

Cuban Journal of
Forest Sciences

CFORES

Volume 11, Issue 3; 2023

Illegal capture and trade of wild birds in the town "Finca Pedregal Dagame" Artemisa municipality, Artemisa province

Captura y comercio ilegal de aves silvestres en localidad "Finca Pedregal Dagame" municipio Artemisa, provincia Artemisa

Captura e comércio ilegal de aves silvestres na localidade "Finca Pedregal Dagame", município de Artemisa, província de Artemisa

Fernando R. Hernández Martínez^{1*}  , Yatsunaris Alonso Torrens¹ 

¹ University of Pinar del Río "Hermanos Saíz Montes de Oca". Pinar del Río, Cuba.

*Corresponding author: fhernandez@upr.edu.cu

Received: 03/10/2023

Approved: 07/12/2023

ABSTRACT

The research was carried out in the municipality of Artemisa, province of Artemisa in the town "Finca Pedregal Dagame" with the objective of evaluating the behavior of the illegal capture and trade of wild birds in said place, in the period between October 2020 and January 2021. To this end, a survey was applied to 21 people who are dedicated to poaching and illegal trade in wild birds for various purposes, identifying a total of ten species



belonging to three orders and seven families. Social, economic and environmental indicators were evaluated, with the majority of respondents being pre -university. It was proven that 70 % of the species are used as pets and for sale, 20 % are used for pets, for sale and other functions, while 10 % are used for sale and other functions; As for the sales prices, they range from 10 to 400 pesos in national currency, with the most commercially in demand being *Passerina ciris* , *Passerina caerulea* and *Pheucticus lidovicianus*. Of the bird species identified for illegal trade, 50 % are permanent residents (PR), 40 % are winter residents (RI) and 10% are bimodal residents (RB) and according to their degree of threat, five species are least concern (LC) and vulnerable (V).

Keywords: poaching, illegal trade, wild birds

RESUMEN

La investigación se llevó a cabo en el municipio de Artemisa, provincia de Artemisa en la localidad "Finca Pedregal Dagame" con el objetivo de evaluar el comportamiento de la captura y comercio ilegal de aves silvestres en dicho lugar, en el período comprendido entre octubre de 2020 y enero del 2021. Para ello, se aplicó una encuesta a 21 personas que se dedican a la caza furtiva y comercio ilegal de las aves silvestres para diversos fines, identificándose un total de diez especies pertenecientes a tres órdenes y siete familias. Se evaluaron indicadores sociales, económicos y medio ambientales siendo la mayoría de los encuestados preuniversitarios. Se comprobó que el 70 % de las especies son usadas como mascotas y para la venta, el 20 % destinadas a mascotas, a la venta y a otras funciones, mientras que el 10 % son empleadas para venta y otras funciones; en cuanto a lo precios de venta oscilan de 10 y 400 pesos en moneda nacional, siendo las de más demanda comercial *Passerina ciris*, *Passerina caerulea* y *Pheucticus lidovicianus*. De las especies de aves identificadas para el comercio ilegal el 50 % son residentes permanentes (RP), el 40 % son residentes de invierno (RI) y el 10 % residentes bimodales (RB) y según su grado de amenaza, cinco especies son de preocupación menor (LC) y una vulnerable (V).



Palabras clave: caza furtiva, comercio ilegal, aves silvestres.

RESUMO

A pesquisa foi realizada no município de Artemisa, província de Artemisa, na localidade "Finca Pedregal Dagame", com o objetivo de avaliar o comportamento da captura e comércio ilegal de aves silvestres nesse local, no período entre outubro de 2020 e janeiro de 2021. Para isso, foi aplicada uma pesquisa a 21 pessoas envolvidas na caça e no comércio ilegal de aves silvestres para diversos fins, identificando um total de 10 espécies pertencentes a 3 ordens e 7 famílias. Foram avaliados indicadores sociais, econômicos e ambientais, sendo que a maioria dos entrevistados eram estudantes pré-universitários. Constatou-se que 70 % das espécies são usadas como animais de estimação e para venda, 20 % são usadas como animais de estimação, para venda e para outros fins, enquanto 10 % são usadas para venda e outros fins; os preços de venda variam de 10 a 400 pesos em moeda nacional, sendo que as espécies mais procuradas comercialmente são *Passerina ciris*, *Passerina caerulea* e *Pheucticus lidovicianus*. Das espécies de aves identificadas para o comércio ilegal, 50 % são Residentes Permanentes (RP), 40 % são Residentes de Inverno (IR) e 10 % são Residentes Bimodais (BR) e, de acordo com seu grau de ameaça, cinco espécies são Menos Preocupantes (LC) e uma é Vulnerável (V).

Palavras-chave: caça furtiva, comércio ilegal, aves silvestres

INTRODUCTION

The illegal trafficking of species, although it is a problem worldwide, for Cuba it is particularly serious, if one takes into account that within the Caribbean region it is the largest island, which, together with its proximity to the continent, Diversity of ecosystems and biogeographic history makes it a key nucleus for the conservation of biodiversity in the insular Caribbean. The Cuban archipelago is home to the largest number of plant and vertebrate species in the Antilles and is home to a high percentage of exclusive species (Mancina *et al.* 2017). According to Carmona and Arango (2011), one of the greatest



implications of this problem consists of the loss of diversity generated by a strong pressure towards the extinction of species. This, together with the deterioration of the habitat due to breaks in the food chains, has implications that are can be considered catastrophic not only at a local level, but in a broader sense, at a global level. The protection of wildlife and natural heritage must be a basic ethical principle of any society that contemplates the sustainable use of natural resources, particularly biodiversity, in its development and economic model (Alonso *et al.*, 2020).

