

## LATITUDINAL RANGE LIMITS OF RESIDENT FOREST BIRDS IN THAILAND AND THE INDOCHINESE-SUNDAIC ZOOGEOGRAPHIC TRANSITION

*Philip D. Round<sup>1</sup>, Jennifer B. Hughes<sup>2,3</sup>, and David S. Woodruff<sup>2</sup>*

### ABSTRACT

A geographical distribution database is presented showing the documented recent occurrence of 544 resident forest-associated bird species at 46 sites spanning 15° of latitude (approx. 1500 km) in Thailand and peninsular Malaysia. The data are used to analyze the avifaunal transition between Indochinese and Sundaic zoogeographic subregions which lies in the northern part of the Thai peninsula near the Isthmus of Kra. The northern or southern range limits of 152 species lie just north of the Isthmus of Kra, between 11° and 13°N, between the towns of Chumphon and Phetchaburi. This amounts to more than half of the forest-associated species occurring in this 200 km wide latitudinal zone. At the species level, the Sundaic avifauna is clearly different from that of the Indochinese subregion. The distributional data also provide a basis for a grid-based mapping of the regional avifauna and future studies of the ecology and evolution of bird species, the monitoring of species local extirpation (regional extinction), and the impacts of habitat alteration, species introductions and global climate change.

Keywords: bird distributions, species ranges, species borders, biogeography, Thailand, Malaysia, grid-based mapping

### INTRODUCTION

Thailand lies at the crossroads between the Indochinese and Indo-Malayan (Sundaic) subregions of the Oriental zoogeographic region. The position of the transition on the Thai-Malay peninsula was originally placed near the top of the peninsula at about 14°N (WALLACE, 1876) (Fig. 1). Subsequently, KLOSS (1915, 1929) placed the boundary at 10°N near the Isthmus of Kra and one hundred years later WELLS (1976) mapped the avifaunal transition and found a disproportionate number of species limits at 10°30'N. In contrast, phytogeographers and others have followed STEENIS (1950) and placed the transition 500 km further south along a line drawn between Kangar, Malaysia, and Pattani, Thailand, near the international border (WHITMORE, 1984; WIKRAMANAYAKE *ET AL.*, 2002).

---

<sup>1</sup>Department of Biology, Mahidol University, Rama 6 Road, Bangkok 10400 Thailand

<sup>2</sup>Ecology, Behavior, Evolution Section, Division of Biological Sciences, University of California, San Diego, La Jolla CA 92093-0116 U.S.A.

<sup>3</sup>Present address: Department of Ecology and Evolutionary Biology, Brown University, Providence, RI 02912 U.S.A.

Received 31 October 2002; accepted 5 May 2003.

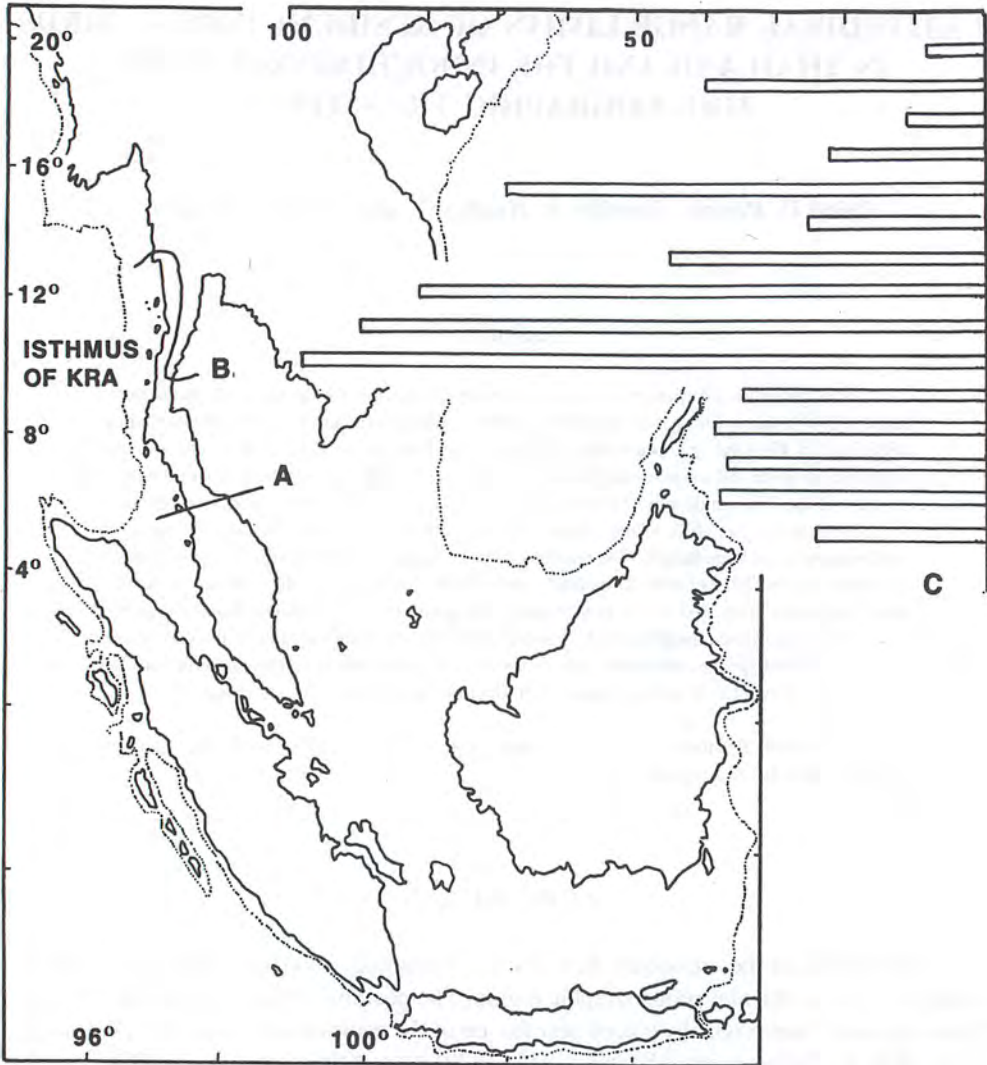


Figure 1. Sketch map of Southeast Asia showing the number of forest associated Thai-Malaysian bird species and subspecies with geographic range limits in each of 15 latitudinal zones. Three biogeographic transitions are indicated: (A) the Kangar-Pattani line, (B) the seasonal rainforest-mixed deciduous forest transition, and (C) the avifaunal transition (HUGHES *ET AL.*, 2003)

The current position and nature of the boundaries between zoogeographic subregions are of interest to ecologists and biogeographers and the age and history of these transitions are of interest to evolutionary biologists and paleobiogeographers (BROWN & LOMOLINO, 1998; COX, 2001). To stimulate the study of the poorly known Indochinese-Sundaic transition we here document its current geographic position based on records of bird distribution over more than 20° latitude, from Chiang Rai in northern Thailand to Singapore.

## MATERIALS AND METHODS

One of us (PDR) has assembled the most detailed set of confirmed bird records available for Thailand. The records used here are based on personal observations over the period 1979–1994, on reliable published records (e.g., HOLMES, 1973; HOLMES & WELLS, 1975; ROUND, 1988), and on bird watchers' reports reviewed monthly by a committee of the Bird Conservation Society of Thailand (formerly Bangkok Bird Club). The 1990 version of these records formed the basis of the species range maps in the standard field guide to the birds of Thailand (LEKAGUL & ROUND, 1991) and, for convenience, we have followed this source for species names and species numbers. Using the 1994 records for the occurrence of birds at 46 specific sites (Table 1), we created a database of the distribution of 544 bird species (and their component subspecies) from 50 taxonomic families and subfamilies (Appendix & Table 2). Recognizing subspecies in the field is difficult so we relied for the most part on older published data to establish subspecific distribution limits. In addition, we added records for Malaysia based on the work of MEDWAY & WELLS (1976). We focus primarily on rainforest birds but also include species characteristic of deciduous forests and forest edge grasslands. We excluded families of shorebirds, most waterbirds, Palaearctic migrants, non-breeding visitors, species known from only a single sighting, and most open country residents from the analyses as their geographic ranges are constrained by different parameters. We also excluded a few species restricted to southeast Thailand whose current ranges are remote to the peninsula. Only families with two or more species found in Thailand were included as we sought to compare concordant and non-concordant distribution patterns in phylogenetically comparable taxa. The 46-site survey records were used to establish northern and southern species range limits in 23 latitudinal zones ranging from Malaysia (lumped as <6°N) and the southern border of Thailand adjacent to Malaysia (6°N), to the northern border of Thailand with Laos and Myanmar (>20°N) (Table 1). Discoveries made since 1994 do not figure in this preliminary analysis but are discussed in detail below.

## RESULTS

Bird species occurrence records for 544 forest-associated species are tabulated in the appendix by Family. 200–300 species were observed in each of the better surveyed latitudinal zones, but unequal sampling prevents us from establishing a latitudinal species diversity gradient. Five species distributional patterns are recognizable with respect to the 1500 km north-south transect and are summarized in Table 2.

Table 1. Species occurrences were recorded from 45 specific localities grouped into 23 latitudinal zones (A–W). Latitudes are the northernmost limits of the zones.

(°N)	LOCALITIES
>20°	Doi Pha Hom Pok
20°	Doi Chiang Dao
19°	Doi Inthanon, Doi Suthep-Pui
18°	Om Koi, Phu Luang, Phu Kradeung
17°	Mae Sot, Phu Khieo, Nam Nao, Thung Salaeng Luang
16°	Huai Kha Khaeng, Thung Yai, Umphang
15°	Bung Kroeng Kavia
14°30'	Khao Yai
14°	Sai Yok
13°30'	Khao Soi Dao
13°	Kaeng Krachan
12°30'	Hua Hin, Khao Sam Roi Yot
12°	Prachuap, Khao Luang, Khao Nok Wua
11°	Thasan, Thae Sae
10°	Ranong, Tapli
9°+9°30'	Khao Sok, Khlong Saeng, Khlong Nakha
8°30'	Khao Phanom Bencha, Khlong Phraya, Krabi, Khao Nong, Khao Luang
8°	Khao Nor Chuchi, Khao Pu-Khao Ya
7°30'	Trang, Khao Banthad
7°	Thale Ban, Ton Nga Chang
6°30'	Pattani
6°	Yala province, Narathiwat province
<6°	Malaysia

- (1) Indochinese species. There are at least 190 northern or Indochinese species whose southern range limits fall between 2 and 20°N. A disproportionate number of their southern species borders fall at 18°–19°N, at 15°–16°N, and most significantly at 11°–13°N. Sixty-five of these species are montane and 125 are lowland residents. Examples among the bulbuls include *Pycnonotus xanthorrhous* (brown-breasted bulbul, 520), *P. aurigaster* (sooty-headed bulbul, 521), *P. flavescens* (flavescent bulbul, 524), *Alophoixus flaveolus* (white-throated bulbul, 531), and *A. pallidus* (puff-throated bulbul, 532) [species numbers are those of LEKAGUL & ROUND, 1991; ROUND, 2000].
- (2) Sundaic species. There are at least 151 southern or Sundaic species whose northern range limits fall along the same transect. Disproportionate numbers of their northern species borders fall at 11°–12°N and at 13°–13°30'N. Examples, again among the bulbuls, include *Pycnonotus melanoleucos* (black-and-white bulbul, 516), *P. squamatus* (scaly-breasted bulbul, 517), and *P. cyaniventris* (grey-bellied bulbul, 518).

