HARAMAYA UNIVERSITY

POST GRADUATE PROGRAM DIRECTORATE

COMMUNITY AWARENESS ABOUT ECOLOGY, DISTRIBUTION, CONSERVATION AND POPULATION CENSUS OF WHITE WINGED FLUFFTAIL (*SAROTHRURA AYRESI*, GURNEY, 1877) AT BERGA WETLAND IN ADEA BERGA DISTRICT, WEST SHOWA,ETHIOPIA

M.SC. THESIS

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Community Awareness About Ecology, Distribution, Conservation And Population Census Of White Winged Flufftail (*Sarothrura Ayresi*, Gurney, 1877*)* At Berga Wetland In Adea Berga District, West Showa, Ethiopia

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POSTGRADUATE DIRACTORATE

We hereby certify that we have read and evaluated this thesis entitled Community Awareness about Ecology, Conservation and Distribution of White Winged Wlufftail **(***Sarothrura ayresi***)** at Berga Wetland in Adea Berga District, West Showa,Ethiopia. We recommend that it would be submitted as fulfilling the requirement.

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As a member of the Board of Examiners of M.Sc. Thesis Open Examination, we certify that we have read and evaluated the thesis by Fikadu Gutema and examined the candidate. We recommend that the thesis be accepted as fulfillment of the Thesis requirements for the degree of Master of Science in Biology.

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DEDICATION

I dedicated this manuscript for all my friends and parents for their friendly supports and affections in the success of my life.

STATEMENT OF THE AUTHOR

First I declared that this paper was my own work and all sources of materials used for this thesis had been duly acknowledged. This thesis has been submitted in partial fulfillment of the requirements for M.Sc.degree in Biology at Haramaya University and was deposited at university library to be made available to borrowers under the rules and regulations of Haramaya University library. I seriously declared that this thesis was not submitted to any other institution anywhere for the award of any academic degree, diploma or certificates.

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Date of Submission 29/11/2016

BIOGRAPHICAL SKETCH

The author was born on November 1975 G.C. in North Showa Zone, Oromia Region. He attended his primary education at Archo Elementary School and his junior and secondary school at Muketuri Senior Secondary School in North Showa. Then, he joined Jimma Teachers Training College (TTC) and graduated in Biology in July 1999 G.C. After graduation he was employed by the Ministry of Education and served as Biology teacher at Enichne Preparatory School for 17 years. Finally, he joined the postgraduate program at Haramaya University in July 2013 to pursue the Degree of Master in science (M.Sc. in Biology).

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ACRONYMS AND ABBREVIATIONS

ASLNP	Abjata Shalla Lake National Park
AEWA	Agreement on Conservation of African-Eurasian Migratory Water Bird
ARD	Agricultural and Rural Development
BLI	Bird Life International
CMS	Convention on Conservation of Migratory Species of Wild Animals
CR	Critically Endangered
EPA	Environmental Protection Authority
EWA	Ethiopian Wild Life Association
EWCO	Ethiopian Wild Life Conservation Organization
EWNHA	Ethiopian Wild Life Natural History Association
EWNHS	Ethiopian Wild Life Natural History Society
FGD	Focus Group Discussion
IBCR	Institute of Biodiversity Conservation and Research
IBAs	Important Bird Areas
IUCN	International Union for Conservation of Nature and Natural Resource
NGO	Non-Governmental Organization
OEPO	Oromia Environmental Protection Office
SSG	Site Supporting Group
SPSS	Statistical Package for Social Sciences
SW	South West
WCMC	World Conservation and Monitoring Centre
WWFs	White Winged Flufftails

.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF TABLES IN APPENDIX

LIST OF FIGURES IN APPENDIX

COMMUNITY AWARENESS ABOUT ECOLOGY, DISTRIBUTION, CONSERVATION AND POPULATION CENSUS OF WHITE WINGED FLUFFTAIL(*SAROTHRURA AYRESI*, GURNEY, 1877) AT BERGA WETLAND IN ADEA BERGA DISTRICT, WEST SHOWA, ETHIOPIA

ABSTRACT

Sarthrura ayresi were endangered birds and their migratory routes are between Ethiopia and South Africa. Because of their population size, the International Union for the Conservation of Nature and Natural Resource(IUCN) regarded Sarothrura ayresi as critically endangered species. The study was aimed at assessing community awareness about ecology, conservation, and distribution and population census of WWFs in Berga Wetland. From 230 household owners living in four kebeles were used for questionnaire surveys selected purposively and 37 were used for focus group discussions. Questionnaire survey, population census by investigator in intensive field survey during breeding season and focus group discussions of the household owners were used as a means of data collection instruments. The data obtained were analyzed by using SPSS statistical software version-16. The respondents were aged between 31to 64 years. They had different occupations and educational levels. The diversity of opinions expressed during focus group discussion suggested that knowledge about the ecology, conservation and distribution of the bird was somewhat uniform among the inhabitants of the four Kebeles. The respondents had awareness about the availability of WWFs in the wetland. 83% of the household owners had awareness about the benefits of the birds. 70% of respondents had information about the factors that affected the distribution of these birds. 39.2% of the respondents believed that the population of WWFs has greatly declined and showed their concerns. 37% of household owners reflected that the bird was in common Africa. 49% of respondents have responded that WWFs were found in Berga during breeding. In recapping, the populations of WWFs were declined due to various factors and they were critically endangered birds that required serious conservation measures by engaging all stakeholders at different levels of the community.

***Keywords**: Berga Wetland, Conservation,Critically Endangerd, Endemic.*

1. INTRODUCTION

Ethiopian avifauna is widely known for its diversity and distribution globally (Anon, 2006). For this reason, more recently, Ethiopia has become the leading birding destination as compared to other African Nations (John and John, 2009). Primarily, the diversity and distributions of birds is attributed to the presence of wider ranges of climatic and agro-ecological environments in Ethiopia (John and John, 2009; Assefa, 2015).

So far, it was believed that there was over 900 birds were known to occur in Ethiopia. Out of these, 23 were found exclusively within the country's boundaries or were endemic (Spottiswoode and Mills, 2000) bird species that were widely distributed, chiefly on the western and southern highland plateau. Studies have also revealed that, many of the endemic birds of Ethiopia- like Thick-Billed Raven, Wattled Ibis, Black Winged Love bird and White Collared Pigeon- are notably for some studied bird species, their biology was not well documented (John and John, 2009).

Despite their distribution and diversity, the avifauna's of Ethiopia are poorly known as compared to many parts of Africa. Knowledge on the distribution of many birds is scattered throughout literature and even, 23 are found exclusively within the country's boundaries or are endemic (Spottiswoode and Mills, 2000).

According to Abebe and Geberesilassie (in litt.2013),the numbers of Sarothrura ayresi were rapidly declined due to habitat degradations and they failed to record any of these bird species at Berga and Woserbi in August 2013.The white winged flufftail was first identified in the Ethiopian highlands, 10-15 pairs bred at Sululta in the late 1990s (Atkinson *et al.* 1996; Anon, 1997) and later on new breeding sites were recognized with 200 pairs at Berga floodplain in 1997 in officially unpublished material (Anon, 1997; Wondafrash, 2007). In 2005, a small breeding population was discovered at Bilacha in Ethiopia (Wondafrash, 2007). Three adults WWFs were recorded initially in July, followed by the location of three eggs in August and 19 nests in September (Anon. 2006). Apparently, the searches of three breeding sites of WWFs with an area of 5.5km^2 in Ethiopia have failed to find the species(Simt Robinson. In litt.2013).

According to Important Bird Area(IBA information Fact Sheet 2002), the only breeding records of Endangered species of WWFs were from highland marshes of central Ethiopia. It is a very local and apparently seen only in summer by visitors to highland marshes south of the equator.. The species was first found to breed at the Berga wetlands in 1997 (Anon, 1997; Anon, 2006). In Ethiopia, the white winged flufftail, *Sarothrura ayresi* under the Family *Rallidae* and *Ankober Serin*, *Serinus ankoberensis* under the Family *Fringillida*e, are Endangered (EN) bird species of Ethiopia . In particular, the white winged flufftail is listed as critically endangered (CR) as its population is now thought to be very small (Anon, 2006).

At present, there is a common understanding that conserving and managing important bird areas through participatory approaches means targeting the protection of a wide variety of avifauna (Taylor and van Perlo 1998; Barnes 2000). In South Africa the species are regular at the Dullstroom and Wakkerstroom marshes, where public access is strictly regulated. Non-breeding birds call only at dawn and dusk, sometimes in duet. Their natural habitat is seasonal marshland of subtropical or tropical high-altitude grassland.

Bird Life South Africa and the Middelpunt Wetland Trust (MWT) have rolled out a number of research projects during 2012 and 2013 to focus on the conservation of the white-winged flufftail. All the research findings have indicated that better understanding of the flufftail's movement and its habits demands connection and joint works between South Africa and Ethiopia which would in turn provide ground to implement correct conservation measures (MWT).

A survey of suitable wetland habitat in South Africa is also currently underway and will contribute to a better understanding of the extent of its occurrence in the country. Whether a single population migrates between Ethiopia and South Africa, or each country hosts its own subpopulation,was still not known (Taylor and van Perlo 1998, Barnes 2000) although, observations from a breeding site in Ethiopia discovered in 2005 show that birds continue to breed into the dry season and may remain in Ethiopia after breeding, rather than migrate

(Anon. 2006). A genetic and isotopic analysis is in progress to assess whether the species is migratory or not (Smit-Robinson, 2014).

