

HABITAT ASSESSMENT OF AARDVARK (*Orycteropus afer*) IN KAINJI LAKE NATIONAL PARK, NIGERIA

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ABSTRACT

Vegetation structures have been used to describe the habitat of wildlife species. Therefore, the assessment of the habitat of Aardvarks is very strategic to its conservation. Using field observational methods, the Global Positioning System, and the assistance of experienced Park rangers, this study located the Aardvark burrows to map out their coordinates. Two tracks were purposively selected based on a reconnaissance survey. Animal activities, inventory, size, the distance between burrows, number of active and abandoned burrows were recorded. Four burrows were randomly sampled using a 50 m x 50 m plot to identify trees and shrub species on each plot and a 10 m x 10 m plot was used to identify grass species. Soil samples were collected and analyzed. Overall, 12 (35%) active and 22 (65%) inactive burrows were identified. The average circumference of the burrows on the tracks was 2 m and the average distance from one burrow to another in the same area was 10 m. The wild animals associated with the burrows were Agama Lizard (*Agama aculeate*), and the cane rat (*Thryonomys swinderianus*). Also, the dominant tree species enumerated within their habitat include *Burkea africana*, *Ficus thonnigii*, while the dominant shrub species were *Grewia molle*, and *Securidata longipendiculata*. Furthermore, *Andropogon gayanus* and *Pennisetum purperium* were the predominant grass species. The soil types from the burrow extract were mostly sandy/loamy. The study observed that Aardvarks prefer mixed woodland vegetation, on sandy/loamy soil as their habitat in Kainji Lake National Park. This habitat type must be maintained so that the existing population can thrive in the study area.

Keywords: Aardvark, Habitat, Active burrow, Inactive burrow, Reclusive.

INTRODUCTION

Aardvark *Orycteropus afer* is a medium-sized, stocky, burrowing, nocturnal mammal with porcine snouts native to Africa. It is the only living species of the order Tubulidentata although other prehistoric species and genera of Tubulidentata have been identified (Asher *et al.*, 2009). Aardvarks *Orycteropus afer* are classified as 'Least Concern' due to their population status in the wild (Lindsey *et al.*, 2008). However, their population numbers may be overestimated due to their reclusive nature and uncommon sightings. Aardvarks are ecologically important in grasslands as their burrows create a micro-habitat that facilitates the existence of other vertebrate species (Cilliers, 2002). Several nocturnal and diurnal species have been identified to use the Aardvark burrows for short or long-term shelter and a place to rear their young. According to a study, these species consists of mammals (n=25), birds (n=7), reptiles (n=6), and amphibian (n=1) (Whittington-Jones, 2006). One notable species that rely on Aardvark burrows is

the critically endangered blue swallow, *Hirundo atrocaerulea*. Blue swallows are amongst the top five most threatened bird species in South Africa (Evans and Barnes, 2000). This species of birds nest in mist-belt grasslands and construct cup-shaped nests in Aardvark burrows. Therefore, a loss of aardvarks and consequently, their burrows, could have dire consequences for blue swallow survival. Despite their importance in a range of different ecosystems, Aardvarks remains poorly studied and it is important to gain an understanding of this elusive animal's ecology. The effective management of animal species is enhanced when wildlife managers have detailed information about their habitat. The study aimed at assessing the location of Aardvark burrows and plant species associated with the habitats where burrows are found. Also, soil types within and around the burrows, and animal species associated with the burrows were investigated in the Borgu Sector of Kainji Lake National Park. This study will aid existing conservation activities or

programmes designed by the Park management for this species, and provide baseline information for further studies of the species.

MATERIALS AND METHODS

Study Areas

The study was conducted in the Borgu Sector of Kainji Lake National Park, Nigeria which covers an area of 3,970.02 km². Kainji Lake National Park is the premier National Park in Nigeria situated in the Northern part of the country within the Northern Guinea Savanna and Sudan Savanna (Keay, 1959) and lies between latitude 9° 45' and 10° 23'N and longitude 3° 40' and 5° 47'E. The park has a total area of 5,340.82 km² separated into two distinct non-contiguous sectors.

