Spizaetus

Neotropical Raptor Network Newsletter

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Spizaetus tyrannus and *Harpia harpyja* in Colombia

Geranoaetus polyosoma in Bolivia

Birds of Prey in Bolivia

Nesting of *Elanus leucurus* and *Buteogallus meridionalis* in Costa Rica

SPIZAETUS
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Cover Photo: Black Hawk-ealge *Spizaetus tyrannus* photographed in captivity, Panama
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THE PEREGRINE FUND

Neotropical Raptor Network

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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.

The Harpy Eagle (*Harpia harpyja*) and the Black Hawk-eagle (*Spizaetus tyrannus*) in the Ecotone between the Andes and the Plains of La Orinoquia, Arauca, Colombia

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Few studies have been carried out in the eastern foothills of the Colombian Andes. As a result, there is a great lack of information on the avifauna of the region, principally in the departments towards the northern part of this slope (Casanare & Arauca; Restrepo-Calle et al. 2010, Acevedo-Charry et al. 2014). The few ornithological explorations in this part of the foothills - the ecotone between the Andes and the Orinoquia - have been concentrated in the basin of the Cusiana River, in the Department of Boyacá, at subtropical latitudes between 5°23' and 5°26' latitude and 72°41' and 72°41' longitude (Olivares 1963, 1971, Bohórquez 2002). North of the Cusiana River basin, specifically in the Arauca Department, the first and most representative documented ornithological exploration was the bird list collected by Kjell von Sneidern in the middle of last century (Blake 1961). This list was developed from bird specimens collected in different locations within subtropical forests from the eastern foothills of the Andes, north of Boyacá, to the plains associated with the Arauca River and its southern tributaries in the Orinoquia region (Blake 1961). Recent interest in the foothills of the Andes-Orinoquia ecotone has led to the exploration of new areas of the region, however, any related information is still not

