

TRAFFIC



December 2021

TRADING FACES

LIVE BIRD TRADE ON FACEBOOK IN SINGAPORE

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TRAFFIC REPORT

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N A T U R E

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ANNEX



WILDLIFE PET TRADE ONLINE IN SINGAPORE



DEC 2018

5 MONTHS

APR 2019

44  **FACEBOOK GROUPS**

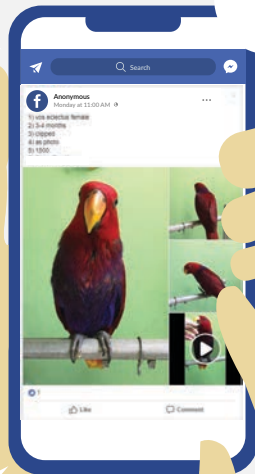
2,276
UNIQUE POSTS



UNIQUE TRADERS 662

93
TAXA

91 BIRDS
88% NON-NATIVE SPECIES
59% PARROTS & COCKATOOS
1 MAMMAL
1 REPTILE



3,354  **UNIQUE ANIMALS**
28% RED-WHISKERED BULBULS

WHERE ARE THEY SOURCED FROM?

LEGAL



- Imported with permits
- Bred in registered local farms

ILLEGAL



- Smuggled from abroad
- Poached locally

APRIL 2021 UPDATE: 36 of 44 groups still active. 13 groups closed but 5 re-formed.



EXECUTIVE SUMMARY

Singapore's demand for wildlife traded as pets online has not been well studied. Previous inventories of pet shops in Singapore have shown an existing significant market for wildlife pets, particularly birds. While physical markets are still active, online platforms are increasingly important marketplaces. Facebook is a popular platform with more than 4.3 million active users in Singapore—and is often used by the wildlife pet trading community. Between December 2018 to April 2019 TRAFFIC researchers explored the scale of the online wildlife pet trade to analyse trends and assess trade dynamics.

A snapshot of trade activity in 2021 to assess the current situation was also completed. The results were shared with the National Parks Board (NParks) Singapore and Facebook for follow-up action.

From December 2018 - April 2019, the study recorded 2,276 unique posts representing 93 taxa (91 birds, one mammal and one reptile) and a minimum of 3,354 individuals posted by 662 unique traders in 44 Facebook groups. Despite extensive searches for these three taxa across Singapore-based groups, most of the groups found focused exclusively on birds. In Singapore, the legal pet trade is limited mostly to birds, with only a small number of reptilian and mammalian species allowed for sale under national legislation. This restriction could explain the popularity of birds and their overwhelming presence in the survey findings. As a result,

the focus of this analysis was on birds.

The 10 most traded species collectively accounted for more than 81% (n=3,042) of the total number of birds recorded for sale. Non-native species dominated (88% of species and 69% quantity-wise), and the major groups of birds documented were parrots and songbirds. Species from the order Psittaciformes (Psittacidae and Cacatuidae) accounted for almost two-thirds of the total species recorded, whereas the non-native songbird Red-whiskered Bulbul *Pycnonotus jocosus* accounted for 28% of all birds recorded.

More than 50% of the species recorded are listed on CITES Appendices, mostly Appendix II (17% of number of individuals) with eight listed on Appendix I (3% of number of individuals). A few Appendix I and II listed species were recorded for sale despite having no recent recorded imports into Singapore. For instance, even though 133 individuals of the Chinese Hwamei were recorded here, the last reported import record on the CITES trade database was back in 2004, where a total of 1,200 individuals were imported. Individuals offered for sale could have been bred in local breeding facilities from CITES-registered parent stock, or that the species was brought into the country undocumented. Access to breeding records is required to ascertain this.

While many non-native species, particularly parrots and finches, were likely to be from captive sources, most native songbirds

documented are believed to be wild-sourced, as established commercial breeding facilities are not known. For the 69 species for which sale prices were available, the total value was a minimum of SGD 820,591 (USD 602,933) cumulatively. Private hobbyist breeders in Singapore reported success only with the White-rumped Shama (Chiok *et al.* 2021). While wild-sourced native birds could have been legally or illegally imported from neighbouring range countries, posts alluding to domestic poaching were also recorded during this study.

Out of the 44 Facebook groups surveyed, one particular group disproportionately accounted for more than 55.5% (1,263) of all posts recorded, with the second-highest group accounting for only 8.7% (198). This top group also had the highest membership (18,000 members during the survey). Across the study, there was one apparent top user who published 109 posts in contrast to 86% of unique users who posted five or fewer times. Social network analysis of the traders reveals that parrot sellers and songbird sellers in Singapore form separate communities, and appear to have some connections to bird traders in Malaysia who primarily sold parrots.

NParks and Facebook acted on this information to close groups and remove posts with illegal wildlife trade activity, and NParks issued advisory letters to sellers. In recent surveillance by the authors in April 2021, 36 out of 44 groups initially surveyed in this study were still active, with daily sale posts – using disguised wording – and new members joining monthly in most groups. A total of 13 groups had been shut down, out of which five were re-formed with similar names. These observations point towards the persistent behaviour of online traders and buyers to circumvent regulatory actions, and the continued usage and relevance of online platforms in the trade of live birds in Singapore.

This study identified gaps within the national legislative framework and implementation pertaining to the live bird trade that can be closed in future to clarify conditions for legal and sustainable trade. These include the lack of documentation of bird owners in Singapore, and possible false declarations of illegally wild-caught birds as legally captive-bred. Our study also recorded sale posts posted by private sellers who did not have licences to breed nor sell live animals. Ultimately, this report shows that the unregulated sale and/or illegal movement of live birds occurs in Singapore.

The following actions are recommended to address the gaps identified above:

- Monitor wildlife trade regularly to support timely responses to illegal wildlife trade activities
- Deter persistent online illegal wildlife traders through effective enforcement
- Increase owner accountability through a compulsory wildlife pet registration system
- Tag all captive-bred birds to improve traceability
- Continue collaborating with neighbouring countries to tackle cross-border trade
- Improve anti-poaching efforts to protect native wildlife
- Raise awareness to discourage illegal wildlife pet sellers
- Monitor songbird keeping community for ivory trade
- Improve identification and removal of posts offering wildlife for sale
- Continue coordination between NParks and Facebook
- Reduce demand for illegal wildlife pet trade
- Report suspected wildlife trade or poaching incidents

These are detailed further under the **Recommendations** section.



INTRODUCTION



FIGURE 1

Bird singing competition in Singapore.



The illegal and unsustainable international wildlife trade is one of the main drivers of species extinction (Tingley *et al.*, 2017), prominently in biodiversity hotspots like Southeast Asia (Sodhi *et al.*, 2010; Symes *et al.*, 2018). Increased efforts to document and analyse wildlife trade impacts in the region have been identified as a research gap to be addressed (Coleman *et al.*, 2019). Singapore's status as a regional trade hub and transshipment centre has made it a popular transit destination along shipping passages (Lin, 2005), involving the import and (re-) export of various wildlife both legal and illegal, that include wild birds (Shepherd *et al.*, 2012; Poole and Shepherd, 2017), reptiles (Goh and O'Riordan, 2007), pangolin scales (Prinsloo, 2020), ivory (Liu, 2019) and rosewood (Ong *et al.*, 2016).

Singapore's role as a consumer in the wildlife pet trade is less documented. Keeping wildlife as pets is illegal in the country, except for most birds, fish and other select species (see **Legislation Review**). Birdkeeping has a long documented history in Singapore and remains commonplace today (Figure 1; Chasen, 1923; Layton, 1991; Nash, 1993; Lee, 2006; Lai, 2010).

The bird trade in Singapore continues to be of a significant scale; pet shop surveys in 2016 recorded 14,085 individuals comprising 109 species across 39 shops, including 48 species listed on CITES Appendices (Eaton *et al.*, 2017). Recent studies signalled a rising domestic market for parrots (Jain *et al.*, 2021).

Technological advancements in the last two decades have resulted in a proliferation of online platforms, and a corresponding rise in online marketplaces to trade wildlife. Its ease of use, often unregulated nature, and the anonymity conferred to the user make it a popular platform to sell wildlife, especially where legality is questionable (Lavorgna, 2014). In light of this, numerous studies have been conducted to ascertain the scale of wildlife trade online (Martin *et al.*, 2018), particularly on popular social media sites (Krishnasamy and Stoner, 2016; Phassaraudomsak and Krishnasamy, 2018; Sy, 2018). With Singapore having one of the highest internet penetration rates globally (Kemp, 2019), TRAFFIC researchers undertook this novel assessment to gain insight on the dynamics of trade in wildlife as pets on social networking sites in Singapore.

LEGISLATION REVIEW

CITES

Singapore has been a signatory to CITES since 1986 (CITES, 1979; Tan and Tan, 2013), with the now-defunct Agri-Food and Veterinary Authority of Singapore (AVA) playing a dual role as both CITES Management Authority and Scientific Authority. Since April 2019, these roles have been held by the National Parks Board (NParks, 2019a). Under the CITES National Legislation Project, Singapore is considered as Category 1, with the country's legislation deemed to generally fulfil CITES requirements (Cheong and Lye, 2015).

WILDLIFE TRADE AND PROTECTION LEGISLATIONS

Ownership of pets in Singapore is restricted to mainly domestic animals. No species of reptiles, amphibians or aquatic wildlife (apart from ornamental fish), except Red-eared Terrapin *Trachemys scripta elegans*, Malayan Box Turtle *Cuora amboinensis*, Green Tree Frog *Litoria caerulea* and Land Hermit Crab *Coenobita rugosus*, may be kept or sold in Singapore. Birds and fish may be imported and sold as pets when accompanied by relevant permits and documents. Similarly, CITES-listed species can be imported and sold with CITES documents. The trade of non-CITES listed wildlife still requires declaration and necessary documents (e.g. certificate from country of origin) from the import/exporter (NParks, 2019b). Only licensed traders from pet shops may import animals for sale domestically.

The leading national legislations regulating the trade of wild animals in Singapore are:

- *Animals and Birds (Amendment) Act 2014 (ABA)*
- *Endangered Species (Import and Export) Act 2008 (ESA)*

ABA mainly regulates the movement of wildlife into, out of and within Singapore via documentation and permits. ABA regulates the pet industry through issuing permits and licenses to local pet shops and breeders. ABA also covers animal welfare by regulating the possession of animals and birds for sale, export or exhibition via a licensing system. However, licenses are not required for pet owners. Those violating ABA may be fined up to SGD10,000 (USD7,371) or jailed for up to 12 months.

Covering both native and non-native species, ESA is the main CITES-implementing legislation, controlling the import and export of scheduled species via certificates and permits. The Act mandates the evidence of a valid export/import document, in the form of a CITES permit. It also outlaws the possession, sale, advertisement or display of any products from a scheduled species, which refer to CITES-listed wild flora and fauna. Offenders convicted of smuggling CITES-listed species face up to SGD50,000 fines (per species) to a maximum aggregate of SGD500,000, and/or imprisonment of up to two years.





The two key legislations that cover the protection of wildlife in Singapore are:

- *Wildlife Act 2020 (WA)*
- *Park and Trees Act 2006 (PTA)*

Both outlaw trapping of wildlife in the country, with WA being the primary legislation covering poaching in Singapore, and PTA applied specifically to designated nature reserves and parks. Wildlife is defined in the law as “any species of animals of a wild nature” excluding domestic animals, therefore also including non-native species. WA also regulates the trade of wildlife in Singapore.

Following extensive reviews, WA came into force on 8 May 2020, replacing the *Wild Animals and Birds Act 2000 (WABA)* and improving its scope, offences, penalties and enforcement powers to better reflect the current issues at hand (Chun, 2020). WA prohibits the killing, trapping or sale of wildlife without a permit. An offender who imports, exports or sells wildlife illegally is liable for a maximum fine of SGD10,000 (USD7370) and a jail term of up to six months – a ten-fold increase from WABA. Poachers can be fined up to SGD20,000 (USD14,740), jailed for 12 months, or both, increased from the previous SGD1000 (USD737) fine. Previously, a select number of wildlife species were explicitly excluded from protection under

WABA from poaching or killing: Common Myna *Acridotheres tristis* and White-vented (Javan) Myna *Acridotheres javanicus*, Asian Glossy Starling *Aplonis panayensis*, House Crow *Corvus splendens*, Feral Pigeon *Columba livia*, Purple-backed Starling *Agropsar sturninus*.

