

Full Length Research Paper

Species composition, seasonal abundance and distribution of avifauna in Lake Hawassa and part of the Eastern Wetland habitats, Southern Ethiopia

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Received 24 December, 2018; Accepted 30 May, 2019

This study was carried out in Lake Hawassa, Tikur wuha riverine habitat and Cheleleka wetland from August 2017 to February 2018. The study aims to investigate species composition, seasonal abundance and distribution of birds. Systematic random sampling techniques at an interval of 3 km were used to select sampling blocks. T-test and one way ANOVA were applied for analysis of the effect of season on the composition and abundance of species. The result showed a total of 103 avian species record belonging to 47 families and 14 orders during the wet and dry seasons. Of the species recorded, (71) bird species (68.93%) were residents, 29 Palaearctic migrants (28.16%) and 3 Intra-African migrants (2.91 %). The overall species composition of birds during the wet and dry seasons was not significantly different, but there was a significant difference within the study sites. There was no significant seasonal difference in the abundance of birds in Lake Hawassa and the riverine habitat. However, dry season had an effect on the avian abundance in Cheleleka wetland. Distributions of bird species were variable in the study areas. The results imply the need to conserve the avifauna of the whole study sites through the conservation of their habitats.

Key words: Wetland birds, abundance, endemic, migrant, resident.

INTRODUCTION

Birds, also known as Aves, are the best-known class of vertebrate animals that occur worldwide in nearly all habitats (Wenny et al., 2011; Sekercioglu, 2012). Most of the birds are useful to mankind. They play a useful role in the control of insect pests of agricultural crops, as predators of rodents, as scavengers, as seed dispersers, and as pollinating agents (Hadley et al., 2012; Ramchandra, 2013). The diversity of these organisms is one of the most important ecological indicators to

evaluate the quality of habitats (Manjunath, 2012). Furthermore, they do add enjoyment to our lives, because of their distinctive colors, attractive display, unique songs and calls.

There are over 9,026 various species of birds (class Aves), grouped to 27 Orders and 155 families currently inhabit the earth (BLI, 2017, Nkwabi et al., 2018). Of these, 1,469 species are considered threatened with extinction, 1,017 species are near threatened, 62 species

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lack the data to determine their status, and 145 species are recorded as extinct. As the recent data from the IUCN shows, a total of 2,486 species or just under one quarter of all the world's birds are treated as global conservation priorities (BLI, 2018). According to Lepage (2017) there are 864 bird species in Ethiopia, of which 19 are endemics, 35 are globally threatened and 1 introduced species and a further 13 are shared only with Eritrea. Two-hundred-fourteen Palearctic migrants were also recorded in Ethiopia (Pol, 2006). Among these, 45 species have been found to over-summer within the boundaries of the country.

Birds have different spatial and temporal distributions in any wetland (Fletcher and Hutto, 2008). The diversity and distribution patterns depend on birds' mobility, food availability, habitat suitability, geo-physiological structure of a wetland and the size of the wetland (Akosim et al., 2008). Water bird communities represent a potentially useful group of organisms for monitoring changes to freshwater ecosystems. They may be ordered into functional groups representing a combination of diet and habitat use that allow assessment of changes to wetland habitats (Balapure et al., 2013). They are indicators and useful models for studying a variety of environmental changes (Green, 2004; Jamil, 2011).

The study area, Lake Hawassa and its part of the eastern catchment wetland habitat are part of the Ethiopian Central Rift Valley ecosystem. Lake Hawassa is a closed-catchment, which is fed both by a few temporary streams on the north-west and western side of the catchment and by the Tikur Wuha River, which is the only perennial river, that enters into Lake Hawassa draining the Cheleleka wetland on the north-east side. The terrestrial habitat adjoining the Lake Hawassa supports a rich diversity as compared to other Ethiopian Rift Valley lakes (Sairam, 2014). Cheleleka wetland is slightly acidic (humic acid) due to the large biomass degrading in the standing water (Zerihun Desta, 2003).

Assessment of diversity and distribution of ecosystem resources provides information on the resource that is contained in an ecosystem, resource relationships and the environmental factors that influence their distribution and diversity (Bibby et al., 2000; Thiollay, 2007). Characterizing community species composition and water bird dynamics are also important evaluation indicators that reflect habitat quality (Paillisson et al., 2002; Bishop et al., 2005; Nielsen et al., 2014).

However, a systematic bird species list and information on bird species diversity, relative abundance and their distributions across sites are lacking from this natural lake and part of the eastern wetland habitats.

