Survey of De Brazza'S Monkey (Cercopithecus neglectus Schlegel) in the Tororo District of Eastern Uganda and Trans-Nzoia and West Pokot Districts of Western Kenya

Author: Decker, Barbara Sigman

Source: Journal of East African Natural History, 84(1) : 25-34

Published By: Nature Kenya/East African Natural History Society

URL: https://doi.org/10.2982/0012-8317(1995)84[25:SODBMC]2.0.CO;2

Journal of East African Natural History **84**: 25-34 (1995)

SURVEY OF DE BRAZZA'S MONKEY (*CERCOPITHECUS NEGLECTUS* SCHLEGEL) IN THE TORORO DISTRICT OF EASTERN UGANDA AND TRANS-NZOIA AND WEST POKOT DISTRICTS OF WESTERN KENYA

Barbara Sigman Decker[1]
Institute of Primate Research
National Museums of Kenya
P.O. Box 24481, Nairobi, Kenya

ABSTRACT

Censuses of De Brazza's monkey *Cercopithecus neglectus* were conducted in the Tororo District of eastern Uganda and in Trans-Nzoia and West Pokot Districts of western Kenya to determine the status of this species and its habitat. The species had not been reported in eastern Uganda since 1958, and a previous census in western Kenya had reported it under threat. In Uganda 13 sites were surveyed, and 124 individuals were counted in 20 groups ranging in size from two to 22 individuals ($\bar{x}$ = 5.8). In the 11 sites surveyed in Kenya, only 68 individuals were counted in 19 groups ranging in size from two to six individuals ($\bar{x}$ = 3.56). In all these districts, De Brazza's monkeys are threatened with local extinction due to pressures from deforestation and hunting.

INTRODUCTION

De Brazza's monkey (*Cercopithecus neglectus* Schlegel) has been reported to inhabit an extensive geographical range in Central Africa bordered by longitudes 10°30'E and 36°12'E and latitudes 7°26'N and 11°S. This range includes parts of Gabon, Cameroon, the Central African Republic, Zaire, Uganda, Kenya, Ethiopia and northern Angola (Hill, 1966; Sabater Pi & Jones, 1967; Brown & Urban, 1969; Kingdon, 1974; Gautier-Hion & Gautier, 1978; Wolfheim, 1983; Brennan, 1985; Blom *et al.*, 1992; McGraw, 1994). The present size and status of the De Brazza's populations in most of these countries are unknown due to the paucity of recent surveys. Almost all of the documented sightings were made over ten years ago in areas which have been under heavy pressure from expanding human populations, and many sites have not been visited for over 20 years. Periodic censuses are crucial to conservation efforts if we are to monitor the status of primate species.

In East Africa, the De Brazza's monkey has been reported only in isolated forest patches in Uganda and Kenya, and in almost all areas the sightings are quite dated (Wolfheim, 1983). Although populations were reported in the Tororo District of south-eastern Uganda in the fifties (Tappen, 1960; Bere, 1962; Kingdon, 1974), no official record of actual sightings exists since Stott's visit to the area in 1958 (Stott, 1980). During a return visit in 1964, Stott found the site where he had viewed the De Brazza's cleared for agriculture.

In Kenya, the species is now apparently restricted to areas near Kitale (Brennan, 1985; Wolfheim, 1983) and Kakamega (Muriuki & Tsingalia, 1990) and is threatened with local extinction (Brennan, 1985; Brennan & Else, 1984; Karmali, 1984). Previous records indicate

[1] Contact address: Box 4351, Dar-es-salaam, Tanzania or 236 Big Canoe, Jaspar, GA 30143, USA.

that they were reasonably abundant on Mt Elgon (Allen *et al.*, 1936; Pitman, 1954) and present but rare near Maralal (Wolfheim, 1983) and on the lower slopes of the Cherangani Hills (Booth, 1962). However, the species has not been reported at these sites in recent years.

In late 1984 a census was conducted in the Tororo District of eastern Uganda to determine the status of the De Brazza's populations and of their habitat. These results are reported in this paper together with the results of a 1985 census conducted in western Kenya to determine if significant change had occurred in the De Brazza's population and in habitat quality since Brennan's survey in 1983 (Brennan, 1985).