Method of data collection

The study was carried out specifically at the Oli Range of the Borgu Sector along the two tracks - Shehu Shagari and Gilbert Child between February to July 2015. The tracks were purposively selected along the course of the Oli River where Aardvark burrows were mostly sited from the reconnaissance survey. Global Positioning System (GPS) was used to map out all the coordinates of each burrows visited. A measuring tape was used to measure the circumference of each burrow and the distance of each burrow to the other was recorded. The

observation was conducted twice a month in the morning (between 6 am and 10 am) on each of the tracks to identify the animals associated with the burrows. The size of each burrow, the number of active (activities of Aardvark in the burrow e.g., fur, footprints, fresh faecal material of Aardvark) and abandoned (no activity of Aardvark) burrows, and other animal indicators around the burrows were recorded. Of the 10 burrows investigated, four were randomly sampled using a 50 m x 50 m plot to assess the dominant tree and 10 m x 10 m plots to assess shrubs and grasses around each burrow. Total inventory was done using direct census on the established plots. The species with the highest occurrence or population on the plots were considered dominant. This was done to establish any relationship with vegetation types in the choice of Aardvark habitat. Furthermore, soil samples were collected from three different horizons (O, A, & E) by digging into the soil close to the burrows. Thereafter, the samples were stored in polyethylene bags and taken to the laboratory for analysis. Soil types were determined using Squish and Jar test methods (Schulte and Hoskins, 2011). Animals that were sighted around the burrows and indices that were associated with each burrow were observed and recorded. This was done to establish any relationship with Aardvark burrows and other animals that use the burrows as micro-habitats.

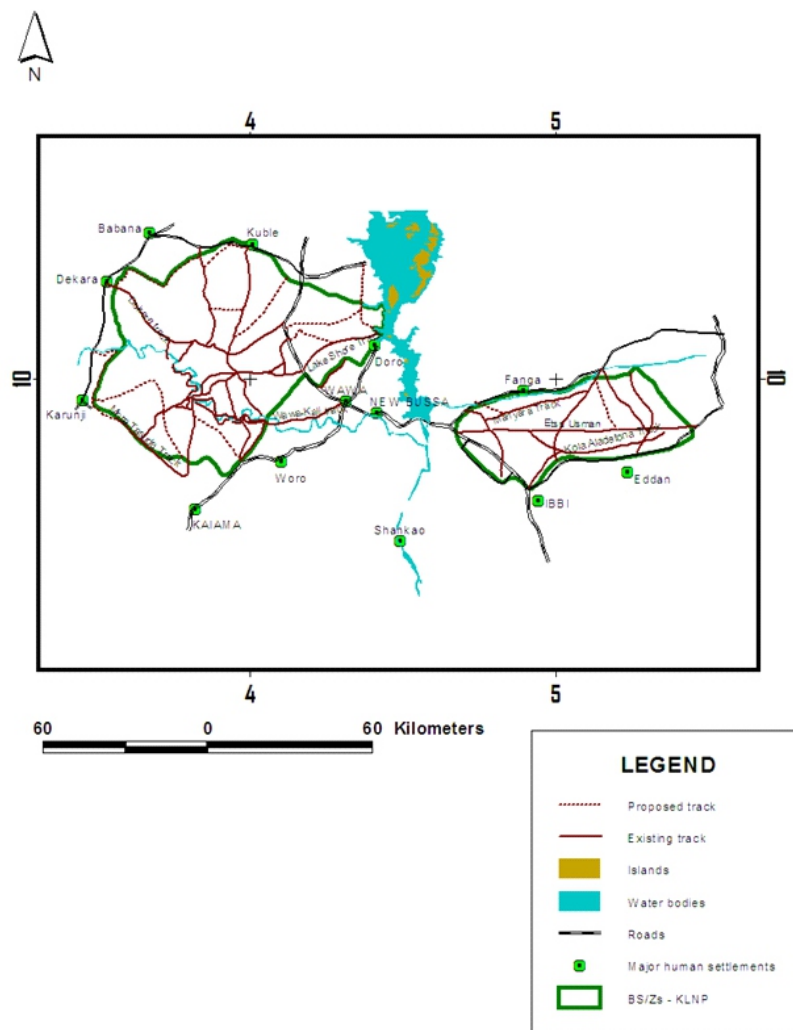


Figure 1: Existing and proposed game viewing tracks of Kainji Lake National Park.

STATISTICAL ANALYSIS

Data collected were collated and subjected to descriptive analysis using tables.

RESULTS

Ten tracks of Aardvark burrows were identified. They comprised the Shehu Shagari track (n=3) and Gilbert Child track (n=7), respectively (Table 1). Overall, 16 burrows were observed in the

Shehu Shagari track consisting of four active burrows and 12 inactive burrows, while in the Gilbert Child track, eighteen burrows were identified [active burrows (n=8) and inactive burrows (n=10)]. Hence, the number of active (Figure 1) and inactive burrows (Figure 2) in the two tracks was 12 (35%) and 22 (65%), respectively (Table 1).

