



List of Species and Conservation Status of Avifauna and Small mammal around Bade Segment Area of River Yobe, Yobe State, Nigeria

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ABSTRACT: The study was carried out to assess a Checklist of avifauna and small mammal species along Bade catchment area of Yobe State, Nigeria. Preliminary survey was conducted around the river, three (3) habitat types were identified; (river bank, farm lands and flood plain). The line transect was 8 km in length. Two (2) transects were established per habitat type, making a total of six (6) transects. The transects were 100 m apart to the left or right in order to avoid double counting of species. A distance of 200m was maintained between each habitat. The data obtained were analysed using descriptive statistics (Frequency tables and Charts were used to portray the findings. The result of the study; showed that a total of 50 bird species in 28 families were recorded. RB had the highest individuals of Fifty (50) species while FP has the lowest with ten (10) species. The Bird family *Columbidae* has the highest number with six (6) of species, while the lowest were *Ardeidae*, *Sturnidae* and *Tytonidae* with one species in each of the habitat types. However, checklist of small mammal species also indicated that a total of 6 species of small mammals belonging to 4 families were identified. The result of the study shows that the family *Muridae* has 3 species which was the highest number of per family identified in the study area, this is due to the fact that *Muridae* family are the most common small mammals in the study area. And both bird small species fell under least concern (LC) category except Pallid Harrier *Circus macrourus* which fell under near threatened (NT) species. However, awareness campaign should also be organized for the residents around the study area on the presence, distribution of bird and small mammal species and also disturbing effect of their activities on bird and small mammal around the segment area of river Yobe.

KEY WORDS: Avifauna, Checklist, River Yobe, Small Mammal.

INTRODUCTION

Bird species are warm blooded vertebrates in the scheme of biological classification. They belong to the phylum chordate because of the presence of backbone and to the class Aves for possessing feathers on their bodies (Kwaga, *et al.*, 2017). There are approximately 8,700 living species and more than 1,000 extinct species identified from fossil remains (Safra, 1998). They are good indicators of ecological status of any given ecosystem (Castelletta, *et al.*, 2000). Avian species are important component of the health of an ecosystem furthermore, plays an informational role in attracting public attention to natural habitat (Bibi and Ali, 2013). Birds have been considered as useful biological indicators because they are ecologically versatile and can be found in all kinds of habitats (Sivaperuman and Jayson, 2006). Many frugivorous birds are of tremendous importance as pollinators and play a key role in seed dispersal (Sekercioglu, 2006). Migration of birds is a common response to environmental periodicity (Berthold 2001). In Nigeria, four (4) avifauna species; Anambra waxbill (*Estrilda poliopareia*), Ibadan Malimbe, (*Malimbus ibadanensis*), Jos Plateau indigo-bird (*Vidua maryae*) and the Rock Fire-Finch (*Lagonosticta sanguinodorsalis*) are endemic to the country, making them globally important species for conservation (Nigeria National Biodiversity strategy and action plan NBSAP, 2007). Previous studies on the avifauna resources were carried out at Dagona Waterfowl Sanctuary by Lameed, 2011; Hadejia-Nguru Wetlands by Ringim and Sulaiman, 2017; Sabo, 2016. All these studies covered the Dagona-Nguru-Hadejia wetland which is congruent with river Yobe. Even though, a recent study was conducted on small mammals in Federal University Gashua by (Adam *et al* 2021).

Nigeria has a vast and unique diversity of small mammals, which has been surveyed and reported on extensively (Igbokwe, *et al*, 2016). Small mammals have long been used as bio-indicators and model organisms to study patterns of species abundance and diversity along different land use gradients (Michel, *et al*, 2007). Small mammal influence the structure and composition of forests



through consumption and seeds dispersal, pollination and prey for other animals species such as snakes, birds and mammals, which are often of greater conservation concern (Chung and Corlett, 2006). Small mammals constitute a large proportion of the prey base for avian and mammalian predators (Fryxell Rosenberg *et al.* 2003). Alterations in the community structure of these small mammals can be used as alternative and a quick way of measuring environmental disturbance, due to their sensitivity to small changes in the environment (Avenant, 2011) Some of these small mammals are also plants pests and carriers of zoonotic diseases (Datiko and Bekele, 2014).

There is paucity of information and on the competition of bird and small mammal species around the River Yobe, (bade segment area). Previous studies on the avifauna resources were carried out at Dagona Waterfowl Sanctuary by Lameed, 2011; Hadejia-Nguru Wetlands by Ringim and Sulaiman, 2017; Sabo, 2016. All these studies covered the Dagona-Nguru-Hadejia wetland which is congruent with river Yobe, in which this study covered. Even though, a recent study was conducted on small mammals species in Federal University Gashua by (Adam *et al.* 2021). However, no studies have covered the eastward section of the River (Bade catchment area) particularly Gashua. Hence the need for this study which is to assess bird and small mammal species around Bade segment Area of River Yobe, in order to provides a list and IUCN status of bird and small mammal species in the area.

The Data obtained from the study provides baseline information on the species list and iucn status and also create an understanding of the current Avian and small mammal species present in the study area for better future studies, conservation and management plan initiatives around segment of river bade section. Moreover, the list of avian and small mammals produced in the study area, couple with checklist of other areas in the country might be useful in updating the country's fauna species, since not all the ecosystems were covered.

