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Cover Photo
Ridgway's Hawk *(Buteo ridgwayi)* and Hispaniolan Mango *(Anthracothorax dominicus)* photographed in Dominican Republic © Dax Roman

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Red de Rapaces Neotropicales

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The NRN is a membership-based organization. Its goal is to aid the research and conservation of Neotropical raptors by promoting communication and collaboration among biologists, raptor enthusiasts, and other conservationists working in the Neotropics. To join please e-mail the NRN coordinator, Marta Curti, at mcurti@peregrinefund.org, stating your interest in Neotropical raptor research and conservation.

Conserving a Rediscovered Population of Ridgway's Hawk (*Buteo ridgwayi*) in Haiti

By **Anderson Jean, Maxon Fildor, François Jephtanie, Bony Fanel, Aubourg Wilson,** and **Bazil Brinel**
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The Ridgway's Hawk (*Buteo ridgwayi*) is a Critically Endangered, diurnal bird of prey endemic to the island of Hispaniola (Jean et al 2023). It has a varied diet including snakes, lizards, frogs, rodents, bats, small birds, and insects (Woolaver 2013). Pairs are generally monogamous (McClure et al 2017) and will mate for life. Both male and female participate in nest building, incubation, and care for their young (Woolaver et al 2015).

Once found throughout much of Hispaniola - a Caribbean Island that encompasses Dominican Republic and Haiti - the Ridgway's Hawk population has diminished over the past few decades due to human persecution, parasitic nest fly (*Philornis* sp) infestations, and other factors (Quiroga et al 2020, Woolaver et al 2015). While a remnant population held strong in Los Haitises National Park in Dominican Republic, the last known sighting of this species in Haiti occurred more than 3 decades ago (Schwartz and Klinikowski 1965, Keith et al. 2003).

The Peregrine Fund began working to conserve this species in the Dominican Republic in 2002.

Figure 2. **View of Petite Cayemite. Photo © ACSEH**

Figure 2. **Preparing to return a nestling *Buteo ridwayi* to its nest after banding. Photo © ACSEH**

In 2007, Anderson Jean joined The Peregrine Fund and local partners, the Hispaniola Ornithological Society (SOH), in Los Haitises National Park to learn about the project. The purpose of this trip was to give him a chance to observe the Ridgway's Hawk in the hopes that he would be able to identify it if he ever came across one in Haiti. After time spent in the field, observing pairs, banding nestlings, and hiking through the karstic and forested habitats of the park, he returned home. Once back in his native Haiti, he continued to work for conservation on the island, focusing his attention on the local avifauna.

Twelve years later, on 19 August 2019, Anderson and Maxon Fildor were conducting bird surveys in Les Cayemites, which is composed of two islands - Petite Cayemite and Grande Cayemite - located in the Gulf of Gonâve off the coast of southwestern Haiti. While on Petite Cayemite, they spotted a medium-sized, juvenile raptor perched in a tree. They carefully documented their sighting with photos and videos of the hawk vocalizing. Peregrine Fund biologists were able to confirm that this observation was indeed of a Ridgway's Hawk (Jean et al 2023).

Since then, Anderson, Maxon and the rest of our team have been conducting yearly surveys during Ridgway's hawk breeding season (between January and July) in Les Cayemites to gather more information on the population size, behavior, nesting sites, and diet of this small population. To carry out these surveys, we apply the strip transect

Figure 3. **Juvenile *Buteo ridwayi* in Grande Cayemite. Photo © ACSEH**

method, which consists of walking along existing trails on the islands and recording the position where we observe or hear Ridgway's Hawks. We enhance these efforts using the playback method, through which we randomly play the call of Ridgway's Hawk using the Merlin app on a ZTE blade smartphone, linked with a Bluetooth speaker. If an individual responds, we record its location with a GPS and then actively search for its nest nearby. When a nest is detected, our team visits it weekly to record the number of eggs, the nest content, period of incubation, hatching date, and nest success.

In 2023, we intensively surveyed for Ridgway's Hawk in 29 locations, 10 of which are new and located on the east side of the Grande Cayemite Island. Throughout this region, we detected 6 new individuals, which raised the number of Ridgway's Hawk detected this year to 28 individuals. Our team also located 5 nests, four of which are on Grande Cayemite and one on Petite Cayemite. In exciting news, we were able to band two nestlings – the first banded Ridgway's Hawks in Haiti in decades – or perhaps ever!

Another important aspect of our work aims to reduce anthropogenic threats that affect the local population of Ridgway's Hawk. To do so, our team works directly with the human communities to create awareness about the hawk. This year, we visited several schools and participated in two public activities: the Endemic Birds Festival and the newly created Ridgway's Hawk and Raptor Festival. The main goal of these activities was to increase people's ability to identify the different raptor species, understand their importance, and learn how everyone can help to mitigate the threats these groups of birds are facing.

We also speak frequently with as many local farmers as possible. Many farmers believe that drought, and the subsequent loss of crops and cattle, is brought about because a Ridgway's Hawk is nesting on their farmland. Therefore, farmers often destroy the nests, and many have cut down large numbers of mature *Bursera simaruba* trees to reduce the possibility that hawks will nest on

their land. This wood is then used for making charcoal which is an alternative source of income for them. When speaking with these farmers, our team emphasizes what we have learned about the species during our research and the important role these raptors play in the environment, especially as controllers of rodent populations. This year alone, we reached 620 students 20 teachers during our school visits, and around 800 individuals during the community activities.

Even though we have been studying this species for the past four years, there is still so much we hope to learn about the breeding population of the Ridgway's Hawk. We will continue our work to get a more accurate estimate of the number of individuals that live and nest in Grande Cayemite, the causes of nestling mortality, the number of nestlings that survive after fledging, dispersal patterns, and much more. We hope that our continued effort will allow us to create baseline data that could help us to find answers to this missing information and preserve the species from extinction in Haiti.

Acknowledgments

We would like to thank the mayor of Les Cayemites Islands, Kenson Bony, for facilitating our boat transportation, the director of the protected area Baraderes-Cayemites, Mr. Alcide Nahum, and Prénor Coudo from the National Agency of Protected Area. Julia Pupko, Marta Curti for helping us secure funding, Thomas Hayes for providing training to field staff and technical ideas. Thanks to the Catholic priest of Les Cayemites Rev. Pere Marcdonal Bazil for offering space for meetings and environmetal education activities. We thank The Peregrine Fund, Vermont Center for Ecostudies, BirdsCaribbean, the Betty Petersen Conservation Fund, the National Aviary, and the VanTienhoven Foundation for financial support.

Figure 4. **Participating in the Raptor Festival.** ***Figure 5.*** **Speaking with a farmer about the Ridgway's Hawk. Photo © ACSEH**

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Data on the Feeding of the Stygian Owl (*Asio stygius*) in the Province of Misiones, Argentina

By **Marcelo Javier Wioneczak[1], Gisel Barroso[2], Paula Florencia Bertarini[3],** and **Giovanni Ignacio Wioneczak[4]**

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The Stygian Owl (*Asio stygius*) is endemic to the Americas and is distributed from Mexico to northern Argentina (Marks et al., 1999, Arizmendi et al. 2020). In Argentina, it is associated with humid montane forests, humid chaco, wooded islets, savannas, jungles, open areas and parks (Contreras 1981, Blendinger 1998, Bodrati 2004, Bodrati et al. 2006, Rodríguez-Mata 2006, de la Peña 2019). It is also widely distributed in Misiones, where it inhabits *Araucaria* upland forests, jungles, urban areas with abundant woodland and *Pinus* sp. monocultures (Krauczuk and Baldo 2004, Chebez 2009, Bodrati et al. 2010, 2012, Martínez Gamba 2014, Wioneczak et al. 2021).

The diet of the Stygian Owl includes birds, frogs, insects, bats and rodents, with birds being the item most consumed by this species (Motta-Junior 2006, Martínez and Echevarria 2018, Arizmendi et al. 2020). Among mammals, bats contribute scarcely to the total diet, although more frequently than in other strigids (Lehmann 1957, Franz 1991, Borrero 1967, Motta Junior and Tabbei 1992, Motta Junior 1996, Lopes et al. 2004, Motta-Junior 2006, Cadena-Ortíz et al. 2018). Likewise, the low presence of rodents in the diet of Stygian Owls stands out (Motta-Junior 2006, Arizmendi et al. 2020). The trophic ecology of the Stygian Owl is poorly known in Argentina, with particularly scarce information for the province of Misiones. The analysis of 20 Stygian Owl pellets collected in the province of Tucumán, Martínez, and Echevarria (2018) determined that 100% of the vertebrates consumed were birds belonging to the orders Passeriformes and Columbiformes. Invertebrate remains and seeds were also found.

In this note, we report new and unpublished information on the diet of the Stygian Owl in the province of Misiones. In addition, we report a

Table 1. **Measurements (in millimeters) and contents of the Stygian Owl pellets collected in San Pedro, Misiones, Argentina.**

Pellet N°	Site	Length	Width	Observations
1	Botanical Garden Cancharana Roost	30	20	Feather remains, crops, and orange seeds
2	Botanical Garden Cancharana Roost	-	-	Bird bones and feather remains
3	Botanical Garden Cancharana Roost	25	18	Bird bones
4	Botanical Garden Cancharana Roost	35	25	Bird bones
5	Botanical Garden Cancharana Roost	40	25	Bird bones and feather remains
6	Botanical Garden Cancharana Roost	40	30	Bird bones and feather remains
7	Botanical Garden Cancharana Roost	23	35	Bird bones
8	Botanical Garden Cancharana Roost	42	30	Bird bones and feather remains
9	Botanical Garden Pino Paraná Roost	33	20	Bird bones and feather remains
10	Botanical Garden Pino Paraná Roost	35	22	Feather remains, crops, and orange seeds
11	Botanical Garden Pino Paraná Roost	23.5	15	Bird bones
12	Botanical Garden Pino Paraná Roost	-	-	Bird bones
13	Jardín Botánico Pino Paraná Roost	-	-	Bird bones
14	Botanical Garden Pino Paraná Roost	-	-	Bird bones and feather remains
15	Der Wald Complex Pino Paraná Roost	47	23	Bones and mandibles of *Mus musculus*, and*Calomys* sp. fur
16	Der Wald Complex Pino Paraná Roost	40	25	Mandíbles of *M. musculus* and fur
17	Der Wald Complex Pino Paraná Roost	41	22	Bones, mandibles, and skull of *M. musculus*
18	Der Wald Complex Pino Paraná Roost	45	31	Indeterminate bones and mandibles of *Calomys* sp.
19	Der Wald Complex Pino Paraná Roost	45	22	Bones and mandibles of *M. musculus* and *Oligoryzomys* sp.
20	Der Wald Complex Pino Paraná Roost	35	21.5	Carpus metacarpus, synsacrum, nail phalanges and undetermined bones of birds

new prey item (a rodent of the genus *Calomys* sp.) for the diet of this strigid, expanding the information on its trophic ecology in Argentina.

