KAKUM NATIONAL PARK, GHANA

Wildlife Specialist's Report on visit of 9-29 August 1993

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CONTENTS

1. INTRODUCTION AND OBJECTIVES

This visit was to be a continuation of the survey work initiated by Struhsaker and Oates in and around Kakum National Park in March and April 1993. Following discussion of the results of the initial survey between Brent Bailey, Chuck Hutchinson, Thomas Struhsaker and Oates in Washington, D.C., on May 20-21 1993, and further telephone conversations with Bailey, the primary objective of the current work was understood to be:

(1) To conduct further surveys of primates in Kakum N.P., so as to better establish the species-composition and relative abundance of the monkey community. A particular effort was to be made to survey the central part of the park, which we had been unable to visit on our first trip, and to make systematic censuses along proper transect lines. Such systematic census work could provide baseline data against which the influence of conservation management might be assessed in the future.

Secondary objectives were understood to be:

(2) To commence surveys in other forests of southwest Ghana by visiting the Nini-Suhien/Ankasa complex, and paying particular attention to learning the status of three endangered subspecies: Miss Waldron's red colobus (*Procolobus badius waldroni*); the Roloway monkey (*Cercopithecus diana roloway*); and the white-collared mangabey (*Cercocebus atys lunulatus*).

(3) To assist, to the extent possible and appropriate, with the general development of Kakum park management, especially through continuing training efforts. The training component was to involve working closely with park staff (particularly Assistant Wildlife Officer Erasmus Owusu) and meeting with the Zoology faculty of Ghanaian universities to discuss how they and/or their students might become involved in research at Kakum. Bailey specifically requested that I try to meet Dr. Sam Yeboah at the University of Cape Coast.

These objectives are very similar to those defined in the report of our first trip (p. 8).

2. CONSTRAINTS TO ACCOMPLISHING OBJECTIVES

In our first report we noted that for the second phase of our consultancy to be effective we would require the following:

(i) our own vehicle and a sufficient fuel advance;
(ii) a cross-park trail with a simple km^2 grid and camp, situated near the middle of the park near an adequate source of water;
(iii) accurate map of park;
(iv) one or two Ghanaian counterparts.

And we said that the following would be very helpful:

(v) Forest Department records (working plan, stock mapping, and offtake);
(vi) recent aerial photos;
(vii) require the current patrol force (park guards) to begin collecting information on sightings of larger mammals.

I soon found that most of these requests had not been fulfilled.

- A new vehicle was available which I was often able to use, but the vehicle was not completely at my disposal and I found myself using a variety of vehicles and drivers. No advance was ready on my arrival and occasionally I had to wait while drivers obtained coupons for fuel; these delays were not great, however.

- There was no cross-park trail, nor a simple trail (transect) grid near the middle of the park, but a potential camp site had been located during an anti-poaching patrol in June. In my first days in Ghana I discovered through my own field work that at two locations (not in the center of the park) the position of transects had been traced and flagged; only one of these systems had been partially cleared. On August 17 I learned from Owusu of a third trail, flagged but not cleared near the eastern edge of the park.

- There was no more accurate map of the park available than on our March-April visit. The positions of the trails and lines that had been established had not been mapped.

- Counterpart Owusu was in the U.S., but was to return during my visit.

- When I asked about Forest Dept records I was told that David Kpelle had prepared an offtake report and that this had been supplied to Bailey; however, a copy had not been sent to me in New York and was not provided to me in Ghana.

- No recent aerial photos were available, but I learned that (a) there was a plan for an overflight, (b) Bailey had discussed a remote-sensing study during his visit to Ghana, and (c) Dr. William Hawthorne is arranging for a SPOT imagery analysis.

- The patrol force had not been collecting any systematic records of large mammal sightings.

Malcolm Stark (CI advisor) advised me to discuss these problems, particularly the lack of transects, with Owusu on his return from the U.S. With Stark I met Owusu on August 17. The only explanation provided for the lack of accomplishments was "work pressure," but I was also informed by Stark that the report on our previous survey had not been well received by senior staff at Kakum and had contributed to demoralization. Aspects of the report apparently causing special concern were our comments concerning the sustainability of the project in the absence of external funds, and comments on the lack of staff leadership and direction.

A visit planned to Ankasa/Nini-Suhien in my first week in Ghana was shortened as a result of:

(a) the need to investigate the above problems on my arrival and to make arrangements for transects and a camp to be established in time for me to achieve some portion of my major objective;
(b) delays caused by the coincidental arrival in Ghana of another consultant, Jonathan Shatz, for trust fund advisory discussions which occupied much of the time of the CI advisor and senior park staff at the beginning of my visit;
(c) the arrival of the senior DGW officer from Ankasa, Mr. James Agyei-Ohemeng, in Kakum one day after my arrival in Cape Coast. Ohemeng had come to meet Dr. Richard Barnes and would therefore not be at Ankasa to make arrangements for me;
(d) other demands on the research vehicle, including the collection of Owusu from Accra.

