

## **CHECKLIST OF AVIFAUNA AT SELECTED ECOLOGICAL CORRIDORS IN PENINSULAR MALAYSIA**

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### **ABSTRACT**

Thirty-seven ecological corridors have been identified in the Central Forest Spine (CFS) Master Plan. Of these, Pantii Forest Reserve– Ulu Sedili Forest Reserve (PL3) and Sungai Yu Forest Reserve–Tanum Forest Reserve (PL1) which are located in Johor and Pahang respectively are among the important ecological corridors in Peninsular Malaysia. The main objective of this paper is to provide a preliminary checklist of avifauna at these corridors. Ten mist nets were set up at each forest reserve for five-sampling nights, respectively. Inventories were carried out from March to September 2017. Overall, from Pantii and Ulu Sedili Forest Reserves, 203 individuals from 59 species were recorded while Sungai Yu and Tanum Forest Reserves documented 129 individuals from 45 species. Of these, 18 species are categorised as Near Threatened, and one species each under the Vulnerable category in PL3; while in PL1, 12 species under the Near Threatened category were recorded. Weather, fruiting season and vast resources may affect the number of species captured. Based on this information, further action must be taken to conserve these fragmented forest reserves as a habitat for the valuable avifauna species.

**Keywords:** Avifauna, Ecological Corridors, Central Forest Spine, Pantii - Ulu Sedili FR, Sungai Yu - Tanum FR.

*Received (28-February-2018); Accepted (14-May-2019); Available online (11-October-2019)*

**Citation:** Alwani, N.Z., Shahfiz, M.A., Faradiana, N.M.F., Nor Hazwani, A.R. & Kaviarasu, M. (2019). Checklist of avifauna at selected ecological corridors in Peninsular Malaysia. *Journal of Wildlife and Parks*, **34**: In press.

### **INTRODUCTION**

Birds in Malaysia can be categorised into endemic, resident, migratory and introduced species. Endemic species are described as species that only exist locally while resident birds are species that can be found locally and also in other countries. Migratory birds are species that breed in the northern hemisphere during the northern spring to summer and fly southwards to new feeding grounds before winter and returning during spring the following year. On the other hand, introduced species are species that were introduced locally as a consequence of direct or indirect human actions (Denis, 2018). In Malaysia, a total of 785 avian species belonging to 97 families are recorded, of which 670 species can be found in Peninsular Malaysia (MNS Bird Conservation Council, 2005). Of these, 549 species are recorded in Johor while 602 species

are recorded in Pahang (Clements *et al.*, 2018). Approximately 90% of the bird species in Malaysia inhabit the tropical forest (Wells, 1988) and different bird requires different habitat to live which is a combination of life requirement such as sufficient space, food, water and shelter (U.S. Fish and Wildlife Service, 2002).

Forest fragmentation has been identified as one of the most pervasive and deleterious processes occurring in the tropics that lead to loss of biodiversity (Gascon *et al.*, 2000; Brooks *et al.*, 2002; Hanski, 2005; Groom *et al.*, 2006). This process has caused fragmentation and isolation of forest which were caused by nature or human activity. Naturally, the habitat is fragmented due to climatic effects and geological processes. However, vast land-use conversion by human activities such as deforestation and urban development usually impacts large areas over short periods (Regional Planning Division Department of Town and Country Planning, 2009). Thus, creating connectivity by ecological corridors in Peninsular will provide more habitat requirements to live for wildlife, especially birds (Shahfiz *et al.*, 2013).

The Central Forest Spine (CFS) is formulated to address issues relating to forest fragmentation. The importance of this initiative is mainly to conserve biodiversity via protecting Environmentally Sensitive Areas (ESAs) such as water catchments area. Moreover, with this initiative, nature-based tourism can be explored, and other potential ecosystem services can be identified. Thirty-seven ecological corridors have been identified to connect four major forest complexes in Peninsular Malaysia (Regional Planning Division Department of Town and Country Planning, 2009). Of these, Primary Linkage-3 (PL3) located in Panti Forest Reserve – Ulu Sedili Forest Reserve, Johor and Primary Linkage-1 (PL1) located in Sg. Yu Forest Reserve – Tanum Forest Reserve, Pahang are among important corridors for large mammals, particularly for tigers and elephants.