Materials and Methods

Pellets were collected at three locations within San Pedro, Misiones, Argentina (Table 1). From 27 June to 1 July 2020, GB and PFB collected pellets from Stygian Owl individuals at the Yvyrá Pytá Botanical Garden (26°37'18 "S; 54°06'17 "W). The pellets were collected from below a Cancharana tree (*Cabralea canjerana*) - the preferred roost of a male Stygian Owl. Additionally, pellets were collected at another site, where the male had daily interactions with a female, in a Parana Pine tree (*Araucaria angustifolia*). Sex was determined through size comparison (the female is larger than the male) when the individuals interacted. Also, on 23 March 2023, MJW and GIW collected pellets at a day roost in a Parana Pine tree within the Der Wald Tourist Complex (26°36'34 "S; 54°05'51 "W). The pellets were dissected and cleaned individually to locate identifiable bones and remains of feathers and hairs.To perform this procedure we followed Marti et al. (2007), soaking and washing the pellets with warm water, and then removing the material with forceps.

Results

Of the material collected, 20 pellets were studied, 14 of which were found in the Yvyrá Pytá Botanical Garden. Eight were collected from under

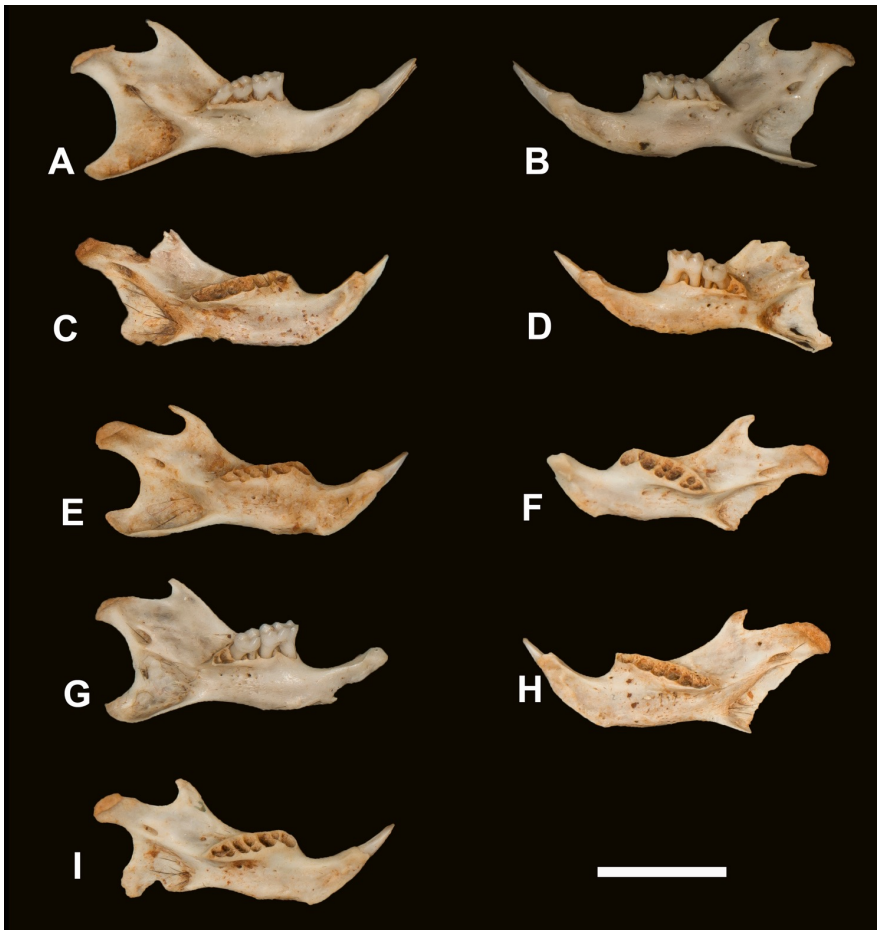

Figure 1. **Remains found in the disseted Stygian Owl pellets in the Der Wald Complex, San Pedro, Misiones, Argentina: (A, B, D and G) right and left hemimandibles of the domestic mouse, (C and H) right and left hemimandibles of pygmy rice rat (*Oligoryzomys* sp.), and (E, F and I) right and two left hemimandibles of a mouse (*Calomys* sp.). Scale = 5mm. Photographs © Wioneczak MJ.**

the owl roost in a Cancharana tree. Of these, one could not be measured due to its poor condition. The mean height was 35.28 (standard deviation ± 6.10 mm) while the mean width was 24.42 (standard deviation ± 4.57 mm).

Six pellets were collected from under the Parana Pine, of which three were in poor condition. The mean height was 30.5 (standard deviation ± 6.14 mm), while the mean width was 19.00 (standard deviation ± 3.60 mm). Finally, six pellets were collected from the Der Wald Complex. The mean height was 42.16 (standard deviation ± 4.4 mm), while the mean width was 24.08 (standard deviation ± 3.61 mm). The results are summarized in Table 1.

At the time of dissection, the pellets had a compact consistency. In those collected at the Botanical Garden, bones such as skulls, cartilaginous parts, remains of feathers and seeds of orange coloration were found. The latter was ingested indirectly, since they were found inside the undigested crop of four Columbiformes.

A similar result was described by Martínez and Echevarria (2018), where they describe pellets with seeds contained within the undigested crop of avian prey species. In the pellets collected in the Der Wald Complex, we found hairs, bones and hemimandibles of rodents. Also, we found bird bones, such as the carpus-metacarpus, the synsacrum, phalanges, and other undetermined bones.

Figure 2. Left. **Skull and hemimandible of the domestic mouse found in the dissection of the pellets of the Stygian Owl, Der Wald Complex, San Pedro, Misiones, Argentina. Scale = 5mm. Photos © Wioneczak MJ.**

Figura 3. Right. **Hemimandible of mouse of the genus *Calomys* sp. found in the dissection of the Stygian Owl pellets, Der Wald Complex, San Pedro, Misiones, Argentina. A) occlusal view and B) lingual view. Scale = 5mm. Photos © Wioneczak MJ.**

Final Considerations

Although the pellets from the Botanical Garden conatined 100% bird remains, the pellets collected at Der Wald and analyzed also contained rodent remains. We consider that the proximity of the roost to a shed may be the reason for the abundance of these mammals in the samples studied. It should be noted that the most frequently found remains belong to the synanthropic murid rodent known as the House Mouse (*Mus musculus*) (Figure 1, 2), a cosmopolitan species, whose introduction into Argentina most likely occurred in colonial times. Currently, it inhabits the entire country, but its habits are mainly peridomiciliary or subrural (Massoia and Fornes 1967,1969, Massoia 1983).

Hemimandibles of rodents of the genus *Oligoryzomys* (Figure 1C, H), and remains of a vesper mouse of the genus *Calomys* were also found in the samples studied (Figure 3). This cricetid is commonly found in the diet of other raptors, particularly the Barn Owl (*Tyto alba*), in southern Misiones (Massoia 1988). While unable to determine which *Calomys* species these remains belong to, we found recent studies that indicate that *Calomys tener* populations are present in the province (González Ittig et al. 2014). However, these analyses have not included animals from San Pedro and its vicinity. Likewise, in areas of Brazil, close to the locality of our study, *Calomys laucha* is also recorded (Bradzinski et al. 2012).

Arizmendi et al. (2020) mention the lack of rodents in the diet of the Stygian Owl. However, these authors did not include in their references the work of Motta Junior (2006), who mentioned two individuals of Hairy-tailed Bolo mice (*Bolomys lasiurus*), one House Mouse, and two Black-footed Pygmy Rice Rats (*Oligoryzomys nigripes*) found in the analysis of Stygian Owl pellets. The lack of these prey items in the diet of this strigid is surprising in previous studies. Thus, the information collected for this study will help to complete the scarce information on the trophic ecology of the Stygian Owl in Argentina.

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We would like to give special thanks to the Board of the Yvyrá Pytá Botanical Garden for the pertinent permissions to carry out the observations and collection of study material, to Edit Riendfleisch for his generosity and hospitality at the Der Wald Complex, to Ulyses Pardiñas for the identification of the rodents, contributions and corrections, to Ernesto Krauczuk and Claudio Navarrete for their collaboration, and to Claudio Calimares and Axel de Torres Curt for their invaluable bibliographic contributions, to Claudio Calimares and Axel de Torres Curt for the invaluable contribution to the bibliography, to Germán Lafuente, Patricia Rodríguez Elías, Roberto Güller and Diego Döke, for their company in the field and observations, and finally, we are

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* * *

Conservation of Birds of Prey Through the Rescue of Biocultural Memory in Communities of the Andes of Venezuela

By **Luis A. Saavedra[1], José Gregorio Noguera[1], Juan Monsalve[1]** and **Leida Valero[2]**

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Birds of prey (from the Latin rapere, "to seize" or "to take by force") make up a functional group of species categorized according to their predation strategy, specifically, that they hunt and feed on other animals (Raimilla and Rau 2017, McClure et al. 2019). This group includes hunting birds such as eagles, hawks, falcons and owls, and obligate scavengers such as condors and vultures. The diversity of this group is high in the tropics and Venezuela is among the richest countries with a total of 68 species of diurnal raptors (Naveda-Rodríguez et al. 2016, Miranda et al.

