dry

season was unusually cold and this seemed to affect fruit set. Little fruit was available either in the dry season (December-February) or thereafter. Elephants were commonly in Bomassa during this reporting period, as is normally the case during the dry season. This supports the prediction of the last reporting period that elephants move to raid crops when forest fruit availability is low. Elephant visits to the village continue to be recorded on a daily basis.

*Elephant-human conflict*

The NNNP management team continued to test and evaluate measures aimed at reducing human-elephant conflicts near Bomassa village. Beginning in 1998, elephants began to move into the area for the first time in memory, likely because of reduced poaching pressure attributable to the presence of the park. However, as a result, elephants also began to destroy fields to such an extent that most of the village has abandoned agricultural activities. In December 2000 the NNNP project cleared three fields near the Bomassa base, which were planted with manioc and corn. These fields were surrounded with heavy cables (abandoned by logging companies) that we expected would prevent elephants from entering the fields. The results from that reporting period were that although some manioc grew in the fields, several elephants again learned to knock down the barriers, and entered the fields. Three of these elephants were recognized as being those from Wali Bai, and the behavior of two of them indicated that they were probably brothers (feeding very close together, and in synchrony). They showed no fear whatsoever of the villagers. The NNNP team had to harvest what could be salvaged in the fields, before the elephants consumed the entire crop. A calculation of the cost of the fencing and the value of the crop showed that the fencing and the labor required cost three times more than the crop produced. A third attempt is underway this season, and heavy wire is again being used, this time stretched between closely spaced trees, and the wires will be smeared with a mixture of grease and hot chili pepper powder *(Capsicum* spp.*)* to detract the elephants.

**Goualogo chimpanzee study:**

The long-term study of the Goualogo chimpanzee population continued. The objectives of this study are to identify home range size, seasonal feeding requirements and behavioral patterns. The methods include standard line transect surveys to estimate chimp density (using pruning shears, to ensure that no visible trail is created that might disturb the habitat or lead poachers into the area), and identification of known individual chimpanzees. To date over 165 individuals are recognized by the research team. Fifty-seven of them are within one community, the "Moto" community, and the accrual curve of identified individuals indicates that we are reaching asymptote, suggesting that most of the chimpanzees in this community have been identified. An important aspect of this study is to re-contact individuals, as this gives information on seasonal, annual, and long-term ranging patterns, as well as on population size. Sixty-seven percent of the known chimpanzees have been contacted on more than one occasion. The average number of contacts for the same individual was 4.06 (range = 1-25). A manuscript that describes their "naïve" response to human observers was recently submitted for publication.

**Activity 1.3. Safari Target Landscape Species**

On track

**Bongo**:

The tragic death of Ebam Narcisse of the Mombongo research program by a drowning accident in January 2002 was a great loss to the BCLS team. As the primary research assistant in Mombongo Ebam had begun to expand the remote camera surveys of bongo populations to include Wali bai with the Mombongo, Bagbali, and safari areas. He was highly skilled and motivated in collecting information on bongo social organization and demographics through direct observations at clearings in Mombongo.

Ebam's passion for conservation, skilled enthusiasm, and limitless energy in the field will be remembered by all, and the Mombongo research team particularly.

Other researchers stepped in to assure interim continuation of research activities and a new research assistant has begun training to fill the Mombongo position. The bongo research program has been expanded to include comparison of bongo identifications (resulting from camera trapping and direct observations) from sites throughout the Ndoki-Likouala landscape (Mombongo, Bagbali, Safari zone, Mbeli, Mingingi, Wali) to provide further insight into movements. Preliminary data indicate minimum home range estimates >500 $km^2$ with 50 km movements observed. Methods include remote camera surveys to generate mark-recapture estimates on bongo populations in the Kabo and northern Pokola concessions, reconnaissance surveys, and direct and indirect observations at forest clearings. Plans to tag bongo with GPS/VHF units, a high priority for the BCLS landscape approach, were rescheduled for 2003 due to capacity and financial constraints.

Analysis of the various data on bongo antelope population ecology and large mammal use of forest clearings in Mombongo and the Kabo concession collected between 1995-2001 are being finalized and findings published in a Ph.D. Dissertation by Paul Elkan. Expected future publications from the bongo research program will focus on social organization and demographics, implications for conservation, and applications for managing and monitoring the impact of safari hunting.

Publication progress has included:

- The compilation and analyses of bongo antelope population demographic and social organization databases contributed new information and perspective to the species profile on bongo (*Tragelaphus eurycerus*) to be published in the new field guide to the Mammals of Africa (chapter authored by P. Elkan for *MOA* Eds. Kingdon, Butynski, and Happold).
- A scientific paper titled "Multifactorial mortality in bongos and other wild ungulates in the north of the Congo Republic" was published as: 2001. Huchzermeyer F, Penrith, M. L. and Elkan, P.W. Onderstepoort Journal of Veterinary Research 68: 263-269 was distributed to the Ministry of Forestry Economy and the Ministry of Scientific Research.
- A manuscript titled "A die-off of large forest ungulates following a *Stomoxys* fly outbreak in northern Republic of Congo" by Elkan P, Parnell R and J.L.D. Smith, was finalized for publication. The paper reports on an assessment of the environmental conditions surrounding the 1997 event, the impact on bongo and other large mammal populations over time, and implications for conservation and management.

**Buffalo:**

Data on buffalo social organization and demographics continued to be collected through direct observations at Wali bai. Reconnaissance surveys, road surveys (Bomassa, Mombongo, Safari zone) and the CIB wildlife inventory transects collected data on buffalo relative abundance throughout the forest concessions. Building on Steve Blake's earlier findings in NNNP, Richard Malonga is developing the research design (employing spatial data and vegetation maps) for an investigation to assess factors influencing the abundance and distribution of buffalo within the Ndoki landscape.

**Activity 1.4. Hunting and Forestry Impacts**
On track

**NNNP:**
The Bomassa-Bon Coin hunting monitoring study continues and the results from 2000 and 2001 were analyzed during this reporting period. The price of bushmeat between 1995 (Eves and Ruggiero 2000) and 2001 (this reporting period) were compared for the same two villages.

There were no significant differences between the number of animals killed, nor in the weight of bushmeat harvested from the area around Bomassa-Bon Coin, when data from 2000 and 2001 are compared. Of the animals hunted in 2000 and 2001 (total N=572), about 65% were duikers, of which most were Peter's duiker (*Cephalophus callipygus*) and about 20% were monkeys. This compares with 66% and 17% respectively in 2000. Red river hog (*Potamochoerus porcus*) comprised 9-10% of hunted individuals in both years. When the weight of the meat obtained is examined by species, Peter's duikers comprise about 40-50% of the total meat harvested, and red river hog comprise most of the remainder (about 40%).

A rough calculation showed that close to 70g of meat was consumed per person per day. A recommended daily amount of meat cited is about 280g per person per day (average per capita consumption) (Robinson and Bennett 2000). This means that in Bomassa, about 25% of protein needs were met by meat and the rest is met by fish, leaves, caterpillars, and other insect larvae. Price per kilo of undressed carcass, averaged over twelve species, has not changed since 1995 in Bomassa-Bon Coin; it is still about $0.40 per kilo.

**Peripheral Zone:**
The PROGEPP team continued monitoring hunting practices and demographic trends in the logging concessions through bushmeat market, household, and demographic surveys at the major camps and towns. These data provide information on the effects of management interventions on hunting practices, information necessary to assess the impact of hunting on game populations, and insight into the nature and cause of demographic growth and expansion in the concession areas. Information from these surveys is immediately communicated to inform and adjust management interventions as well as to infuence planners and decision makers regarding land-use and management planning needs.

