

BIRDING HOTSPOT

Birding the tip of the Malay peninsula: bird diversity and birding sites in Johor

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Introduction

Johor is the southernmost state of Peninsular Malaysia, covering an area which historically included some of the largest expanses of lowland rainforest in South-East Asia and even today some 20% of this forest cover still remains. Not surprisingly the state is rich in birds, but sadly is ignored by most birders visiting Malaysia who focus on the ‘traditional hotspots’ of Gombak, Taman Negara, Fraser’s Hill and Kuala Selangor in Pahang and Selangor. But with more than 450 recorded species Johor has much to offer, particularly for those passing through or domiciled in Singapore—the main lowland rainforest site in southern Johor, Pantii Forest Reserve (Pantii FR) is accessible by road from Singapore in an hour. A week spent in Johor’s diverse habitats can produce 200–250 species depending on the season.

This article does not attempt to cover all Johor’s sites, but we hope that it will foster the growing interest in birding and ecotourism in the state, a jewel of Peninsular Malaysia.

Background to Johor today

Johor, 19,984 km² in area, is the third largest state after Perak and Pahang (Lum 2010) and is the only state in Peninsular Malaysia that straddles the peninsula with coastlines bordering the Strait of Malacca to the west and the South China Sea to the east. Largely flat, Johor is isolated from the main Titiwangsa mountain range and its satellites with few peaks exceeding 1,000 m; the highest being Gn Ledang (formerly Mt Ophir) at 1,276 m in the north-west, followed by Gn Belumut at 1,010 m in the centre. Johor is drained by many rivers notably the Sungei Johor (Johor river) which rises in the Pantii massif and flows through primary hill forest, riparian forest and a largely deforested floodplain to the mangrove-fringed Tebrau Strait north-east of Singapore. Other major rivers include the Muar, draining into the Strait of Malacca, and the Skudai, which drains into the western part of the Strait of Johor.

Economic development came early to Johor and conversion to oil palm, rubber, gambier and pineapple cultivation account for the bulk of the land-use change, although recently urbanisation and industrial development have increased. Johor Bahru, the state capital, has a population of over 2

million people and is congested and sprawling. The state government has established a development area—Iskandar Malaysia—and is moving to a new administrative centre at Nusajaya.

Natural habitats in Johor

Not surprisingly, montane vegetation is exceedingly rare, confined to the few peaks that dot the state, and the dominant climax vegetation is mixed lowland and hill dipterocarp forest, which is unfortunately reduced to a few large blocs in the north-east (e.g. Ulu Sedili FR and Endau-Rompin NP) and many scattered smaller fragments (e.g. Gn Pulai FR and Arong FR) surrounded by a matrix of monoculture and settlements. The forests are dominated by multiple genera of dipterocarp trees with heights exceeding 30 m although, given extensive logging, only a limited amount of what can be considered ‘primary’ forest remains. However, there are still large areas of logged forests in managed forest reserves.

Lowland dipterocarp forests in Johor (as with similar areas elsewhere in Malaysia, Brunei and lowland Sumatra) support the richest and most diverse bird assemblages in tropical Asia. A patch of lowland forest only 2 km² may support a resident bird community of 190 species (Wells 1999) and when migrants are excluded, more than 200 species have been recorded in an 8 km section of primary and logged forest in Pantii FR (Yong 2006). These lowland forests form a crucial habitat for many globally threatened lowland specialists such as the Vulnerable Crestless Fireback *Lophura erythrophthalma*, Endangered Storm’s Stork *Ciconia stormi*, Vulnerable Wallace’s Hawk Eagle *Spizaetus nanus*, Vulnerable Short-toed Coucal *Centropus rectunguis* and Vulnerable Brown-chested Jungle Flycatcher *Rhinomyias brunneatus*.