METHODS

Both censuses were conducted in the early mornings and late afternoons during the periods of peak primate activity. All primates seen were counted and age/sex composition of groups recorded when possible. Accurate records of composition were only obtained for a few groups due to the very cryptic nature of the species and its fear of humans. Characteristics of each site were noted, including the type and condition of the forest (including evidence of recent tree cutting and charcoal manufacture), its proximity to cultivated land, other primate species present, evidence of trapping of non-human primates, reports or evidence of crop raiding by the primates, and reports of, or the presence of, hunters.

Uganda

The 1984 census of De Brazza's monkeys in Tororo District (0°44'N, 34°11'E; altitude 1160 m) was conducted from September through December. Most of the surveys were made in the riverine forests and swamps along the Malaba River and its tributaries (fig. 1). The

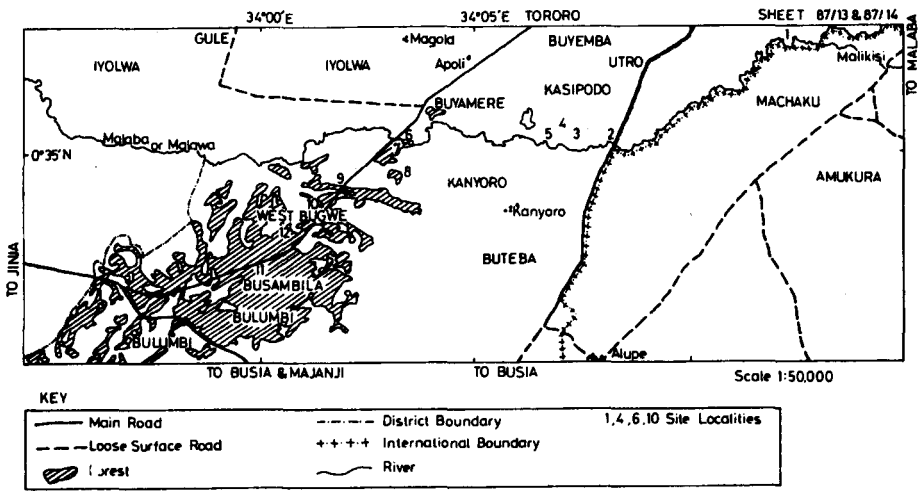

Figure 1. *The survey area in Tororo District, Uganda. Sites are indicated by reference numbers (table 1).*

Malaba River flows from the border town of Malaba south-westerly for about 30 km, then turns north to empty into Lake Kioga. The survey encompassed the stretch of river from the border with Kenya to just north of where the river crosses the main road, *i.e.* about 33 km of the river's course (map refs 1–8). To the west, the West Simia Bugwe Forest Reserve (map refs 9–12 and the forest on the western district boundary (map ref. 13) were also surveyed (fig. 1).

Surveys were made either where local inhabitants reported seeing primates or at sites appearing to be suitable De Brazza's habitat, *i.e.* forests and watercourses with some degree of canopy or cover.[1] If primates had been reported in a forest but not seen on an initial survey or if I was uncertain as to the accuracy of the count, the site was revisited on subsequent days. Ten of the sites were revisited at least twice. Small forest patches were surveyed completely when accessible; in thick swampland or forest, a trail survey method was employed, following logging roads or human and livestock trails.

Kenya

The area surveyed in Kenya in September 1985 encompassed the Trans-Nzoia and West Pokot Districts from Kitale (1°N 35°E) to Kapenguria (1°15'N, 35°07'E). Nine sites were located in Trans-Nzoia District and six in West Pokot District (fig. 2). All but one were riparian forest remnants along streams or springs. In order to make direct comparisons with Brennan's study (Brennan, 1985), 12 of the 14 sites where she had observed De Brazza's were located. Four additional sites were surveyed where the species was reported by local inhabitants.[2]

A Wilcoxon sign-ranks non-directional test was used to analyse differences between years in numbers of individuals per forest. Alpha level was set *a priori* at 0.05 (Sokal & Rohlf, 1981; Witte, 1980).

