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2	Distribution and abundance of threatened and heavily traded
3	birds in the mountains of western Java
4	
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21 Abstract

There is serious concern for the future of a wide range of birds in Java and elsewhere in 22 Indonesia due to both loss of habitat and trapping for the cagebird trade (the so-called 23 24 'Asian Songbird Crisis'). Despite this concern, few data on presence and abundance of key species exist. We provide such data on 184 bird species from two years of 25 biodiversity surveys from 37 sites on twelve mountains in West and Central Java. Many 26 27 of these species are heavily traded, endemic, and globally threatened. Several of the threatened endemics, notably Javan Trogon and Javan Cochoa, were often recorded, in 28 terms of both geographical spread and numerical abundance. Rufous-fronted 29 Laughingthrush, Spotted Crocias and Orange-spotted Bulbul, believed to be threatened 30 by trapping for the songbird trade, appear to remain fairly widespread. By contrast, 31 Brown-cheeked Bulbul, Chestnut-backed (Javan) Scimitar-babbler, Javan Oriole, and 32 especially Javan Blue-flycatcher, recorded on just a single occasion, and Javan Green 33 Magpie which we failed to record with certainty, now appear to be extremely rare. Our 34 encounter rates, while not pinned to specific mountains for security reasons, represent 35 an important baseline against which future changes in abundance can be gauged. 36

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43 Introduction

For the world's most populous island, with around 149 million inhabitants, and despite 44 a long occupation by Europeans with a strong tradition of natural history, Java in 45 Indonesia is remarkably poorly known ornithologically. Unlike its larger island 46 neighbours Sumatra and Borneo, it has no modern checklist of birds, and the only 47 recent field guide (Eaton et al. 2021) and bird atlas (Winnasis et al. 2020) also serve 48 much of the rest of Indonesia. However, the biodiversity of Java is of considerable 49 importance: although the island forms part of the Greater Sunda biogeographical region 50 ('Sundaland') and shares many species with the Thai-Malay Peninsula, Sumatra and 51 Borneo, it is also a centre of endemism in its own right (Stattersfield *et al.* 1998); 52 indeed, greater taxonomic scrutiny in the 21st century has shown this endemism to be 53 far more pronounced than was previously apparent (del Hoyo & Collar 2014, 2016, 54 Eaton *et al.* 2021). Much of Java is montane, concentrated in the tropical forests 55 flanking the island's many volcanoes; but owing to the declining west-east rainfall 56 gradient across the island the highest endemism and overall biodiversity are 57 concentrated in the west (Whitten et al. 1997). 58

Researchers wishing to study—and birdwatchers wishing simply to see—the birds 59 endemic to montane western Java almost invariably visit the twin peaks of Mts Gede 60 and Pangrango which, being only 25 km south-east of Bogor, form easily the most 61 accessible and much the best-known site (Andrew 1985). A consequence of this is that 62 knowledge of the avifaunas of other forested volcanoes in the region has remained 63 rudimentary. For example, the Rufous-fronted Laughingthrush Garrulax rufifrons is 64 65 known from 15 volcanoes but, as documented in Collar & van Balen (2013), only Gede-Pangrango held records from the present century, while half of the other 14 involved 66 67 records made in or before 1930. Similarly, the Javan Green Magpie *Cissa thalassina* has only been recorded in the 21st century at four of its 18 known sites (van Balen et al. 68

69 2013). The absence of recent information on these two species at so many sites, and 70 indeed on the extent and condition of their habitat there, has rendered it problematic to assess their IUCN Red List status or to identify the most appropriate conservation 71 measures; and the same difficulty affects all other species occupying a similar range. 72 Preliminary to fieldwork to address this issue, an analysis of satellite images of 19 73 74 volcanoes in West Java attempted to assess, as best as possible, the extent of remaining 75 montane forest on their slopes (Higginbottom et al. 2019). This indicated that much of the most accessible lower-altitude montane forest has already disappeared and only 76 some 5,200 km² of montane forest remains, often as fragmented isolates, although 77 official protection has slowed deforestation rates in recent decades (Higginbottom et al. 78 2019). However, a further problem in assessing the conservation status and needs of 79 the bird species in these forests is the intense pressure on Java's songbirds exerted by 80 the cagebird and song competition industries (Marshall et al. 2020). So great is the 81 82 concern over the fate of the Rufous-fronted Laughingthrush and Javan Green Magpie that they have become the precautionary subject of intensive (and expensive) captive-83 breeding initiatives (Collar et al. 2012, Owen et al. 2014), despite the possibility that 84 populations might survive in some of the forests where no surveys have been 85 undertaken in 50 years or more. Equally, if such populations survive but are in poor 86 condition or simply remain unknown, the opportunity may be lost to put in place 87 measures to secure them for the long term. Moreover, a further value in a modern 88 inventory of these forests is their potential for reintroductions of captive-bred birds, if 89 90 (a) the sites prove to be in good condition but 'empty', having lost the species in question to trapping, and (b) they can be better protected under new management 91 systems. 92

There are, however, also concerns for the loss of numbers in once extremely common 93 species—white-eyes, leafbirds, shrikes, bushlarks and even sunbirds and weavers—and 94 the ecosystem services, such as seed dispersal and pollination, that they provide (e.g. 95 Barros et al. 2019). While evidence of declines due to excessive trapping is clear in 96 species on the brink of extinction (e.g. van Balen & Collar 2021), in Java, as elsewhere, 97 much less is known about the scale of declines in commoner species, largely due to a 98 lack of baseline historical data (e.g. Hughes 2017). This knowledge gap is slowly being 99 filled in Java's lowlands by initiatives such as the *BigMonth2020* citizen science event 100 and the Indonesian Bird Atlas (Squires *et al.* 2021) and targeted repeat surveys of 101 102 individual species (van Balen et al. 2022). For Java's montane birds, knowledge is far more rudimentary and restricted to notes of visiting birdwatchers or records from 103 consultants. 104

105 We undertook a two-year bird survey across eleven West (plus one western Central) Javan mountains aimed at identifying areas for enhanced biodiversity protection; 106 mammals and certain amphibians were also surveyed (see, e.g., Devenish *et al.* 2021) 107 but will be reported elsewhere. Here we present occurrence data for bird species from 108 622 km of transects from 37 sites on the twelve mountains, and encounter rate data 109 (groups encountered per hour) aggregated across sites. We do not identify bird records 110 with particular sites or mountains for reasons of security, but these data are available to 111 112 *bona fide* individuals on request.

