Survey of avifaunal pest in oracle rice farm in Makurdi, Benue state, Nigeria

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ABSTRACT
A study of the Avifaunal pests of Oracle Rice Farm, Makurdi, Benue State Nigeria was undertaken. Reconnaissance was carried out in the paddy plots and from these point stations were randomly selected. Bird survey was conducted using point count technique. A total of 20 point stations were marked and each placed a minimum of 50 m apart to minimize double counting of birds. A total of 1,772 individual Avifauna pests made up of 10 species and belonging to six families were recorded. Mean abundance of Avifauna pests of rice (109.3) in the morning was significantly higher than in the evening (67.9). Rufous grass warbler (*Cisticola galactotes*) was the most abundant avian pest in both morning (265) and evening (479) while the least was grey plantain eater in the morning (2) and evening (0). Other avian pests observed include the Bronze mannikin, Double-spurred Francolin, Red bishop, Pin-tailed Whydah, Senegal parrot, Laughing doves and Village weaver All the birds except Grey plantain eater consumes rice both in the morning and evening when available. It can be concluded from this study that Rufous grass warbler, Bronze mannikin and Village weaver are predominantly present at Oracle Rice Farm in Benue State. These birds pose a serious threat to the rice. There is a great need to find sustainable solutions to reduce or eliminate these pestilence birds so as to reduce the level of damages done in the farm. It is also important to introduce current control methods used in developed countries and adopt suitable ones for local use at Oracle Rice Farm.

Keywords: Avifauna, rice farm, pest, oracle

INTRODUCTION
Avifauna are unique considering their importance in the ecosystem, food source, and inspiration for several aspects of human art across culture and ethnicity (Basu, 2015). Bibby (1999) noted that Avifauna are the most reliable indicators of biological richness and environmental conditions. As reported by Basu (2015), different species of Avifauna have successfully adapted to different ecosystems in all the cities, towns and rural areas. Abundance of Avifauna species is largely influenced by the distribution of some key environmental factors within their habitat (McCain, 2009). Environmental factors such as elevation, rainfall and slope determine the vegetation components and structure which affects avifauna species and abundance (Waterhouse *et al.,* 2002). Thomas (1979) described habitat as the resources and conditions present in an area that produce occupancy, including survival and reproduction. According to Odun and Barrett (2004), habitat contains all the resources and conditions influencing the survival and reproduction of resident wildlife. It was mentioned that the relationship between animals and their habitat is a central component of wildlife ecology (Morrison *et al.,* 2006). According to Morrison *et al.*

(2006), it can be concluded that for the sustenance of holistic ecosystem integrity, positive relationship and good knowledge of other biological resources in the ecosystem by man is crucial.

Rice (*Oryza glaberinima*) is indigenous to Nigeria and has been in cultivation for the past 3500 years. The earliest cultivation of improved rice varieties (*Oryza sativa* L) started in 1890 with the introduction of upland varieties to the high forest zone in Western Nigeria. By 1960, *O. sativa* had taken the pride of place over *Oryza glaberrima* which is now limited to some deep flood plains of Sokoto Rima River Basin and other isolated pockets of deep swamps all over the country. Active and systematic rice research started in Nigeria in 1953 with the establishment of the then Federal Rice Station at Badeggi, Niger State, now the headquarters of the National Cereals Research Institute. However, improved technologies to meet rice production needs of Nigeria focus heavily on the side of variety improvement, germplasm collection and conservation, and not only the techniques that release women and children in scaring birds in the farms. This has found expression in the continued use of women and children in rice fields as bird scarers.

Controlling pest or nuisance birds is more difficult than any other pest, insect or animal known to man (www.kingtrog.com.all). According to Gallagher *et al.* (2002) birds can be very damaging to rice especially when they occur in large flocks. During the ripening period of rice in Northeast Asia, some fields are protected by being covered with bird nets which are widely available. In both Asia and Africa various forms of bird scaring techniques are employed to keep birds out of rice fields. While reflective ribbons or used video or cassette tape are widely utilized for birds scaring in Asia,

people shouting or hurling dried mud and other stones at the birds is common in Africa. In Nigeria in particular women and children involved in bird pest control. Sound cannons and owl or hawk look-alike are used in developed countries. The relative ease of scaring birds depends on the following three attributes they are found in: Roosting birds are easy to scare. Birds roost in a particular location out of habit. When this habit is broken the problem is solved.