However, with WA all wildlife species are covered, and additionally, Chapter 351 of the WA includes a schedule of Protected Wildlife Species that are afforded greater protection under the law. As the study period was before WA came into force and WABA was the implementing law, the results are considered in the context of WABA.

PTA prohibits the capture and removal of plants and animals in gazetted nature reserves and parks. The PTA also provides a comprehensive definition of “animal”: “any mammal (other than man), bird, reptile, amphibian, fish (including shellfish), insect or any other living creature, vertebrate or invertebrate, and includes any egg or young thereof”. Restrictions on activities within gazetted areas include the trapping, removing or feeding an animal, disturbing or removing a nest, and collecting or deliberate displacement of any other organism (Tan and Tan, 2013). Compared to WABA, offenders of the PTA are liable to heavier punishment, with a fine of up to SGD50,000 (USD36,857) and a jail term of up to six months.



CYBERSECURITY

Cybersecurity in Singapore is governed by the *Computer Misuse Act and the Cybersecurity Act 2018 (No. 9 of 2019)*. There are no clauses pertaining specifically to trade, e-commerce or wildlife, but the sale of wildlife without relevant permits, regardless of the medium employed, is outlawed under Chapter 92A of the *ESA*. Some online e-commerce platforms have also established policies that prohibit the sale

of live animals, animal parts and/or some of their derivatives. However, it is worth noting that the recently enacted *WA* states that "... person must not offer for sale, sell or export any wildlife (whether alive or dead), or any part of a wildlife..." which can be interpreted as a blanket ban for private individuals to conduct any sales or transactions pertaining to wildlife without a valid permit or approval.

IMPLEMENTATION

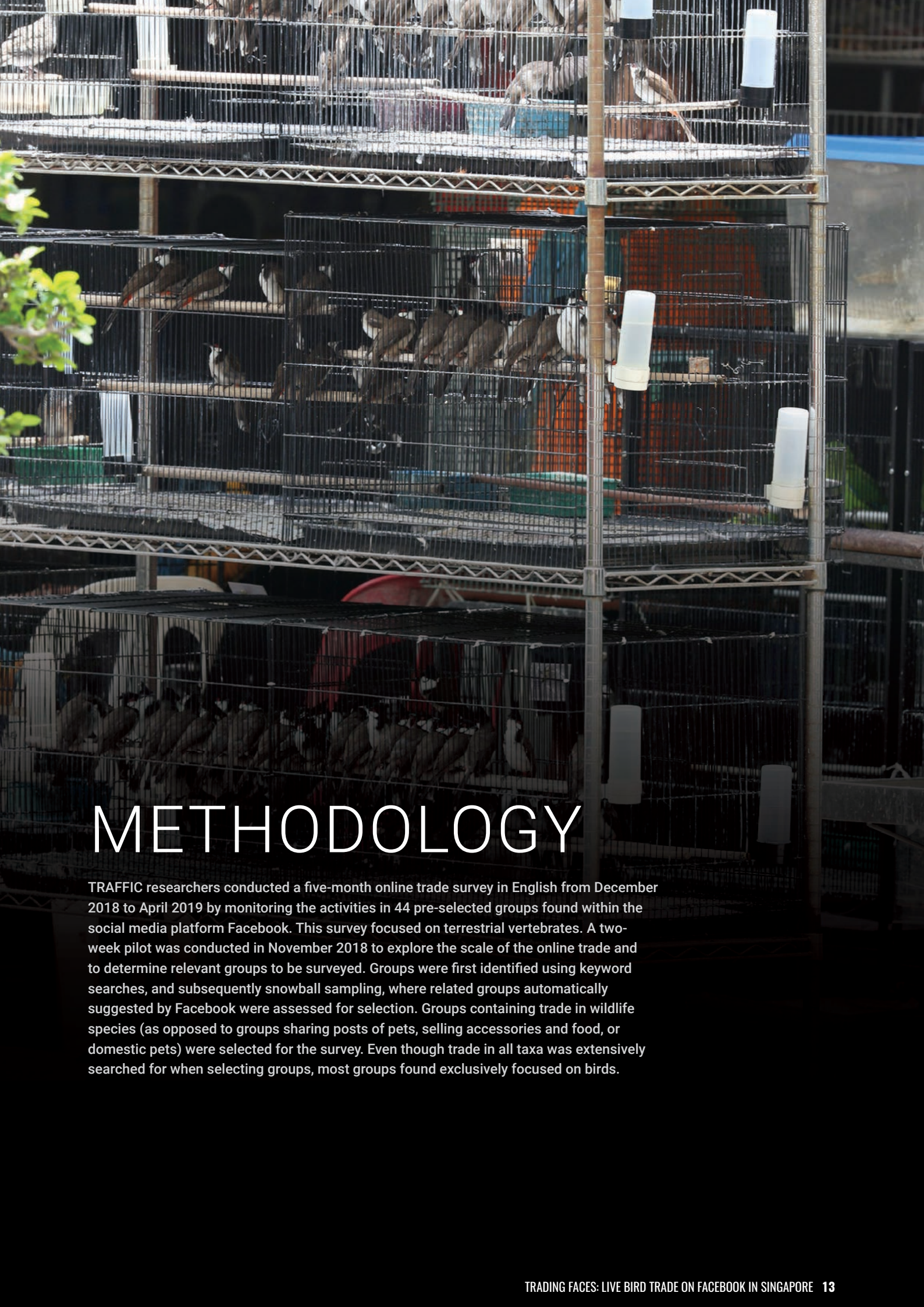
Singaporean agencies adopt a collaborative whole-of-Government approach to tackle the illegal pet trade covered under the laws as mentioned earlier. Measures to regulate the pet trade include the licensing of pet shops¹, issuance of permits and licenses for the import of birds², regular inspections at licensed pet shops to check the inventory and corresponding documentation and records, and enforcement action against offenders who sell animals without a valid pet shop licence. NParks' strategy focuses on upstream measures to regulate trade by ensuring that

they are from legal sources while targeting illicit trade, rather than imposing licensing requirements at the consumer level.

Additionally, a range of agencies conduct surveillance at checkpoints to intercept wildlife trafficking. NParks also engages directly with e-commerce platforms to remove offensive sale posts and blacklist users, and collaborates with international, regional and national enforcement agencies and NGOs (NParks, *in litt.*).

1 <https://www.nparks.gov.sg/avs/animals/animal-related-businesses/pet-shops/starting-a-pet-shop>

2 [https://www.nparks.gov.sg/-/media/cites/factsheet-birds-\(import\)_nov2019.pdf?la=en&hash=C349272418E51931017048FBC90BA79A0AE349A6](https://www.nparks.gov.sg/-/media/cites/factsheet-birds-(import)_nov2019.pdf?la=en&hash=C349272418E51931017048FBC90BA79A0AE349A6)



METHODOLOGY

TRAFFIC researchers conducted a five-month online trade survey in English from December 2018 to April 2019 by monitoring the activities in 44 pre-selected groups found within the social media platform Facebook. This survey focused on terrestrial vertebrates. A two-week pilot was conducted in November 2018 to explore the scale of the online trade and to determine relevant groups to be surveyed. Groups were first identified using keyword searches, and subsequently snowball sampling, where related groups automatically suggested by Facebook were assessed for selection. Groups containing trade in wildlife species (as opposed to groups sharing posts of pets, selling accessories and food, or domestic pets) were selected for the survey. Even though trade in all taxa was extensively searched for when selecting groups, most groups found exclusively focused on birds.

An hour was allocated each day to manually checking and documenting all posts offering birds and other wildlife (hereafter posts) showing live animals for sale. All new posts offering to sell or barter³ animals were noted and screen captured. No retrospective posts were recorded. All posts and their accompanying photographs were reviewed to record the species, minimum quantity and sale price. Posts without accompanying pictures, videos or additional information on the total number of specimens offered for sale were counted as a minimum of one individual per species to avoid inflating the number of species in trade. Posts suspected or confirmed to be duplicates (e.g. posted in multiple groups by the same trader; posts by the same trader with the same descriptions and species) were excluded from analysis. Domestic animals like cats *Felis catus*, rats *Rattus sp.* and domestic chickens *Gallus sp.* were also omitted. Posts, where stock and/or generic photos were used, were also scrutinised for their authenticity before being recorded. Posts advertising shops but not specific animals (e.g. listing species that the shop has, but not explicitly advertising animals) were omitted from analysis. As nearly all sale posts recorded during the study were of birds, this report and analysis focuses on the online bird trade, while mentioning the scant data on other taxa found.

For the price valuation analysis, posts with no sale price indicated were assigned the lowest retail price recorded for the corresponding species in the dataset. Species with no prices shown in the survey were not included in the price valuation analysis. All information recorded was based on the actual wording of the posts, with no engagement with any of the group members, and no animals were purchased during this assessment.

The April 2021 snapshot update involved checking the original 44 groups surveyed, searching for new groups, as well as a rapid scan of the content of the groups to assess the level of activity. Individual posts were not recorded.

To assess the legal import of CITES-listed species documented in the survey, Singapore (importer) reported data from the CITES Trade Database from 1975–2018 (CITES, 2019) was examined. The following data were extracted: (i) Aves, (ii) live specimens, (iii) purpose codes breeding [B], personal [P] and commercial [T]. Appendix listings follow the status at the time of survey (i.e. before the changes made at the recent CITES CoP18). Despite Singapore only ratifying CITES in 1986, CITES imports from before 1986 were still available in the CITES Trade Database and therefore included in the analysis here.

The Singapore Dollar (SGD) fluctuated between 1.3718 and 1.3621 against the USD during the period of this assessment. A conversion rate of SGD1.3610 = USD 1 (as of 30 April 2019; <https://www.oanda.com>) was used for consistency throughout the report.

Networks of social relations among all user accounts identified during the survey were mapped by analysing the mutual connections (i.e. common linkages between user accounts, which may be friend connections or interactions) on their social media accounts. These accounts and connections were also analysed with known operating trader accounts in Southeast Asia, based on TRAFFIC online trade monitoring in the region. Only accounts with at least 10 connections were considered, to minimise the inclusion of connections that are unlikely to be wildlife trade-related. No nominal information for these connections were collected.

3 Sale posts sometimes mentioned both (either or) the asking price and the seller's preferred items to be traded (e.g. trade with another individual with lower perceived value and 'top-up' with bird feed etc.). These posts were thus classified as 'barter trade'.

RESULTS

A total of 2,276 unique posts involving offers for 3,354 live animals were recorded during the assessment period, averaging 456 posts per month. The majority of the posts offered only one individual per sale post (81%, $n = 1844$), while 12% ($n = 275$) had two and 7% ($n = 157$) had three or more individuals offered for sale. An additional 10 posts did not offer individual birds but instead publicised their own websites or businesses selling birds; these were omitted from the analysis.





SPECIES IN TRADE

Of the 93 species recorded, only one mammal, the Eurasian Hedgehog *Atelerix albiventris* (1 individual from one post) and one reptile, Bowring's Supple Skink *Lygosoma bowringii* (45 individuals from four posts) were recorded. The remaining 91 species were birds, comprising 3,308 (99%) individuals. The rest of the analysis therefore focuses solely on birds. Nine species and two hybrids were domesticated or captive-bred as pets (e.g. canaries, lovebirds, Budgerigar, Barbary Dove), and constituted 18% (582) of all birds recorded.

88% of the species ($n = 80$) comprising 2,276 individuals (69%) were non-native. Of the top 10 most traded species, only two were native to Singapore: the White-eyes *Zosterops* sp.⁴ and White-rumped Shama *Copsychus*

malabaricus. Notable non-native species include the globally Endangered Grey Parrot *Psittacus erithacus* (48 individuals) and Blue-and-yellow Macaw *Ara ararauna*, both popular pets that are highly sought after globally.

One Critically Endangered species was recorded in this study: a single Yellow-crested Cockatoo *Cacatua sulphurea* of the subspecies *citrinocristata*, also known as Citron-crested Cockatoo. It is endemic to Sumba Island in the Nusa Tenggara region of Indonesia, protected from harvest and trade under Indonesian law, and listed on CITES Appendix I. Additionally, six Endangered species, seven Vulnerable and seven Near Threatened species, were recorded (Annex 1; IUCN, 2020).

4

The taxonomy of White-eyes *Zosterops* sp. is complex and currently being updated, with a recent proposal to its taxonomic revision (Lim *et al.*, 2019). As such, White-eye individuals were not identified down to species level due to the often low quality of uploaded media, and instead listed all individuals as *Zosterops* sp. Most of them are suspected to be what is currently classified as Swinhoe's White-eye (*Zosterops simplex*), of the *simplex* or *erwini* subspecies, and considered as native.

