

# Peat swamp forest birds of the Tuanan research station, Central Kalimantan, Indonesia, with notes on habitat specialists

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The avifauna of tropical peat swamp forest has not been well documented, even though it is an extensive habitat in parts of South-East Asia. We conducted surveys using various methods at the Tuanan research station and surrounding areas in Central Kalimantan, Indonesian Borneo. These observations resulted in a list of 138 bird species and numerous noteworthy records. Although more depauperate than lowland rainforest on mineral soils, peat swamp forest is an important habitat for many threatened and Near Threatened bird species, especially habitat specialists such as Hook-billed Bulbul *Setornis criniger* and Grey-breasted Babbler *Malacopteron albugulare*. We also recorded in selectively logged peat swamp several high-profile, globally threatened species such as Crestless Fireback *Lophura erythrophthalma*, Storm's Stork, *Ciconia stormi*, Great Slaty Woodpecker *Mulleripicus pulverulentus*, Black Hornbill *Anthracoceros malayanus* and Wrinkled Hornbill *Aceros corrugatus*. In view of its importance to certain species, peat swamp forest should be afforded more protection, especially in light of the recent rapid loss of this habitat to land conversion and forest fires.

## INTRODUCTION

Borneo is the third largest tropical island in the world and particularly rich in biodiversity, with 630 recorded bird species (Mann 2008). Geopolitically, the island is divided into Brunei Darussalam, the Malaysian states of Sabah and Sarawak, and the four Kalimantan provinces of Indonesia. Most of the ornithological work on Borneo has been conducted in the northern part of the island, and Kalimantan remains poorly studied, with only a few avifaunal lists published specifically for this region (e.g. Holmes & Burton 1987, Holmes 1997). In Central Kalimantan, the second largest province of Indonesian Borneo with a land area of 154,564 km<sup>2</sup>, bird surveys have largely concentrated in a few well-known areas such as Tanjung Puting National Park and Barito Ulu (Bohap & Galidikas 1987, Nash & Nash 1988, Dutson *et al.* 1991, Wilkinson *et al.* 1991). The extensive tropical swamp forests dominating the southern lowland plains of Central Kalimantan have largely been ignored and unexplored, even though these habitats constitute one of the seven biogeographic zones of Borneo and have an important influence on species distribution (MacKinnon *et al.* 1996).

Tropical peat swamp forest (PSF) is a unique wetland ecosystem that develops in areas where waterlogging prevents the complete decomposition of plant debris, which over time accumulates as peat soils (Anderson 1983). PSF occurs throughout the tropics but reaches its greatest extent and depth in South-East Asia, especially in the lowlands of Sumatra and Kalimantan (Rieley *et al.* 1996). PSFs are characterised by periodic flooding, nutrient limitation and high acidity due to the leaching of organic compounds. PSF trees are adapted to tolerate nutrient deficiency, unstable substrate and fluctuating water levels, and in this respect exhibit structural features such as stilt roots and pneumatophores. The overall primary productivity and biodiversity levels in this nutrient-deficient forest type are lower than in lowland forest on mineral soils (Bruenig & Droste 1995).

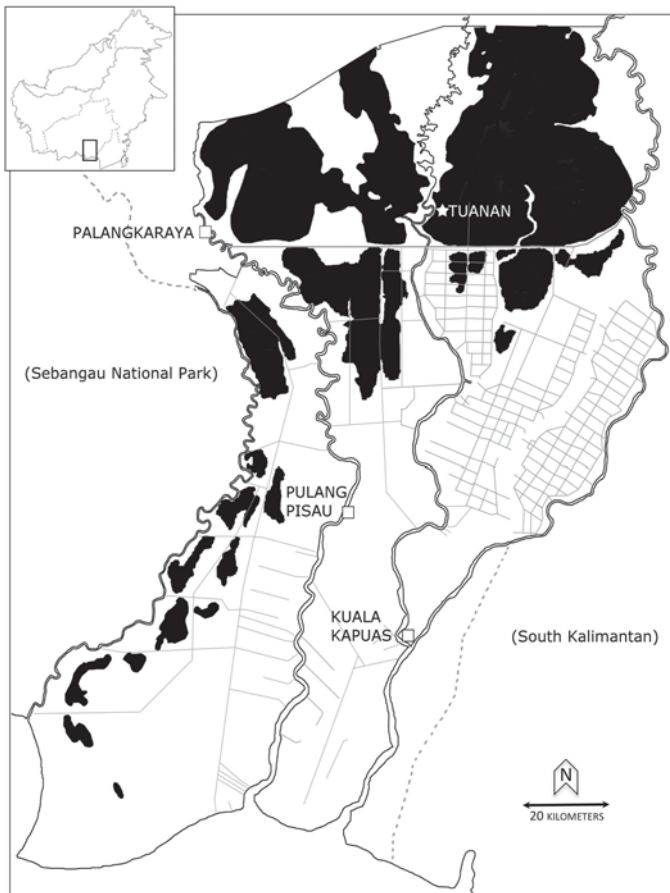
The neglect of PSF by biologists might result either from its relatively depauperate flora and fauna or from the difficult access and working conditions brought about by the boggy soils and dense understorey vegetation, which severely hamper movement and visibility. However, recent research indicates that PSF may harbour a considerable proportion of the South-East Asian fauna (Posa *et al.* 2011). Thus, there is an urgent need for more information on the flora and fauna of this unique ecosystem, as its destruction has accelerated in recent years. Nearly half of the PSF in Peninsular Malaysia, Borneo and Sumatra has been lost since 1990 (Miettinen

& Liew 2010). Many areas have already been converted into oil palm and paper pulp plantations and much of what remains under forest cover has been selectively logged (Miettinen & Liew 2010). Such disturbance renders PSF extremely prone to forest fires, since peat itself is combustible when dry (Page *et al.* 2009). Fire is now one of the major drivers of PSF loss and conversion to degraded land.