Demographic surveys showed that Pokola town has grown from a population of 7,200 (1999) to 11,389 (2002) with a 27% increase in 1999 to 2001 and a 25% increase in 2001 to 2002. Kabo village increased from 1406 (1999) to 2333 (2002) with the expansion and growth of CIB activities in the area. Numerous secondary industries (charcoal, sawn timber theft, carpentry, etc.) have developed in association with the sawmills at both sites thus greatly increasing the in-migration of revenue seekers.

However the demographic trends at the forest camps are different. After a period of initial population growth from 616 (1999) to 806 (2002) (32%) at the Ndoki 2 camp, the rate slowed to 6.5% (859 in 2002). This can be explained by a flux of in-migration by employment seekers and hunting opportunists at the opening of the site (1998). Over time the opportunities for new jobs diminished and wildlife management protection and management activities discouraged commercial hunters, thus contributing to the departure of part of the population. Ndoki 1 camp (established in 1993) also has a lower observed growth rate increase from 900 (1999) to 1002 (2002) (5-6%), thus suggesting a stable situation with little secondary immigration.

Surveys of bushmeat entering the Kabo, Pokola, Ndoki 1 and Ndoki 2 sites were undertaken on 10 randomly selected days each month in conjunction with household consumption surveys to collect information on hunting practices and off-takes as well as protein consumption trends in relation to location, season, and management interventions. In this reporting period, market surveys showed a shift in activities away from hunting to fishing during the dry season (February-March) following traditional patterns. Rates of snared animals entering the sites remained low 0-10% compared with 1999 trends of 20-35%. Snare rates of 5.2% at Pokola, 2.8% at Ndoki 1 camp, 3.8% at Ndoki 2 camp, and 1.6% at Kabo were registered. These data support the general observation of a substantial shift from illegal and wasteful wire snares to the more selective and legal use of licensed shotguns for hunting of small game species. Survey estimates of daily quantities of bushmeat reflected fluctuations in wildlife protection efforts. High levels of hunting were observed at Ndoki 1 and Ndoki 2 in December, coinciding with a temporary reduction in wildlife protection activities (Activity 2.3).

Surveys monitoring household consumption of protein from October 2001 – March 2002 indicated that bushmeat and freshwater fish are the fundamental sources of protein in the CIB concessions. The frequency of consumption of the one varies with the availability of the other, being inversely proportional. These data, collected from 2000-present are being analyzed in comparison with market data and taste and purchase preference survey data to provide a multi-faceted analysis of the most important factors influencing bushmeat and alternative protein consumption in the region. These data will be presented in a report to promote local understanding of the problem as well as to a broader conservation community through peer reviewed paper (Figure 12).

**LTCR:**

In October 2001, four national research assistants were trained to conduct village socio-economic surveys. The principal objective of the socio-economic surveys is to qualitatively and quantitatively describe human demography, natural resource use, and attitudes towards conservation and natural resource use in the Lac Télé region, particularly as they may apply to the biological integrity of the region. This information will permit managers to make reasonable and educated decisions regarding natural resource use, such as determining hunting and harvesting zones in a manner congruent with the needs and concerns of the local population.

Between November 15, 2001 and April 01, 2002, the LTCR socio-economic research team completed phase one of this research effort. This socio-economic research consisted of 1) a complete population census of each village, 2) the creation of village sketch maps, and 3) the creation of a historical calendar for each village. The complete village census and maps will provide managers with detailed knowledge of the population and demographic structure of all 27 villages in the Reserve. Village sketch maps that roughly describe the number and locations of houses, fields, water sources, roads, paths, markets, and offices will provide knowledge regarding: 1) land use strategies of the village; 2) potential problem areas for the conservation project (e.g. fields near forests with high elephant traffic) and; 3) infrastructures and social areas of importance for the village (numbers of houses, schools, hospitals, government buildings). Historical calendars will serve both as an important temporal reference for villagers and researchers throughout the survey process and as a description of the history and traditions of each village. Demographic data are currently being compiled and analyzed. Results will be available during the next reporting period.

In March 2002, LTCR socio-economic teams began conducting phase II of their research efforts. Specifically, phase II of this research program consists of: 1) the creation of a community annual activity calendar for each village; 2) a detailed household economic survey; 3) semi-formal interviews with hunters regarding the general practices of their trade and land use patterns (hunting zones), etc.; 4) formal one-on-one interviews/questionnaires with hunters to gather more detailed information regarding

hunting practices and attitudes toward wildlife; 5) attitude surveys investigating human-animal conflict, forest resource use, and attitudes toward hunting laws and conservation efforts. These surveys will be completed in July 2002 and will be discussed in the next reporting period.

In December 2001, socio-economic researchers completed household surveys to examine food consumption patterns throughout LTCR. Food consumption surveys were completed for dry season consumption patterns during the last reporting period and were repeated for three months in the wet season (September - December). Surveys were conducted in each of 8 villages in the Reserve. Participating households (totaling no less than 50% of the homes in each village) were selected at random in each of the designated villages once or twice a week. Surveys were generally administered at the end of each day, and relied on the ability of the interviewee to recall all of the consumed foods that day. These data will serve to help managers to: 1) determine the relative importance of bushmeat in the diets of villagers compared to fish and other protein sources; and, 2) determine what proportion of diet foods are found locally versus the proportion that is purchased.

Preliminary analysis of these data indicate that bushmeat consumption is relatively unimportant in the diets of LTCR villagers and most hunting conducted in the Reserve is for export to large villages and cities rather than for personal consumption. Only 6.6% (N = 3113) of all households surveyed reported bushmeat consumption. In contrast, 75.5% of all households consumed fish. Domestic livestock consumption represented a mere 1.8% of the households surveyed. All remaining households consumed either insects or no animal protein source in that day's food consumption records (of all animal protein consumed, 91% = fish, 7% = bushmeat, 2% = domestic livestock). Despite the relatively low proportion of households recorded to consume bushmeat, results of this survey show a high number of completely or partially protected species are consumed by LTCR villagers. Of all bushmeat consumed in village households (n= 203), 33% represented species with some level of protected status. Protected or partially protected species consumed during this study included: forest buffalo (n = 1), chimpanzee (n = 3), gorilla (n = 2), python (n = 10), red river hog (n = 29), and dwarf crocodile (n = 23). Across villages and season, average household food expenditure was 244 FCFA/household/day ($ 0.32).

In February 2002, a Congolese masters student, Gilbert Madouka, who was advised by LTCR field staff and financially supported by Wetlands International, successfully defended his thesis entitled "Contribution à la Connaissance sur l'Utilisation des Ressources Naturelles de Zones Humides de la Réserve Communautaire du Lac Télé. Mr. Madouka will be joining the LTCR staff in April 2002 as a socio-economic researcher and educator.

During the first half of FY 2002, LTCR socio-economic surveys completed a six-month study monitoring village bushmeat markets that was begun during the last reporting period. Data are currently being compiled and analyzed and will be included in the next report.

**Activity 1.5. Timber Exploitation and Impacts on Wildlife**
On track

A research design and full proposal is being developed for a long-term comprehensive investigation of the direct and indirect impact of forestry exploitation on wildlife populations. John Poulsen, Connie Clark, and Richard Malonga have agreed to act as principal investigators on this research program in partial fulfillment of their graduate degree requirements. During this reporting period, data relevant to the investigation were collected in the concessions by PROGEPP staff through reconnaissance surveys and monitoring of hunting off-take from the various management zones within the concessions. The wildlife inventory teams of the CIB management plan, trained in data collection by PROGEPP staff in May-June 2001, continue to progress in collection of large mammal sign abundance and distribution

along the forestry transects surveying the concessions (1% sampling of 1,200,000 ha.). These teams were monitored and evaluated every two months by PROGEPP researchers. The CIB wildlife data will be joined with data from reconnaissance surveys and analyzed in conjunction with line transect data collected in different "treatment" areas by the investigators of the focused research program. This research program will be based out of the Bonyo camp located in the center of the safari zone of the Kabo concession. The camp location provides easy access to all areas of the CIB concessions and is located in a heterogeneous habitat area with a diverse history of logging and hunting. A full research proposal is being produced for circulation to potential donors (Fonds Francaise pour l'Environnement Mondial, United States Forest Service, and others).

