

## ARTICLE

<http://dx.doi.org/10.4314/mcd.v15i1.2>

# Motivations of pet parrot ownership and captive conditions of the pets in Madagascar

Lucía Rodríguez<sup>I</sup>, Kim E. Reuter<sup>II</sup>, Melissa Schaefer Seabocyc<sup>III, IV</sup>

Correspondence:  
Lucía Rodríguez  
Cambridge, United Kingdom  
Email: [lrodriguez.v6@gmail.com](mailto:lrodriguez.v6@gmail.com)

## ABSTRACT

In Madagascar, parrots (*Coracopsis nigra*, *C. vasa*) are often kept as pets, with 8% of urban households surveyed having owned a *Coracopsis* spp. However, the motivations for pet parrot ownership and the captive conditions of these animals remain unexamined. In this study, we present qualitative information on the motivations and captive conditions of pet parrots in Madagascar based on 440 urban household surveys and 64 hotel surveys in central, southern, and eastern Madagascar. We present evidence that the primary motivation for owning pet parrots in Madagascar is for companionship, with no evidence that money-making is a primary motivation for ownership by households or hotels. Of the 11 *Coracopsis* spp. individuals that we saw in private homes during our data collection efforts, most were kept in sub-standard captive conditions (average cage size of  $\sim 0.06 \pm 0.03$  m<sup>3</sup>). Less than half had access to food and/or water when we observed them and some showed evidence of stereotypical behavior and feather chewing. Because many of the pet parrots were taken from the wild, motivations for owning a pet parrot and their captive conditions can impact their conservation.

## RÉSUMÉ

À Madagascar, les perroquets (*Coracopsis nigra*, *C. vasa*) sont souvent gardés comme animaux de compagnie, avec 8 % des ménages urbains interrogés ayant été propriétaires d'un *Coracopsis* spp. Cependant, les motivations poussant les gens à garder des perroquets comme animaux de compagnie et les conditions en captivité de ces animaux restent non examinées à Madagascar. Dans cette étude, nous présentons des informations qualitatives sur les motivations et les conditions de captivité des perroquets de compagnie à Madagascar, basées sur 440 enquêtes auprès des ménages et 64 enquêtes dans des hôtels dans le centre, le sud et l'est de Madagascar. Des preuves montrent la principale motivation comme étant tout simplement la compagnie ; par contre, aucune preuve supporte l'idée que gagner de l'argent est une raison principale motivant les ménages ou les hôtels à garder ces animaux. Parmi les 11 *Coracopsis* spp. que nous avons vus dans des maisons privées au cours de nos efforts de collecte de données, la

plupart ont été maintenus dans des conditions de captivité inférieures aux normes (taille moyenne de la cage d'environ  $0,06 \pm 0,03$  m<sup>3</sup>). Moins de la moitié d'entre eux avaient accès à de la nourriture ou à de l'eau lorsque nous les avons observés, et certains ont montré des signes de comportement stéréotypé et de mastication de plumes. Parce que beaucoup de perroquets de compagnie ont été pris dans la nature, les motivations pour posséder un perroquet de compagnie et leurs conditions de captivité peuvent avoir un impact sur leur conservation.