The wildlife trade is considered the third largest illegal market in the world, after drug and weapons trafficking (Wyler and Sheikh, 2008; Barber-Meyer, 2010), and is valued at ten trillion dollars year⁻¹ (Wilson-Wilde, 2010). According to the United Nations Environment Programme, nearly 100 species disappear from the planet daily due to habitat destruction, indiscriminate hunting and illegal trade (Nassar *et al.*, 2000). About a third of bird species are captured for the pet market (Harris *et al.*, 2016). This trade stands out as a major threat to many endangered species (BirdLife International, 2000), but the studies carried out are not sufficient to evaluate its real impact (Wright *et al.*, 2001). Surprisingly, there is no intense and sustained monitoring program to evaluate the effects of the trade on wild bird populations or to find ways to make it sustainable (Gilardi 2006).

The illegal trafficking of wild birds causes direct impacts on biodiversity, and reduces many populations to near extinction (TRAFFIC 2016); The extraction of birds from their natural habitats could also affect plant species, of which they are their main seed dispersers. When a species is endangered, harvested to supply the illegal trade, it can easily reach unsustainable levels (Sodhi *et al.*, 2004); The demand for attractive individuals tends to remove those with the best reproductive performance, and this reduces this parameter in subsequent generations (Paquette and Lapointe, 2007). Furthermore, this trade implies a threat to humans, native species and farmed animals (Gómez and Aguirre, 2008; Daut *et al.*, 2016); For example, the illegal transport of large quantities of live animals could facilitate the movement of pathogens to new regions (Smith *et al.*, 2009). In urban areas, escapes of caged birds are frequent (Roll, Dayan and Sim-Berloff 2008; Plasencia and Escalona (2012)



and can displace or exterminate them (MacGregor *et al.*, 2011). Likewise, they cause damage to the economy (Romero *et al.*, 2006).

On the other hand, trade conditions are degrading and those species that can establish themselves become successful colonizers (e.g. *Myiopsitta monachus* - Batllori and Nos, 1985) and/or invasive that threaten biodiversity (Wilcove *et al.*, 1998), since they compete with native species: the animals are massively caged, without water or food, they suffer from stress, fight, mutilate themselves and die (TRAFFIC 2016), and those that survive suffer from abuse with drastic consequences such as reducing their life expectancy (Vanstreels *et al.* 2010).

Birds occupy third place in pet preferences worldwide and it is estimated that their trafficking could reach three million specimens per year, of which almost 80,000 come from the Caribbean (CITES 2016). The insular Caribbean is one of the 25 most important sites in the world in terms of biodiversity conservation (Myers *et al.*, 2000). This region provides habitat for many species of resident and migratory birds (Wiancko *et al.*, 2011).

Captive bird maintenance activities are common throughout Cuba in rural and urban environments; These birds rarely come from legal breeders, and are mostly captured from the environment. For example, psittacine chicks are removed from nesting habitat for sale (Wright *et al.*, 2001; Cañizares *et al.*, 2006). Most bird species are traded as pets and a few species are used as food (Mugica *et al.*, 2006). Although there are laws prohibiting wildlife trade in Cuba, they appear to be little known and not adequately enforced, despite the presence of institutions responsible for wildlife such as the Environmental Inspection and Control Center, the Forest Ranger Corps and the National Company for the Protection of Flora and Fauna. The local bird trade could have a substantial impact on population conservation, but remains unquantified in Cuba; Furthermore, without detailed information on the species traded and the number of specimens involved, it is impossible to accurately judge the impact of this trade.



There are numerous examples that reveal the illegal capture and commercialization of several species of songbirds and ornamental birds throughout the country, many of which are endemic and a certain number of them are found in some of the categories. of threat, among them can be mention: García *et al.* (2011), González *et al.* (2012), Ferrer *et al.* (2017), Mancina *et al.* (2017), Izquierdo *et al.* (2020), González *et al.* (2020), Gómez *et al.* (2022) and Hernández *et al.* (2022). For these reasons, this study aim was to evaluate the behavior of the illegal capture and trade of wild birds in the town "Finca Pedregal Dagame" in the municipality of Artemisa, province of Artemisa.

MATERIALS AND METHODS

Location of the research area

The investigation was carried out from November 2020 to May 2021 in the town "Finca El Pedregal Dagame" 13 km away. south of the province of Artemisa.

Methods

Application of surveys

An anonymous survey was applied to people residing in the town "Finca el Pedregal Dagame" who participate in the capture and commercialization of songbirds and ornamental birds, evaluating the following indicators: economic, social, environmental and illegal trade.

To collect this information, an anonymous questionnaire was used as a fundamental tool, carried out with residents who illegally trade birds in the municipality (hunters), to find out the main problems and proposals for alternatives to minimize illegal trade, asking different questions:

Open: they allowed the respondent to freely express their considerations and information.



Closed: included the possible answers that could be selected by the respondent. In turn, the closed questions that were used were of the following types: bivalent (they gave two possible answers, which were, of course, exclusive and antonymous) and with exclusive alternatives (they offered several possible answers, but which mutually rejected each other).