**Goualogo chimpanzee study:**
Due to the immediate threat of mechanized logging in northern Congo and a lack of knowledge on the natural history of the central subspecies of chimpanzee (*Pan troglodytes troglodytes)* a socio-ecological study of an undisturbed population is underway in the area south of NNNP soon to be annexed, known as the Goualogo Triangle (Figure 4). This area encloses about 280 $km^2$ of intact forest, and includes several known communities of chimpanzees. The objective of the research is to assess whether logging activities affect density, distribution, and behavior of chimpanzees in the logged area; in the areas immediately adjacent to them and finally, in areas up to ten kilometers away from logging. The study will also reveal whether major swampy rivers within the landscape (such as the Goualogo river itself) form a barrier to chimp dispersal.

During this reporting period, the Goualogo team surveyed all of the study area outside the national park that will be logged in 2003-2004, and the adjacent area within the Goualogo Triangle. The final sector, also within the Goualogo Triangle, will be surveyed in the next reporting period. This will provide a unique opportunity for the Project to evaluate the impacts of logging on chimpanzees, which seem to respond more negatively to logging than many other species, as indicated by the results of the reconnaissance surveys in Activity 1.1 within the logging concessions to the north of the NNNP. To date, 93 kilometers of line-transects have been completed. A preliminary density estimate for gorillas and chimpanzees in the Goualogo Triangle and adjacent areas has been calculated (very roughly, two gorillas and one chimp per $km^2$). The next reporting period will see the completion of the density estimate fieldwork for "before logging" and the final analysis of this full dataset. Equivalent surveys will be conducted after the 2003-2004 logging to assess impacts.

**Large mammal use of timber roads:**
Monthly surveys of large mammal sign along secondary roads in the Kabo concessions were conducted to improve understanding of the effects of timber road networks on large mammal populations. PROGEPP continued monthly monitoring of large mammal sign along 16 km of old logging road in the Mombongo area of the Kabo concession. High levels of elephant and buffalo activity along with the presence of bongo, spotted hyena (*Crocuta crocuta*), and other species were registered. The full datasets from the Mombongo road surveys (1996-present) are currently being analyzed and compared with large mammal activity transect data from the Mombongo study area to examine activity patterns in relation to season and other factors.

Ten km of secondary logging road in the center of the safari zone (disturbed by commercial logging in 1998) of the Kabo concession were demarcated and monthly large mammal surveys initiated has activities (1997-1999). The safari zone has a high level of leopard activity and the highest encounter rate of spotted hyena sign thus far observed in the area.

It is unclear why spotted hyenas have started to infiltrate the forest concessions. A working hypothesis is that logging roads have facilitated their in-migration. A pilot study investigation of sported hyena being

undertaken by national researcher Alain Ampolo has confirmed that the species is not known by the traditional local people of the area around the Kabo and Pokola concessions. The research design for a directed investigation of hyena abundance, distribution, and food habits is being developed. Scat of both leopard and hyena are regularly collected along the roads to contribute to diet assessments.

NNNP staff monitored the 30 km road between Park Headquarters in Bomassa and the Ndoki Research Station on the edge of the Park. The road was monitored six times during the reporting period. At least twenty-six mammal species were recorded. Red duiker sign and elephant made up most of the total, followed by buffalo (13%), and red river hog and civet (7% each). Bongo and yellow-backed duiker made up 5% and 4% of signs. When the entire 2001 data were analyzed and compared to 2000 data, no significant differences were found in animal presence along the road. This suggests that hunting pressure has remained the same, and with the possible exception of bush pigs, seems to be sustainably managed.

**Activity 1.6. Physical Landscape and Habitat Types**
On track

LTCR field staff continue to identify and describe the physical landscape of the Reserve. GIS data is continually collected (both aerial and ground-truthing) in order to create more accurate maps of the area.

**Biochemistry and zoogeomorphology of forest clearings (bais and yangas):**
Sarah Elkan (WCS PROGEPP coordinator and national research assistants furthered the investigation of the biogeochemistry and zoogeomorphology of forest clearings by undertaking dry season geomorphological structure investigations along the Sangha river and in selected forest clearings of the Kabo and Pokola forest concessions. Soil and rock samples are being analyzed by the University of Minnesota Department of Water, Soils and Atmospheric Science. The remote sensing, aerial photographs and GIS tools are being employed in spatial investigation of clearings at the landscape scale. The investigation aims to determine the origin of yanga and bai forest clearings, develop understanding of their importance in the landscape, and produce recommendations for monitoring and conservation of key habitat areas.

**Activity 1.7. Additional Biodiversity Surveys**
On track

**LTCR:**
*Birds*
LTCR is the only Ramsar site in the Republic of Congo, chosen for the high diversity and density of waterbirds along its river ways. The Reserve houses several nesting and breeding sites for the purple heron (*Ardea purpurea*), african darter (*Anhinga rufa*), night heron (*Nycticorax nysticorax*), long-tailed shag (*Phalacrocorax africanus*), and lily trotter (*Actophilornuis africana*) (Wetlands International Report). However, little else is known regarding the actual density and diversity of birds in LTCR. In January 2002, LTCR supported a study by Jerome Mokoko, a Congolese ornithologist, to determine the diversity and distribution of birds in the Reserve. A preliminary species list of over 300 species has been developed from this work.

In addition to the preliminary inventory of birds in LTCR conducted by Mr. Mokoko, two LTCR researchers and two research assistants initiated a survey of water birds to determine: 1) the density of water birds in the Reserve; 2) the seasonal fluctuations in water bird densities. A second survey was completed in March 2002. Data will continue to be collected at three-month intervals over the course of the year. Preliminary results are currently being analyzed and will be included in the next reporting period.

*Fish and reptiles:*
The Lac Télé project has offered logistical support to biological experts to conduct inventories and surveys of fish and reptiles in the Reserve. The swamp forests of central Africa are poorly understood, and are a vital habitat for the dwarf crocodile and other reptiles. The herpetofauna of these forests are little known, and are likely to comprise an important part of the overall Lac Télé faunal community. The majority of the inhabitants of the LTCR are fishermen, and therefore the economic importance of various species must be better understood if this resource is to be exploited in a sustainable manner. These studies are currently in the planning stages.

**Artisan ivory market surveys in Brazzaville:**

Under separate funding, two PROGEPP research assistants monitored the sale of sculpted ivory in the Brazzaville market from July 2000 – January 2001 replicating methods employed by Moukassa and Madzou in 1995. The objective of the study was to assess the current ivory market situation in Brazzaville, compare this to the earlier study and gather information about raw ivory supply from source areas of the country (Sangha, Cuvette, Likouala provinces). The surveys found that purchasers of ivory objects were essentially nationals (27%), Chinese (12%) and Russian (26%). 42.2 kg of sculpted ivory was estimated to have been sold during the survey period with an overall value of 80,000 FCFA/kg. These data suggest that the Brazzaville sculpted ivory market was greatly reduced by the effects of the 1997 civil war, which caused the departure of expatriates and international organizations. Overall reduction in clientele has discouraged sales. It was observed that the price asked for each item varied greatly depending on the perception of the client (i.e. businessman, national authority, etc.). Sale of sculpted ivory is expected to increase as stability and the expatriate community returns to Brazzaville. With the expansion of the Brazzaville market with its links to sources areas in the Cuvette, Sangha, and Likoula areas, monitoring of the evolution of ivory sales in Brazzaville may become an important tool in developing BCLS and national strategies for elephant conservation.

