# Spizaetus

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*Sarcoramphus papa* © Santiago Gibert-Isern/Dimension Natural

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# Neotropical eagles and the King Vulture (*Sarcoramphus papa*): a review

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Currently, most raptor populations worldwide are in decline, and therefore fall under various conservation categories (McClure et al. 2018, McClure and Rolek 2020, IUCN 2024). Despite their ecological importance as predators and scavengers, there are still gaps in information about the natural history and ecology of many species. This information is important for understanding ecological processes, such as the regulation of prey populations that maintain communities, and the patterns of distribution, abundance, and diversity of species at different times and in different spaces within ecosystems. This information is also important for identifying their main threats and promoting their conservation at local and global scales (Sergio et al. 2006, McClure et al. 2018, Blanco-Márquez and Chacares 2019, Buechley et al. 2019).

Analyzing published ecological information on Neotropical eagles and King Vultures is important, as it will allow us to identify and detect information gaps (e.g., Méndez et al. 2022, McClure et al. 2022) and propose research on these birds, thereby advancing scientific knowledge to protect them (Sargeant and O'Connor 2020).

In order to identify information gaps, in this review we analyze the studies carried out on seven species of diurnal raptors that inhabit humid tropical forest ecosystems. The Harpy Eagle (*Harpia harpyja*) inhabits primary tropical forests and is distributed from southern Mexico to northern Argentina, although its population has declined in northern Central America (Vargas et al. 2006, Schulenberg 2020). The Crested Eagle (*Morphnus guianensis*) inhabits primary areas of tropical and subtropical forests, with a discontinuous distribution from Central America to south-central South America (Smith 2020). The three species of the genus *Spizaetus* (Black Hawk-Eagle- *S. tyrannus*; Black and White Hawk-Eagle- *S. melanoleucus* and Ornate Hawk-Eagle- *S. ornatus*) are distributed from southern Mexico to northeastern Argentina, mainly in humid primary tropical forests in lowlands (Iliff 2020, Quintero and Jácome 2020, Tate 2020). Unlike the other eagles of the genus *Spizaetus*, the Black and Chestnut Eagle (*S.*

*isidori*) has a smaller distribution. It is restricted mainly to the Andes mountain range, from northeastern Colombia and northwestern Venezuela to northeastern Argentina, inhabiting primary and montane forests at medium and high altitudes (Rivas-Fuenzalida et al. 2024). Finally, the King Vulture (*Sarcoramphus papa*) is distributed from southern Mexico to northern Argentina, mainly in lowland tropical forests (Holste et al. 2020).

Among these species, the global risk categories vary: three are in the category of least concern (Black Hawk-Eagle, Black-and-white Hawk-Eagle and King Vulture), two are near threatened (Crested Eagle and Ornate Hawk-Eagle), one is vulnerable (Harpy Eagle) and one is endangered (Black and Chestnut Eagle; IUCN 2024).

**Methods**

We searched for information published from 1990 to November 2024, through digital libraries such as Google Scholar, BioOne, Scielo and in specialized journals such as: *Actualidades Ornitológicas online, Biological Conservation, Condor, Conservation genetics resources, Cotinga, Ecology and Evolution, El Hornero, Endangered Species Research, Euphonia, Folia Primatologica, Global Ecology and Conservation, Hal open science, Huitzil, Ibis, Inheringia serie Zoológica, Journal of Raptor Research, Nótulas Faunísticas, Nuestras Aves, Ornithological Applications, Ornithology Research, Ornitological Neotropical, Perspectives in Ecology and Conservation, Primates*, *Revista Aves Argentinas, Revista Brasileira de Ornitología, Revista Ecuatoriana de Ornitología, Revista Mexicana de Biodiversidad, Revista Peruana de Biología, Série Zoología, Spizaetus, Vulture News, The Southwestern Naturalist, The Wilson Journal of Ornithology, Tropical Forests* and *Zeledonia*.

We also reviewed web pages: Birds of the World, Global Raptor Information Network, Research Gate, The Peregrine Fund, and in books: *Libro Rojo de la Fauna Silvestre Amenazada del Perú* (Servicio Forestal y de Fauna Silvestre, 2018), *Libro Rojo de la Fauna Silvestre de Vertebrados de Bolivia* (Ministerio de Medio Ambiente y Agua, 2009), *Libro rojo de las aves de Colombia* (Renjifo, et al. 2014), *Fauna Argentina Amenazada* (Chebez 2008), and *Neotropical Birds of Prey* (Whitacre 2012).

We searched online repositories of universities and research centers in the research and thesis sections. The repositories consulted were: El Colegio de la Frontera Sur (ECOSUR), Pontificia Universidad Católica del Ecuador (PUCE), Smithsonian Research Online, Universidad Central del Ecuador (UCE), Universidad de Alicante (UA), Universidad Federal do Pampa (UNIPAMPA),Universidad Federal do Paraná (UFPR), Universidad Nacional del Comahue (RDI UNCO), Universidad Veracruzana (UV), University Libraries (UNM), University of Wisconsin (UW). Bird lists in documents and field guides were not used in this study.

The keywords used for the information search were "Neotropical birds of prey," which included: feeding, threats, behavior, conservation, diet, dispersal, distribution, foraging, monitoring, nesting, reintroduction, reproduction, and habitat use. The scientific and common names of each species were also used. These keywords were also translated into English and Portuguese to broaden the range of information searches. For some species, a search was included for recognized genera (e.g., *Spizastur*, *Oroaetus*). For the analyses, the information obtained was organized by species, topic, country, and year.

**Results**

A total of 311 documents were obtained, distributed as follows: 262 scientific articles, 19 theses, 13 chapters and one book, 11 outreach articles, and five documents grouped under "other publications" as this literature could not be classified. Information was classified according to the focus of each publication (e.g., food, reproduction, distribution). Documents with similar themes were then grouped into a main theme (e.g., food, which included topics on diet and foraging strategies). Finally, we identified 13 themes. Other general documents that covered several topics or were outreach articles were grouped into outreach articles, books and chapters, and theses (Table 1).

