

Socioeconomic Characteristics of Songbird Shop Owners in West Kalimantan, Indonesia

Authors: Miller, Adam E., Gary, Demi, ansyah, Juhardi, Sagita, Novia, ., Muflihati, et al.

Source: Tropical Conservation Science, 12(1)

Published By: SAGE Publishing

URL: <https://doi.org/10.1177/1940082919889510>

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

Socioeconomic Characteristics of Songbird Shop Owners in West Kalimantan, Indonesia

Tropical Conservation Science
Volume 12: 1–9
© The Author(s) 2019
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/1940082919889510
journals.sagepub.com/home/trc



Adam E. Miller^{1,2} , Demi Gary^{1,2}, Juhardiansyah², Novia Sagita², Muflihati³, Kartikawati³, and Sadtata N. Adirahmanta⁴

Abstract

The songbird trade in Indonesia is a major driver of avian species loss. Songbird traders represent the link between trappers and consumers for this lucrative industry, though details on the dynamics of this relationship remain understudied. To understand why songbird shop owners entered the trade, if businesses were lucrative, and assess owner receptiveness to adopting alternative businesses, we investigated socioeconomic characteristics of 95 songbird shop owners via an interview-style survey across 13 regencies in West Kalimantan. Responses from shop owners showed a widespread lack of legal permitting for businesses and the sale of bird species. Indeed, the majority of respondents (63%) did not have the mandatory business permits, which suggests that nonwildlife regulatory laws could be leveraged to reduce the volume of the illegal songbird trade in West Kalimantan. Nearly half of all respondents (40%) noted that bird trading was not their sole income source, nor was it particularly lucrative. More than half (55%) of all bird traders interviewed expressed interest in switching to alternative businesses if given the resources and opportunity to do so. This study offers novel insights into motives of engaging in songbird trade in West Kalimantan. This study also supports the possibility of addressing the songbird trade via a combination of law enforcement and alternative business programs.

Keywords

songbirds, Indonesia, wildlife trade

Introduction

The illegal wildlife trade is major threat to biodiversity around the globe and a multimillion dollar a year industry (Nijman, 2010; Robinson & Bodmer, 1999; Wilson-Wilde, 2010). Dead plants and animals are traded for medicine, trophies, and as ornaments, as well as alive for pets and items among collectors (Oldfield, 2003; Souto et al., 2017). Indonesia represents one of the major leaders in illegal trade and harvest across a wide range of species (Nijman, Shepherd, Mumpuni, & Sanders, 2012; Shepherd, 2006). Among species traded, the Indonesian songbird trade stands out with hundreds of species and thousands of individuals sold across the nation in open markets, shops, and online (Eaton et al., 2015; Harris et al., 2015, 2017; Shepherd, Sukumaran, & Wich, 2004). One study (Chng, Eaton, Krishnasamy, Shepherd, & Nijman, 2015) revealed over 19,000 birds from 206 species for sale over just a 3-day survey in Jakarta's three most prominent wildlife markets.

In a similar survey conducted in markets in central and eastern Java, over 22,000 individual birds were found in just five markets (Chng & Eaton, 2016), underscoring the massive scale of the trade. Recent work has shown that outside the island of Java, the songbird trade is also rampant, with over 25,000 individuals from 151 species recorded across markets in Kalimantan, Indonesian Borneo (Rentschlar et al., 2018).

Songbird keeping in Indonesia is deeply rooted in masculine Javanese culture but has also become a

¹Yayasan Planet Indonesia, Pontianak, Indonesia

²Planet Indonesia, Saint Louis, MO, USA

³Fakultas Kehutanan, Universitas Tanjungpura, Pontianak, Indonesia

⁴Balai Konservasi Sumber Daya Alam, Pontianak, Indonesia

Received 5 August 2019; Accepted 24 October 2019

Corresponding Author:

Adam E. Miller, Planet Indonesia, 241 Selma, St. Louis, MO 63119, USA.
Email: adam.miller@planetindonesia.org



Creative Commons Non Commercial CC BY-NC: This article is distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 License (<http://www.creativecommons.org/licenses/by-nc/4.0/>) which permits non-commercial use, reproduction and distribution of the work without further permission provided the original work is attributed as specified on the SAGE and Open Access pages (<https://us.sagepub.com/en-us/nam/open-access-at-sage>).

popular pastime and hobby linked to sophistication and wealth among Indonesians of all ethnic backgrounds (Jepson & Ladle, 2005; Jepson, Ladle, & Sujatnika, 2011). Jepson and Ladle (2005) surveyed Indonesia's five largest cities and found that nearly a quarter (~22%) of all households owned at least one bird. It was also estimated that in an average year as many as 614,180 native songbirds are trapped and traded nationally throughout Java and Sumatra (Jepson & Ladle, 2005). Trade and habitat loss are widely recognized as having the greatest impact on Indonesia's avian species (Collar, Crosby, & Stattersfield, 1994; Collar & Juniper, 1992; Wright et al., 2001) yet understanding how these impacts interact with socioeconomic and market drivers is limited. Market data provide an important snapshot into the severity of the trade, as price and volume of birds sold can be used as indicators of wild species population status (Harris et al., 2015). However, the lack of information on the socioeconomic and cultural dynamics of the trade present a major barrier to targeting demand reduction campaigns or social marketing strategies (Burivalova et al., 2017). What limited socioeconomic data are available tends to focus on consumer choice (Jepson & Ladle, 2005) and the possibilities of substituting captive bred birds for wild-caught birds (Burivalova et al., 2017) as a viable solution to the trade.