In these surveys, the different species of wild birds that are most popular among the so-called birders to be kept in captivity are investigated, which are the hunting areas that they use the most in the municipality, the capture methods most used by them, the purpose of the captures, trying to determine the state of life in which the individuals are extracted from their natural state. This would allow us to know the stage of the year in which the protection mechanisms should be strengthened by the ranger corps, to avoid or minimize said captures. Likewise, the surveys include a sociocultural analysis of the birdwatchers, which would facilitate the implementation of an environmental education system for them and the population involved in a general sense. It was also considered that the fundamental objective of these individuals is to obtain money. The survey also included an analysis of the prices at which the different species of birds are quoted, to specify which of them would be the most threatened by this concept.

To process the information, the empirical method of structured surveys was used (Giraldo 2008; Jiménez *et al.*, 2010), applied with a random distribution. The number of people surveyed is calculated using the formula proposed by Gabaldon (1980) Equation 1.

$$n = \frac{NZ^2pq}{(N-1)e^2 + Z^2pq} \quad (1)$$

Where:

n: sample size

N: size of the universe (total population).

Z: confidence level of the estimate, considering 95 % confidence.

p: probability of acceptance (0.5)

q: probability of rejection (0.5);



e: error (10%)

To update the scientific names of each of the illegally traded species, as well as the category of permanence in Cuba, degree of endemism and threat status, the Annotated List of the Birds of Cuba by Navarro (2022) was taken into account.

RESULTS AND DISCUSSION

Main characteristics of social actors: level of education and occupation

Educational level of the respondents

The surveys were applied to a total of 72 people, all men and hunters, with an age average of 40 years old, those who acknowledge that they carry out illegal hunting of ten species of wild birds. The educational level of the respondents is seen in Figure 1. The results in the figure coincide with those of García *et al.* (2011) in works carried out on illegal trade in localities of eastern and western Cuba. González *et al.* (2018) point out that more and more children and young people are observed in places where birds are sold on Sundays, and that from a young age they begin to create that illicit trading mentality.

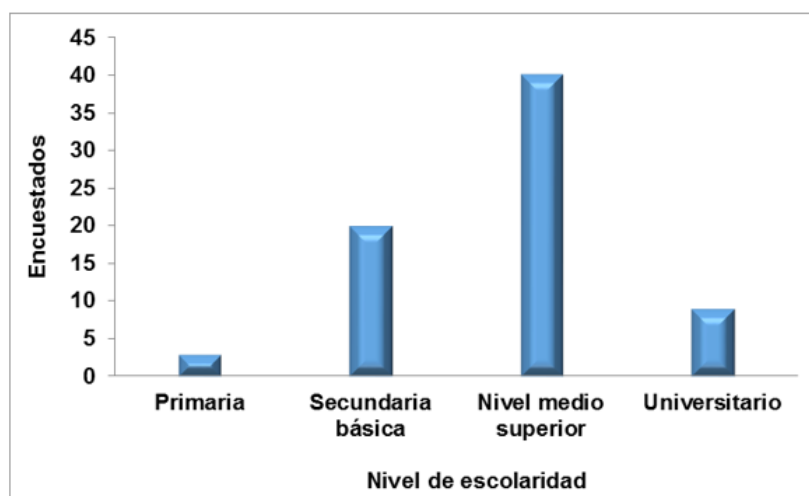


Figure 1.- Education level of the respondents



Occupation of respondents

Figure 2 shows the different occupational categories to which the people who capture and market the bird species declared by them are dedicated. They stand out with the highest percentage (57%) self-employed workers, followed by those engaged in other activities with (19%) and students with (13%) and state workers with (11%). These results coincide with those of García *et al.* (2011) in works carried out on illegal capture and trade of songbirds and ornamental birds in municipalities of the Central and Eastern region of the country, those who report the most dedicated to these activities to these same occupational categories.

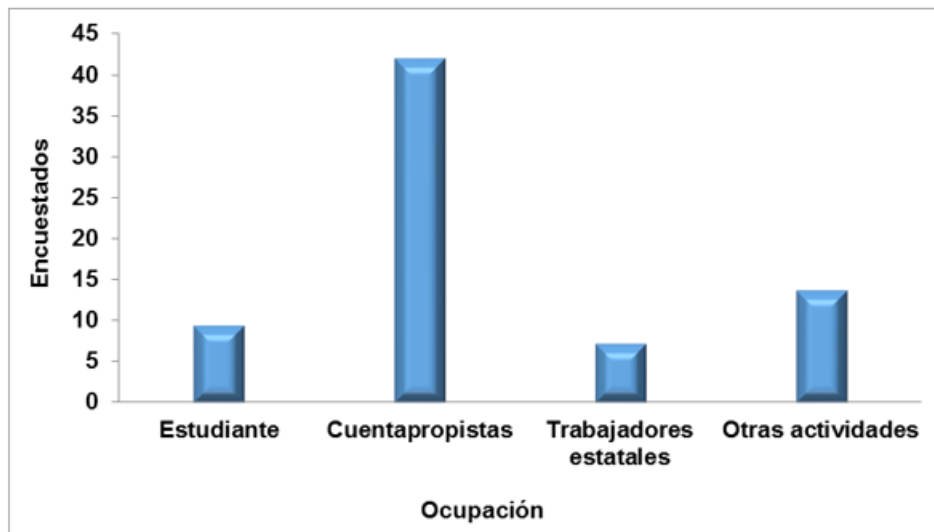


Figure 2.- Activities that illegal hunters engage in

Bird species captured and traded in the studied locality

According to the statements of the illegal hunters surveyed, the bird species that are captured and traded by them are shown in Table 1.