Feeding birds are difficult to scare. This is because any attempt at scaring is an attempt at denying them their source of feeding. Nesting birds are impossible to scare (Ellliot, 1989). The reason is that their mothering instinct is so strong that they defiantly return to the nesting site. However, birds can be stopped from selecting a site in the first place. Bird populations especially pest birds are increasing (www.Kingtrog.comm.all). Bird damage is getting worse.

On a global scale, only a handful of birds are serious pests of cereal crops. Birds can become serious pests when large flocks migrate seasonally and concentrate in large populations. In a review of literature, Manikowski (1984) lists 36 bird species as 'pest' among the approximately 1390 bird species in West Africa (Van Perlo, 2002). The most serious destructive species are; Spur-winged Goose (*Plectropterus gambensis*), Knob-billed Goose (*Sarkidiornis melanotos*), Village Weaver (*Ploceus cucullatus*), Black-headed Weaver (*Ploceus melanocephalus*), Red-billed Quelea (*Quelea quelea*), Red-headed Quelea (*Q. erythrops*) and Golden Sparrow (*Passer luteus*) (Van Perlo, 2002).

More background information on granivorous pest birds in sub-Saharan Africa (their identification, biology and feeding habits) is provided by Allen (1997). Red-

billed Quelea is one of the most notorious pest bird species in the world, injurious to various cereal crops such as rice, millet, sorghum and wheat (FAO, 1991). It occurs throughout sub-Saharan Africa. It gathers in flocks of several million birds and breeds in colonies that can cover more than 100 hectares (with about 30,000 nests per hectare). It is considered the most numerous bird worldwide with population numbers totaling about 1.5 billion at the end of the breeding season (Elliott, 1989). Red-billed Quelea has been studied extensively and there are many publications describing its pest status and control strategies in African agriculture (Oschadleus, 2001).This study was conducted to identify the the Avifauna pest species in Oracle farm located in Makurdi Local Government Area of Benue state, Nigeria.

MATERIALS AND METHODS

Study Areas

The study was conducted in Oracle Rice Farm Makurdi, Benue State. Benue state is predominantly an agrarian State with over 60% of its labour force deriving their income from farming. Makurdi is located between latitude $7^0 44'$N and longitude $8^0 21'$E in the Guinea Savanna Zone of West Africa. The area has an annual rainfall season of between 6 - 8 months (March - October) ranging from 508 to 1016mm with minimum and maximum temperatures of 22.8^0C and maximum temperature of 40.03^0C respectively. The relative humidity ranges between 37.3 % and 59.2% (Tactical Air Command, 2011). The natural vegetation is the high forest, composed of many varieties of hardwood timber such as *Melicia excelsa, Antaris africana, Terminalia superba, Lophira procera and Symphonia globulifera.* In the northern districts, the vegetation consists of woody savanna featuring such tree species as *Blighia sapida* (Sunshine Liberation Forum, 2011).

Data Collection

A portion of the farm measuring up to 2000 meters square was demarcated using 50 meters tape, a total of 40 plots were observed in the morning and evening leaving a distance of 50 meters from each plot to minimized possible double counting according to (Borchers *et al.,*1998). Instruments used includes 10 x 50 binocular, camera, measuring tape, field guide "Birds of west Africa" by Serle *et al.,* (1992)

A reconnaissance survey was carried out to mark locations in the paddy plots and from this the number of point stations were deduced. A total of 20 points were randomly chosen in respective paddy plots.

Bird counts were performed using Point Count Method (PCM) as described by Gregory *et al.* (2004). A wait period of 2 minutes was observed at the station before commencement of daily count to avoid bird scare. A 10 x 50 binocular was used to sight and identify all birds seen and heard within 30-meters radius plot, and counts were recorded for a period of 8 minutes. Serle *et al.* (1992) field guide of birds of Western Africa was used to confirm identifications. Two observers were involved in the survey. The observation began at 0700 hour until 1900 hour, with 45 minutes time interval and 15 minutes breaks to avoid continuous data collection. Points selected were at least 50 meters plot apart to avoid double counting (Gregory *et al.*, 2004). The data recorded were for bird species abundance.