MATERIALS AND METHODS

Description of the study area

Lake Hawassa and part of the eastern wetland habitats (Tikur wuha riverine habitat and Cheleleka wetland) were the specific sites

where the present study was conducted (Figure 1). The area comprises parts of Oromya Regional State, and Southern Nations and Nationalities Peoples' Regional State. The Lake lies between 6°45' 7" to 7°6'37"N and 38°23'30" to 38°28' 48" E. The city of Hawassa, named after the Lake, is located at 275 km south of the capital city-Addis Ababa and is established in the very eastern shore of the lake (MoWR, 2010). The riverine habitat of Tikur Wuha River begins at Cheleleka wetland habitat towards Lake Hawassa to the west-south. It is a perennial river and the only tributary rivers that feed Lake Hawassa which drains from the Cheleleka wetland. The Cheleleka wetland habitat occurs between the geographical co-ordinates of 07°00'13" to 07°6'37"N and 38°30'51" to 38°34'44"E.

The annual average rainfall of Hawassa and its vicinities is 961 mm and distributed as 50% for Kiremt (June to September), 20% for Bega (October to February) and 30% for the Belg season (March to May) (Mulugeta, 2013). Mean monthly temperatures varied between 17 and 22°C with mean temperature of 17°C and low in July. The maximum temperature is 27°C and drops to 25.5°C from May to November. The night temperatures decline and sometimes come to zero ° C between December and February and the relative humidity is close to 60% (Mulugeta, 2013).

Preliminary survey

A preliminary survey was conducted during the first two weeks of August, 2017. The physical features of the study area were assessed using ground survey. The coordinates of each study site were taken and their boundaries were delineated.

Sampling design

A systematic random sampling technique was used for selecting the actual sampling sites as described by Bibby et al. (1992). From the total area of Lake Hawassa (95.8 km²), the following areas were sampled: 23.95 km², from Cheleleka wetland total area of which is 56.6 km², and also 14.15 km² and approximately 75% of the riverine habitat areas.

Then, a line transect method was employed for counting of birds on the shoreline of the Lake and the open wetland habitats at every 3 km interval. For the riverine habitat, four block observations were made by walking along the bank of the river (Rajashekara and Venkatesha, 2010).

A total of 26 transect lines were taken, including; 4 from the riverine habitat, 12 along the shoreline, 1 in the open area of Lake Hawassa and 9 from the open wetland habitat of Cheleleka wetland. A total of 25% of the study area was sampled from the Lake Hawassa and Cheleleka wetland habitats (Figure 2).

To count birds, a transect line of 2 km for the open wetland habitats and lake shoreline at 50 to 300 m sighting distance was selected. In the riverine habitat, a length of 1 km and a sighting distance ranging from 150 to 200 m in both sides perpendicular to the riverine buffer zone was followed (Bibby et al., 1998). The sighting distance varied on either side of transects depending on the species and habitat types as used by Pomeroy (1997) and Girma Mengesha et al. (2014). In the open area of the lake, one long transect line of 18 km length was laid projected from a south to north direction following Girma Mengesha et al. (2014). Counting of birds was carried out using a boat that was slowly driven along the transect line at a speed of between 5 and 10 km/hr to allow an easy detection of birds during surveys. Then birds within 300 m width on either side of the transects were counted.