Outside of consumer-based research, we argue that one of the most understudied aspects of the songbird trade is among the bird shop owners and traders that represent the link between trappers and consumers. Yayasan Planet Indonesia (YPI) is a nonprofit grassroots conservation organization based in West Kalimantan, Indonesia, that developed a survey to explore interest in and potential efficacy of a targeted alternative business program backed by the Indonesian government and Department of Natural Resources (Balai Konservasi Sumber Daya Alam West Kalimantan) that would provide start-up capital and training to allow bird shop owners a chance to change businesses. This program is backed by the government such that if those involved in the program who are found selling birds again, of any kind, protected or not, will be immediately processed with law enforcement. The lack of socioeconomic information was impeding the design and implementation of the desired program and, therefore, this study was designed to fill that gap. Therefore, this study aimed to provide basic insights into the socioeconomic dimensions of the songbird trade at the market and shop level. These insights on socioeconomic characteristics of songbird shop owners were intended to inform programs to provide alternative businesses and venture capital to decrease the number of bird markets in West Kalimantan, Indonesia. Interviewing bird shop owners identified via previous surveys, the current socioeconomic survey focused on understanding why shop

owners entered the trade, if their business was lucrative, if they are open to the idea of changing livelihoods, and other socioeconomic factors.

Methods

Data Collection

YPI with the Department of Natural Resources (Balai Konservasi Sumber Daya Alam-Kalimantan Barat) conducted interviews with 95 bird shop owners previously identified through market surveys conducted between 2015 and 2018. Surveys were conducted at bird shops across 14 districts of West Kalimantan, Indonesia, in Pontianak City, Kubu Raya Regency, Landak Regency, Sanggau Regency, Sintang Regency, Melawi Regency, Kapuas Hulu Regency, Mempawah Regency, Singkawang City, Sambas Regency, Bengkayang Regency, Ketapang Regency, and North Kayong Regency from July to September 2018. Data collection was conducted by seven local YPI employees using a semistructured interview with bird shop owners.

Survey

Surveys were conducted in teams of three with one individual recording responses, one conducting the interview, and one documenting the process. All survey respondents were told upon the start of the survey the objective of the survey and that the results would be used for both nonprofit and government purposes to better inform the design of a potentially beneficial program. Verbal consent was required before the start of the survey and was recorded with an audio recorder. All names of respondents were kept confidential.

Socioeconomic characteristics of bird traders such as income, gender, ethnicity, age, education, and employment were recorded. Participants in the bird trade were asked questions about their personal backgrounds, length of involvement in the bird trade, whether or not they would consider changing business professions, and so on. Our survey team also asked bird shop owners about licensing, number of shop customers and workers, and income. All surveys were recorded to note any additional details or responses. The full translated survey questionnaire can be found in Online Appendix 1.

Data Analysis

Data from recorded interviews were simplified, and responses were classified by each question or socioeconomic indicator asked of the respondents. All interviews were recorded and used to review at a later time if marked responses were unclear. Data were analyzed and figures were produced using R studio. We used linear regression models to test for relationships between

the length of involvement in the songbird trade and age of respondents as well as income and the length of involvement in the trade. We used an analysis of variance in cases where predictor variables were categorical such as permit type, whether selling birds was the individuals main source of income (yes/no), or willingness to change businesses (yes/no) and response variable was continuous. Results have been summarized in the form of tables, figures, and descriptions with a number and percentage of responses from those surveyed (see survey Online Appendix 1). In addition, descriptive responses were coded with a predefined scale (e.g., *yes*—1 or *no*—0) that allowed us to categorize attitudes or motivations. The survey was simple, and pieces included in this manuscript did not require coding of long responses based upon attitudes or motivations and in all descriptive cases responses were coded with binary responses (yes/no).

Results

Shop Owner Demographics and Bird Trade Involvement

A total of 95 bird shop owners were interviewed with 83% male and 17% female shop owners. Seven major ethnic groups were identified among shop owners: Chinese, Javanese, Malay, Madurese, Bugis, Dayak, Padang, and Unknown. Nearly half of respondents were Chinese and about a quarter of the respondents were Javanese (Table 1).

Respondents were grouped into five education level categories: elementary school, middle school, high school, higher education, and not finished. Of the 95 respondents, nearly half had completed high school. Only 5% of respondents had completed any college (higher education) (Table 2).

There was a weak but statistically significant ($df=89$, $r^2=.535$, $p=.015$) linear relationship between shop owner age and length of involvement in the trade (Figure 1). Age varied among bird shop owners; the majority of respondents were aged between 31 and

50 years. Respondents' length of involvement in the bird trade also varied greatly (range: 1–20 years, Figure 1). Over a third of respondents (35%) had been involved for 2 years or less, a third (33%) had been involved for 3 to 5 years, and a quarter (25%) had been involved for 6 to 20 years (Figure 2). Only 2% of shop owners had been involved for more than 20 years and 5% did not respond (Figure 3 and 4).