Swamp-forests have generally received considerably less attention from biologists as a result of difficulties in access. However, in Johor where swamp-forest is an important habitat, Corner (1978) made one of the best botanical assessments of riverine swamp-forests in tropical Asia on the Sungei Johor. Swamp-forest, both freshwater and peat, is partly waterlogged and usually abuts dryland dipterocarp forest and supports a similar bird community, although many ground-dwelling birds occur in lower densities.



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Plate 1. Brown-chested Jungle Flycatcher *Rhynomyias brunneatus*, Gn Belumut, Johor, 22 April 2010.

Much of the east coast has sandy beaches with pockets of remnant beach forests and, rarely, mangroves, while the west coast, despite considerable exploitation, supports healthy stands of mangrove forest, with large patches protected in a few major forest reserves (e.g. Benut) and national parks (e.g. Tanjong Piai). Although overall species diversity is considerably lower than in lowland rainforests, mangroves form unique habitats that support a number of specialists, including Mangrove Pitta *Pitta megarhyncha*, Mangrove Blue Flycatcher *Cyornis rufigastra*, Greater Flameback *Chrysocolaptes lucidus* and Copper-throated Sunbird *Nectarinia calcostetha*. The adjoining mudflats support a significant population of the Vulnerable Lesser Adjutant *Leptoptilos javanicus* as well as herons and waders, including in winter the rare Vulnerable Chinese Egret *Egretta eulophotes*.

There are three Important Bird Areas (IBA) in Johor (BirdLife International 2004, Yeap *et al.* 2007). The south-west coastal IBA extending from Sungei Muar in the north, with Parit Jawa and Benut at its midpoint, to Tanjong Piai and Pulau Kukup (both Ramsar sites) in the south, includes a significant area of mangrove forest and tidal mudflats. The other IBAs, Panti FR and Endau-Rompin National Park (NP) (shared with Pahang state), cover large areas of lowland rainforest.

Man-made habitats in Johor

Large areas of Johor are converted to agriculture with plantations of oil palm which continue to expand (Peh *et al.* 2006, Lum 2010) dominating the state, whilst many smaller areas of fruit orchards produce durian, banana, pineapple and watermelon. This landscape supports a species-

poor avian community of adaptable birds typified by Red-wattled Lapwing *Vanellus indicus*, Red Junglefowl *Gallus gallus* and Oriental Pied Hornbill *Anthracoceros albirostris*, as well as a few species of bulbul, sunbird, tailorbird and cuckoo; but areas adjacent to forest may exhibit slightly higher diversity. Oil palm plantations support a number of owl species, with nest-boxes successfully placed in some estates to attract Barn Owls *Tyto alba* as rodent control agents. Spotted Wood Owls *Strix seloputo* are likely to have been attracted by the high density of rats and even Barred Eagle Owl *Bubo sumatranus* has been recorded where there is still forest nearby.

There is a small area of wet paddy cultivation in the north-west and the paddyfields which adjoin areas of secondary scrub and mangroves are used by foraging Lesser Adjutants and a number of resident heron species. In winter this area is utilised by various *Aquila* eagles, especially the Greater Spotted Eagle *A. clanga* which occurs annually, together with harriers, kites and other migratory herons and passerines (Lum 2010).

A brief history of ornithology in Johor

William Farquhar, the Resident of Malacca (later the first Resident of Singapore), is credited with the first recorded collecting in Johor, obtaining specimens on Mt Ophir sometime after 1795. He was followed by other notable naturalists and ornithologists—Alfred Russel Wallace visited the site during July–October 1854, followed by Robert Ramsay (1873) and John Whitehead (1884–1885). Possibly even more famously, William Davison, curator and travelling collector to A. O. Hume (Collar & Prys-Jones 2012) and later curator of the Raffles Museum, Singapore, explored and collected in Johor in 1875, 1879, 1880 and 1891. Davison also exchanged notes and specimens with Henry Kelham, a military officer, in 1879 and Kelham also explored north-west and south Johor and collected from Gn Pulau (Wells 2007). It is not surprising that sites in Johor are type localities for Sundaic species such as Black Partridge *Melanoperdix nigra*.