METHODOLOGY

Study Area

River Yobe, is also known as the komadougou-Yobe in French is a river in West Africa that flows into Lake Chad through Nigeria and Niger; in Nigeria, it covered an eastern extension of Bade-Nguru wetlands sector. The wetlands are rich community which housed numerous plants and animals species, including vertebrates, invertebrates, seeds, and tubers, which provides shelter, foods and water for birds and small species (David *et al.*, 2009; Muhammad *et al.*, 2012), and supporting valuable bird species such as songbirds and shorebirds besides a wide habitat range (Anderson, 2003). Wetlands also serving as a roosting, breeding and thermoregulation ground for many bird's species (Shiemelis and Afework, 2008),

This research was carried out at Gashua part of the Bade L.G.A. catchment area of River Yobe. Gashua is the headquarters of Bade L.G.A. River Yobe has a total land size of 148,000 km² (IUCN, 2009). It is situated in semi-arid sub-Sahara region of Nigeria in Yobe State. Popular towns alongside of the River include Gashua, Geidam in Nigeria and Damasak in Nigeria and Diffa in Niger Republic (Kole, 1997). The study site lies between latitudes 12° 52' 5 North and longitudes 11° 2'47 East and at an average elevation is about 299 m above sea level (Wakawa, *et al.*, 2017). Bade Local Government area has an area of 772 km² (Yusuf, 2015), with estimated population of about 139,782 (NBS, 2006). It Shares a common boundary with Bursari, Yunusari, Jakusko and Karasuwa Local Government areas of Yobe state, as shown in (Fig. 1). Agriculture is the major economic activity of this area due to the presence of rivers, stream and tributaries notably, River Yobe. Gashua area provides opportunity for the people of the community to engage in irrigation farming, which contributes a high share of rice production to the state and fishing activities (Hamidu, 2015). The few scattered trees found within her vegetation range are mostly the Gum Arabic (*Acacia senegal*), Baobab (*Adansonia digitata*) and Doun palm (*Hyphaen thebaica*). *Acacia seyal*, *Acacia nilotica*, *Faidherbia albida*, *Maerua crassifolia*, *Tamarindus indica*, *Anogeissus leiocarpus*, *Bauhinia refescence*, *Ziziphus mauritiana* and *Ziziphus spina-christi* (Wakawa *et al.*, 2017). Neem trees *Azadiracta indica* are found in area of settlement. Grasses are very short that complete their life cycle within the few three month of rainfall.

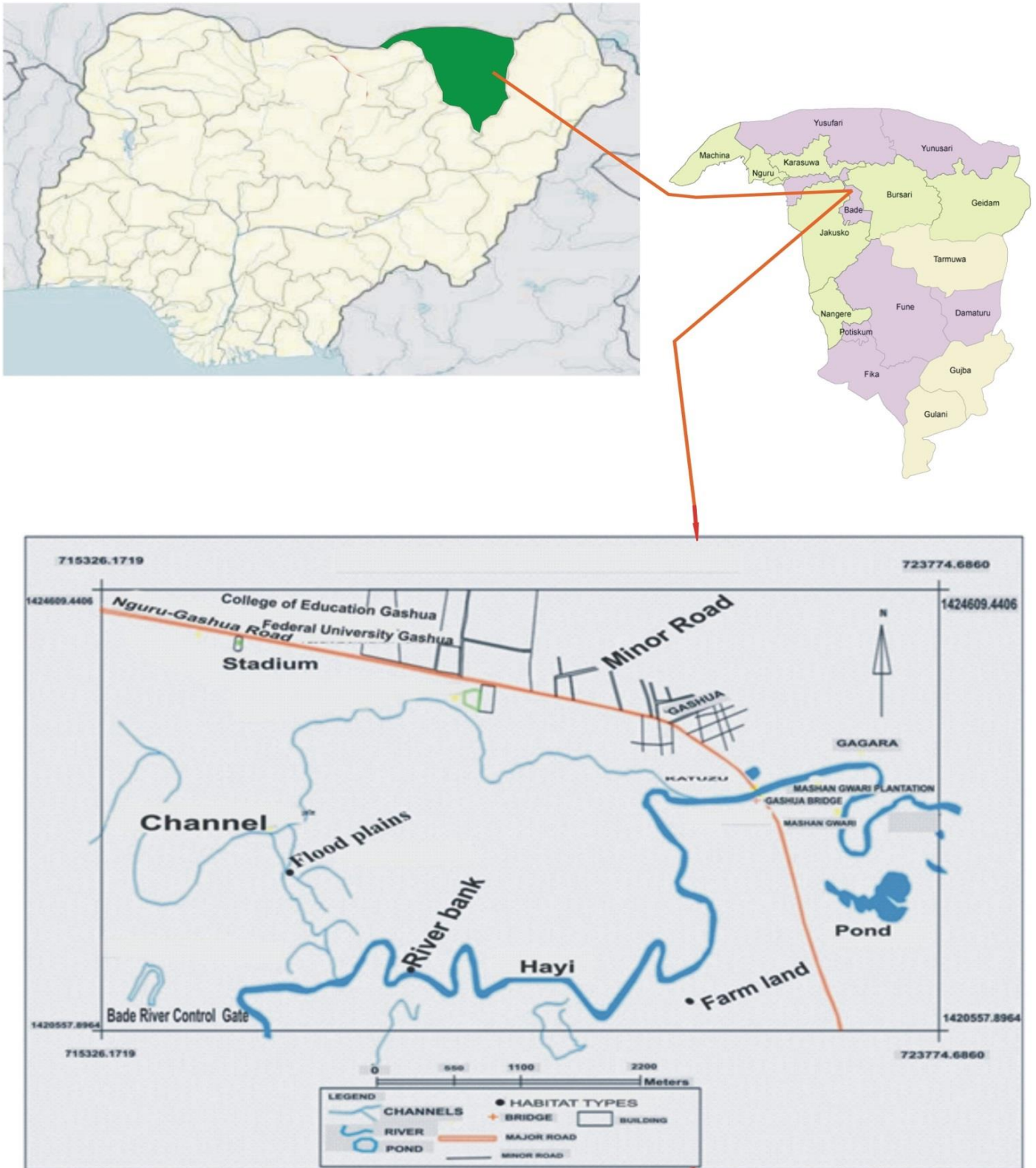


Figure 1: Map of River Yobe Showing Bade Catchment Area in Yobe State
Source: Google earth image, open source software (c) (2017)