It was suggested that I travel to Ankasa in Ohemeng's vehicle when he returned with Barnes to Ankasa on Friday August 13. I agreed to do this, and to be collected from Ankasa on August 16.

3. KAKUM SURVEY

3.1. What Was Done

In my first three days in the Cape Coast-Kakum area I held discussions with Stark and senior park staff. I inspected the state of trails and transects and conducted a primate census on the uncompleted transect near Antwikwaa (my detailed itinerary is given in Appendix 2). Some of the findings of my first few days are presented in the previous section. In light of my findings I drew up a plan for the rest of my stay. It was arranged with Stark and Afia Asamoa that the Antwikwaa transect line be completed (3 out of 4 km had already been cleared), and that a 4-km transect be cut near the Obuo River in the center of Kakum. I then left on my brief survey of Ankasa.

After returning from Ankasa I moved to the Antwikwaa protection camp/ research station for two nights and from there conducted two more censuses on the now-complete 4-km transect. I also had discussions with Dr. Klaus Schmitt, who visited me from the IUCN/DGW project office in Accra.

On returning to Cape Coast from Antwikwaa I traveled to Briscoe II (= Mesomago village) on the eastern edge of Kakum N.P. with Owusu. From Briscoe II we trekked west into the forest with several game protection staff. Owusu, I and two men stayed 4 nights at a camp on the Obuo River (12-14 km from Briscoe II), while other staff set off on an anti-poaching patrol. Four primate censuses were made on consecutive mornings on the newly-cut Obuo transect, and other walks were made near camp (including one night walk).

After returning to Cape Coast I discussed my findings, as well as general impressions of the project and staff, with Stark, Owusu and Asamoa. On August 26 I left with Owusu and Asamoa on a short visit to Kumasi and Boabeng-Fiema Monkey Sanctuary before returning to Accra on the evening of August 27.

Standard methods were used in censusing diurnal primates (see, e.g., Whitesides *et al.*, 1988). I walked slowly and quietly along the cleared transect line, stopping frequently, listening and watching for signs of monkeys. If primates were definitely detected near the line I spent 10-20 minutes on a limited length of the transect, attempting to identify the species present and estimating their distance from the line.

3.2. Observations

3.2.1. Features of transects

The Antwikwaa transect lay astride an old logging road that heads roughly east into the reserve from north of the Antwikwaa protection camp. This transect commences a little over 3 km from the forest boundary. The logging road was measured by a group of protection staff under Struhsaker's guidance in March-April; much of it is now overgrown. Access to the transect is now from Antwikwaa village on a path that joins the logging road 1-1.5 km from the forest boundary. The 4 km transect had been cut as a square, oriented approximately WNW-NNE. Most of the area through which the transect passed had been heavily logged and there was dense undergrowth, few large trees, and frequent patches of *Eupatorium* (=*Chromolaena*) *odoratum*. The route passed through several swampy areas dominated by *Raphia* palms. Most of this transect was marked and cut on August 3-9 (i.e., just before my visit) and finally completed on August 12 (after my first census). The short interval between clearance and my censuses could have affected the chances of encountering mammals.

The Obuo transect began 500 m to the west of an old poacher's camp (our camp site) on the west bank of the Obuo River. This camp is estimated to be about 9 km in a straight line from the west of the forest boundary, or some 12-14 km along an initially good (but latterly indistinct) path. This was also a 4 km transect laid out as a square on approximate S and W bearings from the point closest to the camp. The transect passed through vegetation that was a mixture of heavily and recently logged forest (similar to that at Antwikwaa) and - closer to the river - forest logged less heavily and less recently (perhaps 15-20 years ago). Again, *Raphia* swamp was relatively abundant. This transect was estimated to lie 3-4 km east of the Antwikwaa transect at their points of closest approach. The transect was cut on August 15-16 (i.e., 5 days before my first census on August 21). It would have provided a more useful contrast to the Antwikwaa line if it had been cut east rather than west of the Obuo River; its siting resulted from confusion in initial reports as to the location of the camp.

3.2.2. Primates

A detailed summary of the census results is provided in Appendix I.

Analysis of these results reveals that in the 3 Antwikwaa and 4 Obuo censuses (27 km), primate associations were encountered on at least 22 occasions $\leq$50 m of the transect line (on 2 additional occasions animals were detected that may have been primates, but their identity could not be confirmed). This is equivalent to 0.81-0.89 associations/km and 0.75-0.82/hr on the transect (0.99-1.19/hr of active searching, excluding time stopped with monkeys, etc). This is about three times the rate of encounters during the March-April reconnaissance. However, because of the dense vegetation and animals' shyness, the monkeys were very difficult to see; there were sightings on only 9 occasions (0.33/km).

The causes of a higher encounter rate in August compared with March-April could have been:

(a) Chance, due to small sample sizes (this is thought not to have been a major factor).
(b) Season; there may have been more calling by monkeys in the wet season, making their detection easier.
(c) Quieter travel by observers through the forest and earlier starts in the morning, made possible by the existence of the transects, by staying at Antwikwaa or Obuo camps, and by the presence of fewer people on the census - only 2 on all but one day, with the leader (JFO) always 30-40 m ahead; this is judged to be the main factor producing a higher sighting rate.

