

ORNITHOLOGICAL OBSERVATIONS FROM MARATUA AND BAWEAN ISLANDS, INDONESIA

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ABSTRACT

Indonesia's many islands, large and small, make it an important center of avian diversity and endemism. Current biogeographic understanding, however, is limited by the lack of modern genetic samples for comparative analyses from most of these islands, and conservation efforts are hampered by the paucity of recent information from small islands peripheral to major, more commonly visited islands. In November and December 2016, we visited Maratua, an oceanic coral atoll 50 km east of Borneo, and Bawean, a volcanic island on the Sunda continental shelf 150 km north of Java, to survey birds and collect specimens for morphological and genetic analysis. We detected many of the birds on Maratua's historical lists and added several new resident and migratory species. Notably, we did not detect the Maratua White-rumped Shama (*Copsychus malabaricus barbouri*). On Bawean, we found the forests to be nearly silent and detected remarkably few resident land-bird species overall. The severe population reduction of *C. m. barbouri* on Maratua and the drastic reduction of forest birds on Bawean probably result from overexploitation by the cage-bird trade in the first case and a combination of the cage-bird trade and pellet-gun hunting in the second.

Keywords: Avifauna, Borneo, cage-bird trade, extirpation, Sundaland

INTRODUCTION

The Sunda Islands of Indonesia constitute an important centre of avian diversity and endemism (Kier et al., 2009; de Bruyn et al., 2014; Sheldon et al., 2015). However, many holes remain in our understanding of the relationships and dynamics of bird populations on these islands due to a lack of recent ornithological surveys and modern biological specimens (Sheldon et al., 2009; Eaton et al., 2016; Manthey et al., 2017). Of particular interest are the many small islands adjacent to the Greater Sunda Islands. These small islands, especially if they are oceanic, may act as refugia, sheltering their native residents from ecological forces affecting populations on adjacent larger islands (Fooden, 1995; Chua et al., 2015). As such, they may act as museums or natural experiments in biogeography, potentially providing insight into the evolution of Sundaic biodiversity as a whole. There is, however, a paucity of recent information on the avifaunas of these small islands, and changes in them are expected due to the increasing human population pressure and especially the region's flourishing cage-bird trade (Eaton et al., 2015; Shepherd et al., 2016; Bergin et al., 2017).

One such island, with a rich ornithological history, is Maratua (Fig. 1), a 24 km² coral atoll that is part of the Derawan Islands located 50 km east of Berau Regency, East Kalimantan, Indonesian Borneo. Most of what we know about Maratua's avifauna comes