Table 1. - Bird species captured and marketed in the studied locality

Scientific name	Common name	Order	Family	ES	CA
<i>Passerina cyanea</i>	tile	Passerines	Cardinalidae	RI-T	L.C.
<i>Tiaris olivaceus olivaceus</i>	tomeguín	Passerines	Emberizidae	PR	L.C.
<i>Spindalis zena</i>	goatherd	Passerines	Phaenicophilidae	PR	L.C.
<i>Length malacca</i>	tricolor nun	Passerines	Estrildidae	PR	
<i>Passerina ciris ciris</i>	butterfly	Passerines	Cardinalidae	RI-T	VU
<i>Zenaida macroura macroura</i>	dove rabiche	Columbiformes	Columbidae	R.B.	
<i>Passerina caerulea</i>	tile	Passerines	Cardinalidae	RI-T	L.C.
<i>Pheucticus ludovicianus</i>	cut throat	Passerines	Cardinalidae	RI-T	L.C.
<i>Colinus virginianus</i>	quail	Galliformes	Phasianidae	PR	
<i>Patagioenas squamosa</i>	purple-necked dove	Columbiformes	Columbidae	PR	

Legend: Status (ES): RI-T= Winter Resident and Transient; RP= Permanent Resident; C-RP= Common Permanent Resident; A (local), RP=Abundant, Permanent Resident; A-RB= Abundant Bimodal Resident. Threat Category (CA): LC=Least Concern; VU=Vulnerable.

Of the ten bird species reported by illegal hunters, seven are singing and ornamental, while another three (*Zenaida macroura*, *Colinus virginianus* and *Patagioenas squamosa* are game species). The species *Zenaida macroura* and *Colinus virginianus* appear in the hunting calendar that the Ministry of Agriculture publishes each year, while for *Patagioenas squamosa* is not authorized for use, which is why the legislation in this regard is not complied with. Also when capturing *Patagioenas squamosa* violates Resolution 160/2011 of the Ministry of Science, Technology and Environment, which establishes the commitments made by Cuba with International Institutions, through which actions aimed at the conservation of species of special significance are demanded, such as: CITES (International Convention on Endangered Species of Wild Flora and Fauna), SPAW (Protocol Concerning Specially Protected Areas and Wild Flora and Fauna of the Wider Caribbean Region and CMS (Convention on the Conservation of Migratory Species of Animals Wild).



The reported species are grouped into a total of three orders, with Passeriformes being the best represented with a total of seven species, also grouping into a total of 7 families, with the Columbidae and Cardenalidae families being the ones with the highest number of species (2 and 4 respectively). The results obtained partially coincide with those of García *et al.* (2011) in the Eastern and Central region and with Ferrer *et al.* (2017) in the Central region of the country, which also report the species *Tiaris olivaceus* as commercialized, *Passerina cyanea* and *Passerina ciris*. The report of *Pheucticus lidovicianus* stands out in these results because the species was not included in the previous studies. It is distinguished by its song and its contribution to seed dispersal in the ecosystems where it lives. González *et al.* (2020) reports it among the most illegally captured birds in Cuba.

Time of year and state of life in which birds are captured in the wild by local illegal hunters

The captures of the winter migratory bird species that visit us are carried out during the months of October to March, when they are in the country, while the permanent residents are captured at any time of the year.

The state of life in which these birds are captured in nature, as reported by those surveyed, appear in Table 2.

Table 2. - State of life in which the species reported by the respondents are captured

Species	Eggs	Pigeons	Youth	Adults
<i>Tiaris olivaceus</i>		x	x	x
<i>Spindalis zena</i>				x
<i>Length malacca</i>				x
<i>Passerina ciris</i>			x	x
<i>Zenaida macroura</i>				x
<i>Passerina caerulea</i>			x	x
<i>Pheucticus lidovicianus</i>			x	x
<i>Colinus virginianus</i>				x
<i>Patagioenas squamosa</i>				x
<i>Passerina cyanea</i>				x



According to survey results, 31% are extracted in the juvenile stage, 62.5% in the adult stage only and 6% in the chick stage. The results regarding the different states in which birds are extracted from nature coincide with those of Ferrer *et al.* (2017) and Gómez *et al.* (2022), who carried out studies on illegal trade in the eastern and central regions of Cuba and obtained that the majority of birds are captured in the juvenile and adult stages.

Capture methods used to obtain birds from the wild

The reguilet or cage trap (Figure 3 a, b, c) is the method most used by illegal hunters to capture birds, but not for all of them. This method is only used in *Passerina* species *cyanea*, *Tiaris olivaceus*, *Lonchura malacca*, *Passerina caerulea* and *Pheucticus lidovicianus*, while for the goatherds they use lasos and the lyre (Figure 4), a somewhat dangerous instrument for the birds because it has glue that can harm the animal. To *Zenaida macroura*, *Colinus virginianus* and *Patagioenas squamosa* are used other methods as the use of boxes and snare traps.



Figure 3.- Different types of trap cages: for capturing butterflies A; for tile and tile B and for cut-out C.





Figure 4. - Lira used to capture goatherds

These same means used to capture birds in nature are those mentioned by García *et al.* (2011) and Ferrer *et al.* (2017).

Use of the bird species that are captured

The uses that respondents propose giving captured birds are reflected in Figure 5, where it can be seen that 10 % corresponds to sale and other activities, 20 % are intended for pets, for sale and other activities, and 70% are used for pets, for sale and other activities. of these species are intended for pets and for sale. Results that coincide with the criteria of García *et al.* (2011), Ferrer *et al.* (2017) and González *et al.* (2020) who propose that illegally captured birds are used as pets and many of them are extracted from the country across borders, others are used in religious activities and also practice singing competitions, with some species (*Phonicara canora*) being used in fights as they were fighting cocks.



