Survey Of Endangered Forest Primates In Western Ghana

Report On Field Work In Reserved And Public Land In Western Ghana
From April To November, 1997

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1. SUMMARY

Surveys over the past decade revealed that the primates of the forest zone of western Ghana faced very server threats to survival, particularly for the tree subspecies endemic to the region: the Waldron's red Colobus (*Procolobus badius waldroni),*which was considered to have already gone extinct; the Roloway monkey (*Cercopithecus diana roloway);*and the white - collared mangabey (*Cercocebus atys lunulatus).* This raised much concern for the long - term survival of other forest primates: the black-and-white colobus (*Colobus vellerosus),the* olive colobus *(Procolobus verus*), and the western chimpanzee (Pan troglodytes verus). This report presents the findings of a follow-up survey of forest primates of western Ghana and far south-eastern Cote d'Ivoire I conducted between April and November 1997.

I did not observe Waldron's red colobus in any of the survey areas. Local hunters and bushmeat traders generally believed it had been terminated in their areas more than four years ago. Only the large, mainly inaccessible, swamp forests of far south-eastern Cote d'Ivoire offered some hope for a remnant population; even then, such a population may be wiped out before it is found, as a result of the fast land reclamation for agricultural purposes, and high hunting pressure. The black-and-white colobus was also not seen in any survey area. It was found to be rarer than presumed; largely accounting for this was its emerging adaptive behavioural change of suppressing or, in some cases, abandoning its characteristic loud longcall to avoid detection by hunters, even in places where its presence was reported by locals.

White - collared mangabey was observed in Draw River and Yoyo River Forest Reserves in Ghana, and a carcass from the swamp forests of far south-eastern Cote I'voire was collected in south-western Ghana. Informants reported its presence in almost all the survey areas. It was, however, very difficult to detect because of the adaptive largely terrestrial habits, which makes it vulnerable only to the unusual practice of hunting with dogs in the forest zone.

Roloway monkey was apparently more common than presumed; it was sighted in the Draw River and Boin River Forest Reserves, and was reported by informants to be present in Dadieso, Boi-Tano, Yoyo River and Tano - Nimiri Forest Reserves, and in the Ankasa Resource Reserve. . A juvenile male was collected from the swamp forest of southeast Cote d'Ivoire

The western chimpanzee was not seen in any survey area but evidence of its recent presence were found in Ankasa Resource Reserve (an adult-male jaw), Yoyo River Forest Reserve (a six- month-old nest), and Tano - Nimiri Forest Reserve (two very old nests). Its presence was reported by hunters in other survey areas, particularly Draw River and Dadieso Forest Reserves.

The olive colobus was the most common of the six survey species, and was observed in Dadieso, Draw River and Yoyo River Forest Reserves. It was reported by hunters in all the survey areas, and is expected to be the only survey species likely to expand its population and range by colonizing the rapidly expanding secondary forest over the next few decades.

All survey areas were observed to be undergoing rapid habitat disturbance, mainly in the form of commercial logging and slash-and-burn subsistence farming. An influx of migrant farmers, mainly to the south- western forest zone of Ghana in response to acute land hunger elsewhere in the country was being facilitated by major road and electrification development programmes that increased access to previously very remote areas. Compounding this was the strong utilitarian attitude to forest resources by both policy makers and local communities without any marked efforts at effective resource management; the protection efforts of the Wildlife and Forestry Departments were largely ineffective as a result of poor pay, understaffing,and lack of logistics, among others.

Given the alarming rate of habitat destruction and extermination of these primates,. I recommend, as a matter of urgency, more intensive surveys to establish their exact status and the formulation of a strategic action plan for the primate community of the Upper Guinea rainforest zone.

2 . INTRODUCTION

The Pleistoscene era is believed to have created forest refuges of which the Upper Guinea rainforest region is considered a global "hot spot" for its high species diversity and endemism. The high forest zone of western Ghana constitutes a special section of this region and contains a distinct community of primates including the endemic red colobus (*Procolobus badius waldroni*), the white-collared mangabey (*Cercocebus atys lunulatus*), and the Roloway monkey *(Cercopithecus diana roloway).*

Centuries of human settlement in the region have put an intense destructive pressure on its fauna, particularly on the endemic primates. Warnings of the eminent extinction of the primates of the forests of Western Ghana were given as far back as forty years ago when Booth (1956) expressed concern about the future of the red colobus unless effective conservation measures were taken. Fifteen years later, forest wildlife still had little real protection and hunting was rife even in reserves (Jeffrey, 1970). Prospects for Ghana's rainforest wildlife appeared to improve with the establishment of the Bia National Park/Game Production Reserve in 1984, and the Nini - Suhien National Park/Ankasa Game Production Reserves in 1976 (Asibey, 1978, Gartland, 1982). The IUCN (1994) listed these reserves as sites where red colobus, Roloway monkey and black -and-white colobus, *(Colobus vellerosus)* were protected, based on research findings in the 1970s. This led to the assumption by the international conservation community that these monkeys, and the western chimpanzee (*Pan troglodytes verus*), were secure in Ghana (Lee *et al,* 1988*).*

The paucity of research on these monkeys during the 1980s sustained this assumption until surveys by Struhsaker and Oates (1994) in Ankasa Resource Reserve (RR) and Bia National Park (NP) and revealed that the endemic primates in particular faced very severe threats to survival as a result of poor protection, and that red colobus may be on the brink of extinction in Ghana.

Subsequent surveys by Whitesides and Oates (1995) and Oates (1996) in Ankasa RR, Nini-Suhien NP, Bia NP, Bia RR, Krokosua Hills Forest Reserve (FR) and other FRs, all in the forest zone of western Ghana, revealed that:

i. red colobus may have no remaining viable populations in Ghana.

ii. Roloway monkey could be confirmed only in Ankasa RR and Nini-Suhien NP.

iii. white-collared mangabey may be extinct in the area.

iv. black-and-white colobus, olive colobus, and western chimpanzee were under severe threat in areas from which historical specimens were collected.

Mason (1995) surveyed fifty-eight reserves in Ghana and reported the "possible" presence of red colobus in Ankasa RR, Nini-Suhien NP, Boin River FR and Boi-Tano FR, with an estimated population size of "less than 200 individuals". Roloway monkey was reported at 5000 + individuals; and white-collared mangabey (1000-1500), black-and-white colobus (15000 +), olive colobus (20,000 +) and chimpanzee (1,500 - 2,200) were allegedly widely distributed in their historical range. Oates (1996), however, viewed the robustness of Mason's conclusions with scepticism, a stance strongly supported by other staff of the Wildlife Department with substantial knowledge of Ghana's wildlife. The survey apparently relied heavily on hunter information, and details of field techniques were not given.

There was, therefore, the urgent need to substantiate Mason's claims, considering its inconsistency with other research findings. Due largely to time limitations, surveys by Oates, Struhsaker and Whitesides were concentrated on wildlife reserves in western Ghana. Relatively little time was spent in forest reserves surveyed. Moreover, some forest reserves in the historical range of these primates in the southwest were largely inaccessible as a result of numerous streams, major rivers and difficult hilly terrain. Some areas of these reserves are designated Hill Sanctuaries, which have either never been logged or were last logged over 50 years ago and therefore, were assumed to be a good representation of the original forest habitat and, hopefully, fauna.

Oates (1993), Struhsaker and Oates (1994), Oates (1996) and the IUCN (1996), among others, called for additional surveys to clarify the status of the forest primates of south-western Ghana, particularly of the endemic red colobus, Roloway monkey and white-collared mangabey. This report is of a follow-up survey I conducted at various sites mainly in the remnant rainforests of south-western and mid-western Ghana ,and in the extreme south-east Cote d'Ivoire, between February and November 1997. The objectives were to :

i. identify any surviving populations of Miss Waldron's red colobus, Roloway monkey, white-collared mangabey, black-and-white colobus, olive colobus and the western chimpanzee

ii. assess the viability of any extant populations

iii. identify measures that could be taken for their effective conservation.

I sought not only to investigate the current status of the threatened primates but also to examine, more broadly, the current status of the rainforests of south-western Ghana, particularly in the forest reserves visited.