No new primate species were encountered on the census, except that distant black-and-white colobus monkey (*Colobus vellerosus*) male loud calls ("roars") were heard on two days at Obuo, coming from 3 different locations (*Cercopithecus campbelli* male loud calls were also heard $\geq$50 m from the census line on 4 occasions).

The censuses confirmed our earlier conclusion that Lowe's or Campbell's guenon (*Cercopithecus campbelli lowei*) and the spotnose guenon (*C. petaurista petaurista*) are the most common monkeys at Kakum, with each definitely identified by sighting or vocalization on 10 occasions in an association. The olive colobus (*Procolobus verus*) was definitely detected on 5 occasions. Although the black-and-white colobus is now confirmed present in Kakum its population is clearly at a low density.

After our last survey we noted that the Diana or Roloway guenon (*Cercopithecus diana roloway*) is extremely rare if not extinct in Kakum; this further work does little to change that conclusion. No Diana monkeys were seen or heard. However, an experienced former hunter and current guide, Isaac Owusu of Antwikwaa, reported to me that in May 1993 he escorted two American visitors on a camping trip from Antwikwaa and on one morning saw two Diana

monkeys, one a large male, moving with an association of spotnose, olive colobus and Campbell's monkeys. This was Isaac's first sighting since 1989. Even if this report is accurate, and there is a strong probability that it is, it still suggests that the Diana is extremely rare in Kakum and may not have a viable remaining population.

Although more monkeys were encountered than on the initial reconnaissance, the overall sighting rate is still low compared with many other African forests. The low sighting rate appears to be largely a consequence of only three monkey species occurring at more than low density. The Campbell's, spotnose and olive colobus encounter rates during August censusing are comparable to sighting rates of these species at Tiwai Island, Sierra Leone; Tiwai has the highest recorded biomass of anthropoid primates in a West African rain forest (Oates *et al.*, 1990), but Tiwai has abundant populations of species rare or absent in Kakum (black-and-white and red colobus, Diana monkeys and mangabeys), as well as low-density green monkey and chimpanzee populations. Sighting rates at Tiwai were: *Cercopithecus campbelli* 0.31/km; *C. petaurista* 0.37/km, *P. verus* 0.1/km (Whitesides *et al.*, 1988). These three monkeys are widespread and relatively common throughout the Upper Guinea forest zone, and occur frequently in young secondary forest.

3.2.3. Other mammals

On the 7 formal censuses, small ungulates (duikers and/or royal antelopes) were detected in close proximity to the transect (by a sighting or hearing an alarm call) on 6 occasions (0.22/km or 0.24/hr on census route). This is a slightly higher rate than during the March-April survey. On 8 additional occasions sounds of animals moving on the ground might have been small ungulates. Two of the definite encounters with duikers involved seeing a Maxwell's duiker (*Cephalophus maxwelli*) walking across the transect.

Squirrels were seen or heard on 14 occasions, and on 10 additional occasions sounds of small animals in trees may have been squirrels. Squirrels seen and identified were *Funisciurus pyrrhopus* (4 times) and *Heliosciurus* sp., possibly *gambianus* (3 times). *Protoxerus stangeri* was heard.

Signs of elephants (footprints, dung, damage to vegetation - especially *Raphia* palms) were abundant on the Antwikwaa transect, and on the path and logging road leading from the village to the transect. Many of these signs were very fresh and on one census 2-3 elephants were heard within 30 m of the line, in one case greatly startling the observer! Elephant signs on the Obuo transect were sparser and less recent. The Antwikwaa evidence strongly suggested that elephants are abundant in an area extending at least 6 km east of the protection camp, an area devastated by logging. I saw many fresh elephant signs here in April, so this is probably not a seasonal phenomenon.

In some *Raphia* swamps, tracks of red river hogs were seen, and returning one day from the Antwikwaa transect a grasscutter was spotted next to the path. On a 1-hour night walk with a headlamp near the Obuo camp, 2 Demidoff's bushbabies were seen (along with several bats and a water snake). At the Obuo camp site, tree hyraxes and Demidoff's bushbabies were often heard calling at night, and a Pel's flying squirrel (*Anomalurus peli*) was seen.

3.2.4. Other observations

Raphia swamps yielded higher frequencies of vertebrate animal signs than other sections of the census routes. In *Raphia* areas were found: the most frequent elephant and pig signs, and squirrel sightings; several of the primate associations encountered; many birds (including *Ceratogymna elata* hornbills and a *Malimbus* colony), and reptiles (a turtle, for instance).

Forest without signs of recent logging and with a relatively high frequency of large trees occurs between Briscoe II and the Obuo River, i.e., a distance of perhaps 9-10 km. Some stands of very large trees grow on the right bank of the Obuo upstream from the camp.

Anti-poaching efforts by the protection staff appeared to be producing results. Near the Obuo River we saw five abandoned hunting camps of various ages; two of these were discovered in use by protection staff in June 1993. Compared with over 20 gunshots heard in one night in central Kakum by Gilles Nicolet (personal communication) earlier this year (or last year?), I heard only one shot during 4 nights at the Obuo camp.