RESULTS

Uganda

De Brazza's monkeys were seen in 13 of the 15 sites surveyed. Twenty groups, ranging in size from two to 22 individuals ($x = 5.8$), and eight solitary animals were recorded. A total of 124 individuals were sighted. Using estimates of the size of the 13 inhabited forest patches (table 1), the density of individuals was 0.28/ha ranging from 0.2–1.8/ha.

The habitats in which the De Brazza's were found varied in size and type (table 1). Five were classified as riverine forest patches, three as forested wetland, two as secondary forests with open canopies, and one each as *Acacia* woodland, exotic forest reserve, and natural forest reserve. All of the forested wetlands contained springs, and all but two sites were on or near water, either springs, rivers, or streams. The sites ranged in size from 3 to 200 ha ($x = 33$ ha) with a mode of 5 ha.

The age-sex compositions of the 20 groups varied widely (table 1). Adults comprised 58% and young animals 27% of the overall population; the remaining 15% could not be aged. No clinging infants were seen.

Other primate species were recorded at eight sites (table 1). Vervets (*Cercopithecus aethiops* Linnaeus) were seen at five sites, baboons (*Papio anubis* Lesson) at three sites, and redtails (*Cercopithecus ascanius schmidti* Matschie) were in the company of De Brazza's in two sites.

---

[1] In Tororo District, the De Brazza's are known as *ebubusi* (Itesot) and *abumbuli* (Simia).

[2] The Kiswahili names for De Brazza's are *kalasinga* and *nyani ya ndefu*. They are called *wambumuli* by the Bukusu Luhya, *ekadokoi* by the Turkana, and *sibolitit* by the Masai Elgon.

One group of patas monkeys (*Erythrocebus patas* Schreber) frequented the savannah between Tororo and Malaba.

The black-and-white colobus (*Colobus guereza* Ruppell) and Stuhlmann's blue monkey (*Cercopithecus mitis stuhlmanni* Matschie) were observed in Tororo District in 1958 (Stott, 1980) but were not seen during this survey nor reported as present by local inhabitants and are presumed to have become extinct in the district.

Table 1. Survey results: number of De Brazza's monkeys, habitat description, and sympatric primate species in Tororo District. AM-adult male, AF-adult female, UA-unidentified adult, Juv-juvenile, SJ/Inf-small juvenile or infant, UI-unidentified. Habitat key: A - riverine forest, B - forested wetland, C - *Acacia* woodland, D - Monoculture forest, E - Forest reserve, F - Secondary open canopy. Other species: V - vervets, B - baboons, R - redtail monkeys.

Site	Numbers								Site Size	Site	Other
	Map Ref	AM	AF	UA	Juv	SJ/ Inf	UI	Tot	(ha)	Type	Species
Tororo Water Supply	1							10	6	A	V
Osia River Bridge	2			1				1	5	A	V
Chaquatti	3							6	5	B	
Kasipodo	4	1	1		1	1		4	3	F	
Agolot	5		1	11	11			23	13	B	
Buyamere	6	1		3				4	14	C	V
Galama No. Forest Res.	7	2		22	10	2		36	80	A	R
Galama So. Forest Res.	8	3	3	4	4	2		16	60	D	V,B
Okame River	9			3				3	4	A	
Namakombi. River	10			4	1			5	5	A	B
W.Simia Bugwe F.R.	11	1		5			3	9	200	E	R
Kabuleke	12			5	1			6	5	B	B,V
Busia Roundabout	13			1				1	30	F	
Katerema #1	14							0	4	B	
Katerema #2	15							0	6	B	V
Totals		8	5	59	28	5	19	124	440		

Kenya

De Brazza's were observed at 11 of 15 sites surveyed (fig. 2). One of the forests previously containing De Brazza's had been cut. Another one of Brennan's sites could not be located.

Nineteen groups ranging in size from two to six individuals ($\bar{x} = 3.68$) were found. One solitary male was observed. The total number of De Brazza's counted in 1985 was 68 compared to 54 in 1983. The apparent 26% increase is most likely the result of inter-observer differences and the inaccuracies inherent in the censusing of cryptic forest primates.