Data collection

Data were collected from 6:30 a.m. to 10:00 a.m. in the morning

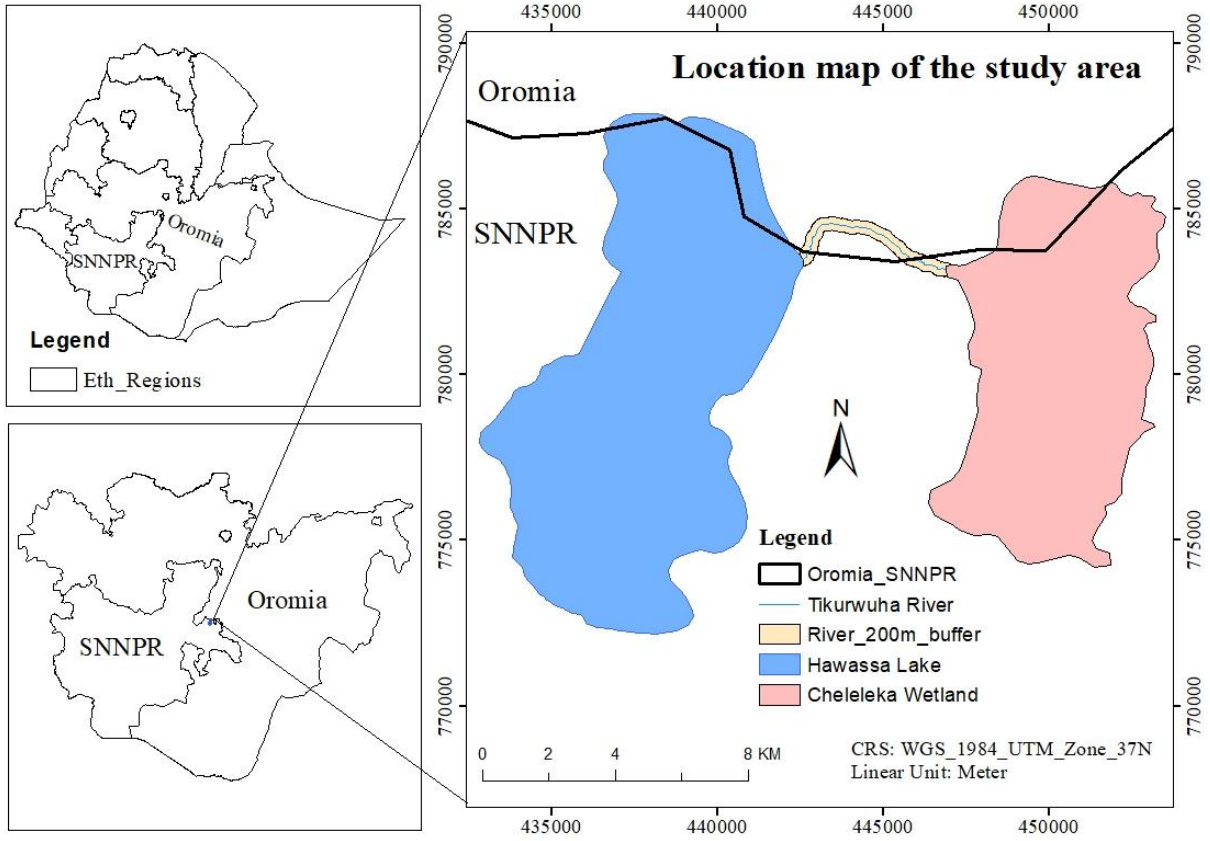


Figure 1. Location map of the study area.



Figure 2. Placements of sample points along transect lines. Source: Google earth image (2016).

and from 3:00 p.m. to 6:00 p.m. in the afternoon, when bird activity was maxima and on days with good weather conditions (Centerbury et al., 2000). To minimize disturbance during counting, silent movement and appropriate distances from birds were taken into consideration (Bibby et al., 1992). Weekly visits to the site were made for six months during both wet and dry seasons. During the counting of birds, the start and end geographical coordinates of each transect were saved in Garmin 72 GPS unit to ensure the same transects were repeated during the dry season. The date (including starting and finishing time), bird species, number and survey site were recorded. To avoid repeated counting of birds, areas were divided, based on their distribution and habitat types (Datiko and Bekele, 2012).

Finally, a bird checklist was prepared on the basis of their scientific names, common names and IUCN status as per BirdLife International (2017) and (Redman et al., 2009).

Data analysis

The collected data were organized in an Excel spreadsheet for statistical analysis. Statistical Product Services and Solutions (SPSS) Version 20 software was used to do the statistical analysis. Before inferential statistics were performed, number of birds were transformed to \log_{10} to improve homogeneity and normality test (Quinn and Keough, 2002; Skinner and Clark, 2008). The effect of seasons on species composition and abundance was analysed and compared using one-way ANOVA. Differences were considered statically significant at the 5% level. A pairwise t-Test was applied to test the difference in means in abundance of birds between the two seasons among the study sites and the level of significance was set at ($p=0.05$).

RESULTS

Species composition

A total of 103 species of birds, grouped under 47 families and 14 orders, were recorded during the two seasons, wet and dry from the three study sites (Appendix 1). Among the 14 orders Passeriformes was the highest with 24 species followed by Coliiformes (16), Ciconiiformes (14) and Bucerotiformes (13). The least species was recorded in the order Accipitriformes, Charadriiformes, Columbiformes and Piciformes, with one species each (Appendix 1).

Out of the species recorded in the study area, Wattled Ibis (*Bostrychia carunculata*), Banded Barbet (*Lybius undatus*) and Black-winged lovebird (*Agapornis taranta*), were endemic to both Ethiopia and Eritrea. One endemic bird species Yellow-fronted Parrot (*Poicephalus flavifrons*) was also recorded (Appendix 1).

The analysis of data on migratory status revealed that out of 103 species, 29 Palaearctic Migrants (28.16%) and 3 Intra-African Migrants (2.91%) were recorded during the study period. The remaining (71) bird species (68.93 %) were residents including endemic species.

As per IUCN status (2017), 98 species were of least concern, and 2 species Ferruginous Duck (*Aythya nyroca*) and Black-tailed Godwit (*Limosa limosa*) were near threatened. A critically endangered species Hooded

Vulture (*Necrosyrtes monachus*) was also recorded during the study period (Appendix 1).

During the wet and dry seasons, 90 and 96 bird species were recorded, respectively. Eighty three bird species were common to both seasons, but 13 and 7 species were exclusive to the wet and dry seasons, respectively.

The species composition of birds during the wet and dry seasons was not significantly different (ANOVA $p = 0.23$) but there was a significant difference within habitats between seasons. During both dry and wet seasons, Lake Hawassa (ANOVA $p = 0.02$) and Cheleleka wetland (ANOVA $p = 0.01$) show significant difference in the composition of avian species between seasons. However, in Tikur wuha riverine habitat (ANOVA $p = 0.07$) did not show a significant difference.

