

The trade in Rufous-fronted Laughingthrush *Garrulax rufifrons* in Java, Indonesia

VINCENT NIJMAN, AHMAD ARDIANSYAH, RIFQI HENDRIK, MUHAMMAD ALI IMRON & K. ANNE-ISOLA NEKARIS

The Rufous-fronted Laughingthrush *Garrulax rufifrons* shares the western part of the island of Java, Indonesia, with close to 100 million people. Historically it has been recorded from 15 mountains but post-2000 records all come from two of them (Gn Gede-Pangrango and Gn Slamet). Illegal trade for the cage-bird market is considered to be the main threat to the species; it is currently listed as Critically Endangered. Despite trade being the main threat, well-documented records of birds for sale and associated price data are scarce. Based on 174 surveys of 11 Javan bird markets (August 2016 to February 2020), we here report on the trade (volume, price developments and temporal patterns) in Rufous-fronted Laughingthrush. The species was recorded in 21% of the surveys, with a total of 61 birds (all adult-sized); in addition, we found seven birds offered for sale on online platforms. Prices were relatively low at ~US\$69 and these prices differed geographically. We found no temporal changes in numbers or prices. We assessed that birds were sold on average within two weeks after arriving at the bird market and based on this we estimate that overall some 90 Rufous-fronted Laughingthrushes are sold in these markets annually. Our surveys raise the possibility that the species persists on other mountains in western Java and underscores the value of bird market surveys in gaining insight into how trade affects the conservation of imperilled bird species.

INTRODUCTION

The Rufous-fronted Laughingthrush *Garrulax rufifrons* is endemic to the western part of the Indonesian island of Java, one of the most densely populated areas in the world, where little natural forest remains. Collar & van Balen (2013) gave a comprehensive overview of the distribution, ecology, natural history and conservation needs of the species. It is found exclusively in hill and montane forest, mostly from 900 to 2,000 m. The distinct subspecies *slamatensis* is only known from Gn Slamet in central Java, the easternmost locality where the species has been recorded, and the nominate is known from 14 other sites further west. Gunawan *et al.* (2013), based on an anonymous report from 2003, listed the species as present on Gn Merapi, ~250 km east of Gn Slamet. It is uncertain if this record is based on reports from local people or on actual sightings and, if confirmed, it is unclear if this would be a second site where *slamatensis* is found. There are only two areas where the species has been recorded in the last two decades, i.e. Gn Gede-Pangrango (e.g. van Balen *et al.* 2014) and Gn Slamet (Devenish *et al.* 2020).

As recently as 2000, the conservation status of Rufous-fronted Laughingthrush was assessed as Near Threatened, but in 2013, following the review by Collar & van Balen (2013), its status was first changed to Endangered and later upgraded to Critically Endangered in 2016, primarily due to heavy trapping pressure. Population estimates are at best approximate, but BirdLife International (2018) suggested that fewer than 250 mature individuals remain, based on the highly restricted distribution and lack of recent records (both in the wild and from bird markets). The species has been protected under Indonesian law since 1979 (Noerjito & Maryanto 2001), but as far as we are aware no-one has ever been fined or prosecuted for trading Rufous-fronted Laughingthrushes.

Records of trade and price data for Rufous-fronted Laughingthrush are incomplete. According to Resit Sözer, an expert on the Javan songbird trade, ‘... at the start of the century the species could be found in bird markets as a cheap songster, selling for US\$16, but in the past few years [i.e., 2010 and/or 2011] prices have increased tenfold’ (Collar & van Balen 2013). Shepherd *et al.* (2016) noted that, in 2008, one was offered in a bird market in Medan for US\$45, two in Jakarta in 2014 for US\$69 and US\$129, and one in Surabaya in 2015 for US\$113. Most recently, Nijman *et al.* (2017) reported on five Rufous-fronted Laughingthrushes for sale in Jakarta and Tasikmalaya, with prices ranging from US\$60 to US\$98.