3. METHODS

The surveys were conducted in forests considered to retain a more complete remnant of the original flora and fauna (especially of the survey species) of the rainforest zone of south-western and mid-western Ghana, and the extreme south-eastern Cote d'voire. I selected survey areas on the basis of information acquired from maps; reports on vegetation of forest reserves, wildlife reserves and their surrounding areas (e.g. Hawthorne and Juam Musah, 1993); and consultations with staff of the Wildlife Department and Forestry Department. Information sought included (but was not limited to) :

i. sites where the survey species were believed to be either currently or formally present and
ii. exploitation activities currently going on in such areas.

The nature of the survey demanded that I use a variety of standard techniques applied in Ghana and elsewhere in West Africa, e.g. Oates *et al* (1992); Struhsaker and Oates (1993); Butynski and Kostner (1994); Oates and Whitesides (1995). I conducted extensive foot surveys at low speed (approximately 1 - 2 km/h). The survey did not necessitate cutting of transects ; instead, access roads as were already available (logging roads, bush trails, etc.) were used to minimise noise and habitat disturbance. As these routes were usually not straight, I was unable to measure distance covered precisely; therefore I used time spent on a particular route, augmented by a rough distance estimation with an electronic pedometer.

When sightings or sounds indicative of primate presence were made I spent some time (usually 10 minutes, but occasionally more) attempting to collect information regarding the:

i. identify of the species present
ii. estimated numbers, where possible
iii. activities engaged in, and
iv. location of the group/individuals, using a Magellan GPS "Trailblazer" unit. when possible.

Following Struhsaker (1989) and Whitesides (1989) an assemblage of individual primates of different species occurring within 50m of each other was identified as a *polyspecific/interspecific association (*or simply *"association"*). Also, observations were made of signs or sightings of other animals in addition to qualitative information on forest composition, such as dominant or common tree species present and an impressions on the general condition of the forest. I interviewed local hunters, residents, chopbar/bushmeat traders and loggers as well as staff of the Forestry Department and Wildlife Department. Interviewees were asked to give the vernacular names of animals (especially primates) they personally knew in the area, care being taken to avoid posing leading questions. They were subsequently quizzed about the relative body sizes, abundance in the area, pelage and vocalisation, as well as knowledge of their natural history. I also sought the local perceptions about the threats to extend population and their attitude concerning the importance of maintaining such populations in the wild. Interviewees who exhibited appreciable knowledge about the survey species were asked to mention the last time they last saw each species; guides for each survey area were selected from local hunters who had had the most recent, apparently reliable, sightings. Promising survey areas were selected for further studies during the survey.

I was generally assisted by a technical officer of the Wildlife Department, Kenneth Eshun (KFE) and a guide/hunter. Occasionally, additional guide services were provided by a knowledgeable field staff if the Forestry Department or a local hunter with more detailed knowledge of the location of a primate population. I also conducted a collaborative survey of islands in the Black Volta River near Bamboi in the Northern Region ,and Cape Three Points in the Western Region, with John F. Oates (JFO);and in eastern Cote d'Ivoire and Elenda(Ghana) with Scott McGraw (SM) and Isaac Monah (IM). An average of six days were spent in each particular location. See Appendix 2 for itinerary.

4. SURVEY FINDINGS

4.1 Black Volta River Islands (Bamboi)

The presence of Miss Waldron's red colobus on a cluster of islands in the Black Volta River near the town of Bamboi(≈ 08° 09.83 N, 02° 2. 01 W) in the Northern Region by Schoustsen (1996). Considering that the said location was far outside the known historical range of the species, it was imperative that the claim be verified. Thus, assisted by KFE and guided by Kofi Amoah,(who had provided guide services to Schoustsen in 1995), I conducted four foot surveys on the islands (≈ 08^0 09.76 N, 02^0 08.45 W), about 11.5 km West of Bamboi in April. The survey routes comprised one each on the two main islands, Wale and Fole, and a 4km route along the north bank of the river.

The survey area was made up of the two main islands, each approximately 1km long and 0.08km wide, an assortment of smaller ones of rocky outcrops that become submerged in the rainy season in August. At the time of survey the only closed canopy forests in the area were confined to the islands and the river banks: the sever annual bushfire at the peak of the dry season had devastated adjacent lands. The riverine forests were characterised by small emergents (≈ 10 - 15m tall; 15 - 30cm dbh), with an occasionally closed upper layer and sparse undergrowth; gaps created by fire were invaded by grass and the exotic weed, *Chromolaena odorata*. The not-well-defined middle layer was generally thick with lianas. Island trees included *Dialium guineenses, Morelia senegalensis, Combretum thonningii,, Diospyros eliotti* and *Cola laurifolia*; the gallery forest trees included *Celtis integrifolia, Combretum nigricans, Kigelia africana* and *Tamarindus indica.*

After almost 18hrs of survey time (covering about 12km) only one group of monkeys was observed. On the north bank of the river and near the westernmost end of the 4km route, we detected three individuals of a probably larger group of *Cercopithecus aethiops;* the subspecies could not be verified.On the westernmost tip of Wale we discovered the fairly complete skeletal remains of an adult Defassa waterbuck (*Kobus defassa*) claimed to have been shot in February 1997 by our guide.

At various points along the routes, we observed footprints of another Defassa waterbuck, those of two bushbucks (*Tragelaphus scriptus*) and of grasscutters (*Tryonomys swinderianus*). Also seen were several squirrel species, notably *Fiuscuirus* spp. and sun squirrels (*Helioscuirus* spp). A nursing female hammer bat (*Hypsignathus monstrosus*) with young was as seen at the centre of Fole island.

Judging form the abundance and diversity of bird species, the islands seemed to be of great avifaunal importance, both for migratory and resident species. I frequently observed the giant kingfisher *(Ceryle maxima*), long-tailed shag *(Phalacrocorax africanus*), white-headed plover *(Vanellus albiceps*) and little egret *(Egretta garzetta*) The violet plantain eater *(Musophaga violecea*) black-shouldered kite *(Elanus caeruleus*) and the grey plantain eater (*Crinifer piscator*) were also observed.

During interview of local hunters , farmers and fishermen who regularly plied the river, it became obvious that none of the survey species had been seen in the area in the living memory; no local name existed for the red colobus and the rollaway monkey had probably been exterminated from the area long ago; it was mentioned only by people who had sojourned in southern rain forest areas.The white-collared mangabey had probably been displaced by the patas monkey (*Erythrocebus patas*). Confusion in description of the survey species mentioned by interviewees and their inability to confidently identify them from field guides indicated lack of familiarity with them; even conflicting descriptions were given for the quite common green monkey. Surprisingly, Kofi Amoah, reputedly the best hunter in the area, could not give convincing account of his sighting of "red monkeys" with Schoutsen in 1996, and his knowledge of the other survey species appeared to have been gleaned from second hand information, probably from researchers.

No spent carbide form hunting lamp or empty shotgun shells were found on the survey route, neither were any snares found. We were however shown several locations of the very dangerous gin-trap by our guide; these were said to be more common on the southern river bank. Two

gunshots, some 6 mins. apart, were fired from Wale island less than 200m form us on the second day. We also observed that almost the entire stretch of river along the 4 km route had been poisoned for fish, some of which were seen being dried in hamlets along the river.

A subsequent visit with John F. Oates in late June confirmed my earlier observations, with the additional sighting of a group of spot-nosed monkeys (*Cercopithecus petaurista*).

4.2 Ankasa Conservation Area.

4.2 1. Ankasa Resource Reserve.

Any primate surveys in the contiguous Andasa R. R and Nini -Suhien N.P subsequent to those of Oates and Whitesides (1995) and Oates (1996) would necessitate intensive transect walks, which was outside the scope of the present survey. thus, the surveys |I conducted in the Ankasa RR was based on reports by local hunters and arrested poachers that white-collared mangabeys were present in the mid - southern portion of the reserve. I conducted two walking surveys with KFE and a local hunter in the area, working from a poachers" camp ($\approx 05^0$ 11.86N, $02^0$34.64w) to the east of an old logging road from compound village ($\approx 05^0$ 08.63, 02^0 36.97w) on the Takoradi - Elubo highway.