Table 2. Families included in the database and the approximate numbers of species with different types of geographic ranges. Widespread species are continuously distributed across the north-south Indochinese/Sundaic transition or hop between isolated montane habitats and may or may not show subspecies differentiation associated with the avifaunal transition. See text for detailed comments.

Family	Indochinese species			Sundaic species	Widespread species			Total species
	Montane	Lowland Indochinese	Total		With ssp	Without ssp	Montane Island hoppers	
Phasianidae, pheasants	5	6	11	7	2	1	0	21
Turnicidae, buttonquails	0	1	1	0	1	0	0	2
Picidae, woodpeckers	2	11	13	11	6	0	5	35
Megalaimidae, barbets	1	2	3	5	0	2	2	12
Bucerotidae, hornbills	1	1	2	6	3	1	0	12
Trogonidae, trogons	0	0	0	4	1	0	1	6
Coraciidae, rollers	0	1	1	0	0	1	0	2
Alcedinidae, kingfishers	0	1	1	4	3	4	0	12
Ceryliidae, kingfishers	0	2	2	0	0	0	0	2
Meropidae, bee-eaters	0	2	2	1	1	2	0	9
Cuculidae, cuckoos	0	3	3	8	4	4	1	20
Centropodidae, coucals	0	0	0	0	2	0	0	2
Psittacidae, parrots	0	5	5	2	0	0	0	7
Apodidae, swifts	0	2	2	4	1	2	0	9
Hemiprocnidae, treeswifts	0	1	1	2	0	0	0	3
Tytonidae, barn owls	0	0	0	0	1	1	0	2
Strigidae, owls	0	6	6	4	2	2	2	16
Batrachostomidae, frogmouths	1	0	1	2	1	0	0	4
Eurostopodidae, eared-nightjars	0	1	1	1	0	0	0	2
Caprimulgidae, nightjars	0	3	3	0	0	1	0	4
Columbidae, pigeons	3	6	9	4	2	7	5	27
Rallidae, rails	1	1	2	0	1	6	0	9
Phasianidae, pheasants	5	6	11	7	2	1	0	21
Jacaniidae, jacanas	0	1	1	0	0	1	0	2

Table 2. continued.

Family	Indochinese species			Sundaic species	Widespread species			Total species
	Montane	Lowland Indochinese	Total		With ssp	Without ssp	Montane Island hoppers	
Accipitridae, hawks	0	8	8	3	4	9	0	24
Falconidae, falcons	0	2	2	1	0	2	0	5
Pittidae, pittas	0	2	2	5	0	2	1	10
Eurylaimidae, broadbills	0	0	0	2	2	1	2	7
Irenidae, leafbirds	0	1	1	1	1	1	1	5
Laniidae, shrikes	0	2	2	0	0	0	0	2
Corvinae/Oriolini, cuckoo-shrikes	2	3	5	5	2	0	2	14
Dicrurinae/Rhipidurini, fantails	1	1	2	1	0	1	1	5
Dicrurinae/Dicrurini, drongos	0	1	1	0	2	1	1	5
Dicrurinae/Monarchini, monarchs	0	0	0	0	2	0	0	2
Aegithinae, ioras	0	0	0	1	2	0	0	3
Malaconotinae, bushshrikes	0	1	1	2	1	0	0	4
Turdinae, thrushes	3	1	4	1	1	1	2	9
Muscicapinae/Muscicapini, flycatchers	4	3	7	6	3	1	6	23
Muscicapinae/Saxicolini, chats	6	3	9	2	3	0	2	16
Sturnidae, starlings	0	7	7	2	1	0	0	10
Hirundinidae, swallows	0	1	1	1	1	1	0	4
Pycnonotidae, bulbuls	6	6	12	16	4	2	1	35
Cisticolidae, Af. Warblers	0	4	4	0	3	0	1	8
Zosteropidae, white-eyes	0	0	0	1	1	0	0	2
Sylviidae/Acrocephalinae, leaf warblers	9	0	9	2	3	0	2	16
Sylviidae/Megalurinae, grassbirds	0	2	2	0	0	0	0	2
Sylviidae/Garrulacinae, laughingthrushes	5	4	9	0	0	0	1	10
Sylviidae/Sylviinae, babblers	13	8	21	18	7	0	13	59
Alaudidae, larks	0	3	3	0	0	0	0	3
Nectariniidae, sunbirds	2	1	3	14	8	2	4	31
Passeridae, sparrows	0	5	5	2	4	2	0	13
<b>Totals</b>	<b>65</b>	<b>125</b>	<b>190</b>	<b>151</b>	<b>86</b>	<b>61</b>	<b>56</b>	<b>544</b>

- (3) Widespread species with subspecific differentiation. There are 86 species which are distributed along most of the transect as a series of two, three or four parapatric or allopatric subspecies. All but a few of these include both Indochinese and Sundaic subspecies; the exceptions are exclusively Indochinese. A broader geographic survey would establish whether these species should really be regarded as Indochinese, Sundaic or pan-Oriental. Examples among the bulbuls include *Pycnonotus melanicterus* (black-crested bulbul, 515), *P. finlaysoni* (stripe-throated bulbul, 523), *Alophoixus ochraceus* (ochraceous bulbul, 533), *Iole propinqua* (grey-eyed bulbul, 539), and *Hemixos flavala* (ashy bulbul, 543).
- (4) Widespread species without subspecific differentiation. There are at least 61 widespread Oriental species ranging more or less continuously from  $<5^{\circ}$  to  $>20^{\circ}$ N without showing subspecific differentiation. Examples among the bulbuls include *Pycnonotus atriceps* (black-headed bulbul, 514), and *P. jocosus* (red-whiskered bulbul, 519).
- (5) Montane species with fragmented ranges. Finally, there are 56 species associated with isolated "islands" of montane habitat. These are found more or less continuously in the hills of northern Thailand and then disjunctly on hills and mountains in the central and southern peninsula. This distributional patterns is often referred to as montane island-hopping. Examples include *Treron sphenura* (wedge-tailed pigeon, 248), *Cuculus sparveroides* (large hawk cuckoo, 282), *Pomatorhinus hypoleucos* (large scimitar babbler, 596), and *Myiomela leucura* (white-tailed robin, 732).

Our distributional records show gaps in many species ranges. For example, some widespread species have been seen in 20–22 of the 23 latitudinal zones: *Anthracoceros albirostris* (Oriental pied hornbill, 374), and *Megalaima haemacephala* (coppersmith barbet, 389). Such gaps are probably biologically insignificant and will be filled in by focused local observations. Others may be meaningful and attributable to recent habitat destruction or possibly to competition with congeners. The woodpeckers provide examples of parapatric distribution of subspecies (e.g., *Sasia ochracea*, white-browed piculet, 394) and of congeneric species (examples in *Picus* and *Hemicircus*) without gaps on this mapping scale and, interestingly, of short gaps between the ranges of allopatric northern and southern subspecies (e.g., several cases in *Picus*). A more detailed analysis of these species range limits and of species and subspecies range limits combined is presented elsewhere (HUGHES ET AL., 2003).

## DISCUSSION

Our detailed distributional data reveal a statistically significant turnover in bird species between  $11^{\circ}$  and  $13^{\circ}$ N on the northern Thai-Malay peninsula (HUGHES ET AL., 2003). The northern or southern range limits of 152 species lie just north of the Isthmus of Kra, between  $11^{\circ}$  and  $13^{\circ}$ N, between the towns of Chumphon and Phetchaburi. This amounts to 28% of the bird species considered and more than half of the species occurring in this 200 km wide latitudinal zone. At the species level, the Sundaic avifauna is clearly different from that of the Indochinese subregion, and a disproportional number of species have their range limits between  $11^{\circ}$ N and  $12^{\circ}$ N (Fig. 1). WELLS' (1976) earlier analysis, placing the

transition 50–100 km further south, is an inconsequential artifact of his survey's geographic limits and his revised analyses (WELLS, 1999, in prep.) are in close agreement with ours as they are based on the same verified distributional data.

As the distribution data reported here represent the state of our knowledge in 1994 it is appropriate to recognize a number of more recent discoveries and range extensions. The maps in a new field guide by ROBSON (2002), which are based on those in LEKAGUL & ROUND (1991), show these range extensions for some species. These distributional changes will have to be taken into account when the database is revised or used by others. For example, in the past nine years there have been a number of new records for the Thai avifauna. At the time of our survey, no birds in the Sundaic montane category had been seen in Thailand. Malaysian montane species now known to occur in extreme southern Thailand are *Arborophila orientalis* (grey-breasted partridge), *Polyplectron inopinatum* (mountain peacock pheasant), *Psilopogon pyrolophus* (fire-tufted barbet), *Megalaima oorti* (black-browed barbet), *Sitta azurea* (blue nuthatch), *Phylloscopus trivirgatus* (mountain leaf warbler), *Garrulax lugubris* (black laughingthrush), *G. mitratus* (chestnut-capped laughingthrush), and *Alcippe peracensis* (mountain fulvetta). A few other species, e.g., *Coracina macei* (large cuckooshrike, 490), previously known from northern Thailand and the mountains of Malaysia, have now been found in montane habitat islands in southern Thailand. Sundaic lowland species recently found in southern Thailand are *Centropus rectunguis* (short-toed coucal) and *Pomatorhinus montanus* (chestnut-backed scimitar babbler), and one Indochinese species, *Aceros subruficollis* (Tenasserim or plain-pouched hornbill, 372), has also since been found to occur in peninsular Thailand and Malaysia. These new records do not significantly affect our analysis or conclusions regarding the avifaunal transition.