Panti Forest Reserve – Ulu Sedili Forest Reserve constitutes of lowland dipterocarp forest, peat swamp forest, hill dipterocarp forest and lower montane forest (Go *et al.*, 2006) covering an area approximately 10,879 ha with altitude ranging from 122 m to 834 m (Chow & Lum, 2009). The majority of the birds recorded are resident species like bulbuls, broadbills, babblers, hornbills, and sunbirds that breed within the reserve together with a substantial number of migratory species like flycatchers, thrushes, and warblers (Lum, 2012). Both forest reserves (FRs) are connected only by a narrow bottleneck of state land forest with both side have been cleared for agriculture (Regional Planning Division Department of Town and Country Planning, 2009). Sg. Yu Forest Reserve – Tanum Forest Reserve, on the other hand, is a lowland dipterocarp and the mixture of primary and secondary forest and both FRs are fragmented by road networks connecting Kuala Lipis to Gua Musang (Regional Planning Division Department of Town and Country Planning, 2009). It is located adjacent to the Merapoh entrance of Taman Negara National Park (TNNP) that covers three states, namely Pahang, Kelantan and Terengganu, with a total area of 434,351 ha in which 57% of the area is located in Pahang. A total of 479 species of birds were recorded in TNNP including species such as the Malayan Peacock Pheasant, Moustached Hawk-Cuckoo and Reddish Scops Owl (UNESCO, 2014).

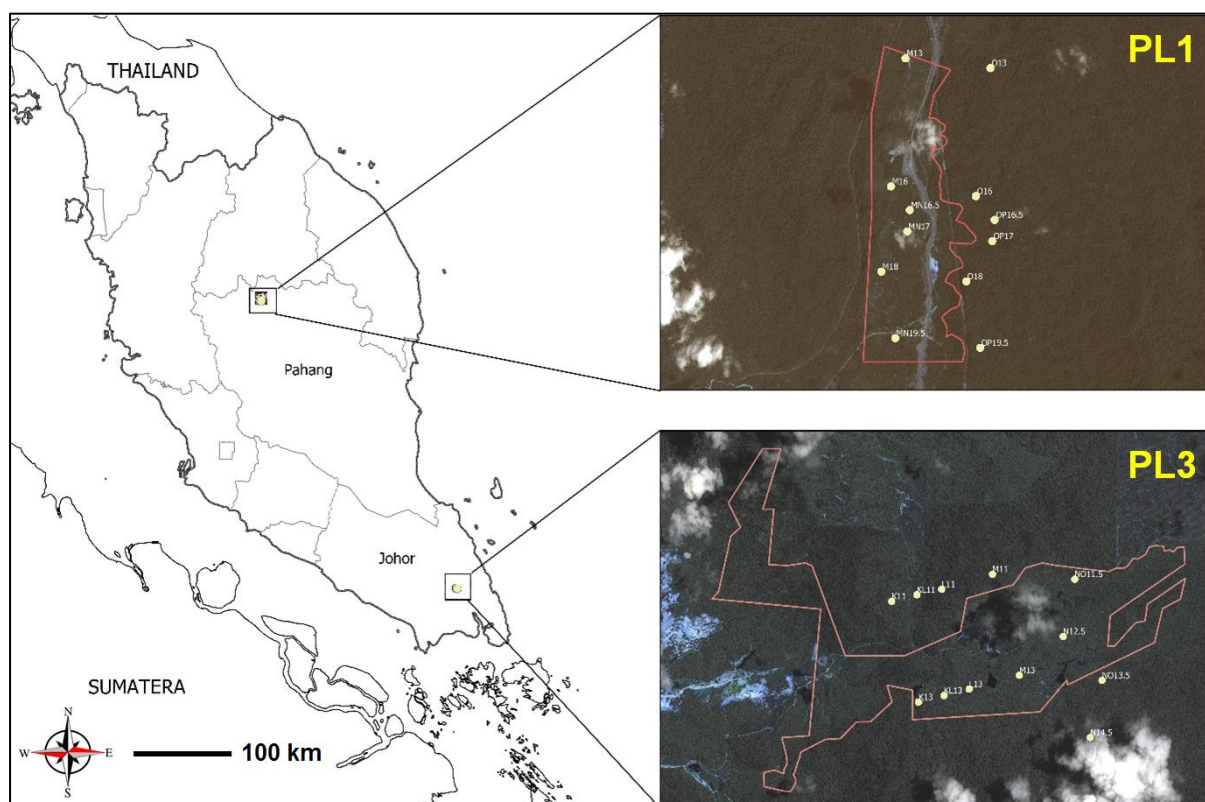
The importance of protected areas and FRs to the survivability of big mammals in Peninsular Malaysia are paramount. However, the diversity of other vertebrates, particularly avifauna, are equally important but yet information of these animal taxa are scarce, especially at PL1. For PL3, several surveys were conducted at Panti Forest Reserve in 2006 during scientific expeditions involving several institutions in Malaysia such as Universiti Sains Malaysia,

