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POPULATION STATUS AND HABITAT PREFERENCES OF COMMON WARTHOG (*PHACOCHOERUS AFRICANUS*) IN KAINJI LAKE NATIONAL PARK, NIGER STATE NIGERIA

¹*Adeola, A. J., ²Adeyemo, A. I. and ²Ejidike, B. N.

¹Federal College of Wildlife Management, Forestry Research Institute of Nigeria, P.M.B 268, New-Bussa, Nigeria.

²Department of Ecotourism and Wildlife Management, Federal University of Technology, Akure, Ondo State.

*Corresponding author E-mail: nimibola@gmail.com; +2348060763452

ABSTRACT

This study assessed the population status and habitat preference of common Warthog in Kainji Lake National Park using direct sighting and line transect method using the existing jeep tracks. Data were analysed using the Paleontological Statistics Software (PAST) for scientific data analysis. Population estimates for the common warthog across various habitats were compared using one-way ANOVA and t-test for wet and dry seasons. A total number of 318 individuals were recorded in both seasons in the study area. Wet season recorded 244 individuals while dry season recorded 74 individuals. The findings also showed that the mean population estimates of the warthog were 175.17 ± 58.18 and 106.25 ± 17.23 . The mean age structure and sex ratio of the observed warthog population during dry and wet seasons in the study area showed that juveniles had the highest mean of 18.50 ± 1.04 during the wet season and adult females and juveniles had the highest mean of 5.25 ± 1.25 respectively during the dry season. The seasonal distribution and habitat preference of common warthog showed that during the wet season, the species were commonly sighted in Terminalia macroptera tree savannah as 76 individuals was recorded during the study period and During the dry season, Oli complex habitat had the highest observation with 23 individuals. The study recommends that more aspect of the ecology of the animal should be studied in details and emphasis should be placed on the habitat requirements.

Keywords: Population status, Habitat Preference, Warthog, Kainji Lake National Park

INTRODUCTION

Populations of all species are naturally dynamic and fluctuate over time. The degree to which the change occurs depends on a complex interaction between the biology of the species and the ecosystem in which they live. Some changes in environmental conditions can be beneficial and lead to an increase in population size (Roots, 2007). At the other end of the spectrum, extreme circumstances can result in a catastrophic decrease in numbers leading to a species becoming locally extinct (Dannenfeldt, 2005). The distribution or range of a species can also change over time and either expand or contract over time. Both species abundance and species distribution are closely linked to measures of factors that affect the status of species, whether positively

or negatively (Dannenfeldt, 2005). These include changes in the extent of habitat, habitat fragmentation, water quality, invasions by alien species, coverage of protected areas and harvesting by humans. By tracking trends in population size, indicators based on species abundance therefore not only monitor the trends within those species but also changes in the ecosystems in which they live (FAO, 2000). Warthog are ungulate that belongs to order artiodactyla in the family suidae. It has been genetically proven that two species of warthog are recognised in Africa which comprises of *Phacochoerus africanus* (Common Warthog) and the *Phacochoerus aethiopicus* (desert warthog) (Kleiman *et al.*, 2004). These two species are distinguished largely through the presence and

absence of functional incisors and external appearance (d'Huart and Grubb, 2005). Warthog habitat has generally been described in broad terms as comprising open woodlands, scattered tree-grassland, plains and proximity to water (Fradrich, 1965).