Based on a comprehensive monitoring programme of 11 Javan bird markets, we here report on the trade in Rufous-

fronted Laughingthrush, specifically price developments and sale fluctuations. Rarity has a premium in the wildlife trade (Courcamp *et al.* 2006, Siritat *et al.* 2019), and if demand is greater than supply then, over time, prices should go up above and beyond inflation. Given the species’s rarity and its Critically Endangered status, we expect asking prices to have increased over time. Harvest and trade in songbirds can be affected by the biology of the species (e.g. a species may be easier to catch during the breeding season), other responsibilities or work commitments of the bird-catchers (e.g. agricultural labour, harvest, etc., which may have a seasonal component), or demand from buyers (e.g., for certain festivals or holidays). Rufous-fronted Laughingthrushes have been observed breeding during most months of the year (Collar & van Balen 2013) and 78 skins in the museums of Leiden, Amsterdam and Bogor were collected more or less equally over the 12 months of the year (V. Nijman, unpubl. data). These data suggest that there is no seasonality in conspicuousness or catchability, and as such any temporal patterns in the availability of the species in the bird markets should be linked to the supply and demand chain.

The size of bird markets in Java differs considerably. At the large end, Pramuka bird market (Jakarta) comprises a four-storey building occupied almost exclusively by traders in birds and aviculture supplies such as food and cages, and typically over 100 shops selling wild-caught birds. At the other end, many small markets comprise a dozen or so shops. We expect that the number of ‘positive’ surveys, i.e. visits during which we do record at least one Rufous-fronted Laughingthrush, and the mean number of birds encountered will be higher in the large than in medium-sized and small bird markets.

METHODS

Data acquisition

The lead author has been conducting surveys in the bird markets of Java intermittently since the early 1990s (Nijman 2003, Nijman *et al.* 2018). This activity was scaled up in April 2012 when we focussed initially on a limited number of taxa (e.g. primates, carnivores, birds of prey and owls, certain songbirds) and in a limited number of bird markets (e.g. Nijman & Nekaris 2017). In August 2016 we initiated a comprehensive monitoring programme, focussing on a much wider range of taxa, a larger number of bird markets, and a higher intensity of visits (e.g. Nijman *et al.* 2017, 2018). Here we focus on those bird markets that are broadly within the range of the Rufous-fronted Laughingthrush and that we have monitored

Table 1. Bird markets on Java surveyed for Rufous-fronted Laughingthrush *Garrulax rufifrons* in the period August 2016 to February 2020; cities are listed from west to east, and positive surveys are those where we observed at least one Rufous-fronted Laughingthrush. Small markets have typically fewer than 20 shops, medium markets comprise between 20 and 49 shops, and large markets comprise >50 shops (markets do vary in size, with often more shops open on weekends, and fluctuate somewhat in size over the years, but generally will remain within their respective size classes).

Town, bird market (size)	Surveys	Positive surveys (proportion)	Birds: mean overall, (total) and mean when present
Jakarta, Barito (medium)	16	2 (0.13)	0.25 (4) 2.00
Jakarta, Pramuka (large)	16	10 (0.63)	1.88 (30) 3.00
Jakarta, Jatinegara (large)	12	0 (0)	0
Sukabumi, Pasundan (small)	6	1 (0.17)	0.17 (1) 1.00
Bandung, Sukahaji (large)	25	4 (0.16)	0.20 (5) 1.25
Garut, Bayongbong (small)	6	4 (0.66)	0.50 (3) 1.50
Garut, Kerkhof (small)	35	5 (0.14)	0.11 (4) 1.00
Tasikmalaya, Cikirubuk (small)	24	6 (0.25)	0.29 (7) 1.17
Cirebon, Plered (large)	16	3 (0.19)	0.38 (6) 2.00
Semarang, Pon / Karimata (medium)	9	1 (0.11)	0.11 (1) 1.00
Yogyakarta, Pasty (large)	9	0 (0)	0

at least six times during at least three of the years spanning the period August 2016 to February 2020, and for which we were able to conduct complete inventories (Table 1). Surveys were halted in March 2020 because of the outbreak of COVID-19. In all we conducted 174 market surveys.

The bird markets were visited typically by one or two, and occasionally three, surveyors and all birds that were openly on display were recorded. Trade in songbirds is open in these markets and there is no need to resort to undercover techniques. Surveys were conducted at least one month apart. For those markets that for specific periods were surveyed weekly or fortnightly, we included only the first survey of the month. We did use the more frequent visits to Cikurubuk (Tasikmalaya), Bayongbong and Kerkhof (Garut) to obtain insights into the turnover of Rufous-fronted Laughingthrush. We obtained asking prices in the markets—these are first quotes and would have gone down after bargaining or when more than one bird was purchased at a time. We obtained additional asking prices from the literature.