Shop owners were also asked if they traded other types of animals; 60% of respondents said that they sold other animals and 35% indicated that they only sold birds. Five percent did not respond. When asked their reason for initially engaging in the bird trade, 59% of respondents said that they first opened a bird shop as a hobby, whereas 24% said that they were involved purely for business prospects. Twelve percent said that it was a combination of both, and 5% did not respond.

Table 2. Breakdown of Education Level for Songbird Traders Interviewed.

Education level	No. of respondents	Percentage of respondents
Elementary	15	16
Middle school	23	25
High school	42	44
Higher education	5	5
Not finished	6	6
Unknown	4	4
Total	95	100

Table 1. Breakdown of Ethnicity for Songbird Traders Interviewed.

Ethnicity	No. of respondents	Percentage of respondents
Bugis	5	5
Chinese	40	42
Dayak	3	3
Javanese	21	22
Madurese	10	11
Malay	12	13
Padang	1	1
Unknown	3	3
Total	95	100

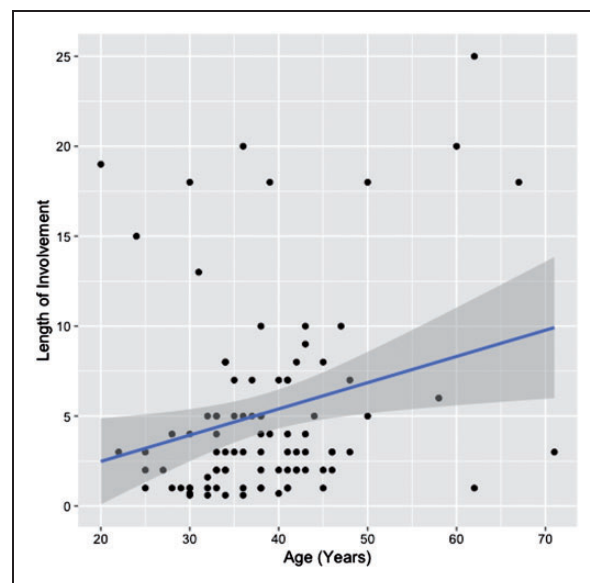


Figure 1. Age and length of involvement in the bird trade for all bird shop owners interviewed.

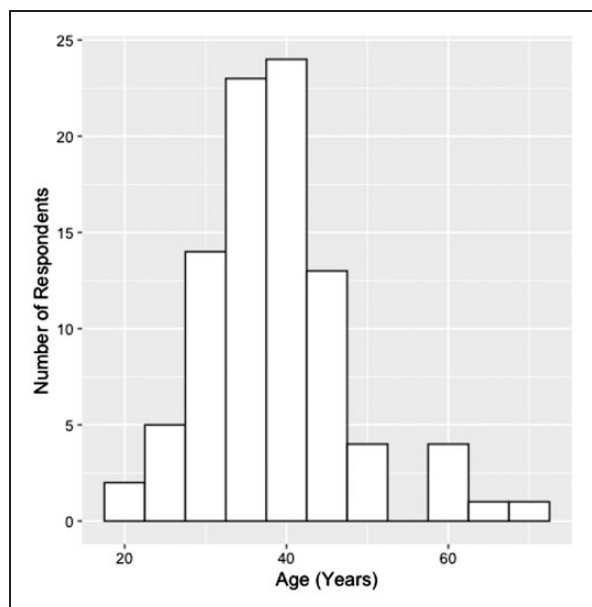


Figure 2. Number of respondents by age of bird shops surveyed.

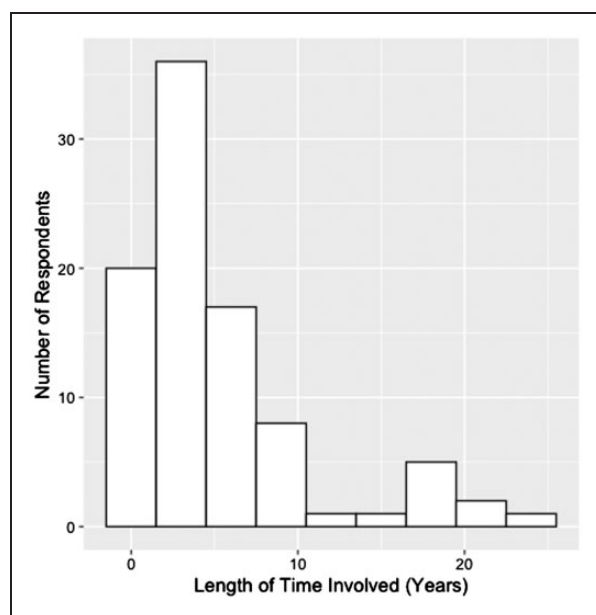


Figure 3. Length of time involved in the songbird trade across shop owners surveyed.

Income and Licensing

The average income for 43% of respondents was less than or equal to IDR 3,000,000 a month (~US\$212), and 43% made over IDR 3,000,000 a month. Average monthly income for over a third of respondents (34%) was below West Kalimantan's legal minimum wage of IDR 2,211,266 (~US\$159) per month. Five percent did not respond (Table 3).

Table 3. Breakdown of Average Monthly Income for Songbird Traders Interviewed.