Common warthogs (*Phacochoerus africanus*) are found on the savannah grasslands in almost all of Africa and sub-Saharan countries (Powell, 2003; Berger *et al.*, 2006). Warthogs have disappeared in some areas where the human population is increasing and are therefore found in protected area in some countries (Muwanika *et al.*, 2006). They are diurnal animals, usually remain in a hole abandoned by other animals during the night (d'Huart and Grubb, 2001; Treydte *et al.*, 2006a). Females live in small family groups with their offspring and the males live solitary or in bachelor groups (Berger *et al.*, 2006). There is a significant sexual dimorphism; males are significantly larger than females. Warts distinguishing between sexes; males have much larger and easily seen warts with larger tusks, Juveniles are with much reduced warts and no tusks ((d'Huart and Grubb, 2001). Reproduction may be markedly seasonal. They inhabit areas with distinct dry and rainy seasons and tend to breed towards the end of the wet season (peaking around early April). Females warthog are polyestrous, with estrous periods lasting for about 72 h. Females give birth in the park after the rainy season ended mainly during late September and it is common to see a female with 3 to 4 piglets. Young emerge from the burrow to feed on grasses at about 3 weeks of age, though they are not fully weaned until they are about 6 months old. Piglets follow the mother wherever she goes, suckling as much as every 40 min, using her as shade from the hot sun (Benjamin, 2007). Warthogs eat a variety of grasses and shrubs, and occasionally fruits and insects. An important component of their diet is underground rhizomes, bulbs, and tubers, all of which are dug up with the tusks and snout. They have specialized multi-cusped hypsodont third molar and reduced

premolars which makes them well-adapted to grazing (Mendoza and Palmqvist, 2007).

Little is known about the size of wildlife populations in West African National Parks and other areas where wildlife management is practiced (Aneni and Osaguona, 2005). Existing figures are mere guesses with no indication on the degree of accuracy, whereas continuous monitoring of the size of wildlife population is a basic requirement for proper management, and population counts should be made at least once a year. Effective management of wildlife resources depend basically on the knowledge of some ecological factors – their population, distribution, migratory patterns and their habitat preferences (Ayeni, 2007).

MATERIALS AND METHODS

Study Area

Kainji Lake National Park (KLNP) is located approximately 560 km north of Lagos, and 385km southwest of Abuja, Federal Capital of Nigeria. It covers a total area of 5,340.82km². The two sectors of KLNP lie approximately between latitudes 9^o 40'N and 10^o 30'N and longitudes 3^o 30'E and 5^o 50'E. It is made up of two non-contiguous sectors; the Borgu Sector and the Zugurma Sector. The Borgu Sector of KLNP (Bs-KLNP) is situated on the land area shared between Borgu Local Government Area (LGA) in Niger State and Kaiama as well as Baruten LGAs, Kwara State. It is bordered on the east by the Kainji Lake, popular for the National Electric Power Authority's (now Power Holding Company of Nigeria's) Hydro-electricity Generation Station and supply of freshwater fish. Its western border is contiguous with inter-national boundary of Nigeria and the Republic of Benin. The Zugurma Sector (Zs-KLNP) is situated in the land area shared between Magama and Mashegu LGAs of Niger State. The tributary of Kontagora River on the Northwest side and River Manyara on the north borders the Zugurma Sector (Ayeni, 2007).