In addition, we have become aware that we inadvertently omitted 12 crows, 5 orioles and 5 nuthatches, and one flycatcher, *Culicicapa ceylonensis*, from our database. These comprise 16 Indochinese, 4 Sundaic, 2 widespread species with transition-associated subspecies, and one Indochinese montane island-hopper. These taxa show seven additional species range limits near the Isthmus of Kra so they bolster rather than alter our conclusions.

Our initial decisions to exclude some types of species from the analysis may have resulted in some minor loss of information. Examples include species that were the only representatives of their families in Thailand: *Indicator archipelagicus* (Malaysian honeyguide, 391), *Upupa epops* (hoopoe, 365), *Gerygone sulphurea* (flyeater, 659), *Pachycephala grisola* (mangrove whistler, 814), *Cinclus pallasii* (brown dipper, 582), *Certhia discolor* (brown-throated treecreeper, 581). Similarly, the exclusion of species found only in eastern or southeastern Thailand, e.g., *Arborophila diversa* (chestnut-headed partridge, 130), *Pitta soror* (blue-rumped pitta, 436), *P. elliotii* (bar-bellied pitta, 442), *Megalaima incognita* (moustached barbet, 386), *Alcippe rufogularis* (rufous-throated fulvetta, 632), or the very far north, e.g., *Aegithalos concinnus* (black-throated tit, 571) and *Hirundo rustica* (barn swallow, 466) which lacked populations along the peninsula may warrant re-examination when this analysis is revised. *Megalaima incognita*, for example, has since been found to have a population in Kaeng Krachan National Park in the northern peninsula. A few open-country birds which were omitted would now be included as we now know they enter the dry open forest-savanna habitats: *Dicrurus macrocercus* (black drongo, 546), *Anthus rufulus* (paddyfield pipit, 477), and *Hirundo smithii* (wire-tailed swallow, 468). Conversely, distribution patterns of a few feral species, island tramps, and the introduced commensal,



*Columba livia* (rock pigeon, 262), which were included in the analysis probably should be left out. Migrant birds (those without breeding populations in the area of interest) were, of course, excluded although this led to difficulties in a few cases where the breeding status of local populations was not clear. Two species, *Cuculus canorus* (common cuckoo, 287) and *C. poliocephalus* (lesser cuckoo, 289), excluded in the original analysis for this reason are now thought to breed in Thailand. Also in this category *Rhyacornis fuliginosus* (plumbeous redstart, 737), *Alcedo hercules* (Blyth's kingfisher, 344), *A. atthis* (common kingfisher, 345), *Dicrurus annectans* (crow-billed drongo, 548), and *Porzana fusca* (ruddy-breasted crake, 150), were excluded and *Chaimarrornis leucocephalus* (river chat, 738) was included. Finally, *Pseudochelidon sirintarae* (white-eyed river martin, 462) was omitted as it was described from a single locality in 1968 and has not been seen since.

Taxonomic revisions affecting these bird species since 1994 also present a few problems. We originally followed DEIGNAN (1963) and an avian taxonomy favored throughout the world until about ten years ago when SIBLEY & MONROE'S (1990) monumental revision appeared. Some "old" families were left out of our analysis because they had no Sundaic representatives and did not seem particularly relevant (e.g., parrotbills, Panuridae). SIBLEY & MONROE'S revision of the parrotbills shows, however, that they are not distinct from other babblers, even at the level of the tribe, and they would have to be included today. Another taxonomic exclusion involved *Irena puella* (Asian fairy-bluebird, 559), which is now placed within the Chloropseidae. Similarly, our exclusion of the oriole family is no longer justified as they are now lumped with most of the old Campephagidae into the same tribe. In contrast, the one pipit (*Anthus rufulus*, 477), excluded along with all other birds of the old family Motacillidae as they were migrants, is now placed in Passeridae and should probably be included. In all, we are aware of about 50 additional species records that would be included or revised in the database today as a result of new taxonomic alignments, new distributional records, and our inadvertent omissions. Again, these revisions do not appear to alter our biogeographic findings.

Species ranges do, of course, change over time. Our category of Indochinese species includes a few widespread Eurasian species that have extended, or are now extending, their ranges into the Sundaic subregion. Some, like *Parus major* (great tit, 574), are often confined to marginal wooded habitats (e.g., beach scrub, riparian growth, mangroves and mangrove edge) or open country and were not included in our analysis. Another recent colonist is *Passer domesticus* (house sparrow, 876) which entered central Thailand from Burma in about 1983 and has spread south to 12°N by 2002. Evidence of prehistoric shifts in bird species ranges are provided by some Sundaic species. Today, most of the species we recognize as Sundaic do not extend north or very far north of Kra. Those that do extend north of the isthmus have range limits between 12° and 15°N and a few of these, e.g., *Arborophila charltonii* (chestnut-necklaced partridge, 132), *Cuculus vagans* (moustached hawk-cuckoo, 284), *Malacopteron cinereum* (scaly-crowned babbler, 594), and *Alophoixus ochraceus* (ochraceous bulbul) also have isolated populations in southeast Thailand, Cambodia, or the Annamites mountains of Laos and Viet Nam. These Sundaic outliers suggest that the Sundaic avifauna previously extended further north into continental southeast Asia and that these Indochinese populations are relictual. This hypothesis is supported by those who argue that Sundaic lowland rainforest bird species have limited powers of dispersal, having evolved in a more-or-less contiguous moist forest that has persisted for millions of years. They may have reached Indochina during the Miocene, Pliocene, or Pleistocene when their

rainforest habitat shifted north of its current limits in response to global climatic changes. Furthermore, during Pleistocene hypothermal periods the montane habitat increased in area, and sea levels fell causing Sundaland to emerge, perhaps facilitating the direct dispersal of Sundaic species into continental southeast Asia. Further discussion of these hypotheses are beyond the scope of this report but the paleobiogeographic changes underscore the fact that species ranges are dynamic rather than fixed features.

Interestingly, the majority of birds in our widespread category, both those with subspecific differentiation associated with Kra and those that do not show subspecific differentiation at Kra are of Indochinese or non-Sundaic origin. Very few are Sundaic lowland forest species; most are open country birds, or associated with forest edges and riparian margins, and some are obvious colonists. The reasons why the Indochinese taxa have evolved differently from their Sundaic counterparts deserves study.

We recognize 65 Indochinese species as exclusively northern montane. So far as known these birds do not have populations entering the Thai-Malay peninsular region. Our category of "montane island-hoppers", on the other hand, are an interesting assemblage with populations extending varying distances down the peninsula. A few of these have populations in the mountains of northern Thailand and on the larger mountains of Malaysia but are apparently absent from the hills of peninsular Thailand. This category includes a few species, e.g., *Cissa chinensis* (green magpie, 563), *Harpactes erythrocephalus* (red-headed trogon, 341), and *Psarisomus dalhousiae* (long-tailed broadbill, 433), that descend to foothills in continental Thailand and, in the case of the last two taxa, in Malaysia as well. The montane island-hoppers tend to exhibit altitudinal range shifts in the southern peninsula for reasons that are not understood, although altitudinal range shifts upwards with declining latitude are well known in many plants and some other animals. The role of interspecific competition with lowland Sundaic congeners, or close ecological competitors, in pushing these species up the slopes has not been examined and cannot be ruled out. Any such study would have to include comparisons of both Thai and Malaysian populations and this is complicated by subspecific differentiation in some cases. The observation that these montane island-hoppers tend to be Indochinese may have historical roots. Many montane species, have their origins in the Sino-Himalayan region and although they are more or less moist forest species, they seem to have evolved in patchy habitat mosaics. One might expect them to have somewhat better powers of dispersal, or at least to be more ecologically tolerant than the ecologically conservative Sundaic lowland forest assemblage. This might facilitate habitat island-hopping, especially during cooler hypothermal periods when the limits of the montane biome expanded. Again, discussion of the historical biogeography of the avifauna lies outside the scope of this paper.

Our analysis does not include several montane forest birds endemic to the peninsular Malaysian mountains (or Malaysian plus other Sundaic non-Thai mountains): *Cuculus (saturatus) lepidus* (Oriental cuckoo), *Hydrochous gigas* (waterfall swiftlet), *Oriolus cruentus* (black-and-crimson oriole), *Myophonus robinsoni* (Malayan whistling thrush), *Niltava sumatrana* (rufous-vented niltava), *Seicercus montis* (yellow-breasted warbler), *Napothera marmorata* (marbled wren babbler), and *Rheinartia ocellata* (crested argus). The last mentioned provides another link with moist forests of the ancient Annamites Mountains of Indochina. Other lowland birds occurring in Malaysia, but which, so far as known, do not extend into Thailand are: *Melanoperdix nigrea* (black partridge), *Lophura erythrophthalma* (crestless fireback), *Dendrocopos moluccensis* (brown-capped woodpecker), *Psittacula*

*longicauda* (long-tailed parakeet), *Corvus enca* (slender-billed crow), *Malacopteron albogulare* (grey-breasted babbler) and *Dicaeum everetti* (brown-backed flowerpecker).

Finally, it must be recognized that our classification of montane species into two classes, Indochinese and widespread montane island-hoppers, is somewhat arbitrary. Only further study will establish whether this dichotomy is useful and whether these species shed light on the historical biogeography of the regional avifauna.

Although we are well aware of all the above codicils we have postponed the revision of our database until WELLS' monographs (1999, *in prep.*) on the avifauna of peninsula Malaysia are published. At that point, with current data for the entire peninsula available for the first time, it would be worthwhile to revise the database and the analyses. Nevertheless, the present analysis, and the documentation of the transition between the Indochinese and Sundaic avifaunas, permits more detailed studies of which two general ones can be reported here. WOODRUFF (2003a) discusses the relationship between the avifaunal transition and the transition between Indochinese and Indo-Malay floras. He concludes that although plants are understood to be significant determinants of bird distribution patterns, the concordance of the zoogeographic and phytogeographic transitions is not yet proven. In a second study, WOODRUFF (2003b) reviews the paleobiogeographic history of these biotic transitions and suggests a role for Neogene seaways south of the Isthmus of Kra in their early development.