**Activity 1.8. Large Mammals and Human Use Patterns in the LTCR**
On track

**Note: This activity was not described in the FY 2002 Implementation Plan, but is described separately here as it is deemed to be a significantly autonomous activity from the others in Objective 1.*

The LTCR team conducted line transects between November 15 and December 15, 2001, to determine the densities and distributions of gorillas, chimpanzees, and other large mammals, as well as to record signs of human activities, in the terra firma habitat of the Reserve (Activity 1.1). In addition, transects in terra firma habitat conducted during the high water season (November – December) are being repeated during the low water season (February – June) to determine if large mammal densities change according to the level of water in the surrounding habitats. During the low water season, transects are also being conducted in all the other habitat types to estimate large mammal densities for each habitat and for the Reserve in general.

Preliminary gorilla survey results demonstrate a high density of gorillas in terra firma habitat, which represents 10% of the total area of LTCR. 657 gorilla nests were found in 146 nest sites, with a mean of 4 nests per site. We estimated a density of 11 weaned gorillas per $km^2$ using the Distance software. Multiplying the area of the terra firma (436 $km^2$) by gorilla density, we obtain an abundance estimate of 4931 weaned gorillas in this habitat type. The gorilla nest sites were patchily distributed, with many nest sites being counted on some transect and no nest sites counted on others. In fact, gorilla nest site encounter rates are significantly greater in the terra firma on the northern side of the Likouala-

aux-Herbes river than the on the southern side. We attribute the differences in gorilla densities to hunting and human population pressure on gorilla populations and to microhabitat differences within the terra firma biological resources across the landscape.

**OBJECTIVE 2: Strengthen local, on-site protection and management of biological resources across the landscape.**

**Activity 2.1. Law Enforcement**
On track

**NNNP:**
Regular patrols inside the NNNP were undertaken by MFE and BCLS staff from both the Bomassa and Makao bases. During the reporting period, the Bomassa team completed five patrols in the west and south of the Park, four of which found little human sign and no seizures, with the fifth resulting in the seizure of 85 wire snares. A joint NNNP-CIB mission in February 2002 began to delimit the southern boundary of the Park to avoid problems during forestry prospection and exploitation. During the same period, the Makao ecoguards completed nine patrols, concentrating in the east and north of NNNP. These missions resulted in the seizure of three illegal 12-gauge shotguns and a box of cartridges, 236 cables and one python skin.

In addition, five monthly tri-national patrols took place on the Sangha River during the reporting period, along the limits of the NNNP, with partners from PROGEPP, Cameroon and Central African Republic. The numbers of seizures continues to drop during these tri-national patrols, as this regular pressure on the poachers along the river has led many to abandon their illegal camps. For the reporting period, tri-national seizures included only 42 cables and two canoes.

**LTCR:**
To determine the quantity of bushmeat and protected species that are exported from the LTCR, the BCLS project continues to support the Head Warden and a small corps of ecoguards to conduct a minimum of 10 road and 3 river controls per month. Bushmeat transported along the road between Epena and Impfondo and on the Likouala-aux-Herbes River is recorded and all protected species seized. Information collected during the controls has assisted managers in identifying areas of significant poaching activities within the region. During the reporting period, these patrols resulted in the confiscation of 3 pair of elephant tusks, 1 gorilla skull, 4 leopard skins, 1 leopard skull, and 1 infant chimpanzee.

Increased collaboration with local officials (Chief of Police in Bouanela) during the first half of FY 2002 has resulted in further seizures of military weapons and illegal trade of protected species in the Reserve. Local police officials do not have the resources necessary to complete their work. Thus, LTCR has supplied police with small quantities of boat gasoline and these police missions have resulted in the seizure of 4 sets of elephant tusks and a total of 15 automatic weapons in the southern region of the Reserve.

A law enforcement program is currently being developed for LTCR with the help of the Head Warden. Additional funds are being sought from the US Fish and Wildlife Service to support these activities.

In collaboration with PROGEPP, LTCR continues to work closely with the RDFE-Likouala to control the export of bushmeat from the Impfondo airport, and to study the quantity of bushmeat that enters the Impfondo taxi terminus and local market from the east (Dongou) and west (Epena) of Impfondo (Activity 2.3).

**Activity 2.2. Wildlife Management in Forestry Concessions**
**On track**

Wildlife protection efforts in the forestry concessions were challenged by legal procedures and local unrest following the accidental death of a Congolese poacher following an anti-poaching operation in the southern Pokola concession in November 2001. The MFE, CIB, and WCS worked positively and collaboratively with local authorities and communities concerned by these events. His Excellency Mr. Henri Djombo, Minister of Forestry Economy of the Government of Congo personally met with the Pokola population shortly after the incident. The Minister reconfirmed the Government's commitment to wildlife protection activities in forestry concessions and discussed the importance of conservation for the long-term livelihood of local communities. Following a one-week reduction of wildlife patrols in mid-November, activities were resumed, albeit on a reduced level.

In December the Ministry reinforced the PROGEPP anti-poaching team with the assignment of three new MFE field officers and removed the MFE officer (Chief of Brigade) who had been responsible for the mission in discussion. MFE officer Marcel Ngangoue was promoted by the Ministry to the position of Chief of Brigade following a recommendation by the PROGEPP Director. By mid- January wildlife protection activities had been fully reinforced, allowing for expanded surveillance.

The Congolese legal system proceeded with investigation and proceedings according to the law. Medical reports concerning the incident indicated that the poacher had died from internal injuries resulting in part from being struck in the abdomen. According to official reports from the MFE officer directly overseeing the mission, the ecoguard had reacted to an attempt by the poacher to seize the rifle from the hands of the ecoguard. The MFE has taken measures for legal representation and PROGEPP and CIB facilitated the participation of regional and local authorities in their investigations and meetings with the local communities. After two and a half months of detention in Ouesso, the MFE officer and the court released four ecoguards involved in the mission, with the MFE officer returning to Brazzaville and the ecoguards re-integrated into PROGEPP protection activities. The MFE will engage with any further legal presentation regarding this case, and has already made partial settlement with the family of the deceased.

During this reporting period, PROGEPP field patrol efforts by 4-6 MFE officers working with 25 ecoguard in the CIB concessions entailed: 478 patrol days at fixed posts controlling vehicles, 163 on mobile patrols in the forest, 78 controlling the Ouesso airport prohibiting export of bushmeat on flights to Brazzaville, and 17 on Tri-national patrols (Activity 2.1). These efforts resulted in seizure of 1895 wire snares, 49 shotguns (involved in wildlife law violations), and four ivory tusks. Law enforcement data collection methods developed by the MIKE program are employed to monitor the success of wildlife law enforcement efforts.

During this period CIB actively enforced its interior regulations governing wildlife management and conservation in its concessions. A series of disciplinary measures were taken related to wildlife violations by its employees. During the period immediately following the incident in November when PROGEPP protection team activities were reduced, many wildlife violations were noted. Upon the resumption of PROGEPP protection activities, large quantities of bushmeat and shotguns were seized on the CIB vehicles. Over the course of several days order was reestablished by CIB and the MFE and PROGEPP teams. These events indicate that although rules are in place and enforced by the company, the probability of being apprehended must be maintained at a certain level in order for individuals to be deterred from violating the wildlife regulations. Meetings with the new RDFE-Sangha focused on

improving legal prosecution of wildlife law violators arrested by PROGEPP and transferred to the RDFE for legal processing.