PERHILITAN, Universiti Kebangsaan Malaysia and Malaysian Nature Society (Johor branch). Meanwhile, in PL1, there are no records of avifauna documented.

Therefore, the main objective of this study is to provide a preliminary checklist of avifauna at these selected ecological corridors using the mist-netting technique. Furthermore, this information is important for stakeholders to manage, undertake further conservation actions and maintain the richness of avifauna at these reserves.

## METHODOLOGY

Surveys were carried out at two ecological corridors namely; PL3 Panti Forest Reserve – Ulu Sedili Forest Reserve located in Johor and PL1 Sungai Yu Forest Reserve – Tanum Forest Reserve located in Pahang (Figure 1). Panti Forest Reserve has been designated as the Gunung Panti Bird Sanctuary (1,200 ha) recorded over 230 species of birds (Regional Planning Division Department of Town and Country Planning, 2009).



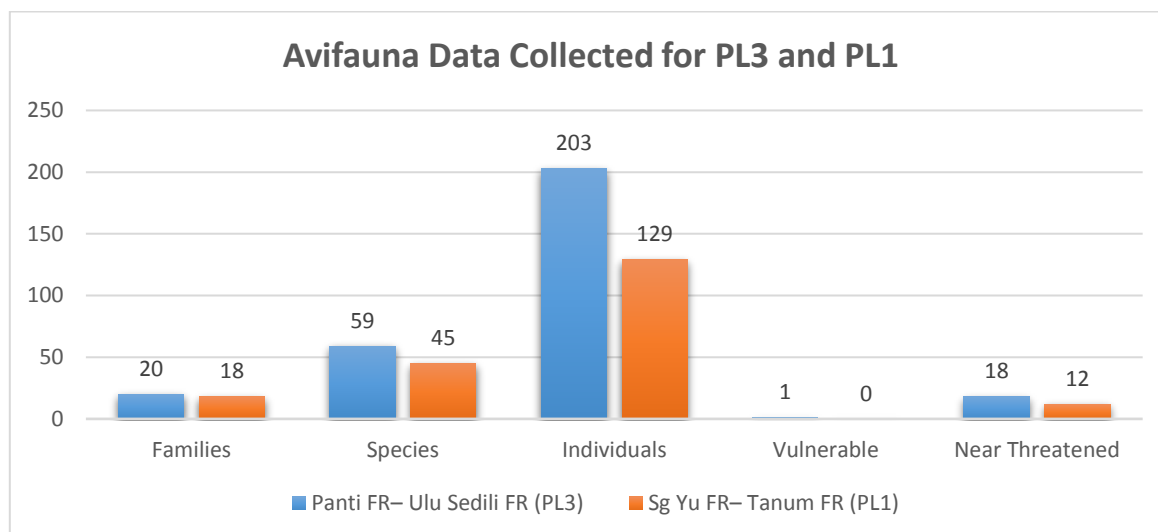
**Figure 1** Survey sites in PL1 (Sungai Yu Forest Reserve–Tanum Forest Reserve, Pahang) and PL3 (Panti Forest Reserve–Ulu Sedili Forest Reserve, Johor)