Comparing the 1983 and 1985 results, a Wilcoxon signed-ranks test shows no significant difference in the number of De Brazza's individuals per forest ($T_{11} = 31.5$, ns). The number of individuals per forest had increased in four sites and decreased in seven sites (table 2). The sparse distribution of the small forest remnants does not provide an opportunity for any widespread migration, even given the partially terrestrial habits of the species. Only four sites contained more than one group.

Three other primate species were observed in the forests in the study area. Vervets inhabited four sites, a total of 105 black-and-white colobus eight sites, and a total of 12 Stuhlmann's blue monkeys three sites. The De Brazza's were seen in the company of the colobus on five occasions but never with vervets or blue monkeys.

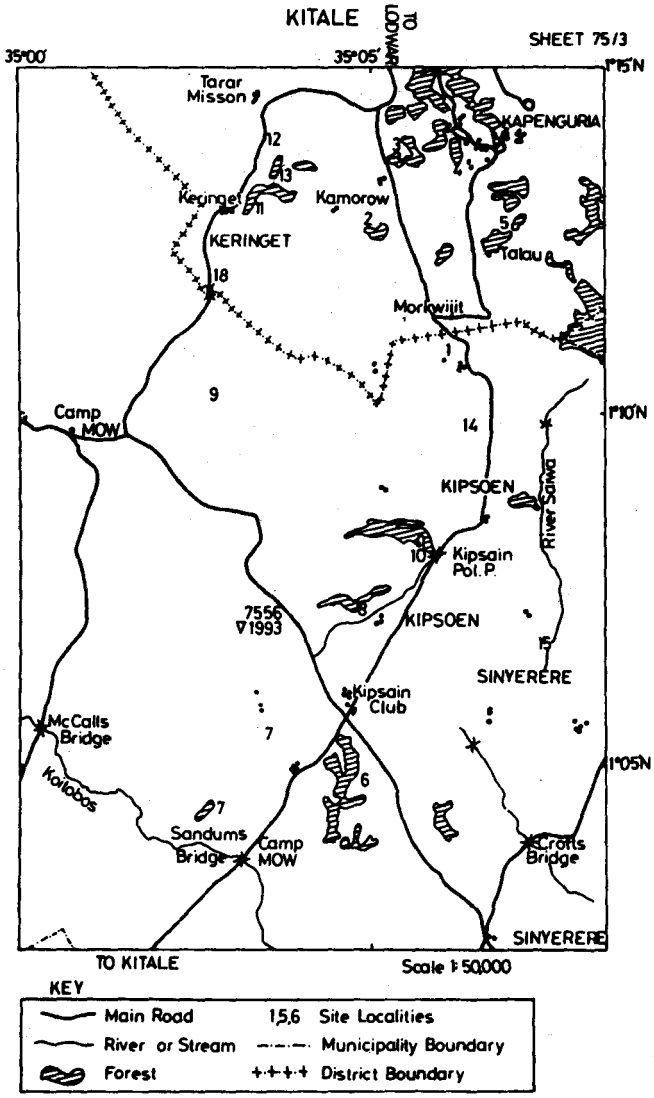

Figure 2. The survey area in Trans-Nzoia and West Pokot Districts, Kenya. Sites are indicated by the 1988 map reference numbers (table 2).

There was evidence of recent deforestation at seven sites, almost all of which were surrounded by subsistence farms. Damage from livestock grazing was seen in one site, and only the Birgen Forest appeared in good condition. Traps and snares were seen in four sites, and hunting for monkeys with dogs was witnessed in two locations.