Parrots (Psittacidae) dominated in terms of species representation and volume (**Table 1**). Second was cockatoos (Cacatuidae) followed by finches (Fringillidae), both with 10 species respectively. Species from the order Psittaciformes (Psittacidae and Cacatuidae; parrots) accounted for 59% of bird species (**Table 1**).

Apart from the common domesticated species which were excluded from Eaton *et*

al. (2017), 32 new species were documented here that were not recorded in the 2016 inventory of Singapore's bird shops (Eaton *et al.*, 2017). These include the Livingston's Turaco *Tauraco livingstonii*, Chestnut-capped Thrush *Geokichla interpres*, Snowy-crowned Robin-chat *Cossypha niveicapilla*, Asian Fairy-bluebird *Irena puella*, Hyacinth's Macaw *Anodorhynchus hyacinthinus* and Red-lored Amazon *Amazona autumnalis*. An inventory of all species documented is provided in Annex 1.

TABLE 1

Breakdown of bird species recorded by family, in descending order of number of species recorded in the survey belonging to that family.

COMMON NAME	FAMILY	NUMBER OF SPECIES RECORDED	NUMBER OF INDIVIDUALS RECORDED
Parrots	Psittacidae	45	1,010
Cockatoos	Cacatuidae	10	78
Finches	Fringillidae	10	85
Flycatchers	Muscicapidae	3	291
Laughingthrushes	Leiothrichidae	3	137
Pigeons	Columbidae	3	100
Finches	Estrildidae	3	7
Toucans	Ramphastidae	2	9
Leafbirds	Chloropseidae	2	5
Starlings	Sturnidae	2	3
Turacos	Musophagidae	2	2
Bulbuls	Pycnonotidae	1	942
White-eyes	Zosteropidae	1	632
Shrikes	Laniidae	1	4
Thrushes	Turdidae	1	1
Fairy Bluebirds	Irenidae	1	1
Whydahs	Viduidae	1	1





TOP 10 SPECIES IN TRADE

The 10 most commonly-traded species by volume comprised 3,042 individuals: making up 81% of the total number of birds recorded for sale. The non-native Red-whiskered Bulbul *Pycnonotus jocosus* accounted for 28% (n = 1,292) of the total trade (Annex 1). The species is a highly popular songbird used for bird song competitions locally, and escapees and releases from the pet trade have established feral populations across Singapore. Along with the white-eyes *Zosterops sp.*, this species had the lowest sale prices

recorded (as low as SGD25/USD18.37 each), likely due to the abundant stocks in shops.

Of the 10 most commonly-traded species, the white-eyes, White-rumped Shama *Kittacincla malabarica*, Chinese Hwamei *Garrulax canorus* and Zebra Dove *Geopelia striata* (in descending order of traded quantity) are also commonly found in bird song competitions (Chiok *et al.* 2021).

VALUATION OF TRADED ANIMALS

Of the 2,276 posts documented, only 999 (43.7%) had prices explicitly stated in the description. Of the 93 species, 24 did not have any sale prices recorded and were omitted from the price valuation analysis. The valuation of the remaining 69 species (accounting for their abundance) was a minimum of SGD 820,591 (USD 602,933) cumulatively.

SOURCE OF BIRDS

Many of the finches and parrots recorded are commercially bred in aviculture, and therefore likely to be from captive sources. This is corroborated by posts where what appears to be captive-sourced hatchlings and juveniles are offered for sale, particularly for parrot species. This could be a mix of birds bred by hobbyists who then offer them for sale, those commercially bred locally in Singaporean bird farms, or those imported from commercial breeding facilities in other countries. It is legal for hobbyists to breed their birds, but they may not sell them without a license.

However, some of these birds may still have wild origins. There is a possibility that some species or individuals have been laundered through breeding facilities, where wild-sourced individuals could be declared as captive-bred. The true source of captive-declared Grey Parrots *Psittacus erithacus* (Poole and Shepherd, 2017) and Indonesian parrots and cockatoos (Furnell and Jain, 2019) has previously been called into question. They could have also been ranched—where eggs or hatchlings are taken from the wild and hand raised (Hruby, 2019).

Many birds listed in online posts did not have leg rings; a common indicator of captive sourcing. But leg rings do not necessarily indicate that the individual was bred in captivity (Martin *et al.*, 2018; Nijman *et al.*, 2018), as closed leg rings may be added to ranched or wild-sourced nestlings, or non-closed rings added to older birds. On the other hand, it is neither mandatory nor a guarantee that captive-bred birds are ringed.

In contrast, most native and songbird species recorded are believed to be sourced from the wild. Among the songbirds recorded, hobbyist breeders in Singapore have only reported success with the White-rumped Shama (Chiok *et al.* 2021). As registered commercial breeding operations for birds in Singapore primarily focuses on high-value non-native species, it is less likely that native birds were sourced from local bird farms. Wild-sourced native birds would therefore have been either illegally trapped in Singapore, smuggled or legally imported from neighbouring range countries.

CITES-LISTED SPECIES

Out of the 93 species recorded, 49 are listed in CITES Appendices – eight listed in CITES Appendix I, 41 in Appendix II and none in Appendix III (Annex 1; Annex 2). Of these, only two are native to Singapore (Annex 2). In terms of volume, 93 individuals from CITES Appendix I species featured in 61 posts (3% of number of individuals), while 567 individuals from Appendix II species featured in 397 posts (17% of number of individuals). None of the sale posts mentioned the CITES listing of the species. However, comments posted by group members revealed that they were aware of CITES and knew that CITES-listed species require documentation to be imported, yet continued to buy and sell on these groups.

Nine Appendix I and II-listed species were recorded for sale despite having no imports into Singapore for the last 10 years (Annex 2). For instance, even though 133 individuals of the Chinese Hwamei were recorded here, the last reported import record on the CITES trade database was back in 2004, where a total of 1,200 individuals were imported. Individuals offered for sale could have been bred in local breeding facilities from CITES-registered parent stock, or that the species was brought into the country undocumented. Access to breeding records is required to ascertain this.

OVERALL SINGAPORE CITES IMPORTS FROM 2009–2018

Singapore is a major global bird importer. A total of 107,827 birds from 174 CITES-listed species were reported by Singapore to be imported from 2009–2018. Imported birds are either destined for local buyers, local breeding farms, or re-export (Aloysius *et al.*, 2019). Of the 174 species, 23 were Appendix I, 149 were Appendix II (85.6%), and 2 were hybrid species (*Ara* and *Amazona* hybrids). Seven species were classified as Critically Endangered on the IUCN Red List, while 16 were Endangered and 20 were Vulnerable. Collectively, these threatened species made up 28.3% of the total quantity of birds imported into Singapore (0.5%, 26.8% and 1.0%, respectively).

The birds were imported from 40 countries, of which five collectively accounted for more than 76.3% of overall import volume during the period: Netherlands (22.8%), Congo (17.3%), South Africa (17.2%), Uruguay (12.1%) and Guyana (6.9%).

Wild-sourced birds (source code W) made up 40.4% of the imports, while those bred in captivity (source code C and F) made up 57.2% of the imports. Another 174 birds (100 from *Amazona aestiva* and 74 from *Phoenicoperus ruber*) were declared as Ranches (R).

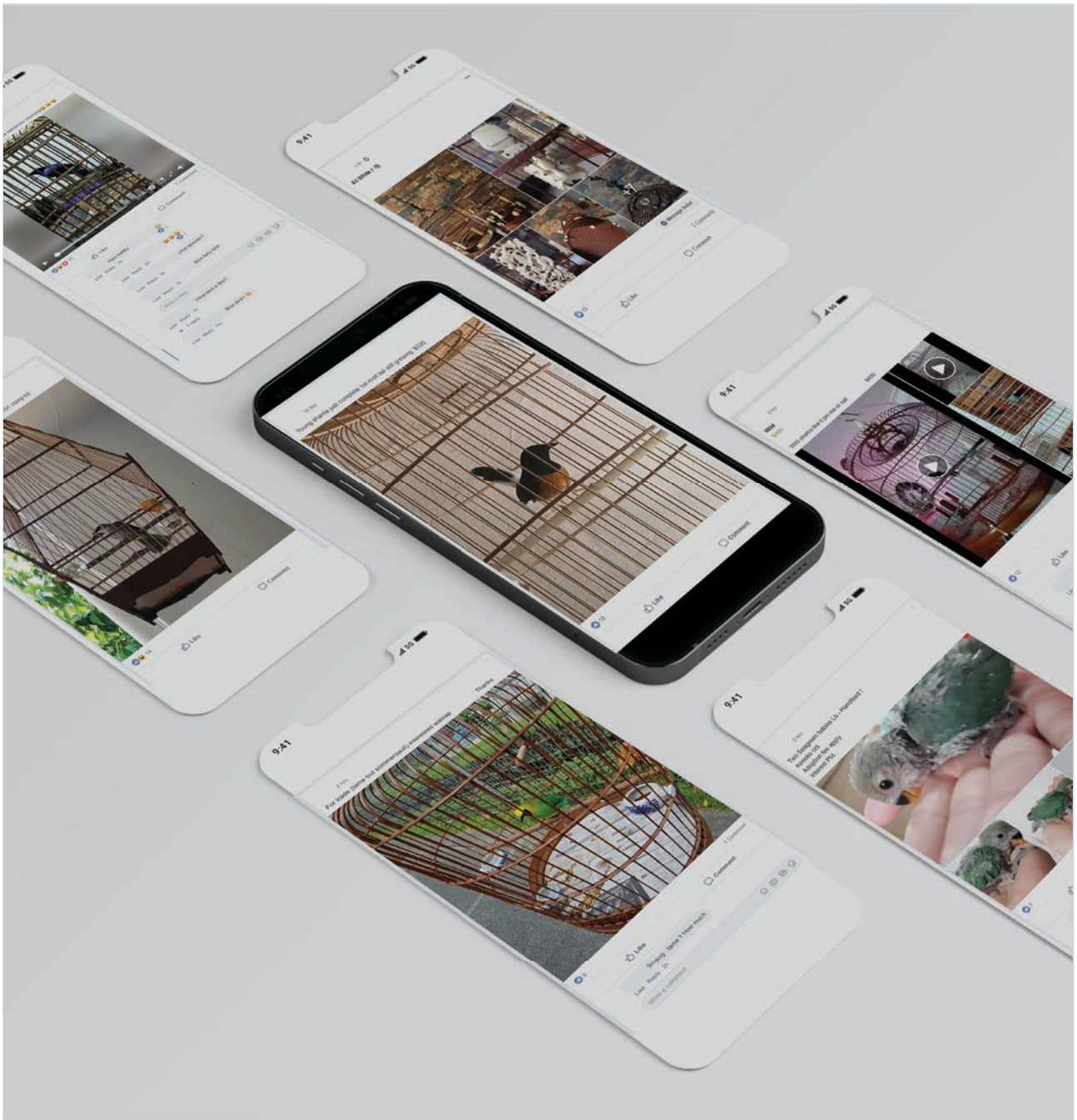
The 10 most commonly reported CITES-listed species imported into Singapore from 2009–2018, with their natural range, CITES-listing, IUCN threat category and quantity imported. Importer-reporter volumes are used here. Source: CITES Trade Database

SPECIES	NATURAL RANGE	CITES	IUCN THREAT CATEGORY	QUANTITY IMPORTED* [% OF TOTAL IMPORT VOLUME]	
<i>Psittacus erithacus</i>	Africa	I	Endangered	20,124	(18.7)
<i>Myiopsitta monachus</i>	South America	II	Least Concern	20,091	(18.6)
<i>Aratinga solstitialis</i>	South America	II	Endangered	5,895	(5.5)
<i>Agapornis fischeri</i>	Africa	II	Near Threatened	5,784	(5.4)
<i>Poicephalus gulielmi</i>	Africa	II	Least Concern	5,143	(4.8)
<i>Poicephalus senegalus</i>	Africa	II	Least Concern	3,837	(3.6)
<i>Amazona ochrocephala</i>	South America	II	Least Concern	3,376	(3.1)
<i>Pionites melanocephalus</i>	South America	II	Least Concern	2,853	(2.6)
<i>Agapornis personatus</i>	Africa	II	Least Concern	2,128	(2.0)
<i>Platycercus elegans</i>	Australia	II	Least Concern	2,084	(1.9)

*Includes birds declared as either captive-bred or wild-caught.



