



POPULATION STATUS OF WHITE THROATED MONKEY (*Cercopithecus erythrogaster pococki*) IN OKOMU NATIONAL PARK OF NIGERIA

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ABSTRACT

Abundance and distributions of *Cercopithecus erythrogaster* including effects of seasonal variation on population status were examined in Okomu National Park. 4km straight line nature trail were traversed with a total effective transect length of 32km. The result revealed high distribution and abundance of *Cercopithecus erythrogaster* in both 1.82±0.06 group/km². A total mean group size ranges between 39.0, 37.5, 32.5 and 25.0 individual respectively. There were no significant differences ($p>0.05$) within months. However, significant difference ($p<0.05$) was recorded within season. There are indications that Okomu National Park still harboured a very high population of *Cercopithecus erythrogaster*, since the habitat has high potentials to sustain the existing population of the animal.

KEY WORDS: Abundance, Conservation, Distribution, Habitat, National park, Okomu, Population, Status, White-throated monkey.

INTRODUCTION

White throated monkey (*Cercopithecus erythrogaster*) occurs in scattered population in isolated forest patches within South-Western Nigeria (both West and East of the Niger River within the Delta region (Oates, 1995). Habitats provide wild animals with food, water, shelter, breeding space, cover and opportunity to roam and also to escape from predators. *Cercopithecus erythrogaster Pococki* is known to be endemic in Okomu National Park South Western Nigeria. Until recently, this species was thought to be very rare, but extensive surveys have revealed its presence at a number of formerly unknown sites (Oates, 1995). The authors did not encounter any localities of recent extirpation, or sites where local reports indicated that populations of Sclater's Monkeys had been extirpated even though suitable habitat remains. Sclater's Monkey occurs in a region with a very dense human population and where most natural forest has been destroyed by logging, conversion to cultivated land and oil exploration (Oates, 1995). Of particular concern for this species is severe fragmentation of remaining habitats and thus lack of connectivity among existing populations. Sclater's is hunted throughout its range (except in the very few places where monkeys are held sacred), but it continues to persist due to preferential hunting of larger-bodied primate taxa and its small size, shy nature and adaptability (Oates, 1995). The original habitat of this species would be moist tropical lowland forest, but due to severe habitat degradation, Sclater's Monkey now persists in remnant secondary, gallery/riparian and freshwater swamp forests. The species is also found in marginal forest and farm-bush in communities where monkeys are regarded as sacred (Oates, 1995). The

species is likely omnivorous, with a diet similar to other members of the *C. cephus* group: mostly fruits, insects and young foliage. Many Africa rainforest primates cluster into discrete communities, which are thought to reflect a shared historical relationship with the rainforest, which they inhabit, and to reflect similar dispersal limitations resulting from zoo-geographic barrier. Human activities are making it inevitable that many of the African primate populations and their habitats will disappear, more so that the rate of increase in human population is still very high (Ogunjemite *et al.*, 2005; Salami, 2006; Matanmi, 2009). There is no indication that this pattern of growth has changed. Even with such growth, environmental condition, inefficient techniques and lack of capital resources are causing the rate of food production to lag behind (Barake and Oladeji, 2009; Olaniyi *et al.*, 2009). All these have led to an increase in subsistence living in the forest area, and hence, more negative impact on the fauna resources of the forest zone; which the primate populations constitute a large proportion.

Nigeria is among the fifteen countries worldwide that harbour the highest diversity of primate species (Cowlshaw *et al.*, 2000). The country is endowed with wide range of habitat types from mangrove forest, lowland rainforest, savanna woodland to montane grasslands. The varying forest types harboured different types and varieties of primate species. The studies of primate community's structure increase our understanding of the behaviour, adaptation, and evolution because it enables us to formulate and test hypotheses on patterns of competition, predation and extinction. In addition, Buchanan-Smith *et al.* (2000) noted that such knowledge is required in order to understand their phylogeny and taxonomic status in addition to determining

the measures required to conserve them. The Objective of the study were to determine the abundance and distribution of white throated (*Cercopithecus erythrogaster pococki*) in Okomu National Park

MATERIALS & METHODS

Study Area

About 777 Km² of the Okomu forest was gazetted in 1912 while in 1935 an extension of a further 411 sq.km was effected to the north and east. The Forestry Department of the former Bendel State Ministry of Agriculture and Natural Resource assumed management responsibility for the reserve in 1970. In 1991, Bendel State was divided into Edo and Delta States and the control of Okomu forest Reserve was passed to Edo State. Okomu Forest Reserve was originally exploited by the AT&P (African Timber & Plywood Company). However, logging was selective, taking only a few large valuable hardwoods. In 1977 however, an area of 156 Km² in BC 9 of the reserve was de-classified (de-reserved) and given to Federal Government oil palm project (Okomu Oil Palm Project).