Online trade

Over the research period we monitored several popular Indonesian online platforms that, occasionally, offer rare birds for sale, e.g. kaskus.co.id and jualo.com. We also searched for Rufous-fronted Laughingthrushes for sale on Facebook and Instagram.

Analysis

When reporting on the total number of Rufous-fronted Laughingthrush, we assumed that individual birds did not move between bird markets and, conservatively, that birds that were recorded in consecutive surveys represented the same bird. We assumed the sale (or death) of a bird if it was recorded during one survey but not the subsequent one and use the number of days between these visits as an indication of turnover. Asking prices, in Indonesian rupiah, for a given month and a given year, were corrected for inflation to May 2020 using an online inflation calculator. Subsequently these values were converted to US\$ using the exchange rate in May 2020 (14,980 rupiah to the dollar). We tested whether or not first quotes were different when a western or foreign surveyor was present or when only Indonesian surveyors were present. They were not. The mean price quoted when author VN, born in the Netherlands, was present was US\$82.51 ± 25.37 (n=5) and when no foreigners was present it was US\$69.51 ± 24.26

(n=8) (t-test, t=0.924, P=0.375), and in Jakarta and Tasikmalaya VN was twice quoted a lower price and three times a higher price than author AA (a Javanese Indonesian).

For each city in Indonesia the central government sets an annual recommended monthly minimum wage (*upah minimum kota*). These wages reflect in part the cost of living in these cities and in 2020 ranged from US\$190 to US\$446 in our study area. We compare prices over time and also in relation to these monthly minimum wages.

We conducted surveys across all months of the year. Considering the bird markets where we recorded Rufous-fronted Laughingthrush, not all months were covered equally (February: 21 surveys; November: 18; January: 15; October: 14; July-September: 13; December: 12; May: 10; March, June: 9; April: 7). Correcting for this discrepancy, we calculated how many birds we expected to observe for each month had all months been covered equally, and we compared this estimate with what we actually observed. Here we included records from consecutive surveys (i.e. when a Rufous-fronted Laughingthrush was recorded in a bird market in June and July of the same year, which may or may not have been the same individual, both months are included in the temporal analysis).

For assessing the effect of market size on the number of Rufous-fronted Laughingthrushes we observed, we used t-tests; to test for changes in prices over time and to test the relationship between price and recommended monthly minimum wage, we calculated Pearson's correlations coefficients; we used χ^2 -tests to test whether or not we observed more or fewer birds in certain months, relative to the survey effort in that month. All tests were two-tailed, and we accept significance when $P < 0.05$.

RESULTS

Trade in bird markets

We recorded Rufous-fronted Laughingthrushes 36 times. This represented a minimum of 61 birds. When we were able to establish the identity to the subspecific level it was invariably the nominate subspecies. We were not able to assess whether the bird observed in Pon (Semarang) or if one of the six birds in Plered (Cirebon) was of the nominate subspecies or *slamatensis*. The Rufous-fronted Laughingthrushes were adults or subadults; we did not record any chicks or fledglings. In most years the mean number of detected birds was between one and two a month (2016: 2.00; 2017: 1.08; 2018: 1.58; 2019: 0.92; 2020: 2.33) and we did not detect an increase or decrease in availability. In 36 out of 174 surveys, or 21% of the time, we recorded a Rufous-fronted Laughingthrush offered for sale, but observations varied greatly between bird markets. Pramuka (Jakarta), one of the largest bird markets in South-East Asia, and Bayongbong (Garut), a very small local one, had the species for sale in two out of three visits, whereas the number of birds observed was one in ten visits for Barito (Jakarta) and Pon/Karimata (Semarang). None was observed in Jatinegara (Jakarta) or Pasty (Yogyakarta). Mostly single birds were offered for sale, and only at Pramuka (Jakarta) did we regularly observe two or more birds for sale. When comparing the proportion of surveys or the number of birds encountered per survey, we did not see a difference between large and small or medium bird markets (t-test, t=0.083, P=0.935 and t=0.761, P=0.466).