GROUPS SURVEYED AND NETWORK ANALYSIS



Out of the 44 groups, one group disproportionately accounted for more than 55.5% (1,263) of all posts recorded, with the second-highest group accounting for only 8.7% (198). This top group had the highest membership, reaching almost 18,000 members during the survey duration. The group was closed when Facebook implemented its policy

change in April 2019 to regulate wildlife trade (see **Discussion**). The group administrator subsequently created a new group under a different name and added members of the old group to the new one. For this study, all posts from the new group were subsumed under the original as it is for all intents and purposes the same group.

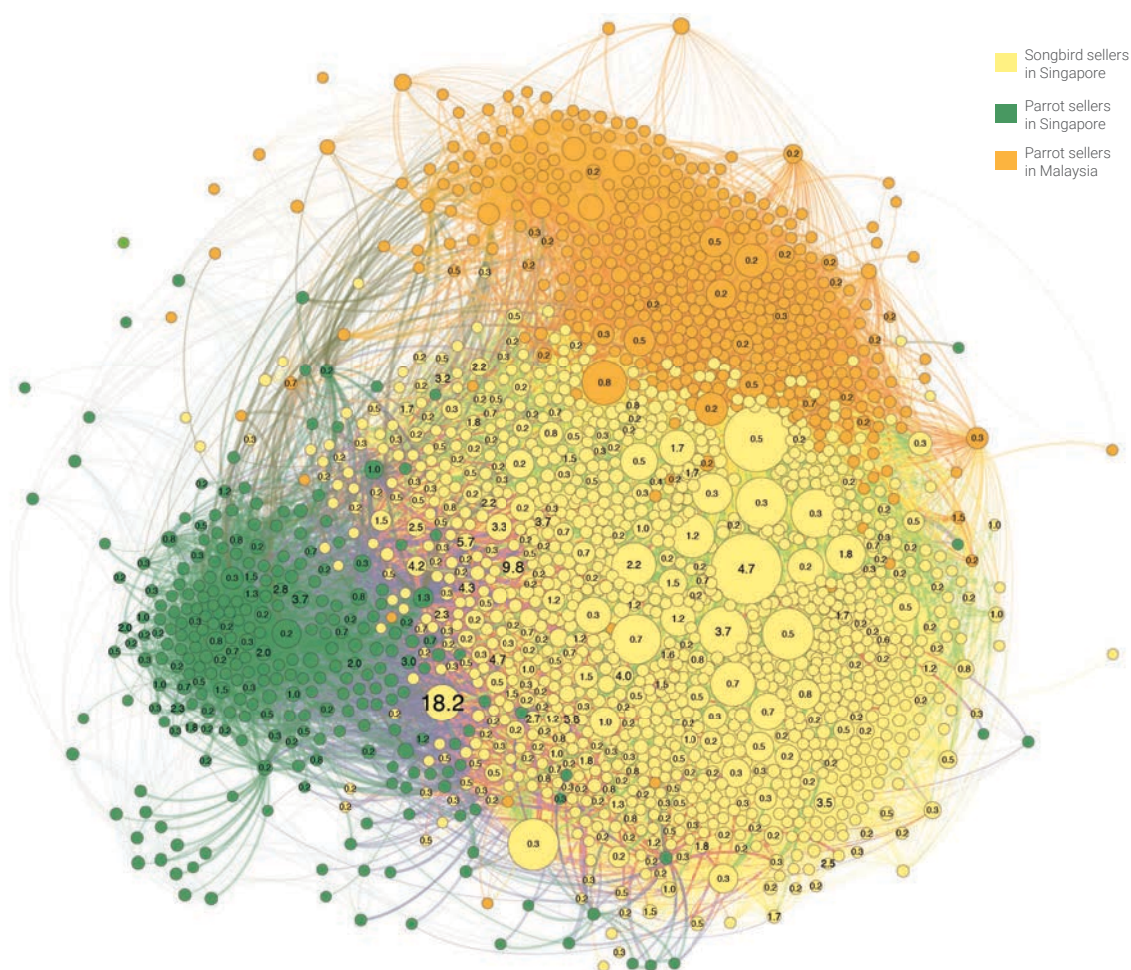
A total of 662 unique users posting wildlife for sale were recorded across the study. One prominent top user posted 4.8% (109) of the total posts. Most unique users (570, or 86% of all users) only posted five or fewer times. A vast majority of users listed their location as 'Singapore' (617 users), but there were also users who claimed to be from Indonesia (22 users), Malaysia (9), Thailand (6), Viet Nam (3) and Saudi Arabia (1).

The social network analysis identified and mapped out user accounts with at least 10 connections to the 662 user accounts recorded from the 44 Facebook groups surveyed in this study. This analysis identified 1,928 user accounts linked to each other through 28,948 connections (**Figure 2**). These form a large and densely connected community comprising other individuals who

buy and sell wildlife online, are part of the groups, or are wildlife pet hobbyists. Three central communities were identified based on the number of connections and common characteristics shared by inter-connected users, namely the type of wildlife featured in their posts and the listed location. Bird sellers in Singapore formed a relatively closed community, but there were some connections to bird traders in Malaysia who sold parrots (orange). Even within the bird seller community in Singapore, those who sold parrots (green) seemed to form a separate, smaller community from those who sold songbirds (yellow). This reflects findings from studies on the songbird and parrot keeper communities in Singapore (Chiok *et al.* 2021.; Jain *et al.*, 2021; see **Wildlife pet trade in Singapore**).

FIGURE 2

Social network analysis of the 662 users (numbered circles) and connections to known wildlife traders operating across Southeast Asia from TRAFFIC's database. The size of the numbered circles are directly proportional to the number of connections the account has within the graph, and the number represents the average monthly volume of wildlife traded by the user in this survey.



NON-SALE POSTS

Not included in the analysis but observed during the study were several posts from people seeking to buy animals or posting business details or animals without any apparent intent of sale. For instance, a photo of this Toco Toucan *Ramphastos toco* individual was posted, not offered for sale (and excluded from analysis) but recorded due to its rarity in Singapore bird shops. This species has been observed for sale in local pet bird shops (WXC pers. obs.). It is possible that such posts are just to share photos of their pets, but may also solicit interest from potential buyers even without stating the intent of sale. Interested buyers would then contact the poster directly via private messaging.

There were also 'reverse sale posts', where potential buyers requested specific species they wished to purchase. Sellers would then comment on these posts indicating their stock availability or proceed to message the interested buyer privately.

Pet shops also use online platforms to advertise their businesses, allowing them to reach out to a larger pool of potential customers who frequently use social media platforms. Some posts publicised shops and businesses, which included both local and overseas establishments. For the latter, weblinks were provided for interested buyers to contact these overseas sellers.





DISCUSSION

While this study clearly shows an active open online bird trade in Singapore, interviews with bird keepers and owners indicate a covert underground trade occurring alongside it (Chiok *et al.* 2021). The volumes and activity levels documented in this study can be considered a conservative estimate and represent an unknown proportion of the true levels of wildlife pet trade. Nonetheless, it provides some interesting insights into the online wildlife pet trade in Singapore.



White-rumped Shama *Kittacincla malabarica*



SURVEY FINDINGS

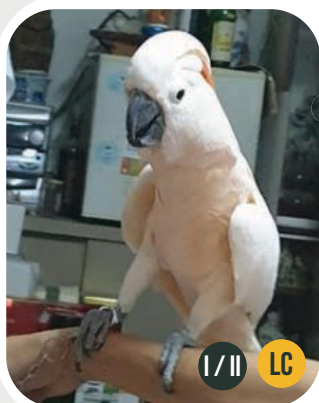
254 individuals recorded (#4)
Claimed to be bred by private individuals for sale.

POPULATION AND TRADE STATUS

Widely popular caged bird trapped relentlessly across Southeast Asia to satiate high demand (Eaton *et al.*, 2015).

15,480 individuals from 432 seizures documented in the past decade. Approximately 8,271 individuals were recorded for sale in open markets across the region (Leupen *et al.*, 2018).

Equally popular in Singapore (Chiok *et al.* 2021), but most individuals likely from peninsular SEA, with remnant native populations almost extirpated locally (Ng *et al.*, 2017)



Parrots and cockatoos endemic to Wallacea

Including: Salmon-crested Cockatoo *Cacatua moluccensis* and Yellow-crested Cockatoo *Cacatua sulphurea* (ssp. *citrinocristata*)



SURVEY FINDINGS

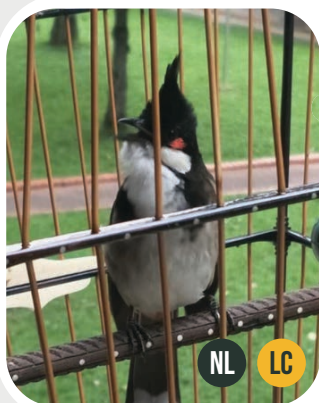
59 individuals of 12 species

POPULATION AND TRADE STATUS

Laundering suspected for many species (Furnell and Jain, 2019).

Legal imports from Indonesia not allowed due to avian influenza policies (NParks, 2019c)

Discrepancies in declared import and export numbers for Singapore (Aloysius *et al.*, 2019). Points towards a growing domestic market.



Red-whiskered Bulbul *Pycnonotus jocosus*



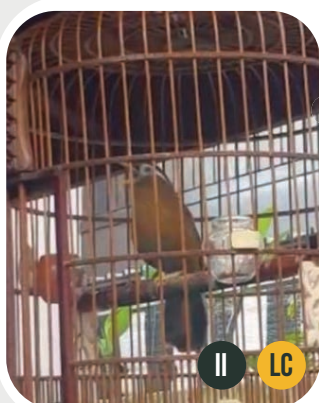
SURVEY FINDINGS

942 (#1)

POPULATION AND TRADE STATUS

Exploited heavily for songbird competitions; very rare locally in Thailand (Techachoochert and Round, 2013).

Most popular songbird species kept in Singapore (Chiok *et al.* 2021). Second highest volume documented for sale in local pet shops (Eaton *et al.*, 2017).



Chinese Hwamei *Garrulax canorus*



SURVEY FINDINGS

133 (#5)

POPULATION AND TRADE STATUS

Species was listed in CITES Appendix II since 2000, but no imports into Singapore were recorded from 2009-2018. Last recorded import in 2004.

Not known if legal commercial breeding occurs in Singapore. If not, the birds may have been illegally brought into the country.





Search



NL

LC

White-eyes

Zosterops sp. (most likely *Z. simplex simplex* or *Z. s. erwini*)



SURVEY FINDINGS

632 (#2)

POPULATION AND TRADE STATUS

White-eyes *Zosterops sp.* taxonomy was recently revised (Lim et al., 2019). Previously known as Japanese White-eye and Oriental White-eye in Singapore, the subspecies occurring in the wild here are *Z. simplex simplex* and *Z. s. erwini*; both likely to be in trade too.

Z. simplex erwini is the native subspecies but believed to have been replaced in the wild by *Z. simplex simplex* escapees, the East Asian race imported into and traded in Singapore. *Z. s. erwini* still present in trade, through imports from Malaysia (Eaton, *in litt*).



I

VU

Hyacinth Macaw

Anodorhynchus hyacinthinus



SURVEY FINDINGS

2

POPULATION AND TRADE STATUS

Wild populations plummeted since 1980s due to trapping for the pet trade. Difficult to breed in captivity; wild-sourced individuals, which are illegal to collect and trade, believed to be laundered as captive-bred (Hruby, 2019).



I

EN

Grey Parrot

Psittacus erithacus



SURVEY FINDINGS

48 (#10)

POPULATION AND TRADE STATUS

One of the most popular pet parrots traded globally. Topped Singapore's CITES import and export numbers from the period 2005–2014 (Poole and Shepherd, 2017), with online mediums further exacerbating the demand and volume trade (Martin et al., 2018).

Between 2007–2014, Singapore imported 41,737 individuals, which made up 9.2% of CITES-reported exports globally, and exported 31,529 individuals (Poole and Shepherd, 2017).

Inconsistencies in reported traded volumes were documented (Poole and Shepherd, 2017), and still persist (Aloysius et al., 2019).

LEGEND: CITES IUCN



SPECIAL MENTION: STRAW-HEADED BULBUL

Although not recorded during this survey period, the authors observed Straw-headed Bulbuls offered for sale online before and after the survey period and in physical markets (Chiok, 2019; Chiok, 2021). Singapore is the last stronghold of the globally Critically Endangered species, and birds are suspected to either be wild-caught locally or from neighbouring countries (Chng *et al.*, 2016; Chiok *et al.*, 2019; Chiok *et al.*, 2020). Moreover, the last reported CITES import of this species into Singapore was in 2000. It would be extraordinary for individuals imported in 2000 to have a lifespan of beyond two decades.