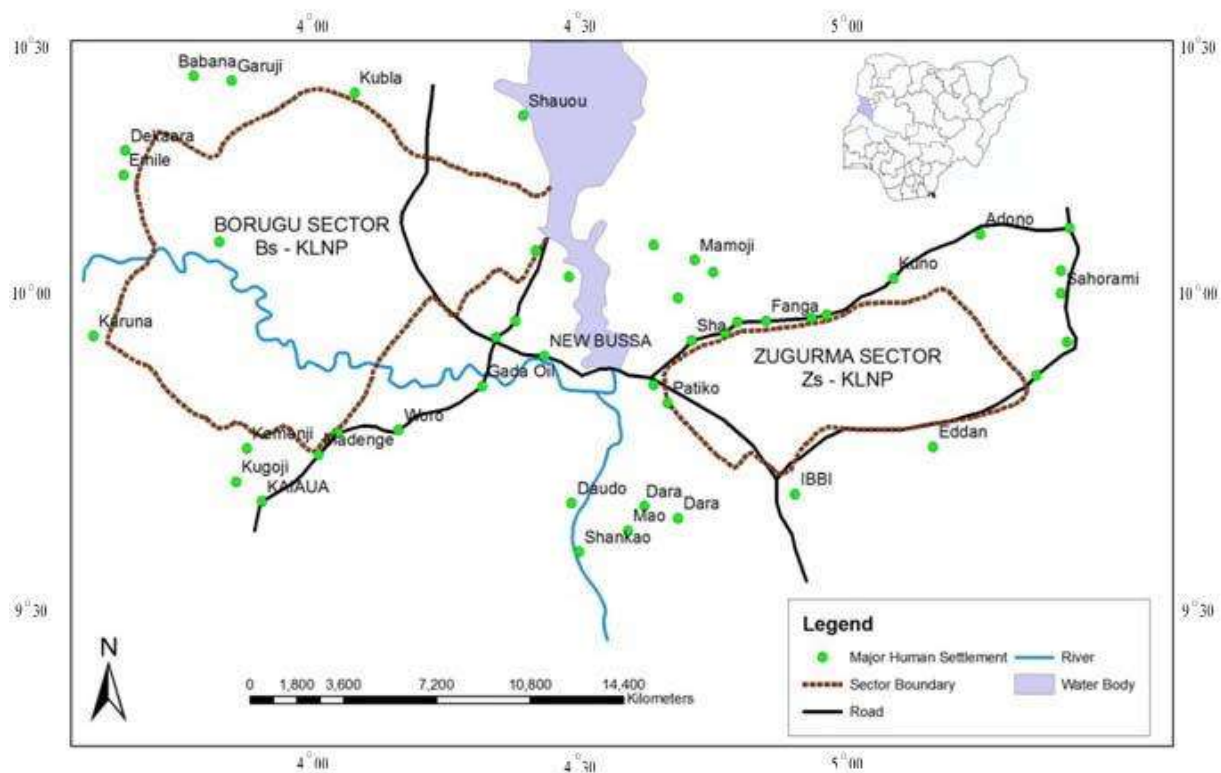


FIG 1: Map of Kainji Lake National Park
Source: Ayeni, (2007).

Data Collection

A Reconnaissance survey was carried out in the study area prior to the detailed study to identify areas of concentration of Warthogs in the Park. Direct sighting, using population studies method described by Buckland *et al.*, (2001) and line transect method using the existing jeep tracks as described by Suthelad (1997) were used. The locations were transverse in the morning between (07:00 to 11:00 a.m) and in the evening (03:00 to 06:00 p.m), binocular was used for viewing of animals of long distances. The age and sex of individual were determine using the method described by Cummings (1970). The three age class of Warthog (Juvenile, Yealings and Adult) based on body and tusk size (Mason, 1984). Data were analysed using the Paleontological Statistics

Software (PAST) for scientific data analysis. Population estimates for the common warthog across various habitats were compared using one-way ANOVA and t- test for wet and dry seasons. Animals counted during different seasons, density, sex, age category, group size and habitat association was compared using t-test for independent samples, Chi- square test.

RESULTS

The results of sample counts of warthog in Kainji Lake National Park are presented in Table 1. A total number of 318 individuals were recorded in both seasons in the study area. Wet season recorded 244 individuals while dry season recorded 74 individuals. A mean of 61.00 (wet season) and 18.5 (dry season) individuals were recorded in KLNP.

Table 1: Population Distribution of Common Warthog in the Ranges of Kainji Lake National Park

Ranges	Individual Observation	
	Wet	Dry
Kemenji	119	43
Oli Camp	58	0
Doro	38	0
Kali	29	31
Total	244	74
Mean ± SD	61.00 ± 40.52	18.5 ± 21.92

Table 2 revealed the seasonal population estimates of warthog in Kainji Lake National Park. The mean population estimates of the warthog were 175.17 ± 58.18 and 106.25 ± 17.23 in KLNP. The mean

density estimates of 0.72 ± 0.26 and 0.52 ± 0.10 were recorded in KLNP. The study equally shows the abundance estimates of 59.25 ± 20.99 and 18.50 ± 10.96 in KLNP in the both seasons.

Table 2: Seasonal Population estimates of Warthog in KLNP during the wet and dry season.