**Activity 2.3. Bushmeat Control Along Key Tranport Axes in the Region**
On track

Agents of the RDFE-Likouala implemented a series of wildlife conservation activities with technical assistance from PROGEPP and LTCR staff and funding from USFW Elephant Conservation Fund. Controls at the airport were implemented on all days of flights (3 days/week) to reduce bushmeat export from Impfondo to Brazzaville. The Regional Director, M. Noel Baobab organized a series of public awareness meetings with communities in the Region of Epena, Enyelle, and Dongou concerning the principles of conservation and wildlife management. The RDFE also published three official notices to the authorities and the population of Impfondo and the Likouala drawing their attention to wildlife law principles and enforcement policies.

Bushmeat surveys at key road and river points and at the airport in Impfondo continue to be conducted by LTCR and RDFE-Likouala control teams. Methods consist of recording bushmeat leaving the Reserve via the Epena – Impfondo road on a minimum of 10 randomly selected days of each month. Similar controls are conducted on the river system, but river controls are non-random, focusing only on transport of bushmeat on the large commercial boats leaving the region. The RDFE-Likouala, in collaboration with the LTCR and PROGEPP, is monitoring all meat seized at the Impfondo airport. Data currently being compiled and analyzed will be included in the next reporting period.

Collaboration between PROGEPP and the RDFE-Sangha has improved with the arrival of the new Regional Director, M. Leonard Mouboundou. Five coordination meetings were held during this period to promote collaboration between PROGEPP and the local RDFE brigades working in Kabo and Pokola, ensure sound communication and feedback in wildlife law applications, and engage the RDFE with direct responsibility for the implementation of controls of bushmeat traffic at the Ouesso airport. A plan was developed in February 2001 to shift the implementation of the airport controls from PROGEPP to the RDFE agents based in Ouesso. By the end of March the responsibility for execution of the operation had been successfully transferred. The RDFE also engaged in organizing several awareness meetings with communities in Ouesso and has played an active role in supporting PROGEPP activities in general.

**Activity 2.4. Conservation Awareness and Education Initiative**
On track

Two PROGEPP educators implemented the conservation awareness campaign in the Kabo, Pokola, and Loundougou areas. Two protected species education and PROGEPP awareness meetings were also held in Ouesso with 171 student and faculty participating. An Ouesso-based environmental NGO collaborated in this effort and undertook a field trip to the Kabo and Pokola concessions to learn about potential areas for collaboration on promotion of conservation awareness and alternative activities

Education lessons at the Kabo and Ndoki 2 schools focused on: justification of the protected species program in the school, vegetation and habitat, protected mammals, diet and the importance of protein and vegetables, primate species ecology, primates and human interactions. Total participation in the Kabo and Ndoki 2 conservation education activities was 264 with an average of 29 participants/session.

The protected species education manual and curriculum was further in developed in collaboration with the Regional Education Ministry authorities. The manual is expected to be finalized and published by July. Mark Gately (author of the WCS-Congo website (Activity 2.9)) has begun to assist the PROGEPP

education team in the finalization of the manual, information bulletins on specific subjects, and a teaching guide for publication.

LTCR began a protected species education campaign in each of the 27 villages in and near the Reserve. The LTCR staff created a poster depicting the protected species found within the Reserve limits and distributed them for display in schools, hospitals, offices, village shops, and other high profile spots throughout each village. Posters were also given to all public transport vehicles (both large boats and bush taxis) for display in their windows. In addition, three LTCR educators held awareness-raising meetings in villages to discuss protected species laws and how these laws affected the local population.

Public meetings on wildlife management principles and hunting techniques were held with the Bambejele pygmy populations in the villages of Terres de Kaboungas, Mobangui, Dzèlo, Mossanguélé, Mbili, and Mossombo. These meetings aimed at prompting awareness among hunters and their families, had a high participation and attracted 166 different Bendjele community members over five meetings with an average of 33 participants. The Kabo football team sponsored by Columbus Zoo and WCS advanced to the regional tournament in Ouesso. The team's uniforms and equipment, provided by Columbus Zoo, display the "Large mammals of northern Congo" emblem promoting the protected species conservation campaign. This public awareness technique has been positive for perceptions of conservation both locally and regionally.

Various PROGEPP teams held meetings with the communities of Ikelemba, Terre de Kaboungas, Kabo, and other key villages in the concessions. Two meetings addressing elephant poaching issues were held with the Ikelemba community in collaboration with the RDFE Sangha. The southern Pokola area, which has recently been opened to road access due to forestry exploitation progression, has become the entry point for many elephant poachers. A strategy involving the community was developed to reduce this threat by enforcing wildlife zoning, recruiting several ecoguards from the village, establishing an advanced post. Two meetings were also held with the Kabo community regarding wildlife management regulations and sound hunting principles.

The Congo TV team, supported by with USFW funds via PROGEPP, finalized the documentary film on elephant conservation and aired a magazine piece on the bushmeat trade and controls at the Ouesso airports. This film generated a great deal of interest at high levels in the country.

A German film company, Arts and Entertainment (led by Cynthia Moses), and more recently a Japanese film team, produced films on the efforts of PROGEPP to reduce the bushmeat trade and promote wildlife conservation and management in the CIB concessions. The German film was aired on several European channels in December 2001 and the Moses film was aired in the US in March 2002. A journalist and photographer from Discover Magazine visited the region in February to produce an article on the bushmeat issue for publication in the fall of 2002.

**Activity 2.5. Alternative Resource Provision**
On track

**Peripheral Zone:**
The alternative activity program aims to decrease pressures on wildlife populations by: promotion of alternative income sources for local traditional people in place of commercial bushmeat hunting and promotion of local community managed activities that increase alternative animal protein availability (beef, chicken, fish, etc.) in the forestry concessions.

Activities are designed and experimented at both CIB sites and traditional villages with explicit care taken not to encourage development that promotes secondary immigration of people from outside the area. Emphasis is placed on supporting local individuals with long-term ties to the area and who demonstrate concrete personal engagement. At CIB industrial sites and camps the company takes the lead responsibility for these activities, with WCS and MFE providing technical support.

A team of three national alternative activity technicians under the supervision of the CIB management plan coordinator (Fred Glannaz) and PROGEPP coordinator worked extensively at CIB sites and in the traditional villages of the concessions. Since January a team of CIB representatives worked with PROGEPP technicians in Pokola to maintain the projects that had been under Fred's supervision.

Progress during this period included:

- Technical and material assistance to traditional farmers with the vaccination of 1345 chickens in the Kabo and Pokola concessions and distribution of 2 $m^3$ in sawn wood for construction of closure for goats and sheep to villagers in the Terres de Kaboungas area.
- Technical assistance to farmers raising meat chickens in Pokola including facilitation of the supply of chicks and construction materials. CIB and PROGEPP supported the construction of a new chicken farm with an expected capacity of 8000 chickens/rotation.
- Technical and material assistance to tilapia fish farmers to increase production and the number of farmers. CIB contributed 25 hours of bulldozer time to construct 14 tilapia basins and provided transport assistance for equipment and materials from Ouesso. PROGEPP technicians provided permanent support and materials such as hoes and levels.
- Material assistance to local fishermen consisted of small loans to fishermen in the form of 1800 m of fish net, 6 rolls of line, and 7100 fishhooks. The PROGEPP research and monitoring program also initiated an investigation to establish baseline data and monitor fresh water fisheries off-take in the region.
- Material and logistical assistance and technical support to beef cattle importers in the Kabo and Pokola concessions consisted of the construction of a butcher shop at the Kabo market and regular CIB transport of cattle from Cameroon. The price of beef has decreased from 2200 to 1700 FCFA/kg in Pokola as a result of these efforts and monthly cattle consumption in Pokola has increase from 7 head in 1999 to 22-25 head in 2001.
- Technical assistance to pilot projects in guinea pig raising has progressed with the distribution of three pairs of guinea pigs and wooden cages to interested local farmers.
- Pilot projects in snail raising as an alternative activity has progressed with the effective establishment of a production system in Kabo with adults reproducing 96 young and 15 eggs to date. This experimentation is encouraging as snails are locally consumed by many ethnic groups in the region who harvest them wild from the forest.
- Assistance to vegetable farmers consisted of the sale, at cost price, of thirty 5 kg bags of seeds and two loans to farmers in the region.