WILDLIFE PET TRADE IN SINGAPORE

The apparent preference for non-native bird species was similar to what was recorded in Singaporean bird markets in Eaton *et al.* (2017). This could be attributed to several factors including the availability of stock in pet shops and husbandry requirements. Several non-native species are common aviculture species (e.g. African and Australasian finches, Latin American and African parrots), with some of them considered to be domesticated breeds.

With songbirds and parrots dominating the study, the dynamics of bird ownership in these two communities in Singapore exert a heavy influence. Songbird ownership characteristics differ from country to country, and even within countries (Jepson and Ladle, 2009; Jepson *et al.*, 2011; Burivalova *et al.*, 2018; Krishna *et al.*, 2019; Marshall *et al.*, 2019; Miller *et al.*, 2019). This study – and other parallel studies – indicate

that communities of songbird and parrot owners in Singapore are distinct (**Figure 2**), with different drivers and motivations. The former places greater emphasis on culture and heritage (Chiok *et al.* 2021) while the latter tends towards prestige and social status (Aloysius *et al.*, 2019; Jain *et al.*).

Compared to online surveys in Malaysia, Thailand and the Philippines, where a wider variety of wildlife was offered for sale as pets (Krishnasamy and Stoner, 2016; Phassaraudomsak and Krishnasamy, 2018; Sy, 2018), the online trade in Singapore appeared to almost exclusively focus on birds. There could be several reasons why: Singapore's laws and regulations against keeping and trading non-avian species, its implementation being an effective deterrent, and greater popularity within Singapore for birds as pets compared to other wildlife species.



prestige and social status
are the motivations for
parrot owners



culture and heritage
emphasized as drivers
for songbird owners

FIGURE 3

Bowring's Supple Skinks offered for sale online.



Regardless, beyond what was recorded in this study, an underdocumented but illegal underground market for wildlife pet reptiles and mammals exists (Chin, 2011; Salim, 2018; Lam 2020a; Ng, 2020; Tan, 2020). For instance, a 23-year-old was prosecuted for illegally trading a CITES Appendix I-listed False Gharial *Tomistoma schlegelii* (Tan, 2020), requesting a SGD\$500 deposit to "...secure the delivery of the Gharial from a supplier in Johor Bahru..", indicating cross-border trade (see *Regional trade links*). The offender was also harbouring three hedgehogs in his apartment. Our findings in this report (or lack thereof) corroborate the hypothesis that non-avian wildlife trade in Singapore is covert. Only six non-avian posts offering Bowring's Supple Skink *Lygosoma bowringii* and Eurasian Hedgehog *Atelerix albiventris* were recorded in this study. The Bowring's Supple Skink is native to Singapore and therefore not permitted for capture or trade, and evidence

gathered here point towards possible domestic poaching of this species (**Figure 3**). Individuals recorded here appeared to be sold as feed for the White-rumped Shama rather than pet-keeping (WXC pers. obs.). On the other hand, the Eurasian Hedgehog is a popular wildlife pet commonly traded and kept in other countries but is illegal in Singapore. Despite this, hedgehogs are still regularly recorded in Singapore, either from abandonment (Lam, 2017) or smuggling seizures (Ang, 2019b). Further investigations revealed a thriving underground trade of non-avian and illegal species, including herpetofauna like frogs and snakes, and invertebrates like tarantulas on encrypted messaging groups (e.g. Telegram). Recent convictions of individuals owning and smuggling such illegal exotic pets from Malaysia into Singapore further proves the presence of an underground trade network (Tang, 2021).

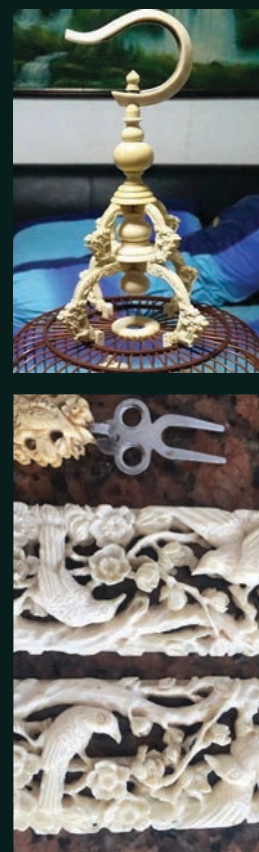
THE IVORY CONNECTION TO SINGAPORE'S CAGED BIRD TRADE

This study also documented a previously unexplored link between birdkeeping and the use of ivory cage ornaments. This is of particular interest because the government announced in August 2019 that a complete ban on ivory trade (both domestic and international) will be implemented in September 2021 (Choo and Menon, 2019). The trade of ivory has been outlawed in Singapore since September 2021. Before the ban, the sale of pre-convention specimens were legal, with past surveys recording open availability of ivory in Singapore (Webber *et al.*, 2013; Neo, 2017).

During the present study, songbird owners were recorded offering birdcages adorned with ivory ornaments such as drinking cups and ornate carvings often depicting oriental mythology. Varying degrees of ivory material, from partial (e.g. ivory hook or base) to full ivory cages have been seen displayed or even offered for sale in many of these bird trade groups (figures on the right). Sellers would

include "ivory", "elephant", "real" or an emoji of an elephant in the captions, to indicate that they are authentic ivory products.

Ivory smuggling busts have occurred in the country in the last two decades (Ng, 2018; Liu, 2019), making it possible that smuggled ivory exists within Singapore's domestic market. A small and declining ivory market appeared to persist locally before the ban came into effect (Webber *et al.*, 2013; Yeoh, 2018; WXC pers. obs.). According to CITES data reported by Singapore, at least 791 ivory pieces (e.g. carvings, tusks and piano keys) were imported into Singapore between 2009–2018, all of which were declared as hunting trophies, for commercial or personal purposes (CITES, 2019). It is worth exploring further to understand where this ivory in birdkeeping is sourced from, if any are carved locally, and if it is significant enough to continue driving demand for an underground trade now that Singapore's ivory ban is in place.

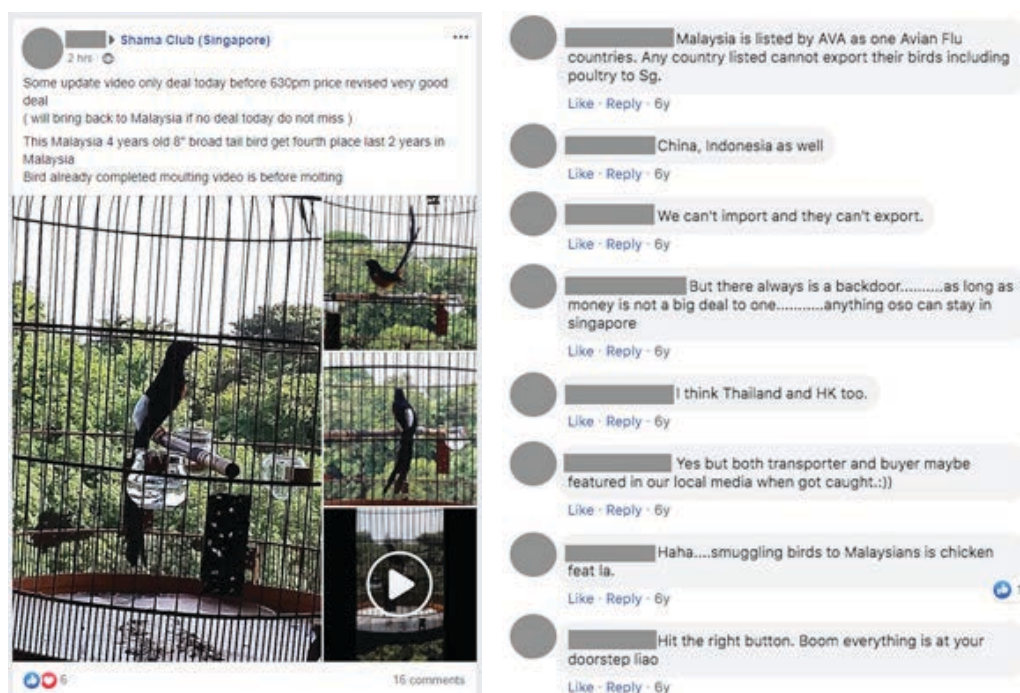


REGIONAL TRADE LINKS

This study also uncovered evidence of illicit cross-border trade in birds and other wildlife. Singapore-based users were observed in Malaysian Facebook groups to deal with wildlife traders based there. Additionally, users in groups surveyed implied their ability to bring back birds from their contacts in Thailand and China (Figure 4). These users would post about their travels to neighbouring countries (e.g. Malaysia and Thailand), taking pictures of the birds purportedly for sale and asking fellow group members in Singapore for an indication of interest to buy the birds. Pet shop owners in Thailand reportedly corroborated such occurrences (Tang, 2017).

FIGURE 4

Conversation in one of the groups discussing smuggling of birds into Singapore.



The study recorded a White-crowned Shama *Kittacincla malabarica stricklandii* (a subspecies endemic to the Malaysian state of Sabah in northern Borneo) and Bornean or Javan all black endemic races of Oriental Magpie-robins recorded for sale in our study (**Figure 5**), evidence of transboundary trade. Seizures also record the attempted smuggling of live birds and hedgehogs from Peninsular Malaysia to Singapore (Ang, 2019a; Ang, 2019b), and of White-rumped Shamans (Leupen *et al.*, 2018) and Oriental Magpie-robins (Chng *et al.*, 2021) into Singapore from Malaysia and Viet Nam.

Singapore prohibits the import of avian wildlife, be it livestock or ornamental, from any avian influenza-affected countries, namely

Malaysia, Indonesia, Thailand, Viet Nam and Myanmar in Southeast Asia (NParks, 2019c). As such, these illegal imports violate Singapore's laws. Indeed, TRAFFIC's dataset revealed bird trade links to Malaysia, Indonesia and Thailand; this is substantiated by previous (Chin, 2011; Zhang and Chin, 2011; Van Uhm, 2016; Salim, 2018) and recent accounts (Lam 2020a; Ng, 2020).

As these were *ad-hoc* observations and anecdotal information, the full scale and level of cross-border trafficking is not known. More investigations by the appropriate authorities are crucial to understanding underground trade networks smuggling routes and *modus operandi* used by traders (Phelps *et al.*, 2016).



**import
of avian
wildlife**
from avian
influenza-affected
countries is
prohibited

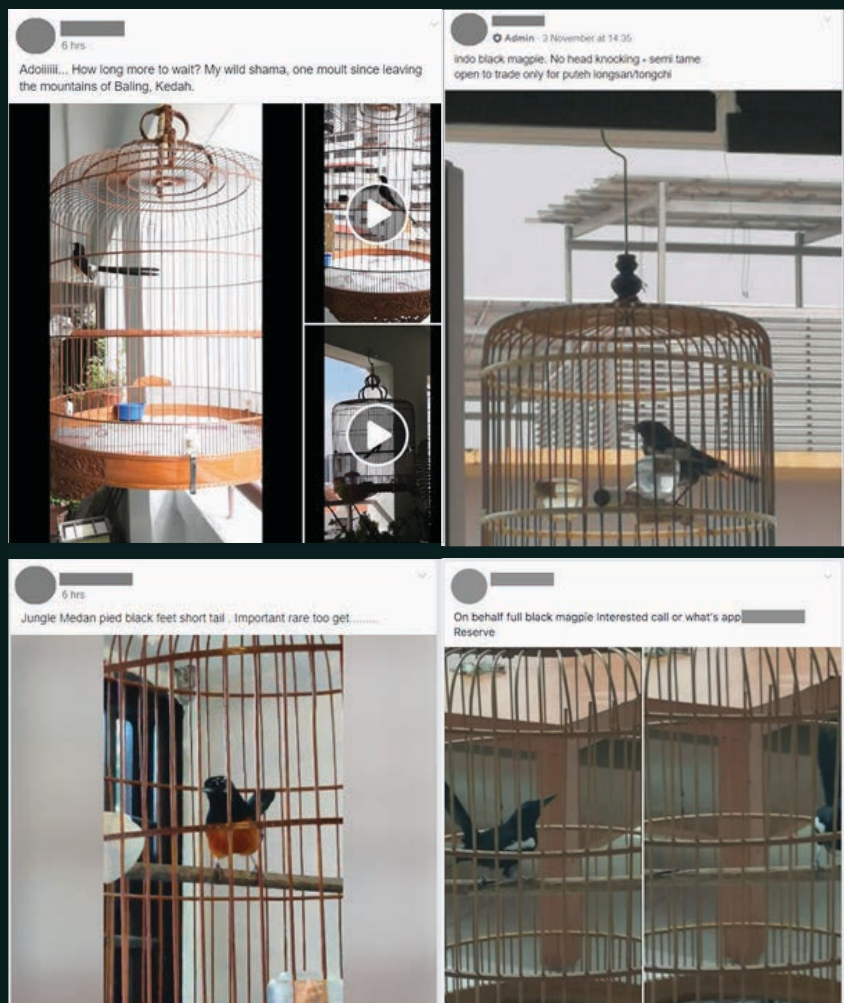
FIGURE 5A

A Bornean endemic White-crowned Shama *Copsychus malabaricus stricklandii* offered for sale.