Records indicate that the southern parts of the reserve was subjected to light-intensity logging in the 1960s and again in mid-1970s. There was a general absence of large-sized trees; thick tangles of lianas rendered the undergrowth mostly impenetrable. Principal large trees included: *Uapaca guineeusis, Funtumia africana, Tighmella heckelli, Newtonia aubreville, Klainodoxa gabonesis, Musanaga Cercroioedes, Lophira alata* and *Parkia bicolor*.

In 13hrs (covering about 7km) survey work, we observed only one group of Campbell's monkeys. This group numbered at least eight individuals. The alpha male of probably the same group was

heard on two nights close to camp. The surveys had to be terminated on the fourth day as a result of severe rainstorm and high winds.

Local hunters claimed during interviews that troops of white-collared mangabeys in association with Campbell's and spot-nosed monkeys had been seen in the survey area over the past year, the latest being two months earlier. A former chew-stick *(Garcinia* spp) poacher claimed he had seen an association of Roloway monkey, olive colobus, white - collared mangabey and Campbell's monkey in the central part of the reserve two years earlier. All informants believed, however, that the black -and - white colobus and chimpanzee were absent from the reserve.

Old chew-stick tree stumps, remains of poachers' camps and both old and new snares indicated that there had been a large chew-stick poaching operation in that part of the reserve probably less than two years ago. Well-used bush-trails, along which could be found fairly new carbide piles from hunting lamps, and empty shotgun cartridges indicated an active (possibly overnight) hunting pressure. At our survey camp were the remains of poached animals: skulls of duikers (*Cephalophus* spp) and Campbell's monkeys, scales of tree pangolins (*Manis* spp) and shells of giant African snails (*Achatina achatina*). These findings were not surprising, however, as the camp was within 3hrs. brisk walk from the reserve boundary. The monkey and duiker skulls were deposited at the headquarters of the reserve.

Calls of tree hyraxes (*Dendrohyrax dorsalis*), hammer bats *(Hypsignathus* monstrosus), palm civets (Nandinia binotata) and Demidoff's galago (Galagoides *demidoff*) were heard each night. The footprints of two duikers, most likely Maxwell's duiker (*Cephalophus maxwelli*) were found near a stream. Squirrels observed were : two giant African squirrel *(Protoxerus stangeri*) a palm squirrel (*Epixerus ebii*) and four unidentified squirrels (possibly Heliociurus spp). Only one hornbill *(Ceratogymna* spp) and two blue plantain eaten (*Corythaeola cristata*) were heard, but small birds were plentiful.

I collected the lower jaw of an adult chimpanzee from an old hunter at Breproh (≈ 05^0 165.30N, 02^0 28.97w) at the east boundary of the reserve. It was allegedly shot deep inside the reserve in the company of a female some six years ago.

4.2. 2 Elenda Swamp Forests

A system of riparian foress and swamps around Elenda village (≈ 05^0 05.27N, 02^0 43.36w), about 15km south of Ankasa RR and 8km from the Gulf of Guinea was reputed to harbour remnant populations of white-collared mangabey and Roloway monkeys. I surveyed a 4km stretch of riparian forest about 3km south of Elenda with KFE and a local guide; another survey, in an extensive swamp forest about 5km north of Elenda, was in collaboration with SM and IM. Two foot- surveys each were conducted upstream and downstream of a point (approximately 05^0 04.49n, 02^0 44.98w) in the riparian forest along a tributary of the Tano River. Principal trees included: *Uapaca paludosa, Spondianthus preusi, Protomegabaria stapfiana, Ficus* spp. *and Symphonia globlifera*. Similar vegetation was found in the swamp forest. The forests in both survey areas appeared to be remnants of a probably very extensive mangrove - highforest transition that stretched from the coast to the Ankasa R.R till as recently as the 1960s and has now been converted mostly coconut (*Cocos nucifera)* plantations. Passage over the survey routes was made very difficult by the frequent unexpected deep muddy spots.

No primates were observed at either locations after 20hr. 15mins. Survey time over approximately 8km of trails. When intervened, local hunters and farmers were emphatic about the presence of white - collared mangabeys in the area. Rolway monkey was alleged to be present in the swamps, in association with Campell's monkey, spot-nosed monkey and Olive Colobus. Black - and - white colobus used to be found there till about 10yrs. The red colobus and chimpanzee had never been seen in the area in living memory and it is unlikely they had ever existed there. A hunter reported having killed a white-collared mangabey and seeing a Roloway - Campbell's monkey association

four days and two months earlier respectively. A pet white - collared was reported to have died six months earlier after being kept for about 10yrs in Elenda.

Numerous snares and expended shotgun cartidges were found during the survey, particularly in the swamp forest north of Elenda, where two local gin distilleries using wine taped from the abundant raphia palm (*Raphia hookeri*) were located. We were assured by hunters in Elenda of getting bones and skulls of red colobus Roloway monkeys and white - collared mangabeys at some hamlets south of the northern swamps and along the Tano River banks. However, we failed to get any such specimens as their supposed owners claimed they threw all the bones into the river soon after the meat is eaten, as they placed no value on them. We were shown the right femur of a female hippopotamus (*Hippopotamus amphibius)* and the smoked carcass of a white - collared mangabey killed in swamp forest in Cote d'Ivoire on the other bank of the Tano River; this was where monkeys which bones were "lost" were said to have been killed.

The survey areas, the riparian forest in particular, possessed a large number of the green-crested turaco (*Tauraco persa*) and other unidentified forest birds.

4.3 Draw River Forest Reserve

I surveyed the 243km^2 wet evergreen. Draw River FR,apparently the only reserved land in Ghana surrounded by an appreciable expanse of primary highforest on stool land, in mid-April. From two camps, one in Asunti village ("Asunti Camp") ($\approx 05^0$ 07.5N, 02^0 17.20W) about 4km from the south boundary of the reserve, and another, "Cane Camp", within the reserve ($\approx 05^0$ 10.90N, 02^0 19.35 W). I conducted a total of seven walking surveys with KFE and a local guide. From Asunti Camp we surveyed along three routes: the first to a remnant forest patch NE of the village(3hr, 40min, km) and the other two to the west of (3hr. 20min; 4km) and along a logging trail (3hrs; 5km) entering the southern reserve boundary at approximately 05^0 09.30N,02 17.6W (3hr, 40min, km); and the other two to the west of (3hr. 20min; 4km) and along a logging trail (3hrs; 5km)

entering the southern reserve boundary at ≈ 05^0 09.30N; 02^0 17. 6W. From Cane Camp, two survey routes went west towards the Hwene River (4hr, 3km and 4hr 30min, 4km respectively), a third to the NNE (7hr 30min, 5.6km), and the last along the logging road to the south boundary (2hr, 4km).The forest areas outside reserve were moderately logged from the1940s - 1960s, and contained very few large-sized trees. Remnant forest patches were largely surrounded by subsistence farms and abandoned cocoa *(Theoboroma cacao)* farms. Logged (1985-94) unfarmed areas within and outside the reserve were dominated by the pioneer species *Musanga cercropiodes* and its close relative *Cecropia peltata*. Current logging operations were centred around 05^0 12.11N; 0.2^0 18.90W. Large-sized economic species included : *Lophira alata*, *Piptadaniastrum africanum, Tieghmella heckelli, Milicia regia Parkia bicolor Khaya* spp, *Pycnanthus angolensis, Dacryodes klianeana* and *Uapaca guineensis*.

In approximately 26hrs of survey time covering about 25.6km, we detected three associations of primates, two vocalisations of Campbell's monkey, two carcasses of male Campbell's monkey and one of spot-nosed monkey. We observed the first primate association in a forest patch (0.5^0 07.90; 02^0 16.63W) at the end of the NW route from Asunti Camp and was made up of Rollaway monkeys, olive colobus and Campbell's monkey, of which two, five and two respectively more observed. Visibility was limited by the thick vegetation but branch movements indicated a larger group than was observed. The other two associations were observed on the routes going west from Cane Camp within the reserved; both were of Campbell's monkeys and white-collared mangabeys. The first of these was about 05^0 10.90N; 02^0 19.0N and was made up of a large group of which we saw six Campbell's monkey and heard the vocalisation of a white-collared mangabey. The second association was about 500m further west but on the second west trail. We heard the vocalisation of Campbell's monkeys and trailed it to a play-ground of a probably larger group of white-collared mangabeys of which only one was seen. At Asunti village we collected the carcass of an adult male Campbell's monkey from a hunter. We confiscated the carcass of another Campbell's monkey and of a spot-nosed monkey *(Cercopithecus petaurista)* hunter and a group of chew-stick *(Garcinia* spp) cutters respectively in the reserve near cane camp. I skinned and collected the skill and limb bones of all carcasses for exhibition at Ankasa RR headquarters.