Forty-one documents could not be grouped into a specific country because they detailed studies that covered a larger geographic scale, even at the continental level, or because they were studies on broad topics such as genetics, health, and outreach. The total number of studies for each species varied among countries (Table 2). The majority of studies were conducted in Brazil, representing 35% (95) of the total, followed by Argentina and Colombia with 9.6% (26) each, and finally, Ecuador and Mexico, with 9.2% (25) each (Table 2).

The species with the highest number of studies was the Harpy Eagle with 115 studies, while the species with the fewest studies was the Black Hawk-Eagle (15,Table 2). Brazil also stood out in the number of studies per species, with the Harpy Eagle having the highest number of studies with 46, followed by Ecuador with 20. For the Crested Eagle, Brazil had the highest number of studies with 13, and likewise, this country had the highest number of studies for the Ornate, Black, and Black-and-white hawk-eagles. For the Black and Chestnut Eagle, studies were concentrated in Colombia and Argentina. For the King Vulture, Mexico had the highest number of studies with 10 (Table 2).

In general, the main topics addressed in studies on Neotropical raptors have been: distribution (69), reproduction (49), and feeding (43) (Figure 1). While studies on abundance, natural history and monitoring were the least represented (Figure 1). In addition, our results showed that over the last 30 years there has been a significant increase

| Topics | Definition |
|---|---|
| Abundance | Studies that estimate the number of individuals per species per site. |
| Threats and conflicts | Studies describing the identified threats. |
| Feeding | Studies that include diet, hunting strategies, and predation. |
| Behavior | Studies that describe the natural or captive behavior of species. |
| Conservation | Studies that propose conservation actions for species. |
| Dispersal | Studies that monitor adult and juvenile individuals with telemetry. |
| Distribution | Studies that include potential distribution and range. |
| Disclosure | Includes general information on various topics to learn about the species. |
| Genetics and health | Studies with genetic information of the species and rehabilitation. |
| Habitat | Studies that include habitat use and selection, and conservation of the species. |
| Natural History | Studies with basic or anecdotal biological information about a species. |
| Books and Chapters | Includes information on various topics related to the species. |
| Monitoring | Includes programs to monitor species in their distribution area. |
| Reintroduction | Studies that monitor the release of captive or rehabilitated species. |
| Reproduction | Studies focused on the nesting of species. |
| Thesis | Studies that address various topics related to the species, grouped into bachelor's, master's and doctoral theses. |
| Other studies | It includes studies on some topics, but they were developed in captivity, so they were considered separately. |

***Table 1.*** **Topics and definitions used to classify documents and use in analyses.**

in ecological and biological studies on these birds. The highest number of studies focused on Neotropical eagles and King Vultures were published between 2006 and 2015 (Figure 2).

## Discussion

The results of this analysis show considerable variation in the number of studies conducted for each species across countries, topics, and years. Currently, citizen science platforms such as eBird and iNaturalist represent an important source of information for monitoring the occurrence and distribution of many raptor species. Likewise, they are a valuable tool for obtaining knowledge that allows for the development of effective conservation measures (Kuonqui and León, 2021). For example, through the photographic and presence records published on these platforms, it is possible to identify sites and relevant information, as well as biological and ecological characteristics of the species, such as different plumage types according to age, behavior, or habitat use. Therefore, they allow for the identification of specific sites for future research.

| Species<br><br>Country | *Sarcoramphus papa* | *Harpia harpyja* | *Morphnus guianensis* | *Spizaetus ornatus* | *Spizaetus isidori* | *Spizaetus tyrannus* | *Spizaetus melanoleucus* | Total by country |
|---|---|---|---|---|---|---|---|---|
| Argentina | 0 | 6 | 1 | 0 | 13 | 3 | 3 | 26 |
| Belize | 1 | 3 | 0 | 2 | 0 | 0 | 1 | 7 |
| Bolivia | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Brazil | 6 | 46 | 13 | 16 | 0 | 6 | 8 | 95 |
| Colombia | 0 | 5 | 0 | 0 | 20 | 1 | 0 | 26 |
| Costa Rica | 3 | 1 | 0 | 2 | 0 | 0 | 0 | 6 |
| Ecuador | 0 | 20 | 1 | 2 | 2 | 0 | 0 | 25 |
| El Salvador | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Guatemala | 0 | 0 | 2 | 0 | 0 | 1 | 0 | 3 |
| Fr. Guiana | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Honduras | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| Mexico | 10 | 2 | 1 | 8 | 0 | 2 | 2 | 25 |
| Nicaragua | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 2 |
| Panama | 0 | 15 | 1 | 1 | 0 | 1 | 0 | 18 |
| Paraguay | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 2 |
| Peru | 0 | 8 | 1 | 2 | 3 | 0 | 2 | 16 |
| Suriname | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| Venezuela | 4 | 3 | 2 | 2 | 0 | 1 | 0 | 12 |
| Total by species | 26 | 115 | 24 | 35 | 39 | 15 | 16 | 270 |

***Table 2.*** **Number of studies carried out in the last 30 years (1990-2004) for seven species of diurnal raptors per country in the Neotropical region.**

Although these Neotropical eagles and the King Vulture have a wide, discontinuous distribution in the Neotropics (Ferguson-Lees and Christie 2001; Clark and Schmitt 2017), knowledge about their distribution and abundance is still very limited. This highlights the need for more population research, both generally and specifically on raptors in the Neotropics (Saggese 2021).

Review studies on bird research are limited (e.g., McClure et al. 2022, Méndez et al. 2022). Therefore, analyzing the existing literature on birds will allow us to identify gaps and prioritize conservation research (McClure et al. 2022). The conservation status of species at the regional, national, and even state- or provincial levels varies.

