

## DIURNAL BIRD COMMUNITY STRUCTURE AROUND THE WAILOI RIVER, OF HILA KAITETU (LEIHITU DISTRICT) MALUKU

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### ABSTRACT

Birds are very dynamic and are found almost everywhere. The purpose of this study was to determine the community structure of diurnal birds around the Wailoi Negeri Hila Kaitetu River, Leihitu District, Central Maluku Regency. The type of this research was quantitative descriptive in nature. The method used is the station line method combined with the count point. The results showed that in the Wailoi River, Negeri Hila Kaitetu, with 2 stations and 11 counting points, several species of diurnal birds were found, namely the type of Trinil beach (*Actitis hypoleucos*), Tiger Kestrel (*Falco severus*), Gray Flycatcher (*Myagra galeata*), Red-cheeked Lorike. (*Geoffroyus geoffroyi*), Terkukur common (*Streptopelia chinensis*), Wiwik Jungle (*Cacomantisvariolosus*), Hornbill Irian (*Rhyticeros plicatus*), Nuri Maluku (*Eos borneo*), King Prawn Erasia (*Alcedo atthis*), Pacific Baza (*Aviceda subcristata*), Small perling (*Aplonis minor*), Lazuli Checkfish (*Halcyon lazuli*), Dotted Flycatcher (*Muscicapa griseisticta*), Sriganti sunbird (*Nectarinia jugularis*), Asian Tuwur (*Eudynamis cyanocephala*), Black honey (*Nectarinia aspesia*), Pergam tarut (*Ducula concinna*). The diversity index for the 2 stations was 1.74 and classified as moderate species diversity criteria. For the average dominance value of station I and station II, which is 0.24, it is included in the low dominance criteria. The evenness value of the two stations is 0.80 and is included in the criteria for a high level of evenness.

**Keywords:** diurnal, bird, community, wailoi river.

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### INTRODUCTION

The number of bird species in Indonesia in 2018 was 1,771 bird species with the number of bird species protected by law being 436 bird species, while the unique or endemic bird species from Indonesia that have been identified increased to 513 species (Indonesian Birds, 2018). Each region of Indonesia has species richness and bird community structure that differs from one region to another. Species diversity in an area is determined by various factors and has a number of components that can react differently to geographical factors and physical development. The availability of feed, breeding and resting places are factors that affect bird species richness at the local level. Birds are found almost everywhere and have an important position as one of Indonesia's animal wealth. The species are very diverse and each species has its own aesthetic value. The existence of birds requires certain conditions, namely the existence of suitable habitat conditions and is safe from all kinds of disturbances (Rahayuningsih et al, 2007). According to Howes, et al. Birds are divided into several categories according to their respective functions and roles (Howes, 2003). Based on their habitat, they are categorized into water birds and non-water birds. According to Elfidasari (Elvidasari, 2007) water

birds are bird species whose life activities are wholly or partly related to water areas or wetlands, while non-water birds are bird species whose life activities are on land, such as terrestrial (soil) and arboreal (trees). However, many terrestrial (land) and arboreal (tree) birds utilize water sources to fulfill their lives. Water sources can be rivers. Birds need water for drinking as well as animals that are found around rivers that can be used as food.

In areas where the diversity of plant species is high, the diversity of animal species, including birds, is also high. Birds or animals are divided into 2 types according to their activity time, namely diurnal (active during the day). Most birds are active during the day, usually at certain hours the birds take a break. Next is nocturnal (active at night), usually only in the strigiformes, podargidae, and caprimulgidae groups. Diurnal birds are birds that are most active during the day. Because of that during the day is the best time to make observations (Mackinon, 2010). Around the river, you can find many invertebrate animals such as fish, shrimp, snails, snails, clams, and mussels which can be used by birds as a source of food. In addition, there is another community that is most abundant, namely insects. Insects can be found in almost every existing habitat, both in waters and terrestrial, including those that live in rivers and their surroundings, so that insect-eating birds can use them as a source of food.