The twentieth century saw further activity in Johor from museum curators based in Kuala Lumpur and Singapore, including Herbert Robinson, Frederick Chasen and Carl Gibson-Hill (Wells 2007). The American explorer William Beebe visited the Labis district on his way north in 1910, and the English educator E. Bromley published the first observations of birds in Johor during the 1940s and 1950s. G. Hutchinson wrote about woodpeckers in South Johor in 1950 and the planter and OBC member Dennis Batchelor published a detailed account of the birds near Mt Ophir during the 1950s.

The formation of the Malayan Nature Society (MNS) in 1940 accelerated the rise of amateur naturalists and ornithologists who became the main observers of birdlife in Johor. Two notable examples were Ian Teesdale who explored Johor from 1965–1970 and Derek Holmes who was active in the state between 1970 and 1973. From the 1960s to 1970 bird observation and ringing was carried out by the Royal Air Force Ornithological Society and the Army Birdwatching Club based in Singapore—their activities ceased when the British forces withdrew from Singapore in 1971. But the impetus in bird observation and, to a lesser extent, bird ringing in Johor was maintained by members of MNS branches in Singapore and Johor. With the collaboration of the State Forestry Department, their activities included bird surveys in the new Endau-Rompin NP in the 1980s and proposals to manage and protect the rapidly diminishing rainforest at Panti—finally opened as a bird sanctuary in 2010—a Lesser Adjutant breeding colony in Batu Pahat, a shorebird observation centre at Parit Jawa, and the creation of two wetland national parks at Tanjong Piai and Kukup Island.

Johor specialities

Many of the most sought-after Sundaic lowland rainforest species are found in the state, including some that are extremely hard to find elsewhere in

Plate 2. Bat Hawk *Macheiramphus alcinus*, Bukit Wang Forest Reserve, Malaysia, 4 March 2010.



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South-East Asia. Bulbuls and babblers dominate the resident avifauna in most areas of lowland forest in Peninsular Malaysia and some areas such as Johor may support up to 12 species and nearly 20 respectively. Many species of bulbuls co-exist and well-explored sites like the Panti FR have been found to support up to 12 species, including the scarce Finsch's Bulbul *Alophoixus finschii* and the elusive, nomadic Black-and-white Bulbul *Pycnonotus melanoleucos*. Babblers exploit the diverse niches offered by the complex structure of the lowland rainforest, with species adapted to the forest floor (e.g. Black-capped Babbler *Pellorneum capistratum* and Striped Wren Babbler *Kenopia striata*), the understorey (e.g. Black-throated Babbler *Stachyris nigricollis* and Chestnut-winged Babbler *S. erythroptera*) and the middle storey and canopy (e.g. Brown Fulvetta *Alcippe brunneicauda* and Rufous-fronted Babbler *S. rufifrons*). Other Oriental bird families well represented in Johor's lowland forests include trogons, kingfishers, cuckoos, hornbills, barbets, pittas, broadbills, flowerpeckers, sunbirds and the enigmatic, monotypic Malaysian Railbabbler, the latter more easily seen in Johor than anywhere else in its range. Some of the best remaining lowland forest in the Endau-Rompin NP and the Panti FR support up to 10 species of cuckoo (including five malkohas), four trogons, eight hornbills and five broadbills. In contrast, Johor's isolation from the Titiwangsa range, a main feature of much of the peninsula, has resulted in many widespread montane species, including all the montane endemics, being absent from Johor's highest peaks.

Mangrove forests in Johor support a different but much smaller community of birds and a typical site e.g. Tanjong Piai, may support 30–50 resident species. Generally, the status of many migratory birds remains poorly known in Johor and there are few records of thrushes, pittas and rails. On the other hand, the efforts of increasing numbers of birdwatchers have found some migratory rarities such as Jerdon's Baza *Aviceda jerdoni* and even vagrants new to the state (e.g. Rosy Starling *Sturnus roseus*) (Lum in press).