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114 Methods

We chose mountain sites based on an evaluation of current knowledge of the fauna andforest status of 20 montane areas in West Java (and Mt. Slamet in Central Java; Marsden

& Collar 2018, unpublished report). Twelve mountains (Figure 1) were chosen for 117 surveys based on their large extents of remaining forest (Higginbottom et al. 2019), 118 with the potential to provide habitat for species of conservation interest such as Rufous-119 fronted Laughingthrush and Javan Green Magpie. At each mountain, we chose sites in 120 consultation with local villagers, in areas accessible to a field team along mountain trails 121 as far into the forest area as possible, but also in proximity to water for the camp sites 122 (Figure 1; map of sites). Table 1 shows information on survey effort across the twelve 123 mountains. To support our analyses, we took habitat recordings at 8-21 10 m radius 124 plots positioned every 200 m along transects lines at each site. At each plot we 125 measured/estimated a range of habitat features, but in this paper, we include 126 assessments of forest type, counts of cut stems to indicate forest disturbance, along with 127 cut trails and signs of trapping (see Appendix S2). 128

At each site, we walked transects of variable length and duration along trails 129 emanating from our camp, noting bird species, number of individuals per group and 130 time of day. Transects were generally walked during the period 06h00–09h00, at an 131 approximate speed of 1 km hr⁻¹. In all, 295 transects totalling 622 km and 1031 hours' 132 effort were walked across the 37 sites over 127 days between 14/09/2018 and 133 06/03/2021. The mean length of each transect was 2.1 km, with a mean number of 134 transects per site of 8.0 (min = 4, max = 16) and a mean length per site of 16.8 km. 135 Transects were walked by one or more of 13 experienced recorders, but with three 136 recorders (ARJ: 206 km; GCA: 189 km; and FM: 63 km) contributing nearly 75% of all 137 138 transect length.

We expressed bird occurrence as the number of transects, sites and mountains in which
the species was recorded. Encounter rates were expressed as mean number of
encounters with groups or individuals per hour of each transect. These were then

aggregated to site level (including transects on which the species was not recorded) and
averaged across all sites, but only where the species was recorded at least once. We
present the final figures as mean encounter rate ± standard deviation and a minimum
and maximum site-level encounter rate (site absences excluded).

Although comparisons with similarly collected historical data from the mountains of
west and central Java are understandably rare, we do make some broad comparisons of
our encounter rates for selected species with those made by BvB in 1981 on Mts GedePangrango and Puncak, just to the west of our surveys, and from 1995 at two sites on Mt

150 Slamet (van Balen 1984; van Balen unpubl. data).

151 In our analyses, we consider predominantly submontane species with IUCN threatened

152 or Near Threatened classifications (BirdLife International 2021), and non-threatened

but traded submontane species, including those regularly recorded in market or

household surveys (e. g. Marshall *et al.* 2020) and those identified in the priority species

155 list by the IUCN Asian Songbird Trade Specialist Group (ASTSG;

156 www.asiansongbirdtradesg.com). It should be remembered when reviewing the results

157 of these analyses that none of these species is restricted to the mountains covered by

this study, being found on at least one other mountain in Java. For security reasons, we

do not name any specific mountains or sites in the Results section. Taxonomy follows

del Hoyo & Collar (2014, 2016) plus Lim *et al*. (2018) for Sangkar White-eye *Zosterops*

melanurus and Gwee *et al.* (2019) for Javan Blue-flycatcher *Cyornis banyumas.*

162

163 **Results**

Altogether, 234 bird species were recorded at any time during the surveys, with 184 of 164 these recorded on the transects themselves. Appendix S1 provides a full list of 165 occurrence and encounter rate data for all species recorded on transects. Encounter 166 rates were positively skewed, with the majority of species occurring on few transects 167 and at low rates (Figure 2a). In fact, only 14 species were recorded at rates above 0.5 168 encounters per hour, just 0.1 encounters per hour greater than the median value. Only 169 two species (Javan Tesia *Tesia superciliaris* and Pygmy Cupwing *Pnoepyga pusilla*) had 170 rates > 1 encounters per hour. Rates decreased with decreasing site/transect occupancy 171 (Figure 2a) but showed little difference across categories of extinction risk (Figure 2b). 172 A total of 32 species of elevated conservation concern (2 CR, 5 EN, 9 VU and 16 NT) 173 were recorded, either on transects (26 species) or incidentally (Table 2). Orange-174 spotted Bulbul *Pycnonotus bimaculatus* was the only species of elevated conservation 175 concern to be recorded on transects on every mountain, being also found on most 176 transects and generally at high encounter rates. The transects were clearly more 177 appropriate for recording some species than certain others such as the nocturnal 178 species; for example, Salvadori's Nightjar *Caprimulgus pulchellus* was encountered 179 incidentally on all twelve mountains but only on five mountains during transect 180 181 surveys. Surprisingly, the Javan Cochoa *Cochoa azurea*, a retiring, unobtrusive species, was recorded at nearly every site and on all but one mountain, while Javan Trogon 182 183 Apalharpactes reinwardtii, previously known from only three of the mountains sampled prior to our surveys (Collar & van Balen 2002), was recorded at nine of them and in 184 185 around two-thirds of sites. These two species also had reasonably high and quite consistent (low SD) encounter rates across transects. Two heavily trapped threatened 186 species—Rufous-fronted Laughingthrush (around half of mountains and sites) and 187 Spotted Crocias Laniellus albonotatus (around two-thirds of sites/mountains)—proved 188

to occur quite widely. Incidental records of the Critically Endangered Javan Blue-banded
Kingfisher *Alcedo euryzona* at single sites on four mountains are notable as there are
just a handful of records of the species since the 1930s (Chan & Setiawan 2019).