Wildlife survey carried out in the then Bendel State (Anadu and Oates, 1982) revealed the following facts:-

- i. Okomu was the largest remaining rainforest in the southwest Nigeria
- ii. Okomu contained a viable population of the rare white throated guenon *Cerceptithicus erythrogaster*, a monkey endemic to southwest Nigeria, in addition to several other species of international concern
- iii. Okomu forest reserve was the least disturbed of all the rainforest in the State.

The researchers (Anadu and Oates, 1982) then suggested that a wildlife sanctuary be gazetted in the centre of the reserve to give full protection from all forms of foreign exploitations. The proposal for a wildlife sanctuary was accepted by the State Government. The gazette constituting Okomu wildlife sanctuary covering 70 Km² of the area originally proposed by Anadu and Oates was finally passed by Bendel State Government in August 1985 (Bendel State Gazette No. 73; 1986 In 1985, the IUCN/SSC primate specialist group designated the white throated guenon as a species with high conservation priority and Okomu forest reserve as a priority reserve for its development and management. (Oates, 1995) The Nigerian Conservation Foundation (NCF) adopted Okomu as one of its priority areas and launched the Okomu forest project in October, 1987.

The Edo State Government in 1993 requested the Federal Government to take over the management and protection of Okomu wildlife sanctuary as a National Park. Okomu wildlife sanctuary was among the seven protected areas around the country accepted for upgrading into a National Park by the governing board of the National Park Service in 1994. However it was not until 1997 that Federal Government decided to fund recurrent expenditure of Okomu and Kamuku as proposed National Parks.

Subsequently after this intervention, the National Parks Board rehabilitated the main access road to Okomu wildlife sanctuary, renovated all the patrol post and office building, provided vehicles and basic facilities among others. The formal handing over ceremony of the protected area by the Edo State Government to National Park Service took place on 26th May 1999 which coincided with the signing of decree 46 of 1999 (now Act of the National Assembly, cap 65 of 2004) that established the sanctuary as a National Park into law the same day. Okomu National Park is located in Ovia South West Local Government Area of Edo State west of the River Niger in South-South Nigeria. It lies between North latitude 6^o 15¹ and 6^o 25¹, and East longitudes 5^o 9¹ and 5^o 23¹. It is bounded in the west by the Okomu River and in the north, east and south by a series of straight cut lines.

Methods of Data Collection

Two nature trails of 4km long each were traversed in each of the four range of the park: Iguowan (Trans A and B). Arakhwan (Trans C and D) Julius Creak (Trans E & F) Baubuis Creek (Trans G & H). Using ranging poles, compass, measuring tapes wooden pegs and GPS with a total effective transect length of 32km. The transects were calibrated into 50m apart using flaging tapes and makers as recommended by Hall *et, al* (1988) The transects were trasversed twice weekly between the hours of 6.30-11.30 in the morning and 3.30-7.30 in the evening (local time) with the assistance of a team of three Research Assistants at average walking speed of 1.0km/hr as recommended by White and Edward, (2000). The periods of traversed were interspersed with periods of silent and watch to increase the possibility of detecting animals that might hide or flee upon the approach or movement of the observers (Buckland, *et al*, 1993) only individuals seen made the count per group. Skipper 7x50, 2006 model Binoculars were used to sight and observed the presence of white-throated monkey as described by Fleagle J.G. (1999), based on the taxonomic characteristics and description of white-throated monkey, the following assumptions were made, animals were detected with certainty, number animals falling on or over these transects were not missed, animals were detected at their initial locations and measurements were exact. (Walsh *et al.*, 1999). The following information was recorded on any group of white-throated monkey sighted: date sighted, time sighted, habitat/range sighted, number of individuals in a group and number of group sighted. Individuals were arbitrarily considered to belong to different group when the average distance between the individuals was at least ten times smaller than the distance to another group of individuals with similar nearest neighbour distance usually above 20M. An individual was classified solitary when the distance between this individual and a group was more than 40m (Onderwood, 1971) Relative abundance of selected species was calculated as follows.

$$P = \frac{AZ}{ZXYKM^2}$$

Where P – Population

A – Total area
 Z – Number of group sighted
 X – Mean sighting distance
 Y – Area of transect/ length of transect

Percentage Precision
 $\% P = \frac{95\% \text{ Confidence Limit}}{\text{Mean number group per transect}}$

$$\text{Standard Deviation} = \sqrt{\frac{\sum x_i^2 - \frac{(\sum x_i)^2}{n}}{n-1}}$$

Where x_i – Total number of group sighted

$$\text{Standard Error [S.E]} = \frac{SD}{\sqrt{n-1}}$$

n –total number of survived individuals

95% Confidence Limits

$$95\% \text{ CL} = t_{0.05} (n-1) \times \frac{SD}{n}$$

Where n – total number surveyed individual

t – t- distribution

SD – Standard deviation

Mean group size and median group size were equally calculated. The median group is the group in which the average individual is found and is calculated as the median value of the cumulative product of group frequency.