Data collection techniques

This survey was conducted from March-June 2018. It was carried out using Line Transect method. The line transect was 0.5 km in length. Two (2) transects were established per habitat type; River Banks (RB), Farm Lands (FL) and Flood Plains (FP). The transects were 100 m apart to the left or right in order to avoid double counting of species. A distance of 200m was maintained between each habitat. When each Habitat is visited, a line transect was walked in the morning hour from 6:00 am-10:00 am and evening 3:00 pm-6:00 pm. These periods coincide with the time when some animals are most likely to search for food and water (Kwaga, *et al.*, 2017). For River Bank habitat, morning observations were taken on one side of the river and evening observations was also taken at the other side respectively. Each transect in a habitat was visited four (4) times, which resulted in each habitat being visited Sixteen (16) man-days during the study, making a total of Forty eight (48) man-Days. Two observers move slowly as possible at a rate of 0.2-0.5km/30 minutes stopping occasionally at every 50 m point along each transect to listen and watch for bird and small mammals species. Once the observers reach the point, they stay for Five (5) minutes after arrival to allow the birds to settle. When a bird or flock is sighted or encountered, the following information was recorded: Name of the species and Number sighted. Birds were viewed with the aid of 12 x 32 Bushnell Binoculars and identified using the Field Guide to birds of Western Africa by Borrow and Demey (2014). And Jonathan Kingdon Field Guide to African Mammals (Kingdon, 2015), was used to identify small mammals species in the study area.

Other Methods which used in Identification of birds and Small Mammals species in the study area

The methods used in identification of bird and mammal species in the study area were highlighted as follows:

- i. Indices: - This follows Koster and Hart (1988) and Akosim and Mbaya (2014), method in which wildlife populations' studies must rely on the interpretation of animals sign. Wildlife signs such as scales of reptiles, fresh droppings, different holes and caves, types of nest, foot prints and animal dead body were considered for interpreting the presence and estimating wildlife population (Adamu, 2006). This was equally observed in the process of moving along the transect line. And many burrows, dead animal bodies and nest were seen as shown in (plate 2 and 3).
- ii. Market Survey: - Bush meats at the local market in the study area were identified and united as adopted by Akosim and Mbaya, (2014). One bush meat market was identified in Gashua town. The visit to the bush meat market in Gashua was carried out between 10:30 am-01:00 pm throughout the period of the study in every Wednesday of a week which is the market day for Gashua town.

Status Categories of Mammals and Birds

Categories outlined by (Ezealor 2002; Mbaya, and Malgwi, 2010). were used to assign the status of mammals and of birds. This is as follows;

Vu = Vulnerable (Likely to become endangered if the factor that is posing threat persists).

LR/ cc= Low risk-conservation dependent (Species in no immediate danger but survival will depend on implementation of effective conservation measures in its range).

Lc= least concern. Categories on the IUCN red list of threatened species which indicates that a taxon has been evaluated and does not qualify for critically, endangered, endangered, and vulnerable or near threatened.

NT= near threatened (species is approaching the threshold of vulnerability)

EN= Endangered (species is unlikely to survive if the factor that is posing threat persists).

RB= Resident breeder

R {B}= Resident but breeding not approved. PM = Palearctic migrant

AFM= Migrates within Nigeria

DD= Data deficient.

Statistical Analysis of Data

The data obtained were analyses using descriptive statistics (frequency tables, means, charts and diagrams following Wakawa *et al.*,(2016).

RESULTS

Checklist of avifauna species in the study area

Result showed that a total of Fifty (50) Species of birds belonging to twenty eight (28) families were recorded. All species recorded occurred around the River Bank (RB) area, Twenty Nine (29) species occurred around Farm Lands (FL) and Ten (10) species in Flood plain (FP) areas respectively. Six (6) species; Great egret *Egretta alba*, Crested lark *Galerida cristata*, Abyssinian roller *Coracias abyssinicus*, Rose Ringed Parakeet *Psittacula krameri*, Bush petronia *Gymnoris dentata* Northern grey-headed sparrow *Passer griseus* occurred across all three (3) habitat types (Table 1). Result also indicated that family Columbidae had the highest number of species six (6), followed by *Accipitridae* (5), while *Leporidae*, *Erinaceidae*, *Nesomyidae*, *Gerbillinae*, *Soricidae*, *Pteropodidae* and *Sciuridae* has the lowest representative by One (1) species each as shown in (Fig. 2). Long-tailed glossy Starling *Lamprotornis caudatus*, Black-headed Lapwing *Vanellus tectus* and Barn Owl *Tyto alba* were also encountered their dead body in the study area as shown in (Plate 2) is just natural dead. However, river bank