Throughout their distribution in the Americas, evidence suggests that the populations of these species have largely declined due to habitat destruction or alteration, which indicates a high vulnerability (Şekercioğlu et al. 2004, Pimm et al. 2006, McClure et al. 2018, IUCN 2024). Therefore, it is necessary to generate more long-

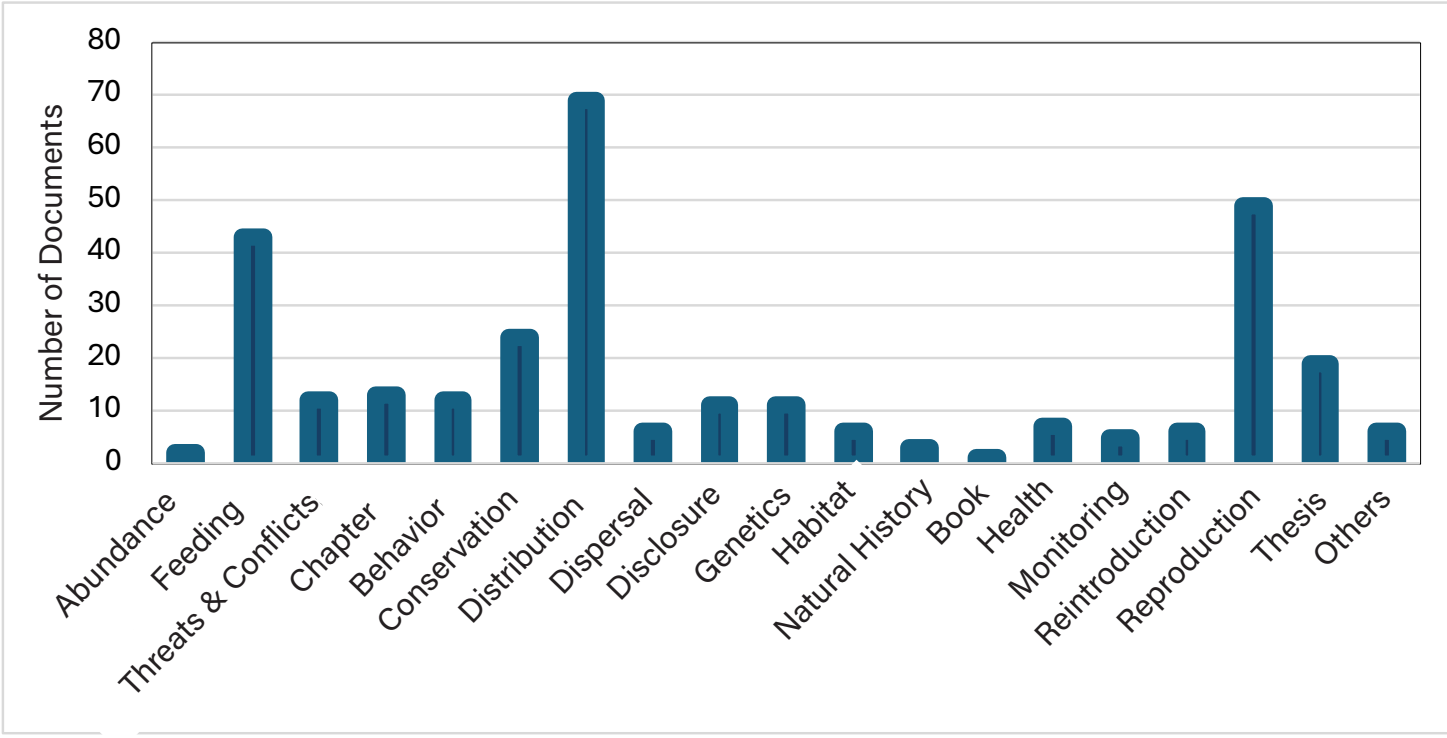


***Figure 1.*** **Number of documents analyzed (1990-2024) for seven species of diurnal raptors (*Harpia harpyja*, *Morphnus guianensis*, *Spizaetus tyrannus*, *S. melanoleucus*, *S. ornatus*, *S. isidori* and *Sarcoramphus papa*) by topic in the Neotropical region.**

