

Attractiveness of Birdfeeders to Birds in the Garden Area of Universiti Malaysia Terengganu, Malaysia

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Abstract: A study was conducted to assess the effectiveness of the birdfeeders to be used as an alternative tool to conserve bird species around the garden area of UMT with the objectives were to identify bird species found in the garden area of UMT and to examine the feasibility of birdfeeders as a conservation tool at the garden area. The study was conducted by presenting three types of foods namely mealworm, millet and papaya on two types of birdfeeders namely hanging and ground birdfeeders during four months observation from October 2010 until January 2011 at two selected locations in the garden area of UMT. A total of 18 bird species from 15 families around the birdfeeders were recorded using the direct observation method. Five bird species were attracted to birdfeeders namely the Magpie Robin (*Copsychus saularis*), Yellow-vented Bulbul (*Pycnonotus goiavier*), Eurasian Tree Sparrow (*Passer montanus*), Brown Shrike (*Lanius cristatus*) and Black-naped Oriole (*Oriolus chinensis*). Magpie Robin (*Copsychus saularis*) was found to be the dominant species that frequently visited the birdfeeders. As compared to millet and papaya, mealworm showed the highest percentage of food consumed and visited by birds as it contain more protein. Significant difference was recorded in the number of birds observed on the hanging and ground feeder at site A ($P = 0.027$, $df = 6$) but there were no was significant difference at site B ($P = 0.313$, $df = 6$). In conclusion, birdfeeders can be used as an alternative tool to conserve bird population due to high bird attraction, but more studies is recommended to further investigate their effectiveness to other species of birds.

Key words: Avian • Garden birds • Feeding preference • Universiti Malaysia Terengganu • Malaysia

INTRODUCTION

Birds belong to the class of Aves among the vertebrate animals. The class Aves consists of more than 9000 different species of birds [1]. The overall bird species count in Malaysia is about 742 species from 85 families with Peninsular Malaysia has a total of 644 species, while Sabah and Sarawak has a total of 568 and 550 species respectively [2]. Birds are the one of the important component of the ecosystem as most birds act as pollinators, biological indicators and play role in prey and predator relationship.

Different species of birds generally have a different feeding strategy and feed on different types of food. The diets of birds are highly diverse and include seeds, fruits, plants, nectar, fish and insects [3]. According to [3], most birds spent much of their day-time foraging food in order to survive, move and reproduce efficiently. The ability to

find a reasonably constant supply of food is very important for a flying animal that must be light and cannot store large reserves. Thus, most birds spend a high proportion of their waking hours in pursuit of food [4]. In addition, birds also have different place feeding preferences as some prefer to feed at elevated height while some prefer to feed on the ground [5].

Nowadays, the gardens have become increasingly important as a habitat for many birds due to the changes and destruction of the forests. Birds come into gardens because of the changes in their habitats to make best use of the garden environment. As every bird needs fundamental things such as food, water and shelter in order to survive [6], if some of this basic cannot be found in the garden, they will not be attracted to visit and this will decrease the bird's survival. Continuous availability of the fundamental things will keep them well-fed and reduces the amount of energy they have to spend on

searching food. As such the garden will be visited by birds if it offers some of the bird's life necessities such as food and nest boxes.

Problem Statement: The continuous development at Universiti Malaysia Terengganu (UMT) caused fragmentation to the garden area of UMT. That fragmentation caused the depletion of habitat and natural foods available to the birds. This situation might cause the decline of bird species that cannot survive and adapt to the disturbed area. This study is important in order to know which types of foods and birdfeeders were preferred by birds as to attract a variety of birds in the garden. Gaining more knowledge about birds feeding preferences at the garden area of UMT is important to maintain a variety of birds at the garden area and to minimize the decreasing bird's populations due to destruction of their habitat and depleted natural food resources at UMT. This study is also important in helping birds and humans to live together.

Research Objectives: The objectives of this study are to:

- To identify bird species found in the garden area of Universiti Malaysia Terengganu and to investigate their feeding preferences.
- To examine the feasibility of bird feeder as a conservation tool at the garden area.