***Figura 1*: Study location where the collection of stories, beliefs and traditions related to birds of prey was carried out in the Chama River Valley, Andes of Mérida, Venezuela.**

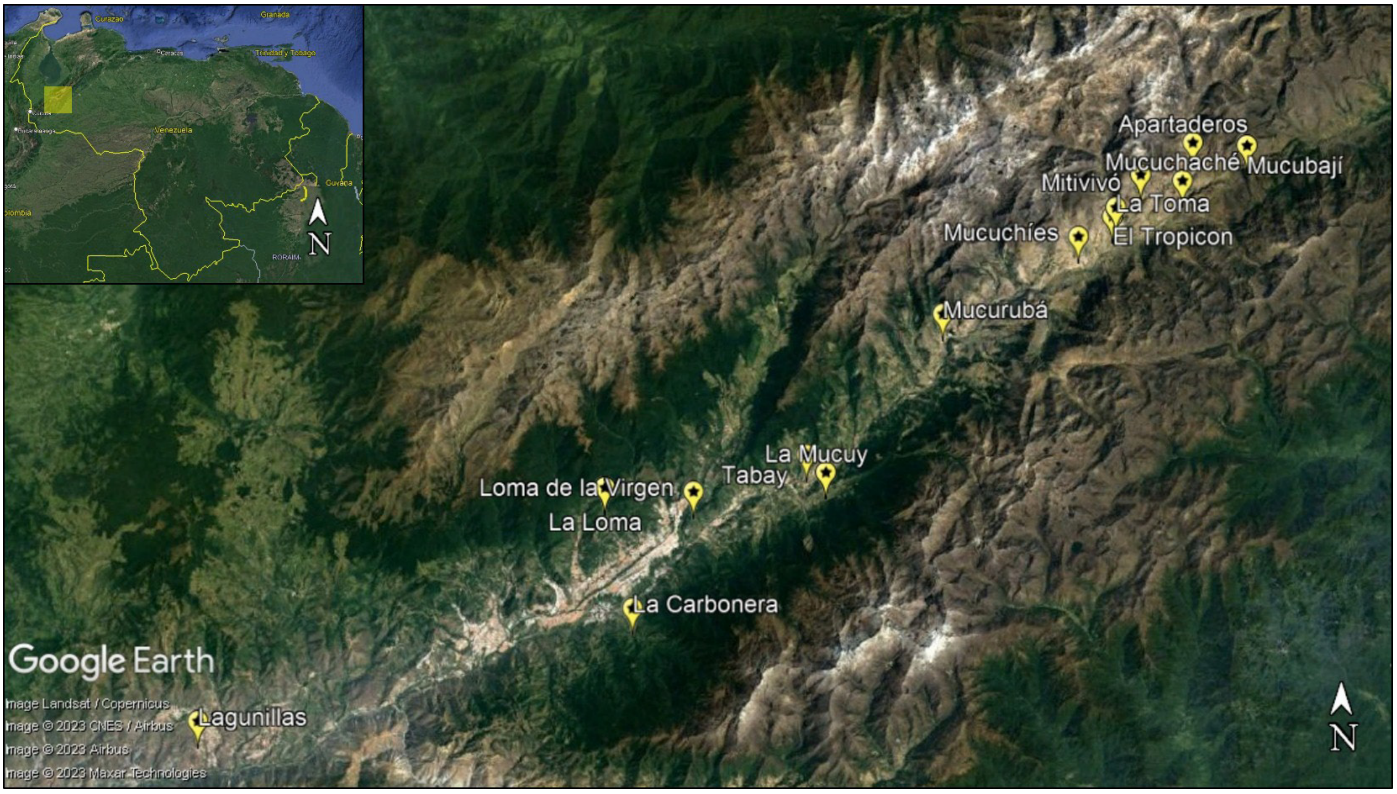

Table 1. **Occupations or trades of the people interviewed in 13 localities in the Chama River Valley, Merida, Venezuela. Values in percentage (%).**

Occupations	%
Farmer	38
Firefighter	2
Businessman	16
Student	3
Park ranger	1
Home Office	7
Laborer	11
No response	22

2023), making it one of the most important nations for the study and conservation of these species. Additionally, some species of raptors are under some category of threat (Naveda-Rodríguez 2015). This richness is also reflected in Venezuelan culture through stories, beliefs, and traditions where references are made to birds of prey (Verea et al. 2018).

Biocultural memory is part of traditional wisdom. It represents the ability to use memories to understand the present, and provides elements for planning for the future, and tracking similar events that occurred in the past (Núñez-García et al. 2012).

The transmission of this knowledge is carried out through oral language, therefore, memory is the most important intellectual resource among indigenous or traditional cultures (Toledo 2005). For these cultures, nature has a sacred quality that is almost absent in Western thought, and at the center of this deep link is the perception that all living and non-living things, and the social and natural worlds, are intrinsically linked (Berkes 1999, Toledo and Barrera-Bassols 2008). Specifically, in the Andes of Mérida, there are various historical and cultural aspects that link communities with birds of prey, such as the indigenous tale

Figure 2. **People interviewed for this study from (*left)* Lagunillas, and (*right*) La Mucuy. Photos © Luis A. Saavedra.**

Figure 3. **Zamuro (vulture) stones. It is believed that the stones found in Black Vulture (*Coragyps atratus)* nests bring fortune and good luck to the person who owns them. Lagunillas, Mérida, Venezuela Photos © Luis A. Saavedra.**

of the "five white eagles" that narrates the origin of the Sierra Nevada of Mérida (Febres Cordero 1994, Rodríguez 2017).

The purpose of our research is to rescue the bio-cultural memory of the inhabitants of the Andes of Mérida and use it as a tool for generating connections and a sense of identity, to help promote the conservation of all birds of prey in the Andes of Venezuela.

Study Area

We carried out these activities in rural communities in the Chama River Valley, Andes de Mérida, western Venezuela (Fig. 1). The Chama River is 200 km long. Its source is located at about 4,000 m in altitude in the Sierra de La Culata, and flows southwest to Lake Maracaibo (León 1999). Along its course, it forms an extensive valley of the same name where numerous Andean towns are located

		Vultures	Hawks
Knowledge	Characteristics/identification	65	26
	Behavior	55	5
	Ecology	27	7
	Migration	70	3
	Do not know/no answer	5	74
Human Perception	Positive	45	5
	Negative	1	4
	Do not know/no answer	54	91

Table 2. **Knowledge and perception of birds of prey as told by interviewees in 13 locations in the Chama River Valley. Merida, Venezuela. Values in percentage (%).**

Figure 4 (left). **Sketching maps of Lumonty community. Points where birds of prey had been observed were identified, as well as places that posed threats to birds, such as cleared forests and garbage dumps. Photos © Luis A. Saavedra**

Figure 5 (right). **Field trip to visit places identified in the sketch (map) along with interviews with the elderly people of the Lumonty and Pie del Tiro communities. Photos © Luis A. Saavedra**

(Gómez 2009). Additionally, it is an important point as a migratory passage for Nearctic birds of prey (Saavedra and Escalona-Cruz 2021).

Methods

We began by compiling stories, experiences, beliefs, and traditions of the inhabitants of the communities of the Chama River Valley, in the Andes of Mérida. Later, these were used as an educational strategy to promote sensitivity in new generations and encourage the conservation of birds of prey in the Andes of Venezuela.

Table 3. **Human-wildlife conflicts related to hawks according to the percentage of respondents in 13 locations in the Andes of Mérida, Venezuela.**

Predation	Yes	27
	No	3
	Do not know/no answer	70
Hunting	Yes	7
	No	16
	Do not know/no answer	77

Stories, Experiences, Beliefs, and Traditions

We conducted 74 semi-structured interviews with inhabitants of 13 rural communities in the Chama River Valley, between July and September 2022. The interviews were aimed mainly at people over 50 years of age, and were recorded for subsequent systematization and analysis (Fig. 2).

The interview questions were divided into two main categories: socioeconomic information and biocultural knowledge. Socioeconomic in-

formation consisted of age, gender, occupation or trade, and level of education. For biocultural knowledge, questions were asked about identification, behavior, ecology, migration, perception, and possible conflicts with birds of prey, specifically vultures and hawks; as well as beliefs, stories and traditions related to them.

Rescue of Biocultural Memory

To help rescue biocultural memory, we carried out an educational activity with the children and adolescents from Lumonty, a community located on the left bank of the Albarregas River, which runs through the city of Mérida, Venezuela. The activity was divided into three phases: 1) talks and educational games, 2) creation of a sketch (map) of the community and its surroundings, and 3) preparation of audiovisual materials.

Our first step was to set up meetings with community members and representatives to present the project to them, and to request their permission and approval to carry out this project. Subsequently, we worked with the the community's youth, holding informative talks about local knowledge of birds of prey. We also hosted games that involved the behavior of these raptors and their ecology, which helped introduce these young people to the world of raptors.

Next, we worked on creating a map of the community and its surroundings. This helped the children and adolescents recognize their communal environment in order to identify friendly areas for the birds of prey observed, as well as sites that represented threats. This activity culminated in a brief exploration of the surroundings, where participants were able to observe birds and the components of the local habitats. We provided participants with binoculars and field guides so that they became familiar with the equipment and learned about bird identification.

The last phase of the educational activity consisted of the preparation of an audiovisual based on interviews with local elderly people. The purpose of this component was to involve children and adolescents in participatory science, where each of them would assume the role of a young scientist. Accompanied by the researchers and some community representatives, the young people took a field trip to a nearby hill called Pie del Tiro, and visited the sites recorded on the map where they observed birds of prey and other common bird species found in the area. During this same field trip, participants met with and interviewed some of the local elders. They recorded the interviews with cell phones. This activity gave these young people a chance to be the protagonists of the ideas and questions, which reinforced their learning. The interviewees talked about the bird species present in Lumonty, as well as anecdotes and stories about birds of prey. The researchers only participated as advisors. We created an audiovisual that documented the lived experiences

of the young people interacting with the elders, as well as of local habitats and the biodiversity. For the premiere of the audiovisual, everyone in the community was invited to attend: young people and students, parents and representatives, neighbors, and the general public.

Results

During the interviews, we documented nine different occupations or trades held by the inhabitants of these communities (Table 1), with farmers being the most common (38%), followed by merchants (16%), and laborers (11%). The towns are located in rural areas where agriculture and livestock are the main economic sources. Although 57% of those interviewed did not provide information about their educational level, of those who did, 24% completed only primary school, 18% completed secondary school, and 1% completed university.