Of the 26 non-threatened but trapped species we considered (Table 3), four stand out as 192 present at few sites, rarely encountered, or both, namely Javan Oriole Oriolus cruentus 193 (7 sites on 3 mountains; IUCN Red List category Data Deficient), Chestnut-backed 194 195 Scimitar-babbler *Pomatorhinus montanus* (6 sites on 4 mountains), and Mountain Serin Chrysocorythus estherae and Javan Blue-flycatcher (both single records only). In 196 contrast, Chestnut-bellied Partridge Arborophila javanica, Sunda Minivet Pericrocotus 197 miniatus, Rufous-tailed Fantail Rhipidura phoenicura, Chestnut-fronted Shrike-babbler 198 Pteruthius aenobarbus, Javan Grey-throated White-eye Heleia javanica, Snowy-browed 199 200 Flycatcher Ficedula hyperythra, Indigo Flycatcher Eumyias indigo, Little Pied Flycatcher 201 *Ficedula westermanni* and White-flanked Sunbird *Aethopyga eximia* all occurred on over half of transects, at the great majority of sites on nearly all mountains. While these were 202 fairly consistently recorded across transects at sites, two species, Mountain White-eye 203 Zosterops japonicus (16 of 37 sites but only 32 of 295 transects) and White-bibbed 204 Babbler Stachyris thoracica (20 sites, 35 transects), were found at a reasonable number 205 of sites but only on very few transects, suggesting their local rarity. 206

Table 4 shows comparisons of mean encounter rates (groups per hour) across the
surveys. We were able to make reasonable comparisons for eleven species. Of these, we
posit that Javan Green Magpie, Chestnut-backed Scimitar-babbler, Javan Fulvetta and
Javan Grey-throated White-eye appear to have encounter rates from our study
markedly lower than those presented previously.

212 Discussion

Java holds high levels of bird endemism, and yet our study represents a rare attempt— 213 another such being van Balen et al. (1999)—to gauge abundance systematically in the 214 island's key birds. It also represents the first documented ornithological surveys of 215 many of the mountains in decades. This was a data gap that needed to be filled, given 216 the rates of environmental change on the island and especially the breadth and volume 217 of bird trapping to supply demand for songbirds (Eaton *et al.* 2015, Marshall *et al.* 218 2020). During over two years of biodiversity surveys, we recorded 234 species, 219 including 32 threatened or Near Threatened taxa. Some species suspected to be scarce 220 were in fact widespread and reasonably often encountered at sites. Species such as 221 222 Javan Trogon and Javan Cochoa, and, to a certain extent, the traded Rufous-fronted Laughingthrush, were encouragingly well-recorded. There was, however, a larger suite 223 of species that were rarer than anticipated: Crested Jay, White-breasted Babbler, 224 Sangkar White-eye, Javan Oriole, Brown-cheeked Bulbul, White-bellied Fantail 225 Rhipidura euryura, Chestnut-backed Scimitar-babbler, Mountain Serin and Javan Blue-226 flycatcher were all either restricted to a few sites, uncommonly recorded within sites, or 227 both. Crested Jay *Platylophus galericulatus*, recorded at just five sites on four mountains, 228 229 and White-breasted Babbler Stachyris grammiceps, on just three transects on three mountains, were likely rare in our surveys as most effort was above the elevational 230 range of the species (survey effort at just three and seven sites respectively were within 231 232 the core elevational range of the species: Eaton *et al.* 2021). Javan Oriole is so poorly known that it may never have been that common in Java's mountains (BirdLife 233 234 International 2021), but trapping for the cagebird trade must surely be a concern for several taxa. For both the traded or threatened species and the common 'Least Concern' 235 birds, our occurrence and encounter rate data represent a first baseline against which 236 future trends in bird abundance can be gauged. 237

A general frustration in conservation biology is the lack of comparable historical data 238 against which to gauge current population densities, thus preventing population trends 239 from being accurately assessed (e.g. Annorbah et al. 2016). In our case, a literature 240 review revealed no published papers that had used similar encounter rates along 241 transects to survey montane birds in Indonesia, but we did have reasonably comparable 242 counts made in the 1980s and 1990s on the same or nearby mountains. We 243 acknowledge that we must interpret these encounter rates with great caution, for 244 several reasons including survey effort and seasonal differences, but most importantly 245 because we are not comparing the same sites. This said, we do suggest that some 246 potentially interesting patterns emerge. Several species in the current study appear to 247 occur at encounter rates fairly like those from the 1980s and 1990s—the fantails, 248 White-bibbed and Crescent-chested Babblers, Indigo Flycatcher, and notably Rufous-249 fronted Laughingthrush among them. There is some support for the notion that Orange-250 spotted Bulbul, Javan Fulvetta Alcippe pyrrhoptera (see Appendix 1) and Javan Grey-251 throated White-eye may have declined, but this is not strong, given the necessary 252 caveats. In contrast, Chestnut-backed Scimitar-babbler does seem to have become 253 scarcer. 254

255 Our work produced a number of new localities for species of conservation interest. We found Javan Scops Owl Otus angelinae and Brown (or Sunda) Wood Owl Strix 256 257 (leptogrammica) bartelsi on Mt Slamet for the first time, both formerly known from only a few sites. The relatively large and colourful Javan Trogon was found on Slamet, 258 259 Cikuray, Limbung, Patuha, Masigit, Tilu, Kencana, Simpang, and Papandayan. The more cryptic Javan Cochoa was recorded at all the above plus Malabar and Guntur. Sunda 260 Grasshopper Warbler Locustella montis was found on Slamet and Tilu. White-breasted 261 Babbler, a species known to be present on the foothills of Patuha, Cikuray and Slamet 262

(van Balen *et al.* 2005), was not recorded at these sites but compensated by turning up 263 at three new sites (Masigit, Kencana, Papandayan) during our surveys. Mountain White-264 eye was previously recorded only as far west as Papandayan (Mees 1996), but we 265 recorded it at several mountains (Patuha, Masigit, Tilu, Malabar, Kencana and Wayang-266 Windu) up to 50 km further west. None of the new localities can be considered to reflect 267 recent colonisations; rather they far more likely represent lack of contact in earlier 268 surveys. However, our failure to find White-breasted Babblers at three known sites for 269 the species should be treated as a warning signal: the species may simply have been 270 missed, perhaps because most of our survey efforts was above the elevations where it 271 272 usually occurs, but it is equally possible that it has steeply declined or disappeared entirely. This is a species that joins understorey mixed flocks in numbers (van Balen et 273 al. 2005) and, as such, might be easily caught in mist-nets. We encourage future visiting 274 birdwatchers to determine which of these scenarios is correct. 275