The weekly and fortnightly visits allowed us to estimate turnover in days for nine individual Rufous-fronted Laughingthrushes. The mean number between first recording and no longer recording within individual shops was 14.9 days, with a range of 3 to 36 days.

For the period 2013 to 2020 we obtained 16 first quotes (including three from online adverts, see below), and prices appear to have declined but not significantly (Pearson's $R = -0.1366$, $P = 0.614$) (Figure 1). The overall average asking price over this period was

Figure 1. Asking prices of Rufous-fronted Laughingthrushes in Java, Indonesia (adjusted for inflation to May 2020), relative to the year in which the bird was offered for sale. The values for 2001 and 2011 are taken from the quote in Collar & van Balen (2013), but they could refer to prices in 2000/2002 or 2009/2010.

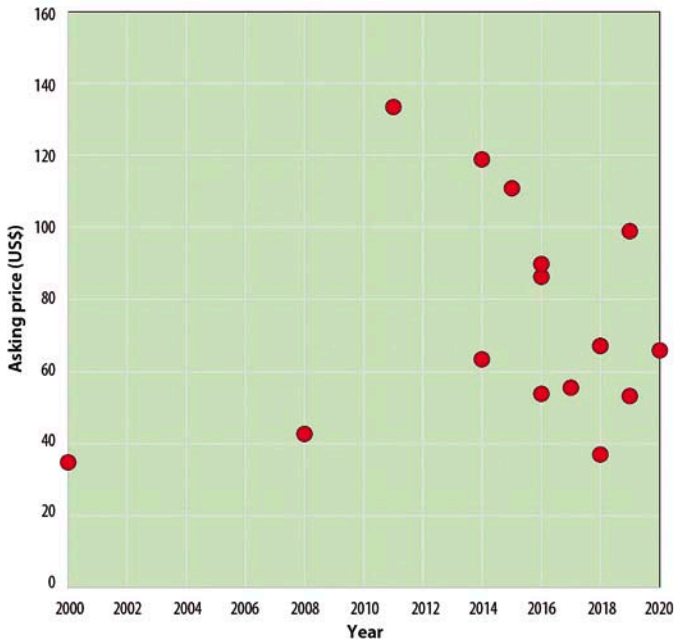


Figure 2. Asking prices of Rufous-fronted Laughingthrushes in seven cities on Java (adjusted for inflation to May 2020), relative to the government recommended monthly minimum wage for the year 2020 of the city where the bird was offered for sale.

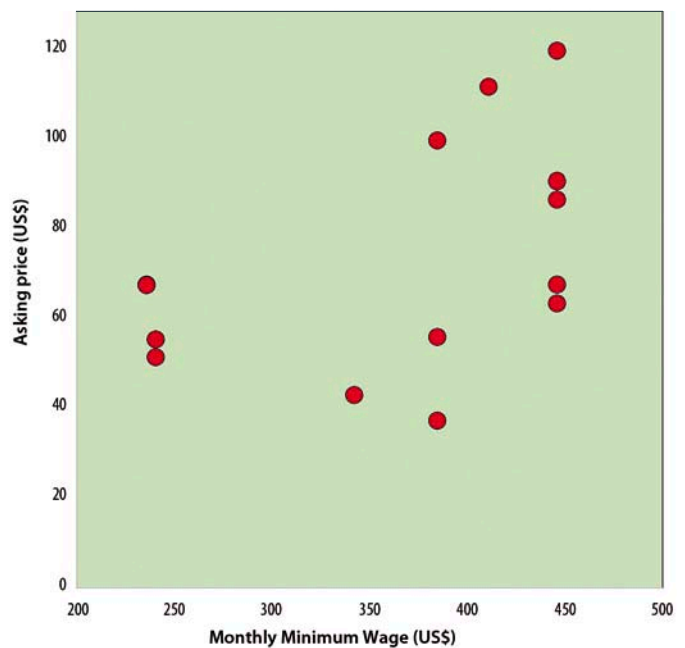
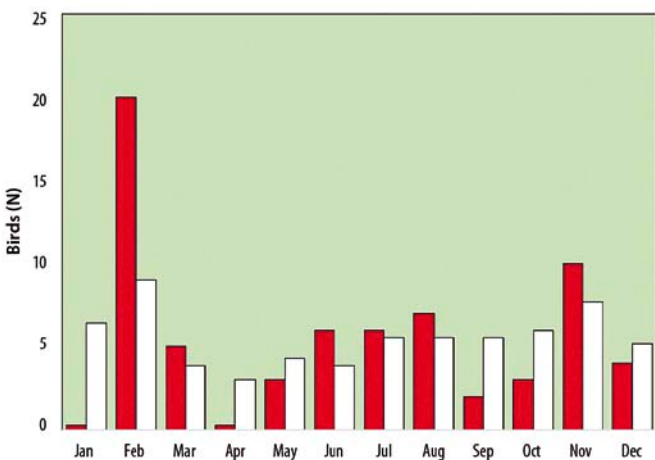