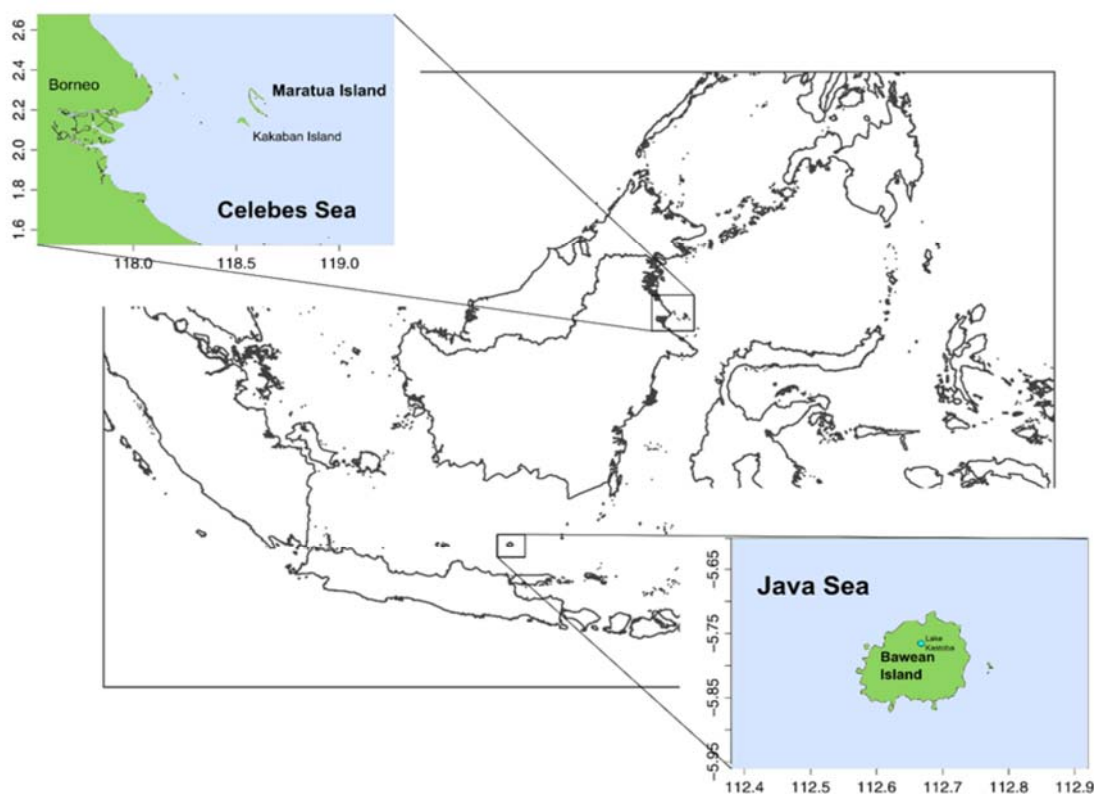


Figure 1. Location of Maratua and Baweian Islands, Indonesia.

from expeditions in the early 20th Century by H. C. Raven and E. P. Mjöberg (Bangs & Peters, 1927; Riley, 1930). Combined, these expeditions collected or observed 24 species on Maratua (Table 1). Twenty of these species are apparent resident land-birds, while the remaining four are water birds and migrants. After these original expeditions, the island's avifauna remained largely unexamined for nearly 100 years until the short surveys of Q. Phillipps in 2009, 2010, and 2011 (pers. comm., Phillipps & Phillipps, 2014; Chua et al., 2015). For most of the last century, published works on Maratua's natural history emphasized its abundant marine life rather than its land animals (Ng & Tomascik, 1994; de Voogd et al., 2009; Becking et al., 2011).

Maratua is biogeographically interesting because it is oceanic and permanently separated from Borneo and the Sunda continental shelf by a channel more than 180 m deep. The island has never been connected by land to mainland Borneo, even during the dramatically low sea-levels of Pleistocene glacial maxima, which joined all islands on the Sunda continental shelf into a single land mass (Vorisi, 2000). One result of its permanent isolation (and size) is that Maratua's species richness is much lower than on adjacent Borneo, causing the few species that occur there to be more abundant than usual, a common island phenomenon (MacArthur et al., 1972). Another result is that several bird populations on Maratua

are phenotypically distinct from populations on adjacent Borneo. These distinct taxa were described as separate species following their discovery (Bangs & Peters, 1927; Riley, 1930), but most are now treated as subspecies of more widespread, polytypic species: e.g., Black-headed Bulbul *Pycnonotus atriceps hodiernus*, White-rumped Shama *Copsychus malabaricus barbouri*, and Black-naped Monarch *Hypothymis azurea aeria* (Clements et al., 2017). These three taxa were the subject of a recent study which used DNA extracted from toepads of the original specimens to examine their relationships to populations on Borneo and elsewhere in Southeast Asia (Chua et al., 2015). That study found that *P. a. hodiernus* and *C. m. barbouri* are strongly differentiated from their sister taxa on Borneo, but *H. a. aeria* varies only slightly from *H. azurea* elsewhere in Southeast Asia, implying either continued gene flow between *H. azurea* populations on Maratua and Borneo or recent colonization of the smaller island (Chua et al., 2015).

Another small island of particular ornithological interest is Bawean (210 km²), which lies 150 km north of Surabaya, Java, in the Javan Sea (Fig. 1). Unlike Maratua, Bawean is a volcanic island and lies on the Sunda continental shelf. Thus, it was connected periodically to Java and Borneo during Pleistocene glacial events, and its bird populations would have experienced periodic gene flow from the larger islands. The first museum collectors to visit Bawean were A. G. Vorderman in 1891–1892 (Vorderman, 1892) and W. L. Abbott in 1907 (Oberholser, 1917). Combined, these two expeditions found 26 species on the island, and taxonomic comparisons indicated that most of the species were similar to respective taxa on Java. Later, Hoogerwerf (1962, 1965, 1966, 1967) expanded the list to 52 species (Table 2). As with Maratua's populations, many Bawean taxa were originally described as endemic species or subspecies (nine in all). Nowadays, most are recognized as subspecies, e.g., Crested Serpent-Eagle *Spilornis cheela baweanus*, Black-headed Bulbul *Pycnonotus atriceps baweanus*, Ashy Tailorbird *Orthotomus ruficeps baweanus*, and Abbott's Babbler *Turdinus abbotti baweanus* (Clements et al., 2017).