As with most status assessments of species in tropical forests, the lack of a historical 276 baseline against which to compare current bird abundance (e.g. Hughes 2017) is 277 frustrating. This is especially true of most of the mountains included in our survey, 278 some of which have not been visited by biologists and naturalists for decades (as 279 280 inferred from the absence of their names in online search engines considering both academic and popular postings). Without such a baseline, we can at least report on 281 282 current occurrence and likely abundance, as a core portion of the montane avifauna is both widespread across mountains and readily recorded within sites. This includes 283 284 Sunda Minivet, Rufous-tailed Fantail, Chestnut-fronted Shrike-babbler, several flycatchers and White-flanked Sunbird. The list even includes some Red List species, like 285 Javan Cochoa and Orange-spotted Bulbul, classified as Vulnerable and Near Threatened 286 on account of habitat loss and trapping respectively (BirdLife International 2021). The 287

abundance of Chestnut-bellied Partridge is encouraging, given the concern for other
ground-dwelling galliforms in Java and elsewhere in Indonesia (Boakes *et al.* 2019). It
seems likely that, in this part of Java at least, the partridge is no longer targeted for food
in numbers by trappers. That components of Java's montane avifauna remain largely
intact bodes well for both their populations in coming years, and for ecosystem
functioning (e.g. Loreau *et al.* 2001).

294 In stark contrast, however, we had only a single and unconfirmed record, from one of the team's local guides, of the Critically Endangered Javan Green Magpie, and we must 295 assume that excessive trade has pushed this once reasonably widespread but perhaps 296 never common species (MacKinnon 1988; van Balen et al. 2013) to the very brink of 297 extinction. Javan Blue-flycatcher, also suffering from trade pressure (Eaton et al. 2015), 298 299 was recorded just once, although most of our survey effort was above its usual elevational range. Hoogerwerf (1969–1971) described it as 'one of the commonest 300 flycatchers in Java, perhaps more common at moderate elevations than in the lowlands 301 or highlands', while in the 1980s the species was described as 'one of the commoner 302 flycatchers at moderate to high elevations' (MacKinnon 1988). It is now extremely rare 303 in the lowlands (Eaton et al. 2021) and was recorded only three times in over 20,000 304 bird lists in a month-long citizen science event in Java and Bali (Squires et al. 2021). 305 This species, about to be recognised as Critically Endangered (BirdLife International 306 307 pers. com.), clearly warrants urgent searches in forests not covered in our survey. While several babbler species appear to be relatively widespread, the current rarity of 308 309 Chestnut-backed Scimitar-babbler is a major concern, given its frequency in bird markets (Chng & Eaton 2016; S. Marsden pers. obs.), and especially given that the taxon 310 is likely soon to be treated as a Javan endemic by BirdLife International. This species 311 was, in the 1980s and 1990s, relatively easily recorded in Java's mountains and was 312

described as 'a not uncommon bird, found in loose parties' (MacKinnon 1988). Similarly, 313 the abundance of White-bellied Fantail seems to have declined: around a century ago it 314 was collected in numbers similar to those of the related Rufous-tailed Fantail (M. 315 Bartels 1895–1936 unpubl. data) and both species were considered fairly common by 316 MacKinnon (1988), yet White-bellied was recorded on nearly ten times fewer transects 317 as Rufous-tailed in our fieldwork. It is likely that the latter's higher elevational 318 preference has served it well in terms of protection against forest alteration, excessive 319 trapping or both. However, these suggestions of abundance declines must be 320 interpreted cautiously, although they certainly are backed up by the perceptions of 321 ornithologists with experience on the island for decades (BvB pers. obs.). 322 While some of Java's montane areas, such as Mts Halimun-Salak and Gede-Pangrango, 323 324 have been formally protected as national parks since the last century (www.protectedplanet.net), the majority of the forested highlands in West and Central 325 Java are under either weaker management or no protection at all (Higginbottom *et al.* 326 2019). Indeed, the objective of our fieldwork was either to support moves towards 327 gazetting further areas as formal reserves, or to enhance protection in alternative ways. 328 Several mountains have stood out as particularly warranting protection, including Mt 329 Slamet, the furthest east of our sites, along with Masigit, Kencana, and Tilu (Devenish et 330 al. 2021). Key taxa driving these judgements included the Endangered Javan Hawk-331 eagle Nisaetus bartelsi, Javan Leopard Panthera pardus melas and Javan Gibbon 332 Hylobates moloch, which are among the Indonesian governments Priority species for 333 334 recovery (Mardiastuti et al. 2008), but others such as Critically Endangered Rufousfronted Laughingthrush should also guide decisions. Arguably, however, there are key 335 336 birds on all mountains surveyed.

How individual sites are best protected is open to debate, but the Indonesian authorities 337 have recently moved away from the idea of further 'national parks' towards a more 338 integrated form of land management. This, largely but not wholly in partnership with 339 private sector entities, involves land and forest protection combined with income 340 generation in an 'Essential Ecosystem Areas' (EEAs) framework (Sahide et al. 2020, 341 Devenish et al. 2021). Some of our key species will of course benefit from forest 342 protection and restoration, particularly at the lower sections of mountains which have 343 lost most forest in recent decades (Higginbottom et al. 2019). We encountered evidence 344 of bird trapping at all but six of the 38 sites we visited, and all but one site had cut trails 345 that may well have been used for bird trapping (Appendix S2). The survival of a suite of 346 species including Javan Green Magpie, Crested Jay, Javan Blue-flycatcher and Chestnut-347 backed Scimitar-babbler will depend on efforts over the next decade to (1) reduce 348 demand for songbirds; (2) enforce restrictions on trapping and trading of key species; 349 and (3) work with local communities at individual sites either to protect remaining 350 populations or to create socio-ecological conditions suitable for re-introductions. This 351 last action appears the most feasible at present, and indeed initiatives centred on 352 species such as Javan Green Magpie are underway. A cornerstone of such initiatives 353 354 must be to identify and create alternative livelihoods to those who currently gain at least part of their income from bird trapping. 355

356

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382 **References**

Andrew, P. (1985) An annotated checklist of the birds of the Cibodas–Gunung Gede

384 Nature Reserve. *Kukila* 2: 10–28.

Annorbah, N.N.D, Collar, N.J. & Marsden, S.J. (2016). Trade and habitat change virtually

- eliminate the Grey Parrot *Psittacus erithacus* from Ghana. *Ibis* 158: 82–91.
- van Balen, S. (1984). *Comparison of bird counts and bird observations in the*
- *neighbourhood of Bogor (Indonesia).* MSc Student Report, State University of Utrecht.

