DIVERSITY AND ABUNDANCE OF UNDERSTOREY AVIFAUNA IN SECONDARY AND PRIMARY FOREST AT KUBAH NATIONAL PARK, SARAWAK

Arina Shahirah Ahmad Fauzi

Bachelor of Science with Honours (Animal Resource Science and Management) 2007
DIVERSITY AND ABUNDANCE OF UNDERSTOREY AVIFAUNA IN SECONDARY AND PRIMARY FOREST AT KUBAH NATIONAL PARK, SARAWAK

ARINA SHAHIRAH AHMAD FAUZI
11654

This dissertation is submitted in partial fulfillment of the requirements for the degree of Bachelor of Science with Honours (Animal Resource Science and Management Program)

Faculty of Resource Science & Technology
UNIVERSITY MALAYSIA SARAWAK
2007
DECLARATION

No portion of the work referred to this dissertation has been submitted in support of an application for another degree of qualification of this or any other university or institution of higher learning.

Arina Shahirah Ahmad Fauzi
Program of Resource Animals
Faculty of Resource Science and Technology
Universiti Malaysia Sarawak
# TABLE OF CONTENT

Acknowledgement

Table of Content

List of Figures

List of Tables

Abstract

Abstrak

1 Introduction
   1.1 Introduction
   1.2 Objectives

2 Literature Review
   2.1 Primary vs secondary forest
   2.2 Study on birds of Malaysian rainforest
   2.3 Different forest types provide different resources for birds

3 Materials and Method
   3.1 Study Site
   3.2 Sampling Method
   3.3 Data Analysis

4 Results
   4.1 Netting effort, diversity and relative abundance of avifauna.
   4.2 Effect of different forest type
   4.3 Effect of season
   4.4 Species with high conservation value
   4.5 Habitat characteristics of primary and secondary forest

5 Discussion

6 Conclusion and Recommendation

7 References
LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1:</td>
<td>Location of sampling sites at Kubah National Park.</td>
<td>12</td>
</tr>
<tr>
<td>Figure 2:</td>
<td>Record of primary forest characteristics.</td>
<td>23</td>
</tr>
<tr>
<td>Figure 3:</td>
<td>Record of secondary forest characteristics.</td>
<td>24</td>
</tr>
<tr>
<td>Figure 4:</td>
<td>Percentage of bird species that use primary and secondary forest.</td>
<td>27</td>
</tr>
</tbody>
</table>

LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 1:</td>
<td>Birds species netted in primary and secondary forest at Kubah National Park.</td>
<td>18</td>
</tr>
<tr>
<td>Table 2:</td>
<td>Bird species netted during the dry and wet season at Kubah National Park.</td>
<td>20</td>
</tr>
<tr>
<td>Table 3:</td>
<td>Composition of birds based on feeding guild (different forest).</td>
<td>25</td>
</tr>
<tr>
<td>Table 4:</td>
<td>Composition of birds based on feeding guild (different season).</td>
<td>29</td>
</tr>
</tbody>
</table>
ABSTRACT

A study on diversity and abundance of avifauna at primary and secondary forest at Kubah National Park was conducted using mist nets during dry season (27th-30th August) and wet season (18th-21st December) of 2006. Total netting effort was 2880 net-hours. A total of 152 birds comprising 41 species were caught. Of 41 species caught, 24 were caught in primary forest and 31 species were caught in secondary forest. The bird species composition in the secondary forest of Kubah National Park was different from that in the primary forest. A total of 35 species were caught during dry season compared to 19 species in the wet season. There was significant difference in Shannon-Weiner indices between the two seasons. Through this study, several protected and endemic species were caught.