Standard errors were also calculated for data collected and Analysis of variance including Duncan’s multiple range test conducted at (P<0.05) as recommended by (Snedecor and Cochran, 1989) The study was conducted in both wet and dry seasons between the months of April 2011 to March 2012, using only the direct method of population and habitat analysis.

RESULTS & DISCUSSION

The highest sighting group of *Cercopithecus erythrogaster* was recorded in Arakhuan range (2.75 group/km) and this observation was made in the month of January.

TABLE 1: Abundance and Distribution of *Cercopithecus erythrogaster* in Okomu National Park

Month/Year	-----Range-----			
	Iguowan	Arakhuan	Julius Creek	Baubui Creek
April, 2011	1.50 ^A	1.75 ^A	0.78 ^A	1.25 ^A
May, 2011	1.50 ^a	2.00 ^a	2.00 ^{ab}	1.00 ^a
June, 2011	0.50 ^A	1.75 ^A	1.00 ^A	1.25 ^A
July, 2011	1.50 ^a	0.75 ^a	1.75 ^{ab}	0.50 ^a
August, 2011	1.75 ^a	1.50 ^{ab}	1.25 ^{ab}	1.25 ^a
September, 2011	1.50 ^a	0.75 ^{AB}	1.25 ^{AB}	0.50 ^B
October, 2011	1.50 ^a	1.75 ^{ab}	0.75 ^b	0.75 ^a
November, 2011	2.00 ^a	2.25 ^a	1.75 ^{ab}	1.50 ^a
December, 2011	2.25 ^a	2.50 ^a	2.25 ^a	1.75 ^a
January, 2012	2.25 ^a	2.75 ^a	1.50 ^{ab}	1.50 ^a
February, 2012	2.50 ^a	1.75 ^a	1.50 ^{ab}	1.00 ^a
March, 2012	1.75 ^a	1.82 ^{ab}	1.25 ^{ab}	1.09 ^b
Mean Group/KM²	1.68	1.82	1.48	1.09
Standard Error	±0.017	±0.016	±0.016	±0.072
Mean Group Size	37.5	39.0	32.5	25.0

Source: Field Survey (2011 and 2012)

Column (a,b) and row (A,B) Means with common scripts are not differ significantly(P>0.05).

Followed by the months of December and February with the mean group sighting of (2.50 group/Km) each in both Arakhuan and Iguowan ranges. The mean group sighting of

2.25/km² was recorded in Iguowan, Arakuan and Julius Creek ranges in the months of December (Table 1). The least mean group sighting of (0.50/km) was recorded in Iguowan

and Baubui Creek ranges in the months of June, July and September respectively. However, an annual highest mean group sighting of $1.82 \pm 0.06/\text{km}$ was recorded in Arakhuan range, while annual mean sighting in Iguowan, Julius Creek and Baubui Creek ranges were 1.68 ± 0.017 , 1.48 ± 0.016 and $1.09 \pm 0.012/\text{km}$ respectively. In addition, the mean group size of *Cercopithecus erythrogaster* ranged between 25 and 39 individuals. There is no significant difference between months. ($p > 0.05$) in the mean relative abundance of *Cercopithecus erythrogaster* recorded in Iguowan and Baubui Creek ranges. Also in Arakhuan and Julius Creek ranges, no significant difference was recorded between months ($p > 0.05$). However, a significant difference ($P > 0.05$) in the mean relative abundance occurred only in the month of September across ranges (Table 1). Highest mean group size was recorded in Arakhuan range 39.0 individuals followed by Iguowan, Julius Creek range and Baubui Creek ranges with a mean group size of 37.5, 32.5 and 25.0 individual respectively.