Figure 3. Temporal variation in the number of Rufous-fronted Laughingthrushes offered for sale on Java; in red are the numbers we observed and in white are what is expected on the basis of differential monthly survey efforts.



US\$68.82, with a highest quote of US\$118.93 in Barito (Jakarta), and the lowest of US\$37.00 in Sukahaji (Bandung) and US\$25.35 from an online trader in Semarang.

Asking prices appear to be linked at least in part to the purchasing power of the people of the city in which the bird market is situated. The recommended monthly minimum wage differs considerably in the cities we surveyed, with those for Semarang being less than half that of Jakarta (i.e. US\$190 vs US\$446). Thus, the lowest asking prices tend to be from cities where the minimum wage is at the lower end, whereas the highest asking prices are from those cities with relatively high minimum wages (Figure 2). The relationship between asking price and recommended monthly minimum wage is statistically significant (Pearson's $R=0.604$, $P=0.013$). Variation in asking prices, even within cities with similar levels of purchasing power, can be large (Figure 2) and this possibly reflects the differences in quality of the birds or their singing abilities and potential.

We recorded Rufous-fronted Laughingthrushes during most months of the year and only in January and April did we not record any birds (Figure 3). Overall, given slight differences in survey efforts, only for the month of January did we record fewer than expected and for February we recorded more than expected ($\chi^2=6.42$, $P=0.011$ and $\chi^2=9.00$, $P=0.003$, respectively).

In 2020, for the first and only time, in Sukahaji (Bandung) we observed a Rufous-fronted Laughingthrush with a leg ring. We were not able to inspect this closely, and we are not confident that it was a proper closed leg ring. If it is, there is a small possibility that this bird represents one of the first captive-born Rufous-fronted Laughingthrushes in trade, or, perhaps equally likely, it may represent a chick poached from the nest that was still young enough to be fitted with one. The other birds in trade all seem to be wild-caught, and we have no evidence that the species is indeed being bred in captivity (by a skilful and committed hobbyist breeder or as part of a commercial breeding enterprise).

Online trade

Seven times we recorded a Rufous-fronted Laughingthrush being offered for sale online: two on kaskus.co.id, one on jualo.com, one on voofla.com and three on Facebook. Five were of the nominate subspecies; we could not establish if the other two were the nominate or subspecies *slamatensis*. Three were offered for sale by one or more traders in Bogor, one in September 2013 for US\$30.46, one in May 2016 and one in April 2020 without price data. Two were advertised by trader(s) in Bandung, one in June 2016 for US\$76.69 and one in April 2017 without price data. One was offered for sale by a trader in Jakarta in August 2017 for US\$103.79 (the advert was posted on kaskus.co.id, with videos of the bird available to view on Facebook). Finally, one was offered for sale by a trader in Semarang, based in the Karimata bird market; the advert was posted for the first time in December 2017 for US\$25.35 (this is most likely a different bird from the one that we recorded during our surveys as that one was recorded in the nearby Pon market, in May 2019).