Table 1: An estimate of Aardvark burrows in Oli Range, Borgu sector of Kainji Lake National Park.

S/NO	Tracks	Active burrows	Inactive burrows	Total no of burrows	Average circumference burrows (M)	Average distance of burrows (M)
1	Shehu Shagari Track	3	3	6	2	6.2
2	Shehu Shagari Track	0	5	5	2	2
3	Shehu Shagari Track	1	4	5	1.4	10
4	Gilbert Child track	2	3	5	1.3	5
5	Gilbert Child track	1	0	1	2	Nil
6	Gilbert Child track	1	2	3	1.1	7.2
7	Gilbert Child track	1	4	5	1.4	4
8	Gilbert Child track	1	1	2	1.2	2.3
9	Gilbert Child track	1	0	1	2	Nil
10	Gilbert Child track	1	0	1	2	Nil

Total /Percentage **12 (35)** **22 (65)** **34 (%)**

KEYS

M-Metre FIELD SURVEY, 2019

Four burrows had a record of the activities of other animals in their burrows (Table 2). In the burrows discovered in the Shehu Shagari track, two had direct and indirect observations of these animal species i.e., Agama Lizard *Agama aculeata*,

Francolin *Francolinus bicalcaratus*, Olive Baboon *Papio anubis*, and Monitor Lizard *Varanus varanus*. Of the burrows discovered in Gilbert Child track, two had direct and indirect observations of Olive Baboon *Papio anubis* and Kob *Kobus kob*.

Table 2: Animals associated with Aardvark burrows

SPOT	Tracks	Animal Sighted (Number)	Animal indices	Inside the borrow
2	Shehu Shagari Track	Agama lizard (<i>Agama aculeata</i>) (2)	Francolin feathers	Nil
		Francolin (1) (<i>Francolinus bicalcaratus</i>)		
3	Shehu Shagari Track	Baboon (1) (<i>Papio anubis</i>)	Baboon dung	Nil
		Monitor lizard (1) (<i>Varanus varanus</i>)		
5	Gilbert child track	Baboon (1) (<i>Papio anubis</i>)	Baboon skeleton	Nil
	Gilbert child track	Kob (1) (<i>Kobus kob</i>)	Kob skeleton	Nil
6				

FIELD SURVEY, 2019

It was observed that animals inhabited large burrows, close to the bank of the River Oli, Open Woodland, and the Riparian vegetation dominated by some tree species. These include *Burkea africana*, *Ficus thonniigii*, *Vitelaria paradoxa*, *Detarium microcapum*, and *Anogeissus leicarpus*. The shrub

species that dominate the burrows are *Grewia molle*, *Securidata longipendiculata*, and *Sterculia setigera*. Also, the grass species that are dominant around the burrows are *Andropogon gayanus*, and *Pennisetum purpureum* (Tables 3-6).

Table 3: Plant species around Aardvark burrows in the study area (Spot 1).

S/NO	COORDINATES	TREE SPECIES	COMMON NAMES
1	Lat. N09 ^o .54', 230" Long E 003 ^o .58',404"	BOTANICAL NAME	
		<i>Ficus thonningii</i> *	Kawuri
		<i>Burkea africana</i> *	Kurdi
		<i>Lannea schimperi</i>	Fran
		<i>Monotes polyandra</i>	Sassabani
		<i>Anogeissus leioarpus</i>	Marike
		<i>Parkia biglobosa</i>	Doorroowa
		<i>Vitex doniana</i>	Dinyaa
		<i>Acacia seyal</i>	Dushe
			Dargaji
		SHRUBS	
		<i>Grewia mollis</i> *	
		<i>Crossopteryx febrifuga</i>	Common crown-berry
		<i>Pilliosigma thonningii</i>	Kaglo
		<i>Securidica longipendiculata</i> *	Sanyai
		GRASSES	
		<i>Andropogon gayanus</i> *	Gamba grass
		<i>Commelina benghalensis</i>	Wandering jew
		<i>Commelina diffusa</i>	Spreading day flower
		<i>Eragrostis cilians</i>	Love grass
		<i>Andropogon tectorum</i>	Giant bluestem
		<i>Truinfetta rhombiodes</i>	Chinese bar
		<i>Pennisetum purpureum</i> *	Elephant grass

KEY: * = Dominant species

FIELD SURVEY, 2019

Table 4: Plant species around Aardvark burrows in the study area (Spot 2).