Keyword: avifauna, primary forest, secondary forest, dry season, wet season

ABSTRAK


Kata kunci: burung, hutan primer, hutan sekunder, musim kering, musim hujan
1 INTRODUCTION

1.1 Background

Malaysia is home to some 746 species of birds (Butler, 1994a). Approximately, 370 species of birds occur in the forest of Malaysia and forest bird form over 60% of all birds recorded (Wells, 1988). Studies on avifauna at different type of forest have been done by numerous researches and it has been found out that lowland dipterocarp forest has the richest bird’s species (Wells, 1988). As the world develop, studies involving different types of habitat are valuable because the habitat loss is increasing over the years and habitat loss is the greatest threat to avifauna species survival and diversity maintenance. It is crucial to know what can make the avifauna survive in order to conserve them, protecting them from extinction.

Study on avifauna at different type of forest is very important nowadays as the number of secondary forest occur over the world is increasing. The major reason that causes this is human activities such as logging and shifting cultivation (Chokkalingam et al., 2001). According to Jarvis (1994), an estimation of 7.3 million hectare of tropical forest has been cleared each year for agriculture and another 4.4 million hectare more has been destroyed through logging. This has cause 12% of approximately 10000 birds to be threatened with extinction in the next 10 to 100 years and another 8% are near-threatened (Sekercioglu, 2002). It takes several years before the logged forest become primary forest again. It is important to know what animal species or avifauna species that can survive at the secondary forest as the secondary forest will become important in the future. Those that can exploit the secondary forest may be less affected by extinction (Navjot et al., 2004). Therefore, research on potential and opportunities of secondary forest as avifauna habitat has to be done as secondary forest provides
different types of resources for avifauna than the natural primary forest habitat (Chokkalingam et al., 2001).

Chokkalingam et al. (2001), suggest that the future goods and services that are obtain from tropical forests will increasingly have to come from the secondary forests. Several characteristics must be possessed by secondary forest to make it attractive to birds. A study has been done by Moyle and Wong (2002) and the high number of fruiting *Litsea cubica* trees in secondary forest attracts the frugivores and this is proven by the diverse number of frugivores in their study. Each bird species have their habitat preferences and birds might be present in other habitat types that fulfill their requirement. Another study made by Mohd Sah et al. (2001) also found out that many of the bird species observe at the undisturbed forests in his study were found to be regular visitors from nearby forests. One type of forest might be the best habitat for roosting and nesting and another type of forest is suitable for the birds to forage (Davis and Baldridge, 1987).

1.2 Objectives

The objectives of the study are:

a. To compare the diversity of avifauna between secondary forest and primary forest.

b. To compare the diversity of avifauna between dry season and wet season.

c. To make a record of habitat characteristics that attracts avifauna.
2 Literature Review

2.1 Primary vs secondary forest

Primary forest, which is considered as the most biologically diverse forests, is defined as forests with no noticeable signs of human activities (Butler, 1994a). Other definition for this virgin forest is forests that has never been cut down or at least, has only minimal logging that do not affect the forest defectively. According to Convention on Biological Diversity (2001), forests that are used slightly by native communities living traditional lifestyles are also considered as primary forest and in Europe the primary forest are referred to an area of forest land which has probably been endlessly wooded at least throughout historical times. In Malaysia, lands that are covered in primary forest have dropped significantly since 1970s and a statement made by Food and Agricultural Organization says that with total of more than 60% lands are covered in forest, only 11.6% of these forests are considered untouched (Butler, 1994a).

Generally, the forest that is classified as primary forest will usually have emergent trees, which is a tree that is more than 30 m high and the diameter at breast high (dbh) of the trees are one m or 100 cm with no signs of extensive felling. Besides that, other characteristics of primary forest are such as, having canopy trees and usually with several layer of understorey. The ground floor is also clear from heavy plant as there is little light passing through the canopy to the forest floor (Butler, 1994b).

Temuda forest, or else known as the secondary forest, has trees that are slightly smaller and shorter than trees that are found at the primary forest. A secondary forest is forest that is regenerating through natural process after extraction of timber from the
forest normally for agriculture and shows a major difference in forest structure and canopy species composition (Chokkalingam and de Jong, 2001). The secondary forest is usually a forest recovering from logging of primary forest and after clearing for shifting cultivations. This is equal to a statement made by (Butler, 1994b) that secondary forest can be a forest recovering from selective logging, to forest cleared by slash-and-burn agriculture.