Double counting was avoided by careful observation especially on flying birds over the census area. However, same individual birds recorded at subsequent points were treated as different individuals. Each species is identified as a member of a specific feeding guild, following Zakaria and Rajpar (2010).

Data obtained were analyzed descriptively using General Linear Model and presented in

tables and bar charts. The software package R version 3.2.2 (R development core team (2014) was used for statistical analyses.

RESULTS

The result of Avifaunal pest species in Oracle Rice Farm are presented in Table 1 and 2, while the frequency of pest occurrence are presented in Figures 1 and 2. A total of 1, 772 individuals made up of 10 Avifauna pest species of rice belonging to six families were recorded. Mean abundance of Avifauna pests of rice (109.3) in the morning was significantly higher than evening (67.9). Rufous grass warbler (*Cisticola galactotes*) was the most abundant avian pest in both morning (469) and evening (280) while the least was grey plantain eater.

Table 1: Bird species and abundance identified during morning observation in Oracle Rice farm Makurdi

S/N	COMMON NAME	SCIENTIFIC NAME	FAMILY	FREQUENCY	%
1.	Bronze mannikin	*Lochura cuculltus*	Estridae	210	19.2
2.	Senegal parrot	*Poicephalus senegalus*	Psittacidae	85	7.8
3.	Double spurred francolin	*Francolinus bicalcaratus*	Phansianidae	44	4.0
4.	Laughing Dove	*Streptopelia senegalensis*	Columbidae	8	0.7
5.	Grey plantain Eater	*Crinifer piscator*		2	0.2
6.	Rufous grass warbler	*Cistocola galactotes*	Sylviidae	469	43.0
7.	Village weaver	*Ploceus cuculatus*	Ploceidae	198	18.1
8.	Red Bishop	*Eupletes oria*	Ploceidae	26	2.4
9.	Pin-Tailed whydah	*Vidua macroura*	Ploceidae	19	1.7
10.	Rufous cane warbler	*Acrocephallus rufesens*	Sylviidae	32	2.9
	TOTALS			1,093	100

Source: Field survey, 2019

Table 2: Bird species and abundance identified during evening observation in Oracle Rice farm Makurdi

| S/N	COMMON NAME	SCIENTIFIC NAME	FAMILY	FREQUENCY	%
1.	Bronze mannikin	*Lochura cuculltus*	Estridae	135	19.9
2.	Senegal parrot	*Poicephalus senegalus*	Psittacidae	63	9.3
3.	Double spurred francolin	*Francolinus bicalcaratus*	Phansianidae	19	2.8
4.	Laughing Dove	Streptopelia senegalensis	Columbidae	13	1.9
5.	Grey plantain Eater	*Crinifer piscator*		-	0.0
6.	Rufous grass warbler	*Cistocola galactotes*	Sylviidae	280	41.2
7.	Village weaver	*Ploceus cuculatus*	Ploceidae	96	14.1
8.	Red Bishop	*Eupletes oria*	Ploceidae	26	3.8
9.	Pin-Tailed whydah	*Vidua macroura*	Ploceidae	21	2.2
10.	Rufuos cane warbler	*Acrocephallus rufesens*	Sylviidae	26	2.8
	TOTALS			679	100