Seasonal abundance

During both wet and dry seasons, Lake Hawassa ($t = 0.32$, $P > 0.05$) and Tikur wuha riverine habitat ($t=1.35$, $P > 0.05$) did not show significant differences in the abundance of avian species. However, dry season had an effect on avian abundance in Cheleleka wetland ($t=1.13$, $P < 0.05$) (Table 1).

Spatial distribution of avian species

Birds showed variation in the distributions among the three habitat types. Charadriiformes, Ciconiiformes and Anseriformes were more abundant and distributed in Lake Hawassa next to Passeriformes. Ciconiiformes, Anseriformes and Passeriformes had greater distribution in the Cheleleka wetland habitat. Piciformes and Psittaciformes were distributed only in Tikur wuha riverine habitat (Figure 3). However, Passeriformes (Slender-billed Starling, Marsh warbler and little weaver), Coraciiformes (Silver-cheeked Hornbill and Northern carmine bee-eater), Columbiformes (doves), Anseriformes (Northern Pintail and Egyptian goose), Charadriiformes (little ringed plover and gull-billed tern, Ciconiiformes (Hammer kop, Hadada ibis and Goliath heron) were well distributed across the three sites (Figure 3).

DISCUSSION

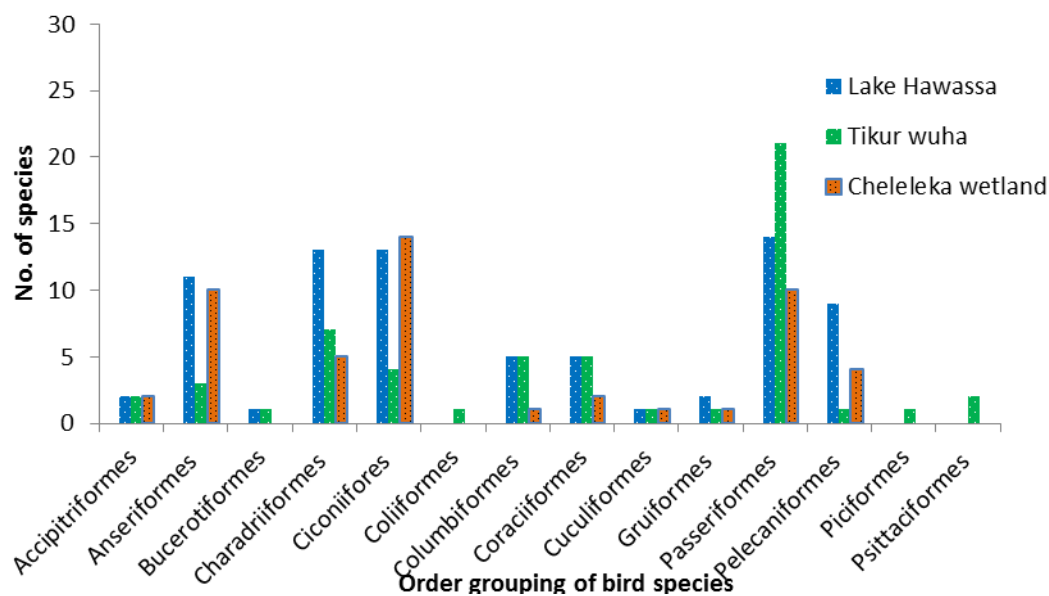
Species diversity

The present study shows that the lake and the associated wetland habitats are likely to have enough trees and vegetation covers to serve as a foraging site for a substantial number of bird species. The large size of the Lake, as compared to the other sites, might contribute to the highest richness and abundance of bird species. As

Table 1. Mean abundance values of birds in different study sites during wet and dry seasons (Mean \pm SE).

Study sites	Season	M \pm SE	T-value	P-value
Lake	Wet	32.22 \pm 6.35	t=0.32	p=0.13
	Dry	32.11 \pm 4.62		
Riverine	Wet	20.33 \pm 1.27	t=1.35	p=0.07
	Dry	18.58 \pm 1.06		
Swamp	Wet	24.06 \pm 1.79	t=-1.13	p=0.02
	Dry	21.89 \pm 1.91		

The t stands for a pair-wise t-test which is a statistical instrument to see the variations of abundance of birds between seasons; p is statistically significant/not significant effect of seasons on habitats.

**Figure 3.** Bird orders and distributions among the three study sites.

reported by Nabaneeta and Gupta (2010), bird species richness and abundance are influenced by the size of habitat patches, local resource availability and vegetation composition. This is because of the availability of multiple, and varied, alternative feed sources for the birds; moreover, a large area is inaccessible for people contributing to a favorable condition for breeding, feeding and nesting sites (Aynalem and Bekele, 2008). It was also pointed out by Prakash and Manasvini (2013) that a higher abundance of birds in a habitat might be brought by the vegetation composition that forms the main element of their habitat, or it may be influenced by landscape, floral diversity, anthropogenic activities, as well as predation.