Check list of small mammals in the study area

Table 2 shows the checklist of small mammal species and their mode of identification. A total of Ten (10) species of some mammals belonging to Nine (9) families were identified. The result of the study indicated that the family *Muridae* has the highest number of three (3) species. While *Herpestidae* *Erinaceinae*, *Nesomyidae*, *Canidae*, *Felidae* and *Leporidae* have the lowest representative by (1) species each recorded in the study area. The highest number of family in *Muridae* as shown in (Figure 2) might be due to the fact that they are the most common small mammal's species inhabiting the study area. This findings is in line with the work of Atiku *et al*, (2014) who reported that *Muridae* are the most common mammals which by implication has the highest number of species in Wassaniya forest reserve Sokoto state Nigeria, while the rest of the families has only single (1) specie each. The findings further reveals that most of the species were identified through Dead Animal (DA) and Visit to bush meat processing and selling centers (BMPSC) which has 6 species each, then followed by Direct Sighting (DS) and Burrow (BURR) which also has 4 species each. *Suricata suricatta*, *Vulpes pallid*, *Cricetomys gambianus* *Lepu saxatilis* *Xeru erythropu* *Lepu saxatilis* *Lepu saxatilis* and *Suncus varilla* were identified through BMPSC, the result also demonstrated that almost all birds and small mammal species felled under LC (least concern) in IUCN red list of threatened species except Pallid Harrier *Circus macrourus* which felled under NT (Near threatened) in the conservation status as shown in (Table 2 and table 3)

Table 1: List and IUCN status of avian species encountered at the three habitat types in Bade Catchment Area of River Yobe

S/N NNN	Family	Species Common Name	Scientific Name	Habitat Types			IUCN Status
				RB	FL	FP	
1	<i>Bucerotiidae</i>	Red-Billed Hornbill	<i>Tockus erythrorhynchus</i>	×	—	×	LC
2		African Grey Hornbill	<i>Tockus nasutus</i>	×	—	×	LC
3	<i>Ciconiidae</i>	Abdim's Stork	<i>Ciconia abdimii</i>	×	×	—	LC
4	<i>Accipitridae</i>	African Cuckoo Hawk	<i>Aviceda cuculoides</i>	×	—	—	LC
5		Black-Shouldered kite	<i>Elanus caeruleus</i>	×	×	—	LC
6		Montagu's Harrier	<i>Circus pygargus</i>	×	—	—	LC
7		Tawny Eagle	<i>Aquila rapax</i>	×	—	—	LC
8		Pallid Harrier	<i>Circus macrourus</i>	×	—	—	NT
9	<i>Charadriidae</i>	Black-headed Lapwing	<i>Vanellus tectus</i>	×	×	—	LC
10	<i>Ardeidae</i>	Intermediate Egret	<i>Egretta intermedia</i>	×	—	—	LC
11		Little Egret	<i>Egretta garzetta</i>	×	—	—	LC
12		Great Egret	<i>Egretta alba</i>	×	×	×	LC
13		Cattle Egret	<i>Bubulcus ibis</i>	×	×	—	LC
14	<i>Estrildidae</i>	Cut-Throat Finch	<i>Amadina fasciata</i>	×	—	—	LC
15		Red-Cheeked Cordon Bleu	<i>Uraeginthus angolensis</i>	×	×	—	LC
16		Red-Billed Firefinch	<i>Lagonosticta senegala</i>	×	—	—	LC



17	<i>Alaudidae</i>	Chestnut-backed Sparrow lark	<i>Eremopterix leucotis</i>	×	×	—	LC
18		Crested lark	<i>Galerida cristata</i>	×	×	×	LC
19		Sun lark	<i>Galerida modesta</i>	×	×	—	LC
20	<i>Upupidae</i>	Hoopoe	<i>Upupa epop</i>	×	×	—	LC
21	<i>Sturnidae</i>	Long-tailed glossy Starling	<i>Lamprotornis caudatus</i>	×	×	—	LC
22		Chestnut-Bellied Starling	<i>Lamprotornis pulcher</i>	×	—	—	LC
23		Purple glossy Starling	<i>Lamprotornis purpureus</i>	×	×	—	LC
24	<i>Columbidae</i>	Namaque Dove	<i>Oena capensis</i>	×	—	—	LC
25		African mourning Dove	<i>Streptopelia decipiens</i>	×	×	—	LC
26		African collared Dove	<i>Streptopelia roseogrisea</i>	×	×	—	LC
27		Vinaceous Dove	<i>Streptopelia vinacea</i>	×	×	—	LC
28		Laughing Dove	<i>Streptopelia senegalensis</i>	×	×	—	LC
29		Speckled Pigeon	<i>Columba guinea</i>	×	×	—	LC
30	<i>Coraciidae</i>	Abyssinian Roller	<i>Coracias abyssinicus</i>	×	×	×	LC
31	<i>Timaliidae</i>	Brown Babbler	<i>Turdoides plebejus</i>	×	—	—	LC
32	<i>Phasianidae</i>	Double-Spurred Francolin	<i>Francolinus bicalcaratus</i>	×	×	—	LC
33	<i>Iniidae</i>	Grey-Backed Fiscal	<i>Lanius excubitoroides</i>	×	—	—	LC
34	<i>Cistocalidae</i>	Tawny flanked Prinia	<i>Prinia subflava</i>	×	—	×	LC
35	<i>Laniidae</i>	Woodchat Shrike	<i>Lanius senator</i>	×	—	×	LC
36	<i>Corvidae</i>	Pied Crow	<i>Corvus albus</i>	×	×	—	LC
37	<i>Scolopacida</i>	Temminck' Stint	<i>Calidris temminckii</i>	×	×	—	LC
38	<i>Viduidae</i>	Village Indigobird	<i>Vidua chalybaeta</i>	×	—	—	LC
39	<i>Cuculidae</i>	Senegal Coucal	<i>Centropus senegalensis</i>	×	×	—	LC
40	<i>Motacillidae</i>	Yellow Wagtail	<i>Lanius senator</i>	×	×	—	LC
41	<i>Alcedinidae</i>	Pied Kingfisher	<i>Motacilla flavor</i>	×	—	—	CL
42	<i>Psittaculidae</i>	Rose-Ringed Parakeet	<i>Psittacula krameri</i>	×	×	×	LC
43	<i>Passeridae</i>	Bush Petronia	<i>Gymnoris dentata</i>	×	×	×	LC
44		Northern grey-headed Sparrow	<i>Passer griseus</i>	×	×	×	LC
45	<i>Meropidae</i>	European Bee-Eater	<i>Merops apiaster</i>	×	—	—	LC
46	<i>Ploceidae</i>	White-billed buffalo Weaver	<i>Bubalornis albirostris</i>	×	×	—	LC
47		Red-billed Quelea	<i>Quelea erthrops</i>	×	×	—	LC
48		Chestnut-Crowned Sparrow Weaver	<i>Plocepasser superciliosus</i>	×	—	—	LC
49	<i>Caprimulgid</i>	Spur-winged Lapwing	<i>Vanellus spinosus</i>	×	×	—	LC
50	<i>Tytonidae</i>	Barn Owl	<i>Tyto alba</i>	×	—	—	LC