In Ethiopia, there are around seventy IBAS(Important Bird Areas), two in Addis Ababa Administrative Region, five in Afar Regional State, twelve in Amhara, two in Gambella, thirty eight in Oromia, Somalia regional state two, and eleven in Southern Nations, Nationalities and People's Regional State. Among the prioritized lists of Ethiopia's IBAS with their sites were: Bale Mountains, Awash National Park , Simen National Mountains , Ankober/Debre Sina , Sululta Palins , Bahir Dar Lake Tana , Berga Floodplains and the like (IBA Information of Factsheet 2002).

White winged flufftails are one of the examples of the natural resources that require serious conservation measures (Taylor, 1998; 1999). The population is now thought to be very small, and is believed to be undergoing a very continuing decline in extent, area and habitat quality, owing to the high rate of loss and degradation of its preferred habitat, seasonal marshland primarily by the activity of man.

Berga wetland has some wetland bird species including white winged flufftails (Tefera and Almaw, 2002 cited in Tefesse, 2008). Berga wetland /Berga Floodplains/ was also widely known breeding site for the white winged flufftail which has retained its critically endangered status since 2014. This wetland was selected as Important Bird Areas (IBAs).

Currently, there is growing interest of conserving and managing IBAs through joint participations of the community, governmental and non-governmental organizations. Understanding community's awareness about the ecology, conservation and distribution of the white winged flufftail (*Sarothrura ayresi)* is fundamental for the successful managemet and conservation of the species as well as for the breeding site (Berga wetland). So far, there was no documented information on the community knowledge and awareness about white winged flufftails in the study areas.

General objective

- To investigate the awareness about ecology, distribution, conservation and population census of white winged flufftails by the community inhabiting the watershed areas of Berga wetland.

Specific objectives

- To investigate the common factors influencing the ecology, conservation and distribution of white winged flufftails in the study areas.
- To conduct population census for white winged flufftails and compare with former reports.
- To identify the main stakeholders involved and document their responsibilities in the management and conservation of white winged flufftails at Berga wetlands.

2. LITREATURE REVIEW

2.1. The White Winged Flufftail

The white winged flufftail (*Sarothrura-ayresi*) was classified under the family *Rallidae* and the Genus *Sarothrura*. The species is a small, secretive little known under the family Rallidae was endemic to Africa. The adult male has a chestnut head and both sexes have a black barred chestnut tail and white winged-patches on the secondary flight feathers .The best chance of seeing this species of bird is during the wet season in upland marshes in Eastern South Africa and central Ethiopia. It is categorized as endangered in the 2008 IUCN Red List. This is because it has a very small range, with breeding proven at only three locations, the range is believed to be undergoing a continuing decline in extent, area and habitat quality, due to the rate of loss and degradation of the bird preferred habitat, seasonal marshlands. According to Bird Life International (2008) currently, the white winged flufftail is listed in migratory species that is in danger of extinction.

Ecologically, the movement of this species is not fully understood. Lack of evidence on sub-speciation suggests that this bird species migrates between two area ranges (del Hoyo *et al*., 1996, Taylor and Van Perlo, 1998), and this is supported by the fact that breeding has not been observed in South Africa where it is considered by many to be a non -breeding summer visitor (Urban *et al.,* 2005). However, the fact that there are overlaps in occurrence has prompted suggestions that strict migration is unlikely (Taylor and Van Perlo, 1998). One suggestion is that long distance dispersal occurs when numbers are high (del-Hoyo *et al.*, 1996; Van Perlo, 1998), with local movements being predominant at other times.

In 2012, a survey was carried out in South-West Ethiopia during the non-breeding season to understand more about the possible movement of birds between Ethiopia and South Africa, however, no birds were found (Drerup, 2015). In Ethiopia, birds that breed in central highlands in June-September may move to lower level habitats during the breeding season, when highland areas become unsuitable. In South Africa the species is thought to be nomadic, moving in search of its transient habitat (Hoyo *et al.,* 1996). It is considered nomadic in Zimbabwe (Ewbankinlitt, 2014). Birds in Ethiopia are between June and October, while the non-breeding birds in South Africa from November to March, with a

few records in May, August and September (Urban *et al., 2005*). Breeding occurs in July-August (Taylor *et al.,* 2004). Breeding birds occurs at a density of 2-4 pair per hectare (Taylor and Van Perlo, 1998). Non- breeding birds occur in loose associations.

2.2. Systematic Classification of White Winged Flufftails

The white winged flufftailis classified under the class avian, order *Gruiforicarmes*, family; *Rallidae*, Genus, *Sarothruara* (Gurney, 1877), sometimes without other chestnut flufftail species. Ethiopian birds first described as *Ortygops-macmillan* (Banner man1911) from a species pair with *S.watersi* Monotypic Synonms; *Coturnicops ayresi; Ortygops-macmillani*. An alternative name is white winged crake.The taxonomic sources are Dowsett and ForbesWatson (1993), Sibley (1990) and Monro (1993).

2.3. Estimated Population of White Winged Flufftails

The population in South Africa is estimated to be 235 birds (Taylor and Van Perlo, 1998) with at least a further 210-215 pairs in Ethiopia, that is probably 700 mature individuals in total (Wetland International, 2006; Bird Life International, 2008).The species population is suspected to be decreasing in line with levels of disturbances, loss and degradation in Ethiopia and South Africa (De Smidt and Evans 2003; Taylor and Grundling, 2003; Drummond in litt, 2005). However, the likely rate of decline has not been estimated.

Whether a single population migrates between Ethiopia and South Africa or each country has its own subpopulation is not yet known (Barnes, 2000; Taylor and van Perlo, 1998) although, the observations from a breeding site in Ethiopia discovered in 2005 show that these birds continue to breed into the dry season and may remain in Ethiopia after breeding winter than migrate. Despite the great distance separating this bird two centers of occurrence and the lack of records from most the intervening regions there appears to be no significant morphological differences between South Africa and Ethiopia populations. Migration between the widely separated distributions in Eastern and Southern Africa is considered unlikely (Taylor and van Perlo, 1998).

2.4. Geographical Distribution of White Winged Flufftails

The white winged flufftail occurs in Ethiopia, Zimbabwe and South Africa and there is only one reliable record in Zimbabwe. Claimed records from Rwanda are unproven. The occupied breeding range has been estimated as 250km2 (Anon, 1999). Currently in Ethiopia, the species has been recorded in three sites in central highlands (Weserbi Wetland, Berga Wetlands, and the Bilacha Wetlands, all Wetlands are near Addis Ababa), the only breeding area for this species (Taylor, 1998; Taylor and van Perlo, 1998). In South Africa, the species is known from nine sites in the Kwa Zulu and M Pumalaga (De Smidt, 2003). In Zimbabwe, according to Cizeket al (in prep), it was more regularly recorded from the Harare high rainfall wet seasons of the 1977 and 1979 than currently generally reported Bird Life (2008). It is known from three sightings from a marsh below the disused Western Sewage works, with another bird at the edge of the Marimba marsh, Jan-March 1979 (Hopkinson and Masterson, 1977, 1984).

These sightings are most likely involved at four individuals, but possibly more different sites in vile ecosystems which formerly covered an extensive area of Western Suburbs of Harare. An individual was recorded at fifth site, Aisle by Farm, just South of Bulawayo 6 February 1998 (Hustler and Irwin, 1995). It was possibly bred in Zimbabwe in the 1950s (Taylor, 1994). In Ethiopia, it was formerly from highland around Addis Ababa (Sululta Plain Akaki, Entotto and Gefersa), at lower elevation to the SW at Charada, Kaffa. From 1939-1957 a small numbers were discovered in August 1984 and four in August-September 1995, while an estimated 10-15 breeding pairs were present in August 1996 (Taylor, 1996).

According to (Taylor,1996) since August 1997, there was a breeding population of at least 200 pairs was found in seasonal and permanent marsh at a new locality near Addis Ababa (Berga Wetland) and it was probable that the species widespread and locally numerous in the central Ethiopian highlands before intensive human. In South Africa the lack of recent records from central localities suggests it amicmay now be confined to be higher altitude Wetlands (Taylor, 1994).

2.5. Annual Migration for White Winged Flufftail

The apparent lack of sub-speciation has been thought to indicate that regular migration occurs between Ethiopia and South Africa of centers of distribution ,but the paucity records from (1985), while birds may be present throughout the year at Berga Wetland, a recently discovered marsh near Addis Ababa (Taylor, 1997). Much habitat in the central Ethiopian highlands, where most occurrences are recorded from June-September is a seasonal marsh and thus unsustainable in the non-breeding seasonal when migration occur SW to lower-latitude permanent marshes such as at Charada, Kaffa (Jimma area), where there is a May specimen (Taylor, 1994, 1996). Guichard (1948) suggested that males arrive in breeding areas before females. The best chances to see the birds were at flight than at rest.

2.6. Reproductive Biology and Life Cycle of White Winged Flufftails

Due to the limited knowledge on the species ecology and population dynamics, non-of the available literature describes reproduction of white winged flufftail. Excluding the down-covered chicks, three age classes have been recognized in white-winged flufftail: juvenile, immature and adult (Taylor, 2005*d*). The timing of the moults between these different age classes does not appear to be known in the white-winged flufftail.