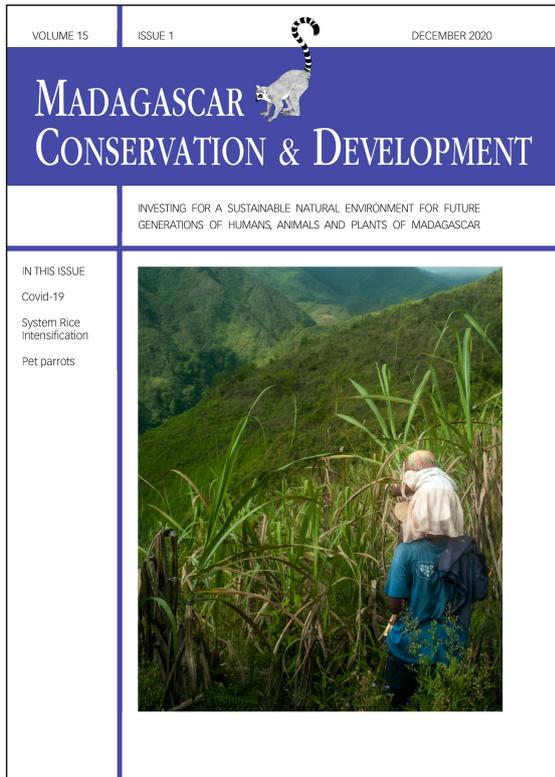
## INTRODUCTION

Around the world, parrots have been owned as pets for thousands of years. Alexander the Great, Marie Antoinette, and Theodore Roosevelt each had pet parrots (Weston and Memon 2009). Christopher Columbus returned to Spain with Cuban Amazons (*Amazona leucocephala*) as gifts for the royals, some petroglyphs evidence *Psittacina* spp. trade among Central American cultures, and there are Scarlet macaw (*Ara macao*) skeletons in burial sites of the Mogollon people in Arizona (Weston and Memon 2009). Even with this long history of pet parrot ownership and trade, studies on the motivations and captive conditions for pet parrot ownership in their range countries are often limited. The motivations for owning a pet bird likely varies by species. Globally, the Psittacines, have proven to be the most popular group for companionship and entertainment (Weston and Memon 2009). Their colorful plumage and their mimicry make them especially attractive for the pet trade (Engrebetson 2006). Studies on the captive conditions of pet parrots usually find serious animal welfare problems (Engrebetson 2006). This means that, though many of the pet parrots' owners describe their affection for their pets, they usually cannot fulfill the parrot's physical and mental needs, resulting in difficulties in maintaining their pets' health and wellbeing.

In Madagascar, three species of parrots (*Coracopsis nigra*, *C. vasa*, *Agapornis canus*) are subjected to the pet trade (Reuter et al. 2017a,b). Historical accounts (e.g. Shaw 1885) indicate that Malagasy people have owned pet parrots for generations and that they liked teaching captive *Coracopsis* spp. words to mimic them. Despite evidence that thousands of parrots are currently kept as pets

I University of Cambridge, United Kingdom  
II University of San Diego, San Diego, California, USA  
III University of Utah, Salt Lake City, Utah, USA  
IV Salt Lake City Community College, Salt Lake City, Utah, USA

Citation Rodríguez, L., Reuter, K. E., Schaefer, M. S. 2020. Motivations of pet parrot ownership and captive conditions of the pets in Madagascar. Madagascar Conservation & Development 15, 1: 13–18. <http://dx.doi.org/10.4314/mcd.v15i1.2>



Madagascar Conservation & Development is the journal of Indian Ocean e-Ink. It is produced under the responsibility of this institution. The views expressed in contributions to MCD are solely those of the authors and not those of the journal editors or the publisher.

All the Issues and articles are freely available at <http://www.journalmcd.com>



Contact Journal MCD  
[info@journalmcd.net](mailto:info@journalmcd.net) for general inquiries regarding MCD  
[funding@journalmcd.net](mailto:funding@journalmcd.net) to support the journal

Madagascar Conservation & Development  
Institute and Museum of Anthropology  
University of Zurich  
Winterthurerstrasse 190  
CH-8057 Zurich  
Switzerland

io@i

Indian Ocean e-Ink  
Promoting African Publishing and Education  
[www.ioeink.com](http://www.ioeink.com)

 MISSOURI BOTANICAL GARDEN

Missouri Botanical Garden (MBG)  
Madagascar Research and Conservation Program  
BP 3391  
Antananarivo, 101, Madagascar

in urban areas throughout Madagascar every year (Reuter et al. 2017a,b), there are still gaps in the understanding of this trade. Specifically, the motivations for the ownership of parrots by private individuals in Madagascar and the conditions of their captivity have not been studied.