FIGURE 5B

Screenshots of birds sourced from outside Singapore offered for sale. A possibly smuggled White-rumped Shama (top left); An Oriental Magpie-robin *Copsychus saularis amoenus*, endemic to Java and Bali (top right); A White-rumped Shama claimed to be from Medan. If so, likely to be tricolor subspecies (bottom left); Another Oriental Magpie-robin, *ssp adamsi*, pluto or *amoenus* (bottom right).



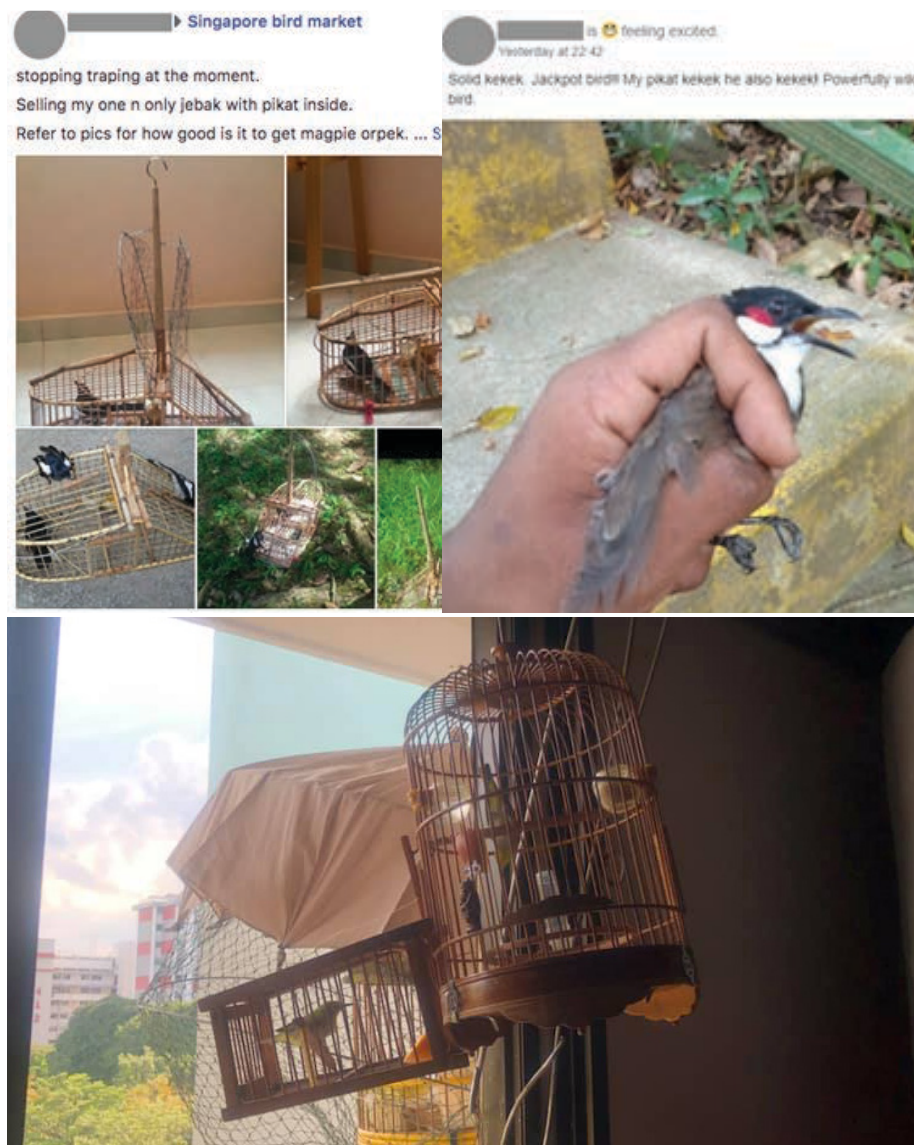
POACHING IN SINGAPORE AND ENHANCEMENT OF WILDLIFE LEGISLATIONS

The source of native species traded remains one of the big questions. Were these species imported from neighbouring range countries or bred locally (legally or illegally), or were they poached from Singapore? Crucially, evidence

was recorded within and outside the study period that some wildlife offered for sale were poached locally, even by the users themselves (Figure 6).

FIGURE 6

Poaching of the Oriental-magpie Robin *Copsychus saularis* (left). Poaching of the non-native Red-whiskered Bulbul *Pycnonotus jocosus* (right). Trap setup at one's home (bottom). 'Jebak' and 'pikat' refer to traps in Bahasa Melayu. These were recorded from the groups surveyed during the study.



Wildlife poaching still occurs in Singapore despite strict legislations (Lee, 2006; Fam et al., 2014; Lim, 2015; Quek, 2018; ACRES, 2019). However, the full extent of poaching is unknown, apart from sporadic arrests and convictions (Shepherd et al., 2013; Chng et al., 2016; Siau, 2018; Tan, 2020).

Singapore's previous laws on poaching, specifically WABA, were difficult to enforce. A heavy burden of proof was required to secure convictions from offenders, with "visual evidence of the animal(s) entering the trap" required (Tan, 2017). As a result, few cases can be acted upon, and even fewer resulted in fines meted out, with most cases served with advisories and warnings (Tan, 2017). Another issue is the under-reporting of poaching records (Quek, 2018; ACRES, 2019). To illustrate this, AVA reported 24 cases of poaching between 2012-2017 (Tan, 2017), while Quek (2018) compiled 64 poaching incidents between 2014-2018 – more within a

shorter period. Insufficient coordination across government agencies was another identified issue (Quek, 2018).

Promising steps have been undertaken in the past few years to address these inadequacies. The new WA that came into force in 2020 addresses some limitations with more precise wording and increasingly substantial penalties (Sim, 2018). The animal and wildlife-related departments in the now-dissolved AVA have merged with NParks, to facilitate smoother operations and overall efficiency. NParks acts on credible intelligence, reviews poaching hotspots and carries out enforcement at such locations (NParks, *in litt.*). Case in point: two bird trappers were charged on September 2020 for offences in 2019 (Lam, 2020b). The establishment of a national database on poaching and other related transgressions could further support improved implementation.



users
posted
about poaching
and selling
poached wildlife





FACEBOOK GROUP CLOSURES AND RESPONSES

Facebook has been working with TRAFFIC and others through a multifaceted approach to address illegal wildlife trade on their platform since 2016 and is a member of the Coalition to End Wildlife Trafficking Online. Actions by the social media platform to combat online wildlife trafficking includes taking down posts that violate their prohibited content policies and banning the trade of all live animals on their platform from non-verified physical businesses and all endangered species and their products across the platform. Facebook also provides TRAFFIC- and WWF-developed training materials to global enforcement staff on how to identify illegal wildlife products on their platform.

Towards the end of the assessment in mid-April 2019, Facebook changed their policy to ban the trade of all live animals except from verified physical businesses, as well as all products derived from CITES Appendix-I listed species. As a result, Facebook shut down

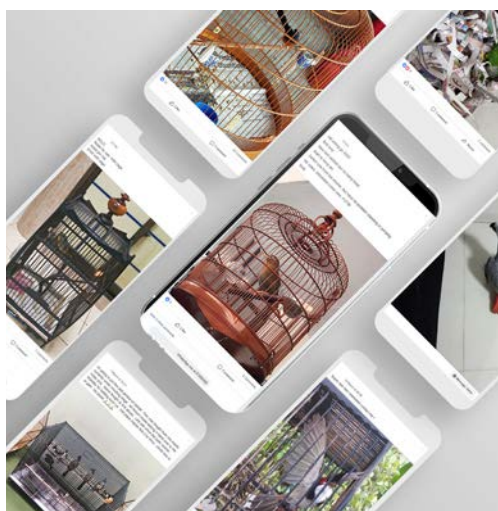
several groups in this study or issued warnings to the administrators. The subsequent displacement of trade activity to other existing groups or to newly created replacement groups was observed. A group with 18,000 members was shut down, and within a week re-formed under a different name and amassed a reduced membership of 2,800 members.

Another round of action was taken by Facebook when this study data was shared with them. Aside from removing the offending posts, this re-formed group and its administrator were disabled for violations, but a third replacement group was then formed almost immediately. The level of activity may be reduced, and casual buyers discouraged due to lowered availability. But the speed at which group administrators re-formed shows how quickly the more serious traders and hobbyists adapt to the new situation to continue their activities (Jain *et al.* 2021).



policy changed

to prevent live animal trade unless verified physical businesses



2021 UPDATE

In recent surveillance by the authors in April 2021, 36 out of 44⁵ groups initially surveyed in this study are still active, with daily posts and new members joining monthly in most groups. A total of 13 groups were shut down, and out of which five were re-formed with similar names. Most of the activity in the groups used disguised wording to avoid technically violating the policy. These observations point towards the continued usage and relevance of Facebook (and other online mediums) in the trade of live birds in Singapore.

5 Information on these groups was not shared with Facebook for removal prior to publication to allow for law enforcement activity and investigation.

Like any crime, those deliberately flouting the law will explore opportunities and chances to continue their activity in less detectable manners and groups as well as other platforms. Responding to the crackdowns, administrators in several groups changed group names (e.g. to remove mention of sales) or change the group privacy settings from “public” to “closed” or “secret” to attempt to evade detection by Facebook. Instructions and guidelines were subsequently created for group members to use codewords in their posts to circumvent the new Facebook policy for selling animals, such as removing any mention of prices and replacing “sell/sale” with “adoption with fee”. This was observed in parrot enthusiast groups (Figure 7), where sellers used the term “adoption” to offer birds for sale. Group administrators were also observed to instruct members to follow up on offers of interest and conduct transactions

privately (e.g. via Facebook Messenger, WhatsApp or Telegram). The shift of such discussions and transactions to secret and closed groups and encrypted messaging platforms creates additional challenges to monitoring wildlife trade online and gathering evidence for decisive enforcement actions against the most prolific illegal traders.

A long-term approach to truly disrupt illegal activity would require the active cooperation of social media platforms and law enforcement agencies to take tangible actions against those who persist in trading in closed and secret groups (see Recommendations). This will also require parallel work on the consumer side to reduce demand for illegal wildlife pets (Verissimo *et al.*, 2012; Challender *et al.*, 2015; Nuno *et al.*, 2018; TRAFFIC, 2019; Burgess and Broad, 2020).



recalcitrant users
shifted their behaviour to avoid detection

FIGURE 7

Screenshots of group administrators that were aware of regulatory actions being carried out by Facebook to suspend or close groups and accounts trading wildlife, and their workarounds to circumvent the ban.



IMPACTS OF NON-NATIVE SPECIES ON SINGAPOREAN BIODIVERSITY

Apart from the legal and welfare issues posed by unregulated or illicit trade of wildlife, non-native escapees and the establishment of feral populations have potential ecological repercussions (Mooney and Cleland, 2001; Bomford and Sinclair, 2002). A rising trend in recent years is 'free-flying', whereby parrot owners train their pets to fly without restraints and return to them (Woo, 2018; Aloysius *et al.*, 2019). Pets spooked by raptors or other wild birds may not return, and add to feral populations of non-native parrots in Singapore (Neo, 2012).

Established populations of exotic species are prevalent in Singapore (Turner *et al.*, 1994; Lim *et al.*, 2003; Peh, 2010; Neo, 2012; Wong, 2014), as a result of the caged bird trade (Nash,

1993). Resource and habitat competition from exotic species create imbalances in the ecosystem (Yap and Sodhi, 2004; Leung *et al.*, 2009). In extreme cases, they may even outcompete their native counterparts and result in the latter's extirpation (Morales *et al.*, 2013). In addition to unsustainable trapping, the prevalence of the non-native Javan Myna is thought to be one reason for the decline of the native Oriental Magpie-robin *Copsychus saularis* in Singapore due to resource and habitat competition (Huong and Sodhi, 1997; Yap *et al.*, 2002). The potential transmission of zoonotic (avian) diseases from escapees to local populations is another factor that needs to be considered (Karesh *et al.*, 2017).