Source: Field survey, 2019
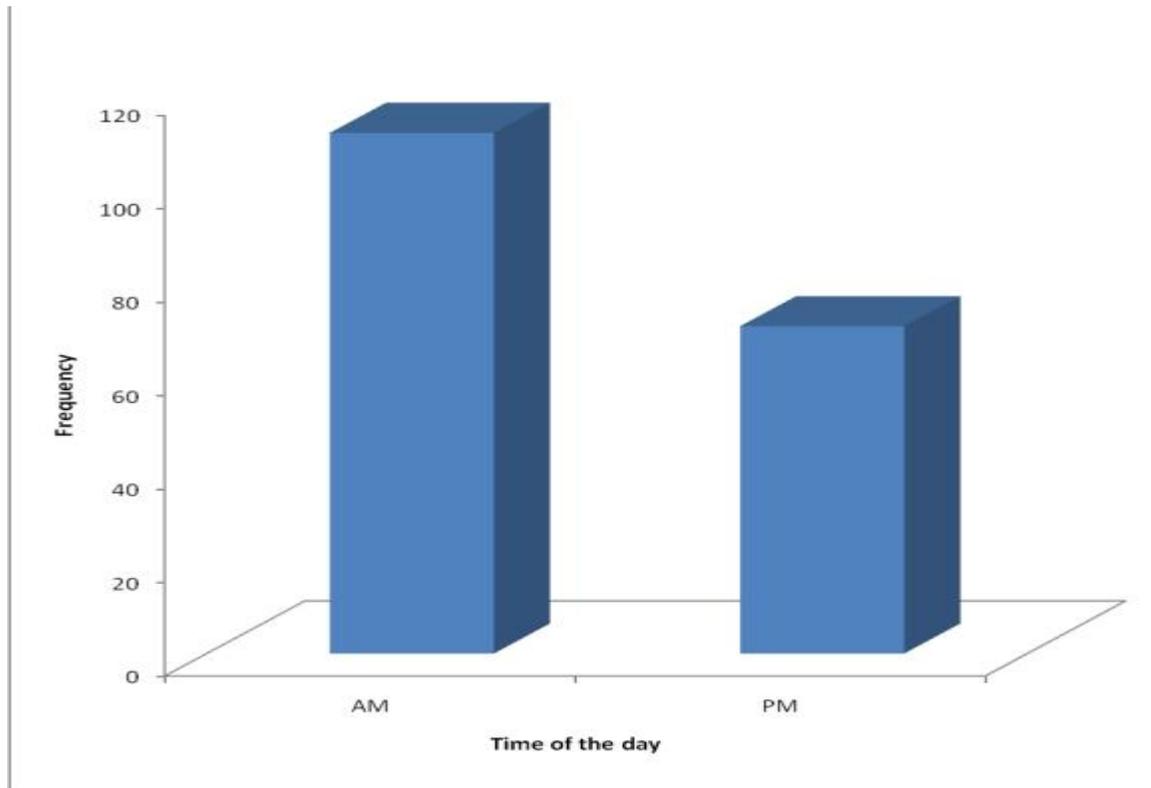
Fig.1. Frequency of sighting Avifaunal pest between the morning and evening
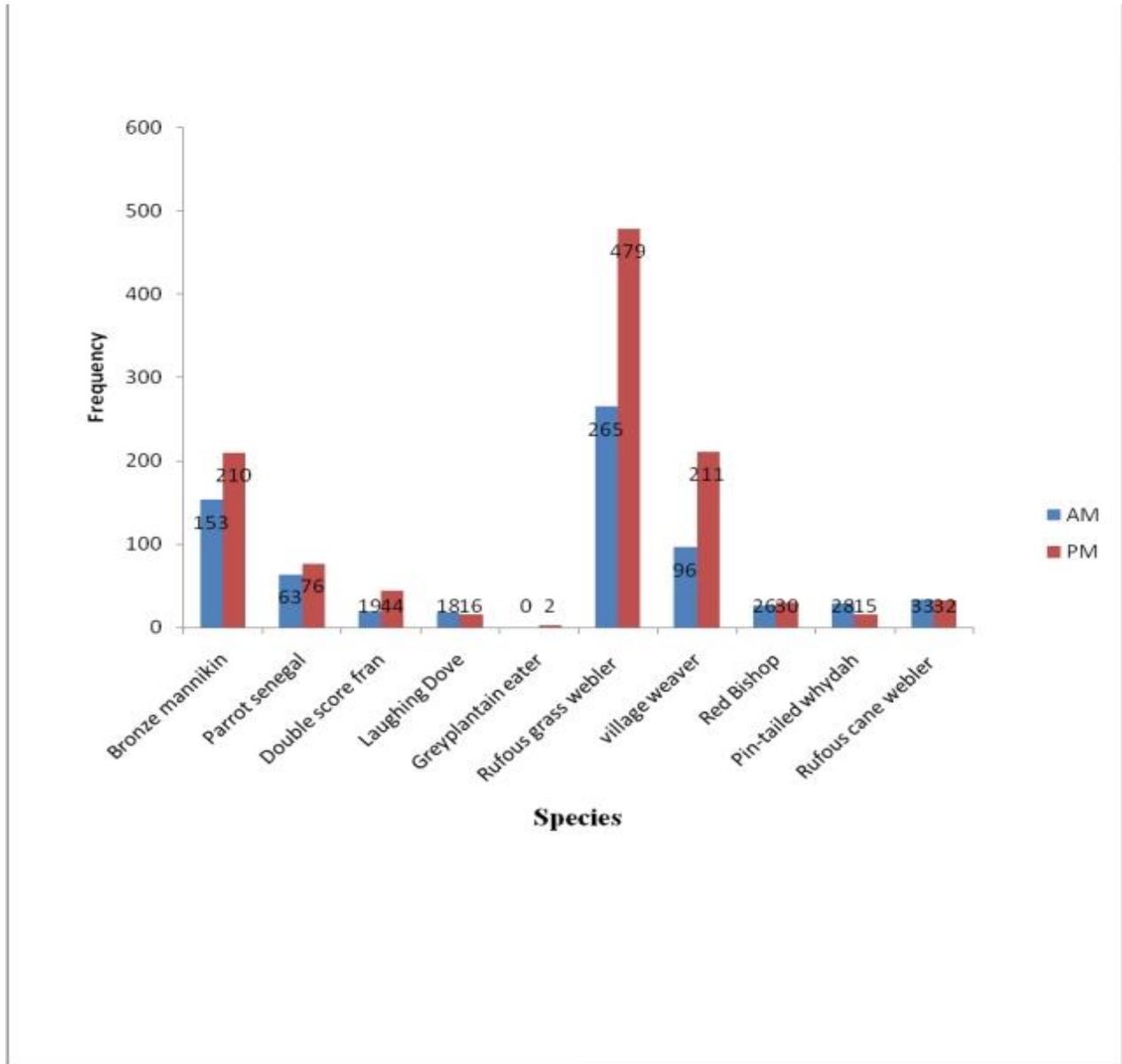
Fig.2. Species of Avifaunal pest found on Oracle Farm between the Morning and Evening period.