The significant seasonal variation of species composition in Lake Hawassa and Cheleleka wetland might be due to the seasonal availability of food for

different bird species and nesting sites in the area. Other studies have also shown that seasonal variations in rainfall and food resources have led to seasonal changes in the species composition and abundance of birds (Bibi and Ali, 2013; Shitta et al., 2016). The abundance of bird species is determined by the composition of the vegetation that forms a major element of their habitats. There were high numbers of birds during the dry season in Lake Hawassa. This is in agreement with the work of Aynalem and Bekele (2008) on Lake Tana; and by Shitta et al. (2016) at Lake Marmai wetland in Nigeria. This could be partly due to the high number of Palearctic migrants that winter in this wetland of the study area. The emergent vegetation like *Typha* spp in the dry season may be making grounds for the winter migrant, which hampers the nesting and breeding sites for birds that breed in the early dry season.

The wet season shows a low species composition in Lake Hawassa. This could be due to the fact that summer migrants migrate back to their feeding grounds and resident birds move towards residential areas. Richardson (1990) had noted that migration greatly alters the bird population by changing both the number and composition. According to Kennedy et al. (2000), the distribution of birds is classified as migrant, resident, and endemic. Lake Hawassa and Cheleleka wetland are well known feeding grounds for winter migratory birds (EWNHS, 1996). The occurrence of winter birds in the area indicates that the area is important for migratory birds. This signifies the conservation importance of the area not only to common bird species, but also to birds of international concern.

Seasonal abundance

Individuals of most species were not distributed uniformly and most population exhibit fluctuations in abundance across study sites and seasons. Factors that may cause fluctuations include variation in water or food supply, the ability of individuals to disperse to new areas and species interactions such as predation or competition (Toms et al., 2002). Some of the bird species were observed in both wet and dry seasons. This was mainly due to the availability of resources that can attract the birds in all of the seasons. Migration to Africa to spend the winter also increased the population of some of the migrant bird species in the area.

There was no substantial significance difference in bird abundance in Lake Hawassa and the riverine habitat between seasons, though there was minimal variation in mean abundance of species. The lowest abundance and diversity of species was observed during the dry season in Cheleleka wetland. This might be attributed to high human disturbance and livestock grazing in the wetland. There was also sand extraction as observed during field visit. Intensive grazing of domestic livestock, primarily cattle, is correlated with the decreased structural complexity of vegetation; and this led to the decline and loss of a wide variety of avian species in the wetland (Scott et al., 2003). This has an effect on the number of birds that depend on such habitats. The impacts of habitat destruction and overgrazing on cover, nesting grounds and food accessibility to birds causes a dangerous situation for the survival of avian fauna (Jansen et al., 2007; Girma Mengesha et al., 2011).

Spatial distribution of avian species

The studied habitat types recorded 103 bird species which call attention for conservation. According to Storch et al. (2003) also Buckley and Freckleton (2010) the distribution patterns of bird species normally follows the

spatial structure of the environment and habitat requirement of the bird species. This corresponds with the results of this study, whereby habitat specificity and generalization were observed. For example, Egyptian Goose (*Alopochen aegyptiacus*), Goliath Heron (*Ardea Goliath*), Hadada ibis (*Bostrychia hagedash*), Little Ringed Plover (*Charadrius dubius*), Marsh Warbler (*Acrocephalus alustris*), Northern Carmine Bee-eater (*Merops nubicus*), Northern Pintail (*Anas acuta*), Red-eyed Dove (*Streptopelia semitorquata*) Silver-cheeked Hornbill (*Bycanistes brevis*) and Slender-billed Starling (*Onychognathus tenuirostris*) were recorded in all habitat types. On the contrary, Abdim's Stork (*Ciconia abdimii*), Black-crowned Night Heron (*Nycticorax nycticorax*), Black-headed Heron (*Ardea*), Comb (Knob-billed) Duck (*Sarkidiomis*), Ruff (*Philomachus*) and Southern Pochard (*Netta erythrophthaima*) were recorded only in Cheleleka wetland.

The highland biome species such as the Yellow-fronted Parrot (*Poicephalus flavifrons*), Banded Barbet (*Lybius undatus*) and Black-winged Lovebird (*Agapornis taranta*) were recorded from the riverine habitat might be due the suitability of the habitat that supported the species. Furthermore, the availability of fruiting and flowering tree species observed during the study such as *Schefflera abyssinica*, *Ficus vast* and *Prunus Africana* could be the reason.

