Checklist on small vertebrates at Kuala Langat North Forest Reserve, Selangor, Malaysia

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Abstract. A survey was conducted in Kuala Langat North Forest Reserve, Selangor from 24 to 28 February 2020. The main objective of this survey is to document the small vertebrates information from this area. There were two harps and 10 mist nets deployed to capture the bats, with an addition of 50 collapsible cage traps placed along the transect line of 500 metres for the trapping of non-volant small mammals. The collapsible cage traps were baited with oil palm seed. The observation of avifauna and active searches for herpetofauna were also carried out. A total of eight small mammal species from four families, 19 species of avifauna from 13 families, and eight species of the herpetofauna from five families were documented. There is not much information on small vertebrates at Kuala Langat North Forest Reserve that has been recorded. With this information, it is hoped that a long-term study can be carried out and an effective management plan can be formulated to conserve this forest reserve.

1. Introduction
Kuala Langat North Forest Reserve, or in short KLNFR, mainly comprises peat swamp forest with smaller areas of lowland dipterocarp forest. It was first gazetted as a forest reserve in 1927, which covered an area of 7,246.96 hectares. The peatlands serve several purposes: preserving global biodiversity, providing safe drinking water, minimizing flood risk, and also helps in addressing climate change [1]. The importance of conserving the KLNFR includes supporting rare species such Selangor pygmy flying squirrel (Petaurillus kinlochii), Malayan sun bear (Helarctos malayanus), and meranti bakau (Shorea uliginosa). Moreover, this forest has become the cultural heritage for local indigenous communities from the Temuan tribe, and it has been their home for more than 150 years.

About 40% of the reserve loss to forest fire, and the Selangor State Government proposed to degazette about 930.93 ha (97%) of the remaining area for development purposes. The justification from the state government implies that the development project on the forest area would reduce the forest fire from spreading. This reserve serves as an important store for carbon due to the accumulation of organic matter. The forest clearing would cause the oxidation process to occur, releasing massive carbon amounts into the atmosphere.
To initiate the conservation effort of this forest, on 5th February 2020 the Selangor State Forestry Department has invited stakeholders in the Kuala Langat district to present their objections to the development proposal within 30 days. As a supportive action towards this movement, FRIM has conducted a sampling session to provide the biodiversity data. The main objective of this survey is to document and update the diversity of small vertebrates, especially small mammals, avifauna, and herpetofauna occupied at this reserve.

2. **Methodology**

A sampling protocol was carried out for five days. A line transect of 500 metres was constructed, with 50 collapsible cage traps used to trap the small mammals, especially rodents and other terrestrial mammals, except bats. Each trap was deployed along the transect with an interval of 10 m between the two traps. The cage traps were placed on the ground, near the tree stump or recumbent logs. All the traps were baited with oil palm fruit. During the sampling session, the traps were left open throughout the day and night, and the traps' checking was done early in the morning (0800 hours to 1000 hours). Two harps and 10 mist nets were deployed in potential fly paths to trap insectivorous bats, fruit bats and birds. The checking on the harp traps and mist nets was done daily in the morning in the range 0730 hours to 1030 hours. The mammals or birds trapped were removed gently and placed inside a cloth bag before the examination process. The sampling session for the herpetofauna was done in two nights. Any herpetofauna detected on sight were obtained by direct capture.

Moreover, the observation on the presence of avifauna was also conducted. Live weight of each animal was obtained before euthanization by using the chloroform and identification to the species level. Identification of the species level was made by measuring the length of particular body parts and observing their morphology and distribution.

3. **Results and Discussion**

A total of 35 species were documented in KLNFR, which comprise eight species of small mammals, 19 species of birds, and eight species of herpetofauna. The number of individuals captured was highest in a small mammal, 21 individuals, followed by 10 and eight for herpetofauna and birds, respectively.

Among 21 individuals of small mammals obtained from the sampling session, there were six non-volant small mammals: two species from the Muridae family and four species from the Sciuridae family. The highest number of individuals recorded for non-volant small mammals was seven individuals of Müller's Sundamys (*Sundamys muelleri*). Of all the rodents that were classified under Least Concern (LC) for IUCN Redlist of Threatened Species, only shrew-faced squirrel (*Rhinosciurus laticaudatus*) was classified under Near Threatened (NT) (Table 1).

One species of fruit bat from the Pteropodidae family and one species of insectivorous bat from Rhinolophidae family were identified for bats. Four individuals of trefoil horseshoe bat (*Rhinolophus trifoliatus*) and only one individual of lesser dog-faced fruit bat (*Cynopterus brachyotis*) were identified. Between these two species, only trefoil horseshoe bat was classified under Near Threatened (NT), while the other one was classified under Least Concern (LC).

Eight individuals were successfully captured by the mist nets trapping method for avifauna, and 11 species were identified through observation (Table 2). The Cuculidae family had the highest number of species recorded, four species (21.05%). All the birds' species were listed under Least Concern (LC) for IUCN Redlist conservation status, except for chestnut-bellied Malkoha (*Phaenicophaeus sumatranus*) and long-tailed parakeet (*Belocerus longirostra*), which classified under Near Threatened (NT) and Vulnerable (VU), respectively.

Herpetofauna recorded 10 individuals with 8 species and comprised five families (Table 3). Results for the sampling of herpetofauna were as follows; two species of Agamidae family, one species of Dicroglossidae (observation), three species of Ranidae, one species of Rhacophoridae, and one species
of Phytonidae. All of the species were classified under Least Concern (LC), except for forest crested lizard (Calotes emma) and common garden lizard (Calotes versicolor), in which there was no classification for these two species yet.