After our March-April survey we noted problems concerning the effectiveness of park staff, planning and operational procedures. Although some of these problems have been remedied, others persist, as witnessed by: the lack of transects, maps, etc. available on my arrival; unwise use and care of equipment (tents packed and stored wet, items missing in tent packs, protection staff setting out on a 3-day patrol with no lights or cutlasses); complaints by junior staff that they had difficulty receiving their out-of-station allowances; the condition of the Antwikwaa research/protection camp (only one table and chair available for all visitors, faulty lights, no garbage pit, uncleaned rooms).

4. ANKASA SURVEY

4.1. Background

The contiguous Nini-Souhien National Park and Ankasa Game Production Reserve in the Western Region of Ghana are listed internationally as a rain-forest area of special biological significance, especially for birds (Dutson, 1989) and trees (W. Hawthorne, pers. comm., reports this as an outstanding 'hot spot' for rare trees). I visited this area on August 13-16, and camped at Ankasa Camp on the southern edge of the Ankasa G.P.R.

The Ankasa and Nini-Souhien wildlife reserves were created from the Ankasa River Forest Reserve in 1976; they are managed by the Department of Game and Wildlife. Parts of the southerly Ankasa G.P.R. (207 km^2) had been logged, but apparently at low intensity; Nini-Souhien N.P. (104 km^2) is said to be unlogged. The main road from Axim to Elubo and the Ivory Coast used to pass through Ankasa by way of Nkwanta, a former hunting camp, and several farms once existed along the road (Bishop & Cobb, 1992; Martin, 1976). The road and farms (except for those at Nkwanta) are now abandoned and the road blocked by fallen trees; Nkwanta survives as a small farming enclave within the G.P.R. and has a resident population of 10-20. The old road is used as a footpath between Nkwanta and Elubo and Nkwanta and Ankasa Camp. Terrain in the reserves is hilly - one factor said to have impeded logging in the past.

4.2. My Survey

While at Ankasa I made 3 survey walks and spent one day visiting Elubo and inspecting access points and land-use along the southern edge of the G.P.R. Two of the survey walks were made alone along a nature trail of approximately 2.5 km which begins very close to

Ankasa Camp and joins the old road about 1.5 km north of the camp. The 2.5 km trail was walked slowly late one afternoon, and the 2.5 km trail plus the road were walked early one morning. The third survey involved a slow walk with a member of the protection staff northeast into the G.P.R. after walking approximately 3 km north along the old road from Ankasa Camp.

4.3. Observations

4.3.1. Vegetation

As expected, the forest showed no signs of recent logging activity, although the course of old logging tracks could still be discerned. As reported by Martin (1976), I noticed that large trees were relatively sparse; the forest was dominated by medium-sized trees. I observed a relatively high frequency of the stilt-rooted *Uapaca*; in a random sample of 200 trees, Martin (1976) found the three most abundant species to be *Capparis erythrocarpos*, *Sterculia oblonga* and *Corynanthe pachyceras*. I was struck by the deep litter layer in the Ankasa forest, which may indicate tree foliage with high concentrations of protective chemicals, perhaps associated with infertile soils (Bishop & Cobb, 1992, refer to poor, leached soils at Ankasa).

4.3.2. Mammals

Total careful survey time was 8 h 40 m, covering an estimated 12 km (excluding diversions from the trail to try to see monkeys). During this time I had these mammal encounters: 3 monkey associations (1 probably *Cercopithecus petaurista* - heard but not seen; 1 *C. campbelli* + *C. diana* - heard but not seen; 1 probably *Cercopithecus* sp. - heard, and one animal glimpsed); 3 squirrel sightings (one of which may have been *Allosciurus aubini*); 5 squirrel calls heard; 1 medium-sized terrestrial animal heard (duiker or large bird?). While moving more rapidly on the road (2.5 hrs) I encountered one group of *C. campbelli* (heard but not seen) and glimpsed one squirrel. The monkeys detected were extremely shy. A variety of birds were encountered, but were generally not easy to see. Large birds were scarce. From my camp at night I heard Demidoff's bushbabies and tree hyraxes calling.

My general impression was a forest with few vertebrate animals; however, hearing the distinctive call of *Cercopithecus diana roloway* during the survey proves that this rare monkey still survives in Ankasa. Martin reported the Diana monkey as the most commonly-encountered monkey in 1976, observed in Ankasa at 4x the frequency per hour recorded in Bia (Martin, 1976).

Whether red colobus are present is uncertain; protection staff claimed that the monkey occurs in Nini-Souhien, but no one gave a convincing first-hand description. It is possible that red colobus have never occurred in Ankasa in recent times. Martin (1976) made transect surveys from Nkwanta in March and May 1976 and reported that: "Red colobus were heard only once. According to Edele Kwao ['the old man of Nkwanta'] the red colobus was not represented some 15-20 years ago but migrated into the Reserve from Ivory Coast." As Martin himself said, this seems unlikely. The report of a Cambridge University bird survey in Nini-Souhien & Ankasa in 1989 lists the species as 'present' (probably on the basis of Martin's original survey) but does not note any actual sighting (Dutson, 1989).