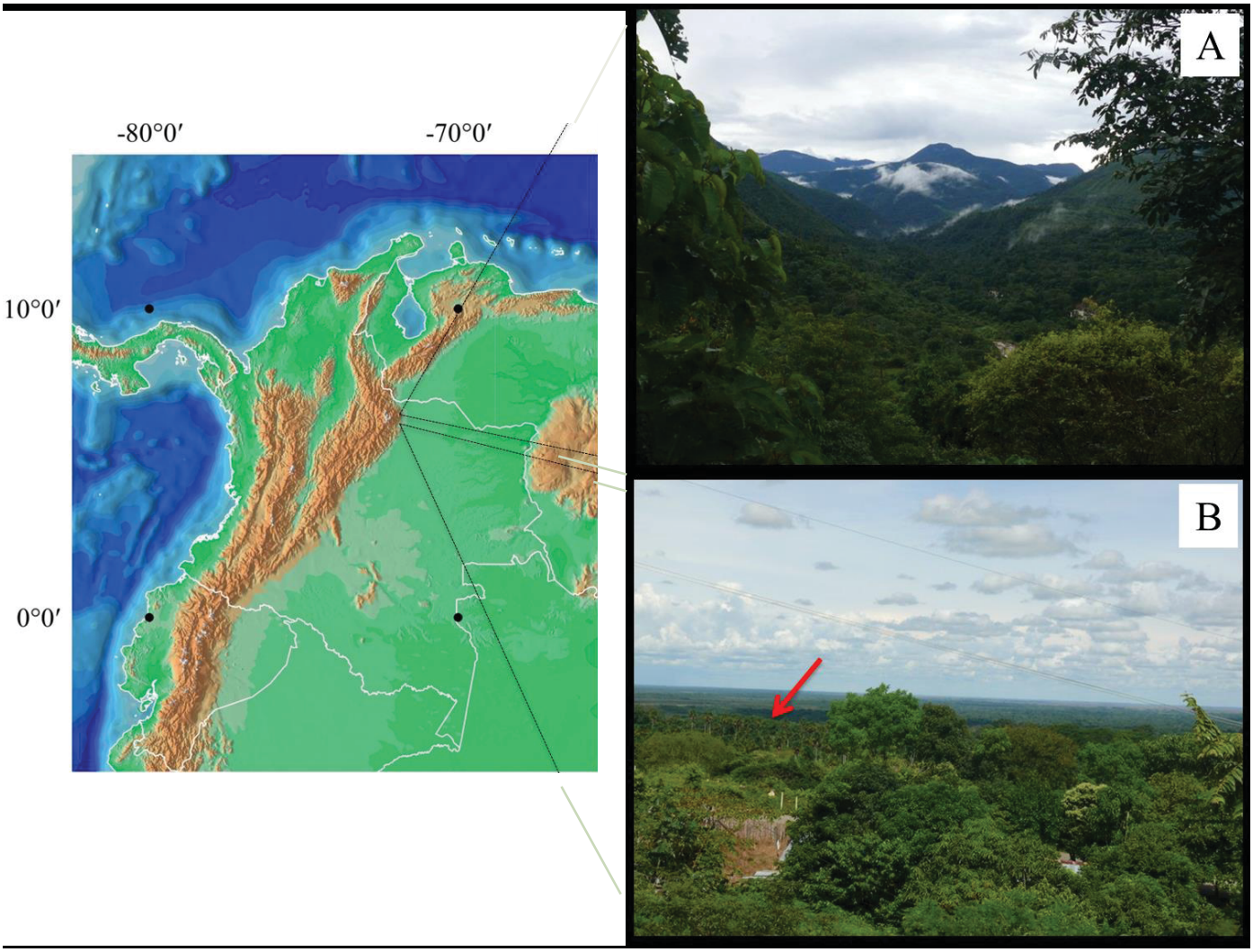

Figure 1. Eastern foothills of the eastern range of Colombia, in the Andes and Orinoquia ecotone. 1A: Piedemonte cloud forests (ca. 600-2000 m), where *H. harpyja*. has been recorded 1B: Outside the town of Tame (ca. 500 m), Arauca; where *S. tyrannus* has been recorded, the red arrow shows a patch dominated by *Mauritia flexuosa*, in the background the Orinoquenses plains are visible. Photos © Orlando Acevedo-Charry

available in scientific literature (Acevedo-Charry unpublished data). Additionally, the exploration of the piedmonts of Arauca and Casanare has been hampered by incidences of armed conflict taking place in the plains and mountain forest regions of Colombia (Sanchez-Cuervo and Aide 2013).

Against this background, further studies on the avifauna of this region are important to help us understand the assembly of birds east of the Andes and the ecotone between the Andean region and the Orinoco region (Acevedo-Charry en revision).

For example, recent observations in the subtropical zone of the eastern Andes, Boyacá Department, have increased the known geographic distribution of the Solitary Eagle (*Buteogallus solitarius)* (Accipitridae), a Critically Endangered

species in Colombia (Renjifo et al. 2014), and one that is considered Near Threatened globally (IUCN 2014). Sightings have confirmed this species' presence in the Andino-Orinoquense region of Colombia (Chaparro-Herrera & Laverde 2014). In this article, we present the first documented records for the foothills of the Arauca Department of two large raptors: the Harpy Eagle *Harpia harpyja* and the Black Hawk-eagle *Spizaetus tyrannus*, known locally as "águila real" and "cobo", respectively.