DISCUSSION

A total of 1,772 individual birds made up of ten (10) species and belonging to six (6) families were recorded in Oracle Rice Farms, Makurdi, Benue State.One thousand and ninety three(1,093) were counted during the morning survey and six hundred and seventy nine (679) birds during the evening survey. The family Sylviidae and Ploceidae constituted the predominant group appearing twice and trice each respectively. The mean abundance of Avifauna pests of rice (109.3) in the morning was significantly higher than evening (67.9) in Oracle rice farm in Makurdi Local Government Area of Benue State.The Rufous grass warbler (*Cisticola galactotes) was* the most abundant avian pest in both morning (469) and evening (280) while the least abundant was grey plantain eater in both

morning (2) and evening (0) in the study area. Other avian pests observed in the study area include the Bronze manikin (19.9% morning and 19.2% in the evening), Double-spurred francolin (4.0% morning and 2.8% in the evening), Red bishop(2.4% morning and 3.8 % evening), Rufous cane Warbler(2.9% morning and 2.8% evening), Pin-tailed whydah(1.7% morning and 2.2% in the evening), Senegal parrot(7.8% morning and 9.3% evenings), Laughing doves(0.7% mornings and 1.9% evenings) and village weaver(18.1% morning and 14.1% evenings). The study revealed that all the birds except grey plantain eater would consume rice both in the morning and evening when available. Rice is one of the five crops most frequently damaged by birds in the Western states of Nigeria (Funmilayo and Akande, 2007). The result showed that Rufous Grass warbler recorded the highest frequency in both morning and evening observation but the invasion was more in the morning than in the evening, This may be as a result of cool weather in the morning and warm weather in the evening.This result is in contrast with the work of (Allen, 1997, Elliot 1989 and Oschadleus, 2001) who reported that Quelea birds are the most notorious pest of grains in West Africa. In terms of the farm invasion by birds, Bronze mannikin, Rufous Grass warbler and Village weaver significantly invaded the rice farm in the morning compared with the evening time invasion. Grey plantain eater was not observed only twice in the morning time throughout the study period while none was observed in the evening. There was no significant difference in the value recorded for Laughing dove, Red bishop, Rufous cane warbler as showed in figure 2. This may be associated with the period or season that the study was carried out. The birds at this period might have migrated or are in their breeding season. Almost non-availability of grey plantain eater birds might be associated to the season, breeding period or unfriendly farm environment.