Also heard were the call s of adult Campbell's monkeys on two occasion at various points along the logging road from Asunti to Cane Camp.

The calls of tree hyraxes (*Dendrohyrax dorsalis*)were heard nightly form both camps. the calls of the two-spotted palm civet *(Nandinia binotata)* were quite common at Asunti; a smoked carcass was found in the market goods of a hunter's wife on the day of our arrival. We saw three dwarf galagos (*Galagoides demidoff*) in an hour night walk. At various points along the survey routes in the reserve we saw the foot-prints of antelopes, including Bongo *(Tragelaphus euryceros*, Maxwell's duicker (*Cephalophu s maxwelli*) and royal antelope (*Neotragus pygmeus*). Trails of brush-trailed porcupine (*Artherurus africanus*) and of African giant rat *Cricetomys* spp), a baby cusinanse mongoose (*Crossarchus obscurus*) an adult broad-fronted crocodile *(Osteolamus tetraspis)* and a tree pangolin *(Manis tricuspis)* were also seen, particularly around Cane Camp. Avifauna observed included a palm-nut vulture *(Gypohierrax angolensis)*, green -crested turaco (*Tauraco persa*) Blue-plantain-eater (*Corythaeola cristata*) and a flock of at least five crested guinea-fowl (*Guthera eduordi*). The calls and flights of hornbill (*Ceratogymna* spp) were very common.

None of the local people interviewed had ever seen the red colobus, with the exception of a 70 year-old man who had last seen one in the late 1960s when he was working in the reserve with a logging company; even then he believed they were scarce. Concerning the presence and abundance of the survey species interviewers indicated that the olive colobus and the Roloway monkey were the most common; at least three individuals of either species had been killed in the past week.White collared mangabeys, though believed to be common and had last been seen some two months earlier, was very difficult to see and kill but its presence could be inferred from their characteristic "play-grounds" and smell. Black - and - white colobus and chimpanzee we admittedly very rare, their last sighting being "more than one-and half years ago". Campbell's and spot-nosed monkeys were the most common in the area.

There were strong indications of mounting human pressure on resources within and outside the reserve. In addition to on-going logging, there were two large groups of chew-stick *(Garcinia*

spp), apparently under licence from the Forestry Department to work for periods of up to six weeks. The associated noise and hunting/trapping but there harvesters and their accompanying local hunters had most likely driven away or reduced the numbers of primates and other species in the area, Wire snares, carbide piles from hunting lamps and expended shotgun. Shells were common along trails. That this pressure would escalate was evidenced by the nearly completed construction of a new feeder road through the reserve and an electrification programme for the peripheral communities.

4.4 Yoyo Forest Reserve

Forestry Department records indicate that, the eastern and western sections of the 236km^2 moist evergreen Yoyo River FR were last logged in 1979. No records exist, however, for the central one-third section, which appeared to have been logged long ago, probably in the 1940s and still held traces of 'admitted farms'. At the time of survey, a road system was under construction for new logging operations in the western and central sections in 1998.

Accompanied by KFE and two local hunters guides, one of whom Emmanuel kwao Narh (EKN), acted as guide to Whitesides in 1995, I surveyed the central section of the reserve in late may, 1997. From a central camp (≈05° 54.32 N , 02^{0}46. 93W), we surveyed over five hunting trails, three of which went generally NN and N E with the other two going N W. Routes ranged in length from 2 - 3.5 km, excluding back-tracking. The surveys were terminated by a severe rainstorm on the evening of the third day.

Gently sloping terrain on the E routes were in sharp contrast with the steep-sided hills (260 - 350m above sea level) on the NE routes. Numerous medium-sized trees (40-60 cm dbh) in a generally open understorey characterised the vegetation of the flat central section, with the hills having a more open understorey and bigger trees. Very thick tangles of lianas rendered most valley areas and disturbed flatland areas inaccessible. Principal large tree species included

Tieghmella heckelii Newtonia duparquetiana, Triplochiton scleroxylon, Piptandeniastrum africana, Antiaris toxicaria and *Terminalia superba*. As in Tano-Nimiri FR, the understorey/canopy ebony tree (*Diospyros sanza-minika*) was very common on the upland areas. A large area along the western bank of the Yoyo river directly east of camp had been devastated by fire (possibly in the 1983 drought) and invaded by the exotic weed_*Chromolaena odorata*. Notably absent were commercial (5 - 14 cm dbh) sized specimens of the chew - stick tree (*Garcinia kola*).

We surveyed the area in two teams on opposite routes each day for three days. Three associations of anthropoid primates were observed. KFE and EKN observed an association of Campbell's monkey and olive colobus in a valley about 3km from camp on the NE route on our first survey day.The following day I observed a Campbell's monkey and spot - nosed monkey association on a hill about 4km N N E of camp. Ground disturbances and scent at the sighting site suggested the association included the white-collared mangabey. A third association, of Campbell's monkey and spot- nosed monkey, was seen by K F E about 2km from camp on one of the N E trailsNo number estimates were attempted for each association encountered. On the first survey day, I was taken by our guide to a chimpanzee nest, on tree branches some 25m off the ground, about 1km S S E of camp. According to my guide, hewitnessed its construction some six months earlier by a solitary male chimpanzee; his vivid narration could only have been from first hand observation.Local hunters and farmers interviewed strongly believed all the survey species were still present in the reserve. A hunter claim another hunter had killed on "a year ago", but sightings by other interviewees were over 6 years old. Roloway monkey were more frequently seen than the black - and - white colobus (which rarely performed its longcall now). The white - collared mangabey was believed to be common but difficult to see, unless routed by dogs. The chimpanzee was believed to have been scared away by chew-stick cutters and sounds of shotguns into the very hilly western section, which was logged in the 1950s. The olive colobus was quite common, according to interviewees, but only occasionally seen, as its association with Campbell's and spot-nosed monkeys rendered them relatively undetectable. The proliferation of snares and old stumps of rattan (*Eremospatha* and *Laccosperma* spp.) and chew-stick *(Garcinia* spp) gave an indication

of the minimal protection accorded the resources of the reserve, with the possible exception of large-sized economic timber species. Though no gunshots were heard, the prevalence of newly-discharged cartridge shells and rotten carcasses in snares suggested that a highly active hunting pressure had only been temporarily curtailed by awareness of my presence.

The largest mammal sighted in the reserve was a single Maxwell's duiker (*Cephalophus maxwelli*.). We also observed at various points along the survey trails, five individuals of the giant African squirrel (*Protoxerus stangeri*), a slender-tailed squirrel (*Protoxerus aubinni*). Tree hyraxes (*Dendrohyrax dorsalis*) were regularly heard from camp. The rotten remains of a brush-tailed porcupine (*Aartherurus africana),* a tree pangolin *(Manis tricuspis*) and several African giant snails (*Achatina achatina*) were found in snares obviously not tended because of our presence. A rich avifauna included a flock of hornbills (*Ceratogymna* spp.), a pair of brown-necked parrots (*Poicephalus robustus*), and two tawny eagles (*Aquila rapax)* apparently stalking the Campbell's monkey- olive colobus association we saw on our send day. Tauracos (*Turaco persa*) and blue plantain eater (corythaeola crisata) were frequently heard and seen.

4.5 Dadieso Forest Reserve

The Dadieso FR was included in Ghana's natural reserve system, as an extension of the contiguous Yoyo River, Boin River and Disue River FRs in 1977. Last logged in 1980 and recorded as being in " excellent condition" (Hawthorne and JuamMusah, 1993), the 171km^2 reserve straddles the wet evergreen and moist evergreen forest zones. Its entire western margin constitutes the Ghana- Cote d'Ivoire border,whilst the southern boudary adjoins the Disue River FR; the eastern and northern margins are bounded by cocoa farms.