DISCUSSION

Demography

The count of 124 De Brazza's in Uganda and 68 individuals in Kenya does not necessarily identify all the De Brazza's in the censused districts. De Brazza's monkeys employ the antipredator defences either of hiding or of descending to the ground when approached, which can result in an underestimation of actual numbers (Quris, 1976; Gautier-Hion & Gautier, 1978). Accurate counts of group age and sex composition were too few to be conclusive. Juveniles and sub-adults were seen, but no infants were observed. The fact that no clinging infants were sighted during the surveys may not indicate a non-reproducing population but rather birth seasonality. A preferred birth period is reported for De Brazza's in Gabon (Gautier-Hion & Gautier, 1978) and also in Kenya in areas of marked seasonal food availability (Wahome *et al.*, 1993). In other areas of Kenya, however, De Brazza's do not exhibit a fixed breeding season (Booth, 1962).

Table 2. Comparison of number and distribution of De Brazza's monkey in 1983 and 1985 in sites surveyed in western Kenya with habitat type and sympatric primate species. Key as in Table 1. [1] From Brennan (1985), [2] numbers in brackets indicate number of individuals in each group, where more than one group occurred in a forest, - not censused, ^ reported but not censused by Brennan in 1983.

Site	Map Ref	1983 Site[1]	1985 count[2]	1983 count[1]	Site Type	1985 Other Species
Musa's Forest	1	1	21 (4,6,2,3,6)	1	A	C
Kibor	2	4	8 (6,2)	4	A	C
Chief's Forest	3	-	0	-	A	C,S
Chemarum	4	-	0	-	cut	
Cheriot Forest	5	3	6	1	A	-
Taito Forest	6	40.41	6 (4,2)	8 (6,2)	A	C
Seven Miles	7	42	1	7 (2,5)	A	C
Kones Forest	8	-	3	-^	A	C
Shamala's Forest	9	34	3	4	A	V
Kipsain Forest	10	5	3	5 (3,2)	A	C,S,V
Mwisho South	11	24	5	2	A	C
Sundi	12	15	0	1	cut	-
Mwisho North	13	20	0	3	C	V
Birgen Forest/ Koseta Farms	14	2	9 (5,2,2)	11 (5,6)	A	C
Sinyerere	15	-	3	-^	B	V
Unnamed forest	-	14	-	2		
Unnamed forest	-	43	-	5		
Totals	15	14	68	54		

Although no clinging infants were seen, 4% of the Ugandan population were large infants or small juveniles and 23% were juveniles. A population in which only 27% are immatures could signal an incipient decline (Decker, 1989; Marsh, 1986). The groups observed in Kenya in the period from May to September 1983 included 9.3% infants and 11% juveniles. A low percentage of juveniles in a population can indicate high mortality of that cohort in years prior to the census and will predict inadequate recruitment into the adult classes (Struhsaker, 1973; 1976). If immature animals constitute at least 38% with more than half of them one year old or older, infant mortality is reasonably low and relatively good recruitment is indicated (Struhsaker & Leland, 1980).

The sites containing only one group of De Brazza's were for the most part too isolated to permit migration between forest patches, especially in Kenya. Therefore high densities cannot be dispersed, and juveniles cannot transfer to non-natal groups to increase their reproductive success. Compression to density levels above carrying capacity can lead to localised population declines (Decker, 1989), and isolation of groups may result in inbreeding, genetic deterioration and vulnerability to stochastic events (Terborgh & Winter, 1980).

The solitary De Brazza's are not an unusual phenomenon for the species and have been reported at other locations (Gautier-Hion & Gautier, 1978; Brennan, 1985; Kingdon, 1974; Wahome *et al.*, 1993). However, three of the solitaries were seen in isolated patches without a resident group and may therefore be precluded from reproducing.

The group sizes of 2–6 ($\bar{x}$ = 3.6) observed in Kenya coincide with those reported by Brennan (1985) ($\bar{x}$ = 3.8, n = 14) and are very similar to those reported in Gabon by Gautier-Hion & Gautier (1978) (range 3–4; $\bar{x}$ = 3.5, n = 6) and by Quris (1976) (range 2–6; $\bar{x}$ = 3.8, n = 8). The size of groups in eastern Uganda falls within the range reported by Quris and Brennan with the exception of four of the 20 groups with 22, 10, 15, and 12 individuals each. These larger groups may indicate a congregation of smaller groups with overlapping ranges as reported by Gautier-Hion & Gautier (1978), especially as there was a clumping of food resources at certain fruiting fig trees at the time of the survey. Excluding these four large groups from the calculations, the eastern Ugandan groups ranged from two to six in size ($\bar{x}$ = 3.6, n = 16). In Kisere Forest in Kakamega Forest Reserve, Kenya, three groups of 11, 13 and 16 individuals, respectively were reported (Wahome *et al.*, 1993).