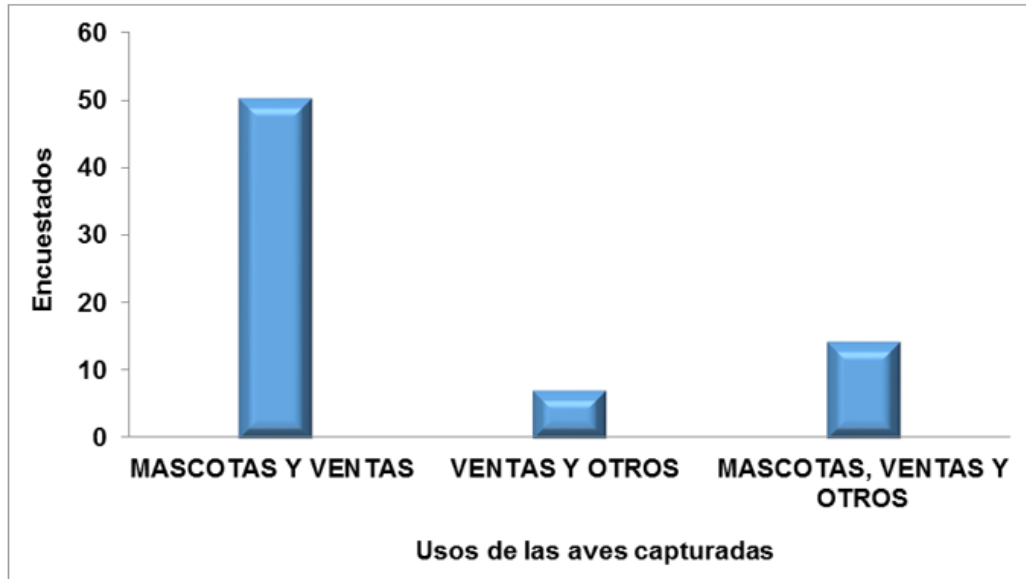


Figure 5. - Different uses given to captured birds

Prices at which captured bird species are marketed

Table 3 shows the prices at which wild bird species illegally captured in the locality are marketed. The highest value (400 CUP) corresponded to *Passerina ciris*, followed in order of importance by the *Pheucticus species. lidovicianus* and *Passerina caerulea*, with prices that fluctuate between 250 and 300 pesos. It should be noted that these prices are set for the species after they have been captured and have learned to feed. These prices vary depending on their stage of development (juvenile or adult), plumage color, as well as their song. According to the criteria of those surveyed, of the species captured, the most preferred are the following: butterfly, bluebird, bluebird and cutthroat. García *et al.* (2011), Ferrer *et al.* (2017) and Gómez *et al.* (2022) also refer to these species as being among the most preferred and marketed throughout the country.



Table 3. - Price at which the species that are captured are marketed

Species	CUP - PRICES
<i>Passerina cyanea</i>	fifty
<i>Tiaris olivaceus</i>	10
<i>Spindalis zena</i>	40
<i>Length malacca</i>	80
<i>Passerina ciris</i>	400
<i>Zenaida macroura</i>	10
<i>Passerine caerulea</i>	250-300
<i>Pheucticus lidovicianus</i>	250-300
<i>Colinus virginianus</i>	60
<i>Patagioenas squamosa</i>	twenty

Classification of birds according to their permanence and degree of threat

The captured species are grouped according to their permanence in the national territory into: five Permanent Residents (RP), four Winter Residents (RI) and one Bimodal Resident (RB). According to the degree of threat, five species are of least concern (LC) and one is in the vulnerable category (VU). The species classified as vulnerable is *Passerina ciris*, of whose specimens that visit us during the winter period numerous individuals are captured each year in different regions of the country, many of which die as a result of their poor handling since they are very easily stressed by be captured.

CONCLUSIONS

The highest incidence of illegal capture of birds are on *Passerina cyanea*, *Tiaris olivaceus*, *Lonchura punctulata* and *Pheucticus lidovicianus*.



In the studied locality, ten species of wild birds are captured and traded, the most representative are: *Passerina cyanea*, *Tiaris olivaceus*, *Lonchura punctulata* and *Pheucticus ludovicianus*.

Self-employed people and people with a higher level of education are those who have the greatest impact on the illegal trade in wild birds, with *Pheucticus* standing out as the most traded species: *Pheucticus ludovicianus*, *Passerina ciris* y *Passerina caerulea*.

The self-employed and people with a pre-university level of education are those with the highest incidence in the illegal trade of wild birds in the studied locality.