Ornithologists from the Museum Zoologicum Bogoriense, Indonesian Institute of Sciences (MZB), and Louisiana State University Museum of Natural Science (LSUMNS) visited Maratua Island from 18–23 November 2016 and Bawean from 1–5 December 2016. The aim of these expeditions was to do inventory work of the avifauna of both islands and collect specimens for molecular biogeographic comparisons of populations across Sundaland (Sheldon et al., 2015; Lim et al., 2017; Shakya & Sheldon, 2017; Shakya et al., 2018). Obtaining updated information on the avifauna of these and other Sundaic islands is especially important given the prevalence of the cage-bird trade and forest loss throughout Indonesia, which has resulted in the near extinction of some species and extirpation of several taxa from locations throughout the region (Jepson & Ladle, 2005; Wilcove et al., 2013; Eaton et al., 2015; Bergin et al., 2017).

MATERIALS AND METHODS

Maratua Expedition

Our Maratua field team members included a researcher from MZB (TH) and two researchers from LSUMNS (RCB, SBS). We flew from Samarinda, East Kalimantan, to Kalimarau Airport, East Kalimantan, and drove to Tanjung Batu where we boarded a speedboat for Maratua Island. We stayed at Maratua Guesthouse (2.267° N, 118.563° E) and set ten mist nets in the low but dense forest within 200 m of the guesthouse (Fig. 2), as well as along trails and openings. Nets were set from sunrise to sunset for five days November 19–22nd, 2016. Most of our effort was spent tending nets and preparing specimens, but we opportunistically noted birds seen or heard near the guesthouse while tending nets and during about 8 person-hours of birding within 1 km of the site. We were not able to explore the rest of this atoll.

Bawean Expedition

The Bawean expedition consisted of one researcher each from MZB (M. Irham) and LSUMNS (SBS). A field technician (Suparno) from MZB also participated. We took a boat from Gresik, north of the city of Surabaya in eastern Java, to Sangkapura on Bawean Island. We stayed at the home of the local forestry officer and set mist nets nearby on a forested mountain-side (Fig. 2; 5.816° S, 112.632° E). As with Maratua, we periodically walked the trails and noted species seen and heard.

RESULTS

Maratua Expedition

We detected a total of 25 species on Maratua (Table 1) and collected 12. Of these, 14 were apparent resident land-birds, five were transient water birds or raptors, and six were long-distance migrants. Of the resident land-birds, three are additions to the early 20th century lists: Asian Emerald Dove *Chalcophaps indica*, Black-naped Fruit-Dove *Ptilinopus melanospilus* and Crimson Sunbird *Aethopyga siparaja*. The two doves were previously detected by Q. Phillipps (unpublished report); *A. siparaja* represents a new record for Maratua.

In addition to these new residents, we also collected specimens of four migratory species--Arctic Warbler *Phylloscopus borealis*, Gray-streaked Flycatcher *Muscicapa griseisticta*, Siberian Blue Robin *Larvivora cyane*, and Narcissus Flycatcher *Ficedula narcissina*--and photographed a fifth--Mugimaki Flycatcher (*Ficedula mugimaki*). All five represent new records for the Maratua, and the Gray-streaked Flycatcher is likely the first specimen from Borneo. Noticeably absent from our observations were Pied Triller (*Lalage nigra*) and White-rumped Shama (*Copsychus malabaricus*). On a brief stop at nearby Kakaban Island we recorded swiftlets (*Aerodramus* sp.), Pacific Reef-Heron (*Egretta sacra*), and Pacific swallow (*Hirundo tahitica*), but did not survey the forest. Details on Maratua species of special interest are provided below.



Figure 2. Typical habitat in A) Bawean Island and B) Maratua Island. C) A pair of Black-headed Bulbuls (*Pycnonotus atriceps hodiernus*) from Maratua Island.

Tabon Scrubfowl *Megapodius cumingii*: We heard and recorded calls from one individual on several occasions from deep within the forest across the lagoon from the Maratua guesthouse (for audio recording, see eBird checklist S40957930). This species occurs widely in Sulawesi and the Philippines, and islands off northeast Borneo. Maratua is its southernmost Bornean locality.