Aggregations of unsually large numbers of individuals could also be the result of compression to high density as a result of habitat disturbance within a very small forest patch. Examples of this include the group of 22 De Brazza's inhabiting 13 ha at Agolot or the 10 animals in ten ha at the Tororo Water Supply. The densities of 1.77/ha and 1.67/ha, respectively were the highest recorded, far above the 0.28/ha average density per site. They are also much higher then the 0.3–0.5/ha in the Gautiers' study site or the 0.28/ha reported by Quris (1976). The range utilised by the Gabon groups of 2–6 individuals was 13 ha at Quris' site and 4–10 ha at the Gautiers' location. The De Brazza's in the Agolot and Tororo Water Supply sites were possibly above carrying capacity.

Habitat

De Brazza's inhabit dense vegetation near streams and rivers (Quris, 1976; Sabater Pi & Jones, 1967; Gautier-Hion & Gautier, 1978; Wahome *et al.*, 1993), although they are also found on occasion in dense foliage away from water. The ranges of the two groups in Uganda observed in areas without water may have included a water source within a day's journey. In choosing a home range, the De Brazza's may not so much be selecting for the water source as for the dense vegetation usually found in the riparian zone (Gautier-Hion & Gautier, 1978). In the De Brazza's-occupied areas of East Africa, the only locations with thick foliage and some canopy are almost exclusively very small forest patches near waterholes, which are by default the only suitable habitat for this species.

Interspecific association

Much of the literature on De Brazza's notes an antipathy on the part of the species toward associating with sympatric primate species (Gautier-Hion & Gautier, 1969, 1978; Quris, 1976), and Kingdon (1974) notes the possibility of a particular interspecific intolerance between De Brazza's and redtails. De Brazza's in Kisere Forest behave aggressively toward redtails and blue monkeys, and both species actively avoid De Brazza's (Wahome *et al.*, 1993). However, during the Ugandan census, De Brazza's were observed in close association with redtails on five

occasions at two sites. They only interacted with vervets at one site and never with baboons. In western Kenya, De Brazza's were frequently seen with groups of black-and-white colobus, but were not observed near blue monkeys or vervets. All the primate species are blamed for crop-raiding, even though the less inhibited blue monkeys, vervets, and baboons probably enter the farms more often than the black-and-white colobus, redtails, or De Brazza's.

CONSERVATION

Uganda

The De Brazza's monkey is in danger of becoming extinct in Tororo District due to pressures from the human population. Half of the sites surveyed in this study were closely surrounded by subsistence farms, and the water sources at the sites were heavily used by humans and livestock. De Brazza's as well as baboons were blamed for crop-raiding and, consequently, were hunted. One hunting party of six men armed with spears, clubs, and dogs was encountered. The larger forest patches were rapidly being cut for charcoal for sale to neighbouring Kenya, and commercial logging companies were active in the West Simia Bugwe Forest Reserve.

The De Brazza's monkey was formerly reported to exist in a number of other areas in Uganda, including the Bwamba (Semliki) Forest, Sango Bay (South East Masaka), Mount Elgon and Mount Kadam (East Karamoja) (Wolfheim, 1983; Bere, 1962). The Semliki and Mount Kadam sites were reconfirmed in 1974 (Wolfheim, 1983), but the other sites have not been confirmed, to my knowledge, since 1954 (Pitman, 1954). All of these localities should be surveyed to determine the status of the De Brazza's monkey in Uganda where it is possible that the species is becoming rare.

In any case, conservation action should be taken to protect the De Brazza's monkey and the forests and wetlands in eastern Uganda. Particular emphasis should be placed on the protection of the West Simia Bugwe Forest Reserve which is the finest remaining forest in the area. In addition to its environmental importance, the forest is a potential tourist resource due to its location on the main road from Kenya to Kampala.