Only 51 of the 74 interviewees provided their age. A median age of 57 years was estimated, while the maximum age was 83 years and the minimum age was 24 years. Regarding gender, 93% of those interviewed were men, and only 7% were women. It is important to note that some women did not respond to the interviews and, instead, contacted their husbands for them to respond.

The interviewees were able to distinguish the vultures (vultures of the order Cathartiformes) and to a lesser extent the hawks (Table 2). They demonstrated knowledge of raptor migration, either from their own observations or from stories shared by their ancestors. Furthermore, they demonstrated a positive perception of vultures (Table 2) and recognize their function as nature's cleaners. They were able to identify the dates in which the migratory season begins and ends and describe ecological aspects and behaviors. For example, they mentioned that migratory vultures such as the Turkey Vulture (*Cathartes aura meridionalis*), unlike Black Vultures (*Coragyps atratus*), do not feed when they are passing through, and they have observed a large number of the former flying in rows and in circles. In addition, they indicated that these vultures rest in trees at nightfall and continue their journey the next day. All these accounts describe the migration of these birds of prey and coincide with scientific explanations of this phenomenon (Kirk and Mossman 2020).

Furthermore, when evaluating the existence of conflicts between humans and wildlife, it was evident that only hawks were included (Table 3). No interviewee mentioned that vultures or condors were involved in human-wildlife conflicts. Hawks were mentioned as predators of domestic animals by 4% of those interviewed in areas where hunting occurred as a control measure; however, the majority of those interviewed indicated that they had not hunted birds of prey as a control measure or in retaliation (Table 3). Additionally, 73% of those interviewed mentioned stories and beliefs related to raptors and their migrations including their links with religious or climatic beliefs, good

and bad luck, or simply a way of explaining some natural phenomena (Fig. 3). At the same time, the children and adolescents of Lumonty, as a result of a process of exploration and observation, were able to recognize some birds of prey and differentiate them from other birds. They were also able to identify gardens, wooded areas, and unoccupied plots as friendly areas for these birds. In contrast, garbage dumps, and deforested and logged areas were identified as risk areas (Figs. 4 and 5).

Discussion

Raptor-related biocultural memories of those living in the Andes of Mérida were not only varied, but also somewhat contradictory. A large number of locals do not seem to have any positive or negative perceptions about vultures and hawks, particularly the latter (Table 2). However, a significant number of people, in general, can identify vultures and hawks by their characteristics. While they are unaware of some of the ecological functions of birds of prey in nature, they are aware of the role of vultures as an integral part of their cultural identity.

In a bibliographic review carried out to document human perceptions about birds of prey in the southern-austral zone of Chile, 67 mentions of perceptions towards birds of prey were found, where nearly 50% consider these birds as harmful, followed by other evaluations and, to a lesser extent, as neutral and beneficial (Raimilla and Rau 2017). For example, the Chimango Caracara (*Milvago chimango*) was classified as harmful for being a bird of "bad omen" and acting as a messenger for witches or shamans. It was also recognized in the "other evaluations" category as poetic inspiration and it is mentioned in historical accounts associated with its high abundance.

Likewise, the Andean Condor (*Vultur gryphus*) was highlighted in the same category "other evaluations" for its majesty and for being considered a biocultural species. It is noteworthy that species were included with several mentions in both the "harmful" and "beneficial" categories; this was the case of the Red-backed Hawk (*Geranoaetus polyosoma*), the Rufous-legged Owl (*Strix rufipes*) and the Barn Owl (*Tyto alba*) (Raimilla and Rau 2017).

Another study described the biocultural elements of five communities in Cartago, Costa Rica, using the analysis of regional common names of birds, associated beliefs and superstitions, through interviews with former songbird hunters and elders (Padilla-Mejía and Ramírez-Calvo 2019). The study showed that nocturnal birds of prey were mostly perceived as negative. It is worth remembering that the nocturnal habits of some birds can inspire stories about the unknown, which can transform people's perceptions of these birds as benign or evil, depending on the region and the particularities of the location.

Particularly, in the Andes of Mérida, interviewees speak of the “muda-pico zamuros" (beak-shedding vulture)” or “todosanto zamuros" (all saints vulture), to refer to vultures which migrate every year between the months of October and November. In particular, on 2 November, when the Day of the Dead or the Day of the Faithful Dead is celebrated, these vultures are often observed passing by in the thousands over the valley of the Chama River. Curiously, the inhabitants of these communities associate vultures with the return of the spirits of their deceased. Furthermore, those interviewed believe that "zamuros" travel to a lagoon to shed their beaks, and each lagoon has a stone on which they leave their beaks during their migrations. They also comment that the first and last vultures that are passing through are swallowed by the lagoon.

These beliefs mirror, in a certain way, the behavior of migratory birds of prey as they pass through the Andes of Mérida. There are a large number of high Andean lagoons along the Chama River Valley. One explanation for the locals' observations may be due to the adverse and variable climatic conditions that persist in the high Andes. When these conditions (low temperatures, thick fog, and constant rain) do not allow migratory birds of prey to continue their journey, they can be observed at ground level near the lagoons waiting for better conditions before continuing their migration (Saavedra pers. comm.). If the fog is thick at ground level, some birds of prey could fall into the lagoons, die from hypothermia and be observed floating on the banks of the lagoons, which may explain the belief that the lagoons swallow some of the migrant raptors.

This pilot study demonstrates that the popular knowledge of the communities of the Andes in Venezuela plays an important role in explaining natural phenomena such as the migration of birds of prey. Additionally, this biocultural knowledge can be used as a tool when studying the interactions between human societies and nature and, even more important, as a linking instrument that allows the conservation of species through traditions rooted in communities.

For this reason, one of the most effective ways to conserve natural elements such as landscapes, ecosystems, and species is by creating a strong sense of belonging to the cultural and religious beliefs of adjacent communities, which encourages their inhabitants to preserve these natural elements as an intangible value to their societies. However, all these biocultural memories currently live mainly in the thoughts of older adults, a characteristic that is evident in the Venezuelan Andes.

Therefore, it is essential to collect and transmit these beliefs and traditions to new generations. They can be used to motivate younger people to appreciate birds of prey more and thus promote their conservation. It is important to understand

these biocultural conceptions about birds of prey, to implement educational programs that are aimed at increasing knowledge of these species and reducing any negative aspects without entering into conflict with the communities.

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Records of Peregrine Falcon (*Falco peregrinus*) in Guatemala City, Structures Used and Presence in all Seasons of the Annual Cycle

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Recent evidence confirms the reproduction of the subpecies of Peregrine Falcon (*Falco peregrinus anatum*) in Guatemala (Eisermann and Avendaño 2018). Originally, the Peregrine Falcon was considered a Nearctic migratory species, present in Guatemala outside of the breeding season (September - April) (Howell and Webb 1995). It was also considered a transitory species, since part of the population migrates long distances in autumn (from August to December) reaching South America, and then returning during the spring (from February to May).

During its migration, it passes through Guatemala following the Pacific route (Bildstein and Zalles 2001), thus the presence of the Peregrine Falcon during the breeding season (June-July) was unlikely in Guatemala. However, some sightings in the western highlands of the country in 2001 (Eisermann and Avendaño 2006) and in Guatemala City in 2008 (Jones and Komar 2009) occurred during the breeding season. Due to these records, it was suspected that the species remained in the country throughout the year and bred locally. This was confirmed in 2014 in Guatemala City (Jones and Komar 2015). This finding allowed the species to be classified as resident and partially migratory. In addition, it constitutes the first breeding record for the Peregrine Falcon in Guatemala and Central America (Eisermann and Avendaño 2018).

The Peregrine Falcon is adapted to living in cities and suburban areas where it uses various human-built structures to perch, feed, and nest. It has been observed on buildings, bridges, cathedrals, industrial chimneys, and telephone towers, among other structures (Watts et al. 2015, Fagan and Komar 2016, Pagel 2018). In some regions of North America, populations are almost entirely composed of Peregrine Falcons that nest in urban areas (Caballero et al. 2016). In these latitudes

the species has been studied intensively, with information collected over several decades (Watts et al. 2015, Caballero et al. 2016). However, in wintering areas in Central and South America, there are still gaps in our knowledge of this species and its conservation, despite the fact that it spends most of the annual cycle in these areas (Franke et al. 2011, Beingolea and Arcilla 2020). Specifically, there is a lack of information on the presence and behavior of the Peregrine Falcon in cities and other populated areas.

For example, in El Salvador it was considered a vagrant or rare species. Currently, the species is recognized as a regular visitor in El Salvador, with several records in San Salvador, the capital city. A specimen collected in the same city has even been reported (Komar 2001). Likewise, in Venezuela the Peregrine Falcon had historically been reported in various habitats, but there were no records in any urban areas. However, for the last two decades this falcon has been an annual visitor to the city of Caracas, where it has been monitored around a parish, using man-made structures such as communication antennas, to rest, hunt, or interact with other species (Terife and Lentino 2018).

In the northern region of Central America, the Peregrine Falcon is distributed mainly in coastal areas and near bodies of water, but also in the interior (Fagan and Komar 2016) where Guatemala City is located. This city has been identified as a specific site in the distribution and reproduction of the Peregrine Falcon (Fagan and Komar 2016), so it is necessary to highlight its relevance for the conservation of this species.

Figure 1. A (left). **IPM Building in the Historic Center of Guatemala City with a Peregrine Falcon perched on the lower part of a sculpture on the facade.** ***Figure 1. B (right).*** **The Peregrine Falcon perched on the sculpture. Photos © Daniel Tenez**

To do this, basic information must be generated, such as knowing the sites and structures used by the Peregrine Falcon, as well as the times when it has been reported. By increasing the number of records outside of migration periods, resident status can be reaffirmed. The objective of the present study was to carry out a review of available records of the Peregrine Falcon in Guatemala City, to identify the structures used, and to determine its presence throughout the seasons of the species' annual cycle.

Methods

Guatemala City is the capital of Guatemala and is located in the central highland region at 1,500 meters above sea level (14°38'29''N; 90°30'47''W). Administratively, it is divided into 22 zones identified with numbers. For example, Zone 1 is the central zone where the Historic Center is located. The capital is surrounded by other urban areas of different municipalities, which together form an extensive metropolitan region. The present study was limited to the capital areas, which were grouped into sectors according to the cardinal points. But some data was also taken from neighboring areas.