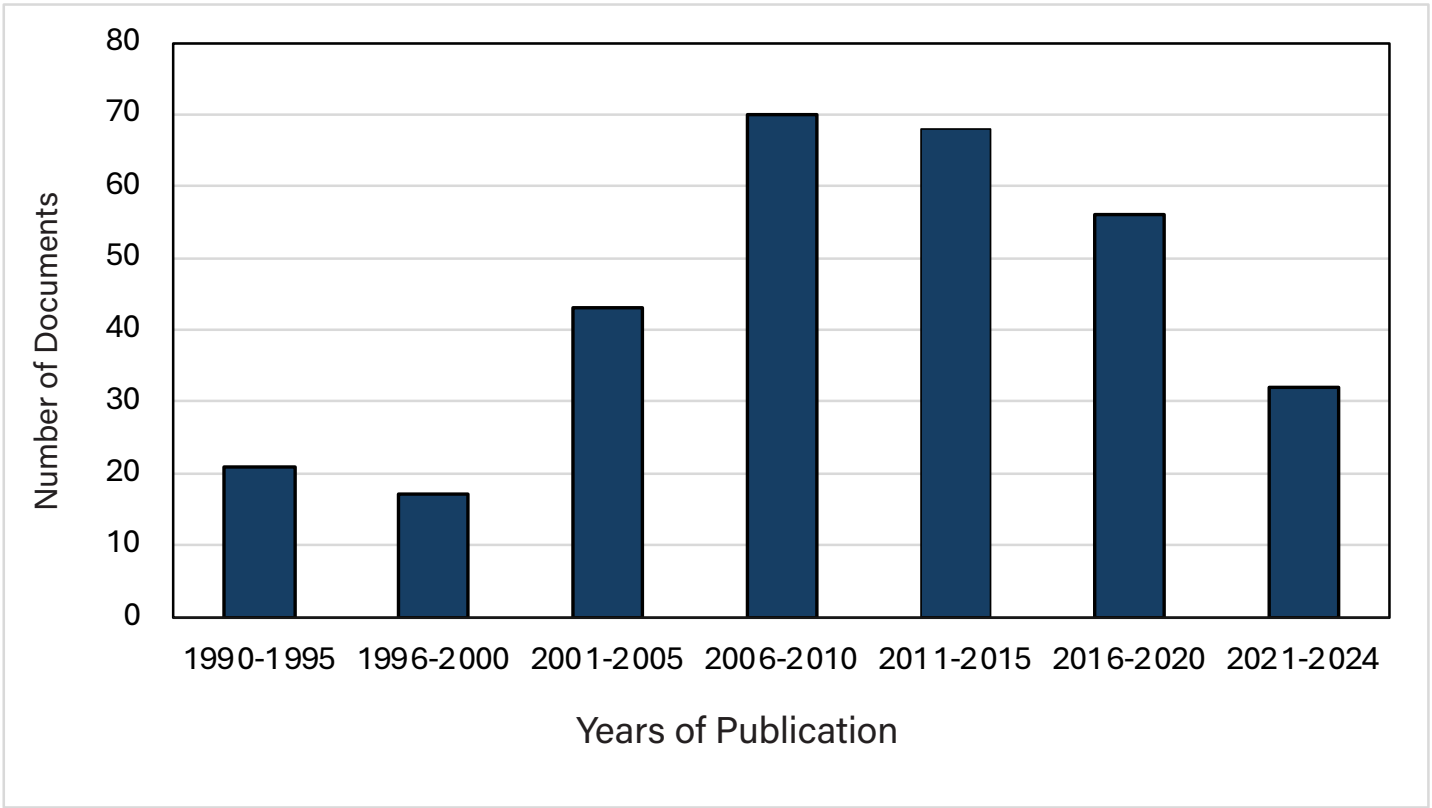


***Figure 2.*** **Number of documents analyzed for seven species of diurnal raptors (*Harpia harpyja, Morphnus guianensis, Spizaetus tyrannus, S. melanoleucus, S. ornatus, S. isidori* and *Sarcoramphus papa*) in the last 30 years in the Neotropical region.**

term information on the population dynamics of the species, habitat use and selection in different seasons, variation in trophic ecology, studies of seasonal or regional movements, reproductive ecology, diseases, and conservation medicine.

This is particularly true for species with limited distributions and classified as rare (e.g., the Black and Chestnut, Black-and-white, and Crested eagles). However, this is also true for widely abundant species that face local and regional threats. For example, human impacts on these eagle populations (human-eagle conflicts, collisions with human structures, or pollutants) must be identified. These studies will allow us to understand how species adapt to new processes of change, identify variations in distribution and abundance patterns, and the different processes they perform in ecosystems. Different spatial and temporal scales must also be considered to identify the specific needs for conserving their populations (Morrison and Saggese 2024).

It is also necessary to generate conservation actions such as protecting ecosystems through Protected Natural Areas or Biological Reserves, implementing environmental awareness programs, and developing better policies and legislation. (McClure et al. 2018). This review identifies information gaps and the need to increase long-term research on these Neotropical raptors. These species are excellent models that allow us to evaluate habitat quality and therefore protect ecosystems. Developing studies on the identified gaps will allow for better understanding of these species at the local, regional, and continental levels for their conservation.

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# Silent victims: aspects of toxicological research on Strigiformes over the past 30 years

By **Priscilla Esclarski[1]; Thaís R. A. Gonçalves[2]; Renata Prudêncio do Carmo[3]**

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Owls, are birds of prey adapted to nocturnal hunting and are important environmental regulators, controlling the population size of their prey, promoting ecological balance in the ecosystem (König and Weick 2009). There are more than 200 species worldwide, 26 of which are found in Brazil (König and Weick 2009; Pacheco et al. 2021; Dantas et al. 2021). Currently, the populations of most birds of prey worldwide are declining (IUCN 2025). However, due to their nocturnal habits, most species lack data on their natural history, which makes risk classification and, especially, the promotion of conservation strategies for these species difficult (ICMBio, 2008; Motta-Junior et al. 2017).

The absence or reduction of these predators in the ecosystem can generate a series of ecological imbalances, especially in areas undergoing forest fragmentation (König and Weick 2009). We know that the distribution patterns of nocturnal birds, as well as their abundance, are directly related to environmental characteristics, influencing each species differently (Ribeiro Gonçalves et al. 2017). However, the ecology of nocturnal birds is poorly understood regarding habitat use, and the lack of this knowledge can put some of these birds on the brink of extinction even before their reclassification on the list of threatened species (ICMBio 2025; Esclarski and Cintra 2014).

Furthermore, some species are considered synanthropic, i.e., they adapt well to human coexistence, gaining advantages in altered environments, such as Burrowing Owl (*Athene cunicularia*) (Strigiformes: Strigidae) and American Barn Owl (*Tyto furcata*) (Strigiformes: Tytonidae). However, this proximity entails additional risks for the survival of the species and their populations (Møller, 2008; Martínez-Haro et al. 2017; Pinheiro et al. 2023). A recent study showed that Burrowing Owls living in urban environments exhibit fluctuating asymmetry related to environmental stress (Esclarski et al. 2025). Specifically, noise instabil-

ity in the environment has been shown to have a complex and measurable physical impact on the development of Burrowing Owls, affecting different members and in opposite ways, males and females (Esclarski et al., 2025). In the same area, Mendes et al. (2024) observed a shift in diet composition in response to species abundance in the urban environment. Franco and Marçal-Junior (2018) reported deeper burrowing in urban areas in response to urban traffic, heavy pedestrian traffic, and the presence of domestic animals.

This suggests that even the seemingly most adaptable synanthropic species suffer from the expansion of deforestation and habitat fragmentation, pollution, poisoning, and, unfortunately, random attacks due to folk beliefs and domestic animals (ICMBio, 2008). Therefore, reporting and analyzing the impact of these anthropogenic actions on owls is necessary for making strategic decisions aimed at preserving these species. The objective of this study was to conduct a literature review addressing toxicological studies on Strigiformes in Brazil and worldwide over the past 30 years.