In Malaysia, majority secondary forest type is the post-abandonment secondary forest. The post-abandonment secondary forest is forest generating largely through natural process after abandonment of alternative use such as agriculture on formerly forested lands (Chokkalingam and de Jong, 2001). The rainforest might have been disturbed either naturally or unnaturally and if there is no further disturbance, the secondary forest will become primary forest again but this process may take hundreds of years. According to Chokkalingam and de Jong (2001), the term secondary forest relates to forest that develop after clearing of the original forest, and secondary succession is complete when they develop again into primary forests. A report compiled by the Food and Agriculture Organization showed that in Asia, secondary forest covers approximately total of 88.3 m ha of land or 28% of all forested area (Anon, 2000).

In general, the trees at the secondary forest are often less than 10 m high with dbh less than 20 cm. Other than that, according to (Butler, 1994b), secondary forest is describe by a less developed canopy structure, smaller trees, and less diversity and due to the lack of a full canopy, more light can penetrate through the canopy to the forest floor. Therefore, there would be a dense of ground growth.
2.2 Study on birds in Malaysian rainforest.

Study on birds in Borneo is not new and has been started in the middle of 1850's when the great naturalist Alfred Russell Wallace collected samples of birds from Northern Borneo (MacKinnon and Phillipps, 1994). In addition to that, the first ever bird specimen has been recorded as reference collection in 1890 (Smythies, 1999). Approximately, 580 species of birds have been recorded from Borneo where more than 300 species are distinctive in tropical evergreen rainforest (Davison and Yen Fook, 2001). Moreover, out of 32 endemic forest birds, 8 are lowland species, 19 montane and 5 of hill slopes that extend up to mountain. Human are often attracted to the birds and found that birds are very interesting animal to study since they are beautiful, easy to observe and can be found everywhere, from the cold arctic to the tropics (Welty and Baptista, 1988; Gill, 1990). However, the distributions of the birds are limited globally and locally (Gill, 1990). By using different types of method, study on birds can be done easily, depends to the purpose of the study (Bibby et al. 1993).

Rahman et al. (2002) has conducted a study on avifauna at Upper Rejang, Sarawak in 1994 by using two type of method that is mist-netting and visual observing along marked transect. The purpose is to determine the distribution, species richness and density of avifauna at the Upper Rejang. The survey that has been made was divided into two periods that is from 17 June to 22 June 1994 and from 27 November to 6 December 1994 and the data obtain were analyzed for species richness, distribution, primary and secondary forest habitat and conservation status. From the analysis, 168 species of 39 families were recorded in the secondary type of forest and 55 species of 23 families were recorded in the primary forest.
Other than that, Rahman et al. (2001) has also done a study on bird diversity of Crocker Range National Park, Sabah in 1999 using mist-nets and transects method. In this study, comparisons of bird diversity were made between the primary and secondary forest. A total of 17 species of birds were caught in mist-net method with seven species were caught at the secondary forest and 13 species at the primary forest. From transects method, 51 species were recorded with 30 species recorded at the secondary forest and 33 species at the primary forest.

Tuen et al. (2000) has also conducted a study at Mount Santubong, Sarawak on distribution and abundance of small mammals and birds. The purpose of the study is to determine the effect of altitude and habitat disturbance on the distribution and abundance of small mammals and understorey birds at Mount Santubong. A total of 28 species of understorey birds has been recorded that is 13 species were captured at lower altitude, 12 species were captured at the middle and 12 species were captured at the summit. Besides that, 15 species were captured in the disturbed area and 12 species were captured in the undisturbed area.

Mohd Sah et al. (2001) conducted a brief survey of bird species at Mahua Basecamp and Ulu Senangang at Crocker Range National Park, Sabah. In the study, field observation and mist-net method were carried out in both primary and secondary forest. The one-day survey at the Mahua campsite recorded a total of 11 bird species from eight different families while the six-day field observation and mist-netting at both primary and secondary forest in Ulu Senangang recorded a total of 41 bird species from 18 families.