The Harpy Eagle is the largest raptor of the Neotropics and the most powerful raptor in the world (Hilty & Brown 1986, Vargas et al. 2006). This eagle is widely distributed in lowland humid forests from southern North America (Mexico) throughout much of Central and South America (Fig. 2). In the northern part of its distribution, it is found from southern Mexico to Panama, but in some areas and countries, such as El Salvador, it is considered extirpated likely due to destruction and fragmentation of habitat, as well as due to poaching of the eagle and its prey (Vargas et al. 2006). Its distribution in South America includes populations in the Chocó and Andean valleys of Colombia, northern Venezuela, and the Amazon and Guayanesa of Colombia, Venezuela, Guyana, Suriname, French Guyana, Brazil, Ecuador, Peru, Bolivia, Paraguay and the extreme northeast corner of Argentina (Fig. 2; Bierregaard et al. 2013). The Harpy Eagle has been reported at altitudes ranging from sea level to 800 m above sea level (from now on only m;. Vargas et al 2006), and additional records in Colombia document the species up to 1600 m (Hilty & Brown 1986). However, despite its wide distribution, ecological studies on *H. harpyja* are insufficient. For example, a compilation of the status and distribution of this species from reports between 1980 and 2002 completely lacks relevant information for Colombia and Suriname, exactly because of this lack of published information (Vargas et al. 2006).

Although *H. harpyja* is named in a technical report on birds of the Orinoco foothills of Colombia (Umaña-Villaveces et al. 2009), this document does not present confirmation of specimens or relevant information on record locations. To confirm these records, we present photographic evidence of an individual wild Harpy Eagle in Altamira Village, in the municipality of Tame (Fig. 2A). We also report on two human/raptor conflicts in Tame. The first incident occurred in January 2011, in which a Harpy Eagle was wounded by a farmer in the village of Caño Rojo (Fig. 2B). Although a local veterinarian tried to save the eagle's life, it died due to the severity of its wounds. The second event occurred in May 2011, in which another farmer fatally wounded a Harpy Eagle in Mararabe Alto. None of the above-mentioned specimens were deposited in scientific collections and at this time their whereabouts are unknown.