Average monthly income (IDR)	No. of respondents	Percentage of respondents
500,000–1,000,000	20	21
1,000,000–2,000,000	12	13
2,000,000–3,000,000	17	18
≥3,000,000	41	43
Did not respond	5	5
Total	95	100

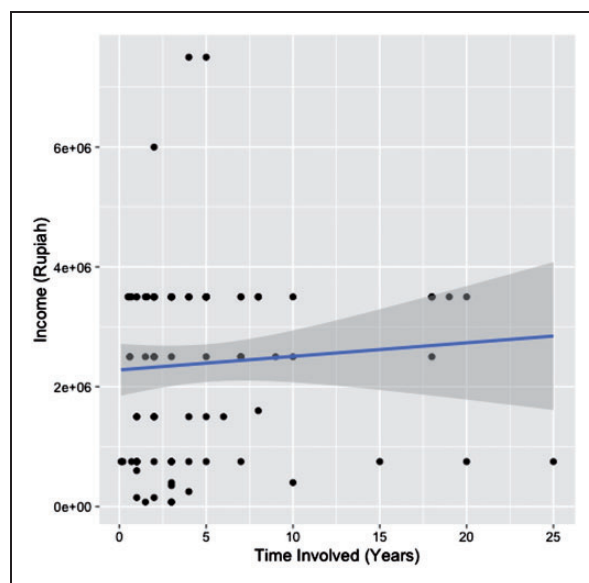


Figure 4. Average income reported by shop owners in response to the length of involvement in the songbird trade.

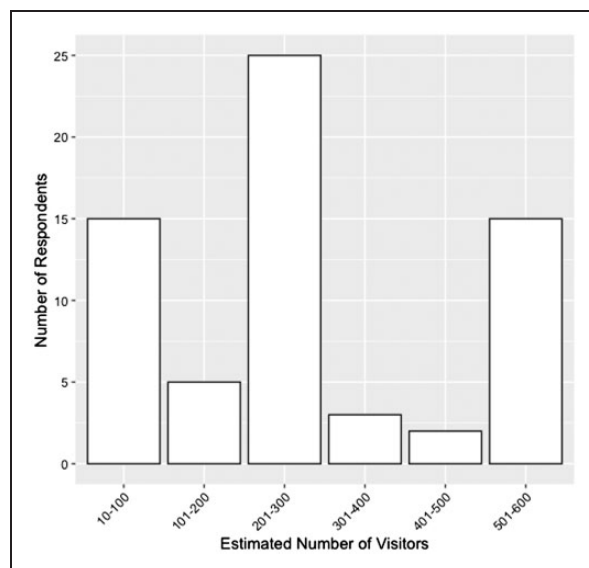


Figure 5. Number of monthly visitors estimated by sellers to visit their shop every month.

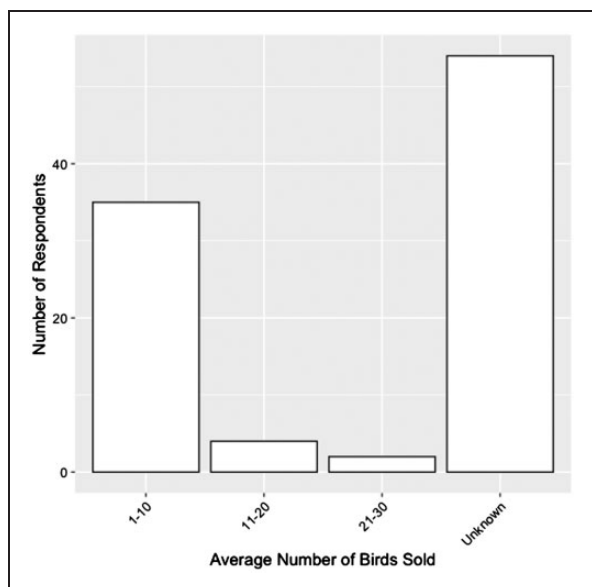


Figure 6. Estimated average number of birds sold each month by shop owners.

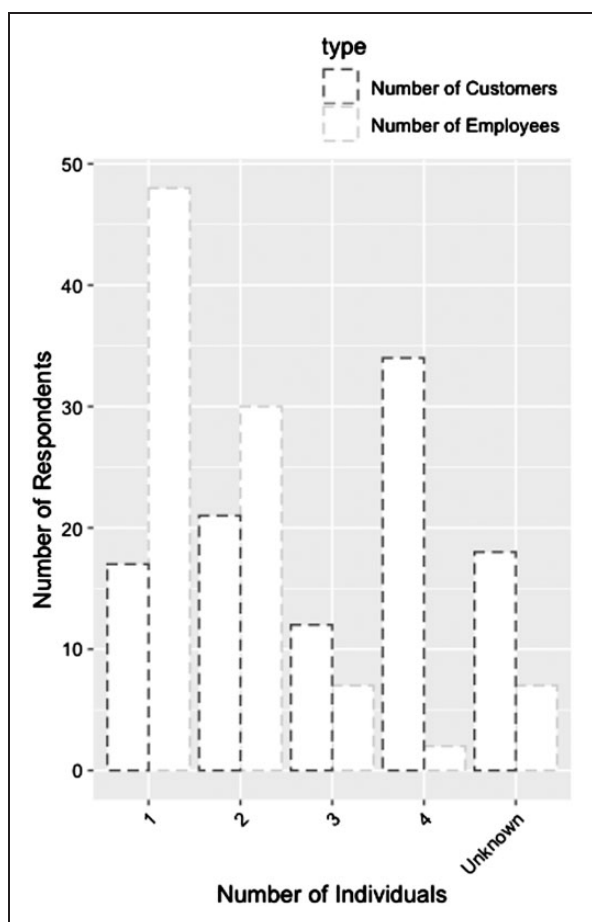


Figure 7. Number of employees and customers present in bird shops at the time of survey.