Methodology: The study was conducted at the garden area of Universiti Malaysia Terengganu (UMT) from October 2010 to January 2011 for a period of four months. Two fixed stations were chosen to conduct the study namely Site A situated near the Perpustakaan Sultanah Nur Zahirah (PSNZ) while site B was situated near the Netloft. Beach Hibiscus (*Hibiscus tiliaceus*), Earleaf Acacia (*Acacia auriculiformis*) and Black Mangrove (*Lumnitzera racemosa*) were the dominant plants at the site A while Beach Hibiscus (*Hibiscus tiliaceus*) and Earleaf Acacia (*Acacia auriculiformis*) were the dominant plants at site B.

Three different kinds of food namely mealworm, millet and papaya were chosen for the study. A total of 30g of each type of food were filled on the two types of birdfeeders namely the ground feeder and hanging feeder. The ground feeders were placed above the ground while the hanging feeders were hung off on a tree branch nearby. Each type of foods were put on the birdfeeders and maintained for a few weeks before beginning observations to allow time for birds to adapt with the appearance of birdfeeders. Water was provided in the

basin close to the birdfeeders at the feeding station. It is used to attract more birds since most of the birds need the water to drink and bath [7]. The birdfeeders also were placed on a shady location to slow down evaporation.

The birds and birdfeeders were observed by using binoculars to identify bird species and the number of birds that eat the food or are near to the birdfeeders. The observation was made during two different periods, namely morning (7.30 a.m to 9.00 a.m) and evening (5.15 p.m to 6.15 p.m). The observation was conducted twice a week namely one day at site A and one day at site B.

The left-over food samples were collected and kept in separate labeled plastic bag for every morning and evening during sampling time. The amount of food consumed was calculated by using the formula shown below:

$$\frac{\text{Initial weight} - \text{final weight} \times 100}{\text{Initial weight}}$$

Identification of the birds were conducted using selected field guides namely 'A Photographic Guide to the Birds of Peninsular Malaysia and Singapore' by Davison & Chew (2003), 'Birds of South-East Asia' by Robson (2000), 'The Birds of Peninsular Malaysia' by Holmes & Phillipps (1998), 'BIRDS: A Photographic Guide to the Birds of Peninsular Malaysia and Singapore' by Strange & Jeyarajasingam (1993) and 'Common Birds of the Malay Peninsula' by Tweedie (1970).

As for data analysis, One-way ANOVA was used to analyze the significant differences among three types of foods consumed by birds, while t-test was used to analyze the significant differences among two types of birdfeeders; hanging feeders and ground feeders and also the number of birds sighted in the morning and evening.

RESULTS & DISCUSSION

A total of 18 bird species from 15 families and 4 orders was recorded from the four months study beginning October 2010 to January 2011. The Passeriformes were the order which had the highest number of families and species recorded (77.78%), followed by Coraciiformes (11.11%), Charadriiformes (5.56%) and Columbiformes (5.56%).

From the observations, birds sighted included two species from the Alcedinidae, Sturnidae and Sylviidae families respectively while other families namely Campephagidae, Chloropseidae, Columbidae, Corvidae,

Table 1: Total bird species observed at both site A (PSNZ) and site B (Netloft)

Order	Family	Species name	Common name	Site A	Site B
Charadriiformes	Scolopacidae	<i>Actitis hypoleucos</i>	Common Sandpiper	/	
Columbiformes	Columbidae	<i>Geopelia striata</i>	Peaceful Dove	/	/
Coraciiformes	Alcedinidae	<i>Halcyon capensis</i>	Stork-billed Kingfisher		/
		<i>Halcyon smyrnensis</i>	White-throated Kingfisher	/	
Passeriformes	Campephagidae	<i>Lalage nigra</i>	Pied Triller		
			Common Iora	/	
	Chloropseidae	<i>Aegithina tiphia</i>	House Crow	/	
	Corvidae	<i>Corvus splendens</i>	Brown Shrike	/	
	Laniidae	<i>Lanius cristatus</i>	Olive-backed Sunbird	/	/
	Nectariniidae	<i>Nectarinia jugularis</i>	Black-naped Oriole		/
		<i>Oriolus chinensis</i>	Tree Sparrow		
	Oriolidae	<i>Passer montanus</i>	Yellow-vented Bulbul	/	/
	Ploceidae	<i>Pycnonotus goiavier</i>	Pied Fantail	/	
	Pycnonotidae	<i>Rhipidura javanica</i>		/	/
		<i>Acridotheres tristis</i>	Common Myna		
	Rhipiduridae	<i>Aplonis panayensis</i>		/	/
		<i>Gerygone sulphurea</i>	Philippine Glossy Starling		
	Sturnidae	<i>Orthotomus sutorius</i>	Flyeater	/	
		<i>Copsychus saularis</i>	Common Tailorbird	/	
	Sylviidae		Magpie Robin	/	/
				/	
	Turdidae			/	/
Total				16	8

Laniidae, Nectariniidae, Oriolidae, Ploceidae, Pycnonotidae, Rhipiduridae, Scolopacidae and Turdidae consisted of only one species observed respectively.