Despite its apparent utility, our latitudinal transect-style survey of species distributions may be misleading. First, our conclusions are compromised by the lack of current information about birds in Tenasserim, on the Burmese side of the northern peninsula. Until this area is re-surveyed we must rely on old reports and our analyses will be biased by the better records for the Thai side of the peninsula. Second, all apparent gaps (empty cells) in a species range need to be verified as some are simply artifacts of the irregular distribution of observation sites along the transect. Verifiable gaps may reflect the absence of suitable habitat. Others may point to the occurrence of interesting biological phenomena including recent local extirpations, competitive exclusion, and niche shifts near the edge of a species range. Third, and most significantly, our localities are not contiguous but rather an assemblage of the sites for which the best data are available. An experimental design with adjacent sites and comparable sampling effort is a prerequisite for more rigorous analyses. Furthermore, several aspects of transition zones cannot be addressed using a linear array of sample sites but require a two-dimensional array of grid cells (WILLIAMS, 1996). Such is definitely the case in the northern peninsula where we already know species range limits are different on the eastern and western sides of the Tenasserim Ranges.

The site-specific data presented in this paper are significantly more useful than an earlier tabulation in which the entire country of Thailand was represented by six regional cells (ROUND, 1988). Ideally, our records can form the basis of a grid-based national inventory that will permit the recognition of trends in abundance and distribution. In the future, we will expand our database to permit finer-scale mapping and each record can be tagged temporally so that seasonal and historical changes in distribution can be monitored. Temporal analysis of distributional records can document the collapse of ranges associated with habitat alteration. Range fragmentation leads to local extirpation for a variety of ecological and genetic reasons, as demonstrated recently at a site near the Isthmus of Kra (LYNAM, 1997; SRIKWAN & WOODRUFF, 2000). Changing range limits may also provide useful indicators of climatic change. This is especially important in the present century as

anthropogenic changes in the atmosphere are expected to raise mean global temperatures by as much as 5°C, and pole-ward range shifts of 1000 km are predicted for some temperate species (WOODRUFF, 2001). Although temperatures are expected to rise less in the tropics than temperate regions, climate change is likely to affect both local specialists and long-distance migrants in Thailand. More generally, geographic range data can be used to predict rates of global and regional population extirpation (HUGHES *ET AL.*, 1997).

Several countries, including Australia, South Africa, the United Kingdom and the United States have implemented national biological surveys using grid systems for recording data, and SCHOLZEL *ET AL.* (2002) provide a recent example of the value of mapping on a larger, continent-wide scale. Such complex databases are shared between researchers and managers in electronic format, and are typically updated regularly. Prime examples of the value of such efforts involving birds include the North American National Audubon Society Christmas Bird Counts (ROOT, 1988), the Atlas of European Breeding Birds (HAGEMELJER & BLAIR, 1997), and the North American Breeding Bird Survey (SAUER *ET AL.*, 1999). The Breeding Bird Survey was designed to monitor trends in common diurnal species and the results for any area and time period are available at <http://www.pwrc.usgs.gov> and have been used to document the rapid decline of some species and the spread of introduced species. A comparable database of Nearctic migrants in Central America is used to assess the threats of habitat alteration on species survival (PARKER, 1996). The European Atlas, cited above, provided a basis for an analysis of the potential impact of global climate change on long-distance migrants and regional species richness (LEMOINE & BOHNING-GAESE, 2003). Distributional data are also valuable in situations where birds are vectors of human disease, as is the case in southeast Asia (MCCLURE, 1974). Finally, grid-based mapping of species distributions is useful in identify areas of high priority for habitat conservation (FJELDSA & RABHEK, 1998). KITCHING (1996) provides a Thai example of the use of grid-based mapping and analysis in identifying priority areas for conservation using owls, hawkmoths and tiger beetles. The birds of Thailand and Malaysia are now sufficiently well known to serve as a model for the development of a regional biodiversity database that will stimulate further research.

#### ACKNOWLEDGMENTS

We thank Warren Brockelman for facilitating this research and David Wells for most useful discussions. Our work was supported by grants from the Meeker Foundation (HUGHES) and the U.S. National Science Foundation (WOODRUFF).

## REFERENCES

- BROWN, J. H., AND M. V. LOMOLINO. 1998. *Biogeography*. Sinauer, Sunderland, MA. 2nd edition.
- COX, C. B. 2001. The biogeographic regions reconsidered. *J. Biogeog.* 28: 511–523.
- DEIGNAN, H. G. 1963. *Checklist of the Birds of Thailand*. U. S. Nat. Museum Bull. 226. Smithsonian Institution, Washington, D.C.
- FIELDSA, J., AND C. RABHEK. 1998. Continent-wide conservation priorities and diversification processes. Pages 139–160 in G. M. Mace, A. Balmford and J. R. Ginsberg (eds.), *Conservation in a Changing World*. Cambridge Univ. Press, Cambridge.
- HAGEMEIER, W. J. M., AND M. BLAIR. 1997. *The European Bird Census Council Atlas of European Breeding Birds*. Poyser, London and Academic Press, San Diego.
- HOLMES, D. A. 1973. Bird notes from southernmost Thailand. *Nat. Hist. Bull. Siam Soc.* 25: 39–66.
- HOLMES, D. A., AND D. R. WELLS. 1975. Further observations on the birds of south Thailand. *Nat. Hist. Bull. Siam Soc.* 26: 61–78.
- HUGHES, J. B., G. C. DAILY, AND P. R. EHRLICH. 1997. Population diversity: its extent and extinction. *Science* 278: 689–692.
- HUGHES, J. B., P. D. ROUND, AND D. S. WOODRUFF. 2003. The Sundaland-Asian faunal transition at the Isthmus of Kra: An analysis of resident forest bird species distributions. *J. Biogeog.* 30: 569–580.
- KITCHING, I. J. 1996. Identifying complementary areas for conservation in Thailand: an example using owls, hawkmoths and tiger beetles. *Biodiversity & Conservation* 5: 841–858.
- KLOSS, C. B. 1915. Zoogeographical divisions for Siam. *J. Nat. Hist. Soc. Siam* 1: 250–251.
- KLOSS, C. B. 1929. The zoo-geographical boundaries between Asia and Australia and some Oriental sub-regions. *Bull. Raffles Museum* 2:1–10.
- LEKAGUL, B., AND P. D. ROUND. 1991. *A Guide to the Birds of Thailand*. Saha Karn Bhaet, Bangkok.
- LEMOINE, N., AND K. BOHNING-GAESE. 2003. Potential impact of global climate change on species richness of long-distance migrants. *Conservation Biology* 17: 577–586.
- LYNAM, A. J. 1997. Rapid decline of small mammal diversity in monsoon evergreen forest fragments in Thailand. Pages 222–240 in W. F. Laurance and R. O. Bierregaard (eds.) *Tropical Forest Remnants: Ecology, Management, and Conservation of Fragmented Communities*. Univ. Chicago Press, Chicago.
- MCCLURE, H. E. 1974. *Migration and Survival of the Birds of Asia*. SEATO Med. Res. Lab./Applied Scientific Research Corp, Thailand, Bangkok. 477 pp.
- MEDWAY, LORD AND D. R. WELLS. 1976. *The Birds of the Malay Peninsula, Vol. 5*. Witherby, London and Penerbit University Malay, Kuala Lumpur.
- PARKER, T. A. 1996. *Ecological and Distributional Databases for Neotropical Birds*. Univ. Chicago Press, Chicago.
- ROBSON, C. 2002. *Birds of Thailand*. Princeton University Press, Princeton.
- ROOT, T. 1988. *Atlas of Wintering North American Birds: An Analysis of Christmas Bird Count Data*. Univ. Chicago Press, Chicago.
- ROUND, P. D. 1988. *Resident Forest Birds in Thailand: Their Status and Conservation*. Intl. Centre Bird Preservation, Cambridge.
- ROUND, P. D. 2000. *Field Check-List of Thai Birds*. Bird Conservation Society of Thailand, Bangkok.
- SAUER, J. R., J. E. HINES, I. THOMAS, J. FALLON, AND G. GOUGH. 1999. *The North American Breeding Bird Survey, Results and Analysis 1966–1998, Version 1998.1*. USGS Patuxent Wildlife Research Center, Laurel, Maryland.
- SCHOLZEL, C. A., A. HENSE, P. HUBL, N. KUHL, AND T. LITT. 2002. Digitization and geo-referencing of botanical distribution maps. *J. Biogeog.* 29: 851–856.
- SIBLEY, C. G. AND B. L. MONROE. 1990. *Distribution and Taxonomy of Birds of the World*. Yale University Press, New Haven.
- SRIKWAN, S. AND D. S. WOODRUFF. 2000. Genetic erosion in isolated small mammal populations following rain forest fragmentation. Pages 149–172 in A. Young, and G. Clarke (eds.) *Genetics, Demography and Viability of Fragmented Populations*. Cambridge Univ. Press, Cambridge.
- VAN STEENIS, C. J. G. 1950. The delimitation of Malesia and its main plant geographical divisions. *Flora Malesiana Series 1*, 1: xx–xxv.
- WALLACE, A. R. 1876. *The Geographical Distribution of Animals*. Macmillan, London.

- WELLS, D. R. 1976. Resident birds. Pages 1–33 in Lord Medway and D. R. Wells, *The Birds of the Malay Peninsula, Vol. V*. Witherby, London and Penerbit Universiti Malaya, Kuala Lumpur.
- WELLS, D. R. 1999. *The Birds of the Thai-Malay Peninsula. Vol. 1: Non-Passerines*. Academic Press, San Diego.
- WELLS, D. R. in prep. *The Birds of the Thai-Malay Peninsula. Vol. 2: Passerines*. Academic Press, San Diego.
- WHITMORE, T. C. 1984. *Tropical rainforests of the Far East*, 2nd edn. Oxford Univ. Press, Oxford.
- WIKRAMANAYAKE, E., E. DINERSTEIN, C. LOUCKS, D. OLSON, J. MORRISON, J. LAMOREUX, M. MCKNIGHT, AND P. HEDAO. 2002. *Terrestrial Ecoregions of the Indo-Pacific: A Conservation Assessment*. Island Press, Washington, D.C.
- WILLIAMS, P. H. 1996. Mapping variations in the strength and breadth of biogeographic transition zones using species turnover. *Proc. Roy. Soc. London B* 263:579–588.
- WOODRUFF, D. S. 2001. Declines of biomes and biotas. *Proc. Natl. Acad. Sci. USA* 98: 5469–5474.
- WOODRUFF, D. S. 2003a. The location of the Indochinese-Sundaic biogeographic transition. *Nat. Hist. Bull. Siam Soc.* 51: 97–108.
- WOODRUFF, D. S. 2003b. Neogene marine transgressions, paleogeography and biogeographic transitions on the Thai-Malay Peninsula. *J. Biogeog.* 30: 551–567.