## Methodology

We conducted a systematic literature review in the academic databases Clarivate, Web of Science, Scopus, Dimensions, Lens.org, and CiteSpace. We used the following keywords: owls, toxicology, owls, ecotoxicology. These terms were selected to cover publications in English, Spanish, and Portuguese, allowing for a more comprehensive approach to the existing literature. The temporal filter was used for the last 30 years (1993–2023). Results were selected based on their relevance to the topic, focusing on studies involving owls and barn owls as bioindicators or victims of environmental pollutants.

## Results and Discussion

The research yielded 97 studies, more than 75% of which were conducted in Europe and North America. In Brazil, only three studies focused on the topic were found, which also analyzed birds other than owls.

porarily high supply of food resources due to episodic resource pulse events observed in mangroves (Ostfeld and Keesing 2000, Nowlin et al. 2008), which Black Vultures quickly exploited. However, this effect did not last long. Within a year, vulture numbers returned to normal, indicating that the hurricane's impact on food availability was short-lived.

| Americas | Europe | Africa | Asia | Oceania | Brazil |
|---|---|---|---|---|---|
| 26 | 53 | 5 | 5 | 5 | 3 |

Furthermore, most studies are based on occasional events, resulting in the analysis of synanthropic species found dead or treated in rehabilitation centers. Wild owls and Barn Owls were rarely considered.

Of all the studies found on owls, only 34% focused on this group (Fig. 1). Of these, 28.51% addressed synanthropic species: A*thene cunicularia* (8.51%) and *Tyto furcata* (20%). This may be due to the cavity-roosting habit observed in many forest species, resulting in undetected deaths due to the absence of visible carcasses.

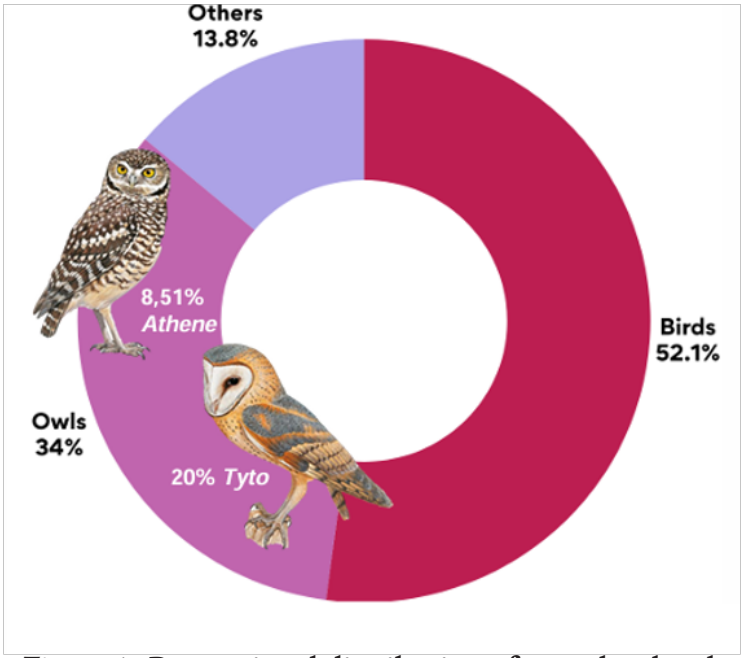


***Figure 1.*** **Proportional distribution of records related to predatory birds in pollution studies. "Birds" represents general bird studies in which owls and barn owls are mentioned among several species; "Owls" represents studies or case reports focusing on one or more species of owls and Barn Owls; "Others" represents general fauna studies in which owls are mentioned.**

At the same time, synanthropic species serve as sentinel bioindicators of anthropogenic impacts (Zacharias and Roff, 2001). By considering the ease of access and abundance of information about them, and by observing what happens to them, we can indirectly infer ecological processes that possibly affect more sensitive, difficult-to-access, or poorly informed taxa. The observed changes in synanthropic species, whether physiological, behavioral, or population-based, become an indicator of emerging environmental threats for more specialized species or those restricted to less accessible habitats, such as forested owls (Zacharias and Roff, 2001; Barry, 2013; Adam et al., 2023).

When analyzing the ten most frequently occurring terms in our data, the top ones identified included "birds", "prey", "owl", "rod poison", "exposure", "metal", "anticoagulant", "feathers", "pollution", and "raptors". This result reflects the emphasis on toxicological incidents involving raptors in relation to the types of prey consumed and the effects of exposure to rodenticides and heavy metals (Fig. 2). This terminological pattern suggests an urgent need to connect ecological studies with the implications of anthropogenic contaminants on the health of top predator species. The lack of data on this matter is particularly worrying given the passage of Law No. 14,785 of December 27, 2023, in Brazil, which reduced the timeframe for reviewing pesticide registrations and new products (24 months) and known formulas (60 days), thereby speeding up the approval process and resulting in the approval of more than 660 new products by 2024 (MAPA, 2025).

The lack of measurement of the impacts on wildlife resulting from this type of flexibility makes it difficult to establish realistic criteria for assessing

| Rank | Term |
|---|---|
| 1 | Birds |
| 2 | Prey |
| 3 | Owl or owls |
| 4 | Rodenticide or rodenticides |
| 5 | Exposure |
| 6 | Metal or metals |
| 7 | Anticoagulant |
| 8 | Feathers |
| 9 | Contamination |
| 10 | Raptor |


***Figure 2.*** **Most frequently used terms in toxicological studies in the scientific literature of the last 30 years. On the left, a list of the 10 most frequently used terms in the context of our search, including "birds," "prey," and "rodenticide" or rodenticides." On the right, a word cloud visually representing the main topics addressed in the literature found, such as "anticoagulant" and "feathers."**

extinction risk at the regional, national, or global levels. Currently, of the Brazilian species, only Pernambuco Pygmy-Owl (*Glaucidium mooreorum*) is listed as endangered (IUCN, 2025). Only two owl species are considered endangered in the Brazilian Red Book of Threatened Brazilian Fauna, Spectacled Owl (*Pulsatrix perspicillata pulsatrix*; CR) and Black-banded Owl (*Strix huhula albomarginata*; VU), while Pernambuco Pygmy-Owl is considered extinct. These species and subspecies are endemic to the Atlantic Forest, a biome highly affected by forest fragmentation due to urban and agricultural expansion (ICMBio, 2018, 2025). Synanthropic species emerge as an alternative for the indirect identification of emerging threats to owls in forested environments. However, evidence of the lack of data on the toxicological impacts on the health of these birds highlights the urgency of promoting studies in this regard to support strategies to control and regulate the use of toxins for the conservation of Strigiformes.