CONCLUSION AND RECOMMENDATIONS

This study indicates that Rufous grass warbler, Bronze mannikin and Village weaver are predominantly present at Oracle rice farm in Benue State. These birds pose a serious threat to the rice. Therefore, there is a great need to find sustainable solutions to reduce or eliminate these pestilence birds so as to reduce the level of rice damage. It is also important to introduce current control methods used in developed countries and adopt suitable ones for local use at Oracle rice farm.

REFERENCES

Allen, R. 1997 *The Grain-eating Birds of Sub-Saharan Africa: Identification, Biology and Management*, 1st Edn. Natural Resources Institute, Chatham, UK.

Basu, K. S.2015 Bird conservation education and awareness. Retrieved on Net Bird.com online bird guide April 6, 2017.

Bibby, C. J. 1999. Making the most of birds as environmental indicators. *Ostrich*, 70, 81- 88

Borchers, D. L., Buckland, S. T., Goedhart, P. W., Clark, E. D. & Hedley, S. L. 1998. Horvitz-Thompson estimator for double platform line transect surveys. *Biometrics,* 54, 1221 – 1237.

Elliott, C.C.H. 1989. The pest status of the quelea. In: Bruggers, R.L. and Elliott, C.C.H. (eds) *Quelea quelea: Africa's bird pest*. Oxford University Press, Oxford, pp. 17– 34.

FAO 1991 *Manuel de protection des cultures contre les dégâts d'oiseaux*. Food

and Agriculture Organization of the United Nations, Dakar, Senegal.

Gallagher KD, PAC, Mew TW, Borromeo E, & Kenmore PE 2002. "*Integrated Pest Management in Rice*". In International Rice Institute, Umudike Extension Bulletin. No. 2 214 pp.

Manikowski, S. 1984. Birds injurious to crops in West Africa. *Tropical Pest Management* 30, 379–387.

McCain, C. M. 2009. Global analysis of bird elevation diversity. *Global Ecology and Biogeography,* 18, 346-360.

Morrison, M. L., Marcot, B. G., & Mannan, R. W.2006. Wildlife-habitat relationships: concepts and applications. Washington, DC: Island Press. 520pp.

Odun, E. P., & Barrett, G. W. 2004 Fundamentals of Ecology. Fifth edition, Pacific Grove: Brooks Cole Publishing Co.

Oschadleus, H.D. 2001 *Bibliography of the African Quelea Species*, 1st edn. Avian Demography Unit, University of Cape Town, Cape Town, South Africa.

Sunshine Liberation Forum. 2011. Information about Ondo State. Retrieved March 26, 2012 from http://www.myondostate.com/w3/ondo.

Thomas, J.W. 1979. Wildlife habitats in managed forests: The Blue Mountain of Oregon Agriculture Handbook No.553 U.S.Department of Agriculture,Forest Service. 512pp

Van Perlo, B. 2002 *Collins Illustrated Checklist: Birds of Western & Central Africa*. Harper Collins, London.

Waterhouse, F. L., Mather, M. H., & Seep, D. 2002. Distribution and abundance of birds relative to elevation and Biogeoclimatic zones in coastal old growth forest in southern British Columbia. *Journal of Ecosystem and Management,* 2: 1-13

Zakaria, M., & Rajpar, M. N. 2010. Bird species composition and feeding guilds based on point count and mist netting methods at the Paya Indah Wetland Reserve, Peninsular Malaysia. *Tropical Life Sciences Research*, 21(2), 7–26.