**LTCR:**

During the first half of FY 2002, LTCR managers began discussions with the Likouala regional military commander to determine alternative means of feeding the military troops in Impfondo. The military base currently feeds its new recruits bushmeat. Our goal is to eliminate the military base as a threat to the wildlife populations in and around LTCR.

**Activity 2.6. Reduced-Impact Logging**
On track

Frederic Glannaz, CIB forest manager, conservationist, and CIB point person for PROGEPP activities over the past four years, died in December 2001 following a tragic accident in Pokola, northern Congo. His commitment to conservation, improving forest management, and helping forest peoples will be greatly missed by WCS, CIB, and local communities. In addition to contributing to many important successes and progress in forest management and alternative activity development in the peripheral zone, Fred played an integral role in the assessment and decision making process resulting in the protection of the Goualogo Triangle.

PROGEPP staff (with input from other WCS experts) is in the process of reviewing and commenting on the draft RIL program guidelines produced by Fred Glannaz, Benoit Demarquez and Dennis Dykstra for CIB in September 2001. CIB recruited a new management plan coordinator, Domic Paget, in April 2002 who will be responsible for overseeing implementation of the program.

Dr. Nadine Laporte, assisted by Tiffany Lin, undertook a consultancy in February-March to produce a vegetation land cover map of the CIB concessions and propose methods to monitor the impact of forestry exploitation using remote sensing tools. This work, supported by ITTO funds, builds upon the work initiated by Dr. Laporte and Fred Glannaz in 2000-2001. Ground and aerial verification surveys were conducted in collaboration with BCLS staff and CIB management plan teams. A final report has been produced and maps of the concessions should be finalized by June. These maps will be adjusted iteratively as verification is improved. Dr. Laporte will be asked to undertake follow-up work in September-October 2002.

**Activity 2.7. Research Methods Training**
On track

All research projects (Activities 1.1 and 1.3) include the participation of Congolese assistants. Monthly meetings held in Bomassa give these young researchers the opportunity to present results of their projects, and to discuss how best to apply results to meet conservation objectives. The research meetings, which started in April 2000, are now in their second year. During the reporting period, Congolese researchers presented seminars on the following topics: the effect of logging prospections on a population of chimpanzees in Conkouati-Douli NP (Jean-Robert Onononga); elephant population structure and ranging behavior based on observations at three bais within Nouabalé-Ndoki National Park (Clement Inkamba-Nkulu); an update of the study of large mammals and human impact in Lopola, Ipendja, and Mokabi concessions, with particular emphasis on elephant distribution (Patrick Boudjan); human-elephant conflict and analysis of resolving crop raiding problems (Dieudonné Ekoutouba) and, marine turtle monitoring in Conkouati-Douli National Park (Jean-Robert Onononga). Dr. Maisels also continues to mentor these research assistants on a daily basis in all aspects of data collection, management, and interpretation in order for them to gain an understanding of the importance that sound research can play in the effective management of protected areas.

In the LTCR, four socio-economic assistants were trained in the scientific method and sampling and socio-economic survey techniques, such as how to design and conduct questionnaires, how to design village maps, how to create a village history, and basic statistical analysis. Three national assistants were also trained in water bird identification and census techniques. The assistants practiced the technique during water bird studies conducted in December 2001 and March 2002.

The PROGEPP research team recruited two new assistant researchers who received training in ecological and socio-economic research methods from researchers Antoine Moukassa, Richard Malonga, Alain Ampolo, and the director. Calixte Makoumbou and Germaine Mavah have demonstrated high motivation and rapid skill acquisition in large mammal and human activity forest surveys and hunting and socio-economic research respectively. Both have quickly learned to use Excel and GPS, manage field teams, and make sound observations with proper documentation.

**Activity 2.8. Technical Training**
On track

LTCR national biological and socio-economic assistants, ecoguards, and the Head Warden took part in a three-day GPS seminar. Participants learned the utility of geographical information and how to read maps, to use a compass and GPS.

A one-week training was held for all LTCR researchers and the Head Warden to train them how to use a computer, especially Windows and Office programs, in October 2001. At the end of the data collection for LTCR large mammal transects, the four national LTCR biological assistants will aid in the manipulation of data in Excel and estimation of animal densities using the program Distance.

**PROGEPP:**
The PROGEPP project director, project coordinator, and project administrator mentored MFE officers, ecoguards, educators, administrators, and national researchers in project management, education, forest/wildlife management, research/monitoring and GIS data-basing. All staff team leaders and researchers are trained in use of computers (Excel, Word) and mentored in workplan development, budgeting and reporting on weekly, monthly, six month and annual cycles. GIS and English language skill development are encouraged particularly for researchers.

PROGEPP national staff development highlights (in addition to the training of new young researchers Activity 2.7) included:

- Moise Zoniaba, chief of personnel and assistant administrator, has demonstrated competent abilities in accounting using Quicken, Access, and Excel, skills in budget tracking, personnel management, project reporting (especially to ITTO), and interpretation of laws and representation of the project with local and regional authorities. Moise is interested in further developing knowledge and skills in project management, as well as use of Access in administrative database management.
- Marcel Ngangoue, MFE officer, chief of PROGEPP wildlife protection activities, has developed skills in the area of law enforcement data collection, organization, and management of personnel using incentive/disincentive and evaluation systems, production of technical reports and documents, and is a skilled field patrol leader. He was one of ten MFE officers selected for a training program in Tanzania, which however, was delayed for financial reasons. Marcel would very much like to receive formal training in conservation and wildlife management at Garoua Wildlife School or Mweka in the pursuit of an advanced diploma.
- Antoine Moukassa, socio-economic researcher, has developed the capacity to design new studies with appropriate methodologies and data analyses. Antoine has developed skills necessary to represent WCS at various regional, national, and international conferences, particularly in the areas of socio-economics and bushmeat. He presented a paper at the FAO/IUCN sponsored conference on bushmeat held in Yaounde, Cameroon

in September 2001. His personality, technical knowledge, and management skills have helped him develop as an innovative researcher and strong leader. Antoine has good potential to take on project management responsibilities in addition to research.

- Richard Malonga, ecological researcher, has developed his capacity to design and carry-out studies, reporting coherently to WCS, the Government of Congo, and donors. Richard worked closely with Dr. Laporte on ground and aerial verification of landcover maps using GIS and is committed to developing his skills in spatial data analysis (GIS). Richard plans to apply his field skills in the pursuing a Masters degree investigation of landscape species (buffalo) in relation to land-use and habitat in the Ndoki-Likouala landscape.
- Michel Sienzo, education team leader, has honed his skills in communication, lesson design, and publication. A talented artist, Michel has learned to formalize education strategies and handle difficult situations with diplomacy and tact. Further training in use of media, education material design and publication will assist in expanding Michel's skills and expertise in conservation education.
- Noel Langalanga, ecoguard assistant patrol leader, has demonstrated sound field leadership qualities and prudent decision making skills in oversight of wildlife protection teams. Noel will receive further training in law enforcement data collection and personnel management strategies in order to further his professional development.