2	COORDINATES	TREE SPECIES BOTANICAL NAME	COMMON NAME
	Lat. N09 ^o .54', 242" Long E 003 ^o .58', 430"	<i>Burkea africana</i> * <i>Lannea schimperi</i> <i>Ficus thonningii</i> * <i>Vitellaria paradoxa</i> <i>Prosopis africana</i> <i>Vitex doniana</i> <i>Maranthes polyandra</i> <i>Pseudoceadrela kotyschiji</i> <i>Detarium microcapum</i> <i>Anogeissus leiolepis</i>	Kurdi Farn Kawuri Shea butter Kiriya Diayaa Sassanbani Tuna Tauraa Marike Kukuki
		SHRUBS <i>Sterculia setigera</i> <i>Crossopteryx ferifuge</i> <i>Grewia mole</i> * <i>Pilliosigma thonningii</i> <i>Secunega virosa</i> <i>Securidica longipendiculata</i> *	Kastiya Dargaji Kaglo Tsa Sanyai
		GRASSES <i>Pennisetum purpureum</i> * <i>Andropogon gayanus</i> * <i>Physalis anyulats</i> <i>Andropogon tectorum</i> <i>Physalis micrantha</i> <i>Triumfetta rhombioides</i>	Elephant grass Gamba grass Wilds cape gooseberry Giant bluestem Slender wild cape Chinese bur

KEY: * = Dominant species
 FIELD SURVEY, 2019

Table 5: Plant species around Aardvark burrows in the study area (Spot 5).

S/NO	COORDINATES	TREE SPECIES BOTANICAL NAME	COMMON NAMES
5	Lat. N09 ^o .54', 402" Long E 003 ^o .56',686"	<i>Bridelia ferruginea</i>	Kokiyar biri
		<i>Tamarindus indica</i>	Tsamiya
		<i>Azizelia africana</i>	Kawo
		<i>Burkea africana</i> *	Kurdi
		<i>Vitalleria paradoxa</i>	kedeya
		<i>Detarium microcapum</i>	Taurea
		<i>Vitex doniana</i>	Dinya
		<i>Terminalia glaucescens</i>	Baushe
		<i>Boswellia dalzielia</i>	Ararabi
		<i>Combretum nigerican</i>	Ciriri
		<i>Sterculia setigera</i>	Kukuki
		<i>Entada africana</i>	Kaiwa
		<i>Pterocarpus erinaceus</i>	Madobia
		SHRUBS SPECIES	
		<i>Pilliosigma thonnigii</i>	Kaglo
		<i>Malvastrum caroman</i>	False mallow
		<i>Sesamum indicum</i>	Seasanu
		GRASSES	
		<i>Spermacoce octodon</i>	Lebrun stork
		<i>Andropogon gayanus</i> *	Gamba grass
		<i>Pennisetum puperum</i> *	Elephant grass
		<i>Brachiara deflexa</i>	Schumach
		<i>Sida rhombifolia</i>	Wire weed
		<i>Boerhavis diffusa</i>	Red spiderly

KEY: * = Dominant species
FIELD SURVEY, 2019

Table 6: Plant species around Aardvark burrows in the study area (Spot 6).

S/NO	COORDINATES	TREE SPECIES	OTHERS NAME
6	Lat. N09°54', 403" Long E 003°56',727"	BOTANICAL NAME	
		<i>Danielia oliveri</i>	African capaiba
		<i>Afzelia africana</i>	Kawo
		<i>Detarium microcapum</i>	Tauraa
		<i>Tamarindus indica</i>	Tsamiya
		<i>Burkea africana</i> *	Kurdi
		<i>Ficus thonnigii</i> *	Kawuri
		<i>Vitellaria paradoxa</i>	Kedeya
		<i>Parkia biglobosa</i>	Doorroowa
		<i>Anogeissus leiocarpus</i>	Marike
		<i>Isobertinia doka</i>	Doka
		<i>Diospyros mespiliformis</i>	Kanya
		<i>Lannea acida</i>	Faru
		<i>Pterocarpus erinaceus</i>	Madobia
		SHRUBS SPECIES	
		<i>Securidaca longipendiculada</i> *	Sanyai
		<i>Grewia mole</i> *	dargaji
		<i>Ptilostigma thonnigii</i>	Kaglo
		<i>Strichnos spinosa</i>	Kokiya
		<i>Cochlospermum planchonii</i>	Zunzuma
		GRASSES	
		<i>Pennisetum purpureum</i> *	Elephant grass
		<i>Tridax spp</i>	
		<i>Andropogon gayanus</i> *	Gamba grass
		<i>Brachiaria lata</i>	Schumack