Wet Season Abundance and Distribution of *Cercopithecus erythrogaster* in Okomu National Park

The highest Wet Season mean group relative abundance and distribution of *Cercopithecus erythrogaster* was recorded in the month of May ($2.00/\text{km}^2$) in Arakhuan and Julius Creek ranges. While the least value of mean group abundance was recorded in the month of July and September in Baubui Creek range. Wet season mean group abundance of *Cercopithecus erythrogaster* ranged between 0.88 ± 0.102 and 1.42 ± 0.108 (Table 2). There is no significant difference ($P > 0.05$) in the mean relative abundance of *Cercopithecus erythrogaster* recorded in the months in wet season in Iguowan and Baubui Creek ranges. However, there is wet seasonally difference between mean relative abundance of *Cercopithecus erythrogaster* recorded in Arakhuan and Julius Creek ranges. Also significant difference ($P > 0.05$) in relative abundance and distribution of *Cercopithecus erythrogaster* was only recorded in the month of September across the four ranges in the park.

TABLE 2: Mean Group Relative Abundance and Distribution of *Cercopithecus erythrogaster* Sighted in Wet Season in Okomu National Part

-----Mean Group Sighted in Wet Season-----				
Month/Year	Iguowan	Arakhuan	Julius Creek	Baubui Creek
April 2011	1.50 ^A	1.75 ^A	0.78 ^A	1.2 ^A
May 2011	1.50 ^a	2.00 ^{ab}	2.00 ^{ab}	1.00 ^a
June 2011	0.50 ^A	1.75 ^a	1.00 ^{ab}	1.25 ^A
July 2011	1.50 ^a	0.75 ^{ab}	1.75 ^a	0.50 ^a
August 2011	1.75 ^A	1.50 ^a	1.25 ^{ab}	1.25 ^A
September 2011	1.50 ^a	0.75 ^{AB}	1.25 ^{ab}	0.50 ^B
October 2011	1.50 ^a	1.75 ^{ab}	0.75 ^b	0.75 ^a
Mean Group/ KM^2	1.38	1.42	1.33	0.88
Standard Error	± 0.099	± 0.108	± 0.113	± 0.102

Source: Field Survey (2011 and 2012)

Column (a,b) and row (A,B) Means with common scripts are not differ significantly ($P > 0.05$)

Dry season Abundance and Distribution of *Cercopithecus erythrogaster*

Highest dry season mean group relative abundance of *C. erythrogaster* was recorded in Arakhuan range ($2.75/\text{km}^2$) in the month of February. Followed by Iguowan range ($2.50/\text{km}^2$) also in the month of February. The least dry season mean group relative abundance of *C. erythrogaster* ($1.00/\text{km}^2$) was recorded in Baubui Creek range in the

months of December and March. There is no significant differences ($P > 0.05$) in the mean relative abundance of *C. erythrogaster* recorded within months and between ranges (Table 3). However, dry season mean group relative abundance ranged between 1.35 ± 0.086 and $2.20 \pm 0.107/\text{km}^2$.

TABLE 3: Mean Abundance and Distribution of *Cercopithecus erythrogaster* in Dry Season in Okomu National Park

-----Mean Group Sighted in Dry Season-----				
Month/Year	Iguowan	Arakhuan	Julius Creek	Baubui Creek
November 2011	2.00 ^A	1.75 ^A	1.75 ^A	1.50 ^A
December 2011	2.00 ^A	2.25 ^A	2.25 ^A	1.00 ^A
January 2012	2.25 ^A	2.50 ^A	1.50 ^A	1.75 ^A
February 2012	2.50 ^A	2.75 ^A	1.50 ^A	1.50 ^A
March 2012	1.75 ^A	1.75 ^A	1.25 ^A	1.00 ^A
Mean Group/KM²	2.10	2.20	1.65	1.35
Standard Error	±0.104	±0.107	±0.096	±0.086

Source: Field Survey (2011 and 2012)

Column (a) and row (A) Means with common scripts do not differ significantly (P>0.05)

DISCUSSION

In the first and second year of observations highest abundance of *Cercopithecus erythrogaster* was recorded in Arakhuan and Iguowan ranges (1.82±0.06) and (1.68±0.017) group/km² respectively representing 25 and 39 mean group size respectively. The highest abundance group recorded in these ranges may not be unconnected with the fact that these ranges provide enough food, water, cover and breeding space for wildlife species throughout the year, most especially during dry season. Also, the presence of anti-poaching patrol post in these ranges might have facilitate adequate protection of wildlife population in the ranges thereby supporting increase in the population of wildlife population in these ranges and at the same time increasing food resources of existing population of animals in the range. This observation supports the view of Harris and Chapman (2007); Potts *et al.* (2011) that good quality habitats may have improvement in animal population and their distribution. However, the presence of River Okomu, Arakhuan stream and numerous lakes which are concentrated in these two ranges ensures constant provision of drinking water for primate population throughout the year. While the ever green forest along the river bank (wetland) provide breeding ground and cover for various wildlife species in the park including *Cercopithecus erythrogaster* most especially in the dry season when other smaller streams, lakes and water holes in the park must have dried, which result to high concentration of animals in these ranges. This indicates that availability of food, water, cover and breeding space influence the distribution and abundance of wild animals in a particular range as observed by (Harris and Chapman, 2007).