## **METHODS**

### **Research Type**

This type of research is descriptive quantitative, where the data is in the form of community structure of diurnal bird species found around the Wailoi Negeri Hila Kaitetu River, Leihitu District, Central Maluku Regency. This research was conducted on August-September 2016, and was carried out around the Wailoi Negeri Hila Kaitetu river. The tools used were digital cameras, binoculars, hand counters, ropes, stationery and observation sheets, Field Guidebooks for Birds in the Wallacea Region Howes et al, (2003) and Coates & Bishop, (2000). While the material is the observed bird species.

### **Materials**

The tools used were digital cameras, binoculars, hand counters, ropes, stationery and observation sheets, Field Guidebooks for Birds in the Wallacea Region Howes et al, (2003) and Coates & Bishop, (2000). While the material is the observed bird species.

### **Procedures**

**Initial stage:** Previously, observations were made to determine the location of the count point which was carried out around the Wailoi River, Negeri Hila Kaitetu. Sampling was carried out at two stations with six count points. Each station has a length of 5200 m and a width of 50 meters according to Figure 1 (Research Location). The number of points calculated according to the conditions of the research location. The counting point is determined based on the presence of bird activity at that point location in the form of perching, feeding activity, and resting places.

**Surveillance stage:** Bird observations were carried out simultaneously at each counting point, therefore this research was assisted by the TEAM. Observations were made around the Wailoi River Negeri Hila Kaitetu in the morning (07.00-09.30WIT), afternoon (11.00-13.30) and afternoon (15.00-17.30WIT). Record the number of individuals per species at each counting point. Observations were carried out for 10 minutes. In addition, bird species found in the field were also documented with video cameras and photo cameras for further identification. Identification of bird species was carried out using the bird manual Howes et al, (2003) and Coates & Bishop, (2000). Observations of bird activity on each tree species were also recorded.

### **Data analysis**

**Abundance of birds:** Abundance is the total number of individual birds found during the activity observation. This abundance index provides an overview of the composition of a species in a community.

$$P_i = \frac{\sum \text{burung spesies } i}{\sum \text{Total burung}}$$

Note:

P<sub>i</sub> = Bird abundance value

I = Type of bird species observed

**Relative Abundance Index (IKR):** Relative abundance index values are classified into three categories, namely high (> 20%), medium (15%-20%), and low (<15%). Calculation of relative abundance index with the equation:

$$IKR = \frac{\text{Jumlah individu suatu spesies } (n_i)}{\text{Jumlah total individu yang ditemukan } (N)} \times 100 \%$$

Note:

P<sub>i</sub> = Bird abundance value

I = Type of bird species observed

**Shannon-Wiener Diversity Index (H')**: The most commonly used diversity index is the Shannon-Wiener index applied to random communities, where the total number of species is known, the natural logarithm (ln) can be used for bird communities because birds are mobile biota.

$$H' = -\sum_{i=1}^s (p_i \ln p_i) \quad ; p_i = n_i/N$$

Note:

H' = diversity index;

p<sub>i</sub> = Proportion of individual taxa i;

S = total number of taxa in the observed samples;

n<sub>i</sub> = Number of individual taxa-i;

N = Total number of taxa

By criteria:

H' < 1 indicates a low level of species diversity

1 < H' < 3 indicates a moderate level of species diversity

H' > 3 indicates a high level of species diversity

**Simpson Dominance Index (D):** Used to determine the level of dominance of certain taxa in the community. This relates to the most common bird species found at the study site. The Simpson dominance index is calculated using the following formula:

$$D = \sum_{i=1}^s (p_i)^2 \quad ; p_i = n_i/N$$

Note:

D = dominance index;

p<sub>i</sub> = Proportion of individual taxa i;

S = total number of taxa in the observed samples;

n<sub>i</sub> = Number of individual taxa-i;

N = Total number of taxa

By criteria:

0 < D < 0.5 indicates a low level of dominance

0.5 < D < 0.75 indicates a moderate level of dominance

0.75 < D < 1.00 indicates a high level of dominance

**Evenness Index (E):** Evenness index is used to determine the evenness of each species in each community encountered

$$E = H' / \ln S$$

Note:

E = Evenness Index

H = Shannon-Wiener diversity index

S = Total number of species in a habitat

By criteria:

0 < E' < 0.4 indicates a low level of evenness

0.4 < E' < 0.6 indicates a moderate level of evenness

0.6 < E' < 1.00 indicates a high level of evenness

**Species richness index (R):** Species richness index can be calculated using the formula:

$$R = \frac{S - 1}{\ln(N)}$$

Note:

R = Species richness index

S = Total number of species in a habitat

N = Total number of individuals in a habitat

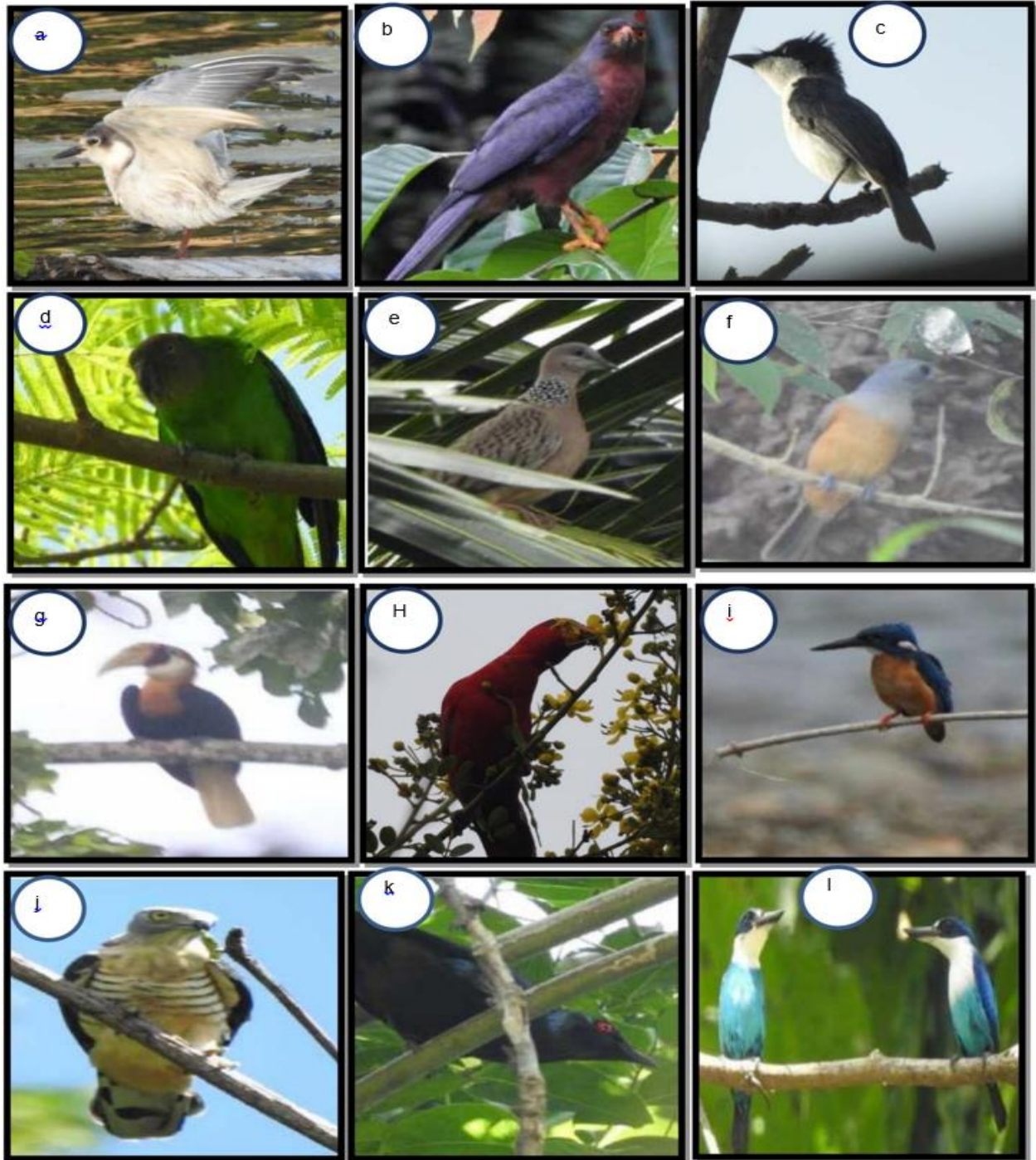
By criteria:

$R < 2.5$  indicates a low level of species richness.