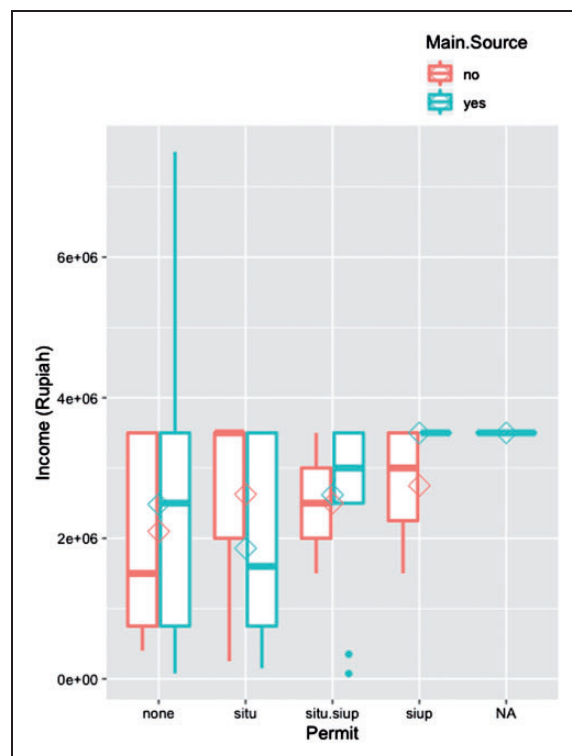


Figure 8. Average income of respondents grouped by whether or not their main source of income was from selling songbirds across four permit types and those that did not have permits.

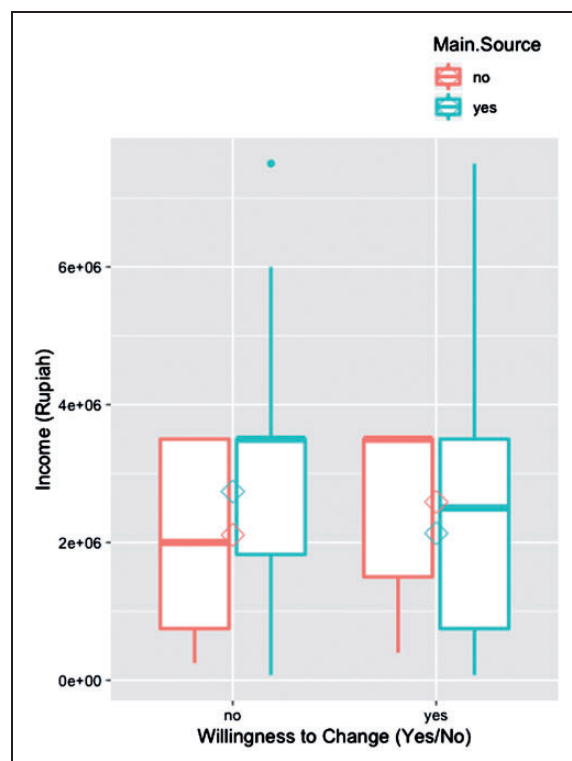


Figure 9. Willingness to change businesses and whether or not bird selling was identified as a main source of income varies across income.

Table 4. Breakdown of Average Monthly Income for Subset of Songbird Traders Willing to Switch Industries.

Average monthly income (IDR)	No. of respondents	Percentage of respondents
500,000–1,000,000	10	22
1,000,000–3,000,000	11	25
3,000,000–5,000,000	21	47
5,000,000–7,000,000	2	4
7,000,000–10,000,000	0	0
>10,000,000	1	2
Total	45	100

We found no statistically significant correlation ($df=89$, $r^2=.066$, $p=.46$) between the income and the length of involvement in the songbird trade meaning those involved longer in the trade did not necessarily have improved profit margins.

We also investigated whether selling songbirds was the individual's primary source of income or whether it was supplementary to other income sources. Fifty-five percent of respondents claimed that selling birds was their main source of income and 40% said that it was supplementary to another line of work. Five percent did not provide an answer. Regarding profitability, 79% of respondents claimed that their business was profitable, whereas 17% of bird shop owners said that they were not making a profit from selling songbirds. Four percent did not respond.

Bird shops noted between 1 and 1,000 visitors per month. Almost a quarter (22%) of shops said that they had between 10 and 200 visitors per month. Roughly a third of shops (30%) said that they had between 201 and 500 visitors per month, and another 28% claimed between 500 and 1,000 visitors per month. Nineteen percent of shop owners were not sure or did not give a response (Figure 5, 6 and 7).