A total of 450 numbers of sightings were recorded at both sites. At site A (Perpustakaan Sultanah Nur Zahirah), there were 16 bird species from 14 families and 4 orders were observed while at site B (Netloft), 9 bird species from 9 families and 3 orders were observed (Table 1).

The Magpie Robin (*Copsychus saularis*) was the species with the highest number of sightings (40%), followed by Yellow-vented Bulbul (*Pycnonotus goiavier*) (19.11%) and Peaceful Dove (*Geopelia striata*) (12.67%). As these species are very common and familiar birds in open country of Peninsular Malaysia where they can be found in almost every garden, park, cultivated area and 'kampong' [8, 9], it may have contributed to these species being sighted in the higher numbers in UMT.

The Magpie Robin (*Copsychus saularis*) is very common bird species in all 'kampong', plantation, garden and park throughout Peninsular Malaysia including the offshore islands. It can be observed in any season since it inhabit the same area of year-round [8-10]. Furthermore, the species have well-developed and adapted to cultivated areas. The Magpie Robin have a variety of diet of fruits and animals but are particularly fond of insects and worms found in garden lawns [9, 11]. In addition, it

was successful probably due to the wide ranging of its diet that includes both plants and animals. Besides that, garden area of UMT is situated near the mangroves area that offers more foods and cover for the Magpie Robin.

In addition to the Magpie Robin, the Yellow-vented Bulbul (*Pycnonotus goiavier*) has also become one of the most common birds in the garden and park over most of the Malay Peninsula although this bird was originally from the coastal scrub and mangroves [9, 11]. Like the Magpie Robin, it have variety in its diet but are also fond of fruits such as berries and small fruits, especially figs and cinnamon tree fruits. It can be fed with papaya and other fruits at a bird table in the garden. According to [9] and [11], it will also take some insects.

During the study, several species such as the Common Sandpiper (*Actitis hypoleucos*), Pied Triller (*Lalage nigra*) and Olive-backed Sunbird (*Nectarinia jugularis*) were recorded as the species least sighted. These birds were least observed due to their behavior. For example, it is not easy to view close-up of Pied Triller (*Lalage nigra*) as it stays high in the foliage, moving around from tree to tree looking for food [9].

Moreover, birds are highly mobile organisms and their movement is not only subjected only on the ground [12]. They may stay at high elevated trees and be difficult to observe. Besides that, their behaviour may be caused by shortage of their food. For example, the Olive-backed

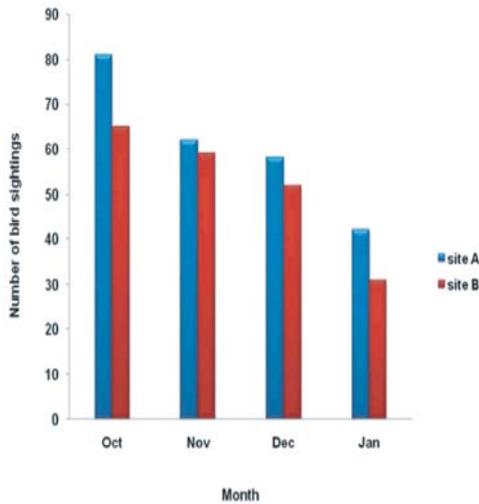


Fig. 1: Number of bird sightings per to month.

Sunbird (*Nectarinia jugularis*) was only observed when the bougainvilleas at the study sites produced flowers. Shortage of food (nectar) will lead them to move to another place to search for their food.