REFERENCES

- BARBER-MEYER, S.M., 2010. Dealing with the Clandestine Nature of Wildlife-Trade Market Surveys. *Conservation Biology* [en línea], vol. 24, no. 4, [consulta: 27 diciembre 2023]. ISSN 0888-8892. Disponible en: <https://www.jstor.org/stable/40864190>.
- BATLLORI, X. y NOS, R., 2008. Presencia de la Cotorrita Gris (*Myiopsitta monachus*) y de la Cotorrita de Collar (*Psittacula krameri*) en el Área Metropolitana de Barcelona. *Miscel·lània Zoològica; Vol.: 9* [en línea], vol. 9, Disponible en: https://www.researchgate.net/publication/39406794_Presencia_de_la_Cotorrita_Gris_Myiopsitta_monachus_y_de_la_Cotorrita_de_Collar_Psittacula_krameri_en_el_Area_Metropolitana_de_Barcelona.
- CARMONA, J.E. y ARANGO, S.E., 2011. Reflexiones bioéticas acerca del tráfico ilegal de especies en Colombia. *Revista Latinoamericana de Bioética* [en línea], vol. 11, no. 2, [consulta: 27 diciembre 2023]. ISSN 1657-4702, 2462-859X. Disponible en: <https://www.redalyc.org/articulo.oa?id=127024227008>.
- CRANE, R. y NASAR-MONTOYA, F., 1999. *Actitudes hacia la fauna en Latinoamérica* [en línea]. S.l.: BPR Publishers. ISBN 978-958-33-1732-3. Disponible en:



https://books.google.com/cu/books/about/Actitudes_hacia_la_fauna_en_Latinoam%C3%A9rica.html?id=uCkgAQAIAAJ&redir_esc=y.

FERRER-SÁNCHEZ, Y., ABASOLO-PACHECO, F., PLASENCIA-VÁZQUEZ, A.H. y RUIZ, I., 2017 Aves silvestres como mascotas en la región central de Cuba: Elementos para una estrategia de mitigación. *Revista de Biología Tropical* [en línea], vol. 65, no. 3, [consulta: 27 diciembre 2023]. Disponible en: <https://www.redalyc.org/journal/449/44954192011/html/>.

GABALDÓN MEJÍA, N., 1980. *Algunos conceptos de muestreo*. 3 ed. caracas: Universidad Central de Venezuela, Facultad de Ciencias Económicas y Sociales, División de Publicaciones. Cuadernos del Instituto. Serie estadística, N°-1, HA33

GILARDI, J.D., 2006. Captured for conservation: will cages save wild birds? A response to Cooney & Jepson. *Oryx* [en línea], vol. 40, no. 1, [consulta: 27 diciembre 2023]. ISSN 1365-3008, 0030-6053. DOI 10.1017/S0030605306000160. Disponible en: <https://www.cambridge.org/core/journals/oryx/article/captured-for-conservation-will-cages-save-wild-birds-a-response-to-cooney-jepson/EEDAC60267F3485EC0ED7602E75E6AC3#>.

GÓMEZ, A. y AGUIRRE, A.A., 2008. Infectious diseases and the illegal wildlife trade. *Annals of the New York Academy of Sciences* [en línea], vol. 1149, ISSN 1749-6632. DOI 10.1196/annals.1428.046. Disponible en: <https://pubmed.ncbi.nlm.nih.gov/19120165/>.

GÓMEZ, MATOS, Y., ALONSO TORRENS, Y., HERNÁNDEZ MARTÍNEZ, F.R., GARCÍA BACALLAO, J.M., RAVELO PIMENTEL, K., MARTÍNEZ MIRANDA, I., PÉREZ BÁEZ, S.A. y CUESTA MARTÍNEZ, L., 2022. Especies de aves más comercializadas ilegalmente y su abundancia en el municipio Niceto Pérez, Guantánamo, Cuba. "XI Simposio Internacional sobre Manejo Sostenible de los Recursos Forestales" [en línea]. Pinar del Río, Cuba: Universidad de Pinar del Río "Hermanos Saíz Montes de Oca", Disponible en: <https://memorias-eventos.upr.edu.cu/>.



GONZALEZ ALONSO, H., MORERA, M., AYÓN, X. y RODRÍGUEZ CABRERA, T., 2020.

Aves Silvestres más capturadas ilegalmente en CUBA. Guía de identificación [en línea]. S.l.:

AMA. ISBN 978-959-300-180-9. Disponible en:

https://www.researchgate.net/publication/353467118_Aves_Silvestres_mas_capturadas_ilegalmente_en_CUBA_Guia_de_identificacion.

GONZALEZ ALONSO, H., RODRIGUEZ-SCHETTINO, L., RODRÍGUEZ, A., MANCINA,

C. y RAMOS, I., 2012. *Libro Rojo de los Vertebrados de Cuba* [en línea]. La Habana, Cuba:

Publisher: Editorial Academia. ISBN 978-959-270-234-9. Disponible en:

https://www.researchgate.net/publication/234145087_Libro_Rojo_de_los_Vertebrados_de_Cuba.

HARRIS, J.B.C., TINGLEY, M.W., HUA, F., YONG, D.L., ADENEY, J.M., LEE, T.M.,

MARTHY, W., PRAWIRADILAGA, D.M., SEKERCIOGLU, C.H., SUYADI, null,

WINARNI, N. y WILCOVE, D.S., 2017. Measuring the impact of the pet trade on

Indonesian birds. *Conservation Biology: The Journal of the Society for Conservation Biology*

[en línea], vol. 31, no. 2, ISSN 1523-1739. DOI 10.1111/cobi.12729. Disponible en:

<https://pubmed.ncbi.nlm.nih.gov/28146342/>.

HERNÁNDEZ MARTÍNEZ, F.R., GÓMEZ MATOS, Y., GARCÍA BACALLAO, J.M. y

MARTÍNEZ MIRANDA, I., 2022. Diagnóstico sobre la conservación de la fauna

silvestre en el sector forestal en Cuba. *Avances* [en línea], vol. 24, no. 2, [consulta: 27

diciembre 2023]. ISSN 1562-3297. Disponible en:

<https://dialnet.unirioja.es/servlet/articulo?codigo=8938910>.