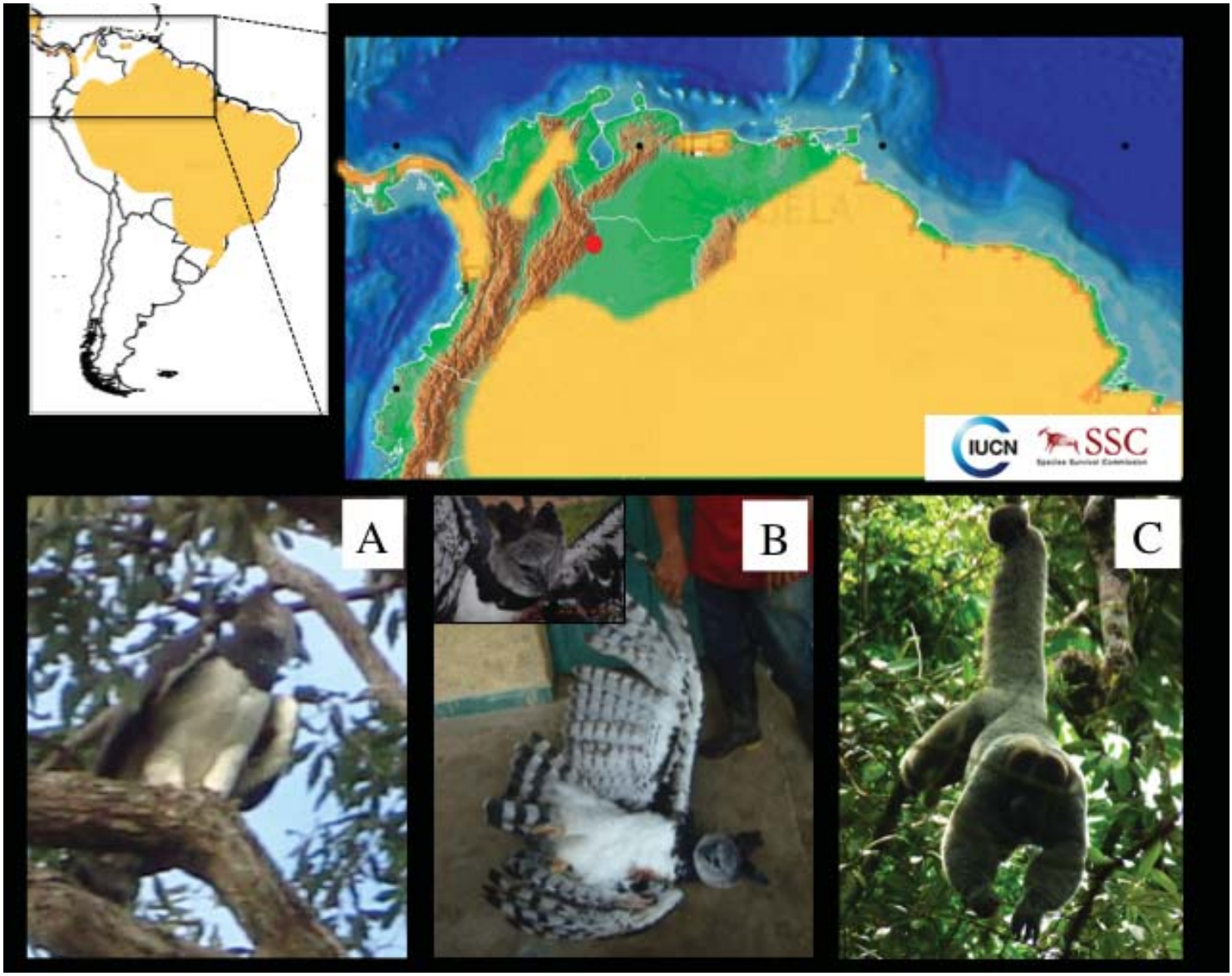

Figure 2. *H. harpyja* **distribution in the northern tip of South America - the red dot indicates the municipality of Tame, Arauca, Colombia (adapted from BirdLife International and NatureServe 2014a). 2A:** *H. harpyja* **in Altamira de Tame, at 1000 m. 2B: A Harpy Ealge hunted by a community member in the foothills of Arauca, Colombia; the inset shows the details of its head. Photos © Cesar Javier Valencia Vera/ Parques Nacionales Naturales de Colombia, P.N.N. El Cocuy y © Karen Pérez/ Fundación Orinoquia Biodiversa. 2C: A Woolly Monkey** *L. lugens defleri***, potential prey for the Harpy Ealge in Sabana de la Vieja, Tame (ca. 950 m). Photo © Orlando Acevedo-Charry.**