Home JUAL BELI All Categories Flora & Fauna Fauna (Hewan)

Reply Subscribe

0 SHARES

f t G+ WhatsApp Email

TERJUAL burung poksai kuda gacor
Rp 2.500.000

Beli Nego

DKI Jakarta (Bisa COD) Bekas 0 Terjual

Posted on : 19-08-2017 10:57
Dilihat : 673 kali
Berat : 1000 gram
Last Sundul : 27 August 2017, 08:52:14 AM

Penjelasan Produk

Saya Mau Menjual Poksai Kuda Langka, Gacor Harian Rajin Bunyi Variasi ,Sehat Makan Doyan Purtot, Mulus No Cacat & Jinak
Video Sempel Ada Di Fb

Harga : Rp.2.500.000 Nego
Kandang Ebod & Krodong

Plate 1. Rufous-fronted Laughingthrush offered for sale on the online platform kaskus.com with the trader based in Jakarta; the description indicates that it is a good singer, rare, in good condition and tame.

DISCUSSION

Through intensive monitoring of bird markets over the last four years, we were able to record a number of Rufous-fronted Laughingthrushes for sale. While 61 birds by itself is not a large number, it is markedly more than any other report on this species in trade. Turnover estimates suggest that individual Rufous-fronted Laughingthrushes remain in the bird markets for around two weeks. These estimates are in line with Nash (1993) who, based on information provided by traders in Pramuka (Jakarta), stated that for birds in general it was 'less than two weeks', and specifically for laughingthrushes for sale in Jalan Bintang (Medan) where it was 'less than a month' (Shepherd 2011). They are also in line with estimates for the similarly prized Black-winged Myna *Acridotheres melanopterus*, for which Nijman *et al.* (2018) calculated that 47 to 62% were sold within one week and 71 to 86% were sold within two weeks. The mean number of Rufous-fronted Laughingthrushes that we recorded across the nine bird markets where we did find the species offered for sale was 0.43 per survey. If these birds are indeed sold within two weeks on average, then we estimate that 7.75 Rufous-fronted Laughingthrushes are sold per month, yielding around 90 per year. In addition to this an unknown number are sold online. Considering a rough population estimate of 250 adult individuals (BirdLife International 2018), this estimate represents a significant part of the remaining wild population. An

Pokeay kuda (LANGKA)
Ikan Tidak Tersedia
Kota Bogor, Jawa Barat

Kuda Bekas Diperoleh Lebih dari 4 tahun Ditulis 2019 kali

5.0/5.0 Lihat Profil Penjual

Verifikasi Belum Terjawab Lebih dari 4 tahun Chat status Belum Ada

Tips Membeli Produk dari Penjual

Deskripsi

Edar gak terawat karena sering tetek kuda, pokeay kuda jerman arid.

Pastikan kamu telah memeriksa profil penjual dan ketersediaan barang sebelum melakukan transaksi atau segala jenis transfer pembayaran langsung ke rekening di luar Jualo.com.

Plate 2. Rufous-fronted Laughingthrush *Garrulax rufifrons* offered for sale on the online platform jualo.com with the trader based in Bogor, West Java; the description reads Rufous-fronted Laughingthrush (RARE).

alternative, but not mutually exclusive, interpretation is that the population estimate is too conservative, and that the species is in fact more common than assumed.

There was no seasonal pattern apparent in the trade, and birds were observed during most months of the year. Contrary to our expectation, we did not see an increase in prices over time, and we found that prices were linked to the economy of the cities in which the bird markets were situated. Prices in the bird markets were comparable to species such as Black-winged Myna (mean of US\$85; Nijman *et al.* 2018) or Asian Fairy Bluebird *Irena puella* (US\$65; Nijman *et al.* 2019). Thus, when available, Rufous-fronted Laughingthrush is still an affordable species to keep. In fact, when comparing it to other laughingthrushes for sale in the same bird markets, prices appear to be low (Shepherd *et al.* 2016, 2020).

We did not observe very young birds. Experience from a conservation breeding programme (Collar *et al.* 2012, Owen *et al.* 2014) suggests that this is a challenging bird to breed. The current low prices that it commands in the bird markets more or less rule out the viability of any genuine commercial captive breeding.

Increasingly, cage birds in Indonesia are also traded on online platforms, including well-known sites such as Facebook. We were able to record a small number of Rufous-fronted Laughingthrush, but it is difficult to assess the magnitude of this trade or to what extent it replaces or enhances the trade in brick-and-mortar markets. These areas of research, management and conservation policy clearly require a higher level of attention.