RB= River Banks, FL= Farm Land, FP =Flood Plain, ×= Present, — = Absent and IUCN= International Union for the Conservation of Nature

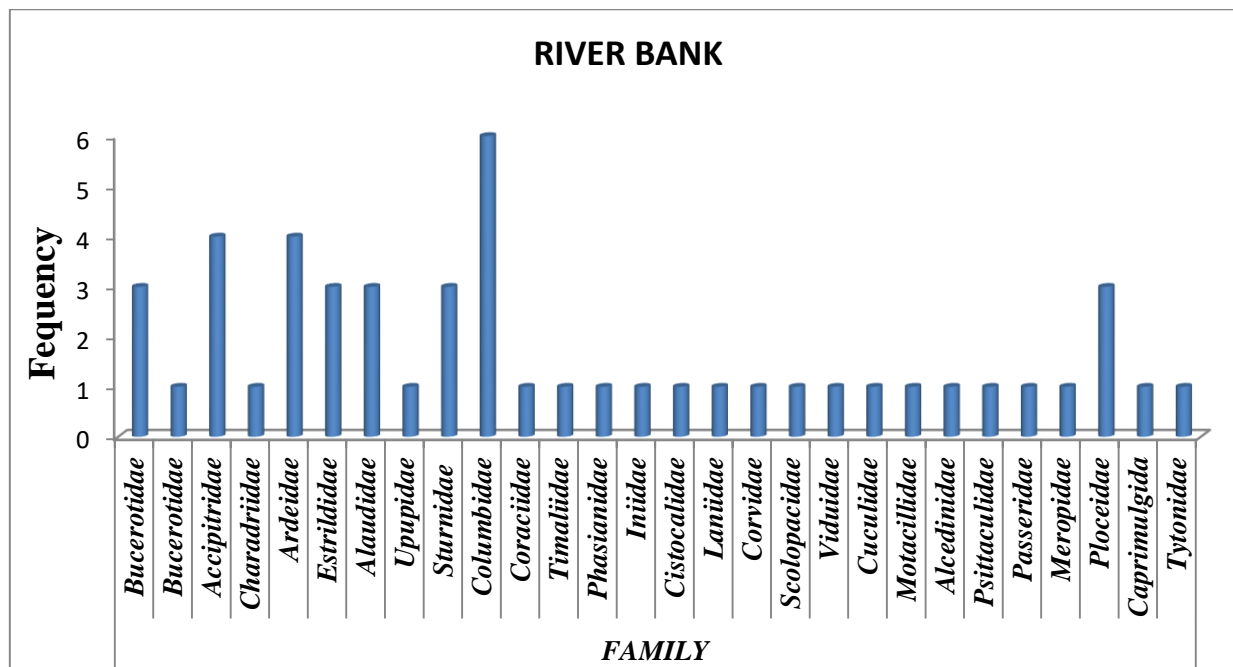


Figure 1: Frequency of family distribution of avifauna species identified at River Bank in the study area