Moyle and Wong (2002) conducted a study on the lower montane avifauna in Mount Trus Madi. During the study, mist-nets were used and were placed at different sites
that is on a ridge line in primary forest, over a small streams, on slightly overgrown logging roads in secondary forest, on ridge of secondary forest and in secondary forest. Overall, 62 species of birds were netted and observe.

In the studies that have been done before, it can be concluded that birds do have their own habitat preferences. Different types of birds occur at different type of forest due to the differences in resources provided by the different type of forest. Each type of forest has their own special characteristics that made them preferable to the birds. Other than that, birds also prefer undisturbed forest as their habitat. All of this causes the differences in the birds' diversity, abundance and also distribution.

### 2.3 Different forest types provide different resources for birds.

Each species of birds, have their own habitat preferences. This is proven by a study that has been made by Rahman *et al.* (2002) where he stated that hornbills, which are arboreal canopy birds, prefer to inhabit the forest that provide big trees such as the kind found in primary forest because this type of forest provides food and shelter for them. Through the study, there are abundance of hornbills recorded which this also indicate the quality of the forest.

From another study of Rahman *et al.* (1995) at Kinabalu Park, it has been recorded that the sites that have shrubs and bushes that provide food and shelter have high density of birds. It is shown that availability of food and shelter are birds' preferences in choosing their habitat.
Different type of forest, provide different resources. One type of forest might be the best habitat for roosting and nesting and another type of forest is suitable for the birds to forage (Davis and Baldrige, 1987). Therefore, birds also occur in many type of forest though they still have the most preferable one. According to the study that has been made by Tuen et al. (2000), he concluded that the distribution and abundance of small mammals and understorey birds is not significantly affected by altitude or disturbance but by differences in resources provide by the site.

This is proven by the study of Rahman et al. (2001) where in this study, it has been found out that some species, such as the White-browed shama (Copsychus stricklandi), Little spidehunter (Arachnothera longirostra) and Magpie robin (Copsychus solaris) were found at both primary and secondary forest.

Mohd Sah et al. (2001) also made a conclusion that many of the bird species observe at the undisturbed forests in his study, were found to be regular visitors from nearby forests that these bird species are said to have occupied either habitats for their feeding and nesting activities. Many of the bird species found in his study could also be found in other habitat types.

Other than that, Madoc (1992) also stated that he made no attempt to separate birds at the two forests, that is the primary and the secondary forest. According to him, the same family occurs in both type of forest though many individual species display marked preferences for one habitat or the other.

Each type of forest has their own special characteristics that made them preferable by the birds. Characteristics such as trees that have fruits and flowers, old trees, nest and abundance of insects such as beetles, ants, butterflies and moths are said to be
important in attracting the birds. As for trees that have fruits and flowers, they are actually food resources for the birds. From the study made by Moyle and Wong (2002), the high number of fruiting Litsea cubica trees in secondary forest attract the frugivores and this is proven by the diverse number of frugivores in their study.

Klomp and Grabham (2002) stated that a higher level of floristic diversity at the remnant vegetation than all other is also the cause of high preferences by birds. Birds such as the frugivores, which plays role as seed dispersers and nectarivores, which plays role as pollinator depend to these types of resources. This type of resources is important as insectivore species of birds also do occasionally take small amount of fruits (Clout and Hay, 1989).

Despite that, insects such as ants, moths, butterflies and beetles are also food for birds and the abundance of insects at the forest will attract the insectivores. Forest with high number of rotting log has high number of beetles as the beetle larvae live in the log until it turns into adult (Castillo and Lobo, 2004). The denser the undergrowth, the higher number of beetles found since beetle hide there (Roe, n.d). For ants, the higher number of leaf litters on the forest floor shows the higher number of ants at the forest (BruHL et al., 1999). In the primary forest, the leaf litters is high and this provide the microhabitat and structural characteristics needed for forest ants (Schonberg et al., 2004).