Though the live capture of parrots as pets in Madagascar has received scant attention (Martin et al. 2014), recent studies indicate that almost 8% ( $n = 38/440$  respondents) of urban households surveyed have owned a *Coracopsis* spp. (Reuter et al. 2017b). More than half of pet parrots on the island are purchased (59%,  $n=29/49$  respondents) and many are captured directly by their owners from the wild (22%,  $n=11/49$  respondents) (Reuter et al. 2017a). McBride (1996) indicated that after capture in the north-east of the country, *C. vasa* and *C. nigra* wing feathers were clipped and that parrots are often kept in small cages that limited movement. Captive *C. vasa* and *C. nigra* were reportedly often fed bananas and rarely provided with drinking water (McBride 1996). Studies have found that *Coracopsis* spp. are often only kept in captivity for an average of  $3.17 \pm 2.51$  years, with ownership ending most often with the death of the bird (Reuter et al. 2017b). Given that the three species can live elsewhere in captivity for 16–38 years (Young et al. 2012) and the length of ownership is comparatively short in Madagascar, it may be that the captive conditions of parrots in private ownership are sub-standard.

Likely similar to the ownership of other wild animals on the island (e.g. lemurs; Reuter and Schaefer 2017), one can hypothesize that parrots would be kept as pets both for personal/companion-ship reasons and for money-making from the tourism industry. Regarding money-making, *Coracopsis* spp. have been seen by the authors on the grounds of hotels catering to tourists around a national park in northern Madagascar as well as in the capital city (KER, pers. obs.). Still, it is not clear whether hotels regularly keep parrots on the grounds as a tourist attraction or whether this is a rare phenomenon. In this study, we provide qualitative information from pet parrot owners. Given the limited information in published reports on this topic, the information presented here tries to provide some insights into both the motivations of ownership as well as typical captive conditions of parrots kept as pets.

## METHODS

**STUDY SPECIES.** Our study investigated two species of parrots: the greater vasa parrot (*Coracopsis vasa*) and the lesser vasa parrot (*Coracopsis nigra*). These species are considered to be common in many areas of Madagascar (del Hoyo et al. 1997) and are listed as Least Concern (BirdLife International 2016, 2018). There are no published population estimates for the species, but they are thought to have at least 10,000 mature individuals in the wild with the population of *C. nigra* being stable and the population of *C. vasa* decreasing. (BirdLife International 2016 2018). Both species have plant-based diets (Hino 2002, Bollen and Elsacker 2004). *Coracopsis vasa* and *C. nigra* are frugivores/granivores and *C. nigra* feeding extensively on ripe and unripe seed (Bollen and Elsacker 2004, Czaja et al. 2015).

**ETHICAL RESEARCH STATEMENT.** International standards for research ethics were followed and research was approved by an ethics oversight committee (Institutional Review Board, University of Utah). This research followed all national and local laws pertaining to the survey of adults in Madagascar. It was authorized by locally elected officials in every town and commune in which re-

search took place. This research required no government research permits.

**DATA COLLECTION.** During July and August 2016, we surveyed 440 households across nine urban towns (Figure 1) and visited 64 hotels in towns in central, southern, and eastern Madagascar. Eight percent of these households surveyed have owned a *Coracopsis* spp. and 11 are current owners (Reuter et al. 2017b). We focused the interviews about the motivations for owning a pet parrot and the conditions of the pets on these previous and current owners. Verbal informed consent was received, and interviews were conducted by a two-person team comprised of one international project leader (KER, LR, MSS) and one trained Malagasy translator (note that different individuals did the translation in different towns to ensure fluency in the local Malagasy dialect, see Acknowledgments). Respondents were not compensated for their participation.

Interviewees were asked about their motivations for owning a pet parrot and how they cared for their pet parrot. If the individual currently owned the bird, we also asked to see the bird and take photos of the bird's captive conditions. All photos were taken with the owner's consent.

We did not provide interviewees with a definition of a pet bird but noted when they reported to us on birds that were both caged



Figure 1. Map of towns where surveys were undertaken during this study.

and not caged. Pet birds typically included birds that had a clear human owner (regardless of whether they were caged or not), though we excluded birds seen in zoos or reserves. Interviewees rarely identified the species of a pet bird and we did not show them images of birds to facilitate species identification. Occasionally, species identification was possible based on direct observation of the pet bird or through the use of local or scientific names. For this reason, we differentiate in this paper only by genus (i.e. *Coracopsis* spp.).