In this paper, we present the first avifaunal list for the Tuanan research station in the Mawas Conservation Area and surrounding areas based on field observations, mistnetting and camera trapping conducted in Central Kalimantan from 2009 and 2010.

## STUDY AREA AND METHODS

The Mawas Conservation Area comprises a 3,000 km<sup>2</sup> area managed by the Borneo Orangutan Survival Foundation located east of the Kapuas river, about 55 km from Palangkaraya, the capital of Central Kalimantan (Figure 1). Here, the Tuanan research station (2°09'06"S 114°26'26"E) was established in 2003 for long-term Orangutan behavioural studies. It comprises a 9.45 km<sup>2</sup> grid-based trail system situated on peat of varying thickness up to 2 m. The forest was subjected to selective commercial logging in the early 1990s, followed by illegal logging (van Schaik *et al.* 2005). However, there has been no systematic logging since 2002 (Vogel *et al.* 2009). Despite this disturbance, the forest supports a relatively high density of Bornean Orangutans *Pongo pygmaeus wurmbii*, Bornean Agile Gibbons *Hylobates agilis albibarbis* and other globally threatened mammals (van Schaik & Brockman 2005, pers. obs.). Central Kalimantan has a humid tropical climate, with very little variability in temperature. The wet season normally occurs during the north-west monsoon in November to April; the climate is drier during June to August. There is some climatic variation associated with the El Niño Southern Oscillation cycle, which affects the duration and severity of the seasons. During strong El Niño events, southern Kalimantan can experience prolonged drought conditions (Page *et al.* 2009). The mean average annual rainfall measured from 2004 to 2007 at the Tuanan research station was 2,678 mm, with an average monthly rainfall of 223 mm (Wartmann 2008). Outside of the Mawas Conservation Area, the PSF has been heavily disturbed by humans. Drainage canals dug in the early 1990s for the Indonesian government's Mega-Rice Project have disrupted the natural hydrology of the area, making it extremely prone to fire (Page *et al.* 2009). As a result, large areas have been subjected to one or more fires and are now dominated by ferns and other low-growing plants.



**Figure 1.** Map of the ex-Mega-Rice Project area with remaining peat swamp forest cover (in black). Approximate location of the Tuanan research station indicated. Straight solid grey lines are canals that were dug for drainage.

Bird observations were made in the intact PSF around the Tuanan research station as well as in surrounding degraded areas using a variety of methods. DM made *ad libitum* observations from November to December 2009, while MRCP conducted standard 10 minute, 25 m radius point-count surveys from August 2009 to July 2010 (Posa 2011). In addition, MRCP also used mistnets and camera traps to survey Tuanan for a total of 2,535 net hours and 3,924 trap nights respectively (details of methodology in Posa 2011). We included in our list only species that were confirmed by visual sightings or distinctive calls, mistnetting and camera trapping. With the exception of Bornean Ground Cuckoo *Carpococcyx radiatus* (following Collar & Long 1996), nomenclature follows the 2009 checklist of the Oriental Bird Club (sequence of Dickinson 2003) available online at <http://orientalbirdimages.org/new-obc-checklist.html>.

## RESULTS

We recorded a total of 138 bird species from all survey methods in the intact and degraded PSF habitats in and around the Mawas Conservation Area (Appendix). Four of these were migratory species, and two were most likely introduced recently to Borneo. Thus, 132 resident birds were found in the PSF. Twenty-six species were observed only along canals or rivers and in the non-forested regrowth vegetation in areas that had previously been burned. The rest of the species were observed in logged PSF and remnant forest fragments. Several species of particular interest were observed, including seven globally threatened, 31 Near Threatened species as well as two PSF specialists (Hook-billed Bulbul *Setornis criniger* and Grey-breasted Babbler *Malacopteron albobulare*) and three

Bornean endemics (Bornean Ground Cuckoo, Bornean Bristlehead *Pityriasis gymnocephala* and Dusky Munia *Lonchura fuscans*).

We captured a total of 293 birds from 28 species in mistnets (see Appendix), with recaptures (21 individuals) comprising 7.2%. Two species that were recorded only by mistnetting were Blue-eared Kingfisher *Alcedo meninting* and Oriental Cuckoo *Cuculus saturatus*. Camera traps took 45 photographs of birds from ten species, of which we were unable to identify three. Three species were detected only through photography, namely Black Partridge *Melanoperdix niger*, Crestless Fireback *Lophura erythrophthalma* and Bornean Ground Cuckoo.