A similar finding also showed that flowering plants support a wide variety of birds as they feed on nectars, berry fruits and seeds (Mengesha and Bekele, 2008). Alviola et al. (2010) reported that birds are mainly dependent on the availability of food items for their life processes, choosing to stay in places where food is abundant. But Forest Oriole (*Oriolus monacha*) species, which was reported previously in the study area, was absent during this survey. This could be the lowest detectability of the species in the present study. But the additional endemic species, Wattled Ibis (*Bostrychia carunculata*), was recorded in this survey. Despite its small share from the total study area, the occurrence of highest number of endemic species in Tikur wuha riverine habitat might be due to the favorable environment of the habitat that supported the species in different ways. Sometimes food richness or the structure of surrounding landscape also made a favorable environment for the species (Whited et al., 2000; Barcena et al., 2004). However, Lake Hawassa which is the least disturbed habitat, and the highest disturbed habitat, Cheleleka wetland, also holds a considerable number of endemic species. This is evident to the present study sites significance in supporting important conservation concern birds in the country.

The globally threatened species, Ferruginous Duck and Black-tailed Godwit were recorded in Lake Hawassa during the wet and dry seasons respectively. Globally critically endangered species Hooded Vulture was also recorded from Tikur wuha riverine habitat. The occurrence

of this critically endangered species is associated with the presence of river in the area, and this species appears to be dependent on riverside vegetation within plantations, selectively logged, and secondary forests (Achondo et al., 2011). Such bird categories together with other aforementioned criteria put the conservation status of this area under the IBA status.

CONCLUSION AND RECOMMENDATIONS

The record of high number of species in Lake Hawassa and part of the eastern wetland habitats during the wet and dry seasons shows a high representation of resident, highland biome and Palearctic species. The presence of endemic species as well as migrant and globally threatened species suggests that Lake Hawassa and part of the eastern wetland habitats are key conservation sites of birds. Moreover, the highest numbers of endemic species were recorded in Tikur wuha riverine habitat, indicating that the need for more conservation effort in this site. The seasonal variation in avian species and number of individuals in the study area was related to the differences in resource availability between habitats. During both seasons, the highest species richness and individuals of species were recorded in Lake Hawassa among other study sites. The three study sites support bird species at varying levels of abundance and distributions. While Lake Hawassa and Cheleleka wetland had complementary bird assemblages, some species were restricted to a specific site. Although, the study sites harbor diverse bird species, interferences with these habitats were observed. Therefore, conservation measures are needed to protect the biological diversity of the area.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

ACKNOWLEDGEMENT

The study was sponsored by ministry of agriculture and natural resource, Ethiopia. Special thanks go to responsible authorities in each of the sites who gave us all necessary information.

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Appendix 1. Systematic list of bird species at Lake Hawassa and part of the eastern wetland habitats (August. 2017 to February. 2018).

Order	Family/sub family	Common name	Scientific name	MS	2017 IUCN red List category
Ciconiiformes	Ciconiinae	Abdim's Stork	<i>Ciconia abdimii</i>	AM	LC
Accipitriformes	Milvinae	African Fish Eagle	<i>Haliaeetus vocifer</i>	R	LC
Charadriiformes	Jacanidae	African Jacana	<i>Actophilomis africanus</i>	R	LC
Bucerotiformes	Bucerotidae	African Grey Hornbill	<i>Lophoceros nasutus</i>	R	LC
Accipitriformes	Accipitridae	African Harrier-Hawk	<i>Polyboroides typus</i>	R	LC
Columbiformes	Columbinae	African Mourning Dove	<i>Streptopelia decipiens</i>	R	LC
Anseriformes	Anatinae	African pygmy Goose	<i>Nettapus auritus</i>	NM	LC
Gruiformes	Rallidae	Baillon's Crake	<i>Zapornia pusilla</i>	R	LC
Piciformes	Capitonidae	Banded Barbet	<i>Lybius undatus</i> ^{NE}	R	LC
Passeriformes	Hirundinida	Banded Martin	<i>Riparia cincta</i>	R	LC
Cuculiformes	Musophagidae	Bare-faced Go-away Bird	<i>Coryphaixoides personatus</i>	R	LC
Passeriformes	Nectariniidae	Beautiful Sunbird	<i>Nectarinia pulchella</i>	R	LC
Gruiformes	Rallinae	Black Crake	<i>Amauromis flavirostris</i>	R	LC
Passeriformes	Corvidae	Black Crow	<i>Corvus capensis</i>	R	LC
Pelecaniformes	Ardeidae	Black Heron	<i>Egretta ardesiaca</i>	NM	LC
Ciconiiformes	Ardeinae	Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	R	LC
Ciconiiformes	Ardeinae	Black-headed Heron	<i>Ardea melanocephala</i>	R	LC
Charadriiformes	Scolopacinae	Black-tailed Godwit	<i>Limosa limosa</i>	NM	NT
Psittaciformes	Psittacidae	Black-winged Lovebird	<i>Agapornis taranta</i> ^{NE}	R	LC
Charadriiformes	Recurvirostidae	Black-winged Stilt	<i>Himantopus himantopus</i>	NM	LC
Cuculiformes	Cuculidae	Blue-headed Coucal	<i>entopus cupreicaudus</i>	R	LC
Columbiformes	Columbinae	Blue-spotted Wood Dove	<i>Turtur afer</i>	R	LC
Columbiformes	Treroninae	Bruce's Green Pigeon	<i>Treron waalia</i>	R	LC
Passeriformes	Passerinae	Chestnut Sparrow	<i>Passer eminibey</i>	R	LC
Anseriformes	Anatinae	Comb (Knob-billed) Duck	<i>Sarkidiomis melanotos</i>	R	NR
Passeriformes	Pycnonotidae	Common Bulbul	<i>Pycnonotus barbatus</i>	R	LC
Gruiformes	Rallidae	Common Moorhen	<i>Gallinula Chloropus</i>	R	LC
Anseriformes	Anatinae	Egyptian Goose	<i>Alopochen aegyptiacus</i>	R	LC
Passeriformes	Sylviidae	Eurasian Reed Warbler	<i>Acrocephalus scirpaceus</i>	NM	LC
Anseriformes	Anatinae	Ferruginous Duck	<i>Aythya nyroca</i>	NM	NT
Anseriformes	Anatinae	Garganey	<i>Anas querquedula</i>	NM	LC
Ciconiiformes	Threskiornithinae	Glossy Ibis	<i>Plegadis falcinellus</i>	NM	LC
Ciconiiformes	Ardeinae	Goliath Heron	<i>Ardea goliath</i>	R	LC
Pelecaniformes	Phalacrocoracidae	Great Carmmorant	<i>Phalacrocorax carbo</i>	R	LC
Pelecaniformes	Ardeidae	Great Egret	<i>Egretta alba</i>	R	NR
Passeriformes	Sylviidae	Great Reed Warbler	<i>Acrocephalu sarundinaceus</i>	NM	LC