Season	MPD	Abundance Estimates	Density Estimates (group/km ²)	Population Estimates
Wet	0.08	59.25 ± 20.99	0.72 ± 0.26	175.17 ± 58.18
Dry	0.08	18.50 ± 10.96	0.52 ± 0.10	106.25 ± 17.23

MPD = mean of perpendicular distance

The mean age structure and sex ratio of the observed warthog population during dry and wet seasons in KLNP are given in Table 3 - 4. In KLNP, the juveniles had the highest mean of 18.50 ± 1.04 during the wet season, this is followed by adult females with 16.75 ± 2.02 while sub adult male has the least was estimated mean value of 7.50 ± 1.55.

In the dry season, adult females and juveniles had the highest mean of 5.25 ± 1.25 respectively and adult male with 3.25 ± 0.95 while sub adult male was the least with 2.00 ± 0.41. There was no significant difference in the age distribution of the species in KLNP ($F = 0.5.135, p = 0.7308, P > 0.05,$ Table 4).

Table 3. Age Astructure and Sex Ratio of the Observed Warthog Population During Dry and Wet Seasons in KLNP

Age Structure	Mean of Individual Seasons				Mean diff.
	Wet		Dry		
	Individual Observation	Mean±SD	Individual observation	Mean±SD	
Am	30	9.75 ± 1.75	13	3.25 ± 0.95	6.50 ± 0.80
Af	67	16.75 ± 2.02	18	5.25 ± 1.25	11.50 ± 0.77
Sam	30	7.50 ± 1.55	8	2.00 ± 0.41	5.50 ± 1.14
Saf	34	8.50 ± 1.71	11	2.75 ± 0.25	5.75 ± 1.46
J	74	18.50 ± 1.04	24	5.25 ± 1.25	13.25 ± 0.21

Key: Am= Adult male, Af= Adult female, Sam=Sub-adult male, Saf= sub-adult female, J=juvenile

Table 4: Test for equal means of age structure using ANOVA in KLNP

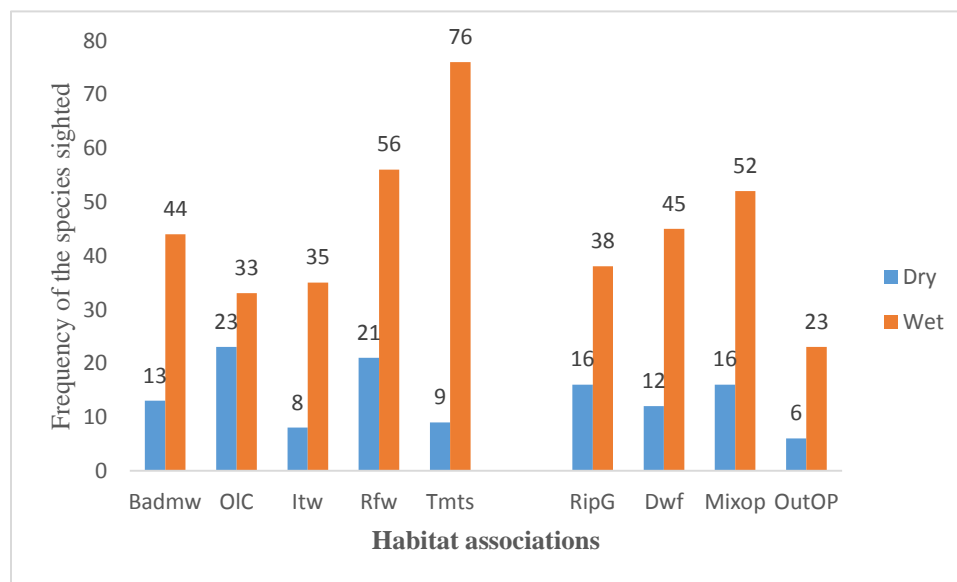
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	1358.6	4	339.65	0.513532	0.730899	5.192168
Within Groups	3307	5	661.4			
Total	4665.6	9				

Welch F test in the case of unequal variances: $F=0.2413$, $df=2.451$, $p=0.8962$

Since F Critical is greater than F tabulated i.e. $P>0.05$ therefore it implies that there is no significant difference in the age distribution of warthog in KLNP.