The presence of Rufous-fronted Laughingthrush in bird markets in seven different cities suggests that the species persists in more areas beyond Gn Gede-Pangrango and Gn Slamet. We found that prices were linked to the local economies rather than one uniform Java-wide price, also suggesting that birds are caught and traded within their local area. Their presence in the small bird markets of Garut and Tasikmalaya, where indeed many of the birds are locally sourced, suggests that the species is still present in the southern Parahyangan. These areas may include those that are known to have held the species in the past, such as Gn Papandayan (most recent record 1987), Gn Guntur (most recent record 1923) and Gn Malabar (most recent record 1910). Likewise, the regular presence of the species in the bird market of Bandung may be indicative of its sustained presence on Gn Tangkuban Perahu (last recorded in 1957), just north of the city, although it is not improbable that in fact these birds are sourced from Gn Gede-Pangrango or the southern Parahyangan. The records in Plered (Cirebon) may suggest their continued presence in the forests on Gn Ciremai (last recorded in 1930), as this is only 10 km, in a straight line, from the bird market. Alternatively, they may have been *slamatensis*, thus having been sourced from Gn Slamet (most recent record from 2018), as this is only 65 km in a straight line from Cirebon.

Recently, Bušina *et al.* (2020) questioned the reliability of bird market surveys like the ones we report on here and instead advocate the use of obtaining covert information about sales figures from traders themselves. We counter that only through a programme of sustained and intense monitoring were we able to gain any insight into the trade in the Rufous-fronted Laughingthrush. We thus were able to make inferences about its rarity ('possibly more common than previously thought'), economic value ('with no indication of increased monetary value over time'), turnover and numbers sold annually ('representing a third of the rough population estimate'), availability ('year-round') and persistence ('probably still present on a number of mountains where it has not been recorded for decades'). The Rufous-fronted Laughingthrush offered for sale in the markets were physically observed by us (rather than relying on second- or third-hand information), something we were not able to do for the birds that we recorded offered for sale online.

Finally, our research stresses the need for enhanced enforcement of the protection of the Rufous-fronted Laughingthrush. As one of the rarest birds in Indonesia, and one that is threatened mainly by trade, it is disconcerting to see it being offered openly for sale in several bird markets as well as online. The Rufous-fronted Laughingthrush has been identified as a species for which captive breeding offers an opportunity to save it from extinction (Collar *et al.* 2012, Owen *et al.* 2014). Efforts to enforce existing legislation by confiscating birds offered for sale in bird markets and online should be integrated with this captive breeding programme, with confiscated birds being added to the captive stock.

ACKNOWLEDGEMENTS

This research is underpinned by a Memorandum of Understanding between Universitas Gadjah Mada (Indonesia) and Oxford Brookes University (UK) and we thank the respective deans for their support. We thank Hélène Birot, Ella Brown, Abdullah Langgeng, Suci Listina, Sophie Manson, Aconk Nughara and Penthai Siritwat for help with, and coordination of, the market surveys, and the Ministry of Research, Technology and Higher Education for permission to conduct the surveys. Cleveland Metroparks Zoo and Zoo Society, Columbus Zoo and Aquarium, and People's Trust for Endangered Species are thanked for funding. We thank two reviewers and the editors for constructive comments.