DAUT, E.F., LAHODNY, G., PETERSON, M.J. y IVANEK, R., 2016. Interacting Effects of

Newcastle Disease Transmission and Illegal Trade on a Wild Population of White-

Winged Parakeets in Peru: A Modeling Approach. *PloS One*, vol. 11, no. 1, ISSN 1932-

6203. DOI 10.1371/journal.pone.0147517.



IZQUIERDO, K., VARELA, R., CÁCERES, A. y MÁRQUEZ, C.A., 2020. Ensamblaje de aves en el encinar de Manuel Lazo, Sandino, Pinar del Río, Cuba - PDF Descargar libre. *Avances* [en línea], vol. 24, no. 2, [consulta: 27 diciembre 2023]. Disponible en: <https://dialnet.unirioja.es/descarga/articulo/8938910.pdf>.

MACGREGOR-FORS, I., CALDERÓN-PARRA, R., MELÉNDEZ-HERRADA, A., LÓPEZ-LÓPEZ, S. y SCHONDUBE, J.E., 2011. Pretty, but dangerous! Records of Monk Parakeets (*Myiopsitta monachus*) in Mexico and their possible invasion effects. *Revista Mexicana de Biodiversidad* [en línea], vol. 82, no. 3, [consulta: 27 diciembre 2023]. ISSN 2007-8706. DOI 10.22201/ib.20078706e.2011.3.721. Disponible en: <https://revista.ib.unam.mx/index.php/bio/article/view/721>.

MANCINA, CALOS, A., FERNÁNDEZ DE ARCILA FERNÁNDEZ, R., CRUZ FLORES, D.D., CASTAÑEIRA COLOMÉ, M.A. y GONZÁLEZ ROSSELL, A., 2017. *Diversidad biológica terrestre de Cuba. Diversidad biológica de Cuba: métodos de inventario, monitoreo y colecciones biológicas* [en línea]. La Habana, Cuba: Editorial AMA. [consulta: 27 diciembre 2023]. Disponible en: <https://www.undp.org/es/latin-america/publicaciones/diversidad-biologica-de-cuba-metodos-de-monitoreo-y-colecciones-biologicas>.

MINISTERIO DE CIENCIA TECNOLOGÍA Y MEDIO AMBIENTE. CITMA, 2011. *Regulaciones para el control y la protección de especies de especial significación para la diversidad biológica en el país.. Gaceta Oficial de la República de Cuba (Ordinaria 26), de 4 de agosto de 2011.* 2011. S.l.: s.n. RESOLUCIÓN 160 (2011).

MYERS, N., MITTERMEIER, R.A., MITTERMEIER, C.G., DA FONSECA, G.A. y KENT, J., 2000. Biodiversity hotspots for conservation priorities. *Nature* [en línea], vol. 403, no. 6772, ISSN 0028-0836. DOI 10.1038/35002501. Disponible en: <https://pubmed.ncbi.nlm.nih.gov/10706275/>.



NAVARRO, N., 2022. *Lista Anotada de las Aves de Cuba* [en línea]. Edición, número 4. S.l.: Ediciones Mundos. [consulta: 27 diciembre 2023]. Disponible en: <https://edicionesnuevosmundos.com/2021/03/07/lista2021n4/>.

PLASENCIA-VÁZQUEZ, A.H. y ESCALONA-SEGURA, G., 2012. Nuevo registro del loro frente blanca (*Amazona albifrons*) para la Isla de Cozumel, Quintana Roo, México. *Huitzil* [en línea], vol. 13, no. 1, [consulta: 27 diciembre 2023]. ISSN 1870-7459. Disponible en: http://www.scielo.org.mx/scielo.php?script=sci_abstract&pid=S1870-74592012000100006&lng=es&nrm=iso&tlng=es.

RIOUX PAQUETTE, S. y LAPOINTE, F.-J., 2007. The use of shell morphometrics for the management of the endangered malagasy radiated tortoise (*Geochelone radiata*). *Biological Conservation* [en línea], vol. 134, no. 1, [consulta: 27 diciembre 2023]. ISSN 0006-3207. DOI 10.1016/j.biocon.2006.08.022. Disponible en: <https://www.sciencedirect.com/science/article/pii/S0006320706003132>.

ROLL, U., DAYAN, T. y SIMBERLOFF, D., 2008. Non-indigenous terrestrial vertebrates in Israel and adjacent areas. *Biological Invasions* [en línea], vol. 10, no. 5, [consulta: 27 diciembre 2023]. ISSN 1573-1464. DOI 10.1007/s10530-007-9160-7. Disponible en: <https://doi.org/10.1007/s10530-007-9160-7>.

ROMERO-BALDERAS, K.G., NARANJO, E.J., MORALES, H.H. y NIGH, R.B., 2006. Daños ocasionados por vertebrados silvestres al cultivo de maíz en la selva lacandona, chiapas, México. *Interciencia* [en línea], vol. 31, no. 4, [consulta: 27 diciembre 2023]. ISSN 0378-1844. Disponible en: http://ve.scielo.org/scielo.php?script=sci_abstract&pid=S0378-18442006000400007&lng=es&nrm=iso&tlng=es.

SMITH, K., BEHRENS, M., SCHLOEGEL, L., MARANO, N., BURGIEL, S. y DASZAK, P., 2009. Reducing the Risks of the Wildlife Trade. *Science (New York, N.Y.)* [en línea], vol. 324, DOI 10.1126/science.1174460. Disponible en: <https://www.science.org/doi/10.1126/science.1174460>.