Some of the interesting and important species recorded in Johor are as follows:

Lesser Adjutant *Leptoptilos javanicus* (Vulnerable)

The extensive mudflats and mangroves on Johor's south-west coast are a major stronghold for this species. An estimated 1% of the biogeographic population occurs within the South-west Johor coast IBA (Yeap *et al.* 2007), a stretch of 150 km from the Tanjong Piai and Pulau Kukup FRs, to the mangrove coast off the town of Parit Jawa. They also forage on fallow fields and counts of up to 25 individuals have been seen on occasions.



Plate 3. Cinnamon-headed Green Pigeon *Treron fulvicollis*, east coast of Johor, Peninsular Malaysia, 21 April 2005.

Plate 4. Cinnamon-headed Green Pigeon *Treron fulvicollis*, Singapore, 3 September 2011.



Plate 5. Cinnamon-rumped Trogon *Harpactes orrhophaeus*, Taman Negara, Malaysia, 6 October 2010.



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Plate 6. Short-toed Coucal *Centropus rectunguis*, Panti Forest, Malaysia, 17 April 2011.

Plates 7 & 8. Blue-banded Kingfisher *Alcedo euryzona*, Panti Forest, Malaysia, 7 June 2010.

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Bat Hawk *Macheiramphus alcinus*
(Least Concern)

This non-migratory raptor is uncommon in Peninsular Malaysia—most recent records are from the central-western states of Selangor, Perak and Pahang. Easily missed due to its crepuscular habits, it is probably overlooked in Johor, because recent observations show it to be regular in Pantii FR where there are two recent nesting records from the Bunker Trail area.

Malaysian Plover *Charadrius peronii*
(Near Threatened)

A specialist of sandy beaches and one of two resident *Charadrius* plovers in South-East Asia, it is uncommon and declining across its relatively small range due to the development of sandy beaches for tourism and infrastructure e.g. in eastern Singapore. The sandy beaches of eastern Johor, especially Teluk Mahkota (Jason's Bay), are probably some of the best places to see it.

Cinnamon-headed Green Pigeon *Treron fulvicollis*
(Near Threatened)

Small groups of this uncommon but distinctive lowland-dwelling pigeon may be seen in the lowland forests, especially swampy, logged forests and mangroves in eastern and south-eastern Johor.

It has been recently recorded in the Mersing and Ulu Sedili areas and Pantii FR.

Short-toed Coucal *Centropus rectunguis*
(Vulnerable)

The only coucal found in closed-canopy forests. A possibly nomadic ground forager, it frequents the floor and understorey of logged and primary lowland forests, including swamp-forest. It has been recorded in Endau-Rompin NP and recently in Pantii FR.

Cinnamon-rumped Trogon *Harpactes orrhophaeus*
(Near Threatened)

This is the least frequently recorded of the four lowland trogons in Peninsular Malaysia, possibly because of its silent behaviour and consistent use of concealed, low perches (Wells 1999). It is regular in the Pantii FR where there are many recent records and it also occurs in Endau-Rompin NP and Ulu Sedili FR.

Blue-banded Kingfisher *Alcedo euryzona*
(Vulnerable)

In Peninsular Malaysia, this species usually occurs in hilly and submontane primary forest (Wells 1999). Previously only found north of Negeri Sembilan, its recent discovery on streams in Pantii FR and Gn Belumut FR (S. Cockayne *in litt.* 2009) extends the known range southwards by nearly 200 km.

Plate 9. Malayan Banded Pitta *Pitta irena*, Taman Negara, Malaysia, 17 April 2012.



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Plate 10. Finsch's Bulbul *Alophoixus finschii*, Panti Forest, Malaysia, 17 April 2012.

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Plate 11. Black-throated Babbler *Stachyris nigricollis*, Taman Negara, Malaysia, 27 July 2008.

Plate 12. White-necked Babbler *Stachyris leucotis*, Panti Forest, Malaysia, 23 June 2011.