Surveys were carried out from March to September 2017 on three sampling sessions involving six plots where the distance for each plot around 1500m. A total of 10 mist nets (12 m x 2.6 m x 30 mm) were set up at each plot at about 0.5 m above ground. The location of the mist nets was randomly chosen at the potential fly-path. Nets were set for five consecutive nights for 24 hours throughout the sampling session in order to record diurnal and nocturnal birds. The nets

were checked every 2 hours starting from 0630 to 1130 hours, then continue from 1630 to 2330 hours daily. All captured birds were measured, identified and photographed and released back to the point of capture. Measurements that were recorded namely Tarsus (T), Bill Length (BL), Bill Width (BW), Bill Depth (BD), Head Bill (HB), Total Length (TL), Tail Length (TA), Wing Span (WS), Wing Length (WL) and live weight (g) including their body conditions. Bird identification was carried out using Jayarajasingam and Pearson (1999); MNS Bird Conservation Council (2005) and Robson (2014).

## RESULTS AND DISCUSSION

From this study, a total of 203 individuals from 59 species belonging to 20 families were recorded in Pantli – Ulu Sedili Forest Reserve (PL3) (Figure 2). Crimson-breasted Flowerpecker (*Prionochilus percussus*) from family Dicaeidae was most dominant in PL3 (Table 1). For PL1, a total of 129 individuals from 45 species belonging to 18 families were recorded (Figure 2). The most abundant species captured were from Cream-vented Bulbul (*Pycnonotus simplex*) from Family Pycnonotidae recorded the highest number (Table 1).



**Figure 2** Avifauna data collected for PL3 and PL1

Frugivorous birds were the highest captures from both corridors which represented by 30% and 28% respectively (Table 2). The presence of fig trees (*Ficus* spp.) might be one of the contributing factors that explain such situations. Based on Ong (2003), figs are the best-known food source to birds and mammals because this plant can bear fruit all year round, unlike other fruit trees.

There are at least three major forest habitats constitute in PL3 namely lowland dipterocarp forest, riparian forest and hill forest (Gunung Mutahak 638m a.s.l) allowing birds to select their habitat for foraging, roosting, nesting and scavenging (Chow & Lum., 2009) which may contribute to the higher number of species gathered. Of these, at least 40 species were caught at lowland dipterocarp forest (53%), 31 species at riparian (41%) and five species at hill forest (7%). According to Rohde (1992) & Stevens (1992), species richness decreased with increasing elevation because of reduced temperatures can cause decreasing in productivity.