In other *Sarothrura* species partial post-juvenile (first pre-basic) moult (excluding remiges and rectrices) to assume immature plumage occurs averagely between appears to be known about the timing of first pre-breeding (prealternate) moult to assume adult plumage that occurs from six to seven months after the completion of the post-juvenile moult *Taylor,2005a-c*).

The post-breeding moult in adult flufftails is complete with erratic, synchronous or descendant moult of the primaries (Taylor2005*a-c*). Juvenile white-winged flufftails are identified by their “predominantly grey-brown” (♂) or “blackish brown” (♀) heads with no rufous or chestnut wash to the breast (Taylor, 2005d). Immature are intermediate with some development of chestnut or rufous on the head and breast (Taylor, 2005*d*). Unlike most *Sarothrura* species, sexual dimorphism in adult white-winged flufftails is not pronounced, with both sexes having chestnut.

2.6.1. Reproductive Biology

The species breeds in high-altitude seasonal marshes (between 2,200 and 2,600 m) with dense, rapidly growing vegetation dominated by sedges, grasses and forbs. It occurs here when vegetation has reached 20-40 cm in height and the ground has not yet become entirely flooded. Very soon after hatching, it appears to move its chicks to areas of denser vegetation where the ground is more deeply and continuously flooded. Three age classes have been recognized in White-winged Flufftail: juvenile, immature and adult (Taylor, 2005d).

2.6.2. Life History of White Winged Flufftails

Season of the nest building and egg lying shown that both occur in Ethiopia during long rains in July-August. A juvenile recorded in South Africa in November is probably from an egg laid in August. Despite claims to the country there is as yet ,no acceptable evidence that the species breeds in South Africa (Taylor, 1994).Nest building recorded by Sarothrura ayresi was found in Ethiopia in 1999 and was situated in short grass (300-450 mm tall), in damp ground in an upland wetland that was drying out. The nest was built in a tuft of Eliocharis, Sedge with its base 10 mm above the ground. It was around ball with a side entrance and was made with stems of grass and sedge, with the live plant stems drawn over the top to form the roof. Further at nest descriptions were made by Allan *et al*. (2006). Regarding to eggs, a clutch of five pure white eggs from the nest found by Tarboton (2001) measured 27 times 20mm. The clutch found by Allan *et al. (*2006) had four unmarked ivory white eggs.

Regarding to chicks, both sexes apparently feed and care for chicks. Adults leave observers away in dense cover. Observations in Ethiopia suggests that birds commence nesting immediately after as a little as six weeks ,after all birds may leave breeding habitat, which may have become unsustainable as the result of damage from grazing ,trampling and cutting. Some birds may be able to raise a second brood elsewhere, before the end of October, in the late developing habitat. Natural predation of eggs and young's may be low at Ethiopia breeding site(EWNRA,2008).

Studies in Ethiopia have provided the following information. Adults take earthworms, small freshwater and crustaceans, and the adults larvae of aquatic and terrestrial insects such as Lepidoetra, Colepetra and Dipetra. Foraging has been observed from early to mid-morning and in the late afternoon (Taylor, 1996, 1997b).

2.7. Habitat Requirements of White Winged Flufftails

The habitat requirements of white winged flufftails are not well documented. Apart from sight records, no detailed observational data has been collected about the species ecology outside the breeding season. Most of the information on habitat is derived from work of (Taylor, 1994, 1996). Ethiopian habitat is seasonal, dense rapidly growing vegetation 20-50cm tall. Dominant plants include sedges, grasses and forbs such as *Uebelina kigesiensis*, *Trifolium calancephalam, Ranunculus multifidus, Rumex maginulata*. In the breeding habitat, birds forage along muddy cattle tracks ,at shallow pools, and at patches of cut vegetation and other small open areas in the dense cover, taking insects and other invertebrates from moist ground, mud and shallow water, and from flattened low-growing vegetation, both adults and chicks apparently also forage in more deeply flooded vegetation (Taylor, 1994, 1996).

In South Africa nine of ten important confirmed sites for the species are within the Eastern uplands, Great Escarpments, Mountains and Highveld Petland ecoregions, emphasizing the importance of peat-based habitats (Taylor and Grudling, 2003). Non breeding birds in South Africa occur for short periods alongside breeding Red-chested flufftails in the dense hygrophilous grasses.

In Zimbabwe birds were recorded from grasses 50-100cm on dry to moist ground also from muddy to shallowly flooded marshy ground with grass and cover (Hopkinson and Masterson, 1984), and in Zambia, one bird was found in a pan- like marsh with emergent grass (Brooke, 1964).It is recoded at 1,300-1,400m in Zambia and Zimbabwe; in South Africa it occurs at mostly at 1,100-1,900m and has been recorded rarely at 150m in areas. White winged flufftail is one of the two species listed on Annex 2 of AEWA that are judged to be critically threatened by climatic change (Maclean *et al.*, 2007).

3. MATERIALS AND METHODS

3.1. Descriptions of The Study Area

The study was conducted at Adea Berga district, West Showa Zone, Oromia Regional State, Ethiopia. The center of the District was Enchine, and located at 64kms West of Addis-Ababa. Of the thirty six kebeles in the district, only four kebeles were located around the watershed areas of Berga Wetland, which is the main breeding site of white winged flufftails. The maximum and minimum temperature of the district was 25℃,and 10℃. The altitude of the District ranges from 1400-3270m above sea level. The district is found between 38^{o} 17'to 38^{o} 36'E, 09^{o} 12' to 09^{o} 38'N (Source :Adea Berga District water and energy bureau).

Based on the census of CSA of 2007(141,991 total populations of the District), the current projected estimation of Adea Berga populations were 155,643 with a growth rate of 2.9% increase per year. From these, 771,871of were males and 77,772 were females. The current population size of ethnic groups of was approximately 27983 Oromo, 2383 Amahara, 531 Gurage and the other 1111 were different ethnic groups with an area of 798.35 square kilometers (CSA, 2007). Of the total areas, the forest covers about 6%, 27% pastoral land, 52% farmland, 1.95% urbans ,0.05% aquatic and 13% others. The district has also boundaries with Mulo District from East, West Metta Robbi, North Kuyyu, Degam, South Welmara and Ejere.

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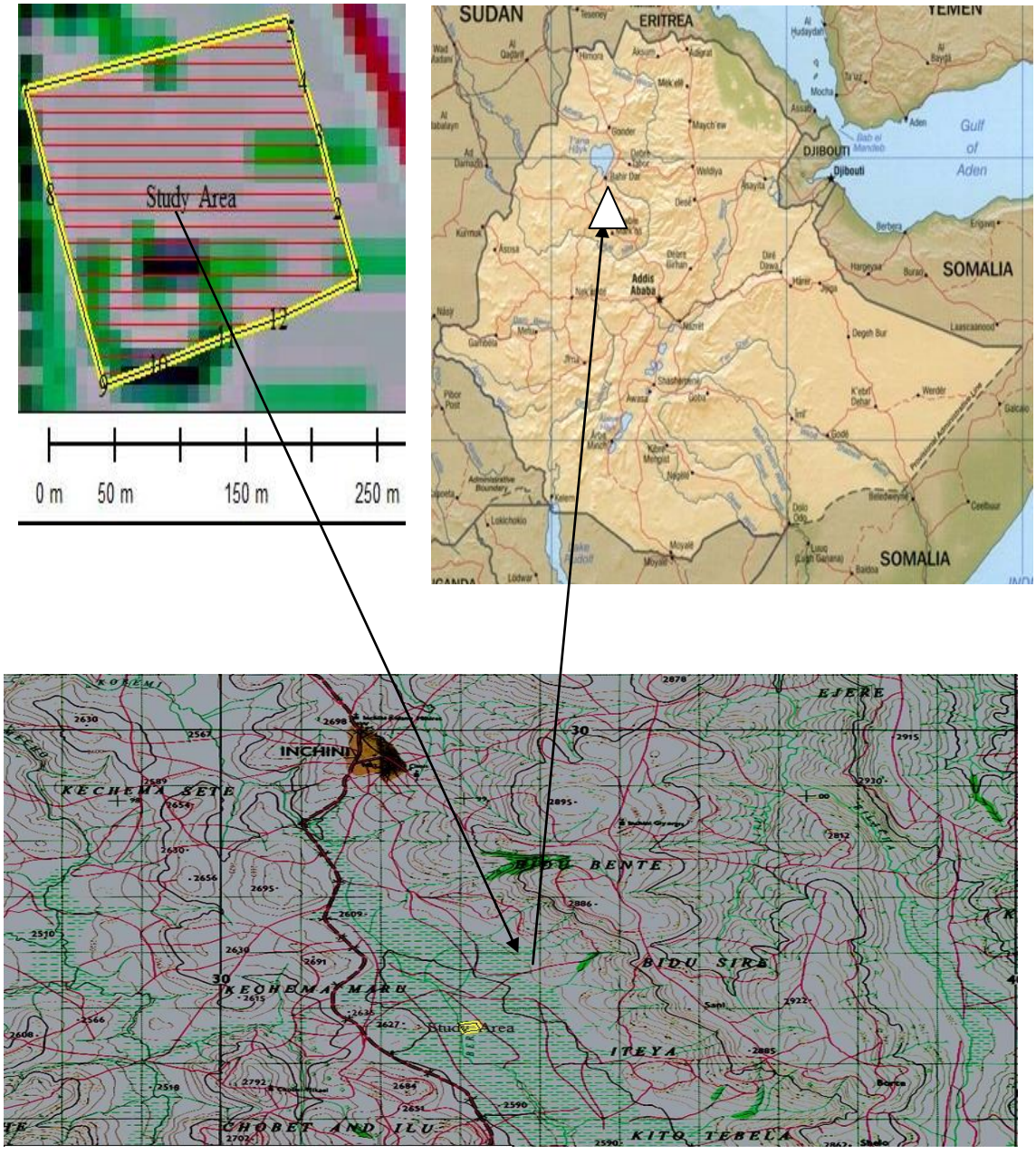

Figure 1.Map of The District With Surrounding Kebeles

Legend

Road

River

Wet land

3.2. Design of The Study

The design of the study was a community based questionnaire survey by using both qualitative and quantitative methods to investigate community awareness about ecology, distribution, population census and conservation of white - winged flufftail at Berga Wetland. The four study kebeles (Sire-Berga, Maru chobot, Iteya and Kitto) were purposively selected as they encompass wetland areas that serve as habitat for this bird species. The survey was conducted between February 2016 and July 2016.