$2.5 > R > 4$  indicates a moderate level of species richness.  $R > 4$  indicates a high level of species richness.

### DISCUSSION RESULT

The Wailoi River is one of the rivers flowing in Negeri Hila Kaitetu and is the widest river in Leihitu District, which has a length of 5200 meters and an average width of 25 meters. This river flows in the middle of the Kaitetu forest and empties into the shores of Negeri Hila.



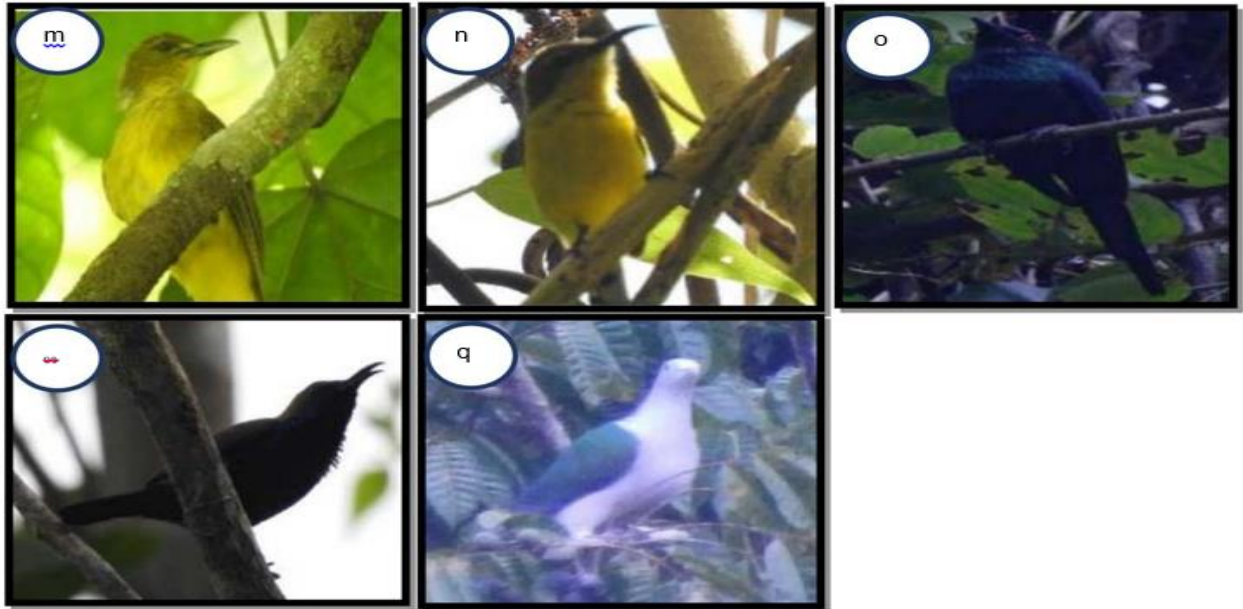


Figure 2. Types of birds found in the Wailoi River, Negeri Hila Kaitetu

Description: a. Trinil beach (*Actitis hypoleucos*), b. Tiger falcon (*Falco severus*), c. Gray flycatcher (*Myagra galeata*), d. Red-cheeked parrot (*Geoffroyus geoffroyi*), e. Commonterkuur (*Streptopelia chinensis*), f. Wiwik Jungle (*Cacomantis variolosus*), g. Hornbill of Irian (*Rhyticeros plicatus*), h. Nuri Maluku (*Eos Borneo*), i. Erasia king prawns (*Alcedo atthis*), j. Pacific Baza (*Aviceda subcristata*), k. Perling minor (*Aplonis minor*), l. Cekakak lazuli (*Halcyon lazuli*), m. Burik flycatcher (*Muscicapa griseisticta*), n. Sriganti honey bird (*Nectarinia jugularis*), o. Tuwur Asia (*Eudynamys cyanocephala*), p. Black honey (*Nectarinia aspesia*), q. Pergam tarut (*Ducula concinna*).