**Table 1** List of avifauna recorded in PL3 and PL1

No	Family	Species	Common Name	Conservation Status	PL3 Panti - Ulu Sedili FR	PL1 Sg. Yu - Tanum FR
1	Aegithinidae	<i>Aegithina viridissima</i>	Green Iora	NT	1	-
2	Alcedinidae	<i>Ceyx rufidorsa</i>	Rufous-backed Kingfisher	LC	8	1
3	Alcedinidae	<i>Ceyx erithaca</i>	Black-Backed Kingfisher	LC	4	-
4	Alcedinidae	<i>Alcedo meninting</i>	Blue-eared Kingfisher	LC	5	-
5	Alcedinidae	<i>Alcedo peninsulae</i>	Blue-banded Kingfisher	NT	1	-
6	Alcedinidae	<i>Actenoides concretus</i>	Rufous-collared Kingfisher	NT	1	-
7	Alcedinidae	<i>Lacedo pulchella</i>	Banded Kingfisher	LC	-	1
8	Alcedinidae	<i>Actenoides concretus</i>	Rufous-collared Kingfisher	NT	-	1
9	Calyptomenidae	<i>Calyptomena viridis</i>	Green broadbill	NT	1	1
10	Chloropseidae	<i>Chloropsis moluccensis</i>	Blue-winged Leafbird	LC	4	-
11	Cisticolidae	<i>Orthotomus sericeus</i>	Rufous-tailed Tailorbird	LC	1	-
12	Cisticolidae	<i>Orthotomus ruficeps</i>	Ashy Tailorbird	LC	-	1
13	Columbidae	<i>Chalcophaps indica</i>	Emerald Dove	LC	4	3
14	Cuculidae	<i>Cacomantis sepulcralis</i>	Rusty-breasted Cuckoo	LC		1
15	Dicaeidae	<i>Prionochilus percussus</i>	Crimson-breasted Flowerpecker	LC	13	2
16	Dicaeidae	<i>Prionochilus thoracicus</i>	Scarlet-breasted Flowerpecker	LC	6	-
17	Dicaeidae	<i>Prionochilus maculatus</i>	Yellow-breasted Flowerpecker	LC	2	2
18	Dicaeidae	<i>Dicaeum trigonostigma</i>	Orange-bellied Flowerpecker	LC	1	-
19	Dicaeidae	<i>Dicaeum ignipectus</i>	Fire-breasted Flowerpecker	LC	-	1
20	Dicruridae	<i>Dicrurus aeneus</i>	Bronzed Drongo	LC	-	1
21	Dicruridae	<i>Dicrurus paradiseus</i>	Greater racquet-tailed Drongo	LC	-	1
22	Estrildidae	<i>Erythrura prasina</i>	Pin-tailed Parrotfinch	LC	-	1
23	Estrildidae	<i>Lonchura leucogastra</i>	White-bellied Munia	LC	-	1
24	Irenidae	<i>Irena puella</i>	Asian Fairy-bluebird	LC	-	2
25	Laniidae	<i>Lanius tigrinus</i>	Tiger Shrike	LC	1	-
26	Monarchidae	<i>Terpsiphone paradisi</i>	Asian Paradise Flycatcher	LC	2	2