We also visited 64 hotels in four towns (Table 1) to understand whether for-profit entities targeting tourists might be using captive parrots as on-site attractions (similar to what has been reported for captive lemurs in Madagascar, Reuter and Schaefer 2016). When visiting hotels, we recorded the presence/absence of a caged bird on the premises and collected information regarding the size of the hotel (number of beds) and hotel price points (standard nightly room rates).

## RESULTS

**MOTIVATIONS FOR HOUSEHOLD OWNERSHIP.** Three of the eleven current owners indicated that they liked having parrots as pets because they provided company, were funny (in their imitation of humans), or provided entertainment. One individual indicated that the parrot would warn her of intruders. Three respondents reported selling their parrot, two of them selling multiple parrots. One respondent reported eating the parrot and two indicated the parrot was *fady* (taboo) and was killed.

Table 1. The nine towns in Madagascar (Figure 1) where interviews were conducted, with population, number of household interviews conducted, number of hotels visited, and number of hotels had pet birds on their premises. Population estimates for cities were obtained from the Ilo Project (2003) or from local officials.

Town	Population	No. of households interviewed	No. of hotels interviewed	No. of hotels with a pet bird (%)
Ambositra	32,818	62	14	0
Andasibe	12	53	0	0
Antananarivo	1,054,649	53		
Antsirabea	186,253	25	28	0
Beforona	13	55		
Fianarantsoa	126	32	14	0
Tôlanaro (Fort Dauphin)	46,298	50	8	0
Moramanga	40,050	60	-	-
Toamasina (Tamatave)	201,729	50	-	-
<b>Total</b>	-	<b>440</b>	<b>64</b>	<b>0</b>

Several of our respondents (22 %) reported they captured their parrots from the wild. Additionally, three respondents who had purchased the parrot or received it as a gift noted that the parrots were taken from the wild. Two sellers of parrots reported that they stopped selling parrots because they were becoming difficult to find in the wild.

**CAPTIVE CONDITIONS.** Some respondents mentioned aspects of *Coracopsis* spp. captive care in passing. Parrots were kept in cages ( $n = 2$  respondents), sometimes with their wings clipped ( $n = 1$  respondent). Most of the parrots we observed were kept in cages, with one being kept in an open cage (where the parrot could move in and out at will), one was kept in a room by itself (a non-functioning bathroom; it had clipped wings), and four were kept loose (three had clipped wings) (Figures 2, 3). Several of the parrots were in cages that overlooked the street and were, thus, exposed to the elements. Only one parrot was kept alongside a pigeon (Figure 3).

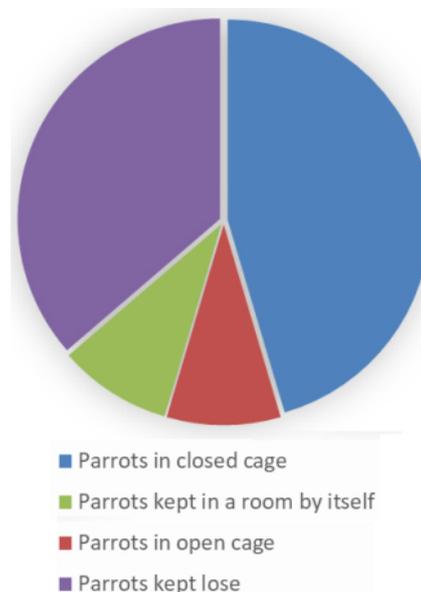


Figure 2. The captive environments of the pet parrots identified in this study.



Figure 3. Caging conditions of captive *Coracopsis* spp.

(a) A parrot was provided with an open cage environment in which it could climb into and out of the cage at will; the cage overlooked a street and the parrot was provided with food and water. (b) A parrot was seen in a cage (for several days in a row) which was affixed to a second-story balcony over a busy street. The parrot did not have much space to move around and was exposed, at least during the days observed, to all outdoor weather. (c) A parrot was kept in a cage in the back corner of a dark, upstairs room; this parrot was reportedly handled by its owners frequently and food and water were present in the cage. (d) A parrot was kept in a small cage overlooking a street; this parrot showed evidence of abnormal behaviors including pacing, repetitive movements, and biting on its own feathers. (e) This parrot frequently stayed close to humans and was seen multiple times at the same location, although it did not have a clear owner. (f) A parrot is seen sitting on a perch spanning a balcony in a residential neighborhood. We did not interview the owner of this parrot but saw several other, similar situations in which the parrot appeared to be habituated and/or to have had its wings clipped (and to be otherwise unrestrained). (g) A parrot was kept in a nonfunctioning bathroom (it was hiding under the bathtub) where it had access to natural light from a window and corn on the ground. This bird had clipped wings and was not able to fly. Photos were taken by KER, LR, and MSS