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Plate 13. Scarlet-breasted Flowerpecker *Prionochilus thoracicus*, Pantli Forest, Malaysia, 3 June 2008.

Plate 14. Scarlet-breasted Flowerpecker, Pantli Forest, Malaysia, 3 June 2008.



JIMMY TAN

Rufous-collared Kingfisher *Actenoides concretus* (Near Threatened)

This colourful inhabitant of lowland forests is easily missed due to its unobtrusive habits—most vocal in the early morning, it otherwise perches quietly in the understorey. It occurs at relatively high densities in Pantli FR where as many as four pairs may be heard within a short distance. It also occurs in Ulu Sedili FR and Endau-Rompin NP.

Wrinkled Hornbill *Aceros corrugatus* (Near Threatened)

This relatively small hornbill is a specialist of plains-level lowland forest—particularly swamp-forest (Wells 1999). Now present only in low densities throughout its range, often in pairs, it is still seen in Pantli FR swamp-forest despite logging. It also occurs in Ulu Sedili FR, Gemaluang FR and Endau-Rompin NP.

Giant Pitta *Pitta caerulea* (Near Threatened)

One of the most sought-after forest birds in South-East Asia, this surprisingly drab species persists in Johor's lowland forests. Although only occasionally recorded from Endau-Rompin NP, it is probably under-recorded as much of the park is infrequently visited. There were records from Pantli FR in 2009, 2010 and 2011.

Malayan Banded Pitta *Pitta irena* (Near Threatened)

The Banded Pitta complex is now recognised to consist of three full species (Rheindt & Eaton 2010), of which the Malayan Banded Pitta occurs only in the Thai-Malay Peninsula and Sumatra and is designated as Near Threatened because of its dependence on lowland forests, a fast-disappearing habitat across its range. The best sites for this species are Panti FR, where it is uncommon, Ulu Sedili FR and Endau-Rompin NP.

Malaysian Railbabbler *Eupetes macrocerus* (Near Threatened)

A bird with complicated taxonomic affinities and a remarkable breeding display (Yong, in prep.), the poorly known but highly prized Malaysian Railbabbler occurs at surprisingly high densities in Panti FR, probably the easiest site to see it anywhere in its range, while it is considerably rarer in Endau-Rompin NP, Ulu Sedili FR and Gn Belulut FR.

Finsch's Bulbul *Alophoixus finschi* (Near Threatened)

This rare, drab bulbul is largely confined to lowland forest across its Sundaic range. Probably overlooked due to its superficial resemblance to other brown bulbuls, it occurs regularly in Panti FR and there are many recent records, mostly of birds feeding at fruiting figs or the *Macaranga* trees which are common along forest edges.

Black-throated Babbler *Stachyris nigricollis* (Near Threatened) and White-necked Babbler *S. leucotis* (Near Threatened)

With their distinctive facial patterns, these two species are among the most striking of the babblers. While Black-throated Babbler is relatively common,

occurring even in logged forests, the White-necked Babbler appears to be considerably rarer, even in optimal primary forest habitats. The best places to see the two species are Endau-Rompin NP, Panti FR and Ulu Sedili FR.

Scarlet-breasted Flowerpecker *Prionochilus thoracicus* (Near Threatened)

A specialist of plains-level lowland forest (Wells 1999), it is most regularly encountered at Panti FR where it is usually seen perched high up or feeding on fruits in swamp-forest. It has also been recorded at Endau-Rompin NP.

Birdwatching sites

Thanks to the efficient network of roads and highways, a week's birding covering the major sites is likely to yield between 200–250 species, including many Sundaic endemics. The itinerary could include a day at Tanjong Piai for mangrove specialists, a day at Parit Jawa for the Vulnerable Lesser Adjutant and waders, followed by a short detour to Sungei Balang for marshland birds and migrant raptors, with the remaining time in Panti FR for rainforest species. There is the added possibility of a half-day side-trip to see Malaysian Plover at Teluk Mahkota (formerly Jason's Bay) about 28 km north-east of the town of Kota Tinggi or at Desaru close to Bandar Penawar. Sites of special interest are described below.