### Significant records

Species accounts are given for threatened species, endemics and habitat specialists and a few other notable records. We give the species conservation status (Endangered, Vulnerable, Near Threatened, Least Concern) based on the 2010 Red List by the International Union for Conservation of Nature (IUCN 2010).

#### Black Partridge *Melanoperdix niger*

Vulnerable. A lone female was photographed in July 2010 in the early morning. An uncommon and local resident on Borneo, this species is poorly known, as it is shy and secretive. It has been recorded from swamp forest in Gunung Palung National Park (Laman *et al.* 1996).

#### Crestless Fireback *Lophura erythrophthalma*

Vulnerable. Only detected by camera traps in intact forest, but the commonest bird species recorded using this method (29 of 45 photographs of birds). Pictures of individuals or pairs were taken between dawn and dusk, but the majority of photos was taken before 08h00. Other researchers reported occasional encounters on man-made transects, but in general this species is very elusive.

#### Storm's Stork *Ciconia stormi*

Endangered. Recorded three times by camera traps and two seen flying over the research station in the early morning in June 2010. This species has also been reported from other swamp forests, including peat swamp (Laman *et al.* 1996, Danielsen *et al.* 1997, Page *et al.* 1997). It is considered very rare throughout its range, but our record and the recent one in Thailand, where it was thought to be extinct (Cutter *et al.* 2007), indicates that camera trapping is a very useful method in detecting this species's presence in forested areas.

#### Lesser Adjutant *Leptoptilos javanicus*

Vulnerable. A few to a dozen individuals were spotted at various times in drained and deforested areas while travelling on canals in May–July 2010.

#### Wallace's Hawk Eagle *Spizaetus nanus*

Vulnerable. An adult was observed perched in the PSF interior in December 2009.

#### Cinnamon-headed Green Pigeon *Treron fulvicollis*

Near Threatened. Individuals and a group of three were seen feeding in fruiting trees lining canals in the deforested area in September 2009. This species was not recorded in intact forest, but was possibly overlooked. It has also been recorded from PSF in Sebangau (Page *et al.* 1997) and was reportedly the most abundant green pigeon in the wooded areas of the Barito region and southern Kalimantan by Holmes & Burton (1987).

#### Long-tailed Parakeet *Psittacula longicauda*

Near Threatened. One bird was observed in PSF in December and groups of more than a dozen birds were seen on dead remnant trees in degraded areas in August to November 2009.

**Chestnut-bellied Malkoha *Phaenicophaeus sumatranus***

Near Threatened. Surprisingly, a commonly encountered bird in the PSF interior habitat, travelling in singles, pairs or groups of three birds. Reported as uncommon throughout Bornean lowland and hill dipterocarp forests (Mann 2008).

**Bornean Ground Cuckoo *Carpococcyx radiatus***

Near Threatened. Endemic. One individual was photographed following a Sun Bear *Helarctos malayanus* in December 2010. Described as a rare resident of lowland forests (Mann 2008). It has been recorded in a few other places in Central Kalimantan in alluvial and swamp habitats (Long & Collar 2002, Fredriksson & Nijman 2004).

**Black Hornbill *Anthracoceros malayanus***

Near Threatened. Small groups of up to eight individuals were uncommonly encountered in intact forest.

**Wrinkled Hornbill *Aceros corrugatus***

Near Threatened. One adult male was observed in PSF in November 2009.

**Red-crowned Barbet *Megalaima rafflesii***

Near Threatened. The commonest barbet in PSF and disturbed forest around Tuanan with up to eight individuals recorded in a day.

**Great Slaty Woodpecker *Mulleripicus pulverulentus***

Vulnerable. Noisy conspicuous groups were uncommonly encountered in intact forest and also observed in forest fragments in the degraded area. This species has also been reported from PSF in West Kalimantan (Laman *et al.* 1996).

**Bornean Bristlehead *Pityriasis gymnocephala***

Near Threatened. Bornean endemic. Considered to be rare and uncommon on the island (Mann 2008). Individuals and small groups of up to five birds were uncommonly encountered in intact PSF and forest fragments in the degraded area. This species has been reported from PSF in Sarawak (Laman *et al.* 2006) and the 'swamp' forests of Tanjung Puting (Nash & Nash 1988). Smythies (1981) suggested that it may prefer PSF, but Witt & Sheldon (1994) refuted this.

**Hook-billed Bulbul *Setornis criniger***

Vulnerable. PSF habitat specialist. Fairly common in intact forest, often travelling in small groups. Their call has been described as a rattling series of notes (3.4 kHz, 11 notes) or a soft *crrrk* (Myers 2009) or harsh alarm *cuurrk* (MacKinnon & Phillipps 2008). These bulbuls are quite easy to detect in the PSF understorey because of

these calls, which we were able to record (Figure 2; www.xeno-canto.org catalogue number XC74801). We also caught six individuals in mistnets. This species has been observed in other nutrient-poor forests in Borneo and was described as a local lowland resident (Mann 2008). In Central Kalimantan, it has been recorded in swamp forest in Sebangau (Page *et al.* 1997) and Tanjung Puting, as well as frequently encountered in kerangas at Barito Ulu (Dutson *et al.* 1991). It has been suggested that *Setornis criniger* is intolerant of habitat degradation (Dutson *et al.* 1991), but our observations indicate that it can persist in large blocks of selectively logged PSF. However, the rapid loss of this habitat will continue to threaten this species.