Ten of the eleven parrots we observed had a clear owner; the eleventh was a loose parrot that apparently liked to be near people (and those people described it as a pet parrot), but we could not determine if it had an owner. At least three of the parrots were handled by their owners (Figure 4). The average cage size appeared to be  $\sim 0.06 \pm 0.03$  m<sup>3</sup>. Five parrots had access to food and/or water when we observed them. We observed them being fed seeds, corn kernels, and bananas [three individuals that had owned parrots in the past stated that their pet *Coracopsis* spp. ate “everything” (n = 2) or ate “peanuts, corn, tomatoes, water, and fruits” (n = 1)]. Two respondents who had seen a pet parrot noted that a parrot was in bad health (“near-death”; “eating himself”). One parrot we observed showed what appeared to be stereotypical behavior (pacing, weaving). No pet parrots were observed in any of the 64 hotels (Table 1).

On occasion, we happened to see birds being sold by vendors on the side of the road (once in the middle of a major city and the second time along a well-traveled road between two large cities). In one instance, we observed a street-side location selling three *Coracopsis* spp. (two kept in a  $\sim 0.06$  m<sup>3</sup> cage; one kept in a  $\sim 0.06$  m<sup>3</sup> cage). The cages were in full sunlight, none had water, and only one cage appeared to have some dried corn and rice available as food.

## DISCUSSION

**MOTIVATIONS.** Though our sample size is small, it appears that the primary motivation for keeping parrots as pets is for companionship. Money-making was not mentioned by any respondents as a reason for owning a pet parrot (though three respondents had sold parrots), nor were they kept by any of the hotels that we visited. However, these hotel establishments did admit to having captive lemurs, tortoises, snakes, and chameleons on their properties (and we sometimes saw these wild animals as pets) for money-making (i.e. as an added-value attraction from tourists, Reuter and Schaefer 2016). Surprisingly, pet parrots were not evident at hotels as a similar value-added attraction.

In accordance with our results, there are numerous examples from around the world where parrots are in demand for varying reasons, with companionship being a common reason. For example, in Costa Rica, a study in 2002 revealed that 24% of the households kept one or more parrot(s) as a pet (Drews 2002), people would usually keep them for companionship and entertainment (Morales 2005). In Costa Rica, it used to be common for the elderly to have parrots as pets, where they would be trained to sing, dance, and talk (LR, pers. obs.). In addition, during Holy Week, a religious festivity in the country, the demand for parrots would increase, since the parrots were of value for these festivities (Morales 2005). In some cases, parrots have been described as being able to fill the social, emotional, and cognitive needs of their caretakers (Engebretson 2006). For many of their owners, they are viewed as

an addition to the family for their human-like characteristics (Grant et al. 2017). In Peru, there are tens of thousands of birds kept because of their ability to mimic the human language (Pires et al. 2016). Of course, pet parrot owners might own a parrot for multiple reasons, and not simply just for companionship.

**CAPTIVE CONDITIONS.** We observed *Coracopsis* spp. in a wide range of captive conditions, most of which indicated poor bird welfare, despite the affection with which some owners discussed their pets. This can be measured by the animal welfare tool which articulates the “five freedoms”, (Farm Animal Welfare Council 1992, cited by Engebretson (2006)) which should be accorded to captive animals. These freedoms are (1) freedom from hunger, thirst and malnutrition, (2) freedom from disease and injury, (3) freedom from physical and thermal discomfort, (4) freedom from fear, distress and negative psychological states and lastly, (5) freedom to carry out normal forms of behavior. None of the captive parrots that we studied in this paper (nor two other pet parrots that the authors opportunistically saw in Madagascar, not reported here), were provided the “five freedoms”.