The data collected were both primary and secondary. Primary data were collected from purposively selected households through cross sectional survey type in face to face interview and focus group discussion. Primary data were also obtained from intensive survey of the study areas for population census of WWFs. On the other hand, the secondary data were collected from already available sources such as books, internet, scientific journals, etc. through document analysis.

3.3. Sampling Technique and Sample Size

For this study, the researcher has used purposive proportional random scheduling system because the number of household heads was varying in study areas. 230 respondents mainly who were living in and around wetland from four kebeles were chosen purposively at available sample from a list of household owners in each *Kebele* provided by local DA workers (Source: District Agricultural Bureau).

Therefore, the required sample sizes for this study were 230 (201 male and 29 females) individuals selected for questionnaire field survey from four kebeles using purposive sampling techniques. They were assumed to have some information's about white winged flufftails ecology, conservation and distributions.

Among the types of research approaches, for this study a mixture of quantitative and qualitative approaches were employed. So that, questionnaire field survey, population census of WWFs was carried out by extensive field survey, and focus group discussions were employed to collect the necessary data**.**

3.4. Data Collection Instruments

3.4.1. Questionnaire Surveys

Due to the potential and illiteracy of the respondents, a serious of questions were prepared in English and used to collect information's from 230 respondents selected purposively from four kebeles. The questionnaires were prepared in English and were translated into the local language, *Afan Oromo* during survey by data collectors *and researcher*. They were selected among the teachers who are working at Meru Chobot Junior Secondary School, Meru Chobot *kebele*, because of the vicinity to the study areas and their command of local language.

The questionnaires with two sections were developed based on the questionnaire modeled on several other questionnaires that have been conducted in assessing community awareness and knowledge on the distribution of other birds in the study area (Mirza and Wasiq, 2007, as cited in Arshad Javid *et al*., 2015). The first section represents socio demographic factors of respondents (age, sex, educational level, family size, occupation) that clearly illustrated the information's of the household heads. The second section with four subsections focused on general questions on the community awareness about ecology, conservation and distribution of white winged flufftail. The first subsection is addressing knowledge on ecology of WWFs, the remaining parts were aimed to assess, ecology conservations, population status and the stakeholders at various levels of the country.

About 13 questions each with descriptors from which the individual would choose the one that best describes his or her belief were used. Information from field visit or surveys from each *kebele* had also been compiled. Video camera, tape-recorder, notebook, pens, direction indicator- GPS used to locate the direction of the surrounding *kebeles* of the study areas from east, west, south and north directions.

3.4.2. Focus Group Discussions of Household Owners (FGD)

The researcher have conducted focus group discussions in all (four) kebeles with 37(22 males and 15 females) respondents selected purposively. Focus group discussion was conducted with a small group of inhabitants from each kebele . The discussion was held to

explore their knowledge about white winged flufftails. To save time and avoid complexity during data collection and analysis, other socio demographic characteristics were not included for FGD. All questions were prepared by investigator in order to cover the topics of the study on white winged flufftails as well as to allow discussants to discuss the issues more freely than they could with closed or forced choice questions of structured questionnaire (Hall and Hall, 1996).

3.4.3. Population Census of White Winged Flufftails

The birds have been known to stay at Berga wetland from the end of June or beginning of July to the end of the September. Estimation of population census of white winged flufftails were carried out during breeding season in the study area by investigator using binocular microscope or by hitting highlands (water containers) with sticks or woods early in the morning and late in the afternoon in Berga wetland when the WWFs were active in feeding habits. With the help of guards assigned from for four kebeles ,the investigator was able to take estimations of their populations while they were flushed away from where they were hiding themselves in long grasses, counting the numbers of WWFs' and comparing the estimated numbers with the former reports to decide whether the WWFs were gradually decline or not.

3.5. Methods of Data Analysis

The analysis and interpretation of the data collected had been made by using appropriate computer software. In short, the collected data from household surveys was entered into a computer and analyzed using SPSS version 16 software. The SPSS data analysis was mainly based on descriptive statistical tools that involved frequency distribution and percentages. For questionnaire survey, qualitative analysis was used for socio demographic attributes. For open ended questions, similar ideas were grouped together, counted and calculated percentages were used for interpretations. Level of significance of the survey was checked by using chi square and p-value at 95% confidence interval (p –value < 0.05).

4. RESULTS AND DISCUSSION

4.1. Socio -demographic Characteristics of Respondents

The socio demographic characteristics of the respondents involved in questionnaires surveys were summarized and presented in Table (1). Out of 230 respondents, 201 (87.4%) of them were males while the rest 29(12.6%) were females. With regard to age, the majority (192) of respondents aged 31-64 years, 26 respondents were aged above 64 and 12 respondents were aged from 15-30. Out of 230,204 (88.7%) of the respondents were orthodox while the remaining 26 (11.3%) were protestants. Respondents'living places were represented in the appendex parts of the thesis.

Regarding to their educational status, most 120 (52.2%) cannot read and write, 69(30%) were in the 1st cycle primary school, 33(4.3%) were 2nd cycle primary school educated, 6(2.6%) were high school complete, 1 (0.4%) had diploma level training. As far as the major occupations concerned , 220 (98%) of them were farmers, 5 (2%) were merchants. Out of 230 respondents,226(98.3%) were married,3(1.3%) were divorced while 1(0.4%) of them were unmarried. Up to the time of surveying, all the respondents were living in and around study area.

Table1.Socio-demographic Characteristics of Respondents

Socio-demographic Characterstics	Respondent Frequency	Percent
Sex		
Males	201	87.4
Females	29	12.6
Age		
15-30	12	5
31-64	192	84
64+	26	11
Education Level		
Non formal	120	52
1^{st} cycle	69	30
2^{nd} cycle	33	14.3
High School	6	2.6
Preparatory	1	0.4
Diploma	1	0.4
Family Size		
1-6	130	57
7-10	79	34
11-17	21	9
Major Occupation		
Famers	225	98
Merchants	5	2
Religion		
Orthodox	204	88.7
Protestants	26	11.3
Marital Status		
Married	226	98.3
Divorced	3	1.3
Unmarried	1	0.4
Living Places	Number of Respondents	Duration
In or around Berga wetland	230	Permanent Residents

4.2. Knowledge of Respondents on The Ecology of Sarothrura ayresi

4.2.1. Awareness of Respondents About Ecological Integrations of Bird

As indicated from table(2) below, the total 230 household heads, 199(86.5%) household heads have a knowledge of ecological interactions of white winged flufftails in the study area. They explained that,these *Sarothrura ayresi* had ecological interactions with themselves, their environments ana other living organisms. This result was went in line with or in agreement with the survey done by other investigators on challenges and opportunities of natural resources (Dixon and Wood,2003, cited in Gemechu,2010).

Table 2. Knowledge of Respondents About Ecological Interactions of Sarothrura

Question item	Response	
	Frequency	Percent
What types of ecological interactions do you know about WWFs? Response: They have interactions with other biotics, their environments & with themselvels.	199	86.5

As shown in (table 3 below),33.9% of the household heads said that these birds in berga wetland have an intra specific interactions with themselves and inter specific interactions with other wetlanad d organisms while 48.3% of the respondents addressed that these birds hided themselvels in the sedges and the remaining 17.8% of the respondents have no a knowledge about WWFs interactions with other living things. Based on the result of table (24), this result showed that, there was significant difference between the respondents' suggestions because the p-value was < 0.05(p=0.000). This result indicated that the survey done has 95% acceptance at p-value < 0.05 (table,24).

Table 3. Respondents Perceptions About *Sarothrura ayresi* Interactions In Study Area

Question items	Response	
How do these *Sarothrura ayresi* interact with others?	Frequency	%
a). Freely living with other living things	78	33.9
b). Hiding themselves in sedges	111	48.3
c). No interactions with others	41	17.8
Total	230	100

4.2.2. Knowledge of Respondents on Conservation Related Issues

From table(4)below, out of 230 householdheads,55.2% have an awareness about the protections of white winged flufftails in study area while 44.8% of them didn't protect the birds' and their habitat.Those that have a knowledge about protections created awareness for other residents, conserving the WWFs and their habitat some of the conserving stratagies that have done in protecting these birds. Again, on the basis of table (24),the p-value of this item was statistically significant because it was less than 0.05 (p=0.000) and there was a statistically variations between those who conserved the WWFs and who didn't played a role in conservations.