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# Observation of Ground-Level Predatory Behavior by Harpy Eagle (*Harpia harpyja*) Pursuing South American Coati (*Nasua nasua*) in Taricaya Ecological Reserve, Perú

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The Harpy Eagle (*Harpia harpyja)*, one of the largest raptors in the world, is classified as Vulnerable by the IUCN and its populations are suspected to be declining rapidly due to increasing deforestation (Birdlife International 2021, IUCN 2025). Studies indicate the majority of its diet consists of a variety of small- to medium-sized arboreal rainforest mammals, such as sloths and primates (Rettig 1978, Sherman 1991, Galetti and de Carvalho 2000, de Souza et al. 2005, Springer et al. 2011, Aguiar-Silva et al. 2015, Bowler et al. 2020). Larger terrestrial prey, such as Collared Peccary (*Dicotyles tajacu*) and Red Brocket Deer (*Mazama americana*) were also found to be part of their diet, especially of the female Harpy Eagles (Rettig 1978, Touchton et al. 2002, Ferrari and Port-Carvalho 2003).

However, due to the elusive nature of these birds and the difficulty in observing their hunting behavior, knowledge about their predation habits has mainly been limited to the collection of prey remains in and around nesting sites (Aguiar Silva et al. 2014, Miranda et al. 2017, Bowler et al. 2020). The hereby presented camera-trap footage therefore provides a unique opportunity to witness a Harpy Eagle in action, showcasing its interactions with South American Coatis (*Nasua nasua*) in their natural habitat.

The incidental records reported of hunting behavior occurred in Taricaya Ecological Reserve (TER), a 476ha privately owned reserve located in the buffer zone of the Tambopata National Reserve in Madre de Dios, Peru. TER consists of seasonally flooded, primary, subtropical, wet forest according to the Holdridge life zone system and has two distinct seasons, a dry season that runs from May to October and a wet season that runs from November to April (Holdridge 1967). The historical average annual rainfall in the area is 2297 mm, and fluctuates strongly between seasons, with ~ 30 mm of rainfall in the driest month and ~ 400 mm in the wettest month. The

average annual temperature is 31.3 °C, with the highest temperatures recorded in September and the lowest in May (SENAMHI 2016). TER has been deploying Browning camera traps in an opportunistic manner since 2017 to obtain a better understanding of the species diversity within the reserve. Five camera-traps were placed approximately 30 cm above the ground and were positioned randomly throughout the reserve. Triggered camera-traps recorded videos of 20s, with an interval of 3 s between videos. The specific camera-trap that registered the predation events by the Harpy Eagle was positioned in an open area of floodplain forest that floods annually during the rainy season.

This scientific note describes the sequence of three videos recorded at the same location on 25 August 2023. In these videos, a Harpy Eagle was observed with a coati as prey, and was displaying hunting and surveillance behavior. The first video, recorded at 06:24, depicts a Harpy Eagle with a dead South American Coati in its talons. The eagle appears in the middle of the camera-trap action radius and seems slightly off balance in the first second of the video (its wings are open and tilted to its right side), suggesting it just landed after killing its prey. The eagle can be seen grabbing the coati in its left foot and pecking it once on the head. It is also observed scanning its surroundings and repeatedly inspecting its prey. The coati cannot be seen moving in the video.

The second video, captured at 09:16 by the same camera-trap at the same location, occurs approximately three hours later. It shows a second coati

***Figure 1.*** **Screenshot of the second video clip in which a South American Coati (*Nasua nasua)* can be observed running away from a harpy eagle (*Harpia harpyja)*.**

running out of the frame during the first second of the video (Figure 1). The second coati can be seen running from the center of the frame to the right. Meanwhile, the eagle is observed in the path of the coati on the center left side of the frame, with its wings open and its head rapidly moving from left to right, indicating two potential behavioral responses: it either just failed to capture the new coati, or was defending its prey from it. After approximately 10 seconds, the eagle returns with the prey documented in the video, immediately grabbing it with its talons and pressing it firmly against the ground. The eagle can then be seen actively looking and scanning the area in the direction of the escaped coati. In the third and final video, recorded at 11:49 of the same day, the Harpy Eagle is seen dragging the coati carcass, with the talons of its right leg, while displaying active surveillance behavior, frequently scanning its surroundings by turning its head from left to right. The prey is first dragged from its original position in the previous two videos towards the left side of the screen and then back again towards the center, but away from the camera-trap.

Scientific studies have long documented the intricate dynamics of predator-prey relationships within ecosystems, shedding light on the factors influencing the foraging preferences and hunting strategies of various species (Toland 1986, Preston 1990, Genovart et al. 2010). There are, however, relatively few reports of predatory behavior in Harpy Eagles. This is most likely a direct result of their extremely large home ranges and subsequently low-density numbers, making them very difficult to observe in the wild (Thiollay 1989). Their diet, nevertheless, is well known due to a number of studies on prey remains found in and around nesting sites (Aguiar-Silva et al. 2015, Miranda et al. 2017, Bowler et al. 2020). It was in this manner that the South American Coati was discovered as a prey species of Harpy Eagles in this region (Bowler et al. 2020). They are not as common a prey species of Harpy Eagles as primates and sloths are however (Aguiar Silva et al. 2014, Miranda et al. 2017, Garbino et al. 2023). This might be a result of coatis inhabiting the comparatively lower strata of the forest (Desbiez and Borges 2010).