Based on research on the Wailoi River, Negeri Hila Kaitetu with 2 stations and 11 counting points, several species of diurnal birds were found, namely the coastal Trinil (*Actitis hypoleucos*), Tiger's Kestrel (*Falco severus*), Gray flycatcher (*Myagra galeata*), Red-cheeked parrot (*Geoffroyus geoffroyi*), Common turtledove (*Streptopelia chinensis*), Jungle Wiwik (*Cacomantis variolosus*), Hornbill Irian (*Rhyticeros plicatus*), Moluccan parrot (*Eos borneo*), King prawn erasia (*Alcedo atthis*), Pacific Bazaar (*Aviceda subcristata*), Little Perling (*Aplonis minor*), Lazuli Kingfisher (*Halcyon lazuli*), Dotted Flycatcher (*Muscicapa griseisticta*), Sriganti Honeybird (*Nectarinia jugularis*), Asian Tuwur (*Eudynamys cyanocephala*), Honey black (*Nectarinia aspesia*), Pergam tarut (*Ducula concinna*). The results showed that at station I the highest abundance value was black honey (*Nectarinia aspesia*) with an abundance value of 0.40 ind/m<sup>2</sup> and a relative abundance of 40% (classified in a very high relative abundance index). While the lowest abundance value was the red-cheeked parrot (*Geoffroyus geoffroyi*) with an abundance value of 0.04 ind/m<sup>2</sup> and a relative abundance value of 4% (classified in a very low relative abundance index). Whereas at station II it shows that the highest abundance value is Perling minor (*Aplonis minor*) with an abundance value of 0.41 ind/m<sup>2</sup> and a relative abundance of 40.91% (classified in a very high relative abundance index) as presented in Table 1 and 2. Based on the data, the diversity index for the 2 stations is 1.74 and belongs to the criteria for moderate species diversity. For the average dominance value of station I and station II, which is 0.24, it is included in the low dominance criteria. The evenness value of the two stations is 0.80 and is included in the criteria for a high level of evenness. Whereas at station II having a high abundance value is Perling minor (*Aplonis minor*) with an abundance value of 0.41 ind/m<sup>2</sup>.

The high value of the abundance of black honey (*Nectarinia aspesia*) is due to the habitat conditions at station I in the form of forest dominated by shrubs. This species was determined by the Government of the Republic of Indonesia No. 7 of 1999 as a protected bird because it is included in the Nectarinidae family and has a very large role, namely assisting in pollinating flowers and in controlling populations of leaf and flower pests, especially caterpillars and insects (Santosa, 1995). The high abundance value of Perling minor (*Aplonis minor*) at station II is due to the large number of fruits that this species can use as a food source. This species is most often found in forest edge habitats, cultivated land, to mangroves and often performs activities in groups. Based on the IUCN (International Union for Conservation of Nature) status, Perling Perling is classified as Low Risk (Least Concern / LC) because of its relatively good distribution in nature. Residents

around used to call little Perling (*Aplonis minor*) as red eyes. The loss of forest trees and shrubs causes the loss of places for nesting, shelter and foraging for these birds.