REFERENCES

- van Balen, B., Trainor, C. & Noske, R. (2014) Around the archipelago. *Kukila* 17: 154–177.
- BirdLife International (2018) *Garrulax rufifrons* (amended version of 2016 assessment). The IUCN Red List of Threatened Species 2018. Downloaded from <https://www.iucnredlist.org/species/22715592/38213200> on 2 April 2020.
- Bušina, T., Kouba, M. & Pasaribu, N. (2020) What is the reliability of visually based animal trade census outcomes? A case study involving the market monitoring of the Sumatran Laughingthrush *Garrulax bicolor*. *Bird Conserv. Internatn.* (online first).
- Collar, N. J. & van Balen, S. (2013) Notes for the conservation of the Rufous-fronted Laughingthrush *Garrulax rufifrons*. *Forktail* 29: 15–18.
- Collar, N. J., Gardner, L., Jeggo, D. F., Marcordes, B., Owen, A., Pagel, T., Pes, T., Vaidl, A., Wilkinson, R. & Wirth, R. (2012) Captive breeding and the most threatened birds in Asia. *BirdingASIA* 18: 50–57.
- Courchamp, F., Angulo, E., Rivalan, P., Hall, R. J., Signoret, L., Bull, L. & Meinard, Y. (2006) Rarity value and species extinction: the anthropogenic Allee effect. *PLoS Biol.* 4(12), a415.
- Devenish, C., Junaid, A. R., Andriansyah, Saryanthi, R., van Balen, S., Kaprawi, F., Aprianto, G. C., Stanley, R. C., Poole, O., Owen, A., Collar, N. J. & Marsden, S. (2020) Biological richness of Gunung Slamet, Central Java, and the need for its protection. *Oryx* (in press).
- Gunawan, H., Sugiarti, M., Wardani, M. H. L. & Prajadinata, S. (2013) Restorasi ekosistem Gunung Merapi pasca erupsi. Bogor, Indonesia: Pusat Penelitian dan Pengembangan Konservasi dan Rehabilitasi. (In Bahasa Indonesia.)
- Nash, S. V. (1993) *Sold for a song: the trade in Southeast Asian non-CITES birds*. Cambridge, UK: TRAFFIC International.
- Nijman, V. (2003) Distribution, habitat use and conservation of the endemic Chestnut-bellied Hill-partridge (*Arborophila javanica*) in fragmented forests of Java, Indonesia. *Emu* 103: 133–140.
- Nijman, V. & Nekaris, K. A. I. (2017) The Harry Potter effect: the rise in trade of owls as pets in Java and Bali, Indonesia. *Global Ecol. Conserv.* 11: 84–94.
- Nijman, V., Sari, S. L., Siritwat, P., Sigaud, M. & Nekaris, K. A. I. (2017) Records of four Critically Endangered songbirds in the markets of Java suggest domestic trade is a major impediment to their conservation. *BirdingASIA* 27: 20–25.
- Nijman, V., Langgeng, A., Birot, H., Imron, M. A. & Nekaris, K. A. I. (2018) Wildlife trade, captive breeding and the imminent extinction of a songbird. *Global Ecol. Conserv.* 15: a00425.
- Nijman, V., Nekaris, K. A. I. & Imron, M. A. (2019) Asian songbird crisis also affects unprotected species. *Oryx* 53: 13.
- Noerjito, M. & Maryanto, I. (2001) Jenis-jenis hayati yang dilindungi perundang-undang Indonesia. Cibinong, Indonesia: LIPI.
- Owen, A., Wilkinson, R. & Sözer, R. (2014) In situ conservation breeding and the role of zoological institutions and private breeders in the recovery of highly endangered Indonesian passerine birds. *Internatn. Zoo Yrbk.* 48: 199–211.
- Shepherd, C. R. (2011) Observations on trade in laughingthrushes (*Garrulax* spp.) in North Sumatra, Indonesia. *Bird Conserv. Internatn.* 21: 86–91.
- Shepherd, C. R., Eaton, J. A. & Chng, S. C. L. (2016) Nothing to laugh about - the ongoing illegal trade in laughingthrushes (*Garrulax* species) in the bird markets of Java, Indonesia. *Bird Conserv. Internatn.* 26: 524–530.
- Shepherd, C. R., Leupen, B. T., Siritwat, P. & Nijman, V. (2020) International wildlife trade, avian influenza, organised crime and the effectiveness of CITES: the Chinese hwamei as a case study. *Global Ecol. Conserv.* a01185.
- Siritwat, P., Nekaris, K. A. I. & Nijman, V. (2019) The role of the anthropogenic Allee effect in the exotic pet trade on Facebook in Thailand. *J. Nature Conserv.* 51: a125726.

Vincent NIJMAN & K. Anne-Isola NEKARIS, Oxford Wildlife Trade Research Group, Oxford Brookes University, Gipsy Lane, Oxford, OX3 0BP, UK. Email: vnijman@brookes.ac.uk

K. Anne-Isola NEKARIS, Ahmad ARDIANSYAH & Rifqi HENDRIK, Little Fireface Project, Cipaganti, Cisarupan, Garut Regency, West Java 44163, Indonesia.

Muhammad Ali IMRON, Faculty of Forestry, Universitas Gadjah Mada, Jl Agro No.1, Bulaksumur, Sleman 55281, Yogyakarta, Indonesia.