Bill shape and size are clues to birds’ diet and birds’ diet depends on nutritional requirements which change with season and age (Partners in Flight, 2002). Feeding behavior also reflects the birds’ diet. For example, breeding adults and growing chicks need additional protein. According to Welty and Baptista (1988), insects are high in protein while fruits are high in calories. Foods that are consume by birds offer energy
to be use by birds in their daily activities. The higher the food resources, the higher the number of birds will be.

Old trees are also important as the indicator for birds. Birds such as the hornbills use the hole on old trees as their nest although for hole-nester, nesting requirement are specific and right locations may be hard to find (Wiens, 1989). Moreover, nest sites and roost locations are considered as resources because they can be limitation for the birds. This nesting location however, has received much less attention than food because for the cup-nesting species, suitable place to build nest are assumed to be readily available.

Disturbance by human also affect the differences in number of birds at different forest. Some birds might leave the disturbed area though some might not be affected at all. According to Tuen et al. (2000), the absence of true forest species in his study is due to the noise that can be heard into the forest. However, from the result obtain the number of birds at the disturbed area is slightly less than at the undisturbed area. He suggested that human visit during weekend daytime might be the cause.

The record on the Great argus (Argusimus argus) by Rahman et al. (2002) at both secondary and primary forest in Upper Rejang and Rahman et al. (2001) at primary forest at Crocker Range shows that the forest is totally undisturbed. In Moyle and Wong (2002) study however, there are no pheasant recorded due to the disturbance by human at the Mount Trus Madi since the past two decades. From another study by Rahman et al. (1995), fewer disturbances are also factor of high density of birds. This proven that most birds prefer undisturbed forest as habitat and avoid disturbed forest.
According to Wells (1988), forest gap could also be the reason why there are differences in number of bird species at different type of forest. From his study, he found out that fresh gap that is cause by tree-falls is large enough to bring the sunlight to the ground. Therefore, many shade-layer birds avoid this area although many canopy species are less disturb. Factors that contribute to the avoidance in certain birds might include sensitivity to high heat and natural behavior to avoid bright light.

According to Wiens (1989), most terrestrial environment goes through seasonal changes in habitat structure and food abundance and these changes also affect the number of birds that occur at different type of forest. Many tropical environments are seasonal but the changes are usually related with rainfall. Heavy rainfall may happen anywhere at any time of the year and this however, will still cause the birds to react to changes (Tjia, 1988). According to Whitmore (1988), Malaysia that is located around the equator will have cloudy and rainy climate and the general vegetation is tropical rain forest that is said to be most complex and have high species-richness. Therefore, there would be slightly different type of birds at different type of forest which have different degrees of structural complexity (Klomp and Grabham, 2002).
3 MATERIALS AND METHODS

3.1 Study Site

The study was conducted at Kubah National Park (latitude N 01° 36' 59.1", longitude E 110° 11' 43.2°). The national park is situated on a small sandstone plateau 119 m above sea level, 20 km to the west of Kuching. The 2230 hectare national park has altitude ranges from 20 meter to 911 meter and covers the eastern slope of Gunung Serapi. At the top of Gunung Serapi is a telecommunication station constructed about 30 year ago. This station could be accessed by road. Mixed dipterocarp forest is the main vegetation type but the presence of patches of scrubs and kerangas forest adds the variety to the habitat type for fauna. Forest was once cleared during the
construction of the road to the tower. But this has already regenerated into old secondary forest. Other plants of Kubah National Park has been logged and cleared for shifting agriculture but not recently (Gregory-Smith, 1997).

Two plots were chosen for this study. The first plot is old growth forest or the primary forest. It is located to the north-east of the Kubah National Park headquarters, along the Belian trail. The habitat is made up of trees species such as *Eusideroxylon zwageri* and *Dipterocarpus* spp. Most of the trees at the first plot are 20-35 m height and are 40-60 cm for diameter at breast height (dbh). Other plants that can be found are rattans and fruiting trees such as figs and rambutan. The second plot is secondary forest which is about 30 years old. The trees are about 20-40 cm dbh and about 10-20 m in height. This site is located to the south of headquarters about 2.5 km from the first plot, along the road to the summit of Gunung Serapi.