Table 4. Respondents Perceptions on Protections of White Winged Flufftails

Question item	Response	
Is there any protection done for WWFs in Berga wetland?	Frequency	Percent
Yes. Awareness creatations,conserving WWFs ana their habitats	127	55.2
No	103	44.8
Total	230	100

As indicated from the results below (table 5), awareness levels of the respondents were between,low(25.7%), medium(38.3%) and high awareness(27.4%). This was because, there was Site Supporting Group (SSG) formed as an association to create an awareness,keep the wetland turn by turn, but still, more awareness creation to the people who were lived adjacent to the wetland and more work should have to done on an implementation. But, as study indicated, not only relevant information, but also knowledge and awareness on wetlands, are lacking in Ethiopia at all levels (Mengistu, 2008, cite in Hagos

Gebresillasie *et al*., 2014). The result was significant because the survey result's p-value was less than 0.05(p=.000, table, 24).

Table 5. Awareness Levels of Respondents About The Wise Use of White Winged Flufftails

Question items	Response	
Awareness levels of respondents about wise use of WWFs	Frequency	Percent
a) No awareness	20	8.7
b) Low awareness	59	25.7
c) Medium awareness	88	38.3
d) High awareness	63	27.4
Total samples and %	230	100

As far as the benefits concerned (table 6), due to the existence of white winged flufftails in Berga,93% of the households have mentioned benefits like donations of money, stocks, workshops,school for residents were some of the benefits obtained by the sourrounding communities. In connection to this, wetlands were the resting and nesting habitats for inter Africa and Europe migratory birds contributed their importance in tourism industry (Lemlem, 2003, cited in Gemechu,2010).

Table 6.Knowledge on The Benefits of White Winged Flufftails toThe Community

Question items	Frequency	Percent
What benefits do the white WWFs and the wetland provide to you?Response: Various supports like money, stock animals, workshops for training, school for residents, dollars from foreign visitors	213	93

From table (7), 69.6% of the respondents have a knowledge of factors influencing white winged flufftails conservations while 30.4% of the respondents didn't have an ideas about factors influencing these birds in the study area. As could be seen from the results, more percentage of respondents have a knowledge about factors influencing WWFs conservations.

According to European studies (Schiess, 1989) showed that the fragmentation of phragmites of redbeeds had a direct effect on breeding birds such as warblers, rails (family rallidae),the

Grey Heron Ardea cinerea and the Little Bittern Ixobrychus minutus. The survey result of this item was again statistically significant because the p-vaule was less than 0.05 (p=.000, table,24). That means, there was statistically difference between respondents suggestions.

Table 7.Attitude of Respondents'on Factors Influencing *Sarothrura ayresi* Conservations

Question items	Frequency	Percent
Do you know factors influencing WWFs conservation in Berga wetland?		
Yes.Ans: Habitat loss,climatc changes,predators	160	69.6
NO	70	30.4
Total	230	100

Out of 230 household heads table(8), 28(12.2%) of them have answered that they wanted Berga wetland for farm land,36(15.7%) of the respondents required the land for grazing. 121(52.6%) needed the wetland to be a protected in the future while the 45(19.6%) wanted the land for both farm and grazing land. More than fifty percent of the households perfered the wetland to be a well protected land.The survey was in agreement with the proclaim of in Ingula that the uncertainty of how best to manage the future reserve of Wetlands (Maphisa, 2012, cited in David Hlosi Maphisa, 2015).

Table 8. Respondents Preference of Berga wetland For Future

Question items	Frequency	Percent
What is your preference of Berga wetland in the future?		
a)Farm land	28	12.2
b)Grazing land	36	15.7
c)Well protected land	121	52.6
d) Both 1and 2	45	19.6
Total	230	100

From the result obtained in Table 9, out of 230 respondents, 97(42%) of the household owners explained that repeated droughts and climatic changes could have affected these birds in study area. On contrary, 133(58%) of the respondents did not have awareness about the natural phenomenon's that influenced white WWFs in Berga Wetland.This finding is inconsistent with the investigations of John Faaorg and Richard Holmes on the impact of climate change on avian life (Cotton, 2003, Both, 2006, cited in: Jhon *et al*., 2010).

Table 9. Natural Phenomenon Influencing White Winged Flufftails Conservation

Question items	Response	
	Yes	No
	Frequency (%)	Frequency(%)
Are there any natural phenomenon's that might have influenced the presence and distribution of WWFs in Berga Wetland? Response:Climatic changes, repeated drought	97(42)	133(58)

4.2.3. Knowledge of Household Heads on Distributions of Bird

From the results indicated below in Table10, 140(61%) of the respondents have the knowledge about these birds' distributions.. They have replied that Berga,Suluta,Weserbi and Bilacha Wetlands are among the places where white winged flufftails distributed in Ethiopia. Out of 230, 90(39%) of the respondents have no awarness about places where white winged flufftails distributed in Ethiopia. In connection to this,the species of white winged flufftails have been documented in central Ethiopia highlands before intensive human pressure(Taylor,1997a).

Table 10. Respondents Perceptions About the places of White Winged Flufftails in Ethiopia

Question items	Response	
Do you know places that the white winged fluff tails found in Ethiopia? Yes, No. Ans :Berga, Bilacha, Woserbi, Sululta wetlands	Yes	No
	Frequency (%)	Frequency (%)
	140(61)	90(39)

Out of 230,85 (37%) respondents have explained that the white winged flufftails were endemic to Ethiopia. The rest,145(63%) of the respondents said that white winged flufftails were endemic (common) to Africa (Table 11). In agreement with this survey, the globally threatened white-winged flufftail was recorded in the southern African bird atlas in Mpumalanga Province, and outside South Africa. This species was also known to occur regularly only in the ecologically similar highlands of Ethiopia (Urban *et al*., 1986,cited in David G. Allan *et al*.,1996). The work done on white winged flufftails that migrated between Ethiopia and South Africa have reported similar findings (Taylor,2000).

Table 11. Knowledge About The Endemicity of White Winged Flufftails

Question items	Response	
Are WWFs endemic to Ethiopia? Yes, No. Ans: Common to Africa	Yes	No
	Frequency (%)	Frequency (%)
	85(37)	145(63)

Regarding to population trends of this bird, the result in Table 12 below shows that the respondents had different opinions. Accordingly, 84 (36.5%) of the respondents explained that population number of bird has increased. 90 (38.7%) of the participants confrimed that the number of the species has declined, while 56(24.5%) of household owners said that population status of these birds emain unchanged. The findings of the study was in

agreement with the report on perception differences of community on species richness, diversity, and abundance in the fragmented wetlands of Brazil (Guadagnin *et al*., 2005).

This survey was also went in line with the investigation done on bird migration and migratory stopover, as migration was thought to be the period of highest mortality in the annual cycle of migratory landbirds, and likely plays a major role in limiting their populations (Holmes, 2007, Johnson *et al*., 2006, Moore and Aborn 2000, Moore *et al.*, 2005).

Table 12.Knowledge of Respondents About Availability of White Winged Flufftails

Question items	Response	Frequency	%
How do you perceive the availability of white winged flufftail in Berga wet land ?	Increase	84	36.5
	Decrease	89	38.7
	No change	58	24.5
	Total	230	100

Out of 230 respondents (Table13),113 (49%) of household owners said that climatic changes or repeated droughts could have affected these birds more in the study area. 117 (51%) of respondents didn't have knowledge about factors that more affeted white winged flufftails in Berga Wetland.In connection to this, study on Ethiopian Wetland degradations,causes, consequenes and remedies showed that Climate change and recurrent droughts were threats to wetland ecosystems of the country (Matthew *et al*., 2006,EWNRA, 2008).

Table 13.Knowledge on Factors More Affecting White Winged Flufftails Distribution

Question items	Response	
Do you know which factors more affecting the WWFs in Berga Wetland? Say Yes/ no Ans(response): Drought,climatic changes	Yes	No
	Frequency (%)	Frequency(%)
	113(49)	117(51)

As indicated below(table14),out of 230 respondents,166(72%) household owners explained that raising awareness through community education, protecting cutting sedges,preventing overgrazing,preventing agircultural expansions towards Berga Wetland

and capacity building for SSG and whole people living in Wetland water shed were strategies (methods) that enabled them to prevent factors influencing these birds conservation in Berga Wetland (Eshete 2008; Mengistu 2008). A total of 64(28%) respondents didn't have a knowledge that prevent factors influencing conservation of white winged flufftails in Berga Wetland.

Table 14.Methods Used To Prevent Factors Affecting Conservation of White Winged Flufftails.

Question items	Response	
Do you know ways to prevent factor affecting WWFs in study area? Response (ans):	Yes	No
	Frequency(%)	Frequency(%)
Awarenes creation,not to cut sedges,protecting over grazing	166(72)	64(28)

From table(15) below, out of 230 household owners, 65% of the respondents have an awareness about availability or distributions of these white winged flufftails in study area while the remaining 35% of the respondents have a knowledge about the distribution ofbthese birds in the study area.

Table 15 . Respondents Perception About Distribution of White Winged Flufftails

Question items	Response	
Awareness about distribution WWFs in study area. Response : Migratory, hide in sedges, found in Berga during breeding seasons	Frequency	Percent
	149	65

As shown in Table 16, the perceptions of respondents about the presence and availability of WWFs vary. Out of the total respondents 58 (25%) of them have responded that the white winged flufftails occurred in Berga Wetland throughout the year, 61(26%) of participants indicated the presence of the birds in the study area and stayed twice in a year. Respondents 111(49%) exactly addressed that the white winged flufftails were stayed in Berga Wetland starting from the end of June to the end of September. In connection to this,

former studies have indicated that the egg laying and nest building WWFs take place in Ethiopia during long rains (Taylor 1994, cited in De Smidt *et al*.,2008).