- van Balen S. & Collar N.J. (2021) The vanishing act: a history and natural history of the
 Javan Pied Starling *Gracupica jalla*. *Ardea* 109: 41–54.
- van Balen, S., Collar, N. J., Liley, D. & Rudyanto (2005) The White-breasted Babbler
- 392 Stachyris grammiceps of Java: natural history and conservation status, especially on
- 393 Gunung Halimun. *Forktail* 21: 139-146.
- van Balen, S., Eaton, J.A. & Rheindt, F.E. (2013) Biology, taxonomy and conservation
- status of the Short-tailed Green Magpie *Cissa [t.] thalassina* from Java. *Bird Conserv. Internatn.* 23: 91-109.
- 397 van Balen, S., Nijman, V. & Sözer, R. (1999) Distribution and conservation of the Javan
- Hawk-eagle *Spizaetus bartelsi*. *Bird Conserv. Internatn.* 9: 333-349.
- van Balen, S., Saryanthi, R. & Marsden, S.J. (2022) Evidence of steep declines in the
- 400 heavily-traded Javan White-eye from repeated standardised surveys. *Bird Conserv.*
- 401 Internatn.:1-5 https://doi.org/10.1017/S0959270922000144
- 402 Barros, F.M., Peres, C.A., Pizo, M.A. & Ribeiro, M.C. (2019) Divergent flows of avian-
- 403 mediated ecosystem services across forest-matrix interfaces in human-modified
- 404 landscapes. *Landscape Ecology* 34: 879-894.
- BirdLife International (2021) IUCN Red List for birds. Downloaded from
- 406 <u>http://www.birdlife.org</u> on 25/05/2021.
- 407 Boakes, E.H., Fuller, R.A. & McGowan, P.J.K. (2019) The extirpation of species outside
- 408 protected areas. *Conservation Letters* 12, e12608.
- 409 Chan, B.P.L. & Setiawan, A. (2019) New record of the Critically Endangered Javan Blue-
- 410 banded Kingfisher *Alcedo euryzona* in Central Java, Indonesia. *BirdingASIA* 31: 24-27.

- 411 Chng, S.C.L. & Eaton, J.A. (2016). *In the Market for Extinction: Eastern and Central Java*.
- 412 TRAFFIC. Petaling Jaya, Selangor, Malaysia.
- 413 Collar, N. J. & van Balen, S. (2002) The Blue-tailed Trogon *Harpactes* (*Apalharpactes*)
- *reinwardtii*: species limits and conservation status. *Forktail* 18: 121-125.
- 415 Collar, N. J. & van Balen, S. (2013) Notes for the conservation of the Rufous-fronted
- 416 Laughingthrush *Garrulax rufifrons*. *Forktail* 29: 15-18.
- 417 Collar, N. J., Gardner, L., Jeggo, D. F., Marcordes, B., Owen, A., Pagel, T., Pes, T., Vaidl, A.,
- 418 Wilkinson, R. & Wirth, R. (2012) Captive breeding and the most threatened birds in Asia.
- 419 *BirdingASIA* 18: 50-57.
- 420 Devenish, C., Junaid, A. R., Andriansyah, Saryanthi, R., van Balen, S., Kaprawi, F.,
- 421 Aprianto, G. C., Stanley, R. C., Poole, O., Owen, A., Collar, N. J. & Marsden, S. J. (2021)
- 422 Biological richness of Gunung Slamet, Central Java, and the need for its protection. *Oryx*
- 423 https://doi.org/10.1017/S0030605320001222
- 424 Eaton J.A., Shepherd C.R., Rheindt F.E., Harris J.B.C., van Balen S.(B.), Wilcove D.S. &
- 425 Collar N.J. (2015) Trade-driven extinctions and near-extinctions of avian taxa in Sundaic
- 426 Indonesia. *Forktail* 31: 1–12.
- 427 Eaton, J. A., van Balen, B., Brickle, N. W. & Rheindt, F. E. (2021) Birds of the Indonesian
- 428 Archipelago: Greater Sundas and Wallacea. Second edition. Barcelona: Lynx Edicions.
- 429 Gwee, C. Y., Eaton, J. A., Garg, K. M., Alström, P., van Balen, S. (B.), Hutchinson, R. O.,
- 430 Prawiradilaga, D. M., Le, M. H. & Rheindt, F. E. (2019) Cryptic diversity in *Cyornis* (Aves:
- 431 Muscicapidae) jungle-flycatchers flagged by simple bioacoustic approaches. *Zool. J. Linn.*
- 432 *Soc.* 20: 1-17.

- 433 Higginbottom, T.P., Collar, N.J., Symeonakis, E. & Marsden, S.J. (2019) Deforestation
- 434 dynamics in an endemic-rich mountain system: conservation successes and challenges
- 435 in West Java 1990–2015. *Biol. Conserv.* 229: 152-159.
- 436 Hoogerwerf, A. (1948) Contribution to the knowledge of the distribution of birds on the
- 437 island of Java. *Treubia* 83-137.
- del Hoyo, J. & Collar, N. J. (2014) The HBW–BirdLife International illustrated checklist of
- 439 *the birds of the world, 1: non-passerines.* Barcelona: Lynx Edicions.
- del Hoyo, J. & Collar, N. J. (2016) *The HBW–BirdLife International illustrated checklist of*
- 441 *the birds of the world, 2: passerines*. Barcelona: Lynx Edicions.
- Hughes, A.C. (2017). Mapping priorities for conservation in Southeast Asia. *Biol. Conserv.*209: 395-405.
- Lim, B. T. M., Sadanandan, K. R., Dingle, C., Leung, Y. Y., Prawiradilaga, D. M., Irham, M.,
- 445 Ashari, H., Lee, J. G. H. & Rheindt, F. E. (2018) Molecular evidence suggests radical
- revision of species limits in the great speciator white-eye genus *Zosterops. J. Orn.* 160: 116.
- Loreau, M., Naeem, S., Inchausti, P., Bengtsson, J., Grime, J.P., Hector, A., Hooper, D.U.,
- 449 Huston, M.A., Raffaelli, D., Schmid, B., Tilman, D. & Wardle, D.A. (2001). Biodiversity and
- 450 ecosystem functioning: current knowledge and future challenges. *Science* 294: 804-808.
- 451 MacKinnon, J. (1988). *Field guide to the birds of Java and Bali*. Yogyakarta: Gadjah Mada
 452 University Press.
- 453 Mardiastuti, A., Kusrini, M.D., Mulyani, Y.A., Manullang, S. & Soehartono, T. (2008)
 454 Arahan Strategis Konservasi Spesies Nasional 2008-2018. Direktorat Jenderal