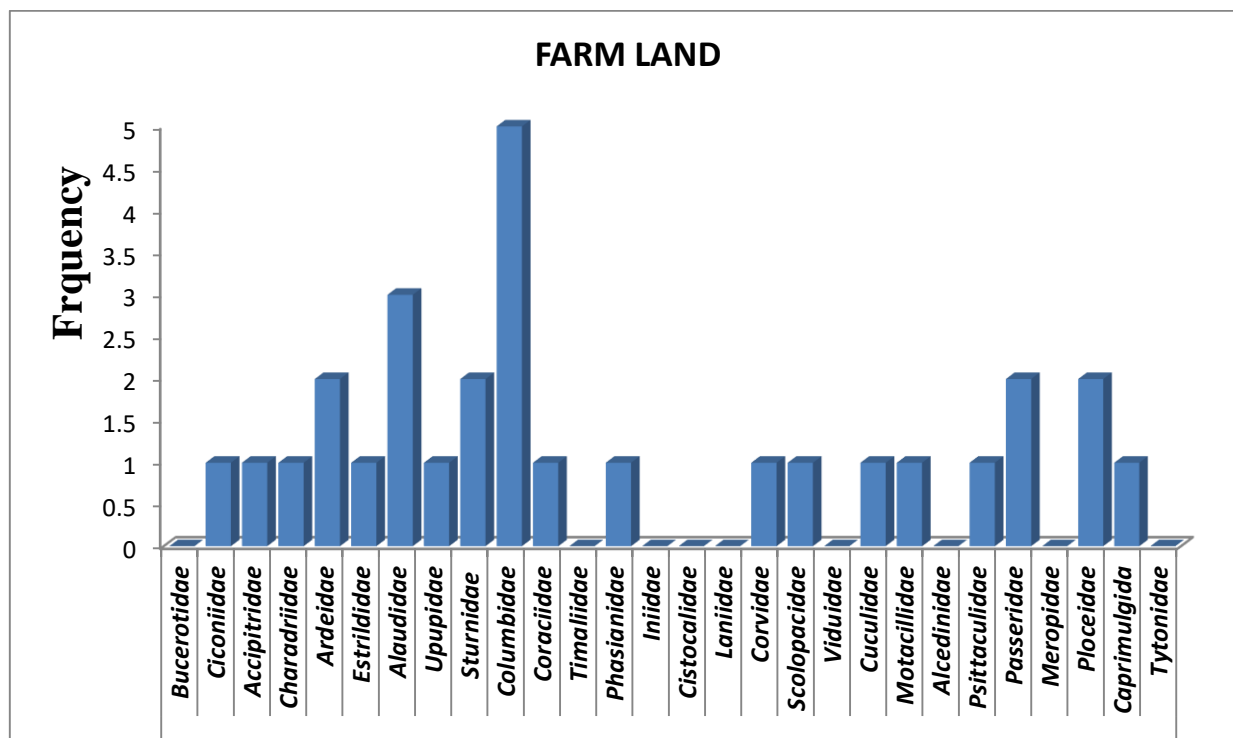


Figure 2: Frequency of family distribution of avifauna species identified at Farm Land in the study area

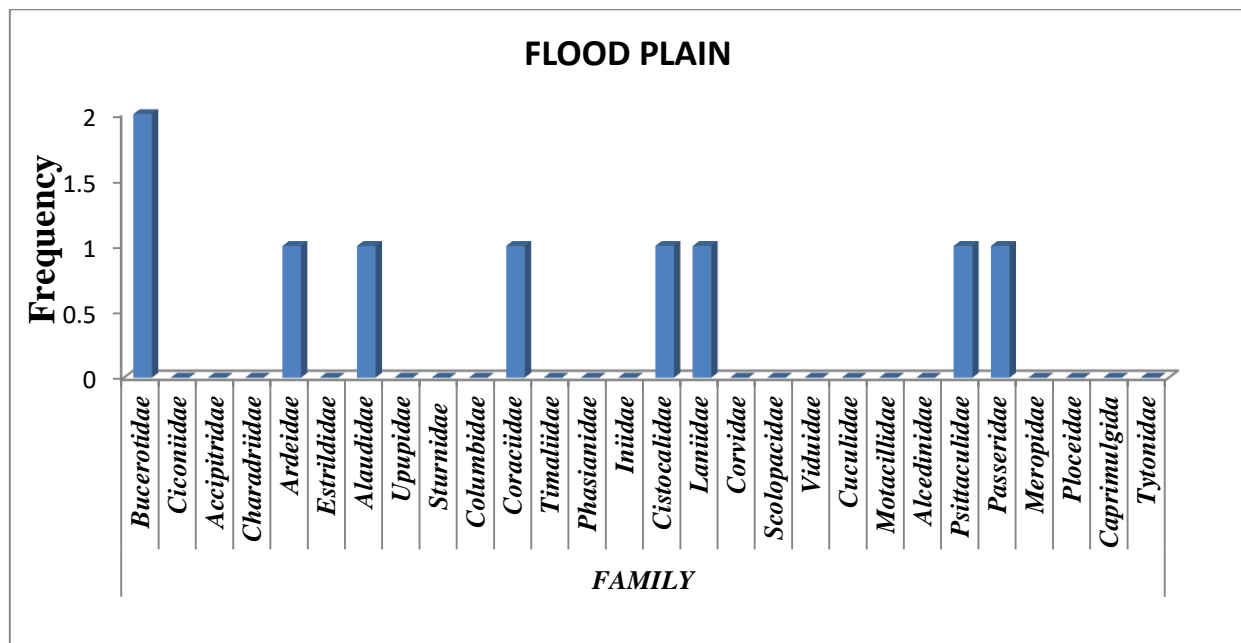


Figure 3: Frequency of family distribution of avifauna species identified at Flood Plain in the study area

Table 2: Checklist of small mammals’ species encountered at Bade Catchment area of River Yobe

Family	Common name	Scientific Name	Mode of identification			
			DS	BMPSC	DA	BURR
Herpestidae	African mongoose	<i>Suricata suricatta</i>	–	×	–	–
Erinaceinae	African hedgehog	<i>Atelerix albiventris</i>	–	–	×	–
Canidae	African sand fox	<i>Vulpes pallid</i>	–	×	–	–
Muridae	Black rat	<i>Rattus rattus</i>	×	–	–	×
	Bushveld Gerbils	<i>Gerbilliscus leucogaster</i>	×	–	×	×
	Short tail manicoot rat	<i>Nesokia indica</i>	×	–	×	×
Nesomyidae	Giant porched Rat	<i>Cricetomys gambianus</i>	–	×	–	–
Sciuridae	Ground Squirrel	<i>Xeru erythropus</i>	–	×	–	–
Felidae	Wild cat	<i>Felis silvestris</i>	–	×	×	–
Leporidae	Scrub hare	<i>Lepu saxatilis</i>	–	×	×	–
Soricidae	Musk Shrew	<i>Suncus varilla</i>	–	–	×	–

In the above table: DS= Direct Sighting BMPSC= Bush Meat Processing and selling Center DA= Dead Animal Burr= Burrow ×= Present – = absent