I also received no convincing report of the presence of white-collared mangabeys, although one of the protection staff said that this species was occasionally seen in farmland outside the forest, and the species was apparently encountered twice by Martin in 1976. A pet mangabey was seen by the Cambridge expedition in possession of game staff, but the expedition apparently saw no wild animals.

No signs of hunting were seen on the nature trail, but on the other survey route I counted 3 spent cartridges, 2 piles of carbide and 2 plastic wrappers from flashlight batteries - all evidence of hunting.

I believe that my low encounter rate with mammals was not largely the result of an unlucky sample. When asked where I could find monkeys and elephants, protection staff said it was hard to see them near Ankasa and that I should go to Nini-Souhien (a somewhat mysterious place, since the staff apparently visit the area infrequently). During the Cambridge expedition, 4 monkeys groups were seen in 220 hours of birding. In a recent visit, Dr. John Grainger (IUCN/DGW Accra) reported seeing no mammals in Ankasa over a two-day period. Although hunting pressure almost certainly contributes to low mammal densities, other factors may also be at work, such as the nature of the vegetation and particularly its chemistry.

4.3.3. Conservation Problems

Most of the conservation problems facing Ankasa/Nini-Suhein are well-described in the report by Bishop & Cobb (1992). The DGW headquarters station for the protected area is at Aiyinasi, about 30 km from the main access point to the protected area, Ankasa Camp. Twelve protection staff are based in or closer to the protected area: 3 at Ankasa Camp, 5 at Nkwanta, and 4 at the town of Elubo, about 5 km west of the G.P.R. The staff quarters at Ankasa have leaking roofs, and the camp and staff are extremely poorly equipped: there is one bucket (rusted through and repaired with a piece of wood), no lamps (I donated one), and no mosquito netting; the staff have no raincoats (although this is one of the wettest places in Ghana). Nkwanta Camp is said to be in worse condition, but I did not have an opportunity to visit it. The Elubo staff live in the town near the Tano River and are using a single tent as living and sleeping quarters; there is no office. All the staff for the protected area share one old single-barrel shotgun, apparently confiscated from a poacher some years ago. The staff at Ankasa have no vehicles of any kind, although the warden at Aiyinasi has two trucks (one of which appears to be nonfunctional).

It is hardly surprising that the tiny protection force is demoralized and unable to provide any significant protection to the two reserves. Conditions have apparently been like this for many years. In these circumstances, poachers can more or less operate unhindered, especially in the Nini-Suhien N.P. whose nearest access point to a patrol base is several hours' walk from Nkwanta, itself several hours away from where a vehicle can be driven.

The proximity of the Ivory Coast border to Ankasa has probably added to the hunting pressure on the reserves. I was told that the flow of bushmeat has typically been from Ghana to Ivory Coast, rather than vice versa.

Clearly, Nini-Suhien and Ankasa face very severe conservation problems. They are badly neglected, despite their acknowledged international significance. Even so, the Roloway monkey at least still survives there, and the earlier abundance of this species in Ankasa suggests that the forest provides very suitable habitat.

I understood from discussions with Drs. Grainger & Schmitt that the Bishop & Cobb proposal to the European Community for funding to develop Nini-Suhien/Ankasa and Bia had been turned down because it did not give sufficient attention to local community development. Apparently the proposal is being rewritten and resubmitted. I found rather little emphasis in the original proposal on who 'local people' are in the Ankasa area, although Ntiamoa-Baidu's appendix notes that there were "settler farmers from all over the country" in all four villages she surveyed. On my own brief visit I met many farmers near the G.P.R. who were relatively recent migrants from eastern Ghana. Such migration caused by land hunger is a common pattern in many of the forested hinterlands in tropical Africa. It suggests that any efforts at

community development should be approached with caution; if they encourage immigration they will be likely to have long-term deleterious consequences for the protected areas.

5. CONTACTS WITH UNIVERSITIES

Along with Jonathan Shatz (trust-fund consultant) and Klaus Schmitt (IUCN/DGW) I visited the Zoology Department at the University of Ghana, Legon, on August 9 and met with Chris Gordon. Our discussion centered on the administration of conservation projects in Ghana, including the role of NGO's, and on the organization of research in protected areas. Gordon suggested the establishment of a Technical Working or Support Group in Ghana for Kakum, containing experts from the universities at Legon and Cape Coast.

On August 17 Erasmus Owusu and I met staff of the Zoology Department at the University of Cape Coast: Dr. John Blay (aquatic biology and fisheries), Dr. Mary Botchey (entomology, especially tsetse flies), Dr. K.A. Monney (snails, other invertebrates, tortoises), and Dr. K. Yankson (Acting Head, aquatic biology and fisheries). We discussed the value of the department cooperating with the Kakum project in reserch, we requested that they organize a proposal (one had apparently been sent previously to the senior game warden at Kakum, Mr. Y. Mensah-Ntiamoah, but this had elicited no response), and we advised that they consult actively with Owusu and Stark. We described existing facilities and their own equipment needs for research; among these needs were mentioned help with transportation, and lab facilities near the park including benches, water supply, balances, glassware and a computer. We also discussed the value of future consultants scheduling seminars at the University of Cape Coast as part of their itinerary.