Metallic Pigeon *Columba vitiensis*: We did not detect this bird, nor was it collected during early Maratua expeditions, but Q. Phillipps (unpublished report) identified one in a 2010 photo taken by a local person.

Black-naped Fruit-Dove: A new record for Maratua (also detected by Q. Phillipps, unpublished report), although one was reported by Riley (1930) from Pulau Panjang nearer the mainland.

Northern Boobook (*Ninox japonica*): Boreal migrant. We did not detect this species, nor was it collected during the early Maratua expeditions, but Q. Phillipps (unpublished report) saw this migratory species on both Maratua and Kakaban in 2011.

Pied Triller: Although conspicuously absent during our trip, multiple specimens were collected on early expeditions to Maratua (Bangs & Peters, 1927; Riley, 1930). Q. Phillipps (unpublished report) found them to be uncommon in 2009–2010. We did not focus much effort on beach-strand habitat and, thus, could have missed this species.

Arctic Warbler: Boreal migrant. We found this species to be common but were not able to distinguish between subspecies recognized by Clements et al. (2017). Some authorities now consider these subspecies as three distinct species (Eaton et al., 2016).

Gray-streaked Flycatcher: We netted one individual, which is probably the first specimen (Fig. 3) from anywhere in Borneo. It was identified based on its heavy, distinct ventral streaking and very long primary projection (David Wells, pers. comm., 14 August 2018). This Boreal migrant typically winters from the Philippines to New Guinea.



Figure 3. Likely the first specimen of Gray-streaked Flycatcher (*Muscicapa griseisticta*) from Borneo, netted on Maratua Island in November 2017. The bold and distinct vertical streaking on the breast and long primary projection are diagnostic for this species.

White-rumped Shama: This normally easily detected species was notably absent from our Maratua list. We failed to see or hear a single individual. Several were collected during the early expeditions (Bangs & Peters, 1927; Riley, 1930), and Q. Phillipps (pers. comm.) found the species to be reasonably common in 2010. However, by 2011 the numbers had been drastically reduced, probably as a result of trapping for the cage-bird industry. However, we surveyed a relatively small segment of the island and it is possible that the species occurs elsewhere. More effort is needed to confirm the status of this endemic taxon.

Siberian Blue Robin: Boreal migrant. We netted one individual.

Narcissus Flycatcher: Boreal migrant. This species was fairly common.

Mugimaki Flycatcher: Boreal migrant. We sighted and photographed this species only once (for photograph, see eBird checklist S40957930).

Crimson Sunbird: We recorded a single individual of this species.

Table 1. Bird species recorded on Maratua Island, East Kalimantan, Indonesian Borneo

Scientific Name ^a	English Name	Early 1900's ^b	Phillipps 2009-11	Expedition 2016 ^c
<i>Megapodius cumingii</i>	Tabon Scrubfowl	X	X	X
<i>Fregata ariel</i>	Lesser Frigatebird		X	X
<i>Ardea sumatrana</i>	Great-billed Heron		X	
<i>Egretta garzetta</i>	Little Egret		X	
<i>Egretta sacra</i>	Pacific Reef-Heron	X	X	X
<i>Bubulcus ibis</i>	Cattle Egret		X	
<i>Butorides striata</i>	Striated Heron	X		X
<i>Pandion haliaetus</i>	Osprey		X	X
<i>Haliastur indus</i>	Brahminy Kite		X	X
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle		X	
<i>Numenius phaeopus</i> *	Whimbrel	X		
<i>Actitis hypoleucos</i> *	Common Sandpiper	X	X	X
<i>Columba vitiensis</i>	Metallic Pigeon		X**	
<i>Chalcophaps indica</i>	Asian Emerald Dove		X	S
<i>Caloenas nicobarica</i>	Nicobar Pigeon	X	X	
<i>Treron vernans</i>	Pink-necked Pigeon	X	X	X
<i>Ptilinopus melanospilus</i>	Black-naped Fruit-Dove		X	S
<i>Ducula pickeringii</i>	Gray Imperial-Pigeon	X	X	X
<i>Ducula bicolor</i>	Pied Imperial-pigeon	X	X	
<i>Ninox japonica</i> *	Northern Boobook		X	
<i>Aerodramus salangana</i>	Mossy-nest Swiftlet	X	X	
<i>Aerodramus fuciphagus</i>	White-nest Swiftlet	X	X	
<i>Alcedo atthis</i> *	Common Kingfisher		X	
<i>Todiramphus chloris</i>	Collared Kingfisher	X	X	X
<i>Tanygnathus lucionensis</i>	Blue-naped Parrot	X	X	X
<i>Artamus leucorhynchus</i>	White-breasted Woodswallow	X		
<i>Lalage nigra</i>	Pied Triller	X	X	
<i>Pachycephala cinerea</i>	Mangrove Whistler	X	X	S
<i>Dicrurus hottentottus</i>	Hair-crested Drongo	X	X	S