The parrots we observed did not have freedom from hunger, thirst, and malnutrition (Freedom 1) as more than half of the pet parrots we saw did not have access to food and/or water. Many parrots were being fed inadequate diets. For example, 68 % of the diet of wild *C. nigra* is made up of seeds (Bollen and van Elsacker 2004), but seeds were not commonly fed to pet *C. nigra* that we observed. Some parrots were fed with bananas, other fruits, and even meat, which are not part of their natural diets. Pet parrots did not experience the freedom from disease and injury (Freedom 2) either. As with the handling of any wild animal, there is a danger of disease transmission. Our study found that pet parrot owners commonly had direct contact with their pet parrots so disease transmission was possible. Parrots can become infected by their owners, with viral, bacterial, fungal and other diseases (e.g. avian polyomavirus, proventricular dilatation disease (PDD), psittacine beak and feather disease (PBBF), and Pacheco’s disease (Ritchie et al. 2000), which can cause the death of the pet parrots. Further evidence for this is found in Reuter et al. (2017a), where it was noted that some parrots died from an illness or a cold (in 6 % of cases where it was known how pet parrot ownership ended). Additionally, birds can have several diseases/injuries associated with being caged, including burns from hot foods and fungal dermatitis (Pater-son 2008).

Regarding the final three freedoms, pet parrots were often kept in cages that were too small for physical comfort (Freedom 3) and they were isolated from conspecifics; both of these captive conditions preclude normal behavior (Freedom 5). It is recommended that cages should be big enough for the parrot (minimum 24 x 24 x 36 inches) (RSPCA 2019) to be able to exercise, play and accommodate toys, perches and water (Bradshaw et al. 2009) and these conditions were largely absent for the pet parrots we saw. Stereotypical behaviors (pacing, self-mutilation, feather-picking) that could indicate that the pet parrots were not provided the freedom of negative psychological states (Freedom 4) was also evident. This type of behavior is usually manifested when the captive conditions are harsh or limit the parrots’ biological needs (Pater-son 2008). Even though only one out of the eleven pet parrots we saw, displayed some of these patterns of behavior, three former pet owners said that their pets were in very bad health, “with no feathers”, “crazy”, or “almost dying”.



Figure 4. Contact of *Coacopsis* spp. with other animals. ((a) Human contact with a Malagasy male in his 20's. (b) and a parrot co-housed with a pigeon. Photos were taken by KER)

Even though we did not ask pet parrot owners in Madagascar whether they had difficulties keeping their pet parrots in better conditions, owners in other areas of the world do have a lack of knowledge, resources, and motivation to improve the welfare or life quality of exotic pets (Engebretson 2006). The sub-optimal captive conditions we observed may explain why pet parrots in Madagascar are kept alive in captivity for such short periods. Reuter et al. (2017) reported an average lifespan for pet parrots of  $3.17 \pm 2.51$  years. Lifespans are considerably longer in other captive environments. For example, the maximum lifespans for *C. nigra* and *C. vasa* are 38 years and 29 years respectively (Young et al. 2012). Psittacines, in general, are among the longest-lived birds so the short lifespan in captivity in Madagascar is surprising.

**CONSERVATION OF PARROTS.** When it comes to birds, 2,600 of the more than 9,600 species are registered as being subject to trade (FAO 2011). As such, the trade of live birds sourced from the wild is causing increasing concern, with parrots (Psittacidae) among the most threatened group of bird species in the world (28 % of species threatened on the IUCN Red List, Olah et al. 2016). Taking *Psittacus erithacus* as an example: these species have been greatly affected by the global pet trade with over 3.5 million individuals traded since the 1970s (Martin et al. 2014). There are countries such as Ghana, where 90-99 % of the bird population has been lost due to trade since the 1990s (Annorbah et al. 2015).