A black and white bird, possibly a zebra finch, is perched on a wooden perch inside a traditional wooden bird cage. The cage is made of thin vertical wooden slats and has a dark wooden base. Another similar cage is visible in the background to the left. The background is a blurred outdoor setting with a blue sky and some greenery.

CONCLUSION AND RECOMMENDATIONS

This report illustrates the open extent of online wildlife, particularly bird, trade in Singapore. Although birds can be traded legally in Singapore under certain circumstances, most wildlife trade on Facebook violates the platform's policy. The unknown provenance of birds recorded in this study raises questions about legality. While a proportion of these are species commonly sourced from aviculture, there are others where unsustainable or illegal wild sourcing is a possibility. Of particular concern are native songbirds, which are likely to have been sourced from the wild – either poached locally, or imported or smuggled in from neighbouring range countries. Large-scale captive breeding of native songbirds for domestic consumption was not recorded in Singapore, nor in neighbouring countries from where their stock is said to be imported. With current legislation in Singapore limiting the sale of wildlife to mostly birds, the lack of posts offering reptiles and mammals suggests that trade in these taxa is more clandestine.

Online traders generally benefit from the guise of anonymity provided by these platforms, which allow them to operate under pseudonyms and facilitate private conversations (and subsequently transactions) between interested parties. This poses challenges to the regulation of online wildlife trade. The following recommendations are proposed to regulate the online wildlife pet trade in Singapore:

1

MONITOR WILDLIFE TRADE REGULARLY TO SUPPORT TIMELY RESPONSES TO ILLEGAL WILDLIFE TRADE ACTIVITIES

NParks and online platforms are encouraged to continue regular and continuous monitoring of wildlife in physical and digital markets to obtain pertinent real-time information, and working with information provided by NGOs to investigate illegal wildlife trade cases and take necessary enforcement actions. More collaborative efforts with researchers and conservationists would facilitate such comprehensive and up-to-date assessment of the status of wildlife trade in the country.

2

IMPROVE IDENTIFICATION AND REMOVAL OF POSTS OFFERING WILDLIFE FOR SALE

Considering the large volumes and rapid turnover of online trade, proactive measures such as automated monitoring and machine learning could greatly complement existing reactive measures to remove illegal content. Facebook is recommended to account for evasion tactics often employed by traffickers such as changing group names (e.g. to remove mention of sales), changing privacy settings from “public” to “closed” or “secret”, and using codewords to circumvent the Facebook policy for selling animals, such as removing prices, changing of the word “sell/sale” to “adoption with fee”.

3

CONTINUE COORDINATION BETWEEN NPARKS AND FACEBOOK

NParks and Facebook are encouraged to continue working closely to follow up on suspected illegal wildlife trade activities and take action against sellers who persist in engaging in criminal activity.

4

DETER PERSISTENT ONLINE ILLEGAL WILDLIFE TRADERS THROUGH EFFECTIVE ENFORCEMENT

Regulation and enforcement efforts are crucial to deter illegal online trade and Singapore has one of the best law enforcement set-ups in Southeast Asia to facilitate this. NParks is urged to investigate the most prolific online wildlife sellers who persist in engaging in criminal activity, and carry out decisive enforcement action and strong convictions against them.

5

INCREASE OWNER ACCOUNTABILITY THROUGH A COMPULSORY WILDLIFE PET REGISTRATION SYSTEM

Currently, owners of wildlife pets (particularly birds) do not require any registration or administrative records to buy and keep wildlife, as the regulatory framework focuses on the sellers. While the current regulatory framework focuses on upstream measures, there is no means to prove that owners obtained their wildlife pets from licensed pet shops; our study shows that there are still buyers acquiring wildlife illegally from unlicensed online sellers. NParks is recommended to consider implementing a system that requires owners to register wildlife pets. This would verify proof of legal purchase and record any change in ownership or disposal of the animal, and allow action to be taken against those who illegally buy wildlife. Such records can include proof of purchase from licensed pet shops and their upstream sources (importers or breeders) linked to each individual animal. This would serve to improve the tracking of legal bird trade in Singapore and ensure accountability along the whole supply chain.

6

TAG ALL CAPTIVE-BRED BIRDS TO IMPROVE TRACEABILITY

Captive-sourced birds can be legally imported and/or sold in Singapore. However, the mixing of illegally wild-sourced birds into the legal supply chain by breeding farms (either by exporters in other countries, or local facilities) remains a risk. To reduce this risk, NParks is recommended to implement traceability mechanisms including government-issued closed rings for local breeders with unique identification numbers linked to sale and ownership licenses, and the maintenance of an electronic database to track the issuance of rings and licenses.

7

CONTINUE COLLABORATING WITH NEIGHBOURING COUNTRIES TO TACKLE CROSS-BORDER TRADE

NParks, Immigration and Checkpoints Authority, and other relevant agencies can continue to leverage on their existing multilateral collaboration with counterparts in neighbouring countries to stem the flow of illegal wildlife into Singapore.

8

IMPROVE ANTI-POACHING EFFORTS TO PROTECT NATIVE WILDLIFE

NParks is urged to increase vigilance at known hotspots to prevent poaching of native wildlife for the pet trade. To improve coordination of anti-poaching efforts, the development of a national database on poaching and other related transgressions is also recommended, to further support improved coordination across agencies.

9

RAISE AWARENESS TO DISCOURAGE ILLEGAL WILDLIFE PET SELLERS

Only licensed pet shops, farms or importers may sell wildlife pets, but sellers may not be aware what constitutes a punishable offence, even though it is clearly stated on the NParks website⁶. NParks may consider raising awareness to discourage illegal activity make potential unlicensed sellers think twice before advertising wildlife pets for sale. Media, online platforms and NGOs can be enlisted to spread this message widely.

10

MONITOR SONGBIRD KEEPING COMMUNITY FOR IVORY TRADE

As ivory ornaments are used in songbird keeping, it is worth exploring further to understand where this ivory is sourced from and if it is significant enough to continue driving demand for an underground trade once the national ivory ban comes into place. NParks, online platforms and civil society are urged to keep an eye out for potential underground trade in this area once the ivory ban comes into place.

11

REDUCE DEMAND FOR ILLEGAL WILDLIFE PET TRADE

Building on recent consumer research to understand the profile and motivations of songbird and parrot keeping communities in Singapore, behaviour change messaging could be developed to shift these buyers away from illegally sourced and traded wild pets. This could be run by government agencies and/or local NGOs, targeting specific groups of buyers through appropriate trusted messengers.

12

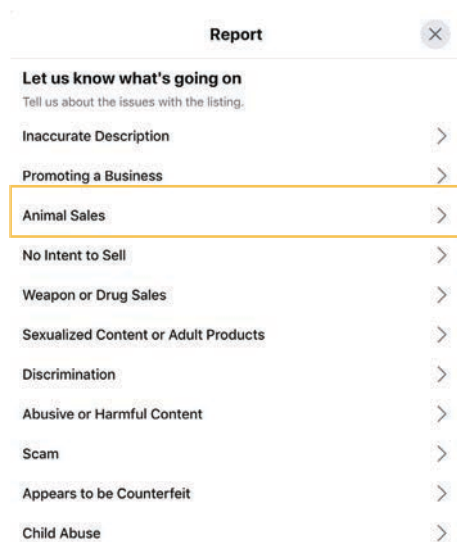
REPORT SUSPECTED WILDLIFE TRADE OR POACHING INCIDENTS

Members of the public are encouraged to report suspected wildlife trade or poaching incidents. This can be done through the following avenues:

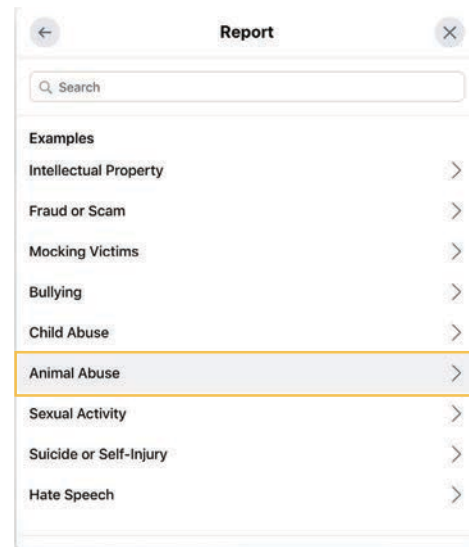
1. NParks' Animal Response Centre Hotline (1800-476 1600) or
ACRES Animal Crime Investigation Unit's 24-hour Hotline
(+65 9783 7782; acrescrime@gmail.com)

2. A direct report to Facebook of posts, messages, groups and other elements which may constitute a violation of legislation through wildlife-specific reporting workflows on the platform itself. The following screenshots show how users can flag such content:

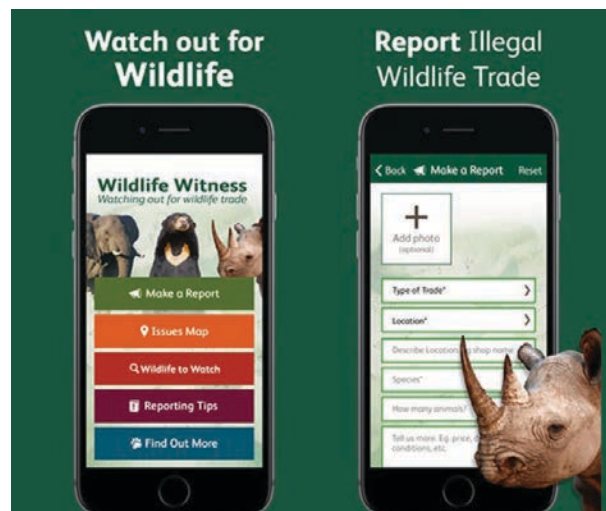
FOR MARKETPLACE



FOR ORGANIC CONTENT, MEDIA, GROUPS AND EVENTS



3. A report through TRAFFIC, via the Wildlife Witness App that can be downloaded for iPhone or Android.



FOR IPHONE



FOR ANDROID



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IMAGE CREDITS

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*	All screenshots are taken from Facebook	

ANNEX

ANNEX 1

Inventory of all species recorded during the 5-month trade survey in descending order of total quantity recorded. Avian species previously not recorded by Eaton et al. (2017) are bolded. Domesticated species (those that undisputedly captive-bred for the pet trade) are marked = *. The suspected source is based on post text, and existing knowledge of commercial captive breeding in the species.