Source: Field Survey (2018)

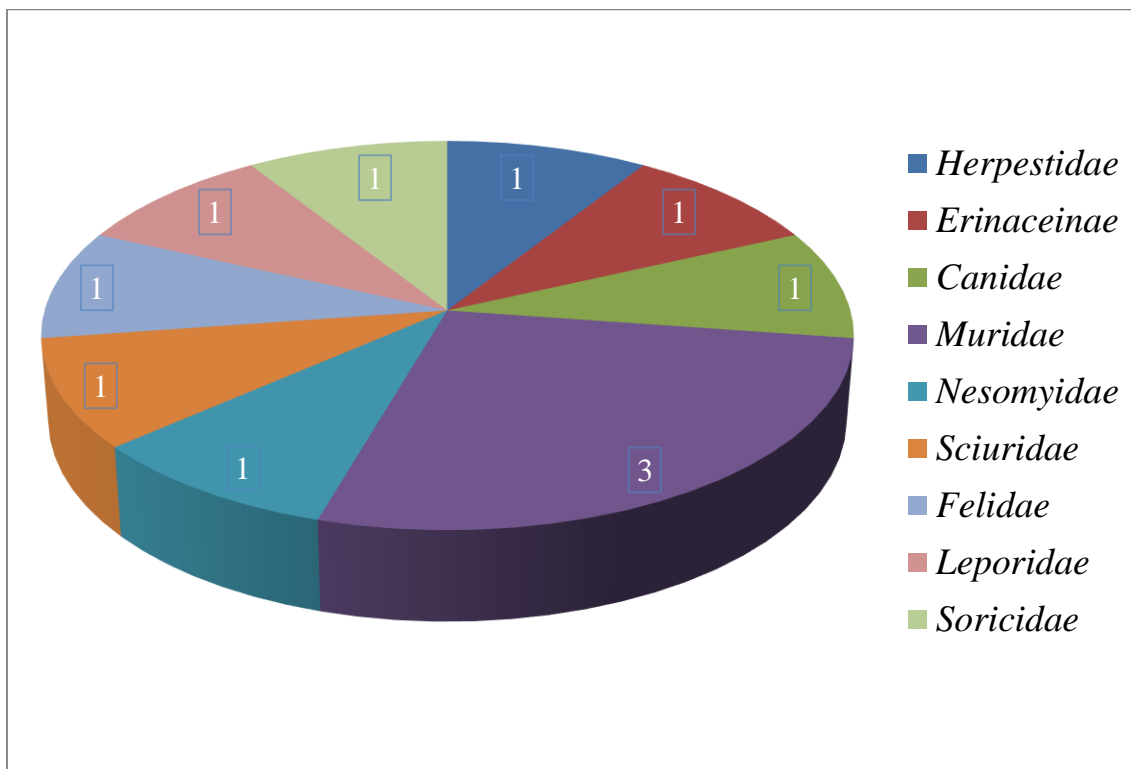


Figure 4: Frequency of family distribution of small mammal species identified in the study area

Table 3: IUCN status of small mammals’ species encountered at Bade Catchment area of River Yobe

Common name	Scientific Name	Mode of identification				IUCN Status Categories
		DS	BMPSC	DA	BURR	
African mongoose	<i>Suricata suricatta</i>	–	×	–	–	LC
African hedgehog	<i>Altelrix albiventris</i>	–	–	×	–	LC
African sand fox	<i>Vulpes pallid</i>	–	×	–	–	LC
Black rat	<i>Rattus rattus</i>	×	–	–	×	LC
Bushveld Gerbils	<i>Gerbilliscus leucogaster</i>	×	–	×	×	LC
Short tail manicoot rat	<i>Nesokia indica</i>	×	–	×	×	LC
Giant porched Rat	<i>Cricetomys gambianus</i>	–	×	–	–	LC
Ground Squirrel	<i>Xeru erythropus</i>	–	×	–	–	LC
Wild cat	<i>Felis silvestris</i>	–	×	×	–	LC
Scrub hare	<i>Lepu saxatilis</i>	–	×	×	–	LC
Musk Shrew	<i>Suncus varilla</i>	–	–	×	–	LC

In the above table: DS= Direct Sighting BMPSC= Bush Meat Processing and selling Center DA= Dead Animal Burr= Burrow ×= Present – = absent and IUCN= international union for conservation of nature

DISCUSSION

Some of the species such as Long-tailed glossy Starling *Lamprotornis caudatus*, Black-headed Lapwing *Vanellus tectus* and Barn Owl *Tyto alba* were also encountered by their dead body in the study area as shown in (Plate 2) is just natural dead. The abundance



of family *Columbidae* might be as a result of rice farming that is predominant in the area. The result is in contrast with the findings of Sabo (2016) who conducted a study in the same ecological area of Hadejia-Nguru wetlands and observed that only 135 species against the 50 species were identified along the RB. Similarly, Odewumi *et al.*, (2017), reported that there were fewer number of 35 bird species belonging to 20 families were identified and recorded, the common species identified in includes Great egret (*Ardea alba*), Spur winged lapwing (*Vanellus spinosus*), Black Kite (*Milvus migrans*), Cattle egret (*Bubulcus ibis*) in Owena Multipurpose Dam, Ondo State, Southwest, Nigeria. The similarity with the present study might be due the fact that both studies were conducted around aquatic environment. The result of the bird species in present study area is lower than those reported by Okosodo *et al.*, (2016) which was conducted in a different ecological area of Old Oyo National Park Southwest Nigeria. The author identified 149 species belonging to 52 families against the 50 species and 28 families identified in the present study area. The high number of bird species recorded may be connected with the land size as the park covers a land area of approximately 251,200 and also, the time of the research differs as Okosodo *et al.*, (2016) undertook the research in both dry and wet season in, where this research was conducted in May and June, 2018 at the time when most of the migrants' bird species have gone from the study area. However, Lameed, 2011 reported a total number of 135 bird species in 40 families during a survey in Dagona-Waterfowl Sanctuary of Chad Basin National Park which is in the same ecological area with present study area, the differences might be due to the irrigation farming activities in the study area. This agrees with the finding of (Sandstrom *et al.*, 2005), that human disturbed areas provide a heterogeneous habitat which usually attracts human tolerant bird species only, species that can co-exist with humans such as Red-billed Firefinch, pied crow, Cattle egret, Laughing dove, Speckle pigeon.