### 3.2 Sampling Method

Twenty mist-nets were put up at each primary and secondary site, giving a total of forty mist-nets for each season. For dry season sampling, mist-nets were put up starting from 27th to 29th August 2006 at primary forest and 27th to 30th August 2006 at secondary forest. Mist-nets were opened for 12 hours at primary forest that is from 0600 to 1800 for three days. At secondary forest, mist-nets were opened for 11 hours for three days and additional 3 hours on the fourth day to standardize the effort.

For wet season sampling, mist-nets were put up starting from 18th to 21st December 2006 at both primary and secondary forest. Mist-nets were opened for 10 hours at each site for two days, nine hours and seven hours respectively for the last two days.
Every two hours, the mist-nets were checked to reduce the number of badly entangled birds and reduce stress to the birds (McClure, 1988). Each bird that were caught, were weight, measured and were marked using banding ring with UNIMAS address written on it. Birds measurements were recorded in the field data sheet and then the birds were identified. Identification was based on Francis (2005), *A Pocket Guide to the Birds of Borneo* and MacKinnon and Phillips (1994), *Field Guide to the Birds of Borneo, Sumatra, Java and Bali*. After this, the birds were released.

A record on habitat characteristic was also made in this study. The characteristics that are taken into consideration are fruits, flowering plants, insects, birds’ nest and old trees. The habitat characteristics were recorded in the field data sheet. For fruits, the frequency was based on number of fruiting trees found, including fruits that were found on the ground. For insects, butterflies, moths and beetles were recorded as individual. Meanwhile, ants were recorded as number of colonies found. Frequency of birds’ nest and old trees were also recorded.

### 3.3 Data analysis

The total effort is presented as net hours and was calculated as follows:

\[
\text{Total effort} = \text{Number of nets} \times \text{Number of hours} \times \text{Number of days}
\]

\[
= 40 \text{ nets} \times 12 \text{ hours} \times 3 \text{ days}
\]

\[
= 1440 \text{ net hours}
\]
The relative abundance, \( P_i \) of each species was calculated by using formula:

\[
P_i = \frac{\text{Total number of individuals per species}}{\text{Overall number of captured individuals}}
\]

Shannon-Wiener index of species diversity \( (H') \) and evenness \( (J) \) were calculated as:

\[
H' = \sum_{i=1}^{s} P_i \log(P_i)
\]

where \( s \) is number of species present in sample area and \( P_i \) is proportion of total of sample belongs to the \( i \) species (Whittaker, 1975)

\[
J' = \frac{H'}{H_{max}}
\]

where \( H_{max} \) is maximum value of \( H' \) (Krebs, 1989).

DIVERS program was used to calculate the Shannon-Weiner and Evenness Index.

After the Shannon-Weiner Index and Evenness Index have been obtained, Zar t-test was used to test the following hypothesis:

Hypothesis 1

\( H_0 = \) There is no significant difference between the diversity of avifauna at the two forest types.

\( H_a = \) There is significant difference between the diversity of avifauna at the two forests types.
Hypothesis 2

\( H_0 = \) There is no significant difference between the diversity of avifauna during the two seasons.

\( H_a = \) There is significant difference between the diversity of avifauna during the two seasons.
RESULT

4.1 Netting effort, diversity and relative abundance of avifauna.

A total of 2880 hours of netting effort was expended during this study. Of the 2880 net hours, 1440 net hours were deployed for first sampling during the dry season (720 net, hours were deployed in each type of forest) while another 1440 net hours were deployed for second sampling during dry season.