TAXON		NATIVE	CITES	IUCN RL	QTY	PRICE RANGE
AVES						
CACATUIDAE						
Cockatiel	<i>Nymphicus hollandicus*</i>	N	NL	LC	38	120-150
Sulphur-crested Cockatoo	<i>Cacatua galerita</i>	N	II	LC	20	170-1400
White Cockatoo	<i>Cacatua alba</i>	N	II	EN	8	1000-1100
Salmon-crested Cockatoo	<i>Cacatua moluccensis</i>	N	I	VU	3	1100
Major Mitchell's Cockatoo	<i>Cacatua leadbeateri</i>	N	II	LC	3	8000
Little Corella	<i>Cacatua sanguinea</i>	N	II	LC	2	600-1100
Tanimbar Corella	<i>Cacatua goffiniana</i>	N	I	NT	1	1100
Blue-eyed Cockatoo	<i>Cacatua ophthalmica</i>	N	II	VU	1	3500
Citron-crested Cockatoo ⁷	<i>Cacatua (sulphurea) citrinocristata</i>	N	I	CR	1	-
Galah	<i>Eolophus roseicapillus</i>	N	II	LC	1	1100
CHLOROPSEIDAE						
Golden-fronted Leafbird	<i>Chloropsis aurifrons</i>	N	NL	LC	4	300
Greater Green Leafbird	<i>Chloropsis sonnerati</i>	Y	NL	EN	1	300
COLUMBIDAE						
Zebra Dove	<i>Geopelia striata</i>	Y	NL	LC	66	80-450
Spotted Dove	<i>Spilopelia chinensis</i>	Y	NL	LC	33	40-500
Barbary Dove	<i>Streptopelia risoria*</i>	N	NL	LC	1	30
ESTRILDIDAE						
Zebra Finch	<i>Taeniopygia guttata*</i>	N	NL	LC	4	200
White-rumped Munia	<i>Lonchura striata</i>	Y	NL	LC	2	-
Magpie Mannikin	<i>Spermestes fringilloides</i>	N	NL	LC	1	-
FRINGILLIDAE						
Domestic Canary	<i>Serinus canaria*</i>	N	NL	LC	38	100-400
Yellow-fronted Canary	<i>Serinus mozambicus*</i>	N	NL	LC	14	100-300
European Greenfinch	<i>Chloris chloris</i>	N	NL	LC	8	60-250
Black-throated Canary	<i>Crithagra atrogularis</i>	N	NL	LC	8	100-500
White-rumped Seedeater	<i>Serinus leucopygia</i>	N	NL	LC	8	60-500
Hooded Siskin	<i>Spinus magellanicus</i>	N	NL	LC	4	200
Common Linnet	<i>Linaria cannabina</i>	N	N	LC	2	200
Rosefinch sp.	<i>Carpodacus sp.</i>	N	NL	LC	1	200
House Finch	<i>Haemorhous mexicanus</i>	N	NL	LC	1	-
Lemon-breasted Canary	<i>Cithagra citrinipectus</i>	N	NL	LC	1	100
IRENIDAE						
Asian Fairy-bluebird	<i>Irena puella</i>	Y	NL	LC	1	400
LANIIDAE						
Long-tailed Shrike	<i>Lanius schach</i>	Y	NL	LC	4	88

⁷ While not currently recognised as a full species, it is expected to be split in the upcoming BirdLife update <https://globally-threatened-bird-forums.birdlife.org/citron-crested-cockatoo-cacatua-citrinocristata-revise-global-status/>

TAXON		NATIVE	CITES	IUCN RL	QTY	PRICE RANGE
LEIOTHRICHIDAE						
Chinese Hwamei	<i>Garrulax canorus</i>	N	II	LC	133	250-1800
Red-billed Leiothrix	<i>Leiothrix lutea</i>	N	II	LC	3	70-100
White-crested Laughingthrush	<i>Garrulax leucolophus</i>	N	NL	LC	1	-
MUSICAPIDAE						
White-rumped Shama	<i>Kittacincla malabarica</i>	Y	NL	LC	254	100-1500
Oriental Magpie-robin	<i>Copsychus saularis</i>	Y	NL	LC	36	80-550
Snowy-crowned Robin-chat	<i>Cossypha niveicapilla</i>	N	NL	LC	1	-
MUSOPHAGIDAE						
Violet Turaco	<i>Musophaga violacea</i>	N	NL	LC	1	-
Livingstone's Turaco	<i>Tauraco livingstonii</i>	N	II	LC	1	-
PSITTACIDAE						
Lovebird sp.	<i>Agapornis sp. *</i>	N	NL	LC	373	50-225
Budgerigar	<i>Melopsittacus undulatus*</i>	N	NL	LC	103	40-220
Blue-and-yellow Macaw	<i>Ara ararauna</i>	N	II	LC	71	800-1780
Green-cheeked Parakeet	<i>Pyrrhura molinae</i>	N	II	LC	71	100-450
Grey Parrot	<i>Psittacus erithacus†</i>	N	I	EN	48	800-1400
Rosy-faced Lovebird	<i>Agapornis roseicollis*</i>	N	NL	LC	35	70-200
Sun Parakeet	<i>Aratinga solstitialis</i>	N	II	EN	34	200-475
Monk Parakeet	<i>Myiopsitta monachus</i>	N	NL	LC	34	150-1100
Yellow-collared Lovebird	<i>Agapornis personatus*</i>	N	NL	LC	32	120-160
Rose-ringed Parakeet	<i>Psittacula krameri</i>	N	NL	LC	24	100-200
Red-and-green Macaw	<i>Ara chloropterus</i>	N	II	LC	22	800-3500
Scarlet Macaw	<i>Ara macao</i>	N	I	LC	19	1080
Hyacinth's Macaw	<i>Anodorhynchus hyacinthinus</i>	N	I	VU	17	-
Fischer's Lovebird	<i>Agapornis fischeri*</i>	N	NL	NT	16	70 -120
Moluccan Eclectus	<i>Eclectus roratus</i>	N	II	LC	10	1300-1500
Green-thighed Parrot	<i>Pionites leucogaster</i>	N	II	EN	9	1250-1300
Dusky-headed Parakeet	<i>Aratinga weddellii</i>	N	II	LC	8	66-380
Red-shouldered Macaw	<i>Diopsittaca nobilis</i>	N	II	LC	8	-
Pacific Parrotlet	<i>Forpus coelestis</i>	N	II	LC	8	50
Coconut Lorikeet	<i>Trichoglossus haematodus</i>	N	II	LC	8	350-430
Senegal Parrot	<i>Poicephalus senegalus</i>	N	II	LC	7	500-650
Orange-winged Amazon	<i>Amazona amazonica</i>	N	II	LC	5	-
Black-headed Parrot	<i>Pionites melanocephalus</i>	N	II	LC	5	850-1200
Red-fronted Parrot	<i>Poicephalus gulielmi</i>	N	II	LC	5	600
Yellow-crowned Amazon	<i>Amazona ochrocephala</i>	N	II	LC	4	950-1580
Red-breasted Parakeet	<i>Psittacula alexandri</i>	N	II	NT	4	100-200
Orange-fronted Parakeet	<i>Eupsittula canicularis</i>	N	II	LC	3	200-500
Turquoise-fronted Amazon	<i>Amazona aestiva</i>	N	II	LC	2	950
Yellow-naped Amazon	<i>Amazona auropalliata</i>	N	I	EN	2	950
Yellow-headed Amazon	<i>Amazona oratrix</i>	N	I	EN	2	-
Chestnut-fronted Macaw	<i>Ara severus</i>	N	II	LC	2	800-1300
Blue-crowned Hanging Parrot	<i>Loriculus galgulus</i>	Y	II	LC	2	-
Chattering Lory	<i>Lorius garrulus</i>	N	II	VU	2	-
Eastern Rosella	<i>Platycercus eximius</i>	N	NL	LC	2	-
Crimson-bellied Parakeet	<i>Pyrrhura perlata</i>	N	II	VU	2	400
Rainbow Lorikeet	<i>Trichoglossus moluccanus</i>	N	II	LC	2	350-600

	TAXON	NATIVE	CITES	IUCN RL	QTY	PRICE RANGE
Yellow-faced Amazon	<i>Alipiopsitta xanthops</i>	N	II	NT	1	1500
Red-lored Amazon	<i>Amazona autumnalis</i>	N	II	LC	1	1200
Southern Mealy Amazon	<i>Amazona farinosa</i>	N	II	NT	1	-
-	<i>Ara hybrid*</i>	N	NL	NA	1	1780
-	<i>Aratinga hybrid*</i>	N	NL	NA	1	-
Barred Parakeet	<i>Bolborhynchus lineola</i>	N	II	LC	1	150
Red-fan Parrot	<i>Derophtus accipitrinus</i>	N	II	LC	1	1100
Black-capped Lory	<i>Lorius lory</i>	N	II	LC	1	-
Black-capped Parakeet	<i>Pyrrhura rupicola</i>	N	II	NT	1	350
PYCNONOTIDAE						
Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>	N	NL	LC	942	25-1800
RAMPHASTIDAE						
Black-necked Aracari	<i>Pteroglossus aracari</i>	N	II	LC	7	-
Ivory-billed Aracari	<i>Pteroglossus azara</i>	N	NL	LC	2	-
STURNIDAE						
Javan Myna	<i>Acridotheres javanicus</i>	N	NL	VU	2	1800
Common Hill Myna	<i>Gracula religiosa</i>	Y	II	LC	1	200
TURDIDAE						
Chestnut-capped Thrush	<i>Geokichla interpres</i>	N	NL	EN	1	-
VIDUIDAE						
Village Indigobird	<i>Vidua chalybeata</i>	N	NL	LC	1	-
ZOSTEROPIDAE						
White-eye sp.	<i>Zosterops sp.</i>	Y	NL	LC	632	25-1000
NON-AVES						
MAMMAL						
Eurasian Hedgehog	<i>Atelerix albiventris*</i>	N	NL	LC	1	-
REPTILE						
Bowring's Supple Skink	<i>Lygosoma bowringii</i>	Y	NL	NA	45	-
TOTAL						3,354

LEGEND:

†	This species was uplisted from CITES Appendix II to Appendix I on 2017. Here, the latest Appendix listing of the species is used.
N	No
Y	Yes
NL	Not Listed
LC	Least Concern
NT	Near Threatened
VU	Vulnerable
EN	Endangered
CR	Critically Endangered
NA	Not Assessed

ANNEX 2

CITES-listed species recorded in this study, along with importer-reported CITES import data (2009-2018 and 1975-2018). Highlighted species are those where imported records are lower than recorded individuals.

SPECIES	CITES	INDIVIDUALS RECORDED IN THIS STUDY	IMPORTER-REPORTED QUANTITY CITES (2009-2018)	IMPORTER-REPORTED QUANTITY CITES (1975-2018)
<i>Psittacus erithacus</i>	I	48	1	61,637
<i>Ara macao</i>	I	19	4	52
<i>Anodorhynchus hyacinthinus</i>	I	17	7	26
<i>Cacatua moluccensis</i>	I	3	0	332
<i>Amazona auropalliata</i>	I	2	0	456
<i>Amazona oratrix</i>	I	2	0	158
<i>Cacatua goffiniana</i>	I	1	0	579
<i>Cacatua sulphurea citrinocristata</i>	I	1	1	(C. sulphurea) 3,006
<i>Alipiopsitta xanthops</i>	II	1	0	17
<i>Amazona aestiva</i>	II	2	534	6,284
<i>Amazona amazonica</i>	II	5	1,058	3,658
<i>Amazona autumnalis</i>	II	1	134	744
<i>Amazona farinosa</i>	II	1	409	1,220
<i>Amazona ochrocephala</i>	II	4	3,376	7,302
<i>Ara ararauna</i>	II	71	1,583	3,842
<i>Ara chloropterus</i>	II	22	1,450	3,714
<i>Ara severus</i>	II	2	434	710
<i>Aratinga solstitialis</i>	II	34	5,895	12,242
<i>Aratinga weddellii</i>	II	8	21	831
<i>Bolborhynchus lineola</i>	II	1	550	5,065
<i>Cacatua alba</i>	II	8	18	2,154
<i>Cacatua galerita</i>	II	20	19	620
<i>Cacatua leadbeateri</i>	II	3	47	124
<i>Cacatua ophthalmica</i>	II	1	2	86
<i>Cacatua sanguinea</i>	II	2	2	105
<i>Derophtus accipitrinus</i>	II	1	302	829
<i>Diopsittaca nobilis</i>	II	8	1,353	3,341
<i>Eclectus roratus</i>	II	10	794	8,961
<i>Eolophus roseicapillus</i>	II	1	505	1,096
<i>Eupsittula canicularis</i>	II	3	0	200
<i>Forpus coelestis</i>	II	8	1,624	6,942
<i>Garrulax canorus</i>	II	133	0	1,650
<i>Gracula religiosa*</i>	II	1	240	40,871
<i>Leiothrix lutea</i>	II	3	0	14,050
<i>Loriculus galgulus*</i>	II	2	0	16,626
<i>Lorius garrulus</i>	II	2	122	3,308
<i>Lorius lory</i>	II	1	34	508
<i>Pionites leucogaster</i>	II	9	1,712	2,088
<i>Pionites melanocephalus</i>	II	5	2,853	5,639
<i>Poicephalus gulielmi</i>	II	5	5,143	9,262
<i>Poicephalus senegalus</i>	II	7	3,837	15,790
<i>Psittacula alexandri</i>	II	4	1	29,874
<i>Pteroglossus aracari</i>	II	7	64	134
<i>Pyrrhura molinae</i>	II	71	1,438	2,833
<i>Pyrrhura perlata</i>	II	2	130	480
<i>Pyrrhura rupicola</i>	II	1	22	240
<i>Tauraco livingstonii</i>	II	1	22	380
<i>Trichoglossus haematodus</i>	II	8	40	8,721
<i>Trichoglossus moluccanus†</i>	II	2	0	0

LEGEND:

- * These species are native to Singapore and fully protected from trapping under WA and PTA.
- † Sometimes treated as a subspecies under the *T. haematodus* complex. Treated as a separate species in this study, hence no imports recorded.



DECEMBER 2021

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