Checklist of small vertebrates at Sime Darby Tangkah Estate, Tangkah, Johor

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Abstract. Oil palm plantations might possess lower species composition compared to forest or riparian areas. Therefore, this assessment is carried out at Sime Darby Tangkah Estate to assess small vertebrates’ composition adjacent to Gunung Ledang National Park. This survey was carried out at two sites: Plot 05A and Plot 18A, from 22rd to 25th October 2019. A transect line of 400 meters was set up at each plot for active trappings, with a total of 20 cage traps, 20 Sherman traps, five mist nets, and one harp trap were deployed. All trapped animals were identified, measured, photographed and released after being examined. Observations were also carried out using Binoculars. Based on this survey in plot 05A, eight species from five families of mammals and seven species from four families of birds were recorded. While in plot 18A, a total of 12 species from six families of mammals and seven species from seven families of birds were documented. Moreover, a total of 17 species of birds was observed during the survey. Oil palm may function as one of the forest buffers, requiring further monitoring and enforcement to prevent poaching and hunting of these resources.

1. Introduction
Sime Darby Plantations is one of the vast oil palm plantation industry in Malaysia. In Malaysia, oil palm plantation provides an alternative environment for small vertebrates to reside part from forest, which is their natural habitat [15]. Vertebrates, particularly small vertebrates, function as seed dispersers and bioindicators [11,18]. Small vertebrates are classified as such because their adult body weight is less than five kilograms [9].

Fortunately, some birds can still find a suitable replacement habitat in these agricultural regions [3]. This is because agricultural areas provide resources for some birds, such as food and adequate habitat. Although forest birds are in critical decline, some fringe species, such as Pycnonotus golavier (Yellow-vented Bulbul), may adapt and thrive in agricultural environments [19]. Fauzi and Ramli [4] stated most oil palm adapted birds are insectivores, as undergrowth such as bushes and shrubs provide insects (as food) and nesting and breeding places.

Malaysian Field Rat (Rattus tiomanicus), Ricefield Rat (R. argentiventer) and House rat (R. tanezumi) are three rat species commonly found in oil palm plantations in Peninsular Malaysia [26].
Hafidzi and Hafidzi et al. [8, 9] found that these species adapt well to the environment in and near oil palm plantations. Rats are common in oil palm plantations, due to food availability, because of the optimal environment given for reproducing and hiding from predators [8]. Numerous researches on the abundance, behaviour, habitat and biological management of rats in oil palm plantations have been conducted [26, 6, 20, 23]. The majority of this research focused on the ecological and temporal changes of rat populations in oil palm plantations.

Bats are vital pollinators, seed dispersers, and insect controllers in the forest [14, 5, 22]. *Cynopterus brachyotis* (Lesser Dog-Faced Fruit Bat) and *C. horsfieldii* (Horsfield’s Fruit Bat) are the dominant species in the oil palm plantation [10]. They are well-adapted to their surroundings, allowing them to take advantage of the numerous available shelters. These species will usually sleep in any cavity, including caves, trees, rock shelters, hollow trees, drains, and culverts [13].

To date, there is a scarcity of knowledge on small vertebrates in Tangkah Plantation. These surveys were carried out to collect baseline data on small vertebrates from this plantation. This information will be used to formulate strategies for sustainable production and biodiversity conservation, especially for the estate managers.

2. Materials and Methods
This survey was carried out at two sites: Plot 05A and 18A, located at Sime Darby Tangkah Estate. This rapid survey was conducted from 22nd to 25th October 2019. The majority of this survey consisted of active trappings and observations. A transect line of 400 meters was set up at each site for active trappings, with deploying a total of 20 collapsible cage traps, 20 Sherman traps, five mist nets, and one harp trap. The collapsible cage traps and the Sherman traps were baited with oil palm fruits to capture the non-volant small mammals. Collapsible cage traps (42 x 17 x 17 cm) and Sherman traps (24 x 8 x 9 cm) were installed alternately on the ground. Non-volant mammals have at least five essential measurements were recorded such as total length (TL), head body (HB), hindfoot (HF), ear (E), and weight.

A total of 5 mist nets were used to capture understory birds. The captured individuals were measured for their bill depth (BD), bill width (BW), bill length (BL), head-bill length (HB), wingspan (WS), wing length (WL), tail (T), tarsus (TR), total length (TL), and weight. Harp trap and mist nets were used to capture bats. The measurements were recorded for forearms (FA), ear (E), tail (T), and weight for each individual. The mist nets and harp trap were set randomly along the line transect and nearby streams within the surveyed areas. Additionally, direct observations were carried out using binoculars.