Appendix 1. Contd.

Passeriformes	Sturnidae	Greater Blue-eared Starling	<i>Lamprotornis chalybaeus</i>	R	LC
Charadriiformes	Charadriidae	Greater Sand Plover	<i>Charadrius leschenaultia</i>	NM	LC
Anseriformes	Anatidae	Greater White-fronted Goose	<i>Anser albifrons</i>	NM	LC
Charadriiformes	Scolopacinae	Greenshank	<i>Tringa nebularia</i>	NM	LC
Charadriiformes	Larinae	Grey headed Gull	<i>Larus cirrocephalu</i>	R	LC
Pelecaniformes	Ardeidae	Grey Heron	<i>Ardea cinerea</i>	NM	LC
Coraciiformes	Alcedininae	Grey-headed Kingfisher	<i>Halcyon leucocephala</i>	AM	LC
Charadriiformes	Laridae	Gull-billed Tern	<i>Gelochelidon nilotica</i>	NM	LC
Ciconiiformes	Threskiorbithinae	Hadada ibis	<i>Bostrychia hagedash</i>	R	LC
Ciconiiformes	Scopidae	Hammer kop	<i>Scopus umbretta</i>	R	LC
Accipitriformes	Accipitridae	Hooded Vulture	<i>Necrosyrtes monachus</i>	R	CR
Anseriformes	Anatidae	Hottentot Teal	<i>Spatula hottentota</i>	NM	LC
Ciconiiformes	Ardeinae	Intermediate egret	<i>Egretta intermediary</i>	R	LC
Columbiformes	Columbinae	Laughing Dove	<i>Streptopelia senegalensis</i>	R	LC
Charadriiformes	Jacanidae	Lesser Jacana	<i>Microparra capensis</i>	R	LC
Passeriformes	Sylviidae	Lesser Swamp Warbler	<i>Acrocephalus gracilirostris</i>	R	LC
Coraciiformes	Meropidae	Little Bee-eater	<i>Merops pusillus</i>	R	LC
Ciconiiformes	Ardeinae	Little Egret	<i>Egretta garzetta</i>	R	LC
Charadriiformes	Charadriidae	Little Ringed Plover	<i>Charadrius dubius</i>	NM	LC
Passeriformes	Ploceinae	Little Weaver	<i>Ploceus luteolus</i>	R	LC
Coraciiformes	Alcedininae	Malachite Kingfisher	<i>Alcedo cristata</i>	R	LC
Ciconiiformes	Ciconiinae	Marabou Stork	<i>Leptoptilos crumeniferus</i>	R	LC
Passeriformes	Sylviidae	Marsh Warbler	<i>Acrocephalus alustris</i>	NM	LC
Columbiformes	Columbidae	Mourning Collared-dove	<i>Streptopelia decipiens</i>	R	LC
Coraciiformes	Meropidae	Northern Carmine Bee-eater	<i>Merops nubicus</i>	R	LC
Anseriformes	Anatidae	Northern Pintail	<i>Anas acuta</i>	NM	LC
Anseriformes	Anatinae	Northern Shoveler	<i>Anas clypeata</i>	NM	LC
Charadriiformes	Recurvirostridae	Pied Avocet	<i>Recurvirostra avosetta</i>	NM	LC
Passeriformes	Corvidae	Pied Crow	<i>Corvus albus</i>	R	LC
Coraciiformes	Cerylinae	Pied Kingfisher	<i>Ceryle Rudis</i>	R	LC
Pelicaniformes	Pelecanidae	Pink-backed Pelican	<i>Pelecanus onocrofalus</i>	R	LC
Ciconiiformes	Ardeidae	Purple Heron	<i>Ardea Purpurea</i>	R	LC
Columbiformes	Columbinae	Red-eyed Dove	<i>Streptopelia semitorquata</i>	R	LC
Passeriformes	Sturninae	Red-winged Starling	<i>Onychognathus morio</i>	R	LC
Pelicaniformes	Phalacrocoracidae	Reed (Long-tailed)Cormorant	<i>Phalacrocorax africanus</i>	R	LC
Charadriiformes	Calidritrinae	Ruff	<i>Philomachus pugnax</i>	NM	LC
Passeriformes	Sturninae	Ruppell's Long-tailed Starling	<i>Lamprotornis purpuropterus</i>	R	LC