From a point (≈05^0 56.09 N, 02^0 59.88w) on the eastern reserve boundary, I followed a trail going west over generally swampy flatland for approximately 5km to a hill (≈05^0 56.00n, 03^0 02.25w) where I camped with with KFE and a local guide. The trail crossed several streams and

swamps. Very thick thorny undergrowth, with numerous fallen trees from apparently frequent rainstorms rendered passage extremely difficult. Large-sized trees (> 50cm dbh) were rare, and included: *Tieghmella heckelii, Lophira alata, Milicia excelsa, Terminalia superba*, Khaya spp., and *Ceiba pentandra*.

A severe rainstorm with accompanying extensive windthrows and swollen streams compelled us to limit our survey to two days and to the hill on which we were camped. In 27hrs of field time during which we covered approximatly 10km, we observed an association of anthropoid monkeys in the night right above our campsite which happened to be their sleeping place. Vocalisation throughout the night indicated the association to be made up of Campbell's monkeys, spot-nosed monkey and olive colobus. During observation in foggy conditions the following, morning we saw six Campbell's monkeys,and twelve olive colobus, five of which(presumably females) had young held in their months. No spot-nosed monkey was actually seen, but their vocalization confirmed their presence. Foggy conditions and the impenetrable vegetation made further observations virtually impossible so the survey had to be terminated to avoid being cut off by swollen streams.

Local informants, particularly long-term settler farmers claimed the red colobus had not been seen in the area since the late 1970s, and chimpanzee were last seen about a year earlier and were believed still present in small numbers in the reserve. The white - collared mangabey was very difficult to see but one had been killed a year earlier by a hunter.

The black and - white colobus was considered very scarce, as its call was no longer heard, but it was believed o be present;so was the chimpanzee. Olive colobus was the least rare of the survey species; our guide claimed he could show me pure groups of this species on various hills within the reserve during the more accessible dry season.Evidence of human activity in the reserve was minimal, probably due more to the extensive swamps and thorny, thick undergrowth than any active protection efforts on the part of the Forestry Department. Snares and discharged shotgun cartidges were very old. We did, however, encounter a poacher close to the reserve boundary on our way out of the reserve. No large mammal was seen in the reserve. A small tree pangolin

(*Manis tricuspis*) and two sun squirrels *(Helioscuirus* spp)were seen. A pair of hornbills *(Ceratogymna* spp) were the only large birds observed.

On an hour night walk in cocoa farms close to Owusukrom, (≈O5^{0}58.17N; 02^0 38.10W) near the eastern reserve boundary, I saw five dwarf galagoes *(Galagoides demidoff)* ,the highest number I ever saw in any locality.

4.6 Cape Three Points Forest Reserve

A joint survey of the Cape Three Points FR was conducted over three days by JFO and myself. The 19.7km^2 relatively hilly (about 10%) reserve, with a narrow series of small hills (altitudes between 91.4m - 152.4m) running NNE - SSE , was last logged some twenty years ago.

We drove to Tumentu village (≈ 4^0 52.10N, 02^0 03.96W) on the Abora - Akatakyi road to the west of the reserve, from where we camped some 1.5km to the southeast of the going village, close to Forest reserves Boundary Pillar (E R B P) 43. Three daytime footwalks, all starting from F.R.B.P 43: one going south along the boundary line (approx. 2km), another going E.S.E. into the centre of the northern half of the reserve (approx. 4.5 km) and the third north along the boundary line and then into the reserve (approx. 2.5km); an hour-long nightwalk was made along the boundary line.The reserve was originally established, in 1949, as a protection area and has no records of ever being logged or of previous farming apart from some seven"admitted" farms in the southern and north-eastern sections. The portions surveyed possessed typical wet evergreen rainforest, with an open upper and middle storey, and a restricted undergrowth. Principal trees rarely exceed 40cm dbh and included *Piptandaniastrum africanum*, *Heretiera utilis*, *Lophira alata*, *Picnanthus angolense* and *Khaya ivorensis*.

In a to tal survey time of 11hr 45mins. (covering approximately 10km) we made no observations of anthropoid monkeys Interviewed local hunters ranked the survey species in the reserve in descending order of abundance/frequency of encounter as : olive colobus, white-collared

mangabey,Roloway monkey, and black - and - white colobus, all of which had been sighted over the past two weeks. The western Chimpanzee and the red colobus had been observed within the reserve in living memory.

The overall impression we gained was of an easily accessible reserve under intense pressure from local communities and itinerant illegal mineral prospectors. Old and new farms mainly for establishment of oil palm (*Elaeis guineensis*) ran right up to the reserve boundary. Almost every dozen footsteps revealed active and old wire snares on either side of trails; old and fresh carbide piles from hunting lamps and discharged shotgun cartridges were common.On the trail going south-east into the reserve , we released a snared cusimanse mongoose *(Crossarchus obscurus*); in two other snares were the decomposed remains of African giant rats (*Cricetomys eminii*). In the interior of the northern sector of the reserve, and area reported by Hawthorne and Juam Musah (1993) to possess almost all the rare plant species in the reserve, were evidence of very old and not so old (less than three months) illegal gold and diamond prospecting pits; the headwaters of the Dabagyin river had been particularly affectedd. The presence of local mineral propectors in villages to the west of the reserve and their marked reluctance to provided guide services to us indicated a probably quited extensive illegal mining operation than had been discovered by earlier survey teams.

4.6 Boin River Forest Reserve

I concentrated my surveys in the mid -southern portion of the Boin River FR because information from the local hunters indicated that chimpanzees and Roloway monkeys were often encountered there. Accompanied by a forest guard and local hunter as guides, I entered the reserve from Bongosor village (≈ 05^{o} 40.66N 02^{0} 51 .58w) on the southeast boundary and followed a 4km tree enumeretion line to camp at approximately 05^{0} 53. 91N, 02^{0}52.80w, from routes. The survey routes ranged from 2 - 5km in lenghs and totaled approximately 15km in lengths and totaled approximately 15km.

The very hilly area had been exploided more than 20yrs I age, but probably at a very low intensity as the forest structure resembled mature highfores. Large to medium trees dominated the hillsides, where the relatively open undertorey was easy to wlk. Principal were similar to those of thenortheastern parts of the reserve, and included: Daniella spp, Piptandeniastrum atricanum, Antiaris toxicaria, Cynometra ananta, Entardrophragma spp, Diospyros snza-minika, Alstonia boonei and Uapaca spp. We detected two groupa of primates during the surveys: an associtions of Roloway and Campbell's monkeys on a hillside (≈ 05^0 54.35N, 02^0 52.65w) NW monkeys on a hillside (≈ 05^0 39.32N, 020 55.36w) SW of camp. Three adult or subadult individuals of the Rolways were seen in the Roloway - Campbell's monkeys association, but vegation inorenent and voclization indicated a larger group, their alarm calls when they detedted us elicited an alarm call from an adult male Campbell's mondey within 50m of the group. Tthe second primate sighting comprised only Campbell's monkeys, of which size individuals of a probably larger group were seen. My guides and other informants believed the red colobus was unlikely to be present in the reserve as none had been reported seen or killed in the past twenty years. The black-and - white colobus had not also been observed for none more than size years. the Chimpanzee had, however, been seen infrequently over the past three years. The Roloway monkey and the "very elusive" white-collared mangbeys were occassionally encountered by hunters but in very remote interior of the reserve. Olive colobus was believed very common, but extremely difficult to see due its coloration and frequent association with the more alert Campbell's monkey.

Beside the presence of numerous wire snares, there were evidence of illegal telling of chew - stick *(Garcinia* spp.) trees. Discharged shotgun cartidges and carbide piles from hunting lamps were common along trails. Two poachers camps, in active service but deserted at tice of survey, were found. Poachers were believed to include both citizenz of Ghana and cote d'Ivoire.

Activities of the red river hog (Potamochoerus porcus) were found at various points along a tributary of the Boin river west of our camp. Duiker (*Cephalophus* spp.) footprints were also present along streams. We heared the palm civet (*Nandinia binotata*) and hammer bats *(Hypsignathus monstrosus*) from our compsite at night. Only observed along a stream close to

our camp. Sun squirrels (*Funisciurus* spp.) and giant african squirrels (*Protoxerus stangeri*) were frequently encountered along the survey routes.The white-crested horn bill (Tropicranus *albocristatus)* was seen two occasions, and the black - casqued horn bill *(Bycanistes* subcylindricus) once.