**Grey-breasted Babbler *Malacopteron albogularis***

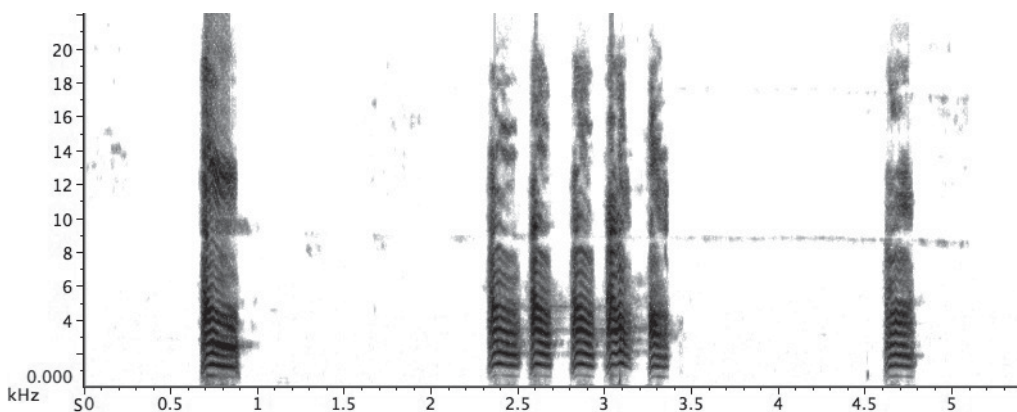
Near Threatened. PSF habitat specialist. This species is rare except in poor soil habitats such as PSF, kerangas and ultrabasic forests (Sheldon *et al.* 2001). It is often overlooked because of its skulking habits, absence from mixed-species flocks and infrequent vocalisations. We observed it only on three occasions in the understorey. However, it was the fourth most commonly mistnetted species (19 out of 272 individuals), supporting the suggestion by some authors that this method can reveal its presence (Sheldon 1987, Dutson *et al.* 1991). Thus it may be overlooked even in habitats where it is fairly common. Birds from Barito Ulu and Tanjung Puting are described as having white lores, while those from north Borneo have yellow lores (Dutson *et al.* 1991, Sheldon *et al.* 2001), but see Collar (2011). The lores of the adult birds captured at Tuanan were white but consistently have a few rufous feathers on the edge near the forehead. We captured one juvenile with an inflated gape on 14 June 2010. It had similar coloration to the adult, except for a yellow lower mandible (grey in adult), brown iris (red in adult) and pink legs (grey in adult).

**Crimson-breasted Flowerpecker *Prionochilus percussus***

Least Concern. Observed on four days in November–December 2009 and on three days in March–June 2010 with a maximum of four individuals. This species is supposed to be a rare lowland resident, especially in northern Borneo (Mann 2008), but identification issues may mask its true occurrence. No Yellow-rumped Flowerpeckers *P. xanthopygius* were observed in the Tuanan PSF, supporting the statement by Holmes & Burton (1987): '*xanthopygius* occurs with *percussus* in upper Barito Sep 1986 but not with it in southern lowlands of Kalimantan'.

**Scarlet-breasted Flowerpecker *Prionochilus thoracicus***

Near Threatened. Single adult males were observed on two separate occasions in the canopy of the PSF interior. An uncommon and local bird on Borneo (Mann 2008). It seems to prefer poor soil habitats (Sheldon *et al.* 2001).



**Figure 2.** Sonagram of the *crrrk* or *cuurrk* call typical for Hook-billed Bulbul *Setornis criniger*.

### Dusky Munia *Lonchura fuscans*

Least Concern. Bornean endemic. Not uncommon in disturbed forest, forest edge and forest regrowth areas around the Tuanan site.

## DISCUSSION

While only one study (Gaither 1994) has made a direct comparison and shown that bird diversity in PSF is lower than in lowland rainforest on mineral soils, we reach the same conclusion from our survey in this nutrient-poor environment. We observed only 132 of Borneo's 398 resident bird species in PSF, including only three of at least 41 Bornean endemics, whereas other lowland sites around Borneo show higher species richness—even up to twice those numbers in eastern Sabah where forests are unusually rich (e.g. Lambert 1992, Johns 1996, Cleary *et al.* 2007, Edwards *et al.* 2011). Aside from fewer numbers of species and endemics, total abundance of observed birds is also very low. However, if we compare the bird species (102) found in the Tuanan PSF (excluding degraded and riverine areas) with other sites on Borneo containing PSF (Appendix), the numbers of species are roughly similar. Laman *et al.* (1996) reported 104 resident species from Gunung Palung National Park, which contains about 400 ha of swamp forest in a mosaic with lowland dipterocarp and upland forests. Tanjung Puting National Park, which is composed of 50% PSF in mosaic with freshwater swamp and heath forests, has 111 resident species reported in its 'swamp forest' by Nash & Nash (1988), although these authors surveyed peat basin margins and not true PSF. Our list shares 97 species (41%) with the lowland habitats of the Cabang Panti research site in Gunung Palung (61 reported from PSF and an additional 36 reported from lowland dipterocarp forest) and 123 species (56%) with Tanjung Puting, including 104 species reported from swamps by Nash & Nash (1988) with an additional 19 reported by Bohap & Galdikas (1987). Page *et al.* (1997) reported 150 species of birds observed over three years from various habitats, including both forest and riverine sedge swamp, at the Sungei Sebangau catchment in Central Kalimantan. However, because they did not provide a complete list of species, we cannot directly compare their results with ours.