Panti Forest Reserve and Bird Sanctuary

The most popular birding spot in Johor, this site covers some 20,000 ha and consists of a mosaic of primary lowland and hill forests, peat swamps, logged and regenerating forests and scrub, in a sea of oil palm. An IBA, a large part of it was designated

Plate 15. Gunung Panti from Bunker Hill, May 2009.



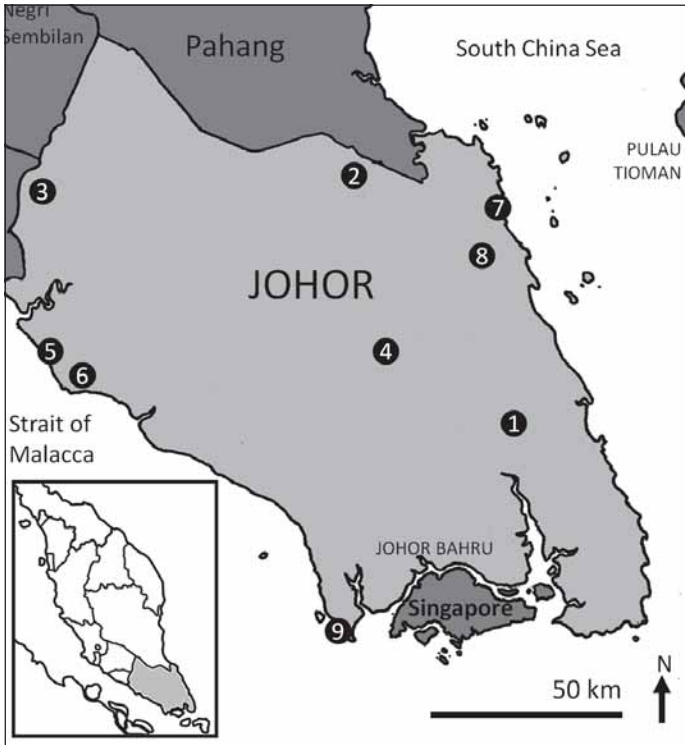


Figure 1. Map of Johor, Peninsular Malaysia, showing birdwatching sites.

- 1. Pantii Forest Reserve and Bird Sanctuary
- 2. Endau-Rompin National Park
- 3. Gn Ledang (Mt Ophir)
- 4. Gunung Belumut
- 5. Parit Jawa
- 6. Sungei Balang
- 7. Air Papan
- 8. Kahang rice fields
- 9. Tanjong Piai and Pulau Kukup National Parks

Plate 16. Endau-Rompin National Park, May 2009.





Plate 17. Gn Belumut, August 2009.

as a bird sanctuary in 2010. Access is from the town of Kota Tinggi and it is also easily reached from Singapore, an hour's drive away. Over 320 species of birds have been recorded here including such sought-after gems as Wrinkled Hornbill, White-bellied Woodpecker *Dryocopus javensis*, Malaysian Honeyguide *Indicator archipelagicus*, Blue-banded Kingfisher, Large Frogmouth *Batrachostomus auritus*, Storm's Stork, Giant Pitta, Malaysian Railbabbler, White-tailed Flycatcher *Cyornis concretus*, Black-and-white Bulbul, and Scarlet-breasted and Brown-backed Flowerpeckers *Dicaeum everetti* (Lau *et al.* 2012). Although ground-dwelling birds and the larger forest species such as hornbills are scarce due to disturbance, it is possible to record over 100 species in a day's birding, and over 150 in 3–4 days. There is also the exciting possibility of encountering mammals such as tapir, elephant, sun bear, leopard and tiger, and up to five species of primate.