Table 16.Knowledge About The Availability of White Winged Flufftails

Question item s	Response	Frequency	Percent
What is your awareness about the availability of WWFs in Berga?	a)Through out the year in wetland	58	25
	bTtwice in a year in Berga wetland	61	26
	c) From the end of June –end of September	111	49
	Total	230	100

4.3. Stakeholders Who Concerned About Distributions of Sarothrura

In respect to the knowledge on the involvment of stakeholders in the conservation of WWFs, 125(54.5%) of the respondents confirmed that government, local communities, district Authorities, Ethiopian Wild Life Natural history Society (EWNHS) (locally called Warra hadha Sinbirro) were stakeholders that are responsible about the conservation and ecology of white winged flufftails in Berga Wetland. This result was in agreement with the investigation of communty awarness on conservation and the different actors that have stakes at the national level (Tefesse,2008). From personal communication and published documents, there are various stakeholders at different for conservations of white winged.

Table 17.Respondents Knowledge About Stakesholders of *Sarothrura* Distributions

Question items	Response	
Stakeholders about distributions of WWFs.Ans:Local community, NGOS, EWNHS were the sakeholders of WWFs	Frequency	Percent
	125	54.5

4.3.1. Types of Food Consumed By White Winged Flufftails

The type of food consumed by the bird has been recognized by respondents. Based on the information obtaind in Table 18, 155(67%) of the participants confrimed that earthworms, insects,grasses,spiders, insects and other wetland creatures were food items that could be consumed by white winged flufftails. Similar studies on Migratory Stopover of Songbirds in the Western Lake Erie Basin showed that Wetlands in the study area support high concentrations of emergent aquatic midges (Diptera: Chironomidae) (Urban *et al.,* 2005, MacDade *et al*., 2011), which were considered an important food resource to migrating birds in the Great Lakes region, particularly in spring (Ewert *et al*., 2011, Smith *et al*., 2007, cited in: Patrick Lyon Johnson ,2013). On the other hand,75(33%) of the respondents did not have a knowledge about food items of white winged flufftails in Berga Wetland

Table 18. Respondents' Suggestion To Foods Consumed By White Winged Flufftails

Question items	Response	
Do you have an information's about foods eaten by WWF? Ans :Insects,earthwors,tiny grassses, and others	Yes	No
	Frequency (%)	Frequency (%)
	155(67)	75(33)

4. 3.2. Population Census of White Winged Flufftails at Berga Wetland

Population estimation was conducted by undertaking extensive field surveys using binacular microscopes and cultural methods. The white winged flufftails were counted at Berga Wetland during the breeding season for ten consequetive days. This census was carried out with the assistance of wetland guards assinged from the four kebeles surrounding Berga Wetland. Since the white winged flufftails were shy birds and hide themselves in the long grrasses such as sedges, it was very difficult going to see and count them. For this reason, searching here and there by colliding or hitting stick with water containers (highlands), then the birds were flushed quickly around 50metrs away from the observers, landed, hided and went zig zug in very long grasses. So, when they were flushed,estimations of counting has taken place.

The number of white winged flufftails counted over the ten days was indicated in Table 19. Totally five birds of the species were estimately counted. This estimations were confirming that the number of white winged flufftails in the wet land has declined greatly as compared to the reports presented to the former censuses. As can be seen from the Table19, on day 24, 26, 27, and 28 no white winged flufftail was observed in the area.

Table 19.Numbers of White Winged Flufftails Counted By Researcher

Census Days	Census time	Morning	After noon	Total white winged flufftails
17/9/2016	12:00-4:00	2 adult white winged flufftais	-	2
21/9/2016	12:00-4:00	1adult white winged flufftail	-	1
22/9/2016	9:00-12:00		1WWFs	1
23/9/2016	12:30-4:00	2 adult WWFs		2
23/9/2016	9:00-12:00	-	-	
24/9/2016	12:30-3:00	-	-	
24/2016	9:00-12:00	-	-	
26/9/2016	9:30-12:00	-	-	
27/9/2016	9:00-12:00	-	-	
28/9/2009	9: 00-12:00	-	-	5 Total adult birds

(Source: Researcher Field Survey**)**

Regarding to population sizes of *Sarothrura ayresi* at national level (table 20), WPE3, WPE4, WPE5 (White Winged Population Estimation three, four and five) clearly indicated that the population numbers of WWFS had been declined. Similarly, CSR4, CSR5 (Central Statistics Report four and five) showed that the population trends of white winged flufftails were decreased while during CSR6 the population trends of these birds at national level were unknown. The trend qualities during WPE3 and WPE4were unkown,but in 1990 and 2000 seems to declined. The survey on population census of WWFs carried out by investigator was went in line with this former resports done by other researchers on *Sarothrura ayres.*

Table 20. Report On Population Trends of White Winged Flufftails At National Level

publication	Start year	End year	Trend	Trend quality	Refrence
WPE3	1990	2000	Decrease		[R68]
WPE4	1995	2005	Decrease		[R64]
WPE5	1990	2000	Decrease	Resemble	[R68]
CSR4	1990	2000	Decrease	Resemble	[R68]
CSR5	1990	2000	Decrease	Resemble	[R68]
CSR6	2003	2012	Unkown	No idea	

Source :Collar & Stuart (1985).

As far as the maximum and minimum numbers of white winged flufftails were concerned (table 21), starting from white winged population estimation one(WPE1,WPE2) and two in 1984, the minimum numbers were one and maximum numbers were 1000. At WPE3 and WPE4, the minimum numbers were increased but, the maximum numbers were declined.

Table 21.Maximum And Minimum Numbers of White Winged Flufftails Recorded

Publication	Start year	End year	Min	Max	Reference
WPE1	1984	1984	1	1000	[R68]
WPE2	1984	1984	1	1000	[R137]
WPE4	1990	2000	450	650	[R68]
WPE3	1999	1999	630	645	[R68]
WPE4	2005	2005	450	650	[R64]

(Source :Collar & Stuart (1985).

As it was observed clearly from the table (22), starting from population estimations(WPE-CSR) up to central statistics reports, the population numbers of white winged flufftails had been decreased in percentages. Based on this and other investigations done on migratory water and wetland bird *(* Sarothrura ayresi) , their numbers had declined. Unless immediate solutions hadn't taken, these rarest birds were on the of extinctions. So that, the survey done on white winged flufftails at Berga wetland was in agreement with those reports.

Table 22.Population of White Winged Flufftails By % Level

Publication	Year Set	Percent
WPE1	1994	10
WPE2	1997	10
WPE3	2002	6
WPE3	2006	6
WPE5	2012	5
CSR4	0	-1
CSR5	0	-1

Source :Collar & Stuart (1985).

4.3.3. Knowledge of Focus Group Discussions on Ecology

From the participants involved in FGD (table 23), 75% of the respondents have an awareness about the ecological interactions of white winged flufftails while the remaining 25% lack an information's about WWFs ecological interactions and statitically it was not significant because the p-value was greater than 0.05(p=1.000, table,24). Regarding to feeding items, 50% of the respondent's have a knowledge while the rest 50% have not any idea regarding to foods consumed by these birds in studay area. Again ,the result of calculated p-value on table,24 clearly indicated that it was not significant because the p-value was > 0.05(p=1.000). As far as other behaviours concerned, 25% of the respondents in the discussions were replied that they could have been seen the birds at any time. 50% of them said that they could have seen the birds better at flights and have more awareness while the rest 25% answered that the birds could seen at rest time in the long grasses or sedges were respondents who lack the knowledge and it was insiginficant because the p-value was >0.05 (p=1.000) because there was no significant variations among the the focus group discussants. This finding was also in agreement with the other survey because these birds could be seen better at fights than at rest time.

Table 23. Perceptions of Respondents on Ecology and Food Types of *Sarothrura ayresi*

Do you have any information about ecology of WWFs? Yes or no Ans:Have interactions with env't,other organisms and themselves.	Response	
	Yes	No
	Frequency (%)	Frequency(%)
	3(75)	1(25)
Any information about foods of these birds. Ans: Earthworms,insects, small fishes	Yes	No
	Frequency (%)	F requency(%)
	2(50)	2(50)
At what time can you them better?	Frequency	%
a) At any time	1	25
b) At flight	2	50
c) At rest time	1	25
Total	4	100

Table 24 .Chi square and P- value of Question Items

Question items	Chi square	P-value
How do these WWFs interacted?	1.530E2[a]	.000
Is there any protection done for WWFS?	40.916[a]	.000
What was your awareness about wise use of WWFs?	87.9640[a]	.000
Do you know any factors affecting WWFs?	75.849[a]	.000
Question Items For FGD	Chi square	P-value
Do you know any awareness about WWFs in study area?	4.000[a]	1.000[b]
Any informations about feeding items of WWFs.	4.000[a]	1.000[b]
At what time could you see this bird better?	8.000[a]	1.000[b]

For the chi square tests, the values 36.837[a], 1.530E[a],40.916[a],87.964[a],75.849[a] were statistically significant at p-value less than 0.05 (p=.000). That means, there was a variation between those have a knowledge and those who didn't' have a perception about the WWFs in the study area. That means, 95% of the work has the acceptance value. On contrary, the chi square tests for FGDS 4.000[a], and 8.000[a] were statistically significant to that of 1.000[b] because there was a difference between the two values. Since the p- values for FGDS were greater than that of 0.05,it showed that it was not statistically significant and there was no variations between the respondents' knowledge involved in the FGDS(p=1.000).