Mistnetting has been conducted in PSF at only a few other sites on Borneo. Gaither (1994) captured 34 species in Gunung Palung but did not provide a complete species list. In Sarawak, sporadic mistnetting from 1996 to 1999 in a previously logged 20-ha patch of PSF at the UNIMAS Campus near Kuching revealed 68 resident species (Tuen & Darub 1999, Rahman & Tuen 2006). However, most of these (31) were represented by one or two captures only, including *M. albogulare*. They also failed to detect *S. criniger*, which suggests the site is heavily degraded and fragmented. In PSF at Loagan Bunut National Park, mistnetting during a short 10-day survey yielded 18 resident species, including *S. criniger* but not *M. albogulare*; observations produced an additional 12 species (Laman *et al.* 2006). In Sabah, six-days of mistnetting in primary PSF of the Klias Forest Reserve (Sheldon *et al.* 2004) yielded 28 species. While it is more difficult to set up mistnets in PSF than in dryland forests, this method is very effective and, thus, useful for studying understorey species, particularly in revealing the presence of *M. albogulare*. However, with the mistnetting bias towards understorey species and the low number of recorded species compared with point count sampling, researchers should be judicious in the use of mistnetting for rapid assessments of avian biodiversity in PSF (Remsen & Good 1996).

Camera trapping of birds has usually been incidental to surveys of terrestrial mammals, but it is starting to be explored as a viable method for sampling large ground-dwelling bird species (O'Brien & Kinnaird 2008). Although low numbers of birds were recorded

with this method, it is a valuable method for detecting rare and elusive species such as *L. erythrophthalma* and *C. stormi* in addition to the other standardised procedures.

Kalimantan's PSF may represent a stronghold for *S. criniger* and *M. albogulare*, as large, albeit disturbed, tracts of this habitat still remain. These species are most likely to be declining in Peninsular Malaysia and Sumatra, where a greater percentage of PSF has been converted to plantations and other non-forest land uses (Miettinen & Liew 2010). Their current status needs to be assessed and monitored in light of the recent rapid loss of PSF habitats. More research is needed on the local distribution of bird species in PSF, and specific microhabitat requirements of these species in PSF needs to be elucidated. Despite low bird diversity in PSF, the occurrence of the PSF specialists *M. albogulare* and *S. criniger* together with other threatened and Near Threatened species underlines the urgent need for continued efforts in the Mawas Conservation Area to prevent further habitat loss and hunting.

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## Appendix

### List of bird species recorded at Tuanan and surrounding areas and their occurrence in other sites containing peat swamp forest habitat

Abbreviations: VU – Vulnerable; EN – Endangered; NT – Near-threatened; LC – Least Concern; I – introduced to Borneo; M – migrant to Borneo; PSF – intact peat swamp forest; DIS – disturbed and non-forest habitat; RIV – riverine forest. Species marked with x\* were recorded in 'swamp' (including peat swamp) habitat in other sites, x – habitat type not specified or recorded from non-swamp habitat, # – caught in mistnet.