Endau-Rompin National Park

This IBA, with an area of 48,905 ha, is the second largest national park in the peninsula and is located on the north-eastern border with Pahang (Yeap *et al.* 2007). It boasts a large wilderness area with remote mountains, rivers and waterfalls, and is worth exploring. Over 195 birds have been recorded here (Davison 1987), include Great Argus *Argusianus argus*, Long-billed Partridge *Rhizothera longirostris*, both firebacks, Wallace's Hawk Eagle, Storm's Stork, Giant Pitta and Malaysian Railbabbler. There is also an abundance of mammals with over 60 species recorded, including the globally threatened Sumatran Rhinoceros *Dicerorhinus sumatrensis* and Ridley's Horseshoe Bat *Hipposideros ridleyi* (Davison 1987). Birdwatching is challenging as the trails are narrow and physically

taxing. Access is from either Kahang or Selai, with four-wheel drive vehicles required due to the tough terrain and poor state of the dirt tracks.

Gn Ledang (formerly Mt Ophir)

This national park on the north-west border is shared with the state of Malacca. Access is from the ancient city of Malacca or from Tangkak in Johor. Chalets and camping grounds are available as it is a popular hiking destination for those wishing to scale the 1,276 m peak, the state's highest mountain. Vegetation ranges from hill to lower montane forest and a suite of interesting birds can be seen, including Helmeted Hornbill *Rhinoplax vigil*, all five lowland malkohas, Striped Wren Babbler and Stripe-throated Bulbul *Pycnonotus finlaysoni*, the latter locally scarce in Johor. There are no true montane species due to its isolation from the main range.

Gn Belumut

This state park is in central Johor, south of Kahang. Vegetation consists mainly of primary hill and lower montane forest that reaches an altitude of 1,010 m. Of interest here are the abundant *Johannesteijsmannia* palms and slipper orchids, whilst birds of note include Oriental Bay Owl *Phodilus badius*, Maroon-breasted Philentoma *Philentoma velatum*, Grey-throated Babbler *Stachyris nigriceps*, Horsfield's Babbler *Malacocincla sepiarium* and Ashy Bulbul *Hemixos flavala*. There are also recent records of Blue-banded Kingfisher and Reddish Scops Owl *Otus rufescens*.

Parit Jawa

This belt of coastal mudflats and mangrove forest on the west coast adjoins a fishing village of the

same name and is part of the South-West Johor IBA (Yeap *et al* 2007). Access is from the seaside towns of Muar and Batu Pahat. The latter is also noteworthy for its nesting colony of Lesser Adjutants, which can usually be observed roosting in mangroves or feeding on the mudflats—this area is one of the easiest places to see this species in Malaysia, along with scores of migrating and wintering waders.

Sungei Balang

Located south of Parit Jawa, Sungei Balang is part of a 2,000 ha rice-field scheme that is good for wintering raptors, shorebirds and open-country passerines. It is possible to drive along the bunds but beware of soft mud. Interesting species include the Vulnerable Greater Spotted Eagle, Imperial Eagle *Aquila heliaca* and Steppe Eagle *A. nipalensis*, Black Kite *Milvus migrans*, Pied Circus *melanoleucos* and Eastern Marsh Harrier *Circus spilonotus*, Black Drongo *Dicrurus macrocercus*, wagtails and pipits. The area is also good for waterbirds ranging from the tiny Long-toed Stint *Calidris subminuta* to the ungainly Lesser Adjutant. Malaysia's fourth Pectoral Sandpiper *C. melanotos* was found here and Rosy Starlings are regularly recorded.

Air Papan

The vast shoreline north of the sleepy seaside town of Mersing on the east coast consists mostly of sandy and muddy shore that attracts waders such as Asian Dowitcher *Limnodromus semipalmatus*, Grey-tailed Tattler *Heteroscelus brevipes*, the resident Malaysian Plover and numerous tern species. Trips to the hundreds of small islets in the Johor-Pahang archipelago to see Nicobar Pigeons *Caloenas nicobarica*, terns, Lesser Frigatebird *Fregata ariel*, the Critically Endangered Christmas Island Frigatebird *F. andrewsi* and oceanic birds such as storm-petrels may be arranged from Mersing. North of the beach are mixed habitats ranging from mangroves and rice-fields to remnant coastal forest which still harbours several species of hornbill. The small hill of Gn Arong, still largely forested, can be explored for forest birds.