Another reason was because the migrant bird species will only appear during certain months. During the study, one sighting of the Common Sandpiper (*Actitis hypoleucos*) was recorded at the study site. This species usually can be found at tidal mudflats and sandy beaches and it is often solitary [9]. As the garden area of UMT is near to the mangroves area, the Common Sandpiper (*Actitis hypoleucos*) observed may have astrayed and entered the garden area.

Some bird species found at site A (PSNZ) but were absent at site B (Netloft) during the study were the Common Iora (*Aegithina tiphia*), Philippine Glossy Starling (*Aplonis panayensis*) and Pied Triller (*Lalage nigra*). This might be caused by the wider variety of vegetation at site A as compared to site B. This is since the diverse vegetation area will attract more bird species to inhabit it since they can provide better shelter and many other foods such as insects, fruits and nectar.

The number of birds observed at the study sites was found to decrease from month to month at the both sites (Figure 1). Several factors may have contributed to the decrease in the number of bird sighted such as habitat destruction, depletion of natural food resources, pollution and the weather. The least number of birds observed was recorded in January. During that particular month, habitat destruction or clearance occurred as a result of cutting down trees and shrubs at both locations. As habitat destruction will disturb and decrease the shelter, perching

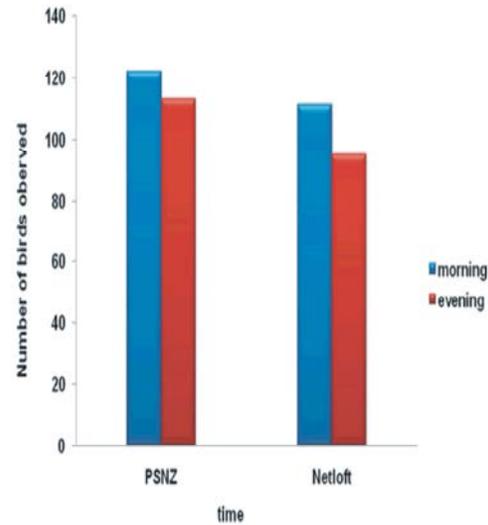


Fig. 2: Numbers of birds sighted according to time.

and foraging area of bird; and expose them to predators, it is believed that the birds will move to another place to ensure their safety.

The birds sighted were also influenced by weather and the movement of the tide [9]. The decrease in the birds observed was related to the tropical monsoon season as Terengganu experiences the monsoon season from November to January. The bird activities might be disturbed or influenced by rainy days. They may be less active during rainy days as they cannot fly well when they are wet [7].

Based on the study results (Figure 2), a total of 233 and 208 individual sighting have been recorded in the morning and evening at both sites. From that, 122 and 111 individual sighting have been recorded at the site A and site B in the morning (7.30 a.m to 9.00 a.m) and 113 and 95 were recorded at the site A and site B in the evening (5.15 p.m to 6.15 p.m). For both time period, there were only slight difference in the number of individual observed. However, results of the t-Test conducted does not indicate significant difference in the number of bird observed in the morning and evening ($P = 0.571$, $df = 6$, $P < 0.05$).

As usually most birds are active at dawn and dusk when most birds spend most of their time searching for food or foraging activities [3]. According to [13], for example, most of Malaysia birds such as doves, myna and robin search their food in the early morning and evening while the coastal birds are dependent on the movement of the tide.

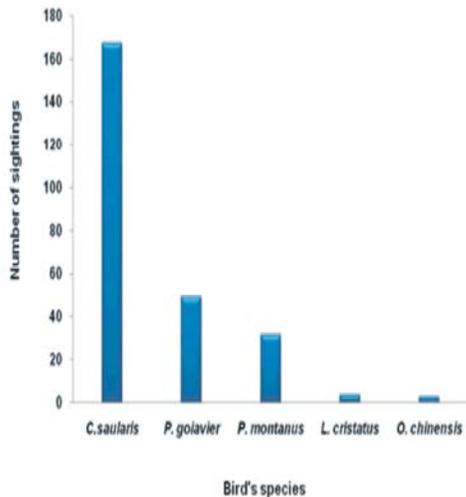


Fig. 3: Sightings of the most common bird visitors to the birdfeeder

Figure 3 showed the Magpie Robin (*Copsychus saularis*) as a major species that frequently visit the birdfeeder (66.27%) and this was followed by Yellow-vented Bulbul (*Pycnonotus goiavier*) (19.44%), Eurasian Tree Sparrow (*Passer montanus*) (12.30%), Brown Shrike (*Lanius cristatus*) (1.19%) and Black-naped Oriole (*Oriolus chinensis*) (0.79%). *Copsychus saularis* was the most abundant at the garden and can become quite approachable. During this study, it was more attracted and preferred to eat mealworm. This was in agreement with their natural diet namely particularly fond of worms and insects found in garden lawns although a variety of food is listed in their diet [9].