#	>20	20	19	18	17	16	15	14 30'	14	13 30'	13	12 30'	12	11	10	9	8 30'	8	7 30'	7	6 30'	6	Malay			
<i>P. vittatus</i>	402																						+++	Laced woodpecker		
<i>P. xanthopygaeus</i>	404																								Streak-throated woodpecker	
<i>P. erythropygus</i>	406																								Black-headed woodpecker	
<i>P. canus</i>	405																						+++	Grey-headed woodpecker		
<i>Dinopium rafflesii</i>	399																								Olive-backed woodpecker	
<i>D. javanense</i>	398															+++	+++	+++	+++		+++			+++	Common flameback	
<i>Chrysocolaptes lucidus</i>	397															+++	+++	+++	+++	+++		+++	+++	+++	Greater flameback	
<i>Gecinulus grantia</i>	400																								Pale-headed woodpecker	
<i>G. viridis</i>	401															+++		+++	+++	+++	+++			+++	Bamboo woodpecker	
<i>Blythipicus rubiginosus</i>	413																								Maroon woodpecker	
<i>B. pyrrhotis</i>	414																								Bay woodpecker	
<i>Reinwardtipicus validus</i>	396																								Orange-backed woodpecker	
<i>Meiglyptes tristis</i>	417																								Buff-rumped woodpecker	
<i>M. jugularis</i>	419																								Black-and-Buff woodpecker	
<i>M. tukki</i>	418																								Buff-necked woodpecker	
<i>Hemicircus concretus</i>	421																								Grey-and-Buff woodpecker	
<i>H. canente</i>	420																								Heart-spotted woodpecker	
<i>Mulleripicus pulverulentus</i>	415														+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	Great slaty woodpecker	
<b>Megalaimidae</b>																										
<i>Megalaima virens</i>	378																								Great barbet	
<i>M. lineata</i>	379															+++	+++	+++	+++	+++	+++	+++	+++	+++	Lineated barbet	
<i>M. faiostricta</i>	380																								Green-eared barbet	
<i>M. chrysopogon</i>	381																								Gold-whiskered barbet	
<i>M. rafflesii</i>	382																								Red-crowned barbet	
<i>M. mystacophanos</i>	383																								Red-throated barbet	
<i>M. franklinii</i>	384																			+++				---	Golden-throated barbet	
<i>M. asiatica</i>	385															+++	+++								Blue-throated Barbet	
<i>M. henrici</i>	387																								Yellow-crowned barbet	
<i>M. australis</i>	388						+++		+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	---	Blue-eared barbet	
<i>M. haemacephala</i>	389																								Coppersmith barbet	
<i>Calorhamphus fuliginosus</i>	390																								Brown barbet	
<b>Bucerotidae</b>																										
<i>Anthracoseros albirostris</i>	374																						+++	+++	+++	Oriental pied hornbill
<i>A. malayanus</i>	373																								Black hornbill	
<i>Buceros rhinoceros</i>	375																								Rhinoceros hornbill	
<i>B. bicornis</i>	376															+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	Great hornbill
<i>B. vigil</i>	377																									Helmeted hornbill
<i>Anorrhinus tickelli</i>	367																								Brown hornbill	
<i>A. galeritus</i>	368																								Bushy-crested hornbill	
<i>Berenicomis comatus</i>	366																								White-crowned hornbill	
<i>Aceros nipalensis</i>	369																								Rufous-necked hornbill	
<i>A. corrugatus</i>	370																								Wrinkled hornbill	
<i>A. undulatus</i>	371													+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	Wreathed hornbill
<i>A. subruficollis</i>	372																									Plain-pouched hornbill



	#	>20	20	19	18	17	16	15	14 30'	14	13 30'	13	12 30'	12	11	10	9	8 30'	8	7 30'	7	6 30'	6	Malay		
<b>Trogonidae</b>																										
Harpactes kasumba	336																									Red-naped trogon
H. diardii	337																									Diard's trogon
H. orthophaeus	338																									Cinnamon-rumped trogon
H. duvaucelii	339																									Scarlet-rumped trogon
H. oreskios	340																+++	+++	+++	+++	+++	+++	+++	+++	+++	Orange-breasted trogon
H. erythrocephalus	341																	+++							+++	Red-headed trogon
<b>Coraciidae</b>																										
Coracias benghalensis	363																									Indian roller
Eurystomus orientalis	364																									Dollarbird
<b>Alcedinidae</b>																										
Alcedo meninting	346																+++	+++	+++	+++	+++			+++	+++	Blue-eared kingfisher
A. euryzona	347																									Blue-banded kingfisher
Ceyx erithacus	348																									Black-backed kingfisher
C. rufidorsus	348																									Red backed kingfisher
Lacedo pulchella	349														+++	+++	+++	+++	+++	+++	---	---		---	---	Banded kingfisher
Halcyon amauroptera	350																									Brown-winged kingfisher
H. capensis	351																+++	+++	+++	+++	+++	+++		+++	+++	Stork-billed kingfisher
H. coromanda	352																									Ruddy kingfisher
H. smyrnensis	353																									White-throated kingfisher
Todiramphus chloris	355																									Collared kingfisher
Actenoides concretus	356																								+++	Rufous-collared kingfisher
<b>Ceryllidae</b>																										
Megaceryle lugubris	342																									Crested kingfisher
Ceryle rudis	343								++++	++++	++++	++++	++++	++++												Pied kingfisher
<b>Meropidae</b>																										
Nyctornis amictus	361																									Red-bearded bee-eater
N. athertoni	362																									Blue-bearded bee-eater
Merops orientalis	359																									Green bee-eater
M. viridis	360																									Blue-throated bee-eater
M. philippinus	358																									Blue-tailed bee-eater
M. leschenaulti	357																									Chestnut-headed bee-eater
<b>Cuculidae</b>																										
Clamator coromandus	281																									Chestnut-winged cuckoo
Hierococcyx sparverioides	282																								+++	Large hawk cuckoo
H. vagans	284																									Moustached hawk cuckoo
H. fugax	285														+++		+++	+++	+++	+++	+++	+++		+++	+++	Hodgson's hawk cuckoo
Cuculus micropterus	286																+++		+++		+++			+++	+++	Indian cuckoo
Cacomantis sonneratii	290																					+++	+++	+++	+++	Banded bay cuckoo
C. merulinus	291																									Plaintive cuckoo
C. sepulcralis	292																									Rusty-breasted cuckoo
Chrysococcyx minutillus	295																									Malayan bronze cuckoo
C. maculatus	293																									Asian emerald cuckoo

	#	>20	20	19	18	17	16	15	14 30'	14	13 30'	13	12 30'	12	11	10	9	8 30'	8	7 30'	7	6 30'	6	Malay		
<i>C. xanthorhynchus</i>	294																								Violet cuckoo	
<i>Surniculus lugubris</i>	296																+++	+++	+++	+++	+++	+++		+++	Drongo cuckoo	
<i>Eudynamis scolopacea</i>	297																								Common koel	
<i>Phaenicophaeus diardi</i>	298																								Black-bellied malkoha	
<i>P. sumatranus</i>	299																								Chestnut-bellied Malkoha	
<i>P. tristis</i>	300																								Green-billed malkoha	
<i>P. chlorophaeus</i>	301																								Raffles' malkoha	
<i>P. javanicus</i>	302																								Red-billed malkoha	
<i>P. curvirostris</i>	303																								Chestnut-breasted malkoha	
<i>Carpococcyx renauldi</i>	304																								Coral-billed ground-cuckoo	
<b>Centropodidae</b>																										
<i>Centropus sinensis</i>	305																						+++++	+++++	Greater coucal	
<i>C. bengalensis</i>	306														+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	Lesser coucal
<b>Psittacidae</b>																										
<i>Psittinus cyanurus</i>	278																								Blue-rumped parrot	
<i>Loriculus vernalis</i>	279													+++	+++	+++	+++	+++	+++	+++	+++			+++	Vernal hanging parrot	
<i>L. galgulus</i>	280																								Blue-crowned hanging parrot	
<i>Psittacula eupatria</i>	274																								Alexandrine parakeet	
<i>P. finschii</i>	277																								Grey-headed parakeet	
<i>P. roseata</i>	276																								Blossom-headed parakeet	
<i>P. alexandri</i>	275																								Red-breasted parakeet	
<b>Apodidae</b>																										
<i>Collocalia esculenta</i>	450																								White-bellied swiftlet	
<i>Aerodramus brevirostris</i>	449																								Himalayan swiftlet	
<i>A. maximus</i>	448																								Black-nest swiftlet	
<i>A. fuciphagus</i>	447																								Edible-nest swiftlet	
<i>Rhaphidura leucopygialis</i>	452																								Silver-rumped swift	
<i>Hirundapus giganteus</i>	458													+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	Brown needletail	
<i>Cypsiurus balasiensis</i>	451																								Asian palm-swift	
<i>Apus pacificus</i>	454																								Pacific swift	
<i>A. nipalensis</i>	455																								House swift	
<b>Hemiprocnidae</b>																										
<i>Hemiproctne coronata</i>	459																								Crested treeswift	
<i>H. longipennis</i>	460																								Grey-rumped treeswift	
<i>H. comata</i>	461																								Whiskered treeswift	
<b>Tytonidae</b>																										
<i>Tyto alba</i>	307																								Barn owl	
<i>Phodilus badius</i>	308																								Bay owl	
<b>Strigidae</b>																										
<i>Otus sagittus</i>	310																								White-fronted scops owl	
<i>O. rufescens</i>	311																								Reddish scops owl	
<i>O. spilocephalus</i>	312																							+++	Mountain scops owl	
<i>O. sunia</i>	313																								Oriental scops owl	