Kahang rice-fields

This is a state-funded rice-field project located in Kahang, central Johor. The emphasis here is on organic rice and fruit farming, and so fewer chemicals are used than elsewhere. The ponds are worth exploring as they are usually full of waterbirds that favour fresh water, including Lesser Whistling-duck *Dendrocygna javanica*, Cotton Pygmy-goose *Nettapus coromandelianus*, Purple

Swamphen *Porphyrio porphyrio*, Red-wattled Lapwing and various quails, crakes and herons.

Tanjong Piai National Park

This Ramsar site is the southernmost protected area in Peninsular Malaysia and harbours one of the most extensive stands of mangroves left on its west coast. It attracts many waterbirds to its mudflats, including waders, terns, egrets and Lesser Adjutant. A network of boardwalks enables birders to explore the mangroves for interesting specialists such as Greater Flameback, Chestnut-bellied Malkoha *Phaenicophaeus sumatranus*, Mangrove Pitta, Mangrove Whistler and Mangrove Blue Flycatcher. Access is from the sleepy coastal town of Kukup, where good, cheap seafood may be found, about two hours' drive from Singapore.

Pulau Kukup National Park

Pulau Kukup, another Ramsar site is a large mangrove island also near Kukup town. It attracts Lesser Adjutant and Chinese Egret in addition to the resident mangrove species. Access to the island is by ferry from Kukup. The island has a network of boardwalks and an observation tower from which one may look for its mangrove specialists including Mangrove Pitta, Mangrove Whistler and Mangrove Blue Flycatcher.

Conservation in Johor

Much of Johor's remaining primary lowland forest, managed by the State Forestry Department, is reserved for future exploitation. The forest reserves are logged in multiple cycles and are usually left untouched for about 20–30 years before being re-logged. While some forest species such as babblers and sunbirds are able to survive post-logging (Peh *et al.* 2005), other important species such as pheasants and hornbills decline in density or become extinct.

Fragmentation of the forest into smaller and smaller patches, separated from each other by large expanses of plantations, threatens small populations of forest birds isolated there (Peh *et al.* 2006). Some isolated forest fragments, e.g. Gn Pulai, may already have lost many large forest birds, especially hornbills. Poaching for food and the pet trade threaten a number of popular cage-bird species such as White-rumped Shama *Copsychus malabaricus* and the increasingly rare Blue-rumped Parrot *Psittinus cyanurus*, which are directly trapped from the wild.

The state government, through its wildlife department (Perhilitan), forestry department and the Johor National Parks Corporation, has established and maintains a number of national parks to conserve the remaining forests. The single



Plate 18. Chestnut-bellied Malkoha *Phaenicophaeus sumatranus*, Panty Forest, 22 April 2007.

most important conservation site in Johor is the large Endau-Rompin NP, the result of a successful expedition and lobby led by the MNS in conjunction with the state government (Kudus & Yeap 2010). Endau-Rompin, which extends north into the state of Pahang, is partly contiguous with major blocs of primary and logged forest, partially protected in a number of forest reserves (e.g. Ulu Sedili, Labis, Mersing and Lenggor) as a major forest complex, forming a major wildlife corridor in Johor's north-east. The other national parks protect a number of offshore islands, Johor's highest peak (Gn Ledang NP), and a large part of the state's remaining mangroves (Pulau Kukup and Tanjong Piai NPs). Forests are also protected in the state as 'catchment forest', 'recreational forest' and 'bird sanctuaries', whilst a recent successful lobby led by the MNS added the Panty Bird Sanctuary to the state's protected network in 2010.

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