455 Perlindungan Hutan dan Konservasi Alam-Departemen Kehutanan RI, Jakarta,456 Indonesia.

- 457 Marshall, H., Collar, N.J., Lees, A.C., Moss, A., Yuda, P. & Marsden, S.J. (2020) Spatio-
- 458 temporal dynamics of consumer demand driving the Asian Songbird Crisis. *Biol.*
- 459 *Conserv.* 241: 108237.
- 460 Mees, G.F. (1996) Geographical variation in birds of Java. *Publ. Nuttall Orn. Club* 26.
- 461 Owen, A., Wilkinson, R. & Sözer, R. (2014) *Ex situ* conservation breeding and the role of
- 462 zoological institutions and private breeders in the recovery of highly endangered
- 463 Indonesian passerine birds. *Internatn. Zoo Yearbook* 48: 199-211.
- 464 Sahide, M.A.K., Fisher, M., Nasri, N., Dharmiasih, W., Verheijen, B. & Maryudi, A. (2020)
- Anticipating a new conservation bureaucracy? Land and power in Indonesia's Essential
- 466 Ecosystem Area policy. *Land Use Policy* 97: 104789.
- 467 Squires, T., Yuda, P., Akbar, P., Collar, N. J., Devenish, C., Taufiqurrahman, I., Wibowo, W.,
- 468 Winarni, N., Yanuar, A. & Marsden, S. J. (2021) Citizen science rapidly delivers extensive
- distribution data for birds in a key tropical biodiversity area. *Global Ecology* &
- 470 *Conservation* 28, e01680.
- 471 Stattersfield, A. J., Crosby, M. J., Long, A. J. & Wege, D. C. (1998) Endemic bird areas of the
- 472 world: priorities for biodiversity conservation. Cambridge, U.K.: BirdLife International
- 473 (Conservation Series 7).
- Whitten, T., Soeriaatmadja, R.E. & Afiff, S.A. (1997) *The ecology of Java and Bali*. Oxford,
 UK: Oxford University Press.

476	Winnasis, S., Yuda, P., Imron, M.A., Iqbal, M., Rudyanto & Wahyudi, H.A. (Eds)(2020).
477	Atlas Burung Indonesia: wujud karya peneliti amatir dalam memetakan burung
478	<i>nusantara</i> . Yayasan Atlas Burung Indonesia, Batu, Indonesia.
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5	14/9-16/10/2018	808–2751	52	103	219
2	19/11-5/12/2018	1593-2806	13	23	45
2	24/2-6/3/2019	1793–2354	9	16	28
3	8/4-6/5/2019	1295–2116	29	72	105
2	17/7-29/7/2019	754–2322	15	43	51
1	7/10-9/10/2019	1808-2160	9	16	32
3	11/12/19-3/2/2020	994–1782	22	44	73
6	13/3-12/10/2020	1100-2047	43	116	175
5	28/8-22/9/2020	1091-2116	37	82	132
2	8/8-20/8/2020	1044-1594	16	36	54
3	5/12-24/12/2020	1982–2321	22	37	54
3	10/2-6/3/2021	1377–1933	28	35	65
	5 2 2 3 2 1 3 6 5 2 3 3 3	5 $14/9-16/10/2018$ 2 $19/11-5/12/2018$ 2 $24/2-6/3/2019$ 3 $8/4-6/5/2019$ 2 $17/7-29/7/2019$ 1 $7/10-9/10/2019$ 3 $11/12/19-3/2/2020$ 6 $13/3-12/10/2020$ 5 $28/8-22/9/2020$ 2 $8/8-20/8/2020$ 3 $5/12-24/12/2020$ 3 $10/2-6/3/2021$	5 14/9-16/10/2018 808-2751 2 19/11-5/12/2018 1593-2806 2 24/2-6/3/2019 1793-2354 3 8/4-6/5/2019 1295-2116 2 17/7-29/7/2019 754-2322 1 7/10-9/10/2019 1808-2160 3 11/12/19-3/2/2020 994-1782 6 13/3-12/10/2020 1100-2047 5 28/8-22/9/2020 1091-2116 2 8/8-20/8/2020 1044-1594 3 10/2-6/3/2021 1377-1933	5 14/9-16/10/2018 808-2751 52 2 19/11-5/12/2018 1593-2806 13 2 24/2-6/3/2019 1793-2354 9 3 8/4-6/5/2019 1295-2116 29 2 17/7-29/7/2019 754-2322 15 1 7/10-9/10/2019 1808-2160 9 3 11/12/19-3/2/2020 994-1782 22 6 13/3-12/10/2020 1100-2047 43 5 28/8-22/9/2020 1091-2116 37 2 8/8-20/8/2020 1044-1594 16 3 5/12-24/12/2020 1982-2321 22 3 10/2-6/3/2021 1377-1933 28	5 14/9-16/10/2018 808-2751 52 103 2 19/11-5/12/2018 1593-2806 13 23 2 24/2-6/3/2019 1793-2354 9 16 3 8/4-6/5/2019 1295-2116 29 72 2 17/7-29/7/2019 754-2322 15 43 1 7/10-9/10/2019 1808-2160 9 16 3 11/12/19-3/2/2020 994-1782 22 44 6 13/3-12/10/2020 1100-2047 43 116 5 28/8-22/9/2020 1091-2116 37 82 2 8/8-20/8/2020 1044-1594 16 36 3 5/12-24/12/2020 1982-2321 22 37 3 10/2-6/3/2021 1377-1933 28 35

495Table 1. The twelve mountain regions visited with dates, altitudes worked and survey

496 effort.