Three new MFE field patrol leaders were trained and integrated into PROGEPP wildlife protection activities. M. Charles Mabeke, a former sergeant in the Congolese Armed Forces, has demonstrated a high level of discipline in overseeing field patrol duties and ecoguard discipline instruction.

**NNNP:**
In addition to mentoring in scientific research as mentioned above in Activity 2.7, daily project operation at NNNP also includes long-term mentoring of Park administrative and management staff, with gradual devolution of responsibility to national staff for developing work plans and budgets.

In December 2001, the NNNP Project Director and Djoni Bourges, the MFE Head Warden, went to Yaounde (Cameroon) to represent the Park in meetings funded by UNESCO for new transboundary conservation projects. This Central African World Heritage Forests Initiative brought together the tri-national partners from Congo, CAR and Cameroon to discuss how best to coordinate future regional activities. In February 2002, Djoni Bourges traveled to Paris to participate in a follow-up meeting that resulted in concrete proposals for future funding of this initiative.

Both Clement Inkamba-Nkulu and Patrick Boudjan, research assistants in the NNNP elephant monitoring program, have been trained to carry out their own planning, budgeting, and accounting, and are now responsible for their own data entry, backups, analysis, and reporting. Their reports are of a sufficiently high standard to be sent directly to US Fish and Wildlife Service, the main donor for these activities. Mr. Inkamba-Nkulu has mastered videography, video capture and data basing of the captured imagery, has designed an Excel-based elephant identification key, and has shown exceptional organizational ability. Mr. Boudjan presented a talk in English to donors in March 2001, and we are working to improve the English capabilities of all the senior research assistants, with the aid of books and audio CDs. Mr. Boudjan has also made good progress in the use of GIS including some aspects of Spatial Analyst.

Building of national capacity in the Nouabalé-Ndoki project also included the recruitment of a new research assistant (Jean-Robert Onononga) to the Goualogo Chimp project, under the direction of David Morgan and Crickette Sanz. Mr. Onononga is responsible for the implementation of the before-and-after

logging chimpanzee study currently underway in the Goualogo Triangle and the adjoining area to the south (Activity 1.2). He had already received training from WCS staff in 1999 during the three-month ecological methods training course, and received a refresher course in late 2001.

A new researcher arrived in Bomassa during this reporting period named Mustapha Mamadou. Mr. Mamadou was a successful student at NNNP in 1999-2000 and he is now responsible for the Wali Bai monitoring, the road study, and is learning phenology methodology.

**Activity 2.9. Development of Ecotourism Activities**
On track

The government of Congo has expressed a keen interest in developing ecotourism within its protected areas. Despite the difficulties associated at present with travel in Congo, which limits the number of potential tourists, the NNNP team has begun to slowly develop a strategy for welcoming visitors to the Park. During the reporting period, improvements were made to existing infrastructure (with funding from WCS and CARPE), which allows a maximum of six tourists to comfortably visit three sites in and around the Park. In addition, the WCS-Congo website (www.wcs-congo.org) was updated, a 2002 calendar was developed, and preliminary designs were prepared for an NNNP poster and pamphlets which we expect to print in the second half of FY02. All personnel (cooks, guides, boat drivers, etc) who will be affiliated with the tourism program undergo continuous training to prepare them for welcoming visitors. Finally, contact has been established with tour operators in Congo, Gabon, South Africa, Japan and the UK to explore interest in the NNNP program. During this reporting period, the Park was visited by 13 tourists (from Germany, Japan and the USA).

**Activities 2.10. Integration of Forest Peoples Communities into Management**
**On track**

The planned PROGEPP expert consultancy on forest peoples in the peripheral zone is tentatively scheduled for September-October 2002. BCLS socio-economic databases were expanded during this period with information on Bendjele communities and other peoples living in the Mokabi concession and updating of demographic databases for the Kabo, Pokola, and Loundougou concessions (Activities 1.4). Integration of communities in the development of LTCR management procedures will begin in the coming year. Currently, the WCS LTCR project is collecting the baseline data so that management policies and zoning can be appropriately developed with local communities.

**OBJECTIVE 3: Promote the development of national policies that support the landscape conservation approach.**

**Activity 3.1. Wildlife Law**
Delayed

As with other Congolese government administrative processes, the wildlife law is still awaiting finalization and adoption. The recent constitutional and presidential elections in early 2002 delayed progress, and legislative elections scheduled for late May 2002 will certainly further delay government work.

**Activity 3.2. Wildlife Management Workshops**
On track

The terms of reference for a workshop on Wildlife Management and Conservation in Forestry Concessions was developed and dates fixed for July 29-August 2, 2002. The principal objectives of the workshop are for managers and policy makers to examine, refine and propose basic templates for wildlife management, law enforcement, and monitoring programs at the scale of forest concessions and identify the process necessary for their integration in concession level, regional and national level planning in the Republic of Congo. Eight government and private sector field level practitioners responsible for wildlife management and conservation programs covering an area more than three million ha. in Congo will learn from the experiences in the CIB concessions and acquire key information necessary for the successful implementation of programs in their respective concessions. The Directors of wildlife of Central Africa will have an opportunity to gather information about the progressive process in Congo and apply the results of this experience to strategies in their respective countries as appropriate.

**Activity 3.3. Safari Regulations**
On track

The PROGEPP director has continued to consult with the MFE on safari issues and monitor safari interest in Congo. No safari lobby activity was observed in Congo during this period. However, the IUCN Antelope Specialist Group contacted the PROGEPP director (also the principal investigator of the bongo antelope research program) to request information concerning the Government's decision not to open bongo hunting in Congo. IUCN was briefed on the findings of the WCS bongo research program, the status of bongo populations in northern Congo, and the lobbying of safari interests to open elephant and leopard hunting in addition to bongo. These discussions assisted IUCN in developing a better understanding of issue and the factors contributing to the decision of the Government of Congo. The PROGEPP director continues to actively provide information to IUCN as a member of the IUCN Antelope Specialist Group.

Discussions were held with tri-national partners from Cameroon and CAR regarding bongo management and monitoring programs. WWF and Government representatives agreed to contribute information on bongo safari off-take and quotas. Recommendations for conservation, management, and monitoring of bongo populations in the tri-national area are being formulated based on the findings of the Congo based bongo research program (Activity 1.3).

**Activity 3.4. Wildlife within Forestry Concessions**
On track

A paper entitled "Wildlife conservation and management in forestry concessions in northern Republic of Congo." Elkan *et al.* will be presented at the Society for Conservation Biology meeting in July. This examination of PROGEPP work aims to inform technical practitioners, logging company representatives, and conservation NGOs on the approach, methods, progress, and lessons learned in the Kabo and Pokola concessions over the past three years. Antoine Moukassa gave a presentation "Monitoring wildlife management efforts in forestry concession in northern Congo" at the FAO/IUCN sponsored conference on bushmeat and food security held in Yaounde, Cameroon in September 2001.

WCS International Programs Vice President, Dr. John Robinson, and the WCS-PROGEPP director contributed to the development of the Terms of Reference for a World Bank CEO Forum-sponsored independent assessment of the CIB, WCS, and MFE initiative in the concessions, to take place in 2002. The assessment is geared to inform timber companies, NGOs and governments that might want to engage

in similar collaborative efforts, including but not limited to the companies and NGO members of the CEO Africa working group. The assessment will also evaluate criticisms of the CIB-WCS-MFE collaboration, such as questions of transparency related to third party visits and public access to the concessions.