continued ...

Scientific Name ^a	English Name	Early 1900's ^b	Phillipps 2009-11	Expedition 2016 ^c
<i>Hypothymis azurea</i>	Black-naped Monarch	X	X	S
<i>Pycnonotus atriceps</i>	Black-headed bulbul	X	X	S
<i>Phylloscopus borealis</i>	Arctic Warbler			S
<i>Muscicapa griseisticta</i> *	Gray-streaked Flycatcher			S
<i>Copsychus malabaricus</i>	White-rumped Shama	X	X	
<i>Larvivora cyane</i> *	Siberian Blue Robin			S
<i>Ficedula narcissina</i> *	Narcissus Flycatcher			S
<i>Ficedula mugimaki</i> *	Mugimaki Flycatcher			X
<i>Aplonis panayensis</i>	Asian Glossy Starling	X	X	X
<i>Anthreptes malacensis</i>	Plain-throated Sunbird	X	X	S
<i>Leptocoma brasiliana</i>	Van Hasselt's Sunbird	X	X	
<i>Leptocoma calcostetha</i>	Copper-throated Sunbird	X	X	
<i>Aethopyga siparaja</i>	Crimson Sunbird			S
Totals:	42	24	33	25

^a Classification follows Clements et al. (2017).

^b Lists from Bangs & Peters (1927) and Riley (1930)

^c S = specimen records from 2016, X = other records

*Boreal migrant

**Phillipps reports seeing a photo taken by a local resident in 2010 (unpublished report)

Bawean Expedition

We recorded only 13 and collected only three species on Bawean Island (Table 2). Although the island was well-forested and had many trees in fruit, we saw and heard few birds during our stay. There was, however, an abundance of flying foxes (*Pteropus alecto*) as well as Cave Swiftlets (*Collocalia linchi*). Around the villages, we often saw and heard Ashy Tailorbird (*Orthotomus ruficeps*) and Plain-throated Sunbird (*Anthreptes malacensis*). In open areas we saw Collared Kingfisher (*Todiramphus chloris*). Oriental Honey Buzzards (*Pernis ptilorhynchus*) and Crested Serpent-eagles (*Spilornis cheela*) were often observed flying over the mountaintops. However, in the forest we had little success in finding birds. We heard Abbott's Babbler (*Turdinus abbotti*) and were able to use playback to attract this species for visual identification. The most frequently netted species was Rufous-backed Kingfisher (*Ceyx rufidorsa*). SBS travelled to Lake Kastoba, but was unable to see or hear any birds besides *O. ruficeps*. Black-headed Bulbul (*Pycnonotus atriceps*) was nowhere to be seen or heard. Based on interviews with the locals, it was apparently the most common forest bird on the island until five years ago. We did manage to obtain one cage-bird of this species, which displayed the grey colour morph, matching those previously described as the dominant form on the island (Hoogerwerf, 1967; Dickinson & Dekker, 2002).