Table 2. Occurrence per site for 32 bird species of conservation concern. Summary data are given for observations on transects (26 516 species), including encounter rate + standard deviation, number of transects, sites and mountain regions. Incidental records away from 517 transects are included in the totals inside parenthesis; six species were only observed off transects. Species which are currently heavily 518 trapped are shown in **bold**. IUCN Red List categories are CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near 519 Threatened. * Species endemic to Java and Bali; † species with subspecies endemic to Java and Bali. Elevational ranges (see Hoogerwerf 520 1948, Eaton et al. 2021) are m = strictly montane, mainly 1000–3000m, but many start at a lower altitude, s = found at 0–1500m but 521 preferring the higher parts of this zone, l = found at 0-1500m, more inland, higher than sea level, but usually not higher than 800m; all 522 other species are less restricted, but below 1500m. 523

524		Transect (n=295)	Sites (n=37)	Mts (n=12)	ER ± SD (min–max)
525	Asian Woollyneck Ciconia episcopus NT	1	1 (1)	1 (1)	0.06
526	Javan Hawk-eagle <i>Nisaetus bartelsi</i> EN *s	25	11 (21)	7 (9)	0.09 ± 0.06 (0.02–0.20)
527	Rufous-bellied Eagle Lophotriorchis kienerii NT	0	(3)	(3)	
528	Javan Woodcock <i>Scolopax saturata</i> NT m	5	4 (6)	3 (3)	0.07 ± 0.04 (0.03-0.12)
529	Sumatran Green-pigeon Treron oxyurus NT m	1	1(2)	1 (2)	0.03
530	Yellow-throated Hanging-parrot <i>Loriculus pusillus</i> NT * s	36	18 (22)	7 (9)	0.11 ± 0.08 (0.03-0.30)
531	Javan Scops-owl <i>Otus angelinae</i> VU * m	5	3 (18)	2 (10)	0.07 ± 0.10 (0.01-0.18)

516	Salvadori's Nightjar <i>Caprimulgus pulchellus</i> NT † m	16	8 (29)	5 (12)	0.09 ± 0.08 (0.02-0.25)
517	Waterfall Swift Hydrochous gigas NT m	2	1 (5)	1 (4)	0.11
518	Volcano Swiftlet Aerodramus vulcanorum NT* m	0	(5)	(3)	
519	Javan Trogon <i>Apalharpactes reinwardtii</i> VU * m	59	24 (27)	9 (10)	0.11 ± 0.07 (0.02–0.25)
520	Javan Blue-banded Kingfisher Alcedo euryzona CR*	1	1 (4)	1 (4)	0.02
521	Rhinoceros Hornbill Buceros rhinoceros VU †	0	(1)	(1)	
522	Wreathed Hornbill Rhyticeros undulatus VU	9	3 (4)	3 (3)	0.13 ± 0.10 (0.02-0.22)
523	Black-banded Barbet <i>Psilopogon javensis</i> NT*	5	4 (4)	3 (4)	0.05 ± 0.02 (0.03-0.07)
524	Javan Yellownape <i>Chrysophlegma mentale</i> NT * s	41	20 (22)	8 (10)	0.10 ± 0.07 (0.02-0.24)
525	Javan Flameback Chrysocolaptes strictus VU* s	4	3 (5)	3 (4)	0.07 ± 0.02 (0.05-0.09)
526	White-rumped Woodpecker <i>Meiglyptes tristis</i> EN*	2	2 (2)	2 (2)	0.04 ± 0.01 (0.03-0.05)
527	Javan Broadbill <i>Eurylaimus javanicus</i> NT* s	93	23 (25)	9 (9)	0.32 ± 0.24 (0.02–0.80)
528	Crested Jay Platylophus galericulatus NT †	11	5 (9)	4 (5)	0.11 ± 0.07 (0.04-0.22)

516	Bar-winged Prinia Prinia familiaris NT	1	1 (7)	1 (4)	0.05
517	Ruby-throated Bulbul Rubigula dispar VU	1	1 (2)	1 (1)	0.03
518	Orange-spotted Bulbul <i>Pycnonotus bimaculatus</i> NT m	100	31(32)	12 (12)	0.23 ± 0.30 (0.03-1.50)
519	Brown-cheeked Bulbul Alophoixus bres EN *	2	1 (1)	1 (1)	0.23
520	White-breasted Babbler <i>Stachyris grammiceps</i> NT * l	3	3 (3)	3 (3)	0.09 ± 0.10 (0.02-0.21)
521	Rufous-fronted Laughingthrush Garrulax rufifrons CR* m	39	14 (14)	6 (6)	0.16 ± 0.20 (0.02-0.60)
522	Spotted Crocias Laniellus albonotatus NT * m	77	21 (22)	8 (9)	0.27 ± 0.34 (0.03-1.38)
523	Sangkar White-eye Zosterops melanurus VU s	37	15 (20)	8 (8)	0.13 ± 0.09 (0.03-0.32)
524	Javan Myna Acridotheres javanicus VU	0	(4)	(3)	
525	Javan Cochoa <i>Cochoa azurea</i> VU * m	100	31 (31)	11 (11)	0.18 ± 0.15 (0.03-0.51)
526	Greater Green Leafbird Chloropsis sonnerati EN † l	0	(1)	(1)	
527	Javan Leafbird Chloropsis cochinchinensis EN* s	0	(5)	(4)	

516 Table 3. Occurrence and encounter rates for 26 heavily trapped but non-threatened birds across the twelve Javan mountains surveyed. *