5. SUMMARY, CONCLUSIONS AND RECOMMENDATION

5.1. Summary

The study was aimed at assessing community awareness about ecology, conservation, and distribution of WWFs at Berga wetland. It was carried out in Adea Berga district, West Showa Zone. Four Kebeles around the watershed areas of the wetland were purposively selected from the 36 kebeles of the district. A total of 230 household owners were used as the respondents for questionnaire surveys. The selection of study participants were based on discussions with village heads on the willingness of participants to involve in FGD and questionnaire survey. Focus group discussions were held by using 37 household owners from the four Kebeles.

The number of WWFs present during breeding period was counted by undertaking extensive field surveys from September 17 to 28. More than half percent of the respondents had awareness about the white winged flufftails in Berga wetland but, more than 40% of the household owners had no awareness about those birds in the study area.

Around fifty percents of the household heads had awareness about the general behaviors of the Sarothrura-ayresi and they explained that the birds hided themselves in the breeding sites in the long grasses and flooded marsh area. More than fifty percents of the respondents had awareness how to keep the bird's habitat from habitat loss, but no implementations that had been done practically. Still, the wetland was excessively

Respondents had awareness about the wise use of birds or *Sarothrura ayresi*, but the wetland was degraded due to over grazing and human interferences. In Ethiopia, white winged flufftails were found in Berga, Sululta, Bilacha and Weserbi wetlands and they were not endemic to Ethiopia, but endemic to Africa. *Sarothrura ayresi* had been also found in South Africa, Zambia and Zimbabwe.Various factors that have contributed for the decline of WWFs habitat loss by anthropogenic and natural events. Different agencies or stakeholders at local, regional and federal governments concerned about the ecology, conservation and distributions of *Sarothrura ayresi*. For instance, Berga Site Supporting Group, local communities, District Agricultural and Rural Development, Administrative ,

EWNHS, etc. Even though many agencies had responsibility about this Critically Endangered wetland migratory birds, different factors have been affected the birds and their habitats.

White winged flufftails were mainly used Berga Wetland as the main breeding places starting from the July to the end of September. The white winged flufftails lived dominant long grasses such as sedges and difficult to watch the birds as the birds hided themselves and very shy in behaviors. Regarding to feeding habits, these *Sarothrura ayresi* fed on various creatures such as earth worms, crustaceans, small, fishes, Lipedio-petra, Colliopetra, and small vegetations

The dependent variables were community awareness and independent ones were educational levels, sexes, ages, marital status, religions and so on. Video camera, GPS, note books, pens had been used as an instruments of data collections. The respondents' suggestion had been analyzed by using SPSS statistical soft ware Vesion-16. Questionnaire surveys, focus group discussions and extensive field surveys of population census of white winged flufftails were data collection instruments.

5.2. Conclusion

Sarothrura ayresi were migratory and prefer wetlands. They were critically endangered endemic birds of Africa. Respondents had awareness about the wise use of WWFs; nevertheless the wetland was degraded due to over grazing and human interferences. The population of WWFs at present demonstrates that migratory wetland birds had been declined .The Conservation of WWFs and their wetland habitat demands joint action by engaging different stakeholders at the district, zonal, regional and federal levels.

5.3. Recommendation

The WWFs and the wetland provide means of livelihood for the community living in the watershed areas of Berga wetland. In order to minimize the threats of WWFs and to enable the sustainable use of biodiversities, the following recommendations can be addressed.

- Enhancing community awareness about the need for conservation of WWFs and the wetland through media and in public gatherings at regular bases.
- Train more technical personnel in ecologically based management practices periodically.
- To undertake subsequent survey to examine changes in the awareness and perception of the community inhabiting the watershed areas of Berga wetland.
- Enhancing participatory conservation practices of WWFs and their habitat by engaging the community at large.
- Establishing laws that ban human disturbances or interferences from the wetland.
- The avifauna resource of the study area was facing various anthropogenic and natural factors, which could be led the bird to decline.
- Therefore, to conserve Berga wetland bird under the study in a proactive and sustainable way; there was a need for government to involve the local residents, knowledgeable individuals (indigenous knowledge), NGOs and other stakeholders at different levels continuously
- Encouraging research on the biology, ecology, and distribution of migratory birds such as WWFs in their habitat.
- So, it was strongly recommended that the various stakeholders together with the local communities should have to work and conduct research on (wetlands)

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7. APPENDICES

Appendix 1. Household Survey Questionnaires

Instruction

1.This questionnaire refers to the household (HH) and should be administered with the head of household, male or female

2 The purpose of the questionnaire or interview is to identify community awareness about ecology, conservation and distribution of white winged flufftails at Berga Wetland. The opinion of the respondents on community awareness about ecology, conservation and distribution of Sarothrura ayresi will help to draw a picture on the knowledge and awareness of the community and draw conclusions and proposed possible recommendation.

3. All information given will be held confidential and will be used for academic purpose.

I: General Information

1. **Enumerator**

1.1. Name of the enumerator:

1.2. Signature of the enumerator ensuring completeness of the questionnaires and correctness.

Sign _____
Date_____

II) Identification of the respondent / household characteristics

2.1. Zone: _____2.2. District: _____2.3. Locality (kebele):_____

2.4. Name of the household head (respondents) or code: _____

2.5. Age of the respondent (years) :_____2.6. Sex of the respondent: (√)

1. Male 2. Female

2.7. Educational level completed by respondents (√)

1. No formal education 2 .1st cycle (1-4 grade) 3. 2nd cycle (5- 8 grade)

4. High school (9_10 grade 5. Completed preparatory 6 .Certificate

7. Diploma 8. Degree

2.8. Current marital status of the respondent (√)

1. Married 2.Unmarried 3.Divorce 4. Widowed

2.9. Religion of the respondent (√)

1. Orthodox 2. Islam 3. Protestant 4. Catholic 5.Others

2.10. What is your major occupation A. Farmer B. Merchant

C. At present_____

2.11 How long did you live in this place? _____ Years

2.12. Family size of the household

Age	Male	Female	Total
15-30			
31-64			
Greater than 64 (64+)			

III). **Community awareness about ecology of white winged flufftails**

3. What do you know about white winged fluff tails interactions with other birds in Berga
Wetland**?**_____
_____
_____
_____
_____

3.1 Do you have any awareness about white winged flufftails at Berga Wetland**?**

Yes ☐ No ☐ If yes, generate your ideas about interactions of the white winged flufftails with other living things and their environments in Berga Wetland.

_____
_____
_____

_____
_____

3.2 How do these *Sarothrura ayresi* interact with other living things in the wetland?

a) Freely living with other living things

b) Hiding themselves in the sedges in breeding seasons

c) No interactions with other organisms

IV). Community awareness about conservation of white winged flufftails at Berga Wetland

3.3 Is there any protection for white winged flufftails in Berga Wetland? Yes ☐ No ☐

If yes, is there any role played by you to keep the birds in the wetland?

_____
_____
_____
_____
_____

3.3 At moment, your awareness about the wise use of white winged fluff tails at Berga Wetland:

a) No awareness b) Low awareness c) Medium awareness d) High awareness

3.4 What benefits do the white winged flufftails provide to you?

_____
_____
_____
_____
_____

3.5 Do you know any factors that influence the conservation of white winged flufftails in Berga Wetland? Yes, No

If yes, give your opinions.

_____
_____

_____
_____
_____

3.6 In the area of BergaWetland ,what is your preference the Wetland to be in the future?

a) Farming land b) Grazing land c) Well protected land d) Farming and grazing

3.7 Are there any natural phenomenon that might influence conservation of white winged fluff tails in Berga Wetland? Yes, No If yes, generate your idea about it.

_____
_____
_____
_____
_____

V) Community awareness about distribution white winged fluff tails in the Berga Wetland

3.8 Do you know any places that the white winged fluff tails distributed in Ethiopia? Yes, No

3.9 If the answer for question number 3.8 is yes, list the names of wetlands at which the birds found in
Ethiopia?_____
_____
_____
_____
_____

4.0 Do you think the winged fluff tails are endemic to Ethiopia? Yes, No

4.1 If the answer for question number 4.0 is no, name the countries in which fluff tails found._____
_____
_____

4.2 How do you perceive the availability of white winged flufftails in Berga Wetland?

a) Increase b) decrease c) Show no change

4.3 If the answer for question number 4.2 is decrease, please reason out why.

_____
_____

_____
_____

4.4 As your opinions, which factors more affect white winged flufftails in Berga Wetland? Say

Yes, No. if yes, justify your
answers._____
_____

4.5 Do you know methods that might enable you to overcome that influence these birds distribution in Berga Wetland? Yes/No. If yes, give your ideas
clearly._____
_____

4.6 Any awareness that you have about the distribution of white winged flufftails in Berga
Wetland._____
_____

4.7What is your awareness about the availability of fluff tails in the Wetland?

a) Throughout the year in the wetland b) Twice in a year in Berga Wetland

c) From the end of June to the end of September

4.8 In your opinion, who are responsible about the distributions of white winged flufftailsinBergaWetland_____
_____
_____?