Table 2. Bird species recorded on Bawean Island, Java Sea, Indonesia

Scientific Name ^a	English Name	Expeditions 1892, 1917 ^b	Hoogerwerf 1966	Expedition 2016 ^c
<i>Anas gibberifrons</i>	Sunda Teal		X	
<i>Gallus varius</i>	Green Junglefowl	X	X	
<i>Fregata minor</i>	Great Frigatebird	X	X	
<i>Ardea sumatrana</i>	Great-billed Heron	X	X	
<i>Ardea purpurea</i>	Purple Heron		X	
<i>Ardea alba</i>	Great Egret		X	
<i>Egretta garzetta</i>	Little Egret		X	
<i>Egretta sacra</i>	Pacific Reef-Heron		X	
<i>Butorides striata</i>	Striated Heron	X	X	
<i>Nycticorax nycticorax</i>	Black-crowned Night-Heron		X	
<i>Pandion haliaetus</i>	Osprey		X	
<i>Pernis ptilorhynchus</i>	Oriental Honey-buzzard			X
<i>Spilornis cheela</i>	Crested Serpent-Eagle	X	X	X
<i>Accipiter soloensis</i> *	Chinese Sparrowhawk			***
<i>Accipiter gularis</i> *	Japanese Sparrowhawk			***
<i>Pluvialis squatarola</i> *	Black-bellied Plover		X	
<i>Pluvialis fulva</i> *	Pacific Golden-Plover		X	
<i>Charadrius leschenaultii</i> *	Greater Sand-Plover		X	
<i>Numenius phaeopus</i> *	Whimbrel		X	
<i>Actitis hypoleucos</i> *	Common Sandpiper	X	X	
<i>Tringa brevipes</i> *	Gray-tailed Tattler		X	
<i>Tringa nebularia</i> *	Common Greenshank		X	
<i>Tringa totanus</i> *	Common Redshank		X	
<i>Turnix suscitator</i>	Barred Buttonquail		X	
<i>Thalasseus bergii</i>	Great Crested Tern		X	
<i>Streptopelia chinensis</i>	Spotted Dove	X	X	
<i>Chalcophaps indica</i>	Asian Emerald Dove	X	X	
<i>Geopelia striata</i>	Zebra Dove	X	X	
<i>Treron vernans</i>	Pink-necked Pigeon		X	
<i>Ducula aenea</i>	Green Imperial-Pigeon		X	
<i>Ducula rosacea</i>	Pink-headed Imperial-Pigeon		X	
<i>Ducula bicolor</i>	Pied Imperial-Pigeon		X	
<i>Eudynamis scolopaceus</i>	Asian Koel	X	X	
<i>Chrysococcyx basalis</i> **	Horsfield's Bronze-Cuckoo		X	
<i>Cuculus optatus</i> *	Oriental Cuckoo	X	X	
<i>Strix seloputo</i>	Spotted Wood-Owl	X	X	
<i>Collocalia linchi</i>	Cave Swiftlet	X	X	X
<i>Aerodramus fuciphagus</i>	White-nest Swiftlet		X	
<i>Ceyx rufidorsa</i>	Rufous-backed Dwarf-Kingfisher	X	X	X
<i>Todiramphus sanctus</i> **	Sacred Kingfisher		X	
<i>Todiramphus chloris</i>	Collared Kingfisher	X	X	X
<i>Oriolus chinensis</i>	Black-naped Oriole		X	
<i>Pycnonotus atriceps</i>	Black-headed Bulbul	X	X	S†

continued ...

Scientific Name ^a	English Name	Expeditions 1892, 1917 ^b	Hoogerwerf 1966	Expedition 2016 ^c
<i>Pycnonotus plumosus</i>	Olive-winged Bulbul	X	X	S
<i>Phylloscopus borealis</i> *	Arctic Warbler		X	S
<i>Orthotomus ruficeps</i>	Ashy Tailorbird	X	X	X
<i>Turdinus abbotti</i>	Abbott's Babbler	X	X	S
<i>Gracula religiosa</i>	Common Hill Myna	X	X	
<i>Dicaeum trochileum</i>	Scarlet-headed Flowerpecker	X	X	X
<i>Anthreptes malacensis</i>	Plain-throated Sunbird	X	X	X
<i>Cinnyris jugularis</i>	Olive-backed Sunbird	X	X	X
<i>Passer montanus</i>	Eurasian Tree Sparrow		X	
<i>Ploceus manyar</i>	Streaked Weaver	X		
<i>Lonchura punctulata</i>	Scaly-breasted Munia	X	X	
<i>Lonchura oryzivora</i>	Java Sparrow		X	
Totals:	55	25	51	13

^a Classification follows Clements et al. (2017)

^b From Vorderman (1892) and Oberholser (1917)

^c S = specimen records from 2016, X = other records

*Boreal migrant

**Austral migrant

***Added by Nijman (2004) but not detected on our 2016 expedition

†Cage-bird collected, no wild individuals detected

DISCUSSION

Maratua Expedition

As a permanently isolated oceanic island close enough to the Bornean coast to receive occasional invaders but far enough to prevent much gene flow, Maratua potentially acts as a “museum,” preserving the morphology of some early inhabitants of Sundaland (Fooden, 1995; Chua et al., 2015). Periodic surveys of birds there provide snapshots of avifaunal changes on the island through time. The island’s birds were well surveyed by Q. Phillipps in the late 2000s (pers. comm.; Phillipps & Phillipps, 2014; Chua et al., 2015), but even so we recorded additional species and two possible losses to the avifauna.