Species		Status (IUCN 2010)	Tuanan record habitat (this study)	Tanjung Puting, Central Kalimantan (Bohap & Galdikas 1987; Nash & Nash 1988)	Gunung Palung, West Kalimantan (Laman <i>et al.</i> 1996)	Berbak, Sumatra (Silvius & Verheugt 1986, Hornskov 1987)	Loagan Bunut National Park, Sarawak (Gumal <i>et al.</i> 2008)	Unimas, Sarawak (mistnetting in regrowth, Tuen & Darub 1999, Rahman & Tuen 2006)
Black Partridge	<i>Melanoperdix niger</i>	VU	PSF	x	x*	x		
Crestless Fireback	<i>Lophura erythrothalma</i>	VU	PSF	x	x		x*	
Storm's Stork	<i>Ciconia stormi</i>	EN	PSF	x*	x*	x	x	
Lesser Adjutant	<i>Leptoptilos javanicus</i>	VU	DIS	x		x		
Black-thighed Falconet	<i>Microhierax fringillarius</i>	LC	PSF, RIV, DIS	x*	x	x	x	
Black-winged Kite	<i>Elanus caeruleus</i>	LC	DIS			x	x	
Brahminy Kite	<i>Haliastur indus</i>	LC	DIS, RIV	x*		x	x	
Crested Serpent Eagle	<i>Spilornis cheela</i>	LC	PSF, DIS, RIV	x*	x*	x	x*	
Crested goshawk	<i>Accipiter trivirgatus</i>	LC	PSF <sup>#</sup>	x*	x	x	x	x*
Changeable Hawk Eagle	<i>Spizaetus cirrhatus</i>	LC	PSF			x	x*	
Wallace's Hawk Eagle	<i>Spizaetus nanus</i>	VU	PSF		x	x	x*	
White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	LC	DIS	x	x		x	
Spotted Dove	<i>Streptopelia chinensis</i>	LC	DIS	x		x		
Cinnamon-headed Green Pigeon	<i>Treron fulvicollis</i>	NT	DIS	x*		x		
Pink-necked Green Pigeon	<i>Treron vernans</i>	LC	DIS, RIV	x*		x	x	
Thick-billed Green Pigeon	<i>Treron curvirostra</i>	LC	PSF	x*	x*	x		
Blue-crowned Hanging Parrot	<i>Loriculus galgulus</i>	LC	PSF, DIS, RIV	x*	x	x	x*	
Long-tailed Parakeet	<i>Psittacula longicauda</i>	NT	PSF, DIS, RIV	x*	x*	x	x*	
Indian Cuckoo	<i>Cuculus micropterus</i>	LC	PSF	x*	x	x	x*	
Oriental Cuckoo	<i>Cuculus saturatus</i>	LC, M	PSF <sup>#</sup>					
Banded Bay Cuckoo	<i>Cacomantis sonneratii</i>	LC	PSF					x*
Plaintive Cuckoo	<i>Cacomantis merulinus</i>	LC	PSF, DIS	x*	x		x*	x*
Violet Cuckoo	<i>Chrysococcyx xanthrohynchus</i>	LC	PSF, DIS	x*	x		x*	
Drongo Cuckoo	<i>Surniculcus lugubris</i>	LC	PSF, DIS, RIV	x*	x	x		
Black-bellied Malkoha	<i>Phaenicophaeus diardi</i>	NT	RIV		x*		x*	
Chestnut-bellied Malkoha	<i>Phaenicophaeus sumatranus</i>	NT	PSF	x*		x	x*	
Raffles's Malkoha	<i>Phaenicophaeus chlorophaeus</i>	LC	PSF	x*	x*	x	x*	
Chestnut-breasted Malkoha	<i>Phaenicophaeus curvirostris</i>	LC	PSF	x*	x*	x	x*	
Bornean Ground Cuckoo	<i>Carpococcyx radiatus</i>	NT, E	PSF		x			
Greater Coucal	<i>Centropus sinensis</i>	LC	PSF, DIS	x*	x*	x	x	
Lesser Coucal	<i>Centropus bengalensis</i>	LC	DIS	x		x		
Brown Wood Owl	<i>Strix leptogrammica</i>	LC	PSF	x*	x*		x	
Savanna Nightjar	<i>Caprimulgus affinis</i>	LC	DIS					
Silver-rumped Needletail	<i>Rhaphidura leucopygialis</i>	LC	DIS, RIV	x*		x	x*	
Grey-rumped Treeswift	<i>Hemiprocne longipennis</i>	LC	DIS, RIV	x*	x	x	x*	
Diard's Trogon	<i>Harpactes diardii</i>	NT	PSF, DIS	x*	x*	x*	x*	x*
Scarlet-rumped Trogon	<i>Harpactes duvaucelii</i>	NT	PSF	x*	x*	x	x*	x*
Dollarbird	<i>Eurystomus orientalis</i>	LC	PSF, RIV			x		
Stork-billed Kingfisher	<i>Halcyon capensis</i>	LC	DIS, RIV	x*	x	x	x*	x*