No	Family	Species	Common Name	Conservation Status	PL3 Panti - Ulu Sedili FR	PL1 Sg. Yu - Tanum FR
27	Monarchidae	<i>Hypothymis azurea</i>	Black-naped Monarch	LC	2	-
28	Muscicapidae	<i>Enicurus scouleri</i>	Little Forktail	LC	4	-
29	Muscicapidae	<i>Enicurus ruficapillus</i>	Chestnut-naped Forktail	NT	3	-
30	Muscicapidae	<i>Kittacincla malabarica</i>	White-rumped Shama	LC	2	3
31	Muscicapidae	<i>Cyornis brunneatus</i>	Brown Chested Jungle Flycatcher	VU	1	-
32	Muscicapidae	<i>Ficedula dumetoria</i>	Rufous-chested Flycatcher	LC	1	-
33	Muscicapidae	<i>Trichixos pyrropygus</i>	Rufous-tailed Shama	NT	1	-
34	Muscicapidae	<i>Larvivora cyane</i>	Siberian Blue Robin	LC	1	-
35	Muscicapidae	<i>Ficedula hyperythra</i>	Snowy-browed Flycatcher	LC	1	-
36	Muscicapidae	<i>Copsychus saularis</i>	Magpie Robin	LC	-	1
37	Nectariniidae	<i>Arachnothera longirostra</i>	Little Spiderhunter	LC	11	14
38	Nectariniidae	<i>Hypogramma hypogrammicum</i>	Purple-naped Sunbird	LC	3	5
39	Nectariniidae	<i>Aethopyga siparaja</i>	Crimson Sunbird	LC	2	-
40	Nectariniidae	<i>Arachnothera modesta</i>	Grey-breasted Spiderhunter	LC	-	2
41	Oriolidae	<i>Oriolus xanthonotus</i>	Dark-throated Oriole	NT	-	1
42	Pellorneidae	<i>Trichastoma rostratum</i>	White-chested Babbler	NT	10	2
43	Pellorneidae	<i>Malacopteron magnirostre</i>	Moustached Babbler	LC	5	1
44	Pellorneidae	<i>Malacopteron cinereum</i>	Scaly-crowned Babbler	LC	3	-
45	Pellorneidae	<i>Trichastoma malaccense</i>	Short-tailed Babbler	NT	3	3
46	Pellorneidae	<i>Malacopteron affine</i>	Sooty-capped Babbler	NT	2	2
47	Pellorneidae	<i>Trichastoma tickelli</i>	Buff-breasted Babbler	LC	1	-
48	Pellorneidae	<i>Malacopteron magnum</i>	Rufous-crowned Babbler	NT	1	3
49	Pellorneidae	<i>Trichastoma bicolor</i>	Ferruginous Babbler	LC	-	2
50	Picidae	<i>Meiglyptes tukki</i>	Buff-necked Woodpecker	NT	6	5
51	Picidae	<i>Chrysophlegma mentale</i>	Checker-throated Woodpecker	NT	1	-
52	Picidae	<i>Micropternus brachyurus</i>	Rufous Woodpecker	LC	1	-
53	Picidae	<i>Sasia abnormis</i>	Rufous Piculet	LC	-	1
54	Platylophidae	<i>Platylophus galericulatus</i>	Crested Jay	NT	1	-

Checklist of avifauna at selected ecological corridors

No	Family	Species	Common Name	Conservation Status	PL3 Panti - Ulu Sedili FR	PL1 Sg. Yu - Tanum FR
55	Podargidae	<i>Batrachostomus stellatus</i>	Gould's Frogmouth	NT	3	-
56	Pycnonotidae	<i>Pycnonotus simplex</i>	Cream-vented Bulbul	LC	11	17
57	Pycnonotidae	<i>Euptilotus eutilotus</i>	Puff-backed Bulbul	NT	11	-
58	Pycnonotidae	<i>Pycnonotus plumosus</i>	Olive-winged Bulbul	LC	8	2
59	Pycnonotidae	<i>Pycnonotus xantholaemus</i>	Yellow-throated Bulbul	LC	6	4
60	Pycnonotidae	<i>Pycnonotus brunneus</i>	Red-eyed Bulbul	LC	5	7
61	Pycnonotidae	<i>Tricholestes criniger</i>	Hairy-backed Bulbul	LC	4	6
62	Pycnonotidae	<i>Pycnonotus erythroptalmos</i>	Spectacled Bulbul	LC	3	9
63	Pycnonotidae	<i>Pycnonotus atriceps</i>	Black-headed Bulbul	LC	2	7
64	Pycnonotidae	<i>Pycnonotus cyaniventris</i>	Grey-bellied Bulbul	LC	2	1
65	Pycnonotidae	<i>Pycnonotus blanfordi</i>	Streak-eared Bulbul	LC	1	-
66	Timaliidae	<i>Cyanoderma erythropteron</i>	Chestnut-winged Babbler	LC	7	2
67	Timaliidae	<i>Mixornis gularis</i>	Pin-striped Tit-babbler	LC	2	1
68	Timaliidae	<i>Stachyris leucotis</i>	White-necked Babbler	NT	2	-
69	Timaliidae	<i>Stachyris nigriceps</i>	Grey-throated Babbler	LC	1	-
70	Timaliidae	<i>Stachyris maculata</i>	Chestnut-rumped Babbler	NT	-	2
71	Timaliidae	<i>Stachyris poliocephala</i>	Grey-headed Babbler	LC	5	2
72	Timaliidae	<i>Macronus ptilosus</i>	Fluffy-backed Tit-babbler	NT	4	1
73	Trogonidae	<i>Harpactes orrhophaeus</i>	Cinnamon-rumped Trogon	NT	1	-
74	Vangidae	<i>Philentoma pyrhoptera</i>	Rufous-winged Philentoma	LC	3	1
75	Vireonidae	<i>Erpornis zantholeuca</i>	White-bellied Erpornis	LC	1	-
				<b>Total</b>	<b>203</b>	<b>129</b>