	#	>20	20	19	18	17	16	15	14 30'	14	13 30'	13	12 30'	12	11	10	9	8 30'	8	7 30'	7	6 30'	6	Malay		
<i>O. bakkamoena</i>	314																+++	+++	+++	+++	+++	+++		+++	Collared scops owl	
<i>Bubo nipalensis</i>	318																									Spot-bellied eagle owl
<i>B. sumatranus</i>	319																									Barred eagle owl
<i>B. coromandus</i>	320																									Dusky eagle owl
<i>Ketupa zeylonensis</i>	321																									Brown fish owl
<i>K. ketupu</i>	322																									Buffy fish owl
<i>Strix seloputo</i>	324																									Spotted wood owl
<i>S. leptogrammica</i>	323																+++		+++	+++	+++	+++	+++	+++	+++	Brown wood owl
<i>Glaucidium brodiei</i>	315																									Collared owlet
<i>G. cuculoides</i>	316																									Asian barred owlet
<i>Athene brama</i>	317																									Spotted owlet
<i>Ninox scutulata</i>	309															+++		+++	+++		+++	+++		+++		Brown hawk-owl
<b>Batrachostomidae</b>																										
<i>Batrachostomus auritus</i>	326																									Large frogmouth
<i>B. stellatus</i>	327																									Gould's frogmouth
<i>B. hodgsoni</i>	328																									Hodgson's frogmouth
<i>B. javensis</i>	329																							+++		Javan frogmouth
<b>Eurostopodidae</b>																										
<i>Eurostopodus temminckii</i>	331																									Malaysian eared nightjar
<i>E. macrotis</i>	330																									Great eared nightjar
<b>Caprimulgidae</b>																										
<i>Caprimulgus indicus</i>	332																									Grey nightjar
<i>C. macrurus</i>	333																									Large-tailed nightjar
<i>C. asiaticus</i>	334																									Indian nightjar
<i>C. affinis</i>	335																									Savanna nightjar
<b>Columbidae</b>																										
<i>Columba livia</i>	262																									Rock pigeon
<i>Columba pulchricollis</i>	264																									Ashy wood pigeon
<i>C. punicea</i>	265																									Pale-capped pigeon
<i>Streptopelia orientalis</i>	268																									Oriental turtle dove
<i>S. chinensis</i>	270																									Spotted dove
<i>S. tranquebarica</i>	269																									Red turtle dove
<i>Magropygia unchall</i>	266																								+++	Barred cuckoo dove
<i>M. ruficeps</i>	267																								+++	Little cuckoo dove
<i>Chalcophaps indica</i>	272																									Emerald dove
<i>Geopelia striata</i>	271																									Zebra dove
<i>Caloenas nicobarica</i>	273																									Nicobar pigeon
<i>Treron fulvicollis</i>	252																									Cinnamon-headed pigeon
<i>T. olax</i>	253																									Little green pigeon
<i>T. vemans</i>	254																									Pink-necked pigeon
<i>T. bicincta</i>	255																									Orange-breasted pigeon
<i>T. pompadora</i>	251																									Pompador pigeon
<i>T. curvirostra</i>	250														+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	Thick-billed pigeon

#	>20	20	19	18	17	16	15	14 30'	14	13 30'	13	12 30'	12	11	10	9	8 30'	8	7 30'	7	6 30'	6	Malay	
<i>T. capellei</i>	256																							Large green pigeon
<i>T. phoenicoptera</i>	257																							Yellow-footed pigeon
<i>T. epicauda</i>	246																							Pin-tailed pigeon
<i>T. seimundi</i>	247																							Yellow-vented pigeon
<i>T. sphenura</i>	248																						+++	Wedge-tailed pigeon
<i>T. sieboldii</i>	249																							White-bellied pigeon
<i>Ptilinopus jambu</i>	258																							Jambu fruit dove
<i>Ducula aenea</i>	259																							Green imperial pigeon
<i>D. badia</i>	261																						+++	Mountain imperial pigeon
<i>D. bicolor</i>	260																							Pied imperial pigeon
<b>Rallidae</b>																								
<i>Rallina fasciata</i>	146																							Red-legged crane
<i>R. eurizonoides</i>	147																							Slaty-legged crane
<i>Gallirallus striatus</i>	145																							Slaty-breasted rail
<i>Armaurornis phoenicurus</i>	154																							White-breasted waterhen
<i>Porzana bicolor</i>	152																							Black-tailed crane
<i>P. cinerea</i>	153																							White-browed crane
<i>Gallinula cinerea</i>	155																							Watercock
<i>Porphyrio porphyrio</i>	157																							Purple swamphen
<i>Gallinula chloropus</i>	156																							Common moorhen
<b>Jacaniidae</b>																								
<i>Hydrophasianus chirurgus</i>	160																							Pheasant-tailed jacana
<i>Metopidius indicus</i>	161																							Bronze-winged jacana
<b>Accipitridae</b>																								
<i>Aviceda jerdoni</i>	72																							Jerdon's baza
<i>A. leuphotes</i>	73																							Black baza
<i>Pernis ptilorhynchus</i>	81													+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	Crested honey-buzzard
<i>Macheiramphus alcinus</i>	117																							Bat hawk
<i>Elanus caeruleus</i>	69																							Black-shouldered kite
<i>Milvus migrans</i>	70																							Black kite
<i>Haliaastur indus</i>	71																							Brahminy Kite
<i>Haliaeetus leucogaster</i>	86																							White-bellied sea eagle
<i>Ichthyophaga humilis</i>	88																							Lesser fish-eagle
<i>I. ichthyæus</i>	87																							Grey-headed fish eagle
<i>Gyps bengalensis</i>	105																							White-rumped vulture
<i>G. tenuirostris</i>	104																							Slender-billed vulture
<i>Sarcogyps calvus</i>	102																							Red-headed vulture
<i>Spilomis cheela</i>	90												+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	Crested serpent-eagle
<i>Accipiter trivirgatus</i>	74																							Crested goshawk
<i>A. badius</i>	78																							Shikra
<i>A. virgatus</i>	79																							Besra
<i>Butastur liventer</i>	83																							Rufous-winged buzzard
<i>Ictinaetus malayensis</i>	98																							Black eagle

	#	>20	20	19	18	17	16	15	14 30'	14	13 30'	13	12 30'	12	11	10	9	8 30'	8	7 30'	7	6 30'	6	Malay	
<i>Hieraetus kienerii</i>	95																								Rufous-bellied eagle
<i>Spizaetus cirrhatus</i>	92																								Changeable hawk eagle
<i>S. nipalensis</i>	91																								Mountain hawk eagle
<i>S. alboniger</i>	93																								Blyth's hawk eagle
<i>S. nanus</i>	94																								Wallace's hawk eagle
<b>Falconidae</b>																									
<i>Polihierax insignis</i>	109																								White-rumped falcon
<i>Microhierax caerulescens</i>	110																								Collared falconet
<i>M. fringillarius</i>	111																								Black-thighed falconet
<i>Falco severus</i>	115																								Oriental hobby
<i>F. peregrinus</i>	116																								Peregrine falcon
<b>Pittidae</b>																									
<i>Pitta phayrei</i>	446																								Eared pitta
<i>P. oatesi</i>	435																							+++	Rusty-naped pitta
<i>P. caerulea</i>	437																								Giant pitta
<i>P. cyanea</i>	443																								Blue pitta
<i>P. guajana</i>	444																								Banded pitta
<i>P. gurneyi</i>	445																								Gurney's pitta
<i>P. sordida</i>	441																								Hooded pitta
<i>P. granatina</i>	440																								Gamet pitta
<i>P. moluccensis</i>	438																								Blue-winged pitta
<i>P. megarrhyncha</i>	439																								Mangrove pitta
<b>Eurylaimidae</b>																									
<i>Corydon sumatranus</i>	428																					+++	+++	+++	Dusky broadbill
<i>Cymbirhynchus macrorhynchos</i>	429																					+++	+++	+++	Black-and-red broadbill
<i>Eurylaimus javanicus</i>	430																	+++	+++	+++	+++	+++	+++	+++	Banded broadbill
<i>E. ochromalus</i>	431																								Black-and-yellow broadbill
<i>Serlophus lunatus</i>	432												+++	+++	+++			+++						+++	Silver-breasted broadbill
<i>Psalisornis dalhousiae</i>	433																							+++	Long-tailed broadbill
<i>Calyptomena viridis</i>	434																						+++	+++	Green broadbill
<b>Irenidae</b>																									
<i>Chloropsis sonnerati</i>	507																								Greater green leafbird
<i>C. cyanopogon</i>	506																							+++	Lesser green leafbird
<i>C. cochinchinensis</i>	509																+++	+++	+++	+++	+++	+++	---	---	Blue-winged leafbird
<i>C. aurifrons</i>	508						+++	+++	---	---			---	---				+++	+++	+++	+++	---	---	---	Golden-fronted leafbird
<i>C. hardwickii</i>	510																							+++	Orange-bellied leafbird
<b>Laniidae</b>																									
<i>Lanius colluriooides</i>	817																								Burmese shrike
<i>L. schach</i>	819									+++	+++	+++	+++											---	Long-tailed shrike
<b>Corvinae/Oriolini</b>																									
<i>Coracina macei</i>	490																							+++	Large cuckooshrike
<i>C. striata</i>	491																								Bar-bellied cuckooshrike
<i>C. polioptera</i>	492																								Indochinese cuckooshrike
<i>C. melaschistos</i>	493																								Black-winged cuckooshrike

	#	>20	20	19	18	17	16	15	14 30'	14	13 30'	13	12 30'	12	11	10	9	8 30'	8	7 30'	7	6 30'	6	Malay			
<i>C. fimbriata</i>	494																								Lesser cuckooshrike		
<i>Lalage nigra</i>	485																									Pied triller	
<i>Pericrocotus cinnamomeus</i>	497									+++																Small minivet	
<i>P. igneus</i>	498																									Fiery Minivet	
<i>P. solaris</i>	499																							+++		Grey-chinned Minivet	
<i>P. brevirostris</i>	500																									Short-billed minivet	
<i>P. ethologus</i>	501																									Long-tailed minivet	
<i>P. flammeus</i>	502								+++	+++	+++	+++		+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	Scarlet minivet
<i>Hemipus picatus</i>	486																+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	Bar-winged flycatcher-shrike
<i>H. hirundinaceus</i>	487																									Black-winged flycatcher-shrike	
<b>Dicrurinae/Rhipidurini</b>																											
<i>Rhipidura hypoxantha</i>	804																									Yellow-bellied fantail	
<i>R. albicollis</i>	805																	+++							+++	White-throated fantail	
<i>R. aureola</i>	806																									White-browed fantail	
<i>R. javanica</i>	808																									Pied fantail	
<i>R. perflata</i>	807																									Spotted fantail	
<b>Dicrurinae/Dicrurini</b>																											
<i>Dicrurus leucophaeus</i>	547											+++	+++	+++	---			---	---		---			---	---		Ashy drongo
<i>D. aeneus</i>	549																										Bronzed drongo
<i>D. remifer</i>	550						+++	+++	+++			+++					+++								+++	Lesser racket-tailed drongo	
<i>D. hottentottus</i>	551																										Spangled drongo
<i>D. paradiseus</i>	552															+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	Greater racket-tailed drongo
<b>Dicrurinae/Monarchini</b>																											
<i>Hypothymis azurea</i>	809									+++	+++	+++	+++	+++	---	---	---	---	---	---	---	---	---	---	---	---	Black-naped monarch
<i>Terpsiphone paradisi</i>	813																										Asian paradise-flycatcher
<b>Aegithinae</b>																											
<i>Aegithina tiphia</i>	504						+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	Common lora
<i>A. viridissima</i>	503																										Green lora
<i>A. lafresnayei</i>	505																+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	Great lora
<b>Malaconotinae</b>																											
<i>Philentoma pyropterum</i>	810																										Rufous-winged flycatcher
<i>P. velatum</i>	811																										Maroon-breasted flycatcher
<i>Tephrodornis gularis</i>	488																+++	+++	+++	+++	+++	+++	---	---			Large woodshrike
<i>T. pondicerianus</i>	489																										Common woodshrike
<b>Turdinae</b>																											
<i>Monticola rufiventris</i>	750																										Chestnut-bellied rock thrush
<i>M. solitarius</i>	751																										Blue rock thrush
<i>Myophonus caeruleus</i>	752																+++		+++	+++		---	---	---	---		Blue whistling thrush
<i>Zoothera interpres</i>	753																										Chestnut-capped thrush
<i>Z. citrina</i>	754								+++		+++																Orange-headed thrush
<i>Z. dauma</i>	757																	+++		+++							Scaly thrush
<i>Z. marginata</i>	758																										Dark-sided thrush
<i>Brachypteryx leucophrys</i>	718																+++	+++							+++		Lesser shortwing
<i>B. montana</i>	719																										White-browed shortwing