Appendix 1. Contd.

Passeriformes	Turdidae	Ruppell's Robin-chat	<i>Cossypha semirufa</i>	R	LC
Passeriformes	Ploceinae	Ruppell's Weaver	<i>Ploceus galbula</i>	R	LC
Passeriformes	Sturnidae	Rüppell's Starling	<i>Lamprotornis purpuroptera</i>	R	LC
Ciconiiformes	Threskiornithinae	Sacred Ibis	<i>Threskiornis aethiopicus</i>	R	LC
Ciconiiformes	Ciconiinae	Saddle-billed Stork	<i>Ephippiorhynchus negalensis</i>	R	LC
Passeriformes	Sylviidae	Sedge Warbler	<i>Acrocephalus schoenobaenus</i>	NM	LC
Coraciiformes	Bucerotinae	Silver-cheeked Hornbill	<i>Bycanistes brevis</i>	R	LC
Passeriformes	Sturnidae	Slender-billed Starling	<i>Onychognathus tenuirostris</i>	R	LC
Anseriformes	Anatinae	Southern Pochard	<i>Netta erythrophthaima</i>	NM	LC
Coliiformes	Collidae	Speckled Mousebird	<i>Colius striatus</i>	R	LC
Passeriformes	Ploceinae	Spectacled Weaver	<i>Ploceus ocularis</i>	R	LC
Charadriiformes	Scolopacinae	Spotted Redshank	<i>Tringa erythropus</i>	NM	LC
Anseriformes	Anatinae	Spur-winged Goose	<i>Plectropterus gambensis</i>	AM	LC
Ciconiiformes	Ardeinae	Squacco heron	<i>Ardeola ralloides</i>	NM	LC
Passeriformes	Sturninae	Superb Starling	<i>Lamprotornis superbus</i>	R	LC
Passeriformes	Ploceinae	Village Weaver	<i>Ploceus cucullatus</i>	R	LC
Ciconiiformes	Threskiornithinae	Wattled Ibis	<i>Bostrychia Carunculata</i> ^{NE}	R	LC
Passeriformes	Sturninae	Wattled Starling	<i>Creatophora cinerea</i>	R	LC
Pelecaniformes	Ardeidae	Western Cattle Egret	<i>Bubulcus ibis</i>	R	LC
Charadriiformes	Sterninae	Whiskered Tern	<i>Chlidonias hibridus</i>	NM	LC
Pelicaniformes	Pelecanidae	White great pelican	<i>Pelecanus onocrofalus</i>	R	LC
Ciconiiformes	Ciconiinae	White Stork	<i>Ciconia ciconia</i>	NM	LC
Anseriformes	Anatinae	Whitebacked Duck	<i>Thalassomis leuconotus</i>	R	LC
Passeriformes	Timmallidae	White-rumped Babbler	<i>Turdoides leucopygius</i>	R	LC
Charadriiformes	Sterninae	White-winged Black Tern	<i>Childonias leucopetrus</i>	NM	LC
Coraciiformes	Alcedininae	Woodland Kingfisher	<i>Halcyon senegalensis</i>	R	LC
Anseriformes	Anatinae	Yellow-billed Duck	<i>Anas undulate</i>	NM	LC
Pelecaniformes	Ardeidae	Yellow-billed Egret	<i>Egretta intermedia</i>	R	LC
Ciconiiformes	Mycteriinae	Yellow -billed storck	<i>Mycteria ibis</i>	R	LC
Psittaciformes	Psittacidae	Yellow-fronted Parrot	<i>Poicephalus flavifrons</i> ^E	R	LC

Description; Movement: MS=migratory status, PM=Palaearctic Migrant, AM= Intra-African Migrant, R=resident; Endemism: E=endemic^E, NE=near endemic^{NE}; IUCN Conservation Status: NT=Near Threatened, LC=Least Concern, CR =Critically Endangered, NR= Not Recognized family names ends with ...dae and subfamily ...nae.