As far as birds sold per month, the majority of respondents (57%) said that they were unsure as to the numbers or did not respond. Over a third of shop owners (37%) estimated that they sold between 1 and 10 birds per month and only 6% said that they sold any more than 10 birds per month (between 11 and 30 birds per month).

Bird shop owners were asked whether they possessed licensing related to the selling of wildlife. A Surat Izin Tempatkan Usaha (SITU) permit is required permission for the physical location or existence of any business in Indonesia. A Surat Izin Usaha Perdagangan (SIUP) permit is required for businesses engaging in any type of trade in Indonesia; in this case, the trading of live birds. Sixty-three percent of bird shops had no permits whatsoever. Nineteen percent of bird shops had only SITU permits, 5% had only SIUP permits, and 13% had both SITU and SIUP permits. We found no

statistically significant difference in income across permit type, indicating that the permit type is not influenced by higher or lower profit margins ($f=.492$, $df=85$, $p=.689$) (Figure 8 and Figure 9).

The number of employees and customers in the shops while the interview was being conducted was also noted. Most bird shops (83%) had one to two employees. Eleven percent of shops had three to four employees, and for 6% of shops the number of employees was unable to be discerned or not stated. Throughout the conduction of the interview, which lasted 25 to 45 min, shops had zero to four customers present (Figure 9).

Switching Enterprises and Business Alternatives

Our survey team inquired as to whether respondents would be interested in changing businesses to move away from songbird trading. Of the 95 respondents, 55% individuals were interested in changing businesses; however, 13% of those only wished to stop selling live birds but continue selling bird paraphernalia like cages, food, and so on. Twenty-eight percent of respondents were not interested in changing business and 17% of (Table 4) respondents did not respond or were not yet sure. Therefore, 47% of the individuals interviewed were considered to be candidates for transitioning out of the bird trade industry via enrollment in Planet Indonesia's Environmental Entrepreneur Program.

We also asked about business alternatives that respondents would consider switching to and their reasoning for choosing said business. Potential other business categories varied widely: eight people were interested in opening general food/goods stores, eight others were interested in opening stores that sold other animals such as chickens and fish, and six more were interested in opening and café or coffee shop. Interest in opening specialty stores was also common: three people showed interest in opening a cake shop, three people in fishing equipment stores, two people in automotive stores, two people in clothing and mobile phone stores, two people in garden/decorative plant stores, one person in a cosmetic store, one person in a vegetable store, one person in a farming store, and one person in an animal feed supplier store. Five people were not yet sure of what business they would change to and two others were actively looking for other (unspecified) work. When asked about reasons for their interest in these specific businesses, responses ranged from adapting to demand for products to relying on previous work experience and skill sets.

Of the 45 bird traders who are willing to switch businesses, the majority have been involved under 5 years. Forty percent were bird traders who had been involved in trading under 3 years and 20% of traders had involvement for between 3 and 5 years. Twenty-seven percent of

bird traders had been involved between 5 and 10 years, and the remaining 13% had been involved for over 10 years.

We investigated whether income varied across willingness to change business (yes/no) or between shop owners who indicated whether selling birds was their main source of income (yes/no). We did not find that income varied between those willing to change businesses or whether it was their main income source ($f = .088$, $df = 89$, $p = .767$).

However, for the subset of 45 bird traders willing to switch industries, most traders earned below IDR 5,000,000 per month. Nearly a quarter of respondents (22%) said that they earned between IDR 500,000 and 1,000,000 (~US\$35–US\$70) per month which is well below the monthly minimum wage standard for West Kalimantan (IDR 2,211,266 or ~US\$159). About half of bird traders (47%) said that they earn between IDR 3,000,000 and 5,000,000 (~US\$212–US\$359) per month.

Based on these three indicators of length of involvement in the bird trade, average income, and willingness to change business, Planet Indonesia identified 19 shop traders to be approached for our Environmental Entrepreneur Program. A further look into the subset for the 19 candidates showed alternative business options of 5 people interested in opening general food stores, 3 people in cake specialty stores, 2 in automotive, and 2 in the sale of other animals. One person was interested in each of the following specialty stores: decorative plants, a café, fishing equipment, and a coffee shop. Two people were still unsure as to what business they would switch to and one was actively looking for other (unspecified) work. Reasons behind interest in changing businesses ranged from high market demand to applicable skill sets of respondents.

Discussion

This study provides some of the first insights into the socioeconomic characteristics of songbird trade shop owners in West Kalimantan, Indonesia. Markets and shops connect rural trappers with urban buyers and represent an important link in the Indonesian caged-bird trade supply chain. For example, Rentschlar et al. (2018) surveyed bird shops in the same province as our study between 2015 and 2016 and found 118 bird shops selling 14,408 individuals from 90 species. This means that only 118 shops are moving thousands of birds sourced from rural trappers to potentially thousands of buyers in urban areas (Jepson & Ladle, 2005). Under this scenario, interventions targeting shop owners whom represent the rural–urban linkage could potentially reduce the volume of species traded within the region.