	#	>20	20	19	18	17	16	15	14 30'	14	13 30'	13	12 30'	12	11	10	9	8 30'	8	7 30'	7	6 30'	6	Malay				
<b>Muscicapinae/Muscicapini</b>																												
Rhinomyias olivacea	767																									Fulvous-chested flycatcher		
R. umbratilis	769																									Grey-chested flycatcher		
Muscicapa dauurica	772																									Asian brown flycatcher		
M. williamsomi	773																									Brown streaked flycatcher		
M. muttui	774																									Brown-breasted flycatcher		
Ficedula monileger	780																									White-gorgetted flycatcher		
F. solitarius	781																									Rufous-browed flycatcher		
F. hyperythra	784																				+++	+++	+++	+++	+++	Snowy-browed flycatcher		
F. dumetoria	782																									Rufous-chested flycatcher		
F. westermanni	783																			+++					+++	Little pied flycatcher		
F. tricolor	787																									Slaty-blue flycatcher		
Eumyias thalassina	797																+++	+++	+++	+++	+++	+++	+++	+++	+++	Verditer flycatcher		
Niltava grandis	792																		+++						+++	Large niltava		
N. macgrigorlae	793																									Small niltava		
Cyomis concreta	799																									White-tailed flycatcher		
C. hainana	800																									Hainan blue flycatcher		
C. unicolor	798																			+++	+++	+++	+++	+++	+++	Pale blue flycatcher		
C. rubeculoides	801																									Blue-throated flycatcher		
C. banyumas	802																									Hill blue flycatcher		
C. turcosus	ap1													+++	+++					+++	+++				+++	Malaysian blue flycatcher		
C. tickelliae	803																			+++	+++	+++	+++	+++	+++	+++	Tickell's blue flycatcher	
C. rufigastra	915																										Mangrove blue flycatcher	
Muscicapella hodgsoni	789																									+++	Pygmy blue flycatcher	
<b>Muscicapinae/Saxicolini</b>																												
Copsychus saularis	729							+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	Oriental magpie robin		
C. malabaricus	730						+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	White-rumped shama	
Trichixos pyrropygus	731																										Rufous-tailed shama	
Chaimarrornis leucocephalus	738																										River chat	
Myiomeles leucura	732																										White-tailed robin	
Cinclidium frontale	733																										Blue-fronted robin	
Enicurus ruficapillus	739																										Chestnut-napped forktail	
E. immaculatus	740																										Black-backed forktail	
E. schistaceus	741																										Slaty-backed forktail	
E. leschenaulti	742																										White-crowned forktail	
Cochoa purpurea	743																+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	Purple cochoa	
C. viridis	744																											Green cochoa
Saxicola torquata	745																											Stonechat
S. caprata	746																											Pied bushchat
S. jerdoni	747																											Jerdon's bushchat
S. ferrea	748																											Grey bushchat

#	>20	20	19	18	17	16	15	14 30'	14	13 30'	13	12 30'	12	11	10	9	8 30'	8	7 30'	7	6 30'	6	Malay	
<b>Sturnidae</b>																								
Aplonis panayensis	821																							Philippine glossy starling
Stumus malabaricus	823																							Chesnut-tailed starling
S. contra	829																							Asian pied starling
S. nigricollis	830																							Black-collared starling
S. burmannicus	831																							Vinous-breasted starling
Acridotheres tristis	832																							Common myna
A. fuscus	833																							Jungle myna
A. javanicus	834																							White-vented myna
Ampeliceps coronatus	835																							Golden-crested myna
Gracula religiosa	836																+++	+++	+++	+++	+++	+++	+++	Hill myna
<b>Hirundinidae</b>																								
Riparia paludicola	463																							Plain martin
Hirundo concolor	465																							Dusky crag martin
H. tahitica	467																							Pacific swallow
H. striolata	469						+++	+++		+++						---	---	---	---	---	---	---	---	Striated swallow
<b>Pycnonotidae</b>																								
Spizixos canifrons	511																							Crested finchbill
Pycnonotus zeylanicus	512																							Straw-headed bulbul
P. striatus	513																							Striated bulbul
P. atriceps	514																							Black-headed bulbul
P. melanicterus	515					+++	+++	+++	+++	+++														Black-crested bulbul
P. melanoleucos	516																							Black-and-white bulbul
P. squamatus	517																							Scaly-breasted bulbul
P. cyaniventris	518																							Grey-bellied bulbul
P. jocosus	519																							Red-whiskered bulbul
P. xanthorrhous	520																							Brown-breasted bulbul
P. aurigaster	521																							Sooty-headed bulbul
P. eutilotus	522																							Puff-backed bulbul
P. finlaysoni	523												+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	Stripe-throated bulbul
P. flavescens	524																							Fluorescent bulbul
P. golavier	525															+++	+++	+++	+++	+++	+++	+++	+++	Yellow-vented bulbul
P. plumosus	526																							Olive-winged bulbul
P. blanfordi	527																							Streak-eared bulbul
P. simplex	528																							Cream-vented bulbul
P. brunneus	529																							Red-eyed bulbul
P. erythrothalmos	530																							Spectacled bulbul
Aiophoixus finschii	536																							Finsch's bulbul
A. flaveolus	531																							White-throated bulbul
A. pallidus	532																							Puff-throated bulbul
A. ochraceus	533															+++	+++	+++	+++	+++	+++	+++	+++	Ochraceous bulbul
A. bres	534																							Grey-cheeked bulbul
A. phaeocephalus	535																							Yellow-bellied bulbul



	#	>20	20	19	18	17	16	15	14 30'	14	13 30'	13	12 30'	12	11	10	9	8 30'	8	7 30'	7	6 30'	6	Malay		
<i>Tricholestes criniger</i>	537																								Hairy-backed bulbul	
<i>Iole virescens</i>	538																								Olive bulbul	
<i>I. propinqua</i>	539								+++		+++	+++	+++	---	---			---		---					Grey-eyed bulbul	
<i>Ixos olivacea</i>	540																								Buff-vented bulbul	
<i>I. malaccensis</i>	542																								Streaked bulbul	
<i>Hemixos flavala</i>	543						+++	+++	+++		+++														Ashy bulbul	
<i>Hypsipetes mccllellandii</i>	541										+++							+++						+++	Mountain bulbul	
<i>H. leucocephalus</i>	544																								Black bulbul	
<i>H. thompsoni</i>	545																								White-headed bulbul	
<b>Cisticolidae</b>																										
<i>Cisticola juncidis</i>	693																								+++	Zitting cisticola
<i>C. exilis</i>	694																									Bright-capped cisticola
<i>P. polychroa</i>	699																									Brown prinia
<i>P. atrogularis</i>	700																								+++	Hill prinia
<i>P. rufescens</i>	696															+++	+++	+++	+++	+++	---	---	---	---		Rufescent prinia
<i>Prinia hodgsonii</i>	695																									Grey-breasted prinia
<i>P. flaviventris</i>	697																+++	+++	+++	+++						Yellow-bellied prinia
<i>P. inornata</i>	698						+++	+++	+++	+++	+++	+++	+++													Plain prinia
<b>Zosteropidae</b>																										
<i>Zosterops palpebrosus</i>	871								+++	+++	+++	+++	+++				+++	+++								Oriental white-eye
<i>Z. everetti</i>	872																				+++	+++	+++	+++	+++	Everett's white-eye
<b>Sylviidae/Acrocephalinae</b>																										
<i>Tesia castaneocoronata</i>	708																									Chestnut-headed tesia
<i>T. olivacea</i>	707																									Slaty-bellied tesia
<i>T. cyaniventer</i>	706																									Grey-bellied tesia
<i>Cettia pallidipes</i>	710																									Pale-footed bush warbler
<i>Bradypterus mandelli</i>	717																									Russet bush warbler
<i>Orthotomus cuculatus</i>	705																+++				+++			---	Mountain tailorbird	
<i>O. sutorius</i>	701																+++	+++	+++	+++	+++	+++	+++	+++	+++	Common tailorbird
<i>O. atrogularis</i>	702																+++	+++	+++	+++	+++	+++	+++	+++	+++	Dark-necked tailorbird
<i>O. sericeus</i>	704																									Rufous-tailed tailorbird
<i>O. ruficeps</i>	703																									Ashy tailorbird
<i>Phylloscopus maculipennis</i>	681																									Ashy-throated warbler
<i>P. reguloides</i>	675																									Blyth's leaf warbler
<i>P. davisoni</i>	676																+++	+++							---	White-tailed leaf warbler
<i>Seiurus castaniceps</i>	663																									Chestnut-crowned warbler
<i>Abroscopus albigularis</i>	665																									Rufous-faced warbler
<i>A. superciliosus</i>	664																+++	+++	+++							Yellow-bellied warbler
<b>Sylviidae/Megalurinae</b>																										
<i>Megalurus palustris</i>	691																									Striated warbler
<i>Graminicola bengalensis</i>	692																									Large grass warbler