KEY: * = Dominant species

FIELD SURVEY, 2019

The four plots diversity index was high (Table 7). It was observed that Shannon wiener's index, Evenness, Simpson indexes, and Dominance were high. The Shannon Weiner and Shannon equitability indices are within the general limits of

1.5-3.5 for healthy forests and this indicates that the habitat is highly diverse with trees dominating its structures and functions which can support Aardvark ecological activities in the range.

Table 7: Diversity of tree species composition around Aardvark burrows in the study areas.

Locations	Taxa species	individual species	Dominance	Simpson	Shannon	Evenness
Spot 1	12	12	0.8333	0.9167	2.485	1
Spot 2	16	16	0.0625	0.9375	2.773	1
Spot 5	14	14	0.07143	0.9286	2.638	1
Spot 6	15	15	0.6667	0.9333	2.708	1

FIELD SURVEY, 2019

The preferred soil type around and inside the Aardvark burrows in the study area is sandy/loamy (Table 8).

Table 8: Soil types around and inside the Aardvark burrows in Oli Range, Borgu sector of Kainji Lake National Park.

SPOT	BURROWS COORDINATE	LOCATION	O	A	E	I.B.
1	Lat. N09°54', 205" Long E 003°58',327"	Shehu Shagari track	Humous/ loamy	Clay	Loamy	Loamy
2	Lat. N09°54', 230" Long E 003°58',404"	Shehu Shagari track	Humous	Sandy /loamy	Sandy	Sandy /loamy
4	Lat. N09°54',364" Long.E003°58',513"	Gilbert Child track	Humous	Sandy/ Loamy	Loamy	Sandy/ loamy
5	Lat. N09°54', 364" Long E 003°58',513"	Gilbert Child track	Humous	Humous/ Sandy	Loamy	Sandy/loamy

KEYS**SOIL
PROFILE**

O Top layer
A Middle layer
E Last layer

I.B. Extracts from
inside burrow

FIELD SURVEY, 2019

**Figure 1:** An active Aardvark burrow in the study area.**Figure 2:** An inactive or abandoned Aardvark burrow in the study area.

DISCUSSION

The study established the presence of Aardvark in the study areas, which is in agreement with previous reports (Ayeni, 2007; Ajayi, 2014) at the Kainji Lake National Park. We observed that most (65%) of the burrows were inactive, which is an indication that the activities and population of the species may face a future threat in the study area if proper management practices such as anti-poaching patrols along the course of the river Oli are not adequately addressed. This finding is in agreement with the report of Anon (2013) that indicated that few people understand the ecological importance of the Aardvark and as their natural habitat continues to decline, a simple, yet integrated system may be lost. Various animal species were associated with the active burrows (Table 2). This observation supports the report of Cilliers (2002) and Whittington-Jones (2006) that nocturnal and diurnal species make use of Aardvark burrows as short or long-term shelter and as a place to rear their young ones. Also, these burrows serve as a refuge for many animals during wildfire season in the savanna ecosystem. Hence, the survival of Aardvark creates a micro-habitat that facilitates the existence of all these vertebrate species. Aardvark *Orycteropus afer* is a predominantly nocturnal, solitary, and secretive semi-fossorial mammal endemic to Africa south of the Sahara. It was observed that the animal inhabits large burrows, close to the bank of the River Oli, Open Woodland, and Riparian vegetation that is dominated by some trees, shrubs, and grass species. This is in agreement with the observation of Evans and Bouwman, (2010) that the animal inhabits open woodland, scrub, and grassland areas of Southern Africa, and is generally absent from forests, deserts, and rocky mountainous terrain. Also, the preferred soil type around and inside the Aardvark burrows in the study area was sandy/loamy. This soil type has insulating properties which resulted in the moderate below-ground environment of burrows providing suitable shelter in both hot summers and cold winters for a variety of species (Reichman and Smith, 1990; Finlayson *et al.*, 2005).

CONCLUSION

The study on the habitat assessment of Aardvark revealed that specific wild animals, trees, shrubs, and grass species were associated with the active

burrows. Also, the study revealed that Aardvarks preferred mixed woodland vegetation with sandy/loamy soil as the common soil type inside the Aardvark burrows. Further studies should be conducted on Aardvark species conservation, habitat requirements, and feeding ecology of the animals which can help to sustain the present population of Aardvarks in the study area.