In addition, the Brown Shrike (*Lanius cristatus*) was attracted to eat mealworm. It is a common migrant visitor. Its natural diet is listed as particularly fond of insects [14] and it is usually seen sitting on a fence, exposed branch or other low perch, patiently watching the grass below and catching insects and small vertebrates on ground [9, 10]. It may be consuming mealworm in order to increase protein stores that use as the primary sources of energy for their flights in migration season [15].

As for the Yellow-Vented Bulbul (*Pycnonotus goiavier*), it was attracted to eat papaya. As it is omnivorous, it is usually fond of fruits and can also snack on insects. It can be feed with papaya and other fruits at a bird table in a garden [9, 11]. The Black-naped Oriole (*Oriolus chinensis*) was also attracted to eat papaya during this study. It was particularly fond of fruits and spent most of its time in the tree canopy. Like other garden birds, it feeds on fruiting trees like papaya and

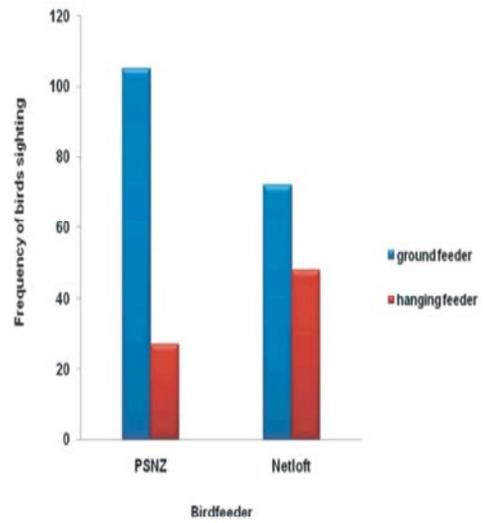


Fig. 4: Frequency of the number of birds sighted on the birdfeeders

mango and also catches large insects such as large green grasshopper [8, 9, 14]. As for the Eurasian Tree Sparrow (*Passer montanus*), it was attracted to eat millet. Commonly, it feeds mainly on seeds and leftovers that found on the ground. It also will take a number of insects especially during their breeding season [9, 10].

The frequency of birds visiting on birdfeeders was higher on the ground feeder as compared to the hanging feeder at the both sites which were 89 and 24 respectively at PSNZ and 73 and 47 respectively at Netloft (Figure 4). The t-Test analysis showed that there were significant difference in the number of bird observed on the hanging and ground feeder at site A ($P = 0.027$, $df = 6$, $P < 0.05$). However, no significant difference was detected in the number of bird observed on the hanging and ground feeder at site B ($t\text{-test} = 0.313$, $df = 6$, $P < 0.05$).

This could have been due to the ground feeder being more stable as compared to the hanging feeder. It is because the hanging feeder will sway when the birds perch on it. Furthermore, the size of ground feeder is larger than hanging feeder and the size is more advantageous to attract more birds. But, as hanging feeder hangs off at the tree branch; it can provide a hiding place for birds against predators.

For the three type of food, the One-way ANOVA analysis revealed significant differences between the three food types ($F_{2,9} = 6.051$, $P < 0.05$) at PSNZ and ($F_{2,9} = 5.034$, $P < 0.05$) at Netloft. Mealworm was more preferred by birds followed by papaya and millet (Figure 4.7 and Figure 4.8). Mealworm is a potential protein sources and more easily digested making certain

bird species frequently to consume it. It also can be an important food during the breeding season [6] since the protein was required for egg production and nestling growth [16]. Furthermore, mealworm is more attractive because it is a live food and can be easily seen by birds.