	#	>20	20	19	18	17	16	15	14 30'	14	13 30'	13	12 30'	12	11	10	9	8 30'	8	7 30'	7	6 30'	6	Malay			
<b>Sylviidae/Garrulacinae</b>																											
<i>Garulax leucolophus</i>	621																									White-crested laughingthrush	
<i>G. monileger</i>	622						+++	+++	+++	+++	+++	+++	+++	+++												Lesser necklaced laughingthrush	
<i>G. pectoralis</i>	623						+++																			Greater necklaced laughingthrush	
<i>G. strepitans</i>	624																									White-necked laughingthrush	
<i>G. chinensis</i>	625						+++		+++			+++														Black-throated laughingthrush	
<i>G. merulinus</i>	626																									Spot-breasted laughingthrush	
<i>G. sannio</i>	627																									White-browed laughingthrush	
<i>G. erythrocephalus</i>	628																+++	+++						+++		Chestnut-crowned laughingthrush	
<i>G. milnei</i>	629																									Red-tailed laughingthrush	
<i>Liocichla phoenicea</i>	630																									Red-faced liocichla	
<b>Sylviidae/Sylviinae</b>																											
<i>Trichastoma rostratum</i>	588																									White-chested babbler	
<i>T. bicolor</i>	589																									Ferruginous babbler	
<i>Malacocincla abbotti</i>	591																				+++	+++	+++	+++	+++	Abbott's babbler	
<i>M. sepiarium</i>	590																									Horsfield's babbler	
<i>M. malaccense</i>	587																									Short-tailed babbler	
<i>Pellorneum tickelli</i>	586													+++	+++		+++	+++		+++	+++	+++	+++	+++	+++	Buff-breasted babbler	
<i>P. albiventris</i>	585																									Spot-throated babbler	
<i>P. ruficeps</i>	583	+++	+++	+++	+++	+++	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	Puff-throated babbler	
<i>P. capistratum</i>	584																									Black-capped babbler	
<i>Malacopteron magnirostre</i>	592																									Moustached babbler	
<i>M. affine</i>	593																									Sooty-capped babbler	
<i>M. cinereum</i>	594													+++	+++		+++	+++	+++	+++	+++	+++	+++	+++	+++	Scaly-crowned babbler	
<i>M. magnum</i>	595																									Rufous-crowned babbler	
<i>Pomatorhinus hypoleucos</i>	596																									Large scimitar babbler	
<i>P. erythrogenys</i>	597																									Rusty-cheeked scimitar babbler	
<i>P. schisticeps</i>	598	+++	+++	+++	+++	+++	---	---	---	---	---	---	---	---	---	---	###	###	###	###	###	###	###	###	###	White-browed scimitar babbler	
<i>P. ochraceiceps</i>	599																									Red-billed scimitar-babbler	
<i>P. ferruginosus</i>	600																									Coral-billed scimitar babbler	
<i>Kenopia striata</i>	601																									Striped wren babbler	
<i>Napothera macrodactyla</i>	602																									Large wren babbler	
<i>N. crispifrons</i>	603																									Limestone wren-babbler	
<i>N. brevicaudata</i>	604																+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	Streaked wren babbler
<i>N. epilepidota</i>	605																										Eye-browed wren babbler
<i>Proopyga pusilla</i>	606																+++	+++								+++	Pygmy wren babbler
<i>Stachyris rodolpheii</i>	607																										Deignan's babbler
<i>S. rufifrons</i>	608															+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	Rufous-fronted babbler
<i>S. chrysaea</i>	609																+++	+++		+++						+++	Golden babbler
<i>S. nigriceps</i>	610																+++	+++	+++	+++	+++	+++	---	---	---	---	Grey-throated babbler
<i>S. poliocephala</i>	611																										Grey-headed babbler
<i>S. striolata</i>	612																+++	+++			+++						Spot-necked babbler
<i>S. leucotis</i>	614																										White-necked babbler

	#	>20	20	19	18	17	16	15	14 30'	14	13 30'	13	12 30'	12	11	10	9	8 30'	8	7 30'	7	6 30'	6	Malay		
<i>S. nigricollis</i>	615																								Black-throated babbler	
<i>S. maculata</i>	613																								Chestnut-rumped babbler	
<i>S. erythroptera</i>	616																								Chestnut-winged babbler	
<i>Macronous gularis</i>	617											+++	+++	+++											Striped tit babbler	
<i>M. pilosus</i>	618																								Fluffy-backed tit babbler	
<i>Timalia pileata</i>	619						+++		+++				+++												Chestnut-capped babbler	
<i>Chrysomma sinense</i>	620																								Yellow-eyed babbler	
<i>Leiothrix argentauris</i>	647																+++	+++						+++	Silver-eared mesia	
<i>Cutia nipalensis</i>	646																							+++	Cutia	
<i>Pteruthius flaviscapis</i>	643																+++	+++						---	White-browed shrike-babbler	
<i>P. melanotis</i>	642																							+++	Black-eared shrike-babbler	
<i>P. aenobarbus</i>	641																								Chestnut-fronted shrike-babbler	
<i>Gampsothynchus rufulus</i>	648																							+++	White-hooded babbler	
<i>Actinodura ramsayi</i>	649																								Spectacled barwing	
<i>Minla cyanouroptera</i>	644																+++	+++						+++	Blue-winged minla	
<i>M. strigula</i>	645																							+++	chestnut-tailed minla	
<i>Alcippe castaneiceps</i>	631																						+++	+++	Rufous-winged fulvetta	
<i>A. brunneicauda</i>	633																								Brown fulvetta	
<i>A. poiocephala</i>	634						+++	+++	+++			+++													Brown-cheeked fulvetta	
<i>A. peracensis</i>	635																								Mountain fulvetta	
<i>A. grotei</i>	635																								Black-browed fulvetta	
<i>A. morisonia</i>	636																								Grey-cheeked fulvetta	
<i>Heterophasia annectans</i>	650																								Rufous-backed sibia	
<i>H. melanoleuca</i>	651																								Black-headed sibia	
<i>H. picaoides</i>	652																							+++	Long-tailed sibia	
<i>Yuhina castaniceps</i>	637																								Striated yuhina	
<i>Y. flavicollis</i>	638																								Whiskered yuhina	
<i>Y. humilis</i>	639																								Burmese yuhina	
<i>Y. zantholeuca</i>	640																		+++	+++	+++	+++	+++	+++	White-bellied yuhina	
<b>Alaudidae</b>																										
<i>Mirafra javanica</i>	473																								Singing bushlark	
<i>M. erythrocephala</i>	474																								Rufous-winged bushlark	
<i>Alauda gulgula</i>	475																								Oriental skylark	
<b>Nectarinidae</b>																										
<i>Prionochilus maculatus</i>	860																						+++	+++	+++	Yellow-breasted flowerpecker
<i>P. percussus</i>	861																									Crimson-breasted flowerpecker
<i>P. thoracicus</i>	859																									Scarlet-breasted flowerpecker
<i>Dicaeum agile</i>	862																+++	+++	+++	+++	+++	+++	+++	+++	+++	Thick-billed flowerpecker
<i>D. chrysorheum</i>	863															+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	Yellow-vented flowerpecker
<i>D. melanoxanthum</i>	864																									Yellow-bellied flowerpecker
<i>D. trigonostigma</i>	865																							+++	+++	Orange-bellied flowerpecker
<i>D. concolor</i>	866																								+++	Plain flowerpecker
<i>D. ignipectus</i>	868																								+++	Buff-bellied flowerpecker
<i>D. cruentatum</i>	867															+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	Scarlet-backed flowerpecker

	#	>20	20	19	18	17	16	15	14 30'	14	13 30'	13	12 30'	12	11	10	9	8 30'	8	7 30'	7	6 30'	6	Malay	
<i>Anthreptes simplex</i>	837																								Plain sunbird
<i>A. malacensis</i>	838																								Brown-throated sunbird
<i>A. rhodolaema</i>	839																								Red-throated sunbird
<i>A. singalensis</i>	840									+++	+++	+++	+++	+++	---	---	---	---	---	---	---	---	---	###	Ruby-cheeked sunbird
<i>Hypogramma hypogrammicum</i>	841																+++	+++	+++	+++	+++	+++	+++	+++	Purple-naped sunbird
<i>Nectarinia sperata</i>	842																								Purple-throated sunbird
<i>N. calcostetha</i>	843																								Copper-throated sunbird
<i>N. jugularis</i>	844																								Olive-backed sunbird
<i>N. asiatica</i>	845																								Purple sunbird
<i>Aethopyga gouldiae</i>	846																								Gould's sunbird
<i>A. nipalensis</i>	847																+++	+++							Green-tailed sunbird
<i>A. saturata</i>	848																	+++	+++	+++					Black-throated sunbird
<i>A. siparaja</i>	849									+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	---	---	Crimson sunbird
<i>A. temminckii</i>	851																								Scarlet sunbird
<i>Arachnothera longirostra</i>	852																+++	+++	+++	+++	+++	+++	+++	+++	Little spiderhunter
<i>A. crassirostris</i>	853																								Thick-billed spiderhunter
<i>A. robusta</i>	854																								Long-billed spiderhunter
<i>A. flavigaster</i>	855																								Spectacled spiderhunter
<i>A. chrysogenys</i>	856																								Yellow-eared spiderhunter
<i>A. affinis</i>	857														+++	+++	+++	+++	+++	+++			+++	+++	Grey-breasted spiderhunter
<i>A. magna</i>	858						+++	+++				+++											---	---	Streaked spiderhunter
<b>Passeridae</b>																									
<i>Passer domesticus</i>	876																								House Sparrow
<i>P. flaveolus</i>	874																								Plain-backed sparrow
<i>P. montanus</i>	873																								Eurasian tree sparrow
<i>Ploceus manyar</i>	878																								Streaked weaver
<i>Ploceus philippinus</i>	877								+++	+++	+++		+++				---	---	---	---	---	---	---	---	Baya weaver
<i>P. hypoxanthus</i>	879																								Asian golden weaver
<i>Amandava amandava</i>	880																								Red avadavat
<i>Erythrura prasina</i>	881																								Pin-tailed parrotfinch
<i>Lonchura striata</i>	883																+++	+++	+++	+++	+++	+++	+++	+++	White-rumped munia
<i>L. punctulata</i>	885																+++	+++	+++	+++				+++	Scaly-breasted munia
<i>L. leucogastra</i>	884																								White-bellied munia
<i>L. malacca</i>	886																			+++		+++		+++	Chestnut munia
<i>L. maja</i>	887																								White-headed munia