**Activity 3.5. Lac Télé Reserve Limits**
On track

Working with the Head Warden, the Lac Télé project direction is currently evaluating the proposed legal limits of the Lac Télé Community Reserve to provide recommendations for appropriate modifications. A specific proposal will be developed once the biological and sociological data have been completely collected and analyzed for the Reserve, as these baseline data will indicate the distribution of important animal populations.

**OBJECTIVE 4: Elaborate a participative, integrated landscape conservation action plan.**

**Activity 4.1. Coordination Meetings**
On track

Although there was no formal meeting of all Ndoki-Likouala landscape partners during the reporting period, several meetings took place between the LTCR-NNNP teams, between the NNNP-PROGEPP teams, as well as between PROGEPP and LTCR partners. Regular contact is also facilitated by daily radio communications among the three sites.

Bi-annual meetings regarding the Kabo-Pokola-Loundougou forest management plan provide a formal context for interaction of the Ndoki-Likouala partners, MFE and RDFE representatives, private timber companies, donors and other stakeholders. Upon adoption of the NNNP management plan (Activity 4.4) a similar formal steering meeting system will be established, further promoting information exchange and collaboration on issues particularly related to the Park's management.

**Activity 4.2. Kabo-Pokola-Loundougou Management Plan**
On track

PROGEPP continued to contribute to the development of the CIB concession management plan during this period through oversight of the CIB wildlife inventories, support of Dr. Laporte's work on monitoring and landcover mapping, wildlife management programs, socio-economic and ecological studies, alternative activity program development, and conservation education in the concessions.

A steering committee meeting for PROGEPP and the CIB management plan was held in Pokola in January 2002. Participants in the meetings included: Juergen Blaser (Swiss Government), Eva Mueller (ITTO), General Director of Forestry Economy, Inspector of MFE, Director of Forests, and Director of Wildlife and Protected Areas, Director of PROGEPP, Director of CIB, Representative of the Governor of the Sangha, Regional MFE Directors of the Sangha and the Likouala, CIB management plan coordinators, GTZ observers, and others. These meetings reviewed reports, work plans, and budgets and oriented strategies for the PROGEPP and CIB management planning process. Overall the meetings were very positive and successful in promoting information exchange and technical orientation). The PROGEPP staff and CIB management plan team have established a tentative schedule to work with consultants and other experts to draft wildlife management/conservation, socio-economic, and monitoring chapters for the management plan for the Kabo, Pokola, and Loundougou concessions.

**Activity 4.3. Mokabi Concession Management**
On track

The Rougier Company has adopted the wildlife regulation template from CIB interior regulations, and has begun to apply them in management of the Mokabi concession. PROGEPP staff drafted preliminary wildlife management guidelines for the Mokabi concession based on the findings of BCLS ecological and socio-economic research and the lessons learned from the CIB concessions. These guidelines will be proposed for adoption by Rougier and MFE. Over the course of this period a contractual agreement was negotiated between Rougier, MFE, and WCS for the establishment of a joint project to improve management of the Mokabi concession based on the model developed in the CIB concessions. An advanced draft (April 2002) is currently under review for final comments and adjustments.

**Activity 4.4. Protected Area Management**
Delayed

**NNNP:**
During the reporting period, the NNNP Director and the MFE Head Warden traveled to Brazzaville to meet with Ministry officials regarding final adoption of the NNNP management plan. Following lengthy discussions, the plan was not accepted. Subsequently, NNNP staff worked directly with MFE personnel in Brazzaville to complete the revisions sought by the government, and it is hoped that this document will finally be adopted in the second half of FY 2002. The Ministry has decided to include approval of both the NNNP management plan and the annexation of the Goualogo Triangle in the same administrative process.

**LTCR:**
The biological and socioeconomic surveys that will provide information for future management of the LTCR are ongoing.

## c. Key management issues

1. The development of roads associated with opening of the forestry concessions and public roads needs to be dealt with in a coherent planning process. At present there is little planning, no environmental assessment, and little political will to slow down road building. On the contrary it is the driving impetus. The Loundougou road could have been moved away from the Park by 15 km with international development funding as part of a regional development plan. A remote option still exists to lobby the Government of Congo, EU, World Bank, and others to finance a road passing via the Terre de Kaboungas which would open road access to more than 7000 inhabitants of traditional villages and allow CIB to close or at least greatly restrict circulation on the current Loundougou road. Cost estimates to move the road require ground data for this scenario and quantified consultation with public work experts. A concerted multi-national focus needs to be brought to bear on northern Congo in order to develop a proper road and demographic center (towns, cities) development plan. The EU and other international donors have expressed interest in funding such a plan.
2. The finalization of the agreement between Rougier, MFE, and WCS for the establishment of PROGEPP in the Mokabi concession is imperative to properly address the threats developing in the areas north of the NNNP. An advanced draft (April 2002), currently under review provides for a comprehensive approach including wildlife protection, road planning, demographic controls and management, conservation education, hunting management, land-use zoning, socio-economic and ecological monitoring, RIL, and other activities.

3. Final adoption of the NNNP management plan and the official administrative procedure for annexation of the Goualogo Triangle, remains in the hands of Ministry officials in Brazzaville. The Ministry has decided to include both in the same administrative process. The recent constitutional and presidential elections in early 2002 retarded progress, and legislative elections scheduled for late May 2002 will certainly further delay government work and signatures.
4. The Lac Télé Likouala aux Herbes Community Reserve has potential to provide an informative model in Congo for collaborative management of natural resources with local communities. With only limited funding, however, feasibility work, surveys and staffing will be significantly constrained, and the role that the LTCR plays in the Ndoki-Likouala Landscape Program will be limited.

**III. Success Stories**

1. The MFE has demonstrated clear interest and active engagement in taking on more direct responsibility for wildlife conservation implementation activities. Effective collaboration has been developed with the Regional Directions of Forestry Economy of the Sangha and Likouala through coordination meeting and field activities funded by the USFW elephant conservation fund. Bushmeat controls and monitoring, public awareness, wildlife law enforcement, and other actions are increasing the confidence and enthusiasm of the RDFE agents in Ouesso and Impfondo regarding wildlife conservation and BCLS Despite many difficulties related to the November patrol incident, the MFE supported PROGEPP to continue and expand wildlife protection activities in the forestry concessions in collaboration with local communities, MFE, and CIB. As wildlife protection activities in multiple-use forests are expanded, the MFE will need to organize and expand its capacity to process and deal with legal procedures related to wildlife law enforcement efforts. Training will be required for protection brigade leaders in law enforcement, personnel management, and monitoring.
2. The LTCR team has developed a dynamic collaboration with the authorities in the Likoula region and has been successful in increasing the profile and support base for integrated community conservation. The LTCR team has developed a dynamic collaboration with the authorities in the Likoula region and has been successful in increasing the profile and support base for integrated community conservation. The agreement reached with local military officials to discontinue hunting within the Reserve is an important victory for the Project. The education programs within the villages serve not only to increase contact with local communities, but also to promote conservation measures important to the Project's success (for example, the improved understanding of species integrally protected by Congolese law). This local focus will soon be expanded to a national level with the upcoming diffusion of a film about Lac Télé made in collaboration with Congo TV.
3. Collaboration between the PROGEPP and the Regional Direction of Forest Economy-Sangha has improved with the arrival of a new Regional Director, M. Leonard Mouboundou. By the end of March, the responsibility for execution of the Ouesso airport bushmeat control operation was successfully transferred from PROGEPP to the RDFE.
4. The PROGEPP and CIB management plan steering committee composed of Government, ITTO, CIB, and WCS representatives agreed upon a series of engagements including the expansion of the model to other forestry concessions in northern Congo. International donors have expressed strong interest in supporting the PROGEPP-Mokabi component.

**Appendices**

1. Ndoki-Likouala conceptual model