Kenya

In the two years following the 1983 census of De Brazza's monkey in the Kitale area of western Kenya, the status of the species deteriorated still further from the serious situation described by Brennan (1985). One or perhaps two forest patches were cleared for agriculture, and deforestation was occurring in seven others. The total number of De Brazza's remained stable, but several factors forecast a demographic decline.

The populations are under severe pressure from human activities. In 1983, Brennan estimated a loss of forest land over the previous 15 years of 50–90%, and the expanding human and livestock populations require ever-increasing land for agricultural and pastoral use. This survey found no forest patches of more than 10 ha, with many of the sites considerably smaller. Using average density figures of 0.28/ha in Tororo District, Uganda and of 0.3–0.5/ha in Gabon (Gautier-Hion & Gautier, 1978), a maximum of five individual De Brazza's can inhabit these small forest remnants. Five of the sites had already exceeded this population density in 1985. Furthermore, the poor condition of these patches and the rapidity with which they were being cut for farms, charcoal and firewood indicates that they are either now or soon will be unsuitable habitat for De Brazza's.

De Brazza's monkey is legally protected in Kenya, and the local game rangers do respond to complaints from citizens about crop-raiding by chasing the monkeys to other parts of the small

forests. But this is a temporary solution at best, and it is an impossible task to patrol each of the forest patches on a regular basis.

The Green Belt Movement in Kenya could be ideally applied to these riverine forests which function as soil catchment areas. Tree planting along the rivers and streams could be instigated, and conservation education programs could be organised to increase awareness of the importance of the forests and wetlands to the local environment.

The possibility of translocation of the De Brazza's in the Trans-Nzoia and West Pokot Districts to an area where they can be actively protected has been considered (H. Tsingalia, pers. comm.), but difficulties have been encountered in locating a suitable site. The Saiwa Swamp National Park near Kitale and the Kakamega National Reserve are the only legally protected areas where De Brazza's naturally occur, but their populations are already considered to be at capacity levels. Uncertainty in the choice of a suitable site centres on the little-known diet and altitude preferences of the species, and more research will be necessary before a successful translocation could be undertaken.

ACKNOWLEDGEMENTS

These surveys were undertaken by the author as a Research Associate of the Institute of Primate Research, National Museums of Kenya, and at the suggestion of Drs T.T. Struhsaker and J.G. Else. I am grateful to Mr F.C. Decker and the late Mr Tim Barnley and his wife, Jane, for their generous assistance, and Mr Paolo Gibogo in Uganda and Mr Maurice Sinyerere in Kenya for their assistance in the field. H.P. Gauff Engineers provided logistical support, and Mr Zack Otieno, National Museums of Kenya, drew the maps of the study sites. Dr E.O. Smith kindly offered his comments on the manuscript.

REFERENCES

Allen, G.M., B. Lawrence & A. Loveridge (1936). Scientific results of an expedition to rain forest regions in E. Africa. III Mammals. *Bull. Mus. Comp. Zool,*. Harvard **79**: 31–126.

Bere, R.M. (1962). *The wild mammals of Uganda.* Longmans, Green & Co., London.

Blom, A., M.P.T. Alers, A.T.C. Feistner, R.F.W. Barnes & K.L. Barns. (1992). Primates in Gabon—current status and distribution. *Oryx* **26**: 223–234.

Booth, C. (1962). Some observations on behaviour of *Cercopithecus* monkeys. *Ann. N.Y. Acad. Sci.* **102:** 477–487.

Brennan, E.J. (1985). De Brazza's monkeys (*Cercopithecus neglectus*) in Kenya: census, distribution, and conservation. *Am. J. Primatol.* **8**: 269–277.

Brennan, E.J. & J.G. Else. (1984). Can Kenya's De Brazza monkeys survive? *Swara* **7**(3): 12–14.

Brown, L.H. & E.K. Urban. (1969). De Brazza's monkey *Cercopithecus neglectus* Schlegel in the forests of south-west Ethiopia. *E. Afr. Wildl. J.* **7**:174–175.