The low abundance values for the two stations also have species differences. For station I the lowest abundance was the red-cheeked parrot (*Geoffroyus geoffroyi*). Meanwhile, for station II, the lowest abundance was several species, namely Pacific Bazaar (*Aviceda subcristata*), Wiwik Rimba (*Cacomantis variolosus*), Erasia king prawns (*Alcedo atthis*), Hornbill Irian (*Rhyticeros plicatus*), Moluccan parrot (*Eos borneo*), Pergam tarut (*Ducula concinna*). The low value of the abundance of these species is due to a lack of food sources, for example the Pacific Bazaar (*Aviceda subcristata*) which usually alight due to the process of searching for food, hunting by humans, also because of human activity around the observation site. For example the red-cheeked parrot (*Geoffroyus geoffroyi*), hornbill Irian (*Rhyticeros plicatus*), Maluku parrot (*Eos borneo*), the low abundance value of these species is due to their beauty value, which causes humans to often hunt. Besides that, the cause of the low abundance value of these species is because their lives tend to be solitary so that only a few are found in station II. From the results of this study, the species richness value at station I was 1.55 and at station II was 2.90. This indicates that the level of species richness is low, indicates a moderate level of species richness, indicates a high level of species richness. In this case the value of abundance greatly affects the richness of species in a community.

Diversity values at both stations belong to the criteria for moderate levels of species diversity with an average value of 1.74 indicating moderate levels of species diversity, sufficient productivity, fairly balanced ecosystem conditions, moderate ecological pressure (Rusmendo, 2009). According to Leksono (2007) that the greater the number of species with balanced proportions, the higher the diversity. And both of these stations have a number of species in balanced proportions. The level of species diversity is determined by the number of species and the total number of individuals. The number of individuals determines the diversity of species because the greater the number of individuals in a population, the more variation between individuals in the population, so that a community structure will be more diverse, and conversely the fewer the number of individuals in a population, the less variation between species in the population and causes a structure the community will not be diverse. Meanwhile, the dominance value at both stations is 0.24 which indicates a low dominance level. According to Rohiyani, et al, (2014) the greater the dominance index value, the greater the tendency for one species to dominate the population, conversely the smaller the dominance index value, the smaller the tendency for one species to dominate the population. This indicates that in this study there was no one species that tended to dominate, because the values for calculating the dominance of all species tended to be close to zero. the smaller the dominance value (D), the higher the species diversity value (H') so that a community structure will be more diverse.

Based on the results of the study also obtained an evenness value at each station, namely station I was 0.87 and station II was 0.72. The results of this study indicate that the evenness of the species at both stations is included in the high evenness. The average evenness of the two stations is 0.80 (high evenness) with an even distribution. According to Dewi, et al, (2007). High species evenness is caused by the absence of dominance of certain species. High diversity and evenness indicate the quality of an ecosystem is in good condition and vice versa if both are low then it indicates pressure or degradation of ecosystem quality.

## CONCLUSION

The structure of the diurnal bird community around the Wailoi River, Negeri Hila Kaitetu, Leihitu District, Central Maluku Regency, obtained 17 species of diurnal birds for both stations, namely the type of Trinil Beach (*Actitis hypoleucos*), Tiger Falcon (*Falco Severus*), Gray Flycatcher (*Myagra galeata*), Lorikeet red-cheeked (*Geoffroyus geoffroyi*), Common turtledove (*Streptopelia chinensis*), Jungle Wiwik (*Cacomantis variolosus*), Irian hornbill (*Rhyticeros plicatus*), Maluku parrot (*Eos borneo*), Erasia king prawn (*Alcedo atthis*), Pacific Baza (*Aviceda subcristata*), Little perling (*Aplonis minor*), Cekakak lazuli (*Halcyon lazuli*), Dotted flycatcher (*Muscicapa griseisticta*), Sriganti honey bird (*Nectarinia jugularis*), Asian Tuwur (*Eudynamys cyanocephala*), Black honey (*Nectarinia aspesia*), Pergam tarut (*Ducula concinna*). At station I with a total of 25 individuals with the highest abundance value, namely the black honey species of 0.40 ind/m<sup>2</sup> and at station II, diurnal birds with a total of 88 individuals were obtained with the highest abundance value, namely the small Perlins species of 0.41 ind/m<sup>2</sup>. With an average diversity value of 1.74, a dominance value of 0.24, and an evenness value of 0.80.

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