**Table 2** The summary of result collected for both PL's

	Conservation Status	Species composition	Seasons	Threat
<b>Panti – Ulu Sedili FR</b>	1 CR, 1 VU, 17 NT, 40 LC	30% Frugivorous	Dry	Oil palm plantation near the FR
<b>Sg Yu – Tanum FR</b>	12 NT, 34 LC	28% Frugivorous	Wet + Fruiting season	Easy access to FR due to old logging road. Presence of predator

Seasonality plays a crucial role in mist-netting birds. Based on the surveys, PL3 recorded a higher number of individuals captured (203 individuals) compared to PL1 (129 individuals) (Figure 2). During surveys conducted at PL3 from April to September, the weather was dry to light rain while the survey at PL1 in July, the area was raining heavily. This result supported the previous study by Robbins (1981), which mentioned that the effects of weather on avian activities appear to vary among species and habitats. Weather can have a considerable effect on avian activity, net visibility and mist-netting success because high humidity makes the net more visible resulting in fewer birds capture. (Stewart, 1971; Quinlan & Boyd, 1976; Robbins 1981). Thus, the harsh weather such as strong winds and rain usually results in reduction on capture rates (Grue *et al.* 1981; Robbins 1981).

The presence of predators species (*Boiga cynodon*) during one of the sampling sessions at PL1 might be another factor that contributes to the low number of captures in PL1. Two different individuals were encountered when they were trying to catch the birds on the mist net at the same plot (Figure 3). Evidence from the previous study showed the *Boiga cynodon* preyed on birds (Greene, 1989) and this finding was supported by Das (2010) observing that this predator's diet consists of birds and their eggs.



**Figure 3** *Boiga cynodon* caught during the survey

Species such as White-chested Babbler and Puff-backed Bulbul which are categorised as Near Threatened according to IUCN Red List (IUCN, 2017), are among the highest individuals



recorded in PL3. Brown-chested Jungle Flycatcher which is Vulnerable, was also recorded at the same corridor. These species are categorised as NT and VU due to the rapid and widespread deforestation across the habitat (IUCN, 2017). The presence of these endangered species shows that this forest reserve has a high value of biodiversity and the corridors are significance to secure the species from being extinction. Rapid ecological studies must be conducted within the areas to monitor the population trend and any changes in the habitat.

## CONCLUSIONS

Panti – Ulu Sedili Forest Reserve (PL3) recorded 20 families with 59 species while Sg. Yu – Tanum forest reserve (PL1) recorded 18 families with 45 species. Frugivorous birds are the highest for both PLs due to fruiting season during the survey which was from April to July. Higher species might be recorded for both PLs if we increase the number of plot, trapping night and number of mist-net. Longer survey time can expand the species listing with more additional records for more study in the future. Rapid habitat loss due to deforestation for development, agriculture and so on is a major reason for both PLs. If the current rate of forest loss continues, large numbers of animal and plant species will disappear over the years. Therefore, our responsibilities to ensure the healthy ecosystem sustains the precious biodiversity for the next generation.

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