On August 18 Owusu and I met separately with Dr. S. Yeboah (mammals and wildlife management) and particularly encouraged him and/or his students to consider small mammal studies in the park (he has a number of Sherman traps already and some expertise in this work).

6. RECOMMENDATIONS

6.1. Kakum

6.1.1. Immediate needs

I discussed with Owusu and Stark what needed to be done to improve the existing transect system to allow more efficient censusing and other field work. In particular I asked that the following be done as soon as possible:

(a) Clear more thoroughly the transects that have been cut, especially snags on the ground and at shoulder/head height. Keep transects clear by sending a cleaning crew around regularly (once/month?).
(b) Improve marking of transects, for instance by placing a piece of red flagging with a measurement in clear black figures at each 100 m point, running sequentially to 4000 m.
(c) Complete a cross-park trail. My recommendation for this is to improve the existing trail, especially the latter portion, leading west from Briscoe II to the central (Obuo) camp; to continue along the access route to the Obuo transect, and then to go west for 1 km on the existing transect to its NW corner; from here, to cut a new line due west, which I predict will meet the Antwikwaa transect after 3-4 km.
(d) Produce an accurate map of these trails and transects in relation to park boundaries, rivers, camps, etc.
(e) Cut a transect in relatively undisturbed old forest, perhaps along the line said to have been flagged by Owusu about 4 km from Briscoe II (not inspected by me), or to the east of the

Obuo river near the Obuo camp. This would best be done only after learning of Struhsaker's plans and needs.

6.1.2. Further primate research

Given the relatively small number of censuses I undertook and the fact that transects had been hastily cleared immediately before or during my visit, I recommend that some repeat censuses be conducted on the same transects to validate my findings. Owusu plans to make such repeat censuses, and they could also be repeated by Struhsaker if this is judged necessary. Additional censuses on a transect in relatively undisturbed forest (see [e] above), and in the Assin Attandaso G.P.R., would also be valuable to better assess spatial variability in primate populations.

6.1.3. Primates and tourism

Efforts to habituate monkeys near the Kuntan trail (as in recommendation 4b in our original report) should still be undertaken; nothing seems yet to have been done. Some trails have now been cleared near the nature trail; this trail system could be developed to facilitate student projects. Even so, visibility is going to be a problem.

6.1.4. Other ecological research

The observation of a relatively dense elephant population in the heavily logged areas near Antwikwaa suggests that studies of elephant ecology will have to be a major part of management planning. Whether or not the influence of *Eupatorium* on regeneration can be modified, elephants are likely to very significantly hinder regeneration. What then are the chief management aims for Kakum in the long run? To maintain a flourishing elephant population (which may be encouraged by large areas of dense undergrowth), or to encourage the eventual regeneration of high-canopy forest over the whole park (which might not maintain a high elephant density)? One of Kakum's most special features may be that it provides the opportunity for visitors to encounter African forest elephants very close to a potentially comfortable and accessible resort (in the Cape Coast area), and this suggests that future management might wish to favor elephants over forest across at least some significant part of the park. The issue of crop damage by elephants and its influence on local support for the park will also have to be closely addressed. Could a trust fund be used in part to compensate farmers for crop damage?

Research focused on *Raphia* and its ecology would be worthwhile. As noted above, *Raphia* swamps appear to be a very important resource for wildlife in the park, particularly elephants. For purposes of management planning, the distribution, abundance and productivity of this resource (along with its possible role as a 'keystone') should be evaluated, and attention should be given to whether people should still be allowed to harvest *Raphia* fronds in some areas - restrictions on *Raphia* harvesting are, I understand, one of the major grievances that local communities have had following the establishment of the national park. This raises another issue, that for the long-term it would be worthwhile to consider a zoning plan other than the present system, a National Park in the south (Kakum) and a Game Production Reserve (Assin Attandaso) in the north; zoning might better be based on a careful geographically-referenced assessment of the present ecology of the protected areas and of the density and land-use patterns of people living around the park.

6.1.5. Roloway monkeys and their possible reintroduction

It is going to be very difficult to assess the precise status of Roloway monkeys in Kakum/Assin Attandaso. It is probable, though not certain, that they survive at very low

density, in which case a very large number of censuses in many areas would be needed to obtain even a small number of sightings. If protection staff can be trained to be reliable observers and recorders, their records could help, and if such records cluster in one or a few places, primatologists could concentrate future searches there.