This characteristic likely presents a challenge for Harpy Eagles, which predominantly target prey located in the upper canopy layers (Touchton et al. 2002). The fact that the camera-traps were placed at ground level could therefore provide an answer as to why coatis and not a more commonly preyed upon arboreal species was recorded. It also seems relevant to address the surprisingly large amount of time between videos (approx. 6 hours) resulting in only 3 videos of 20 seconds. A possible explanation is that the eagle left its captured prey on the ground to return to later, as was observed in other reported predation events by Harpy Eagles (Lenz and Marajo dos Reis 2011). Unfortunately,

none of the videos show the eagle flying off. It is, however, possible that this happened during the 3 second interval between videos. Harpy Eagles are vulnerable at ground level, as their heightened vigilant behavior in the videos indicates, to large terrestrial predator species. This could be a potential explanation as to why the harpy eagle in the videos was recorded for only short intervals.

Arguably the most interesting aspect of these camera-trap videos occurs during the first seconds of the second video, as the Harpy Eagle appears to opportunistically – and unsuccessfully - hunt a coati at ground level. It is, however, also possible that this is not an opportunistic behavior at all, but a standard hunting strategy of this species in this region. The buffer zone of the Tambopata National Reserve has historically been a heavily impacted site, where hunting has eradicated several of the Harpy Eagle's main prey species, including primates inhabiting the canopy layers of the forest (Naughton-Treves et al. 2003, Rosin and Swamy 2013). The Black-Faced Spider Monkey (*Ateles chamek*), for example, has been locally extinct in the area for several decades, although recent reintroduction efforts are showing promising signs (Pottie et al. 2021). It is therefore possible that the harpy eagle in this area has had to adjust from hunting canopy-dwelling species to species inhabiting lower forest strata. This would also explain as to why no similar events have ever been recorded in other regions. This behavior therefore unveils a previously undocumented facet of hunting strategy of Harpy Eagles, which was either an opportunistic behavior or a learned adaptive response to changes in prey availability by forest strata. This observation not only underscores the potential adaptability and opportunistic nature of Harpy Eagles but also emphasizes the need for further research into the complex interplay between Harpy Eagles and their prey species within the Amazon rainforest ecosystem.

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**Repository Data**

Los vídeos de las cámaras trampa se pueden visualizar a través de los siguientes enlaces:
https://doi.org/10.5446/65458
https://doi.org/10.5446/65457
https://doi.org/10.5446/65456

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# First Nesting Record of the Pearl Kite (*Gampsonyx swainsonii*) in Honduras: Evidence of Range Expansion

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The Pearl Kite (*Gampsonyx swainsonii)*, the smallest Neotropical raptor, is widely distributed across dry and arid regions of South and Central America, reaching as far north as southern Guatemala (Del Hoyo et al. 1992, Bierregaard and Kirwan 2020). It favors open landscapes and forest edges in dry habitats such as arid woodlands, thorn scrub, shrublands, savannas, and even parks. It is also commonly found along forest roads and near rivers, where it is frequently observed perched in exposed locations (Ridgely and Gwynne 1989, Clark and Schmitt 2017, Chavarría-Duriaux et al. 2018).

The first sighting of this species in Honduras occurred in 2009, when it was considered a vagrant (van Dort et al. 2010). Since then, it has been reported multiple times along the Pacific slope of Honduras. Oliver Komar, in 2015, and John van Dort, in 2019, photographed and reported pairs in suitable breeding habitat via eBird, suggesting the possibility of local reproduction. Nonetheless, direct evidence of nesting had not been documented until now.

### *First nest record for Honduras*

The nest was first detected on 29 April 2023, in a parasitic plant of the Santalaceae family growing on a willow tree (*Salix* sp.) along the Humuya River, which divides the departments of La Paz and Comayagua (14° 21' 50.37" N, 87° 38' 49.18" W).

The nest was built as a twig basket and held three nestlings, guarded by one parent that provided food for the young. Though both parents were active in rearing the nestlings, only one adult fed the young at a time. A similar behavior was observed in El Salvador (Herrera and Acosta Burgos 2018).

During a 20-minute observation period, both parents were seen bringing prey to the nest, first a

snake (family Colubridae) (Figure 1), followed by a lizard (species unknown) (Figure 2), the latter of which constitutes approximately 90% of the Pearl Kite's diet (Del Hoyo et al. 1992). This nest represents the northernmost known breeding record for this species, extending its documented reproductive range beyond the previous northern limit in El Salvador (Pineda et al. 2016).

**Range expansion**

The Pearl Kite is a relatively recent addition to the list of raptors documented in Honduras. Although its presence had already been anticipated by the early 1980s (Marcus 1983), it wasn't until 26 years later that the first confirmed individual was recorded in the department of Choluteca (van Dort et al. 2010).

In subsequent years, it has been documented in departments north of Choluteca, including El Paraíso, Francisco Morazán, Valle, and La Paz, with Comayagua representing the northernmost confirmed location to date. This pattern suggests that the species is expanding its range northward in Central America, as previously predicted by other authors (van Dort et al. 2010, Gallardo 2014, Fagan and Komar 2016, Clark and Schmitt 2017, Vallely 2018), perhaps favored by deforestation (Del Hoyo et al. 1992), as observed in other countries (Naranjo nad Rodriguez 1981, as cited in (Alvarez-López and Kattan 1995, Pujals et al. 1977).

Juvenile Pearl Kites typically disperse from their natal territories approximately 12–14 weeks after the initiation of a nesting attempt (Del Hoyo et

***Figure 1.*** **Adult Pearl Kite (*G. swainsonii*) feeding three nestlings in a tree nest, providing direct evidence of local breeding activity. Photo © Mario Reyes.**

***Figure 2.*** **Adult Pearl Kite *(G. swainsonii)* perched with a lizard in its talons, moments before feeding its nestlings. Photo © Mario Reyes.**

al. 1992). Based on 42 eBird observations recorded in Honduras between 2009 and 2025, primarily within the dry forests of the Pacific slope, we hypothesize that northward dispersal toward the Caribbean coast of Honduras may occur via two primary routes from the nest location, which we refer to in this note as the eastern and western routes (Figure 3).