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REFERENCES

- Ajayi, S.R. 2014. Assessment of saltlick utilization by large mammals in Kainji Lake National Park. Unpublished Master's Thesis submitted to the Department of Ecotourism and Wildlife Management, School of Postgraduate studies, The Federal University of Technology, Akure. Pp. 99.
- Anon 2013. "All about Aardvarks". *Easy Science for Kids*. Online Science Tutor for Kids. Retrieved, 2013, Pp.11–18.
- Asher, R.J., Bennett, N. and Lehmann, T. 2009. The new framework for understanding placental mammal evolution. *BioEssay*, 31: 853–864.
- Ayeni, J. S. O. 2007. Participatory Management Plan for Kainji Lake National Park ENVIRON-CONSULT Ltd, 80 Adeniji Jones Avenue, Lagos. 156p.
- Cilliers, S. 2002. The ecological importance of the Aardvark, Afrotherian Conservation-Newsletter of the IUCN-SSC Afrotheria Specialist Group 1: 7–8.
- Evans, S. W. and Barnes, K. 2000. Blue Swallow *Hirundo atrocaerulea*. In: Barnes K. N. (ed.), *The Eskom red data book of birds of South Africa, Lesotho and Swaziland*. Ince Cape: Cape Town. pp. 32–34.

- Evans, S. W. and Bouwman, H. 2010. Habitat selection by Blue Swallows *Hirundo atrocaerulea* breeding in South Africa and its implications for conservation. *African Journal of Ecology* 48: 871–879.
- Finlayson, G. R., Shimmin, G. A., Temple-Smith, P. D., Handasyde, K. A. and Taggart, D. A. 2005. Burrow use and ranging behaviour of the southern hairy-nosed wombat (*Lasiorbhinus latifrons*) in the Murraylands, South Australia. *Journal of Zoology*, 265: 189-200.
- Keay, R.W.J. (1959). An outline of Nigerian Vegetation 3rd Edition, Government Press, Lagos.
- Lindsey, P., Cilliers, S., Griffin, M., Taylor, A., Lehmann, T. and Rathbun, G. 2008. "Orycteropus afer". IUCN Red List of Threatened Species. *Version 2008*. International Union for Conservation of Nature. Pp.11-18. Retrieved 2013.
- Reichman, O. J. and Smith, S. C. 1990. Burrows and burrowing behaviour by mammals. In: Genoways, H.H. (Ed.), *Current Mammalogy*, 2: 197–244.
- Schulte, E.E. and Hoskins, B. 2011. Recommended Soil Organic Matter Tests. Pp. 63-74. In J.T. Sims and A. Wolf (eds). Recommended Soil Testing Procedures for the Northeastern United States. Northeast Regional Bulletin #493. 3rd edition. Agricultural Experiment Station, University of Delaware, Newark, DE.
- Whittington-Jones, G. M. 2006. The role of Aardvarks (*Orycteropus afer*) as ecosystem engineers in arid and semi-arid landscapes of South Africa. MSc Thesis. Rhodes University.

APPENDIX 1: Coordinate and locations of Aardvark burrows in Oli Range Borgu sector of Kainji Lake National Park.

S/NO	COORDINATES	TRACKS
1	Lat. N09 ^o .54', 205" Long E 003 ^o .58,377"	Shehu Shagari track
2	Lat. N09 ^o .54', 230" Long E 003 ^o .50,404"	Shehu Shagari track
3	Lat. N09 ^o .54', 242" Long E 003 ^o .58,430"	Shehu Shagari track
4	Lat. N09 ^o .54', 364" Long E 003 ^o , 513"	Gilbert Child Track
5	Lat. N09 ^o .54', 402" Long E 003 ^o .56,686"	Gilbert Child Track
6	Lat. N09 ^o .54', 404" Long E 003 ^o .56,727"	Gilbert Child Track
7	Lat. N09 ^o .54', 412" Long E 003 ^o .56,673"	Gilbert Child Track
8	Lat. N09 ^o .54', 459" Long E 003 ^o .56,641"	Gilbert Child Track
9	Lat. N09 ^o .54', 458" Long E 003 ^o .56,664"	Gilbert Child Track
10	Lat. N09 ^o .54', 453" Long E 003 ^o .56,705"	Gilbert Child Track