Figure 3 showed the seasonal distribution and habitat preference of common warthog in KLNP. The species were directly and indirectly sighted in five out of six different habitats types in Borgu sector of KLNP. During the wet season, the species were commonly sighted in *Terminalia macroptera* tree savanna as 76 individuals was recorded during the study period this is followed by Riparian forest woodland and *Burkea africana/ Deterium microcarpum* woodland with 56 and 44 individuals

recorded. The Oli complex had the least sightings of 33 individuals during the study period. During the dry season, Oli complex habitat had the highest observation with 23 individuals and Riparian forest woodland with 21 individuals while *Terminalia macroptera* tree savanna had the least observation of 9 individuals. There is no significant difference in the number of species sighted in different habitats of KLNP ($F = 0.194$, $p = 0.194$, $P > 0.05$).

**Figure 3: Seasonal distribution of warthog in relation to their habitat in KLNP**

Key: Badmw = *Burkea africana/Deterium microcarpum* woodland, OIC= Oli Complex, Itw = *Isoberlinia tomentosa* woodland, Rfw = Riparian forest woodland, Tmts = *Terminalia macroptera* tree savanna, RipG = Riparian grassland, Dwf = Dense woodland and forest outlier, Mixop = Mixed and open woodland, outcrop and open savanna.

DISCUSSION

The distribution of wild animals varies from habitat to habitat all over the world, since different habitats offers different food source and shelter. Our findings revealed that the Common Warthog are not widely distributed in the study area due to the fact that more warthog are encounter during the wet season. Our study was not in accordance with the study of Abdulfatah and Demeke, (2017) which reported in their work that Warthog are widely distributed across the two seasons and habitat. The wide distribution of Warthog in most season and habitat types might be due to their behaviour and access to resources. Boshe, (1984) reported that young Warthog are usually born at the end of the dry season and at the early moment of the wet season. Kumsa and Bekele, (2013) also reported that high number of Warthog observed during the wet season may be due to the availability of food items and cover. During the dry season, when availability of food item declines, Warthogs may migrate to other localities in search of food and cover.

The information of sex and age distribution of animals is vital for evaluating the viability of a species and the indicator of population change in the nearby future. Sex and age structure of a population at any particular occasion is also sign of the possibility of the population structure change (Wilson *et al.*, 1996). Also knowledge of sex ratio and age distribution of individual mammals is crucial for the evaluation of the viability of the species, because these variables reflect the structure and dynamics of the population. Juvenile recorded highest numbers of individuals in all the ranges also the study showed that there are more females than males. The existence of more females and juvenile are expected to increase the population in the area. A comparatively high ratio of females in the population indicated that the common Warthog

have a potential to replace it and can tolerate the human disturbance. This shows healthy, increasing trend of Warthog population in the study area.

The distribution of warthogs in different vegetation varied depending on the season. Woodland cover is important in the protection against predation and human disturbance. Seasonal trends in the use of woodland vegetation versus open grassland area confirm the importance of availability of food resource in spatial pattern of the warthog (Crump and Scott, 1994). The dependence of species habitat relationship on factors ranging from local vegetation structure to landscape features suggests that several processes operate simultaneously at different scales of influence. The present study showed the presence of strong interaction between the habitat and warthogs. This indicates that certain habitats are very important for the survival of warthogs.

CONCLUSION

This study has revealed that there is abundance of common Warthogs in the study area with overall abundance of 244. Wet season recorded the highest number of observation with Kemenji and Oli camp range recording the highest number of individuals. In respect to population structure, Juvenile and Adult female scores the highest observation. The habitat preference showed that *Terminalia macroptera* habitat is the most preferred habitat. In order to encourage higher population of common warthog 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 animal population that inhabit the park. The study also recommends that more aspect of the ecology of the animal should be studied in details and emphasis should be placed on the habitat requirements.

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