In the other hand result of the study also indicated that a total of six (10) species of small mammals belonging to four (8) families were identified. The result also shows that the family *Muridae* has (3) frequency which was the highest number of species per family identified in the study area, this might be connected with the fact that *Muridae* family are the most common small mammals (Rodent) in the study area, this study is in line with the findings of (Adam *et al.*, 2021) whose reported a total of Nine (9) small mammal species belonging to seven (7) families were recorded in Federal University Gashua and the family *Muridae* has the highest number which represented by three (3) individual species while *Leporidae*, *Erinaceidae*, *Nesomyidae*, *Gerbillinae*, *Soricidae*, *Pteropodidae* and *Sciuridae* has the lowest number of representation with each recording One (1) species, in which both studies were conducted in Bade Local Government area of Yobe state, although the methodology differ the present study used line transect while former used captured mark recaptured method. The higher number of rodent species over other small mammal species in the study area may be attributed to the availability of food as (rodents feed on large variety of food), and their resilience in readily adapting to different modified habitats features. This result corresponds with reports of Koteler and Brown (1988). However, the similar observation by Akpan, *et al.*, (2015) reported a total of seven (7) species of small mammals belonging to three (3) orders: Rodentia, Carnivora and Pholidota were encountered in Idu, Akwa Ibom State, Nigeria.

The study also indicates that Brown rat and short tail manicoot rat were identified by three methods that are direct sighting, dead animal and burrow. This is because the two species of mammals are commonly found around the river bank where they feed and hide in the shrubs the present of shrubs called Giant sensitive plant *Memosa invisa* which are commonly found around the river bank as it provides hide out for some wild animal species. This result correspond with report of Marcelllo *et al.*, (2018) that food availability influence rodent abundance. (Tyowua, 2012) and they also burrow their holes around the flood plain and farm land as shown in (Plate 1). Most of the small mammal species encountered in the study area were rodents this may be attributed to the availability of food shelter and water (rodents feed on large variety of food), because of their resilience and ability to adopting modified habitats. Most of the small mammal species encountered in the study area were rodents this may be attributed to the availability of food, water and cover (rodents feed on large variety of food) and their resilience in adopting to modified habitats. The report of this study on the conservation status of both avifauna and small mammal species around the segment area of river Yobe, is similar with the report of (Sabo, 2016) who found that Majority of birds species felled under LC least concern only few felled under NT, NE and vulnerable at the Hadejia-Nguru Wetlands in which both study areas are in the vegetation zone.

The study also indicates that Brown rat and Short tail manicoot rat were identified by three methods that is direct sighting, detecting their dead animal body and burrow. This is because the two species of small mammals (rodent) are commonly found around the river bank because of the present of food, water and shrub grass which serves as shelter as well as escape ground.



CONCLUSION

Conclusion were drawn from the findings of the study, a total of Fifty (50) Species of birds belonging to Twenty eight (28) families were recorded. All species recorded occurred around the River Bank (RB) area, Twenty Nine (29) species occurred around Farm Lands (FL) and Ten (10) species in Flood plain (FP) areas respectively. Six (6) species; Great egret *Ardea alba*, Crested lark *Galerida cristata*, Abyssinian roller *Coracias abyssinicus*, Rose Ringed Parakeet *Psittacula krameri*, Bush petronia *Gymnoris dentata*, Northern grey-headed sparrow *Passer griseus* occurred across all three (3) habitat types The findings of the study further shows that the highest number of species was found in the family *Columbidae* Six (6) The low number of may be due to the human disturbance such as farming and pastoral herding activities in the study area. Another reason may be due to the time of year in which the study was conducted in the period whereby Migrant, and Vagrant species may have not been seen. In the other hand result of the study also indicated that a total of Six (6) species of small mammals belonging to Four (4) families were identified. The result also shows that the family *Muridae* has (3) frequency which was the highest number of species per family identified in the study area, this might be connected with the fact that *Muridae* family are the most common small mammals species.

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Plate I. Showing the General Features of the Identified Habitat Types along Bade Catchment Area of River Yobe



River Banks



Farm Lands



Flood Plain



Source: Field Survey (2019)

Above: Photographs showing the researcher and his assistance during data collection at the study area.

Plate 2. Photograph showing alive and dead of bird species identified during field survey in the study area



Northern grey-headed Sparrow



Red-Cheeked Cordon Bleu



Black-Shouldered kite



Egg and dead of Black-headed Lapwing



Dead body of Speckled Pigeon



Barn Owl



Long-tailed glossy Starling



Identified Bird Nest

Source: field survey (2019)

Plate 3. Photographs showing dead body of and small mammal (Rodents) species observed along bade catchment area of river Yobe



Plate 4. Photographs showing small mammal species identified at bush meat market in study area



Source: field survey (2019)