To determine the total number of Peregrine Falcon sightings, a review of records available through October 2023 was carried out. Data from the following sources was included:

a) *Direct Observations:* carried out mainly in the Plaza de la Constitución sector in the Historic Center. These observations were recorded in eBird (www.ebird.org).

b) *Personal Communications:* records made by third parties.

c) *Citizen Science:* records published in the eBird and iNaturalistGT databases (www.guatemala.inaturalist.org), as well as photographs published on the social networks of bird watcher groups in Guatemala (facebook.com/groups: Birding Guatemala, Pajareros de Guatemala Birdwatchers and Club Observadores de Aves Urbanas).

d) *Local News*: news and videos published by the media about two Peregrine Falcon rescue events (TN23 2019, 2021a), and about the presence of the Peregrine Falcon on public and private buildings (TN23 2021b, Mejía 2022).

e) *Bibliographic Information:* in addition to the records already cited, two documents on the Peregrine Falcon in Guatemala City were reviewed (Tenez 2009, Meoño 2014).

Because most sightings were of Peregrine Falcons in flight, we identified the structures used for perching, as well as the structures which Peregrine Falcons had been observed flying over. In this study, structures are defined as building with more than four levels and telephone towers such as metal structures that support communication antennas. Additionally, open areas where the species has been reported are included.

To determine the species' presence throughout the year, records were counted in each of the

Sector and Zones	Structures
Central: Zone 1, 4, and 5	Buildings: IPM, El Centro, El Virrey, Torre de Tribunales, Finanzas Públicas, Torre Café, TEC, INGUAT. Other Buildlings: Palacio Nacional de la Cultura, Catedral Metropolitana, Estadio Nacional Doroteo Guamuch Flores. Open Areas: Plaza de la Constitución. Telephone Tower: in Colonia Abril.
North and Northeast: Zones 2 and 17	Telephone Tower: one at the end of Avenida Independencia and another in Carretera al Atlántico.
South and Southeast Zones 10, 13, 14, 15, and 16	Buildings: Hotel Holiday Inn, H. Casa Veranda, H. Stofella, Hospital Herrera Llerandi, Centro Gerencial Las Margaritas, Zona Pradera, Tiffany Novena, Premiere Tintoretto, Las Pilas, Parque 15, Multimédica. Otros por las colonias El Campo, Las Conchas and Vista Hermosa. Telephone Towers: en sector Cayalá. Open Areas: Aeropuerto Internacional La Aurora.
West and Southwest: Zones 3, 7, 11, and 12	Buildings: Tikal Futura, Mariscal 180, Vistares. Telephone Towers: one by Calzada Aguilar Batres and three at the end of the road, and another by Calzada Roosevelt. Puente del Incienso. Open Areas: Las Flores Cemetery (close to the city).

Table 1. **Main structures where the Peregrine Falcon has been reported in Guatemala City according to sector and areas.**

four seasons of the annual cycle of the Peregrine Falcon as a migratory species. This cycle is characterized by two migratory movements and two stationary periods, beginning in June with the reproductive season in North America and ending in May with the migration from south to north. The duration of each season is based on species-specific dates according to maps of predictive abundance and distribution models developed by eBird (Fink et al. 2022).

Records made in the transition weeks between each period were also included (Table 2). The cycle of resident Peregrine Falcons has not yet been studied and records do not distinguish between migratory and resident individuals.

Results

A total of 362 records of the Peregrine Falcon were found in Guatemala City through October 2023, which included 17 records in areas bordering the capital. The majority were obtained through two sources of information: direct observations (180 records, 50%) and records published by other observers on eBird (140 records, 38%).

The first record reported for Guatemala City occurred in 2000, though there is a report from 1996 in the metropolitan area. There are records between 2006 up to the present, meaning, the presence of the Peregrine Falcon in Guatemala City has been recorded for 18 consecutive years.

Observation Sites

Records were found from zone 1 to zone 18. The largest number was obtained in zone 1 with 187 records, mainly associated with the Plaza de la Constitución. In the southern part of the city, zones 9 and 10 next to Avenida La Reforma, as well as zones 13 and 14 next to Avenida Las Américas, form a sector with a high density of buildings that in total have 59 records. In the southeastern part, zones 15 and 16 form another sector with buildings with 28 records. In the western part, zones 7 and 11 associated with the Roosevelt Causeway, have 23 sightings. In the north and other areas of the city the density of buildings is low and the number of records is lower.

Structures Utilized

Buildings and telephone towers were the main structures where Peregrine Falcons have been observed. They have also been recorded in other buildings such as a cathedral, a palace, a stadium, an airport, and a plaza (Table 1). The structures were used as places to rest and roost over night, even in the rain. Likewise, they served as a high platform from which to launch and hunt in flight, mainly domestic pigeons (*Columba livia*), or as a place to bring prey for feeding. They have also been used as nesting sites.

The IPM Building near the Plaza de la Constitución had the most records, with the Peregrine Falcon being observed 133 times in a relief sculpture on the façade (Fig. 1). The Peregrine Falcon has also been reported perching on exotic tree species within the city; in a eucalyptus (*Eucalyptus* spp.) in zone 11 and at the top of a Monkey Puzzle Tree (*Araucaria bidwillii*) in the CECON-USAC Botanical Garden in zone 10.

Seasons of the Year

Records were found for all months of the year, including the months of June and July - which fall within the North American breeding season. During the years 2021, 2022, and 2023, there are records in most months of each season, corresponding to two complete consecutive cycles. The highest percentage of records (39%) occurred during the migratory season after breeding, and the lowest (17%) in the reproductive season (Table 2). Most of the records were of solitary individuals, but in 29 records (8%) at least two individuals were observed interacting, though it was not clear if they were breeding pairs. An adult and a juvenile were observed together on a building in June 2019. One of the records was a nesting event, documented with a photograph of an adult and two nestlins on the balcony of a building in the southeast of the city. This was published by a group of bird watchers on 30 March 2022.

On the IPM building there are records of Peregrine Falcons, mainly from October to March, from 2006 to 2011. These sightings correspond to the post-breeding migration, the non-breed-

ing season and the pre-breeding migration. In addition, for this part of the city, records also occurred in the months of June and July, during the breeding season, in 2008, 2012, 2019, 2022, and 2023.

Discussion

According to the present review, Guatemala City can be considered an important site for the distribution of the peregrine falcon, with records in more than two decades. Furthermore, the presence in each season of the annual cycle and the nesting record reaffirms its resident status. This record apparently represents the second nesting event reported in Guatemala City since 2014 (Eisermann and Avendaño 2018).

The annual cycle of resident peregrine falcons probably follows another temporal dynamic, since the reproductive season in Guatemala City could be different from that of North America. In the first case of reproductive evidence in 2014, it is estimated that egg laying may have occurred at the beginning of February (Eisermann and Avendaño 2018) and in the second case chicks were observed at the end of March. In that sense, more documentation is necessary to better understand its reproductive cycle in

Table 2. **Number of Peregrine Falcon records in Guatemala City according to the seasons of its annual cycle as a migratory species. It begins with the reproductive season in North America. Estimated duration and transition dates between seasons are included.**

Seasons	Dates	No.	TOTAL	%
First stationary period:				
Breeding Season	7 June - 20 July	54	62	17
Transition	21 - 26 July	8		
First migration period:				
Post-breeding	27 julio - 23 November	137	141	39
Transition	24 - 29 November	4		
Second stationary period:				
Non-breeding season	30 November - 15 February	71	83	23
Transition	16 - 21 February	12		
Second migration period:				
Before breeding	22 February - 31 May	73	76	21
Transition	1 - 6 June	3		

Guatemala City compared to its cycle in North America, which can vary depending on its distribution.

It is considered that both the resident subspecies of Peregrine Falcon, *F. p. anatum,* as well as the migratory subspecies *F. p. tundrius* can be found in the city. The sightings that occur in the months of June and July likely correspond not only to residents, but also to some migrants who make early or late migrations. For example, in southern Mexico, individuals of F. *p. anatum* were observed at the beginning of summer, outside the expected season (Grosselet 2001). It could also be that some juveniles remain year round. This behavior has been observed in the region in some juvenile Ospreys (*Pandion haliaetus*) that spend the summer in their wintering areas (Fagan and Komar 2016).

Some cliff-nesting raptors, such as the Peregrine Falcon, may have the ability to use and benefit from urban structures (Solaro 2018). In fact, they have documented greater nesting success and offspring production in urban-nesting Peregrine Falcons than in rural ones (Kettel et al. 2019). The establishment of the Peregrine Falcon in Guatemala City, as in other cities, could be due to the availability of favorable habitats for breeding (Pagel 2018, Solaro 2018), as Guatemala City offers resources such as nesting sites in high structures and an abundance of prey.

The first case of nesting in Guatemala City occurred on a telephone antenna (Meoño 2014), and the second on a building. Additionally, areas with an abundance of domestic pigeons, such as the Plaza de la Constitución and the Metropolitan Cathedral, supply prey to the Peregrine Falcon. In this sector, night hunting has even been observed (Tenez 2009). Another important advantage for nesting may be low predator pressure (Pagel 2018, Solaro 2018).

Likewise, adaptation to the city could be determined by individual behavioral factors such as individual differences in tolerance to human disturbance or the behavioral flexibility of certain individuals that allows them to explore other resources and colonize new environments (Solaro 2018). Probably, a combination of all these ecological and behavioral factors allowed some individuals to remain in Guatemala City without returning to North America.

At the regional level, the use of structures has also been reported in Mexico (Grosselet 2001, Villalobos-Juárez et al. 2023), El Salvador (Arias 2022), Costa Rica (Vargas-Masís and Ramírez 2012, Camacho 2013), Colombia (SCO 2007, 2011) and Venezuela (Terife and Lentino 2018). In addition to human structures, the use of tall trees within the city as perching sites is interesting, and was not expected.

At the same time, in Guatemala City site fidelity may occur. For example, in the IPM building it is common to observe a Peregrine Falcon every year during the seasons associated with migration, although it is unknown if it is the same individual. Through individuals marked in their natal areas in North America and recaptured in areas of Mexico and Peru, it is known that Peregrine Falcon can present high fidelity to wintering areas (McGrady et al. 2002, Beingolea and Arcilla 2020). In Colombia, the return to a building of a possible same individual has also been reported (SCO 2007).