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Collared Kingfisher	<i>Todiramphus chloris</i>	LC	DIS	x		x	x	
Oriental Dwarf Kingfisher	<i>Ceyx erithaca</i>	LC	PSF <sup>#</sup>	x*	x*	x	x*	x*
Blue-eared Kingfisher	<i>Alcedo meninting</i>	LC	PSF, RIV	x*	x	x	x	x*
Blue-throated Bee-eater	<i>Merops viridis</i>	LC	PSF, DIS, RIV	x*		x	x*	
Bushy-crested Hornbill	<i>Anorrhinus galeritus</i>	LC	PSF	x*	x*	x	x	
Oriental Pied Hornbill	<i>Anthracoceros albirostris</i>	LC	DIS, RIV	x*			x	
Black Hornbill	<i>Anthracoceros malayanus</i>	NT	PSF	x*	x*	x	x*	
Wrinkled Hornbill	<i>Aceros corrugatus</i>	NT	PSF	x*	x*	x	x	
Red-crowned Barbet	<i>Megalaima rafflesii</i>	NT	PSF, DIS, RIV	x*	x*	x	x*	x*
Red-throated Barbet	<i>Megalaima mystacophanos</i>	NT	RIV	x	x*	x	x	
Blue-eared Barbet	<i>Megalaima australis</i>	LC	PSF, RIV	x*	x*	x	x*	
Brown Barbet	<i>Caloramphus fuliginosus</i>	LC	PSF	x*	x*	x	x*	
Rufous Piculet	<i>Sasia abnormis</i>	LC	PSF <sup>#</sup>	x*	x*		x*	x*
Sunda Pygmy Woodpecker	<i>Dendrocopos moluccensis</i>	LC	PSF, DIS	x		x		
Rufous Woodpecker	<i>Celeus brachyurus</i>	LC	PSF	x*	x		x*	x*
White-bellied Woodpecker	<i>Dryocopus javensis</i>	LC	DIS, RIV	x*	x	x	x*	
Banded Woodpecker	<i>Picus mineaceus</i>	LC	PSF, RIV	x	x	x		x*
Crimson-winged Woodpecker	<i>Picus puniceus</i>	LC	RIV	x*	x*		x*	x*
Maroon Woodpecker	<i>Blythipicus rubiginosus</i>	LC	PSF	x	x*	x	x*	x*
Orange-backed Woodpecker	<i>Reinwardtipicus validus</i>	LC	PSF, DIS	x*	x*		x	
Buff-rumped Woodpecker	<i>Meiglyptes tristis</i>	LC	PSF, DIS	x*	x		x*	
Buff-necked Woodpecker	<i>Meiglyptes tukki</i>	NT	PSF	x*	x*	x	x*	x*
Grey-and-buff Woodpecker	<i>Hemicircus concretus</i>	LC	PSF, DIS, RIV	x*	x*	x		
Great Slaty Woodpecker	<i>Mulleripicus pulverulentus</i>	VU	PSF	x*	x*		x	
Green Broadbill	<i>Calyptomena viridis</i>	NT	PSF	x*	x*		x	
Black-and-red Broadbill	<i>Cymbirhynchus macrorhynchus</i>	LC	RIV	x*	x	x	x	x*
Banded Broadbill	<i>Eurylaimus javanicus</i>	LC	PSF	x*	x	x		
Black-and-yellow Broadbill	<i>Eurylaimus ochromalus</i>	NT	PSF	x*	x	x	x*	
Dusky Broadbill	<i>Corydon sumatranus</i>	LC	PSF		x*	x	x*	
Golden-bellied Gerygone	<i>Gerygone sulphurea</i>	LC	RIV	x*				
Large Woodshrike	<i>Tephrodornis virgatus</i>	LC	RIV	x	x		x*	
White-breasted Woodswallow	<i>Artamus leucorhynchus</i>	LC	DIS, RIV	x		x		
Common lora	<i>Aegithina tiphia</i>	LC	PSF, RIV	x*	x	x	x	x*
Green lora	<i>Aegithina viridissima</i>	NT	PSF	x*	x		x*	x*
Bornean Bristlehead	<i>Pityriasis gymnocephala</i>	NT, E	PSF	x*	x		x*	
Lesser Cuckooshrike	<i>Coracina fimbriata</i>	LC	PSF, RIV	x*	x		x*	
Pied Triller	<i>Lalage nigra</i>	LC	DIS	x				
Fiery Minivet	<i>Pericrocotus igneus</i>	NT	PSF, DIS, RIV	x*	x*	x	x*	
Scarlet Minivet	<i>Pericrocotus flammeus</i>	LC	PSF	x*	x	x	x*	
Black-winged Flycatcher-shrike	<i>Hemipus hirundinaceus</i>	LC	PSF, DIS, RIV	x*	x	x	x*	x*
Mangrove Whistler	<i>Pachycephala cinerea</i>	LC	PSF <sup>#</sup>	x*		x		
Long-tailed Shrike	<i>Lanius schach</i>	LC	DIS, RIV	x				
Tiger Shrike	<i>Lanius tigrinus</i>	LC, M	DIS				x	
Dark-throated Oriole	<i>Oriolus xanthonotus</i>	NT	PSF, DIS	x*	x*		x*	