4.9 The general behavior of white winged flufftails. List if there is
any._____
_____

5. Do you have any information's about the foods consumed by these birds? NO, YES. If yes, mention the types of food that these birds feed.
_____
_____

Thank you in advance for your cooperation

By Fikadu Gutema Balcha

Appendix 2. Questionnaires for Focus Group Discussions

Instruction

1. These questionnaires were presented for focus group discussions

2 The purpose of the questionnaire or interview is to identify community awareness about ecology, conservation and distribution of white winged flufftails at Berga Wetland. The opinion of the respondents on how the community awareness about ecology, conservation and distribution of white winged flufftails at Berga Wetland give will help to draw conclusions and recommendations for the study.

3. All information given will be held confidential and will be used for academic purpose.

I: General Information

1. **Enumerator**

1.1. Name of the enumerator:

1.2. Signature of the enumerator ensuring completeness of the questionnaires and correctness.

Sign _____
Date_____

II) Identification of the respondents or household characteristics

2.1. Zone: _____2.2. District: _____2.3. Locality (kebele):_____

2.4. Name of the household head (respondents) or code_____
_____

2.5. Age of the respondent (years) :_____

2.6. Sex of the respondent: (√) 1. Male 2. Female

1. Do you have any awareness about the ecology of white winged flufftails at Berga Wetland**?**

Yes ☐ No ☐

If yes, generate your ideas about interactions of the white winged flufftails with other birds in Berga Wetland with your focus group discussions.

_____
_____
_____

2. In group, describe if there are any protections done for these waterfowls.

_____
_____
_____

3. In your focus group discussions, generate an ideas about the distributions of white winged flufftails in Berga Wetland

_____
_____
_____

4. The general behavior of white winged flufftails. List if there are any_____
_____
_____

5. Do you have any information's about the food consumed by these birds? NO⁄YES

If yes, mention the types of food that these birds feed._____
_____
_____

6. At what time can the white winged flufftails be seen better?

A) At any time B) At flight C) At rest time

Thank You in advance for Your Cooperation

By :Fikadu Gutema Balcha

Appendix 3. List of tables

Table 1.Names of Data Collectors

Names of Data Collector	Educational Levels	Kebeles they covered	No.of days they collected Data	Amt of Birr/day paid	Total Amt of Birr paid	Profession	Total Interviewer They Interviewed
Diriba Defar	Degree	Meru Chobot	5	149	745	Teacher	119
Bizueyehu Mokonnen	Degree	Kitto	5	149	745	Teacher	61
Kenni Ayele	Degree	Meru Chobot	5	149	745	Teacher	
Kuma Bededa	Degree	Kitto	5	149	745	Teacher	
Megersa Dibaba	Dgree	Eteya	5	149	745	Teacher	28
Mamo Dejene	Degree	Sire Berga	5	149	745	Teacher	22
Total Birr paid for Six Data Collectors					4470		230(n)

Appendix 4. List of Figures

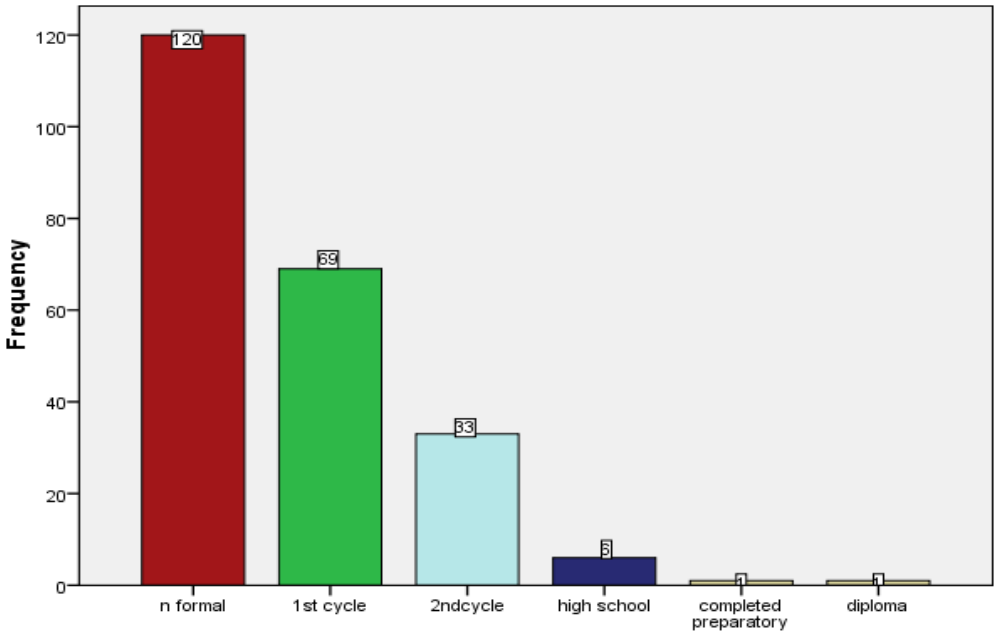

Figure 1.Educational Level of Respondents

Figure 2. Focus Group Discussion in Sire Berga Kebeke

Figure 3. Focus Group Discussion in Meru Chobot Kebele

Figure 4. When Survey Carried Out With Meru Chobot Kebele Chairman

Figure 5.When Survey Carried Out With Berga Site Supporting Group

Figure 6. Focus Group Discussion in Kitto Kebele

Figure 7. Orientation of Data Collectors

Figure 8.Threats To Sarothrura ayresi Through Expansion of Agriculture's

Figure 9. Grazing Cattle's Deteriorated Breeding Sites of Sarothrura ayresi

Figure 10. When a Researcher Carrying out Census of Sarothrura ayresi

Figure 11.White Winged Flufftails Habitat

Figure 12.When a Resident Deteriorated Breeding Site of *Sarothrura ayresi*

Appendix 5. Lists of stake holders for white winged flufftails at different levels

4.5.3 Stake holders at District Levels for Ecology, Conservation and Distributions of White Winged Flufftails At Berga Wetland

4.5.3.1 Stakeholders at District Level

Adea berga was located in West Shoa and Enchine town was the capital citythat far 5km from Berga wetland. Adea Berga district Agricultural and Rural Development (ARD) with Berga Site Supporting Group (SSG) voluntory association teams were responsible for protection and conservation of natural resources in the district via raising awareness and their importance roles inrelation to the provisions of environmental services by community educations. This stakeholder had helped the SSG and local communities through capacity buildings in training some times and supplying various types of seedlings for plantations for themselves and increase their incomes as well as encoraging the voluntory SSG and local people on how to use the Berga wetland to conserve the habitat of white winged flufftails and guided by development agent in each kebele (Personal Communication With Team Leader of natural resource protections,2007,cited in Tefesse,2008)

Through consultation and full involvement of all concerned stakeholders to identify wetlands that need immediate conservation actions is important.The process helps to target limited resources or options for conservation to those wetlands in most urgent need of conservation attention wetlands such as Berga floodplains,in other words there was urgent need corservations of *Sarothrura ayresi* via participations of stakeholders including local people (Mengistu,2000, cited Hagos Gebresillasie,in 2014)

4.5.3.2 Stakeholders At Regional Level

4.5.3.2.1 Oromia Environmental Protection Office

Oromia Environmental Protection Office (OEPO) authority was responsible to environmental protection,involving in pollution control and environmental factor assessments that has a disaster effeect on our environments and biodiversities.

4.5.3.2.2 Oromia Agricultural And Rural Development Bureau(OARDB)

This was the highest governmental authority where the different flora and fauna of the regions had administered under. The organisation has the responsiblities managing wildlife conservations and controlling wetlands including Berga Wetland as an Important Bird Area (IBA)

4.6. Stakeholders at National Level

4.6.1 Institute of Biodiversity Conservation(IBCR) and Research

The institue has a responsibility to implement the international convention agreements and obligations on issuses related to the various biodiversity conservations. The main objective of the IBCR was to promote conservation of natural or biological resources of the country(htt//:www.ibc.et.org/?page id=4,cited in Tefesse,2008).

4.6.2 Ethiopian Wildlife Conservation Organisation (EWCO)

The institute was responsible for the protections of natural resources and wildlie consevations of the country. The Ethiopian Wildlife Conservation Organisation directly had the duty for the establisment, adminisrations,managements of National Parks,Sanctuaries and Wildlife reserves (htt://www.parks.it/ world/ET/Eindex.html, cited in Tefesse,2008).

4.6.3 Environmental Protection Authority (EPA)

The main activity of the Environmental Protection Authority was co-ordinating and regulating tasks relating to environmental management, policies, strategies laws and standards including guidelines and procedures, ensuring the effectiveness of their implementations, perform investigations related with environmental protections and wildlife ecology, conservations and their distributions

4.6.4 Ethiopian Wildlife Natural History Society (EWNHS)

The institue had established since 1966 with the aim of disemination information and create an awareness about the need of conservation and wise use of natural resources and environments ensuring conservation and protections of biodiversities. The organisation was also a birdlife partner with Birdlife International and targeting at enhancing the quality for birds and wildlife for all country community.

4.7 Ethiopian Wildlife Association (EWA)

The Ethiopian Wildlife Association (EWA was established in January,2003 as an administration. It was assisted concerned institutions,NGOS,private sector organisationand the local people in conservations and sustainable utilisations of the country biodiversities specifically wildlife (EWA,2007,cited in Tefesse,2008).

The overall objective of the institute was to develop wetland management,resource and training capacity, wise use of wetlands,and developing awareness and skills for sustainable management and conservations of wetlands and their resources (htt://wetlasnds.hud.ac/ewnra, cited in Tefesse,2008).