I have previously raised the possibility of the reintroduction of Roloway monkeys to Kakum, working in collaboration with the international zoo community. In the near future, Kakum may be the only site within the original range of *C. diana roloway* (assuming the monkey does or did occur here) in which there is both reasonably good protection against hunting, **and** where the original population has been eliminated or reduced to a dangerously small size (two factors that could argue for a reintroduction effort). A reintroduction program would be fraught with difficulties, but it is probably worth at least a **small-scale feasibility study**. This study could consider problems such as: the large cost of reintroduction in terms of people and other resources over a prolonged period; likely difficulties for animals in adjusting to a new environment; genetic and disease issues; and the low numbers of captive stock available for a viable program. There is probably a handful of these monkeys already in captivity in private hands in Ghana that could be consolidated into a small group. Even if reintroduction is judged unwise, a small well-maintained captive colony of Roloway monkeys at Abrafo could be of considerable interest to tourists. Considering a sustainable future for such a project, however, it should be noted that monkeys in West African zoos are rarely maintained sufficiently well that they breed.

6.2. Ankasa + Nini-Suhien

There is clearly an urgent need for improved protection of Ankasa and Nini-Suhien. Quadrupling of the current budget, which I understand is the equivalent of about $5 per day, could have some immediately beneficial effects at what would still be a low total cost. If improved protection has to wait for the planning, approval and implementation of a large-scale conservation and development project, there may be few larger vertebrates left to in the "protected" areas.

In addition to a modest increase in expenditure on staff and equipment, some immediate benefits could also be realized by consolidating the protection staff. The staff based at Elubo are too far from the reserve and too poorly equipped to be able to be at all effective. Rather than creating a whole new camp for them (one current plan) it would probably be better in the short term to transfer the Elubo staff to Ankasa and Nkwanta, and to improve the facilities at those existing camps. Additional firearms should be found for the protection staff, who are clearly afraid of poachers and at present share a single gun. Consolidated staff at an improved Ankasa Camp could patrol between Ankasa and Nkwanta Camps and in the large area of Ankasa east of the old road. Staff at Nkwanta could patrol west of the road towards Elubo, as well as safeguarding Nini-Suhien.

There is also a need for a more extended survey of the primates, with a special concentration on Nini-Suhien. I suggest that an experienced primatologist be found who can spend two weeks camped inside Nini-Suhien, conducting censuses on pre-cut formal transects and on existing paths. This would require the prior location of a suitable camp site by DGW staff and the establishment of the transects within a short distance of the camp. A particular aim of this further survey could be to establish whether red colobus do occur, and if so whether their population appears to be viable.

In the longer term, efforts should be pursued to develop a proper conservation-oriented plan for the sustainable management of Ankasa and Nini-Suhien. Some elements of the Kakum plan could serve as a model, but Ankasa faces different challenges. Tourism is less likely to be a prominent element in future management, given the relative remoteness of this

area and the lack of other obvious nearby attractions. However, specialist natural history tourism could be encouraged given the biological interest of a relatively undisturbed forest with high species richness, especially of rare trees and birds. Forest regeneration is a much less prominent issue than at Kakum, and elephants probably occur at a much lower density. Attention might be given to the concept of a **botanical** reserve with associated research station, and to collaborating more in a protection effort with the Forestry Department.

6.3. Ghana Forest Primate Survey

The findings of this study reinforce the need, discussed in our first report, for a broader survey of endangered primates in the forests of southwestern Ghana. The *waldroni* subspecies of red colobus monkey, known only from western Ghana and eastern Ivory Coast must be in very serious danger. As long ago as 1956, Angus Booth noted that the red colobus is confined to mature forests and "occurs no further east than Bekwai." He warned that "its extinction in the Gold Coast in the near future must be regarded as a probability, unless effective legislation to protect both the animal and its environment is forthcoming. It is not only the most specialized, but also the most unwary of all Gold Coast monkeys." I do not know of a well-protected population of this monkey in Ivory Coast.

In addition to making a more careful survey of Ankasa/Nini-Suhien (in part to establish whether the red colobus occurs there at all), and to examining the status of Bia (where red colobus once certainly occurred), a broader survey should investigate primate status in Forest Reserves, especially such unlogged or lightly logged reserves as Daediaso, Tano-Nimiri, Jema-Asenkrom and Fure Headwaters (J. Wong, pers. comm.).

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APPENDIX 1

PRIMATE CENSUS DATA

Primate associations detected $\leq$50 m from the transect (an association is defined as a cluster of primates in a limited area, such that no one individual is $>$50 m from another).

Numbers in the first column are the time when association first detected. Second column is estimated minimum perpendicular distance of monkeys from transect (in meters). Third column is species detected in association. **Key**: CAM, *Cercopithecus campbelli*; PET, *C. petaurista*; VER, *Procolobus verus*. CAM indicates the species was seen; ?CAM indicates evidence suggests probable presence of this species (not confirmed from unambiguous sighting or call heard); ??CAM indicates possible presence of this species; ?CAM/PET indicates probably *C. campbelli* and/or *petaurista*; ??MON indicates possible monkey; @ = approximately.