4.7 Tano-Nimiri & Boi - Tano Forest Reserves

The contiguous Tano - Nimiri and Boi - Tano forest reserves lie just do the west of Samreboi (≈ 05^0 36.64N, 02^0 33.9, W), heart of the timber industry in the western region of ghana; It is the base of samartes Timber and Plywood Company Ltd (Samreboi) the concession owner of most of th forests in the survey area. Both forest reserves were last logged in the 1980s. I conducted five foot surveys over hunting and trapping trails traversing vey hilly. The eastern and northern extents of the survey area were bounded by the Tano River FR. The eastern and northern extents of the survey area were bounded by the Tano River. The vegetation structure of the unlogged, sleep-sided hills were typical wet evergreen rainforest, with relatively rendered almost impenefrable by thick tangles of thorny liamas. Large expenses of hillsides were covered with the sprawling branches of the understorey-canopy tree *Scaphepetalum amoenum* (Rubiaceae).

Cylicodiscus gabunensis , Entadrophragmmmmma angolense, Celtis Midbraedii, Parkia Bicorlor, dialum aubreevillei, Tieghme,,a hekelii, and *Antiaris toxicaria* were among the trees present in this part of the reserve. *Diospyros sanza-minika* was particularly abundant on the hilltops, so was *Dacryodes klaineana*, which edible fruit is particularly edible to forest primates and other frugivores. From a well - used poachers' camp (≈ 05^0 41.78N, 02^0 35.84w) I surveyed over three routes going w and NW, and two others (with about 70% overlap) going N and NE of camp.

The routes ranged from 2 - 5. 5km in lengh (including some backtracking). All survey routes led to locations reported by local hunters and trappers to be feeding areas or sleeping sites of primates, particularly the red colobus.

Surveys in Boi - Tano FR. were conducted from a radio communication camp (≈05^0 29.18N, 02^0 38.20W) of the forest concessionaire, , samartes, and occured during logging operations b the campany. I walded approximately 2km along a logging road going SE of camp on my first evening. Another survey route, over enumeration lines, trails and skid paths, went SE and S of camp, and covered about 5km. A third survey was over a 10km long strtch of logging road going e and SSE of camp to ascerain the extent and nature of the logging operations. Mnay skid paths criss - crossed the gently - undulating terrain, and led to large loading sites. The noise of heavy machinery and chainsaws could be heared up to 5km away. Some of the trees being felled and other principal tree species in thaat part of the reserve were *Tighmella heckelii, cynometra ananta, Pericopsis elata, Khaya* spp.,*Entandrophragma utili, Pterygota macrocarpa, Piptandeniastrum africana* and *Omphalocarpum ahia.*

After 20hr. 48min. of survey time, during which we covered about 16.5km, I saw only one group of anthropoid primates in Tano - Nimiri FR: a small group (< 10 indiviuals) of spot - nosed mondey *(Cercopithecus petaurista),* five individuals of which were seen about 1km NE of camp. from our campsite, I heared the callsof three alpha males from different locations at night and dawn for two consecutive days Two old nests (probably not more than a year old) of ground on a hill (≈ 05^0 42.21N, 02^0 36.11w) alledged by my guide to be a favourited feeding site of red colobus. When interviewed, three local hunters, and my guide informed me they had seen or shot size red colobus at different times over the past four years (two shot by my guide in 1994). The latest sighting was of a group of at least four by a trapper a week before my arrival, the sighting location was approximately 05^0 42. zone, and 02^0 36.09w. all inforants, including workers of saartex, believed that prior to the last logging in 1986 - 89 , all the survey species were present in the area: the experienced hunters could recall seeing large troops of more than twenty re colobus at a time. the survey species were listed in order of increasing rarity as : olive colobus, Roloway

monkey, whit-collared mangabey, black - and - white colobus, and western chimpanzee (which was most often found near cocoa farms).

In Boi - Tano FR, a group of Campbell's monkeys were the only primates observed in approximately 10hr 20min of survey time. This group was located about 1.5km SE of our campsite along a logging road, and was possible only because it was in the evening, when all logging operations were over for the day. middle sector of Boi-Tano FR: three chimpanzees were alledgedly killed in the past two months in the said area. The red colobus had not been seen in the reserve for more than 20yrs. Though it was believed that the black - and - white colobus was still present, its loud calls, a regular occurrence up to the early 1990s, could no longer be heared. The Roloway monkey and white - collared mangabey were said to be present but During interviews, local hunters and samartex employdds indicated that signs of chimpanzees were often seen during logging operations around 05^0 32.00N and 02^0 39.00 w in the difficult to see as they had become more elusive due to increased hunting pressure.

Samartex employees believed Boi - Tano was about the poorest, in terms of large mammals encluntered, of the forest reserves in which they had worked in the past two years. That both reserves were under several threat from human activities was shown by the abundance of wire snares, gunshots and expended shotgun cartidges in tano - Nimiri FR, and extensive logging operations in Boi - Tano FR. Sizeable (5 - 12cm dbh) specimens of *Garcinia* spp. had been vitually exterminated from both reserves, and rathan came (*Eremospatha* and L*accosperma* spp.) were almost absennt. New enumeration transects by samartex indicated that Tano - Nimiri wast to be logged within a year.

Other animal species observed in Tano - Nimiri FR. included Demidoff's galago (*Galagoides demidoff*) palm civet (*Nandinia binotata*), tree hyrax (*Dendrohyrax dorsalis*), five maxwell's duiker (*Cephalophus maxwelli*) a tree pargolin (*Manis tricuspis*) with young, giant African squirrels (*Protexerus stangeri*), rope squirrels (Funisciurs. spp.), the African giant rat (*Cricetomys* spp.), large hornbills (*Ceratogymna* and *Bycanistes* spp.) and turacos *(Corythaeola cristata* and

Tauraco persa). In Boin - Tano FR, no large mammal, were seen. Squirrels (*Funisciurus* spp and *Heliosciurus* spp) were infrequent. The only birds seen were a flock of black - and - white - tailed hornbills (*Tockus fasciatus semifasciatus*) and sunbirds (Nectariniidae).

4.8 Eastern And Southeastern Cote d'Ivoire

I conducted two surveys in Cote d'Ivoire .One was a collaborative survey with an American Primatolegis, Scott McGraw in Foret Classee de la Bossomatie and the other by myself in a swamp forest, in the western and southeasten parts of the country respectively. None of the survey species were faund in F. C. de la Bossomatie (details of the survey, which was part of a larger survey by S. McGraw, are yet to be published.)

The other was in the far southeast of Cote D'Ivoire lies an extensive swamp forest with the Dwuen lagoon to the south and the Tano River to the south east and east. I visited the northern parts of this swamp forest ot verify reports by hnters in an adjacent swamp area in Ghana that all the survey species, particularly red colobus, were regularly killed there for sale in Ghana. Following the hunters' route, I crossed the border into Cote d'Ivoire from Elenda Wharf ($\approx$ 05^0 06.64, 02 44.81w) with a local hunter and D F E, and camped at a village just at the northern edge of the swarp forest ($\approx$ 5^0 08.41N, 02^0 44.61W). The approximately 4km hunters tootpath passed through vegetation similar to that of swarp forests around Elenda in Ghana and included: large stands of Uapaca spp. Protomegabaria stepfiana, and Raphia hookeri. Drier high grounds had been converted to cocoa (*Theoboroma cacao*) plantations. An on-going logging operation and deep muddy areas made surveys within the seamps impossible; therefore I limited my activities to hunter interviews in hamlets around the northern edges of the swarps. Informants told me the re colobus was definitely present in swamps (this included wives of hunters, who gave accurate descriptions of red colobus pelage and morphology). My guide and his brother claimed (supported by other interviewees) they had killed eight individuals from a group of ten red colobus in March, 1996, when the dry season made access easier.