3. Results and Discussions
One hundred six individuals comprising 13 species of small mammals and 14 species of birds were documented in plot 05A and 18A. Besides that, 16 species of birds (Table 1) were observed near Tangkah Plantation plot 05A and Gunung Ledang National Park.

Table 1. Checklist of Birds Observed at Observation Tower Located near Tangkah Plantation Plot 05A and Gunung Ledang National Park.

| No | Families          | Scientific Name       | Common Name                  | Protection Status – WCA 2010 | Conservation Status - IUCN |
|----|-------------------|-----------------------|-------------------------------|-----------------------------|----------------------------|
| 1  | Accipitridae      | *Spilornis cheela*    | Crested Serpent Eagle         | TPa                         | LCb                        |
| 2  | Bucerotidae       | *Buceros rhinoceros*  | Rhinoceros Hornbill           | TP                          | VUc                        |
| 3  | Bucerotidae       | *Rhyticeros undulates*| Wreathed Hornbill             | TP                          | VU                         |
| 4  | Campephagidae     | *Pericrocotus igneus* | Fiery Minivet                 | TP                          | NTd                        |
A total of 89 individuals of mammals (Table 2 and 3) were captured in this survey. Eight species of mammals from five families were recorded from plot 05A while a total of 12 species of mammals from six families were documented in plot 18A. The most abundance mammals with a total of 39 individuals was *Eonycteris spelaea* (Dawn Bat) documented in plot 05A and 18A. *E. spelaea* is one of three nectivorous bats found in Peninsular Malaysia, and it may be found in both urban and rural areas [16]. *E. spelaea* that feeds on nectar and pollen and, as a result, assists in pollination [22]. The diet of the Dawn bat includes approximately 55 plant species in Malaysia [17]. *Hipposideros bicolor* (Bicolored Leaf-Nosed Bat) was the recorded the second most abundant in this survey, especially in disturbed forest areas. It is a forest species that prefers primary forest [24]. According to the International Union for Conservation of Nature (IUCN) Red List of Threatened Species assigns both *Eonycteris spelaea* [25] and *Hipposideros bicolor* [13] as Least Concern (LC) due to a stable population.

**Table 2.** Checklist of Mammals diversity at Tangkah Plantation Plot 05A.

| No | Families            | Scientific Name         | Common Name                           | Individuals | Protection Status – WCA 2010 | Conservation Status – IUCN |
|----|---------------------|-------------------------|---------------------------------------|-------------|-----------------------------|----------------------------|
| 1  | Hipposideridae      | *Hipposideros armiger*  | Great Himalayan leaf-nosed bat        | 1           | NP<sup>a</sup>              | LC<sup>b</sup>             |

<sup>a</sup>TP: totally protected species
<sup>b</sup>LC: least concern
<sup>c</sup>VU: vulnerable
<sup>d</sup>NT: near threatened
<sup>e</sup>NP: not protected
<sup>f</sup>PR: protected species
Table 3. Checklist of Mammals diversity at Tangkah Plantation Plot 18A.

| No. | Families      | Scientific Name                  | Common Name                  | Individuals | Protection Status – WCA 2010 | Conservation Status - IUCN |
|-----|---------------|----------------------------------|------------------------------|-------------|------------------------------|----------------------------|
| 1   | Hipposideridae| *Hipposideros bicolor*           | Bicolored Leaf-nosed Bat     | 16          | NP<sup>a</sup>              | LC<sup>b</sup>             |
| 2   |                | *Hipposideros larvatus*          | Horsefield Leaf-Nosed Bat    | 2           | NP                           | LC                         |
| 3   | Muridae       | *Rattus tiomanicus*              | Malaysian Field Rat          | 1           | NP                           | LC                         |
| 4   | Pteropodidae  | *Maxomys rajah*                  | Brown Spiny Rat              | 3           | NP                           | VU<sup>c</sup>             |
| 5   |                | *Rattus tanezumi*                | House Rat                    | 1           | NP                           | LC                         |
| 6   |                | *Eonycteris spelaea*             | Dawn Bat                     | 27          | NP                           | LC                         |
| 7   | Rhinolophidae | *Cynopterus brachyotis*          | Lesser Dog-faced Fruit Bat   | 3           | NP                           | LC                         |
| 8   |                | *Chironax melanocephalus*        | Black-capped Fruit Bat       | 1           | NP                           | LC                         |
| 9   | Rhinolophidae | *Rhinolophus affinis*            | Intermediate Horseshoe Bat   | 7           | NP                           | LC                         |