SOCIEDAD CUBANA DE ZOOLOGÍA, SOCIEDAD CUBANA DE BOTÁNICA, FUNDACIÓN ARIGUANABO, y FUNDACIÓN ANTONIO NÚÑEZ JIMÉNEZ, 2020. Declaración de la Sociedad Cubana de Zoología, Sociedad Cubana de Botánica, Fundación Ariguanabo y Fundación Antonio Núñez Jiménez, acerca del comercio ilegal de especies silvestres en Cuba. *Revista Cubana de Ciencias Biológicas* [en línea], vol. 8, no. 2, [consulta: 27 diciembre 2023]. ISSN 2307-695X. Disponible en: <https://revistas.uh.cu/rccb/article/view/984/827>.

SODHI, N.S., KOH, L.P., BROOK, B.W. y NG, P.K.L., 2004. Southeast Asian biodiversity: an impending disaster. *Trends in Ecology & Evolution* [en línea], vol. 19, no. 12, [consulta: 27 diciembre 2023]. ISSN 0169-5347. DOI 10.1016/j.tree.2004.09.006. Disponible en: <https://www.sciencedirect.com/science/article/pii/S0169534704002666>.

VALDÉS, L.M., 2006. *Aves acuáticas en los humedales de Cuba* [en línea]. La Habana Cuba: Editorial Científico-Técnica. ISBN 978-959-05-0407-5. Disponible en: https://books.google.com.cu/books/about/Aves_acu%C3%A1ticas_en_los_humedales_de_Cuba.html?id=OWKJngEACAAJ&redir_esc=y.

VANSTREELS, R.E.T., TEIXEIRA, R.H.F., CAMARGO, L.C., NUNES, A.L.V. y MATUSHIMA, E.R., 2010. Impacts of animal traffic on the Brazilian Amazon parrots (Amazona species) collection of the Quinzinho de Barros Municipal Zoological Park, Brazil, 1986-2007. *Zoo Biology* [en línea], vol. 29, no. 5, ISSN 1098-2361. DOI 10.1002/zoo.20300. Disponible en: <https://pubmed.ncbi.nlm.nih.gov/20069544/>.

WIANCKO, E., NOL, E., PARADA, A. y BURKE, D.M., 2011. Landbird Richness and Abundance in Three Coastal Habitats Near Resorts in Cayo Coco, Cuba - Riqueza y Abundancia de Aves Terrestres en Tres Hábitats Costeros Cercanos a Establecimientos Turísticos en Cayo Coco, Cuba. *The Condor* [en línea], vol. 113, no. 1, [consulta: 27 diciembre 2023]. ISSN 0010-5422. DOI 10.1525/cond.2011.100045. Disponible en: <https://www.jstor.org/stable/10.1525/cond.2011.100045>.



WILCOVE, D.S., ROTHSTEIN, D., DUBOW, J., PHILLIPS, A. y LOSOS, E., 1998. Quantifying Threats to Imperiled Species in the United States. *BioScience* [en línea], vol. 48, no. 8, [consulta: 27 diciembre 2023]. ISSN 0006-3568. DOI 10.2307/1313420. Disponible en: <https://www.jstor.org/stable/1313420>.

WILSON-WILDE, L., 2010. Wildlife crime: a global problem. *Forensic Science, Medicine, and Pathology* [en línea], vol. 6, no. 3, [consulta: 27 diciembre 2023]. ISSN 1556-2891. DOI 10.1007/s12024-010-9167-8. Disponible en: <https://doi.org/10.1007/s12024-010-9167-8>.

WRIGHT, T.F., TOFT, C.A., ENKERLIN-HOEFLICH, E., GONZALEZ-ELIZONDO, J., ALBORNOZ, M., RODRÍGUEZ-FERRARO, A., ROJAS-SUÁREZ, F., SANZ, V., TRUJILLO, A., BEISSINGER, S.R., A., V.B., A., X.G., BRICE, A.T., JOYNER, K., EBERHARD, J., GILARDI, J., KOENIG, S.E., STOLESON, S., MARTUSCELLI, P., MEYERS, J.M., RENTON, K., RODRÍGUEZ, A.M., SOSA-ASANZA, A.C., VILELLA, F.J. y WILEY, J.W., 2001. Nest Poaching in Neotropical Parrots. *Conservation Biology* [en línea], vol. 15, no. 3, [consulta: 27 diciembre 2023]. ISSN 0888-8892. Disponible en: <https://www.jstor.org/stable/3061450>.

WYLER, L.S. y SHEIKH, P.A., 2016. International illegal trade in wildlife: Threats and U.S. policy. En: journalAbbreviation: Combating Wildlife Trafficking: National Strategy, Implementation Plan and Restrictions on Elephant Ivory Trade, *Combating Wildlife Trafficking: National Strategy, Implementation Plan and Restrictions on Elephant Ivory Trade* [en línea]. Washington DC: Library of Congress Washington DC Congressional Research Service, pp. 79-112. Disponible en: https://www.researchgate.net/publication/318585646_International_illegal_trade_in_wildlife_Threats_and_US_policy.



Conflict of interests:

The authors declare not to have any interest conflicts.

Authors' contribution:

The authors have participated in the writing of the work and analysis of the documents.



This work is licensed under a Creative Commons Attribution-NonCommercial 4.0
International license.

Copyright (c) 2023 Fernando R. Hernández Martínez, Yatsunaris Alonso Torrens