We found a total of 95 shops in West Kalimantan with 82 shops surviving from the previous study

(Rentschlar et al., 2018) and 13 shops newly established. Shops were predominately run by men with only 17% of shops operated by women. Interestingly, Chinese represented the largest group owning shops (42%) in West Kalimantan (Table 1). Javanese, often noted to be the ethnic group that is the driver of the songbird trade within Indonesia because of cultural linkages, represented just less than one fourth of all shop owners (22%, Table 1). This is an important consideration when planning mitigation strategies such as behavior change campaigns, as the sociocultural triggers driving the trade likely differs between groups and cultures (Wallen & Daut, 2018).

The majority of shop owners (62%) noted that they first entered the trade because of their interest in songbirds as a hobby, not for economic reasons, which coincides with the finding that nearly half (40%) of respondents also noted that it was not their only source of income. Interestingly, 16% said that their business was losing money and 54% of all shops noted that they would be open to changing their main source of income. Nearly all (90%) of the shops wishing to change businesses indicated that they wanted to leave the pet trade all together, while seven shops (10%) wanted to sell domestic animals and songbird accessories such as cages and food. This finding represents an opportunity to address the songbird trade through schemes that provide business alternatives for shop owners and middlemen.

Our study also points to opportunities to address the trade with law enforcement as 63% of all respondents did not have the correct permits to run or own any sort of business. This indicates that the vast majority of songbird shop owners were not paying any sort of property or commodity tax. If this finding holds true across Indonesia, there may be an opportunity for conservation groups to leverage nonwildlife regulatory laws to reduce the volume of the songbird trade. This is a key finding as the majority of Indonesian songbirds are not protected within Indonesia despite recent revisions (see “Peraturan Menteri Lingkungan,” 2018).

Conservation Implications

Our survey was conducted to provide insights for an evidence-based design of an alternative business program run through YPI. YPI uses a combination of law enforcement, microfinance, venture capital, and behavior change triggers to address the songbird trade in Indonesian Borneo. A major obstacle to address the trade has been linked to state-led legislation which allows for the majority of songbirds in Indonesia to be traded freely (Conrad, 2012; International Union for Conservation of Nature, 2019; Jepson & Ladle, 2005; Jepson et al., 2011; Rentschlar et al., 2018).

Our results provide new insights as there appears to be an opportunity for alternative business models for songbird traders in West Kalimantan. However, caution should be observed, and this intervention should be accompanied with legal action to ensure that songbird traders simply do not shift to online trade or join our program but continue selling songbirds. To address this, YPI has coordinated with government agencies to ensure that shop owners enrolled in this alternative business program if caught selling wildlife, protected or not, will be arrested. In 2019, 19 shops have volunteered to close down, surrender all songbirds, and join the alternative business program facilitated by YPI.

Our study also provides insights into the possibility to leverage taxation and business laws to address the songbird trade, as many businesses did not have proper permits to legally operate. This is an important finding as the majority of conservation groups focus on natural resource-related laws, but our study shows that using a variety of legislation, such as business permits and taxation, could be a viable intervention to reduce the severity of the Indonesian caged-bird trade. In addition, given the option, many shop owners expressed a willingness to change industries if given proper resources and training to do so. Thus, our findings indicate that in West Kalimantan more than two thirds (~70%) of all shops could be closed by leveraging business and tax laws combined with an alternative business approach. If this holds true across other provinces in Indonesia, this could provide critical insights into the design of conservation strategies and interventions.

Debate on the efficacy of various strategies to combat wildlife trade (e.g., law enforcement, wildlife farming, antipoaching, and poverty reduction, among others) remains heated among conservationists (Challender, Harrop, & MacMillan, 2015; Phelps, Carrasco, & Webb, 2014; Phelps, Webb, Bickford, Nijman, & Sodhi, 2010). Our study reveals that perhaps the debate should not solely be focused on whether law enforcement is effective or not but rather if conservation groups should take an inventory on the suite of rules and regulations at their disposal. In West Kalimantan, more than half of bird markets in the region could be closed or at least sanctioned using regulations that are unrelated to the trade or exploitation of natural resources. Our findings support the claim that a multifaceted approach to wildlife trade leveraging a variety of legal, economic, and demand reduction strategies is needed.

Further studies are needed to provide insights into the socioeconomic characteristics of the songbird trade in Indonesia (Burivalova et al., 2017). Our study was designed to provide insights for a better informed strategy to combat the Indonesian caged-bird trade in West Kalimantan. Therefore, limited inference can be drawn from this study due to its regional sample size and

geographic nature. Our study is the first study of its kind to investigate the socioeconomic characteristics of shop owners—the most important link between rural trappers and urban consumers—and provides novel insights on how this critical linkage may be addressed to limit illegal songbird trade.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: The authors would like to thank one anonymous donor and the US department of state for generously supporting this research project.

ORCID iD

Adam E. Miller  <https://orcid.org/0000-0002-9239-9383>

Supplemental Material

Supplemental material for this article is available online.