The presence of the Peregrine Falcon in Guatemala City has implications for its conservation. In cities there are threats such as collisions with urban structures, electrocutions, vehicle collisions with juveniles, falls into the water from bridges during the first flight attempts, or falls into conduits, among others (Pagel 2018). Likewise, negative interactions with humans can occur wherein they scare away the Peregrine Falcon, due to stains of excrement on the walls of buildings (Pagel 2018).

In Guatemala City, these types of conflicts could occur, such as complaints about the excrement or remains of the prey on the sidewalks. Additionally, there appears to be a misperception, as according to some media outlets, Peregrine Falcons are believed to be in the city due to loss of natural habitat and should therefore be captured and released into forested areas. This could constitute a threat, especially for juveniles that are more vulnerable to being captured at ground level after the first flights.

In Guatemala, the Peregrine Falcon is protected by national legislation (CONAP 2022). However, awareness programs emphasizing that the Peregrine Falcon can inhabit the city and about how to coexist with wildlife in cities should be implemented. The inventory of structures contributes to identifying conservation actions, such as monitoring and conflict management. Local citizens can also be involved in monitoring nests in their buildings using video cameras. Currently, the construction of buildings is increasing and expanding to more areas of the capital, likewise the number of telephone towers has increased in the metropolitan region. Therefore, due to the greater availability of structures and the presence of the species at all times of the year, more constant interactions with the Peregrine Falcon would be expected, which is why it is urgent to take measures for its conservation.

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* * *

Courtships of the Black-and-Chestnut Eagle (*Spizaetus isidori*) in the Colombian Andes: Observations at Three Monitoring Points

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The Black-and-Chestnut Eagle (*Spizaetus isidori*) is a large accipitriform that lives in the montane forests of the Andes, from Venezuela to northern Argentina. Both in Colombia and globally, this species is classified as "Endangered" (EN), due to habitat decline and direct persecution.

In the last decade, important advances have been made in the knowledge of the ecology of the Black-and-Chestnut Eagle. In recent years, contributions have been made to map its geographical distribution (Fuenzalida et al., 2023, Córdoba et al., 2021, Roetsler et al., 2008), describe its diet (Zuluaga and Echeverry, 2016), understand the period of parental dependence (Zuluaga and Echeverry 2023), and understand the challenges it faces, especially conflicts with humans (Restrepo et al., 2020, Zuluaga et al., 2022). However, there are still important gaps in our knowledge. For example, in Colombia, it is important to determine the population status of the species, understand the genetic diversity of the population, learn more about its behavior in the wild, and identify the sources of greatest threat to its conservation.

With the aim of contributing to the knowledge of this species for its conservation, the Network of Raptor Custodians (RCAR) in Colombia has implemented monitoring and research work in different parts of Colombia. This article seeks to contribute to the knowledge of the reproductive behavior of the Black-and-Chestnut Eagle through the presentation of three courtship events observed at different monitoring points in Colombia. Furthermore, the implications of these findings are discussed and the importance of the resilience of this species in an environment with significant human disturbances is considered.

Methods and Location

Members of RCAR carried out field observations at three monitoring points (MP) located in the

Figure 1. Upper left. **Characteristics of the ecosystem in the MP1-COA. Photo © Mayra Parra S.**

Figura 2. Uopper right **Characteristics of the ecosystem in the MP2-COA. Photo © Mayra Parra S.**

Figura 3. Bottom left. **Characteristics of the ecosystem in the MP3-CCC. Photo © Juan Quiróz.**

Colombian Andes: two on the Western Cordillera in the department of Antioquia (MP1-COA and MP2-COA,) and one in the department of Caldas over the Central Mountain Range (MP3-CCC). These Monitoring Points were established at three different times. MP1-COA is the oldest (2017) and MP3-CCC the most recent (2023).

MP1-COA is located at 2,400 meters above sea level in the north-western region of the department of Antioquia, within the western mountain range of Colombia. This mountainous landscape encompasses a diversity of natural ecosystems, including sub-Andean, Andean, and cloud forests. The forests in this region have a fragmented appearance, with remnants of primary forest that are mainly concentrated in the higher altitude areas of the mountains. The nest tree, *Ficus* sp., was located in secondary forest with more than 30 years of regeneration, at an altitude of 2,400 meters.

MP2-COA is located in a forest that covers an altitudinal range between 2,000 and 2,700 meters above sea level. This ecosystem is distinguished by its well-preserved core area, which constitutes a remnant of forest that has been protected, to some extent, from degradation. Adjacent to this core area, there are rural properties belonging to peasant communities. The nest tree, *Ficus* sp., was located at 2,200 meters above sea level in a secondary forest with more than 3 decades of regeneration. The tree was destroyed in April 2022 by a natural event.

MP3-CCC is located on the western slope of the central mountain range of Colombia, at an altitude of approximately 2,600 meters above sea level. The environment is made up of cloud forest, pine monocultures, pastures with livestock and areas in the process of recovery. In addition, there are private properties in the area. Initial sightings date back to 2009, and in 2023, frequent courtships were observed. At this point the nest tree could not be located.

The article describes courtship events recorded during different years for each MP. The documentation of each of these episodes was carried out using the fixed point observation method, adapted from the point counting method for raptors proposed by The Peregrine Fund and described by Ralph et al. (1996). This method consists of placing an observer at an elevated fixed point, which allows them to observe the surrounding area for a certain period of time, in this case during continuous 8-hour days, once every fifteen days. The objective was to document the activity of the Black-and-Chestnut Eagle from the early hours of the morning until the beginning of the afternoon. During these days, all observations were recorded in a field journal, including geographical data, climatic conditions and behaviors of the eagles, paying special attention to courtship episodes.

Results

The MP1-COA pair, in particular, has been the subject of constant monitoring due to its long

Figures 4-7. **Flght in formation. *S.isidori* courtship. Photos © Juan Quiróz.**

observation history from 2017 to the present. Therefore, instead of describing a specific courtship event, an overview of how this process has occurred over the years will be presented. In MP1-COA, during the annual cycle, courtships have occurred from the last week of November to the first week of January.

They generally happened in the morning hours, between 0800 hrs and 1100 hrs. They begin with numerous calls from the male, then the female responds and both take flight. Even in the absence of thermals and on gray, cold, cloudy days, the pair flew in formation, side by side, soaring into the skies while vocalizing.

Upon reaching a height well above the forest canopy, the male would fly over the female and turn to face her. In this position they held each other's feet and dropped for a few seconds, then they separated and repeated the ascent, the flight in formation and, again, they grabbed each other's feet and dropped. This behavior was repeated for about 25 minutes, after which they disappeared together into the forest.

In the case of MP2-COA, courtship took place from the second week of August throughout September. The documented event occurred at 12:00 hrs on 18 August 2022, and lasted approximately 20 minutes. The monitoring team was alerted to this activity because the male began vocalizing while he was perched near a road. Shortly after, the bird took flight and perched on another tree. At a later time, the female was observed flying towards the location of the nest tree, carrying material in her talons. During this time, a different vocalization was emitted and subsequently the male appeared.

Figure 8. **Environment of MP3-CCC. Photos taken from video by Juan Quiróz**

Both adults landed inside the forest and then they flew together upward, rising above the mountains. Once above the horizon line, they changed their behavior. One of the eagles began to fly over the other and swoop down toward its companion. They repeated this behavior several times, taking turns flying over each other and holding on to each other's talons before letting go and continuing on. Then they began to gradually rise into the air, ascending until they were out of sight. Their courtship was characterized by these swooping flights, turns, and elevation. Later, when they were observed again, they were flying rapidly in a zigzag pattern, one above the other. Subsequently, they began to fly in circles around the forest, until they finally disappeared.

For MP3-CCC, a period of courtship activity was documented that lasted seven weeks, spanning from the third week of May to the first week of July. The courtship episode that will be recounted took place on 13 June 2023. On this occasion, the monitoring team split up in order to carry out more effective monitoring at two strategic points located in high canyons. The idea behind this strategy was to focus efforts on the canyon that showed the greatest signs of activity. The observations began at 08:00 hrs and, on the first day, lasted until approximately 12:00 hrs. During this period, the team only sighted the male in one of the canyons. This individual moved towards the opposite canyon, where it eventually disappeared from view. Faced with this situation, the team decided to meet in the second canyon, where they later witnessed the courtship sequence. The courtship event took place around 14:00 hrs.

Based on our experience, due to the presence of basic plumages, they were probably two immatures. When the male met the female, they began to fly over the lower part of the canyon, making circular flights and, occasionally, the male flew just above the female. Then, they began an ascent through the canyon and when they reached a considerable height above the surrounding mountains, they began to approach each other, then grabbed each other's feet and plummeted almost until they touched the forest canopy. They repeated this behavior for 12 minutes.

During this entire process, we did not hear any vocalizations by the birds. After this courtship display, we continued watching as they flew over the edge of the forest. One of the birds began to fly over to the side, entering a more densely wooded area and disappeared from our sight. The other bird also disappeared as it headed towards another area, moving away until we lost sight of them completely.

Discussion

The differences in the timing of courtship events are notable. Although these events have in common the fact that they tend to have an estimated duration of between six to seven weeks, these

weeks were recorded in different months of the year at each point. Part of this variability is attributed to the events being observed in different years. In particular, in the case of the western mountain range, a natural event impacted the availability of the nest tree, which probably led to the pair courting in the months of August and September, moving the reproductive event forward. With no records prior to 2022 and no activity during the current year, it is difficult to confirm the precise relationship between these variables.

However, in terms of preparation for reproduction, in the MP1-COA and MP2-COA, the pairs begin this process during the second half of the year, providing material for the nest, expelling the juveniles from the territory, and engaging in courtship behavior. In MP1-COA, for example, during the annual cycle, courtships have occurred from the last week of November to the first week of January. Although this period may vary slightly, it seems to depend on the moment in which the juveniles become independent, since the longer they remain near the nest, the longer the start of courtship takes. Despite these variations, timings have remained relatively stable, and December remains the most active period for courtship. On the other hand, in the central mountain range, courtship begins in the first half of the year.