517	Species endemic	to Java and Bali; † spo	cies with subspecies	endemic to Java and Bali.	See Table 2 for elevational ranges.
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518		Transect (n=295)	Sites (n=37)	Mts (n=12)	ER ± SD (min-max)
519	Chestnut-bellied Partridge Arborophila javanica *m	205	37	12	0.47 ± 0.23 (0.09-1.02)
520	Pink-headed Fruit-dove Ptilinopus porphyreus m	76	24	9	0.21 ± 0.20 (0.02-0.68)
521	Dark-backed Imperial-pigeon Ducula lacernulata † m	32	11	6	0.11 ± 0.11 (0.02–0.35)
522	Sunda Minivet Pericrocotus miniatus m	173	37	12	0.33 ± 0.22 (0.03-0.92)
523	Javan Oriole Oriolus cruentus * m	11	7	3	0.12 ± 0.08 (0.04-0.28)
524	Rufous-tailed Fantail Rhipidura phoenicura * m	172	36	12	0.33 ± 0.20 (0.03-0.78)
525	White-bellied Fantail Rhipidura euryura *m	23	10	6	0.13 ± 0.10 (0.02-0.35)
526	Javan Bulbul <i>Ixos virescens</i> *m	109	25	9	0.38 ± 0.27 (0.03-0.86)
527	White-bibbed Babbler <i>Stachyris thoracica</i> *m	35	20	9	0.11 ± 0.18 (0.01-0.87)
528	Chestnut-fronted Shrike-babbler Pteruthius aenobarbus †m	156	31	12	0.42 ± 0.29 (0.04–1.07)

516	Chestnut-backed Scimitar-babbler Pomatorhinus montanus †m	10	7	4	0.06 ± 0.04 (0.02-0.13)
517	Mountain White-eye Zosterops japonicus m	32	16	10	0.08 ± 0.06 (0.03-0.23)
518	Javan Grey-throated White-eye <i>Heleia javanica</i> †m	149	33	12	0.43 ± 0.39 (0.04-2.00)
519	Velvet-fronted Nuthatch Sitta frontalis †	32	14	8	0.14 ± 0.13 (0.02–0.54)
520	Blue Nuthatch <i>Sitta azurea</i> †m	68	26	11	0.12 ± 0.08 (0.02-0.28)
521	Javan Shortwing Brachypteryx montana *m	44	18	10	0.13 ± 0.10 (0.03-0.30)
522	Sunda [Javan] Blue Robin <i>Myiomela diana</i> †m	47	22	9	0.12 ± 0.11 (0.02-0.45)
523	Snowy-browed Flycatcher Ficedula hyperythra m	174	34	12	0.46 ± 0.28 (0.03-1.07)
524	Little Pied Flycatcher Ficedula westermanni m	232	36	12	0.85 ± 0.47 (0.08-1.99)
525	Indigo Flycatcher <i>Eumyias indigo</i> *m	156	33	12	0.34 ± 0.21 (0.04-0.85)
526	Javan Blue-flycatcher Cyornis banyumas †	1	1	1	0.04
527	White-flanked Sunbird Aethopyga eximia *m	162	36	12	0.37 ± 0.29 (0.02-1.39)
528	Javan Sunbird <i>Aethopyga mystacalis</i> *s	40	15	8	0.24 ± 0.28 (0.01-1.00)

516	Tawny-breasted Parrotfinch Erythrura hyperythra †m	20	10	6	0.09 ± 0.06 (0.02-0.21)
517	Pin-tailed Parrotfinch Erythrura prasina s	4	4	3	0.03 ± 0.02 (0.01-0.05)
518	Mountain Serin Chrysocorythus estherae m	1	1	1	0.03
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Table 4. Comparisons of mean encounter rates (bird groups per hour) for selected songbirds between surveys done in the 1980s and

517 1990s and our study (numbers in parentheses are maximum and minimum at occupied sites). Also shown are dates, altitudes and

518 survey effort (hours of morning fieldwork).

520	Attribute/Species	Gede-Pangrango 1981	Puncak 1981	Slamet 1995	This study
521 522	Dates	2/4-20/7	31/3-22/6	28/6–undated	14/09/18-06/03/21
523	Hours/days surveying	35.5 / 6	27.7 / 7	10.4 / 3	1031/127
524	Altitudinal range (m)	1,450-1,700	~1,600	600-2,500	754–2,806
525	Rufous-tailed Fantail	0.25	0.14	0.96	0.33 (0.03-0.78)
526	White-bellied Fantail	0.11	0	0.19	0.13 (0.02–0.35)
527	Javan Green Magpie	0.06	0.07	0	0
528	Orange-spotted Bulbul	0.17	0.61	0.96	0.23 (0.03–1.50)
529	White-bibbed Babbler	0.08	0.11	0	0.11 (0.01-0.87)
530	Chestnut-backed Scimitar-babbler	0.82	0.90	1.05	0.06 (0.02-0.13)
531	Crescent-chested Babbler	0.23	0.61	2.01	0.90 (0.12-1.84)
532	Javan Fulvetta	1.49	0.98	1.73	0.76 (0.25–2.90)
533	Rufous-fronted Laughingthrush	0.42	0.22	0	0.16 (0.02–0.60)
534	Javan Grey-throated White-eye	0.90	1.48	2.11	0.43 (0.04–2.00)
535	Indigo Flycatcher	0.20	0.29	0.29	0.34 (0.04-0.85)

Figure 1. Survey sites (filled circles) in 12 montane areas (differing shades of grey denote clusters of sites nested within individual mountains) located in West and Central Java, Indonesia, showing forest cover (green shading).



Figure 2. Mean encounter rates (groups per hour) for 184 bird species across 37 sites in 12 western Javan mountain regions. Shown are a) the relationship between transect occupancy (number of transects with species presence) and encounter rates (grey bars show 1 standard deviation); b) median and variability of encounter rates grouped by global red list categories (2021 assessment).



Appendix S1. Full list of bird species recorded on transects across twelve mountains in Java. Also shown are mean, SD, minimum and maximum encounter rates for each species, along with the number of transects, sites and mountains on which they were recorded. We do not identify bird records with particular sites or mountains for reasons of security, but these data are available to *bona fide* individuals on request.

Appendix S2. Characteristics of individual sites surveyed. Shown are number of transects, mean, maximum and minimum altitudes of transects, and main habitat type. No transects were walked at Ketenger 1 at Slamet. Also shown is the number of habitat plots surveyed at sites, and the proportion of these at which bird trapping and cut trails were recorded. Level of habitat disturbance was coded according to proportion of plots at which cut stems were recorded: 0.0-0.2 = Low; 0.2-0.5 = Medium; >0.5 = High.