Julius Creek and Baubui Creek ranges harboured the least abundance of (1.48±0.06) and (1.09±0.012) group/km² in both first and second year of observations respectively. The least abundance of *Cercopithecus erythrogaster* recorded in these habitats might been as a result of the fact that these ranges are located along the park boundaries, thereby experiencing serious habitat disturbance ranging from poaching, illegal farming and illegal logging. A total of 117 individuals of *Cercopithecus erythrogaster* were sighted in

wet season, while 144 individuals were sighted in dry season. This may not be unconnected with the fact that in the dry season, many thickets and vegetation must have been exposed through foliate destination thereby increasing visibility for game viewing, therefore making sighting of wild animals easier, whereas in the wet season the vegetation is usually over grown, making sighting of wild animals very difficult due to very poor visibility.

Population counts vary significantly (p<0.05) between the dry and wet season and between each range. The mean group size counted ranged between 2 – 10 individuals in dry season, while a decrease in the mean group size was observed in the wet season, which ranged between 2 – 8 individuals. This might have been as a result of increase in the availability of food and water in all the habitats in the park during wet season making the population to disperse and then a reduction in the mean group size recorded in both dry and wet seasons. The population structure of *Cercopithecus erythrogaster* included adult males, adult females, subadult males, subadult females and juveniles. Out of 144 individuals sampled in the dry season, 7.64%, 21.52%, 3.19%, 22.92% and 32.48% respectively were adult males, adult females, sub adult males, sub adult females and juveniles respectively. It was generally observed that juveniles, sub adult females and adult females constituted higher population of the population structures in both wet and dry seasons. This is an indication that the animal has the potential to maintain and sustains its population potential in the near future, provided various illegal human activities in the park are addressed. The ever green forest along the river bank of the Okomu river, around Arakhuan stream and lakes which do not dried up completely in the dry season provide all the necessary ecological requirements for the animals especially during the dry season, thereby, attracting primates species and other wild animals in the park. This view is in agreement with the view of Wasserman and Chapman (2003) that there was significance difference in the total group of white-throated monkeys sampled in the park in both wetland habitat and upland habitat in the dry season. Abundance and distribution of white-throated monkeys were

significantly different $p < 0.05$ among various habitats preference in the park.

Daily activities of *Cercopithecus erythrogaster* in the Park included early morning and late afternoon feeding between 6.30 – 11.30am and 3.30 – 7.30pm respectively. They rest on top of trees canopy in the hot afternoon between 12.00 – 2.30pm. They equally spend their time to drink water daily before they retired to late night rest. This observation is similar to the previous report by Ogunjemite, (2007) explained that white-throated monkey drink water to meet their body requirements and regulate their body temperature. It was observed that most primate species has over lapping territories with white-throated in the park. This means that these primate species share common habitat resources such as trees, water, breeding space and cover.

CONCLUSION

In order to encourage higher population of arboreal species in the park adequate conservation and management of plant and soil ecosystem should be improved as the habitat resources continue to serve as sources of food, cover and breeding spaces for the arboreal population that inhabit the park.

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RECOMMENDATIONS

The following recommendations are made based on the findings of this study.

1. Regular population census of *Cercopithecus erythrogaster* in the park should be conducted in every five years interval to ascertain the population status of *Cercopithecus erythrogaster* for effective management policy.
2. The Park should improve the research Department through appointment of more wildlife experts and procurement of biological equipment so as to provide useful data and information on the existing wildlife species and their habitats which could serve as baseline information for adequate management.
3. Illegal activities in the park such as logging, farming, encroachment, wildlife habitat destruction by Osse rubber, Okomu oil and Iyayi Rubbers companies should be totally discouraged as soon as possible so as to preserve the existing population of flora and fauna resources.
4. The park should encourage the establishment of more anti-poaching units especially along park boundaries for effective monitoring.
5. The park should always encourage the protection staff of the park through regular review of anti-poaching

patrol allowance; training and retraining of park staff on modern park patrol techniques, to enable them detect and control activities of poachers in the park.

6. It is also very important for the park authority to establish a very good relationship with all the local communities adjoining the park boundaries such as Iguowan, Mile-3, Nikorogha, Udo, Ugolo, Okosa, Okomu-Ijaw, Ugbo, AT and P camp, Aiguobasimwin and Etete so that these communities could support the conservation efforts of the park.

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