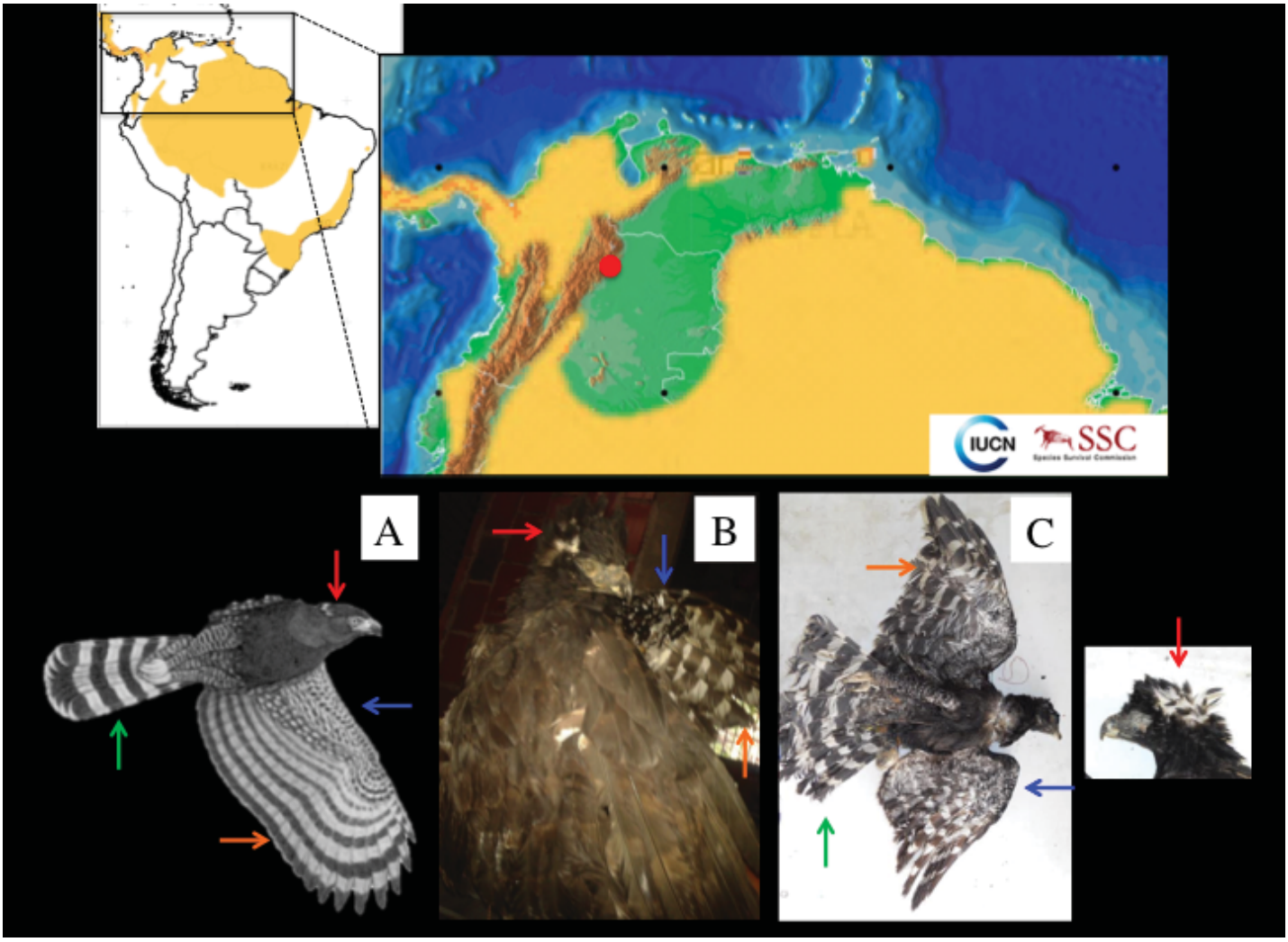

Figure 3. Black Hawk-eagle *S. tyrannus* **in northern South America; the red dot indicates the Tame Municipality in the foothills of Arauca, Colombia (modified from BirdLife International & NatureServe 2014b). 3A. Illustration modified from Hilty & Brown (1986), the colored lines indicate key aspects of its identification. 3B. Individual hunted by a resident of Tame in 2012. Photo © Stiven Rodríguez-González. 3C. A specimen after 2 years of deterioration due to its poor preparation (the same as 3B); the inset on the right is a detail of the head. Photo © Néstor Pérez-Buitrago/ U. Nacional, Sede Orinoquia, Arauca.**

In addition to records of Harpy Eagles in Altamira, Caño Rojo and Mararabe Alto, other records exist for the areas of Alto Cravo, San Antonio Rio Tame, la Garza and Brisas del Cravo - the influence of forests along the basins of Tame, Tate, Gallinaza River, and Cravo Norte, between 400 and 1500 m.

Some of the observations of *H. harpyja* in Arauca have coincided with hunting attempts as well as successful captures of the Woolly Monkey *Lagothrix lugens*, a large arboreal mammal, locally known as "choyo" (Fig 2C; Primates. Atelidae). In fact, one of the most memorable observations (by CJVV) took place in San Antonio Río Tame.

He witnessed two Harpy Eagles that appeared to be playing with a recently hunted juvenile *L. lugens*. The eagles were passing it between each other in the air, while engaging in spectacular aerial maneuvers. Although this behavior is not reported in the literature for *H. harpyja* - not even during breeding season - more in-depth studies on the status and behavior of this species are needed (Rettig 1978, Hilty & Brown 1986, Schulenberg 2009).