The expedition recorded 12 land-bird species, of which seven are new for the island: three likely residents--Asian Emerald Dove, Black-naped Fruit-Dove, and Crimson Sunbird; and five Boreal migrants--Arctic Warbler, Gray-streaked Flycatcher, Siberian Blue Robin, Narcissus Flycatcher, and Mugimaki Flycatcher (Table 1). We failed, however, to detect two species previously found on the island: Pied Triller and White-rumped Shama. The triller was never abundant on Maratua, and we may simply have failed to locate one because we focused on inland rather than coastal habitat. The shama was common on Maratua 10 years ago but was reduced in numbers by 2011 (Q. Phillipps, unpublished manuscript, pers. comm.).

This species is conspicuous when present because of its loud, warbling song, and it is easily mist-netted. Thus, we are confident that it did not occur in the area we worked most intensively (i.e., forest within one km of the resthouse). The shama may still occur in other parts of the island but has been dramatically reduced (if not extirpated), presumably by pet-traders who value it above most other species (Eaton et al., 2015). Its loss would be a great tragedy because the Maratua subspecies, *C. m. barbouri*, represents an evolutionarily important lineage relative to *C. m. malabaricus* and *C. m. stricklandii* on mainland Borneo (Chua et al., 2015). Indeed, some classifications even treat it as a distinct species, *C. barbouri* (Eaton et al., 2016).

Bawean Expedition

Although relatively distant from Java and Borneo, Bawean Island is, in principle, inhabited or visited by at least 52 species of resident and migrant birds (Table 2), including several endemic land-bird taxa, based on historical surveys in the first half of the 20th Century (Oberholser, 1917; Hoogerwerf, 1966, 1967). Since these surveys, however, little ornithological work has been carried out on the island, except for a 2002 study of owls and birds of prey by Nijman (2004, 2006). He added three new species of large predatory birds to the island's list, bringing the historical total to 55, but did not comment on the status of species in other families. Our expedition detected only 13 species on the island, in part because our visit was short and we did not survey coastal areas. However, of great concern was that we found only nine of 25 previously common resident land-birds (excluding migrants, owls, and birds of prey). In short, the silence in the forests and fields of the island was remarkable.

Based on interviews with residents, Nijman (2006) reported that pellet guns became common on the island in the late 1990s, and that bird hunting is common. Additionally, the island is relatively close to Java, where many species are in high demand as cage-birds (Eaton et al., 2015). This combination of hunting pressure and the songbird trade seems likely to have reduced and altered the avifauna of the island significantly. We detected only four of the nine endemic taxa in the wild. The apparent absence of the usually conspicuous Black-headed Bulbul makes it likely that this species has been extirpated from the island. We also failed to detect Barred Buttonquail (*Turnix suscitator*) and Spotted Wood-Owl (*Strix seloputo*), but are not sure this reflects their absence on the island. The former can be difficult to detect, while in the case of the latter we did not try to survey for nocturnal birds. Common Hill Myna (*Gracula religiosa*) and Scaly-breasted Munia (*Lonchura punctulata*), two other species with endemic Bawean subspecies, are usually easily detected but were not observed on our expedition. We also did not detect any of the seven dove and pigeon species previously known to occur on the island. These are likely to be popular prey of local hunters.

CONCLUSIONS

Our expeditions to Maratua and Bawean islands, Indonesia, provide the first modern genetic samples from these locations, as well as updated species lists. They document a significant change in avifaunas on the two islands, as well as new records of migratory and resident species for Maratua. Of the two islands, the current bird community on Maratua is richer and more closely resembles the historic community than does that of Bawean, where extirpation appears significant. Nevertheless, on Maratua it is possible that at least one species (White-rumped Shama) may have been extirpated, though hopefully it still occurs in small numbers. These observations confirm the need for action against the cage-bird trade in Indonesia, which is a significant threat to the survival of several taxa. On small islands with endemic taxa, the genetic effects of local extirpations are irreversible.

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