In order of decreasing frequency of encounter by interviewees the survey species were ranked as : Roloway monkey, white - collared managabey, black - and - white colobus, olive colobus, red colobus, and the chimpanzee (found mainly near cocoa farms). Access to these species was said to be easy either by canoe at the peak of the rainy season (August) in years of abundant rains, or at the peak of the dry season (March). I purchased a live juvenile male Roloway monkey at camping village. The mother was alledgedly ki,lled deep in the swarp forest, and approximately 6months old animal had been kept as a pet with the hunter's family for about 4months. Ilso purchased a collection of skulls, and jaw-bones of probably red colobus, black - and white colobus, white - collared mangabey and Roloway monkey at the same village. The Roloway monkeywas sent to the Accra Zoo to join an adult male and female.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Much of the more than forty forest and wildlife reserves, and virtually the entire unreserved areas of the southwest rainforest zone of Ghana has been logged and or farmed over the past century, and commercial and subsistence poaching for bushmeat, rattan , chewstick and other non - timber forest products are rife. These factors have contributed to a sharp decline in the populations of animal species usually associated with tall, closed - canopy rainforest; and forest primates are especilly at risk.

In none of the survey areas did I see or hear Waldron's red colobus and the black - and - white colobus ; neither were their carcasses or skins seen in the possession of hunters or bushmeat traders. Local hunters categorically stated that it was either impossible or would be extremely difficult to locate the red colobus in its former range in Ghana. Only in a swamp forest in the far south east of Cote d'Ivoire is there reasonable hope for a remnant population. The black - and - white colobus was believed to have become very wary, to the extent of avoiding its characteristic loud dusk and dawn contact calls even in areas where its presence was known.

The white - collared - mangabey was observed in two reserves, and a carcass from the swamp forest of southeast Cote d'Ivoire was seen, but it appeared to be far more abundant and widespread than previously assumed. Its perceived rarity may be attributed to its successful relatively terrestrial habits that makes it vulnerable only to the uncommon practice of hunting with dogs in the forest zone.

Roloway monkey appeared to be persevering in remote parts of reserved forest areas by adapting to more tangled lower levels in the forest structure, forming more interspecific associations and reducing the freqency of vocalization. Sizeable populations may be found in such reservices as Draw River, Boi - Tano, Dadieso, Boin River, and Yoyo River forest reservices and the Ankasa R.R./Nini - Suhien N.P, Contrary to the findings of Maron (1995) the western chimpanzee was

found to be very rare. A lower jaw from Ankasa R.R. and one in Yoyo F.R were the only evidence of chimpanzee found during the survey. Hunter however strongly suggest populations in Draw river, Dadieso, Boin-Tano, and Boin River F.Rs. The commonest of the survey species was the olive colobus, sightings of which were made in Draw River, Dadieso, and Yoyo River E.Rs. Its adaptive pelage and marked tendency to feed, move and sleep in dense foliage, and the non-competitive assoication with other private species especially Campbell's monkey, accords it a relatively high level of protection from hunting. It is expected to be the only survey species likely to expand in its range and population as a result of the rapid conversion of highforest to secondary forest.

The conditions of the forests surveyed gave cause for concern: there were strong indications that commercial logging and hunting were on the increase. The forest zone of south-western Ghana is correctly identified as the last frontier of virgin land by land -hungry farmers from other parts of the country, and even beyond, resulting in an influx of settler farmers,often with cultural practices unsuitable to the forest zone. The forest degradation is further compounded by erosion on the largly very hilly terrain as a result of the heavy rainfall in the area.

Draw River F.R. was the only location at which we detected the highest number of survey species: the Roloway monkey, white-collared mangabey and the olive colobus. Appreciable expenses of little - disturbed areas existed in the reserve and offer hope for viable populations of even the endemic primates.But this hitherto relatively remote reserve that may have accorded some degree of protection to its resources, particularly primates, is fast being logged, and increased access as a result of an on - going road and electrification project within and outside the reserve would shortly negate this advantage by increasing access for the already expanding peripheral human communities.

Past logging in Boin River F.R. had been selective and of low intensity, and the recovery of the forest structure has about reached the climax in most the reserve but there is the possibilty of very

small and widely-scattered populations of the other species. Only the central one - third of the Yoyo River FR appears not to have been logged (or may have been logged too long ago for records to be available). As in Boin River FR, logging in the western and eastern portions of Yoyo were selective, and the light habitat modification for the red colobus, Chimpanzee and black - and -white colobus may have been minimal (the very hilly nature of these areas has probably accounted for this) to offer some refuge to any remnant populations of these species that may still exist. This is merely a hope, for a recently commenced logging operation over the entire reserve quickly speed up their demise through increased access for hunters.

The status of Dadieso F.R. as being in excellent condition by Hawthorne and Juam Musah (1993) may be fast changing as a result of the windthrows from periodic severe rainstorms. The extensive swamps (approximately 10% of of total area). This is where a large olive colobus group in association with Campbell's monkey, was found, and indications were that the ideal forest structure would harbour more of the species, as well as the chimpanzee and white-collared mangabey, at least. Poor access to the interior of this reserve may offer some hope for its primate populations. Northeastern Tano - Nimiri F.R. possessed the most suitable habitat for red colobus of all the locations surveyed. The forest structure and availability of abundant food trees appeared most ideal, but easy human access (within some two hours walk from the reserve boundary) had accounted for the probably complete demise of large unwary species. Indications are that the red colobus, at least, went extinct there in 1994. Two old Chimpanzee nest only confirm that hte species had existed there in the recent past had holds hope for its continued existennce, but in very small numbers. Again, a new cycle of logging had been planned within the next eighteen months.

Boi - Tano F.R. was already being logged at the time of survey. The forest structure was similar to that of the contiguous Tano - Nimiri F.R, on a flatter terrain. The potency of the devastation associated with the logging operation and increased access to hunters was esamplified by the reported killing of thrr chimpazees in the already logged northeast of the reserve in the past two months. The easy access through open understorey an flat terrain offered little hope for the survival of the large, relatively unwary red colobus, black - and - white colobus. The forest of

Ankasa R R. had suffered very little additional damage as a result of improved protection since the surveys of Oates and whitesides (1995) and Oates (1996). Survey in the reserve was very short and it would require long - term intensive surveys to locate any of the survey species that might have survived from earlier intensive poaching, apart from the Roloway monkey which presence has already confirmed in past surveys. The river in the swarp forests to the south of Ankasa R.R. are too small and too long - settled for there to be any viable populations other than the elusive olive colobus and white - collared magabeys, anoy the survey species, to survive there.

The swamp forest of far southeast Cote d'Ivoire appeared to offer the best hope for the three endemic primates. Mounting human pressure on the forest was evidenced by the obviously last commercial logging operation during the survey period the steady land reclamation from its periphery for the establishment of cocoa plantations, and many hunters in Ghana who had been or were planning to hunt there in the dry season of early 1998.

I gained the general impression during the surveys that the primary threats to the suvival of primate community of the Upper Guinea East rainforest zone, hunting and habitat destruction, were on the increase, and that the Ghanaian situation may be worse than assumed. Observations indicated that the high rate of habitat conversion from closed - canopy highforest to secondary forest may favour the olive colobus and the Cercopithecines, particularly the Campbell's monkey, but would drive the large-bodied colobines to extinction (the Waldron's red colobus appears to have already gone) to give the region the distinction of producing the first primate extinction ths century.

A major effort by the international conservation community, in full collaboration with the appropriate institutions in Ghana, Cote d'Ivoire and Togo, is urgently required to produce and implement a conservation action plan specifically for the unique primates of the Upper Guinea East rainforest.

In furtherance of this, I recommend that more careful surveys be conducted in the following areas:

1. western Yoyo River, Boi - Tano and Jema - Assemkrom forest reserves ,Ghana, and the swamp forest of far southeast Cote d'Ivoire; these surveys may utilize only existing footpaths, hunting trails and other access routes for the establihment of presence/absence of the six survey species only; and

2. central Draw River and Dadieso Forest Reserves, Ankasa R.R and its contiguous Nini - Suhien N.P; these may require intensive transect - walks.

It is vital that action be taken immediately to forestall an imminent ecological disaster.