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Bronzed Drongo	<i>Dicrurus aeneus</i>	LC	RIV	x*	x	x	x*	x*
Pied Fantail	<i>Rhipidura javanica</i>	LC	PSF, DIS, RIV	x		x	x,	x*
Black-naped Monarch	<i>Hypothymis azurea</i>	LC	PSF <sup>‡</sup>	x*	x*	x	x*	
Asian Paradise-flycatcher	<i>Terpsiphone paradisi</i>	LC	PSF <sup>‡</sup>	x*	x*	x	x*	
Pacific Swallow	<i>Hirundo tahitica</i>	LC	DIS, RIV	x*		x	x	x*
Barn Swallow	<i>Hirundo rustica</i>	LC, M	PSF				x*	
Yellow-bellied Prinia	<i>Prinia flaviventris</i>	LC	DIS	x		x	x	x*
Dark-necked Tailorbird	<i>Orthotomus atrogularis</i>	LC	PSF, RIV	x*	x	x*	x*	
Rufous-tailed Tailorbird	<i>Orthotomus sericeus</i>	LC	PSF <sup>‡</sup> , DIS	x*	x		x,	x*
Ashy Tailorbird	<i>Orthotomus ruficeps</i>	LC	PSF <sup>‡</sup> , DIS	x*		x	x*	x*
Arctic Warbler	<i>Phylloscopus borealis</i>	LC, M	PSF					
Sooty-headed Bulbul	<i>Pycnonotus aurigaster</i>	LC, I	RIV					
Puff-backed Bulbul	<i>Pycnonotus eutilotus</i>	NT	DIS	x*	x*	x	x*	x*
Yellow-vented Bulbul	<i>Pycnonotus goiavier</i>	LC	PSF, DIS	x*		x		x*
Olive-winged Bulbul	<i>Pycnonotus plumosus</i>	LC	DIS, RIV	x*		x	x*	x*
Cream-vented Bulbul	<i>Pycnonotus simplex</i>	LC	PSF <sup>‡</sup>	x*	x*	x	x*	
Spectacled Bulbul	<i>Pycnonotus erythrophthalmos</i>	LC	PSF	x*	x*	x	x*	x*
Hook-billed Bulbul	<i>Setornis criniger</i>	VU	PSF <sup>‡</sup>	x*	x*	x*	x*	
Black-capped Babbler	<i>Pellorneum capistratum</i>	LC	PSF <sup>‡</sup> , DIS	x*	x*	x	x*	x*
White-chested Babbler	<i>Trichastoma rostratum</i>	NT	PSF <sup>‡</sup> , DIS	x*		x	x*	x*
Short-tailed Babbler	<i>Malacocincla malaccensis</i>	NT	PSF <sup>‡</sup>	x*	x*		x*	x*
Scaly-crowned Babbler	<i>Malacopteron cinereum</i>	LC	PSF <sup>‡</sup>	x*	x*		x*	
Rufous-crowned Babbler	<i>Malacopteron magnum</i>	NT	PSF <sup>‡</sup>	x*		x	x*	
Grey-breasted Babbler	<i>Malacopteron albugulare</i>	NT	PSF <sup>‡</sup>	x*	x*		x*	x*
Chestnut-rumped Babbler	<i>Stachyris maculata</i>	NT	PSF <sup>‡</sup> , DIS	x*	x*	x	x*	
Black-throated Babbler	<i>Stachyris nigricollis</i>	NT	PSF <sup>‡</sup>	x*	x*		x*	x*
Chestnut-winged Babbler	<i>Stachyris erythroptera</i>	LC	PSF <sup>‡</sup>	x*	x*		x*	x*
Striped Tit Babbler	<i>Macronous gularis</i>	LC	PSF, DIS	x*	x		x,	x*
Fluffy-backed Tit Babbler	<i>Macronous ptilosus</i>	NT	PSF <sup>‡</sup>	x*	x	x	x*	x*
Asian Fairy Bluebird	<i>Irena puella</i>	LC	PSF, RIV	x*	x*	x	x*	x*
Velvet-fronted Nuthatch	<i>Sitta frontalis</i>	LC	PSF	x*	x	x		
Common Hill Myna	<i>Gracula religiosa</i>	LC	PSF, DIS	x*	x*	x	x*	
Oriental Magpie Robin	<i>Copsychus saularis</i>	LC	DIS	x*	x*	x	x	x*
White-rumped Shama	<i>Copsychus malabaricus</i>	LC	PSF <sup>‡</sup> , DIS	x*	x*	x*	x*	x*
Rufous-tailed Shama	<i>Trichixos pyrropygus</i>	NT	PSF <sup>‡</sup>	x*	x*	x*	x*	
Grey-chested Jungle Flycatcher	<i>Rhinomyias umbratilis</i>	NT	PSF <sup>‡</sup>	x*	x*	x*	x*	x*
Malaysian Blue-flycatcher	<i>Cyornis turcosus</i>	NT	RIV	x*	x	x		
Greater Green Leafbird	<i>Chloropsis sonnerati</i>	LC	PSF	x*	x*	x	x*	
Lesser Green Leafbird	<i>Chloropsis cyanopogon</i>	NT	PSF, DIS	x*	x*	x	x*	
Yellow-breasted Flowerpecker	<i>Prionochilus maculatus</i>	LC	PSF <sup>‡</sup>	x*	x*	x	x*	x*
Crimson-breasted Flowerpecker	<i>Prionochilus percussus</i>	LC	PSF <sup>‡</sup> , DIS	x	x*	x		
Scarlet-breasted Flowerpecker	<i>Prionochilus thoracicus</i>	NT	PSF	x*	x*		x*	
Orange-bellied Flowerpecker	<i>Dicaeum trigonostigma</i>	LC	PSF, DIS	x*	x*	x	x*	x*
Scarlet-backed Flowerpecker	<i>Dicaeum cruentatum</i>	LC	PSF	x			x*	



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Ruby-cheeked Sunbird	<i>Anthreptes singalensis</i>	LC	PSF, DIS	x*	x*	x		x*
Plain Sunbird	<i>Anthreptes simplex</i>	LC	PSF	x*			x*	x*
Brown-throated Sunbird	<i>Anthreptes malacensis</i>	LC	PSF, DIS	x*		x	x*	x*
Purple-naped Sunbird	<i>Hypogramma hypogrammicum</i>	LC	PSF <sup>†</sup>	x*	x*	x	x*	x*
Purple-throated Sunbird	<i>Nectarinia sperata</i>	LC	PSF	x*	x*	x	x*	
Olive-backed Sunbird	<i>Nectarinia jugularis</i>	LC	DIS	x		x	x	x*
Crimson Sunbird	<i>Aethopyga siparaja</i>	LC	PSF, RIV	x*		x	x	x*
Little Spiderhunter	<i>Arachnothera longirostra</i>	LC	PSF <sup>†</sup> , DIS	x*	x*	x	x*	x*
Yellow-eared Spiderhunter	<i>Arachnothera chrysogenys</i>	LC	PSF	x*	x*	x		
Eurasian Tree Sparrow	<i>Passer montanus</i>	LC, I	DIS					
Dusky Munia	<i>Lonchura fuscans</i>	LC, E	DIS	x*	x		x	x*