ANTWIKWAA, 11 Aug 93
3 km, 3h 52m, commence 0913

0915	15-25	CAM, PET, ?VER
0945	15-20	VER, PET
1013	@30	CAM
1043	$\leq$10	CAM, PET
1128	$\leq$1	PET, CAM, ?VER

ANTWIKWAA, 18 Aug 93
4 km, 3h 27m, commence 0745

0748	25	CAM
0833	@20	?CAM/PET

ANTWIKWAA, 19 Aug 93
4 km, 4h 36m, commence 0740

0839	15	CAM, PET, VER
0933	10	?CAM/PET
1048	0	??MON

OBUO, 21 Aug 93
4 km, 4h 23m, commence 0647

0757	15-20	?CAM, ?PET, ??VER
0855	35	PET, CAM
0937	20	PET, ?CAM

OBUO, 22 Aug 93
4 km, 4h 31m, commence 0641

0754	20	CAM
0908	25-30	??CAM
0945	20-25	PET, ??CAM
1016	30	VER, PET

[Appendix 1, Kakum primate census data, continued]

OBUO, 23 Aug 93
4km, 4h 12m, commence 0647

0728	2	PET, VER, ?CAM
1042	0	CAM

OBUO, 24 Aug
4 km, 4h 9m, commence 0642

0713	50	CAM
0753	0	?CAM/PET
0837	0	?PET
0906	0	VER, ?CAM
1017	20	?CAM

APPENDIX 2

ITINERARY

8 August

Evening: Arrive Accra from London. Meet M. Stark & J. Shatz (trust fund consultant). Night in Accra.

9 August

a.m.: Discussions with Stark & Shatz; visit to USAID offices; visit to Dept of Game & Wildlife offices, discussions with Drs. J. Grainger & K. Schmitt, meet G.A. Punguse; visit University of Ghana, Legon, meet C. Gordon.

p.m.: Attend trust fund discussion in lawyer's office, Accra, with Stark, Shatz, Agbley & Bowditch. Then drive to Cape Coast.

10 August

a.m.: With Stark & Shatz, meet senior Kakum Park staff: Y. Mensah-Ntiamoah, B. Asamoah-Boateng, A. Asamoa, S. Azika; includes visit to Kuntan nature trail.

p.m.: to Antwikwaa, meet R. Barnes; then hold discussions on location of camps and transects with Asamoah-Boateng & Asamoa; return to Cape Coast.

11 August

To Antwikwaa, census partially-cleared transect, further discussions with Barnes and with J. Wong (ODA forestry advisor); return to Abrafo & Cape Coast, discuss findings with Stark.

12 August

a.m.: to Abrafo, inspect supposedly cleared transect lines near Kuntan trail, finding them marked but not cleared. Inspect new reception center. Discussion of problems with Stark and Asamoa. Return to Cape Coast.

p.m.: Buying supplies and packing for tomorrow's trip to Ankasa. Night in Cape Coast.

13 August

a.m.: travel to Aiyinasi and Ankasa with Barnes and J. Ohemeng.

p.m.: set up camp at Ankasa, meet staff, arrange tomorrow's program, survey nature trail.

14 August

Survey walk in Ankasa Game Production Reserve with member of protection staff. Evening discussions with protection staff.

15 August

Visit Elubo and sites along the southern boundary of Ankasa G.P.R., then return to Ankasa camp - discussions there with Barnes and Ohemeng.

16 August

a.m.: survey of Ankasa nature trail and old road; pack up camp.

p.m.: return to Cape Coast.

17 August

a.m.: in Cape Coast, discussions with Stark and E. Owusu; Abrafo, discuss central transect cutting with Asamoa; back to Cape Coast, buy supplies; visit with Owusu to Univ. of Cape Coast Zoology Dept.

p.m.: travel to Antwikwaa, night at protection camp.

18 August
a.m.: census on Antwikwaa transect.
eve.: discussions with K. Schmitt, and I. Owusu, night at Antwikwaa.

19 August
a.m.: census on Antwikwaa transect.
p.m.: return to Cape Coast, meet Stark, buy supplies, visit university with E. Owusu and meet S. Yeboah.

20 August
a.m.: travel to Briscoe II, trek to Obuo River with E. Owusu and protection staff.
p.m.: set up camp, inspect transect, explore environs.

21 August
a.m.: census on transect.

22 August
a.m.: census on transect.
p.m.: survey forest upriver north of camp.

23 August
a.m.: census on transect.
p.m.: visit of Stark and family to camp, discussions.
eve.: night walk in forest.

24 August
a.m.: census on transect.
p.m.: trek to Briscoe II, return to Cape Coast.

25 August
In Cape Coast. Discussions of observations with Stark, Owusu and Asamoa. Drafting of report. Purchase supplies for tomorrow. Pack.

26 August
Drive to Kumasi and then on to Boabeng-Fiema. Meet Boabeng-Fiema Monkey Sanctuary (BFMS) staff, walk through sanctuary. Night camped in Boabeng village.

27 August
a.m.: In BFMS, recording and observing primates. Visit Fiema village and rest house under construction.
p.m.: drive to Kumasi and Kotoka airport, Accra. Fail to get on British Airways flight due to ticket problem.

28 August
a.m.: In Accra, exploring alternative flights out of Ghana.
p.m.: further work on report.

29 August
Fly from Accra to London, after spending 10 hours at airport.