Table 1. List of small mammals and its abundance in Kuala Langat North Forest Reserve, Selangor.
IUCN=International Union for Conservation of Nature; LC=Least Concern; NT=Near Threatened.

| No. | Family        | Common Name                  | Scientific Name     | N  | IUCN Status |
|-----|---------------|------------------------------|---------------------|----|-------------|
| 1   | Muridae       | Müller’s Sundamys            | Sundamys muelleri   | 7  | LC          |
| 2   |              | Malaysian field rat          | Rattus tiomanicus   | 1  | LC          |
| 3   | Pteropodidae  | Lesser dog-faced fruit bat   | Cynopterus brachyotis | 1  | LC          |
| 4   | Rhinolophidae | Trefoil horseshoe bat        | Rhinolophus trifoliatus | 4  | NT          |
| 5   |              | Slender squirrel             | Sundasciurus tenuis | 2  | LC          |
| 6   | Sciuridae     | Three-striped ground squirrel| Lariscus insignis    | 1  | LC          |
| 7   |              | Shrew-faced squirrel         | Rhinosciurus laticaudatus | 3  | NT          |
| 8   |              | Plantain squirrel            | Callosciurus notatus | 2  | LC          |

No. Family | 4
No. Species | 8
No. Individuals | 21

Table 2. List of birds and their abundance in Kuala Langat North Forest Reserve, Selangor.; LC=Least Concern; NT=Near Threatened; VU=Vulnerable.

| No. | Family        | Common Name                  | Scientific Name     | N  | IUCN Status | Remarks |
|-----|---------------|------------------------------|---------------------|----|-------------|---------|
| 1   | Accipitridae  | Black baza                   | Aviceda leuphotes   | 1  | LC          |         |
| 2   | Spilornis cheela | Crested serpent-eagle      |                     |     | LC          | Observation |
| 3   | Cuculidae     | Greater coucal               | Centropus sinensis  | LC | Observation |
| 4   |              | Square-tailed drongo-cuckoo | Surniculus lugubris | LC | Observation |
| 5   | Cuculidae     | Chestnut-bellied malkoha     | Phaenicophaeus sumatranus | NT | Observation |
| 6   | Cuculidae     | Western koel                 | Eudynamys scolopaceus | LC | Observation |
| 7   | Columbidae    | Pink-necked green pigeon     | Treron vernans      | LC | Observation |
| 8   | Dicaeidae     | Scarlet-backed flowerpecker  | Dicaeum cuentatum   | LC | Observation |
| 9   | Eurylaimidae  | Banded broadbill             | Eurylaimus harterti | 1  | LC          |
Table 3. List of herpetofauna and its abundance in Kuala Langat North FR, Selangor.; LC=Least Concern.

| No. | Family       | Common Name               | Scientific Name               | N  | IUCN | Remarks       |
|-----|--------------|---------------------------|-------------------------------|----|------|---------------|
| 1   | Agamidae     | Forest crested lizard     | Calotes emma                  | 1  |      |               |
| 2   |              | Common garden lizard      | Calotes versicolor            | 1  |      |               |
| 3   | Dicroglossida| Asian grass frog          | Fejervarya limnocharis        |    | LC   | Observation   |
| 4   | Ranidae      | White-lipped frog         | Chalcorana labialis          | 2  | LC   |               |
| 5   |              | Common green frog         | Hylarana erythraea           | 2  | LC   |               |
| 6   |              | Rough-sided frog          | Pulchrana glandulosa         | 1  | LC   |               |
| 7   | Rhacophoridae| Common tree frog          | Polypedates leucomystax      | 2  | LC   |               |
| 8   | Pythonidae   | Reticulated python        | Malayophyton reticulatus     | 1  | LC   |               |
|     | No. Family   |                           |                               |    |      | 5             |
|     | No. Species  |                           |                               |    |      | 8             |
For the non-volant small mammals in this study, Müller's Sundamys (*Sundamys muelleri*) was the common species recorded. The appearances of its upper parts and flanks are brownish, with the fur is long and rough, and the under parts are pale. These species occur in lowland habitat, primary and secondary forest [2].

As for volant small mammals, more individuals from insectivorous bats were recorded than the fruit bats. *Rhinolophus trifoliatus* has a head-body length ranging from 514 to 650 mm, and its nose leaf is yellow or yellowish-brown. This species can be typically found in primary and secondary tropical moist forests, mainly in lowland areas [3].

The avifauna recorded two species that do not include under Least Concern. *Phaenicophaeus sumatranus* was listed under Near Threatened (NT) in 2008 [4]. It is an arboreal bird with dark glossy green mantle plumage with grey crown, throat, and breast. It can be found in lowland rainforests and mangroves. *Belocercus longicaudus* was categorized under Vulnerable (VU) due to habitat loss [5]. Appears to have sage green plumage and yellow at undersides of the wings and can be found in lowland habitat, forests, swamps and mangrove area where it feeds on fruits, seeds, flowers and leaf buds [6].

The Ranidae family dominated the herpetofauna. *Chalcorana labialis* can be found ranging from primary forest, degraded secondary forest, vegetation by the river, cultivated or plantation, and swampy areas in the forest [7]. *Hylarana erythraea* was a small to medium-sized frog with bright to dark green colour dorsally and laterally and can be found in natural grasslands, open areas, and disturbed habitats [8, 9]. *Pulcharana glandulosa* was a medium-sized to large species of frog and had a broad head and prominent eyes. The colour ranges from brown to brown dark with dark spots on the back. This species inhabits primary forests and coastal mangroves [10, 11].

4. Conclusions
From the checklist generated, KLNFR is a critical habitat that houses many species of small vertebrates. Although most of the species recorded are generic species, this record can become potential baseline information as it is one of the earliest records in KLNFR. It can be improved with more sampling efforts, such as increasing the number of trapping sites and sessions, higher number of traps to be deployed, and variety of trap placement.

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