Decker, B.S. (1985). De Brazza monkeys. *Swara* **8**(6): 19.

Decker, B.S. (1989). *Effects of habitat disturbance on the behavioural ecology and demographics of the Tana River Red Colobus* (Colobus badius rufomitratus). Ph.D. Dissertation, Emory University, Atlanta.

Gautier, J.P. & A. Gautier-Hion. (1969). Les associations polyspecifiques chez les Cercopitheques du Gabon. *La Terre et la Vie* **23**: 164–201.

Gautier-Hion, A. & J.P. Gautier. (1978). Le singe de Brazza: une strategie originale. *Z. Tierpsych.* **46**: 86–104.

Hill, W.C.O. (1966). *Primates: comparative anatomy and taxonomy VI.* University Press, Edinburgh.

Karmali, S. (1984). Editorial. *Swara.* 7(3): 8.

Kingdon, J. (1974). *East African mammals: an atlas of evolution in Africa.* Vol I. Univ. of Chicago Press, Chicago.

Kleiman, D. (1977). Monogamy in mammals. *Q. Rv. Biol.* **52**: 39–63.

Marsh, C.W. (1986). A resurvey of Tana River primates and their habitat. *Primate Conservation* 7: 72–81.

McGraw, S. (1994). Census, habitat preference, and polyspecific associations of six monkeys in the Lomako Forest, Zaire. *Am. J. Primatol.* **34**: 295–307.

Muriuki, J.W. & M.H. Tsingalia. (1990). A new population of de Brazza's monkey in Kenya. *Oryx* **24**: 157–162.

Pitman, C.R. (1954). The influence of the Belgian Congo on the distribution of Uganda's primates, and some of their characteristics. *Tervuren Belgium Musee Royal de L'Afrique Centrale. Annales Sciences Zoologiques* 1(4): 47–55.

Quris, R. (1976). Données comparatives sur la socioecologie de huit espéces de Cercopithecidae vivant dans une même zone de fôret primitive périodiquement inondée (Nord-est du Gabon). *La Terre et la Vie* **30**: 193–209.

Sabater Pi, J. & C. Jones. (1967). Notes on the distribution and ecology of the higher primates of Rio Muni, West Africa. *Tulane Studies in Zoology* **14**: 101–109.

Sokal, R.R. & F.J. Rohlf. (1981). *Biometry: the principles and practice of statistics in biological research.* 2nd Ed. W.H. Freeman & Co., New York.

Southwick, C.H. & F.C. Siddiqi. (1972). Population studies of Malaysian primates. *Primates* **13**: 1–19.

Stott, K. (1980). De Brazza's Guenon: the elusive swamp monkey. *Zoonooz (San Diego Zoological Society)* **53**: 5–8.

Struhsaker, T.T. (1973). A recensus of vervet monkeys in the Masai-Amboseli Game Reserve, Kenya. *Ecology* **54**: 930–932.

Struhsaker, T.T. (1976). A further decline in numbers of Amboseli vervet monkeys. *Biotropica* 8(3): 211–214.

Struhsaker, T.T. & L. Leland. (1980). Observations on two rare and endangered populations of red colobus monkeys in East Africa: *C. b. gordonorum* and *C. b. kirkii. Afr. J. Ecol.* **18**: 191–126.

Tappen, N.C. (1960). Problems of distribution and adaptation of the African monkeys. *Curr. Anthropology* 1: 91–120.

Terborgh, J. & B. Winter. (1980). Some causes of extinction. Pp. 119–133 in Soule, M.E. & B.A. Wilcox (Eds), *Conservation biology: an evolutionary-ecological perspective.* Sinauer, Sunderland, Mass.

Wahome, J.M., T.E. Rowell & H.M. Tsingalia. (1993). The natural history of de Brazza's monkey in Kenya. *Int. J. Primatol.* **14**: 445–466.

Witte, R.S. (1980). *Statistics.* Holt, Rinehart & Winston, New York.

Wolfheim, J.H. (1983). *Primates of the world: distribution, abundance, and conservation.* Univ. of Washington Press, Seattle.