From the total of 18 bird species observed in the study, 16 were resident species and 2 species were migrant species; namely the Common Sandpiper (*Actitis hypoleucos*) and Brown Shrike (*Lanius cristatus*). Resident species means the bird species that are known to breed in Malaysia while migrant species are the bird species that use Malaysia as their territory during the northern and southern winter passage [2]. The Common Sandpiper (*Actitis hypoleucos*) is a very common migrant species that can be seen in Peninsular Malaysia. They are only absent in our country for a short period, from May to August. As for the Brown Shrike (*Lanius cristatus*), it is also a very common migrant visitor in all kinds of open country that included gardens and parks. It arrived here about September and will leaves for its Eastern Palaearctic breeding ground by April or May [8, 9].

Studies by [2] and [17] recorded a total of 12 species respectively from Netloft. Combination from both studies recorded a total of 17 species namely the Common Myna (*Acridotheres tristis*), Common Iora (*Aegithina tiphia*), Magpie Robin (*Copsychus saularis*), Peaceful Dove (*Geopelia striata*), Flyeater (*Gerygone sulphurea*), Stork-billed Kingfisher (*Halcyon capensis*), White-throated Kingfisher (*Halcyon smyrnensis*), Brown Strike (*Lanius cristatus*), Tiger Strike (*Lanius tigrinus*), Olive-backed Sunbird (*Nectarinia jugularis*), Black-naped Oriole (*Oriolus chinensis*), Ashy Tailorbird (*Orthotomus ruficeps*), Common Tailorbird (*Orthotomus sutorius*), Eurasian Tree Sparrow (*Passer montanus*), Yellow-vented Bulbul (*Pycnonotus goiavier*), Pied Fantail (*Rhipidura javanica*), White-collared Kingfisher (*Torirhampus chloris*). However, the current study showed a decrease of bird species observed, with only 9 species were recorded at Netloft namely Magpie Robin (*Copsychus saularis*), Peaceful Dove (*Geopelia striata*), Flyeater (*Gerygone sulphurea*), Stork-billed Kingfisher (*Halcyon capensis*), Brown Strike (*Lanius cristatus*), Olive-backed Sunbird (*Nectarinia jugularis*), Black-naped Oriole (*Oriolus chinensis*), Yellow-vented Bulbul (*Pycnonotus goiavier*) and Pied Fantail (*Rhipidura javanica*).

Human activities such as cutting down the trees and shrubs, land clearance to build a new building and other facilities such as sport center, health center and new lecture hall at UMT causing loss of bird habitats. Most of the places were no longer providing a safe place for

most birds, caused the depleting in natural foods that available for birds and lead them vulnerable to the predators.

As avian population can be affected by human activities and natural causes, the vegetation area at the habitat is important since it provides availability of food resources, shelter and nesting places for most birds. Most of them are totally dependent on their habitat for survival. The disturbance of their habitat can spell disaster for them [9].

Furthermore, the birds also might be affected by water pollution especially the water in estuary and ponds around UMT. Water pollution was caused by aquaculture activities that lead eutrophication in the pond near the Faculty of Management and Economy (FPE). Moreover, directly sewage disposal in estuary around UMT from hostel and canteen also contributed to the water pollution. Drainage of waste chemical from laboratories to the estuary also increased the toxicity in the estuary.

Birds need clean water for bathing and drinking. Water pollution cannot provide clean water which can cause the depletion of food resources such as crustaceans and fishes for some bird species. The numbers of species recorded also might vary depending on time survey. Migratory bird species will also influence the checklist from time to time.

CONCLUSION

A total of 18 species from 15 families and four orders were observed and recorded during the study. From the study, 5 species were attracted to the birdfeeder. The Magpie Robin (*Copsychus saularis*) was a major species present via birdfeeder followed by the Yellow-vented Bulbul (*Pycnonotus goiavier*), Eurasian Tree Sparrow (*Passer montanus*), Brown Shrike (*Lanius cristatus*) and Black-naped Oriole (*Oriolus chinensis*). Mealworm was found to be more preferred by birds followed by papaya and millet. As for the birdfeeders, the ground feeder was more efficient than the hanging feeder since it attracted the greatest numbers of birds as compared to the hanging feeder. As such, birdfeeders can be a conservation tool at the garden area since there were increases in the number of bird species that were attracted and consumed food on the birdfeeder as compared to the previous study. It is suggested that further study of bird attraction should be continue to give time for more birds to be familiar and adapt to the birdfeeders. The variety of birdfeeders and food types also should be offered to attract more bird's species.

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