Even though the two parrot species subjected to the pet trade in Madagascar are not currently endangered, Reuter et al. (2017 a, b) estimated that there were 38,000 parrots kept as pets in Madagascar in 2015-2016. Additionally, three respondents who had purchased the parrot or received it as a gift noted that the parrots were taken from the wild. Two sellers of parrots reported that they stopped selling parrots because they were becoming difficult to find in the wild. These results indicate that the trade in pet parrots may not be sustainable. As noted by Clarke et al. (2019), every wild animal kept as a pet is either directly or indirectly driving the capture of the animals in the wild to be used or sold as a pet and is, therefore, impacting their conservation. Because of this, it is impossible to completely separate the motivations for owning pet parrots and the conditions in which they are kept in captivity, from their conservation. The pet parrot trade is not only a welfare issue but also a conservation issue. Pet parrots' ownership in Madagascar is an important factor to include in policies and regulations to improve the captivity conditions of these individuals and their health. Therefore, we conclude that parrots are unsuitable as human companions and its trade should be prohibited or regulated with education for owners regarding proper care.

## ACKNOWLEDGMENTS

Many thanks to GERP (Groupe d'étude et de recherche sur les primates de Madagascar), Association Mitsinjo, the Sainte Luce Reserve, and to Conservation International for facilitating research in some of the towns visited. Thanks to Toby Schaeffer for making the map for this paper. Many thanks to Irène Ramanantenasoa, Tiana Ratolojanahary, Housseini Maihidini, Tokihenintsoa Andrianjohaniharivo, and Tolotra Fanambinantsoa for serving as translators during part of the data collection. We thank host communities for their hospitality.

## REFERENCES

- Annorbah, N., Collar, N. and Marsden, S. 2015. Trade and habitat change virtually eliminate the Grey Parrot *Psittacus erithacus* from Ghana. *Ibis* 158, 1: 82–91. <<https://doi.org/10.1111/ibi.12332>>
- BirdLife International. 2016. *Coracopsis nigra*. The IUCN Red List of threatened species 2016. Accessed 3 November 2018. <<https://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T22727885A94946412.en>>
- BirdLife International. 2018. *Coracopsis vasa*. The IUCN Red List of threatened species 2016. Accessed 3 November 2018. <<https://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T22685261A131279943.en>>
- Bollen, A. and van Elsacker, L. 2004. The feeding ecology of the Lesser Vasa Parrot, *Coracopsis nigra*, in south-eastern Madagascar. *Ostrich* 75, 3: 141–146. <<https://doi.org/10.2989/00306520409485425>>
- Bradshaw, G. A., Yenkosky, J. P. and McCarthy, E. 2009. Avian affective dysregulation: Psychiatric models and treatment for parrots in captivity. Proceedings of the 30th Annual Association of Avian Veterinarians Conference, Minnesota. Available online. <<https://bit.ly/354Klqd>>
- Clarke, T. A., Reuter, K. E., LaFleur, M. and Schaefer, M. S. 2019. A viral video and pet lemurs on Twitter. *PLoS ONE* 14, 1: e02085747. <<https://doi.org/10.1371/journal.pone.0208577>>
- Czaja, R., Wills, A., Hanitriniaina, S., Reuter, K. E., and Sewall, B. J. 2015. Consumption of domestic cat in Madagascar: Frequency, purpose, and health implications. *Anthrozoös* 28, 3: 469–482. <<https://doi.org/10.1080/08927936.2015.1052280>>
- del Hoyo, J., Elliott, A. and Sargatal, J. (1997). *Handbook of the Birds of the World, Vol. 1: Ostrich to Ducks*. Lynx Edicions, Barcelona.
- Drews, C. 2002. Attitudes, knowledge and wild animals as pets in Costa Rica. *Anthrozoös* 15, 2: 119–138. <<https://doi.org/10.2752/089279302786992630>>
- Engebretson, M. 2006. The welfare and suitability of parrots as companion animals: a review. *Animal* 15: 263–276. Available online. <<http://shorturl.at/1UY48>>
- FAO. 2011. *International Trade in Wild Birds and Related Bird Movements, in Latin America and the Caribbean*. Animal Production and Health Paper No. 166. FAO, Rome. Available online. <<http://www.fao.org/docrep/013/i0708e/i0708e00.pdf>>
- Grant, R. A., Montrose, V. T. and Wills, A. P. 2017. ExNOTic: should we be keeping exotic pets? *Animals* 7, 6: #47. <<https://doi.org/10.3390/ani7060047>>
- Hino, T. 2002. Breeding bird community and mixed-species flocking in a deciduous broad-leaved forest in western Madagascar. *Ornithological Science* 1, 2: 111–116. <<https://doi.org/10.2326/osj.1.111>>
- Martin, R. O., Perrin, M. R., Boyes, R. S., Abebe, Y. D., Annorbah, N. D., et al. 2014. Research and conservation of the larger parrots of Africa and Madagascar: a review of knowledge gaps and opportunities. *Ostrich* 85, 3: 205–233. <<https://doi.org/10.2989/00306525.2014.948943>>
- McBride, P. 1996. Concern for the Greater Vasa Parrot. *PsittaScene* 8, 2: 10. Available online. <[https://www.parrots.org/files/psitta/435/ps\\_8\\_2\\_may\\_96.pdf](https://www.parrots.org/files/psitta/435/ps_8_2_may_96.pdf)>
- Morales, H. A. 2005. Fauna silvestre en condiciones de cautividad doméstica en Costa Rica: problemática y soluciones. *Revista Biocenosis* 19, 2: 31–37. Available online <<https://revistas.uned.ac.cr/index.php/biocenosis/article/view/1324/1399>>
- Olah, G., Butchart, S. H. M., Symes, A., Guzman, I. M., Cunningham, R., et al. 2016. Ecological and socio-economic factors affecting extinction risk in parrots. *Biodiversity and Conservation* 25: 205–223. <<https://doi.org/10.1007/s10531-015-1036-z>>
- Paterson, S. 2008. *Skin Diseases of Exotic Pets*. Wiley- Blackwell, Hobokrn, NJ.
- Pires, S., Schneider, J. and Herrera, M. 2016. Organized crime or crime that is organized? The parrot trade in the neotropics. *Trends in Organized Crime* 19: 4–20. <<https://doi.org/10.1007/s12117-015-9259-7>>
- Reuter, K. E. and Schaefer, M. S. 2016. Captive conditions of pet lemurs in Madagascar. *Folia Primatologica* 87: 48–63. <<https://doi.org/10.1159/000444582>>
- Reuter, K. E. and Schaefer, M. S. 2017. Motivations for the ownership of captive lemurs in Madagascar. *Anthrozoös* 30, 1: 33–46. <<https://doi.org/10.1080/08927936.2017.1270589>>
- Reuter, K. E., Clarke, T. A., LaFleur, M., Rodriguez, L., Hanitriniaina, S. and Schaefer, M. S. 2017a. Trade of parrots in urban areas of Madagascar. *Madagascar Conservation & Development* 12, 1: 41–48. <<https://doi.org/10.4314/mcd.v12i1.5>>