Throughout this study, a total of 152 birds were caught, which comprise of 41 species from 16 families. Little spiderhunter, with 21 individuals, was the most abundant species caught during this study, with relative abundance of 0.138. Next was Yellow-bellied bulbul with relative abundance of 0.092, where during this study, 14 individual were caught. The third highest abundance is the Yellow-breasted flowerpecker with relative abundance of 0.066. During this study, a total of 10 individual were caught.

4.2 Effect of different forest type

A total of 66 birds, comprising 24 species from 11 families, were caught at primary forest while 83 birds, which comprise of 31 species of 12 families, were caught at secondary forest (Table 1). Capture rate was higher in secondary forest compared to primary forest. It was found that secondary forest has more diverse species of birds compared to primary forest. Based on the Shannon-Wiener Index calculated, the indices are 1.39 for secondary forest compared to 1.24 for primary forest. The secondary and primary forest differs significantly in term of species diversity at Kubah National Park (t = 2.75, p<0.05).
Table 1: Birds species netted in primary and secondary forest at Kubah National Park.

<table>
<thead>
<tr>
<th>Common name</th>
<th>Species a</th>
<th>Primary</th>
<th>Secondary</th>
</tr>
</thead>
<tbody>
<tr>
<td>COLUMBIIDAE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emerald dove</td>
<td>Chalcophaps indica</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>STRIGIDAE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reddish-scops owl</td>
<td>Otus rufescens</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>ALCEDINIDAE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rufous-backed kingfisher</td>
<td>Ceyx rufidorsus</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>MEGALAIMIDAE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Red-throated barbet</td>
<td>Megalaima mystacophanos</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>PICIDAE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rufous piculet</td>
<td>Sasia abnormis</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>EURYLAGIDAE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Green broadbill</td>
<td>Calyptomena viridis</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>PYCNONOTIDAE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black-headed bulbul</td>
<td>Pycnonotus atriceps</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>Grey-bellied bulbul</td>
<td>Pycnonotus cyaniventris</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Grey-cheeked bulbul</td>
<td>Alophoixus brevirostris</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Hairy-backed bulbul</td>
<td>Trichoeca criniger</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Olive-winged bulbul</td>
<td>Pycnonotus plumosus</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Red-eyed bulbul</td>
<td>Pycnonotus brunneus</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Spectacled bulbul</td>
<td>Pycnonotus erythropthalmos</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Yellow-bellied bulbul</td>
<td>Alophoixus phaeocephalus</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>DUCURIDAE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greater-racket tailed drongo</td>
<td>Dicrurus paradiseus</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>AEGITHINIDAE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian fairy bluebird</td>
<td>Irena puella</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>TIMLIDAE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black-capped babbler</td>
<td>Pellorneum capistratum</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Black-throated babbler</td>
<td>Stachyris nigriscolois</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Brown fulvetta</td>
<td>Alcippe brunneicida</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Chestnut-winged babbler</td>
<td>Stachyris erythropelia</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Fluffy-backed tit babbler</td>
<td>Macronous pilosus</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Grey-headed babbler</td>
<td>Stachyris poliocephala</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Moustached babbler</td>
<td>Malacopteron magnirostre</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Rufous-crowned babbler</td>
<td>Malacopteron magnius</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Scaly-crowned babbler</td>
<td>Malacopteron cinereum</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>White-chested babbler</td>
<td>Trichastoma rostratum</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>TURIDAE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chestnut-naped forktail</td>
<td>Enicurus ruficapillus</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>White-rumped shama</td>
<td>Copyyschus malabaricus</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>SYLVIDAE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arctic warbler b</td>
<td>Phylloscopus borealis</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Red-tailed tailorbird</td>
<td>Orthotomus sericeus</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>MUSCICAPIDAE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asian paradise flycatcher</td>
<td>Terpsiphone paradisi</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Black-naped monarch</td>
<td>Hypothymis azurea</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Bornean blue flycatcher</td>
<td>Cyornis superba</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Hill blue flycatcher</td>
<td>Cyornis banyumas</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Spotted fantail</td>
<td>Rhipidura perlata</td>
<td>-</td>
<td>2</td>
</tr>
</tbody>
</table>