References

- Burivalova, Z., Lee, T. M., Hua, F., Lee, J. S., Prawiradilaga, D. M., & Wilcove, D. S. (2017). Understanding consumer preferences and demography in order to reduce the domestic trade in wild-caught birds. *Biological Conservation*, 209, 423–431.
- Challender, D. W., Harrop, S. R., & MacMillan, D. C. (2015). Towards informed and multi-faceted wildlife trade interventions. *Global Ecology and Conservation*, 3, 129–148.
- Chng, S. C., & Eaton, J. A. (2016). *In the market for extinction: Eastern and central Java*. Petaling Jaya, Malaysia: TRAFFIC Southeast Asia.
- Chng, S. C. L., Eaton, J. A., Krishnasamy, K., Shepherd, C. R., & Nijman, V. (2015). *In the market for extinction: An inventory of Jakarta's bird markets*. Petaling Jaya, Malaysia: TRAFFIC.
- Collar, N. J., Crosby, M. J., & Stattersfield, A. J. (1994). *Birds to watch 2: The world list of threatened birds* (Vol. 4). Cambridge, England: BirdLife International.
- Collar, N. J., & Juniper, A. T. (1992). Dimensions and causes of the parrot conservation crisis: solutions from conservation biology. In SR Beissinger and NFR Snyder (Eds) *'New World Parrots in Crisis'*. (pp. 1–24).
- Conrad, K. (2012). Trade bans: A perfect storm for poaching? *Tropical Conservation Science*, 5(3), 245–254.
- Eaton, J. A., Shepherd, C. R., Rheindt, F. E., Harris, J. B. C., Van Balen, S., Wilcove, D. S., & Collar, N. J. (2015). Trade-driven extinctions and near-extinctions of avian taxa in Sundaic Indonesia. *Forktail*, (31), 1–12.
- Harris, J. B. C., Green, J. M., Prawiradilaga, D. M., Giam, X., Hikmatullah, D., Putra, C. A., & Wilcove, D. S. (2015).

- Using market data and expert opinion to identify overexploited species in the wild bird trade. *Biological Conservation*, 187, 51–60.
- Harris, J. B. C., Tingley, M. W., Hua, F., Yong, D. L., Adeney, J. M., Lee, T. M., ... Wilcove, D. S. (2017). Measuring the impact of the pet trade on Indonesian birds. *Conservation Biology*, 31(2), 394–405.
- International Union for Conservation of Nature. (2019). *The IUCN red list of threatened species* (Version 2019-1). Retrieved from <http://www.iucnredlist.org>
- Jepson, P., & Ladle, R. J. (2005). Bird keeping in Indonesia: Conservation impacts and the potential for substitution-based conservation responses. *Oryx*, 39(04), 442–448.
- Jepson, P., Ladle, R. J., & Sujatnika, (2011). Assessing market-based conservation governance approaches: A socio-economic profile of Indonesian markets for wild birds. *Oryx*, 45(04), 482–491.
- Nijman, V. (2010). An overview of international wildlife trade from Southeast Asia. *Biodiversity and Conservation*, 19(4), 1101–1114.
- Nijman, V., Shepherd, C. R., Mumpuni., & Sanders, K. L. (2012). Over-exploitation and illegal trade of reptiles in Indonesia. *Herpetological Journal*, 22, 83–89.
- Oldfield, S. (Ed.). (2003). *The trade in wildlife: Regulation for conservation*. London, England: Routledge.
- Peraturan Menteri Lingkungan Hidup dan Kehutanan [National Regulation for the Environment and Forestry] No. PP. 20/MENLHK/SETJEN/KUM.1/6/. (2018).
- Phelps, J., Carrasco, L. R., & Webb, E. L. (2014). A framework for assessing supply-side wildlife conservation. *Conservation Biology*, 28(1), 244–257.
- Phelps, J., Webb, E. L., Bickford, D., Nijman, V., & Sodhi, N. S. (2010). Boosting cites. *Science*, 330(6012), 1752–1753.
- Rentschlar, K. A., Miller, A. E., Lauck, K. S., Rodiansyah, M., Bobby, Muflihati, & Kartikawati. (2018). A silent morning: The songbird trade in Kalimantan, Indonesia. *Tropical Conservation Science*, 11, 1940082917753909.
- Robinson, J. G., & Bodmer, R. E. (1999). Towards wildlife management in tropical forests. *The Journal of Wildlife Management*, 63(1), 1–13.
- Shepherd, C. R. (2006). The bird trade in Medan, North Sumatra: An overview. *Birding ASIA*, 5, 16–24.
- Shepherd, C. R., Sukumaran, J., & Wich, S. A. (2004). *Open season: An analysis of the pet trade in Medan, Sumatra 1997–2001*. Petaling Jaya, Malaysia: TRAFFIC Southeast Asia.
- Souto, W. M., Torres, M. A., Sousa, B. F., Lima, K. G., Vieira, L. T., Pereira, G. A., ... Pralon, B. G. (2017). Singing for cages: The use and trade of Passeriformes as wild pets in an economic center of the Amazon—NE Brazil route. *Tropical Conservation Science*, 5, 394–416.
- Wallen, K. E., & Daut, E. (2018). The challenge and opportunity of behaviour change methods and frameworks to reduce demand for illegal wildlife. *Nature Conservation*, 26, 55.
- Wilson-Wilde, L. (2010). Wildlife crime: A global problem. *Forensic Science, Medicine, and Pathology*, 6(3), 221–222.
- Wright, T. F., Toft, C. A., Enkerlin-Hoefflich, E., Gonzalez-Elizondo, J., Albornoz, M., Rodríguez-Ferraro, A., ... Brice, A. T. (2001). Nest poaching in Neotropical parrots. *Conservation Biology*, 15(3), 710–720.