Another distinction lies in the intensity of vocalizations during courtship. The MP1-COA pair, apparently more experienced, incorporates strong vocalizations as a fundamental element in their pre-mating dynamics. In contrast, in the case of the younger MP3-CCC pair, vocalizations do not play a predominant or distinctive role. In addition, differences are seen in the way the flights are executed. Experienced pairs with longer courtship episodes demonstrate greater caution in the use of their energy. They limit the frequency with which they grab hold of each other's talons and drop through the air, taking a more careful approach.

At the end of courtship, the experienced pairs enter the forest together, while the subadult pair disperses in different directions. A notable difference concerns the ecological environment. Although the three monitoring points are located in high montane forests with an altitude greater than 2,200 meters above sea level and continuous forest masses of more than 100 ha (mostly well preserved), MP1-COA and MP2-COA are located more than 10 km from urban centers with less than 7,000 inhabitants, while the MP3-CCC is only 9 km from a city with more than 400,000 inhabitants.

The MP3-CCC is located in a much more intervened landscape, characterized by the presence of pine crops, grazing areas, and a regeneration of secondary forest in the vicinity of the city. This contrasts with MP1-COA and MP2-COA, which historically were composed of regenerating

forests, pastures, crop areas, and dispersed settlements. However, in all cases, Black-and-Chestnut Eagle habitat faces considerable challenges due to socioeconomic development based on unsustainable practices. For example, large human settlements intervene and fragment these areas, either transforming the surroundings into grasslands or monocultures. Additionally, humans participate in wildlife hunting that includes the natural prey of the Black-and-Chestnut Eagle, or directly promote the development of roads and urban infrastructures.

Although the Black-and-Chestnut Eagle is considered a forest species that depends on the forest for its survival and reproduction (Zuluaga, 2012), the occurrence of reproductive activity in habitats in such proximity to urban environments could suggest that it may use available relicts of forest to adapt to habitat decline. However, this is speculation and remains a topic of research. What is clear is that deforestation and urbanization are significant threats to the Black-and-Chestnut Eagle in Colombia. These threats not only reduce the species' habitat, but also increase the risk of conflicts with human communities (Zuluaga, 2022). For example, the Black-and-Chestnut Eagle's diet includes chickens in areas where forest cover has decreased in its breeding territories (Zuluaga and Galvis 2016). This has led to conflicts with rural communities, as poultry is an important food source for these communities.

Our Network of Custodians works with communities to protect the Black-and-Chestnut Eagle as this situation is one of the biggest problems around the monitoring points, which is why, in addition to advancing basic research on the species, we have dedicated efforts to applied community research. Our intention is to generate strategies that support the mitigation of conflict with the species. Without a doubt, these monitoring points illustrate the complex relationship between biodiversity conservation and human development in high mountain ecosystems in Colombia, and highlight the importance of finding solutions that preserve this fragile ecosystem and foster a harmonious coexistence between nature and local communities.

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First Camera Trap Record of Rufous-tailed Hawk (*Buteo ventralis*) Scavenging Bait in the Temperate Forest Canopy of Southern Chile

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The Rufous-tailed Hawk (*Buteo ventralis*) is a bird of prey endemic to the temperate forests of southern Chile and Argentina (Vuilleumier 1985). It lives in native forests, exotic forest plantations, *Nothofagus* thickets in steep terrain and shrub-steppe plains (Bierregaard 1995). This raptor is considered a forest specialist (Trejo et al. 2006), which is consistent with reports of its nests found in forest environments, either in native forests (Norambuena et al. 2012, Rivas-Fuenzalida et al. 2011) or in exotic forest plantations (Rivas-Fuenzalida et al. 2020).

In Chile, the Rufous-tailed Hawk is considered one of the birds of prey with the highest conservation priority (Pincheira-Ulbrich et al. 2008). At a global level, it is classified as Vulnerable, given that its population is estimated at less than 1000 sexually mature individuals (BirdLife International 2016). Among its threats, the loss and fragmentation of its habitat, the destruction of its nests, and illegal hunting associated with conflicts due to the predation of domestic birds stand out (BirdLife International 2016). Although their threats are widely known and shared with several species of birds of prey globally (McClure et al. 2018), several aspects of their ecology are still unknown, probably due to their low densities or specialized habitat, which makes their detection and study difficult.

Camera traps installed in tree canopies have been used since 1991 (Carthew & Slater 1991). Use of camera traps has been shown to be efficient in the detection of cryptic species (Godoy-Güinao et al. 2018), efficiently complementing wildlife inventories (Hongo et al. 2020). Godoy-Güinao and collaborators (2023) have used this methodology

to evaluate how wildlife use the different strata of the temperate forest, detecting, among other species, Rufous-legged Owl (*Strix rufipes)* and the Chilean Hawk (*Accipiter chilensis*), both of which are forest specialist raptors.

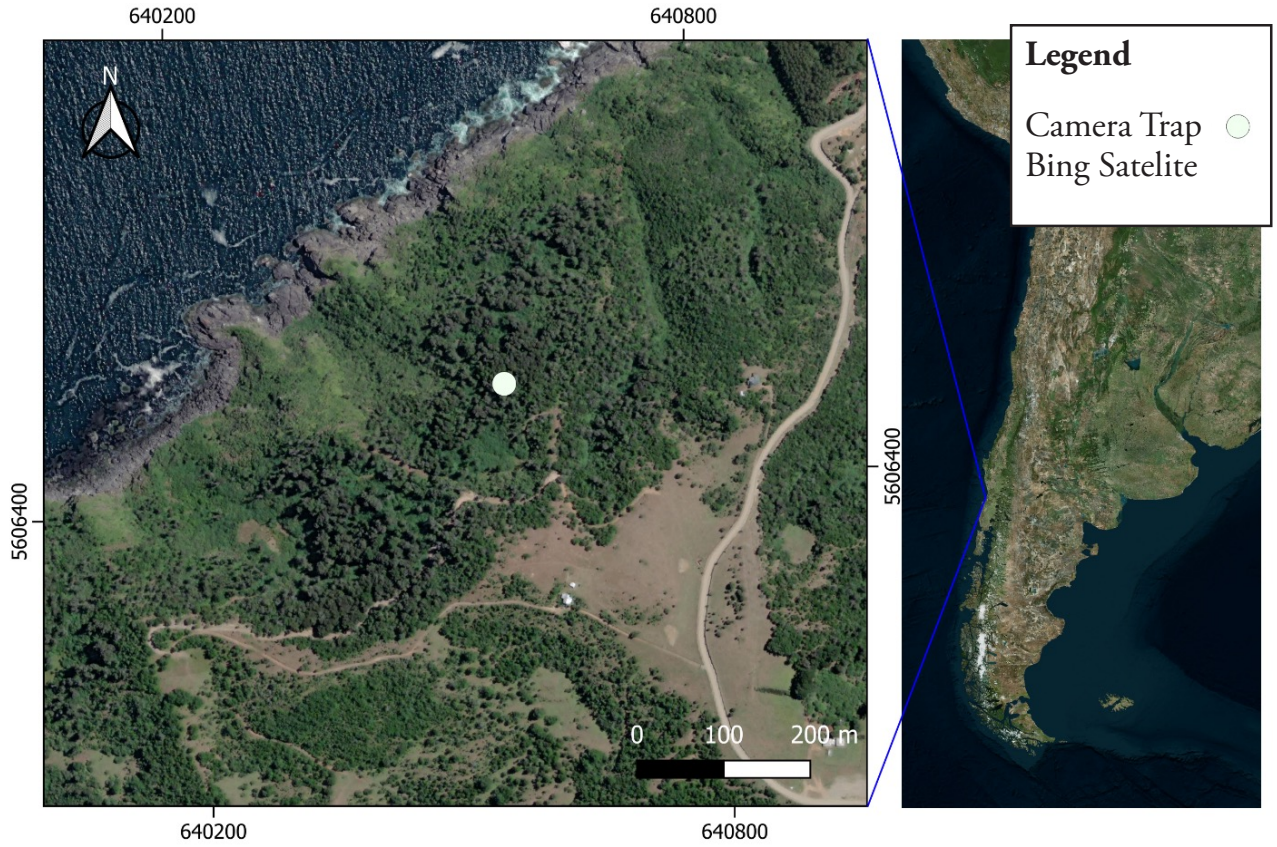
Likewise, Zambrano (2022) used camera traps in the treetops at nests to evaluate some aspects of the reproductive biology of birds of prey. In tropical and temperate forests they have been frequently used in the study of mammals, where the use of attractors or baits has been used to increase the probability of detection of target species (Moore et al. 2021). However, to date there are no studies that have used this tool in parallel with bait to detect the presence of forest raptors and threatened birds of prey.

Within the framework of the scientific project for the comparative evaluation of the methodologies used for monitoring birds of prey in Chile (www.onguce.com/raptors-research-chile), we report the first record of the Rufous-tailed Hawk exhibiting scavenging behavior. The record was obtained through the use of camera traps installed in the canopy. In this context, our objective is to discuss this finding and its particularities based on the available scientific evidence.

Methods

On 4 May 2022, in the private protected area Parque Punta Cóndor, Province of Valdivia, Los Ríos Region, Chile (Figure 1), we accessed the canopy of the temperate coastal forest with single rope climbing techniques (Figure 1a). We used

Figure 1. **Study area Punta Cóndor Park, Valdivia Province, Los Ríos Region, Chile**



a wall security camera mount to install a camera trap (StealthCam brand, model DS4K) 11 meters above ground level on the main trunk of an Olivillo Tree (*Aextoxicon punctatum*).

The camera was directed towards the west, pointing at a horizontal tree branch, where we placed a raw chicken (approximately 200 g) as an attractor (approximately 1 meter away from the camera; Figures 2b and 2c). The camera trap was configured in hybrid mode ("PIR COMBO": video and photography recording), with 2 shots after activation. The sensor level was programmed to detect and activate at a short distance (PIR RANGE=NEAR FIELD), with a resolution of 2k and taking 30 second footage.