- Reuter, K. E., Rodriguez, L., Hanitriniaina, S. and Schaefer, M. S. 2017b. Ownership of parrots in Madagascar: Extent and conservation implications. *Oryx* 53, 33: 582–588. <<https://doi.org/10.1017/S003060531700093X>>
- Ritchie, B. W., Gregory, C. R., Latimer, K. S., Pesti, D., Campagnoli, R. and Lukert, P. D. 2000. A review of the most common viruses affecting Psittaciformes. *International Zoo Yearbook* 37, 1: 257–273. <<https://doi.org/10.1111/j.1748-1090.2000.tb00731.x>>
- RSPCA (Royal Society for the Prevention of Cruelty to Animals). 2019. What size enclosure does my pet bird need? Available online. <<http://shorturl.at/E0UZ5/>>
- Shaw, G. A. 1885. Madagascar and France: With Some Account of the Island, Its People, Its Resources and Development. American Tract Society, New York.
- Weston, M. K. and Memon, M. A. 2009. The illegal parrot trade in Latin America and its consequences to parrot nutrition, health, and conservation. *Bird Populations* 9: 76–83. Available online. <[http://birdpop.net/pubs/files/weston/2009/552\\_Weston2009.pdf](http://birdpop.net/pubs/files/weston/2009/552_Weston2009.pdf)>
- Young, A. M., Hobson, E. A., Lackey, L. B. and Wright, T. F. 2012. Survival on the ark: life- history trends in captive parrots. *Animal Conservation* 15, 1: 28–43. <<https://doi.org/10.1111/j.1469-1795.2011.00477.x>>