The most probable pathway follows the eastern route, a dry forest corridor along the Humuya River, which drains into the Sula Valley. The alternative, and second most probable, is the western route, which follows a similar dry forest corridor along the Río Grande de Otoro. This river connects to the Ulúa River, which also drains into the Sula Valley. These proposed dispersal routes follow the Honduran Depression (Figure 3), a narrow strip of lands that includes the Sula Valley, the Lake Yojoa basin, the Otoro Valley, and the Comayagua Valley, and terminates at the Pacific Ocean (Gallardo 2014, Fagan and Komar 2016). These routes align with the species' ecological preference for open lands and dry forest habitats, their association with riverine corridors, and the overall connectivity of these ecosystems. (Pineda et al. 2016; Clark and Schmitt 2017; Chavarría-Duriaux et al. 2018; Bierregaard and Kirwan 2020).

We predict that Pearl Kites will be observed following these routes into more northern departments, such as Cortés, Santa Bárbara, and Yoro, within the next decade. Additionally, colonization of the dry forests in Olancho, to the east of the country, is also expected.

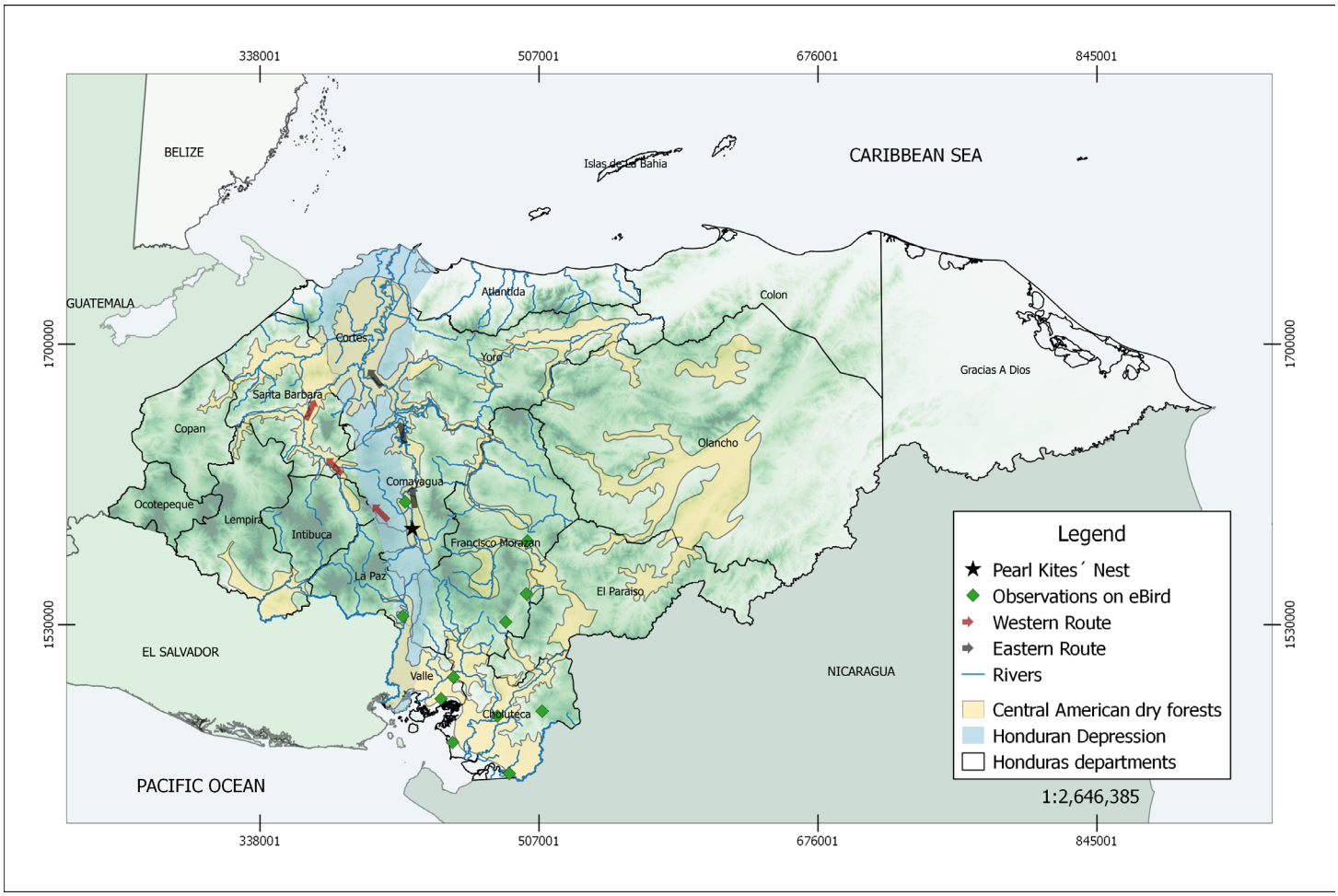


***Figure 3.*** **Nest and potential dispersal routes toward the Caribbean Coast of Honduras.**

The purpose of this note is to document the first evidence of reproduction for *Gampsonyx swainsonii* in Honduras and to report a northward range expansion of the species into the Caribbean region of the country. These observations not only confirm the species' breeding activity in Honduras but also support the hypothesis of ongoing dispersal toward more northern latitudes.


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# Of Interest...

## Grants

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Since funding is limited, the focus is on contributing to highly endangered or poorly understood species. Annual applications must be received by July 31. Applications are only accepted as a single PDF file sent by email to birdprotection@club300.se. The application must be written in English or Swedish and be a maximum of five pages long. It should include, among other things, a detailed description of the project, including information on the bird species that will benefit from the project and their IUCN Red List classification.

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