<sup>a</sup>NP: not protected  
<sup>b</sup>LC: least concern  
<sup>c</sup>VU: vulnerable  
<sup>d</sup>LC: least concern  
<sup>e</sup>PR: protected species
A total of 17 individuals of birds (Table 4 and 5) were captured in this survey. A total of seven species of birds from four families were documented from plot 05A, while seven species of birds from seven families were recorded from plot 18A. Occurrences a total of two individuals each of *Halcyon smyrnensis* (White-throated Kingfisher) and *Pycnonotus goiavier* (Yellow-vented Bulbul) were recorded in plot 05A and 18A. According to the IUCN Red List of Threatened Species assigns *H. smyrnensis* [1] and *P. goiavier* [2] as Least Concern (LC).

**Table 4.** Checklist of Birds diversity at Tangkah Plantation Plot 05A.

| No | Families       | Scientific Name              | Common Name                  | Individuals | Protection Status – WCA 2010 | Conservation Status - IUCN |
|----|----------------|------------------------------|------------------------------|-------------|------------------------------|------------------------------|
| 1  | Chloropseidae  | *Chloropsis moluccensis*     | Blue-winged leafbird         | 1           | TPa                          | LCb                          |
| 2  | Hirundinidae   | *Hirundo javanica*           | House swallow                 | 1           | NPc                          | LCc                          |
| 3  | Muscicapidae   | *Ficedula zanthopygia*       | Yellow-rumped flycatcher      | 1           | TPa                          | LCb                          |
| 4  | Cyornis brunneatus | *Cyornis brunneatus*           | Brown-chested jungle-flycatcher | 1           | TPa                          | VUb                          |
| 5  | Larvivora cyane | *Larvivora cyane*            | Siberian Blue robin           | 1           | TPa                          | LCb                          |
| 6  | Pycnonotidae   | *Pycnonotus simplex*         | Cream-vented bulbul           | 1           | TPa                          | LCb                          |
| 7  | Pycnonotus plumosus | *Pycnonotus plumosus*       | Olive-winged bulbul           | 1           | TPa                          | LCb                          |

| No. of Individuals | 66 |
|--------------------|----|
| No. of Species     | 12 |
| No. of Families    | 6  |

aTP: totally protected species (TP)
bLC: least concern
cNP: not protected
dVU: vulnerable
Table 5. Checklist of Birds diversity at Tangkah Plantation Plot 18A.

| No | Families        | Scientific Name                  | Common Name            | Individuals | Protection Status – WCA 2010 | Conservation Status - IUCN |
|----|-----------------|----------------------------------|------------------------|-------------|-------------------------------|-----------------------------|
| 1  | Alcedinidae     | *Halcyon smyrnensis*             | White-throated kingfisher | 2           | TP                           | LC                         |
| 2  | Hirundinidae    | *Hirundo rustica*                | Barn Swallow           | 1           | TP                           | LC                         |
| 3  | Laniidae        | *Lanius triginus*                | Tiger shrike           | 1           | TP                           | LC                         |
| 4  | Laniidae        | *Lanius cristatus*               | Brown shrike           | 1           | TP                           | LC                         |
| 5  | Muscicapidae    | *Larvivora cyane*               | Siberian Blue robin    | 1           | TP                           | LC                         |
| 6  | Pycnonotidae    | *Pycnonotus goiavier*            | Yellow-vented bulbul   | 2           | NP                           | LC                         |
| 7  | Scotocercidae   | *Horornis flavolivaceus*         | Aberrant bush-warbler  | 1           | NP                           | LC                         |
| 8  | Tytonidae       | *Phodilus badius*                | Oriental Bay owl       | 1           | TP                           | LC                         |

| No. of Individuals | 10 |
| No. of Species     | 7  |
| No. of Families    | 7  |

*a*TP: totally protected species  
*b*LC: least concern  
*c*NP: not protected

Figure 1. Comparison of mammal diversity between Plot 05A and 18A.
There are several species such as *Gracula religiosa* (Common Hill Myna), *Tupaia glis* (Common Treeshrew), and *Phodilus badius* (Oriental Bay Owl) are protected under the Wildlife Conservation Act 2010 (Act 716). Therefore, these habitats must be protected and conserved to ensure the survival of small vertebrate population from poaching.

4. Conclusion
This survey presented a preliminary checklist of small vertebrates, especially for small mammals and birds, at this plantation. Therefore, it does not reflect the true diversity of the area. With longer monitoring and consistent sampling with a higher number of plots, trapping nights, and trapping efforts, it is expected that more species may be documented for Tangkah Plantation.

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