Subsequently, the images were classified according to the detected species and the following parameters were estimated: a) Latency period, defined as the time elapsed between the date of installation of the camera trap and the date of the first detection of the species, b) Independent detections, defined as the number of detections of

Figure 2. **Camera trap installation with bait in the canopy of Punta Cóndor Park, Valdivia Province, Los Ríos Region, Chile. a) Access to the canopy through single rope climbing technique. b) Installation of the bait (chicken) in front of the camera trap. c) Installation of a camera trap on the main trunk, directed at the horizontal branch. Photos © Brayan Zambrano**

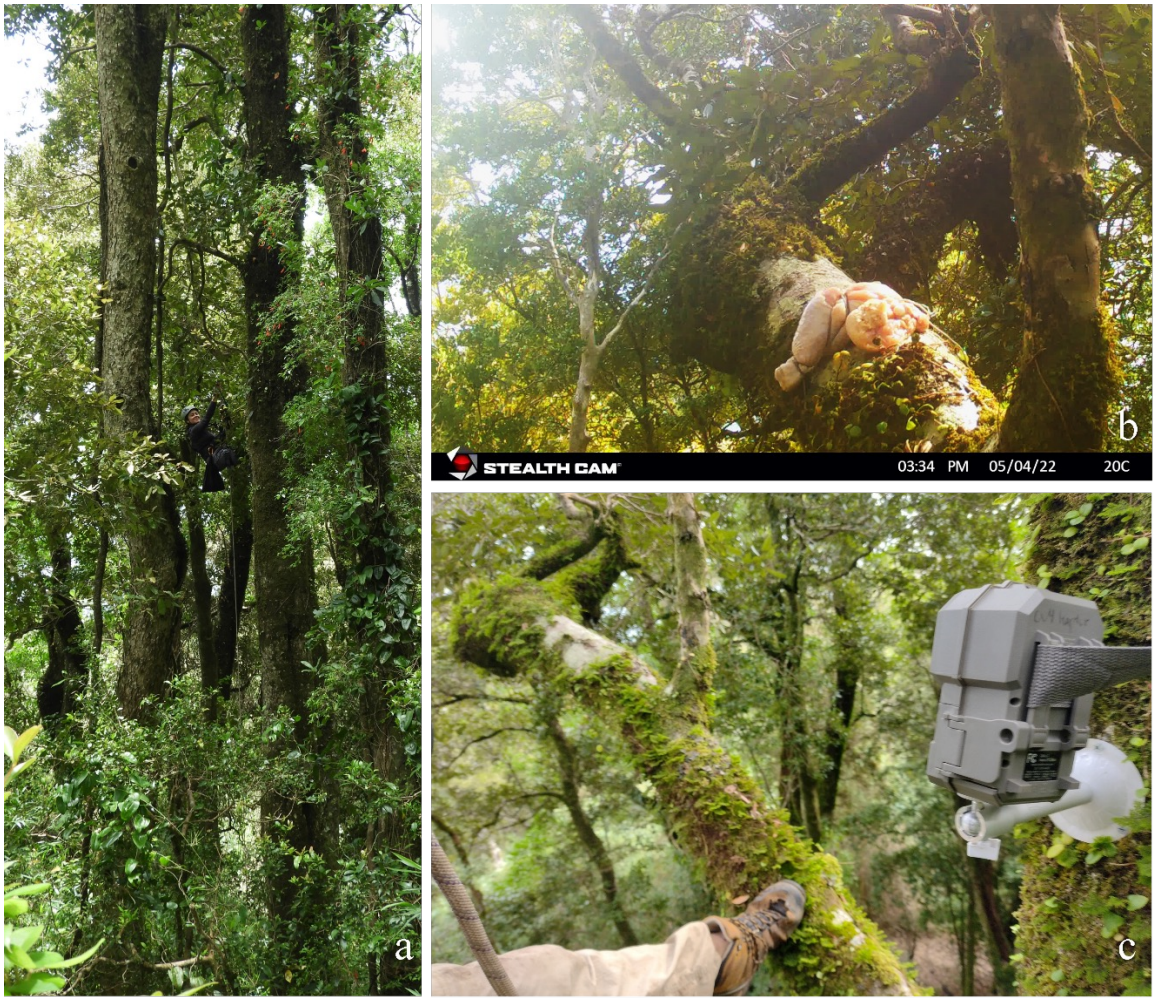


Figure 3. **Images of Rufous-tailed Hawk obtained using a baited camera trap in the canopy of the coastal temperate forest in Punta Cóndor Park, Valdivia Province, Los Ríos Region, Chile. a) First independent detection. b) Second independent detection. c) Third independent detection. d) Fourth independent detection.**

the same species at the same site, separated by at least 1 hour between sightings (Rovero and Marshall, 2009), and c) Duration of the event, defined as the time elapsed during the presence of the individual in each independent detection.

Results

The camera trap was active and recording videos and photographs for 4 days, after which the memory was full. A total of 721 records were obtained, corresponding to 70 videos and 651 photographs, which added up to 14.27 GB. During the study period, the presence of a Rufous-tailed Hawk was detected after a latency period of 2.86 days (68.64 hours). Four detection events were obtained with an average duration of 33.5 minutes (range =13-55 minutes) (Table 1).

In all independent, recorded events the individual was documented scavenging chicken (bait). The individual had a plumage pattern attributable to a juvenile (Figure 2). In some of these records

Figure 4. **Records of Rufous-tailed Hawk detected using a baited camera trap in the canopy of the coastal temperate forest in Punta Cóndor Park, Valdivia Province, Los Ríos Region, Chile. A) photograph of the left wing with the 10 primary feathers and B) photograph of the right wing with the absence of the primary feathers: p6 p7 and p8.**

the individual spread its wings and the absence of three primary feathers (p6, p7 and p8) on the right wing was evident (Figure 4).

Discussion

Our study is the first published record to document the Rufous-tailed Hawk using a canopy camera trap and chicken as bait. This methodology proved to be useful not only to record previously undescribed scavenging behavior for the Rufous-tailed Hawk, but also to determine age and morphological characteristics, such as plumage pattern and the absence of feathers, which facilitated the ability to identify it as the same indivdual.The use of this complementary methodology can be essential to document markings, both natural and artificial (such as the bands used in monitoring birds of prey). It is vital to compare detection rates with and without the use of bait with canopy-level camera traps. Although the number of detection events was low, this was attributed to the initial configuration of the camera, which exhausted its memory within four days. For future research, we recommend adjusting the settings to limit the number of logs per detection event, reducing the amount of resolution of the photographs, and/or setting logs at specific intervals such as every 13 or 33 minutes (representing the minimum and average time of observed permanence), with the aim of optimizing the camera's operating time.

Information on the trophic ecology of the Rufous-tailed Hawk, as well as other aspects of its ecology, is scarce (Raimilla et al. 2012). A detailed study by Figueroa et al. (2000) during the

Independent detection	Date	Detection start time	Detection end time	Event duration (minutes)
First	7 May 2022	12:06	13:01	55
Second	7 May 2022	14:41	14:55	13
Third	8 May 2022	09:21	09:46	25
Fourth	8 May 2022	11:49	12:30	41

Table 1. **Independent detection events of the Rufous-tailed Hawk, recorded with a camera trap installed together with bait in the canopy of the coastal temperate forest in Punta Cóndor Park, Valdivia Province, Los Ríos Region, Chile.**

reproductive season, determined through pellet analysis that the diet of the Rufous-tailed Hawk is composed of a wide variety of medium-sized vertebrates such as reptiles, synanthropic rodents and a high proportion of birds. However, it is currently not possible to determine through pellet analysis which items correspond to carrion.

Additionally, the absence of primary feathers on this individual, which were not in a symmetrical pattern, may be indicative of an injury or trauma. This condition may reflect a poor physiological state or inferior hunting capacity compared to an individual with all its flight feathers, and could be a factor that influenced the recorded scavenging behavior. However, research on a taxonomically close species, the Red-tailed Hawk (*B. jamaicensis*), has shown, in both observational and experimental studies, that carrion is part of its diet during the winter (Sheffield and Jobe 1996; Langley 2001).

This evidence allows us to hypothesize that the scavenging of carrion that we observed in our study with the Rufous-tailed Hawk could be a common pattern to observe in the winter season, which raises further questions such as: how frequent and how important is scavenging for this species? Are natal dispersal periods and difficulty in obtaining prey in new territories a promoter for scavenging? Is there a seasonal pattern in the frequency of scavenging? Is scavenging influenced by age factors and/or physiological deficiencies?

Finally, it is necessary to consider that this report corresponds to a single sampling site. Thus, future studies with larger spatial and temporal sampling scales could elucidate the efficiency of this methodology in population monitoring and provide systematic information on the factors that influence scavenging behavior in this rare and endangered bird of prey.

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Of Interest...

Grants

NEOTROPICAL BIRDING & CONSERVATION

https://www.neotropicalbirdclub.org/conservation/premios-de-conservacion/

NBC offers research grants for conservation work or for research that may benefit conservation. The US$1,500 and US$3,000 awards are for projects carried out by nationals and/or residents of Neotropical countries (i.e., the Caribbean, Central America and South America). The Juan Mazar Barnett Prize (up to US$5,000) is to encourage early career conservationists and Neotropical bird researchers. Application guidelines are available in English and Spanish. The deadlines are January 1 and July 1 of each year.

HAWK WATCH INTERNATIONAL AWARD

https://hawkwatch.org/investing-in-others/grrcg/

HawkWatch International's Raptor Research and Conservation Global Grant supports projects that address global raptor priorities. The grant aims to increase diversity and inclusion in conservation while building local capacity. The requirements to apply are:

> Located in high priority countries for raptor research and conservation including Latin America

>Focused on a single raptor species recognized as a high priority species

>Led by an applicant who is a citizen of the country and who is associated with a registered NGO and/or university in the country where the project will be carried out. The deadline for proposals is December 31, 2023. Access the form to apply here.

Conferences

VI NEOTROPICAL RAPTOR CONFERENCE, 1-4 October, 2024

Although we are still in the planning stage, it is with pleasure that we announce that the VI Conference on Neotropical Birds of Prey will take place in Pereira, Colombia from October 1 to 4, 2024. Apart from the conference, there will be several workshops and symposiums about Neotropical Owls, *Spizaetus isidori*, and *Harpia harpyja*, and a night of movies. We will soon be sending more information about the event, including how to register and present your work during the conference. In the meantime, if you have any questions, you can contact Marta Curti directly, mcurti@peregrinefund.org.