6. ACKNOWLEGEMENTS

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APPENDIX 1. Summary of Primate Observations

Primate Species of the Ghanaian Rainforest

Cerecopithecus campbelli (Campbell's monkey)
Cercopithecus diana roloway (the Roloway monkey)
*Cercopithecus petaurista (*the lesser spot-nose monkey)
Colobus vellerosus(the black- and- white colobus)
*Procolobus badius waldroni (*Miss Waldron's red colobus monkey*)*
*Procolobus verus (*the olive colobus monkey*)*
*Cercocebus atys lunulatus (*the white-collared mangabey*)*
*Pan troglodytes verus (*the West African chimpanzee
*Cercopithecus aethiops (*Green monkey*) -- Savannah species**
Erythrocebus patas (Patas monkey*)--Savannah species**

Location	**Species detected during survey**[1]	**Species reliably Reported/Probably present**[2]	**Species presence questionable or unlikely**[3]
Black Volta River Islands	*C. aethiops* *C. petaurista*	*E. patas* *C. campbelli* *C. petaurista*	*C. d roloway* *P. b waldroni*
Draw River FR.	*C. a lunulatus* *C. d roloway* *P. verus* *C. campbelli*	*C. vellerosus* *C. petaurista* *C. t. verus*	*P. b waldroni*
Ankasa Conservation Area	*C. campbelli*	*C. vellerosus* *C. d. roloway* *C. a. lunulatus* *C. verus* *C. petaurista*	*P. b waldroni*
Yoyo River F.R.	*P. verus* *C. verus* *C. campbelli* *C. a lunulatus*	*C. d. roloway* *C. petaurista* *C. vellerosus*	*P. b. waldroni*
Dadieso F. R.	*C.verus* *C.petaurista* *C. campbelli*	*P. t. verus* *C. d. roloway* *C. vellerosus* *C. a lunulatus*	*P. b. waldroni*
Cape Three Points F.R.		*P. t. verus* *C. d. roloway* *C. vellerosus* *C.campbelli* *C.a.lunulatus* *C.campbelli*	*P.b.waldroni* *P.t.verus*

		C.petaurista	
Tano - Nimiri F. R	*C. campbelli* *C. petaurista*	*C. verus* *C. d. roloway* *P. t. verus* *C. a. lunulatus*	*C. vellerosus* *P. b. waldroni*
Boi - Tano F. R.	*C. campbelli*	*P. t. verus* *C. d. roloway* *C. a. lunulatus* *C. a. lunulatus* *C. vellerosus* *C. verus* *C. petaurista*	*P. b. waldroni*
Southeast Cote d'Ivoire swamp forest	*C. d. roloway* *C. a. lunulatus*	*P. b waldroni* *C vellerosus* *C. verus* *P. t. verus* *C. campbelli* *C. petaurista*	

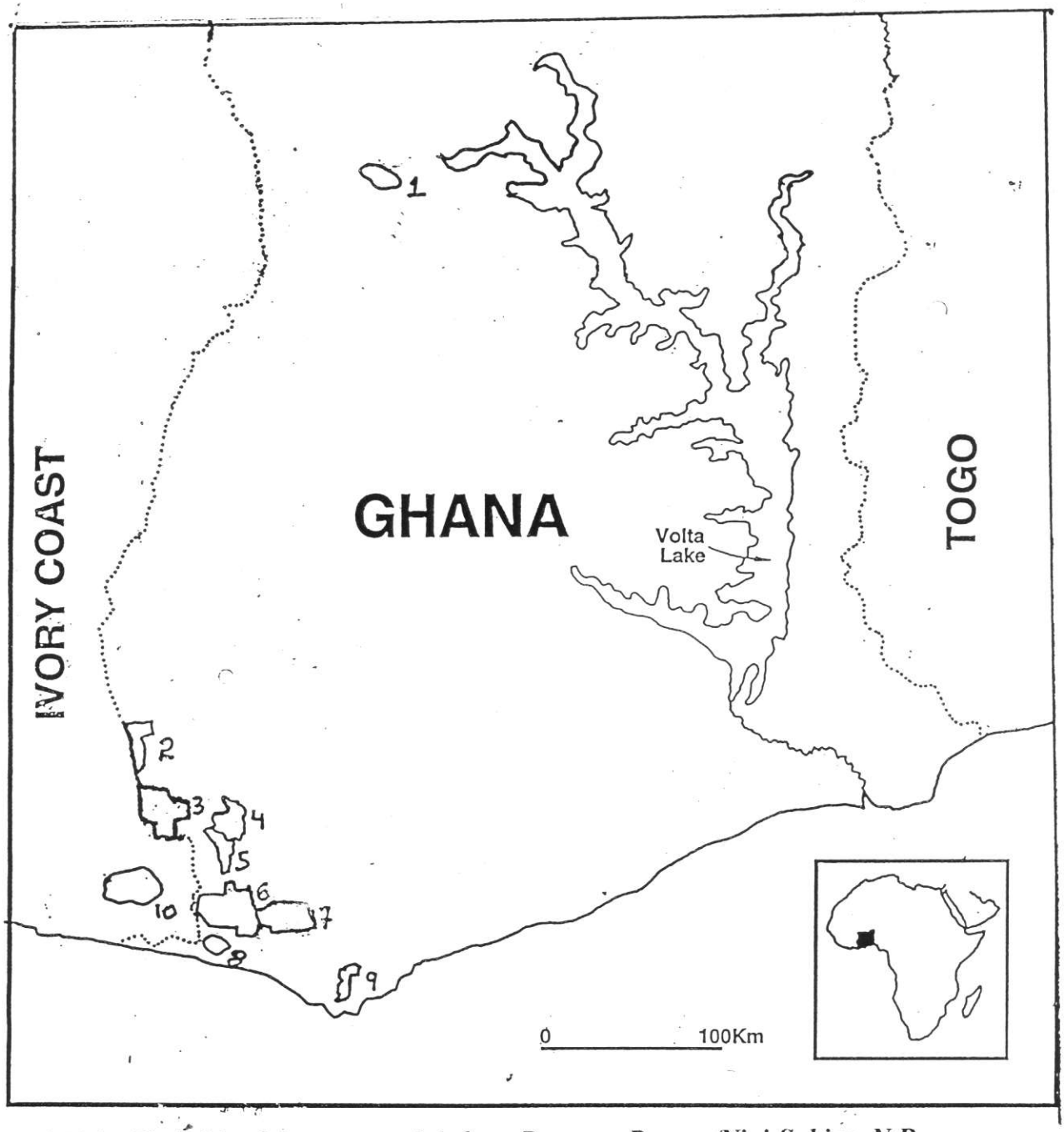
1 These represents species actually seen or heard by the aurthor

[2] These represent species believed likely to be present. Some of these species may be uncommon.

[3] These represent species for which I had no good evidence or reliable reports and which may be ectinct,at least locally.

**Savannah species.*

Appendix 2: Map of Areas Surveyed



1. Black Volta River Islands
2. Dadieso Forest Reserve
3. Boin RIver Forest Reserve
4. Tano-Nimiri Forest Reserve
5. Boi-Tano Forest Reserve
6. Ankasa Resource Reserve/Nini-Suhien N.P.
7. Draw River Forest Reserve
8. Elenda Swamp Forests
9. Cape Three Points Forest Reserve
10. Far S.E. Cote d'Ivoire Swamp Forest

Appendix 3: Survey Areas and Dates, with Names of Surveyors

Site	*Survey Dates*	*Surveyors**
Ghana		
Black Volta River Islands (Bamboi)	1 -7 April 29 June - 1 July	MAL MAL, JFO
Ankasa Conservation Area	23 - 25 March 27 - 29 April 13 - 16 May	MAL IM, MAL, SM MAL
Draw River Forest Reserve	14 - 19 April	MAL
Yoyo River Forest Reserve	24 - 26 May	MAL
Dadieso Forest Rerserve	31 May - 1 June	MAL
Boin River Forest Reserve	6 - 10 November	MAL
Tano - Nimiri Forest Reserve	23 - 26 November	MAL
Boi - Tano Forest Reserve	26 - 28 November	MAL
Cote d'Ivoire		
Foret Classe de la Bossematie	14 - 17 March	SM, MAL, IM
Swamp forest, far SE	7 - 8 May	MAL

*

MAL = *Michael Abedi - Lartey*
SM = *Scott McGraw*
I.M. = *Isaac Monah*