Our reports from the foothills of Arauca expand not only the known geographic distribution of *H. harpyja*, but also confirm the species' use of high altitude areas in eastern Colombia above 800 m (Vargas et al. 2006). The use of higher altitude forests could be related to the presence of potential prey, such as *L. lugens defleri* (Fig 2C;. Mantilla-Meluk 2013), but may also be a result of the high rates of deforestation in the jungles of the lowland foothills in Arauca which has taken place over the past 60 years.

Another large raptor with a wide distribution in Central and South America is *S. tyrranus*. Its distribution extends from southern Mexico throughout Central America, to the Pacific and Caribbean region of Colombia, Venezuela and extensively throughout the Amazonian and Guyanese region of Venezuela, Guyana, Suriname, French Guyana, Brazil, Ecuador, Peru and Bolivia. It is also found in the Pacific region of Ecuador and in northeastern Peru to the coastal range of Venezuela, to south and east Brazil, eastern Paraguay and the extreme northeast of Argentina (Bierregaard and Kirwan 2013).

Recently, in Colombia, its distribution has increased in the department of Valle del Cauca (Córdoba-Córdoba et al. 2008). Generally, *S. tyrannus* is present in lowland areas under 500 m (Hilty & Brown 1986), although recent records do exist for the species at higher elevations (1300-1500, 1800-2250, 2000, 2100-2250, 3000 m; see Córdoba-Córdoba et al. 2008). It is scarcely known in the Amazon region of Colombia, with a few observations in the departments of Guainía and Amazonas, as well as records of observations in the north of the department of Guaviare (Hilty & Brown 1986; Carantón-Ayala et al. unpublished data).

In the piedmont of the Colombian Andes and Orinoquia *S. tyrannus* has only been documented in the west of the Department of Meta in Villavicencio (Hilty & Brown 1986); and unconfirmed sightings have occurred in Arauca and Vichada (Acevedo-Charry et al. 2014). Here, we present the first record of an individual that was killed on 18 December 2012 by a community member from the Tame municipality, Arauca. This incident took place on the outskirts of Tame, on the border of secondary forest above an alluvial plain that borders on a large extension of *Mau-*

ritia flexuosa (Fig. 1B). At that time, the poacher tried to preserve the dead bird by injecting it with Formaldehyde (formol; Fig. 3B, 3C). We learned of the incident a couple of days later, and we were able to identify the eagle as *S. tyrannus* (Fig. 3). Aspects of its plumage coloration and pattern corroborated this identification: the short black crest with some white margins, the black wing coverts spotted with white, the distinct white and black barring on the primaries, and the four white bands in its relatively long tail (Fig. 3A). The person who killed this eagle insisted that he had seen this type of raptor sporadically trying to hunt domestic animals.

Unfortunately, although all the necessary factors to deposit the specimen in a scientific collection were met, we were unable to do so because the community member preferred to keep the specimen at his house for a while. Eventually, the eagle was taken to the Orinoquia headquarters of the National University of Colombia, in the city of Arauca, but it was too deteriorated to be considered as a specimen (Fig. 3C).

These two species, *H. harpyja* and *S. tyrannus,* are some of the largest raptors in the Neotropical region (Marquez et al. 2005, Córdoba-Córdoba et al. 2008). Although *S. tyrannus* is also found in disturbed areas and is the most widely distributed and most abundant of the species within the genus *Spizaetus* (Hilty & Brown 1986), large raptors are often used as indicators of the state of conservation of an ecosystem. They are sensitive to habitat disturbances, they require larger prey that occupy large extensions of well-conserved forest, and they also need large extensions of well-conserved forest for breeding, for establishing their territories, and for the dispersal of juveniles (Kattan et al. 1994, Marquez et al. 2005, Córdoba-Córdoba et al. 2008).

Despite this, the knowledge of different aspects of the basic biology and ecology of the majority of raptors in Colombia is not completely known. This situation is worse in little-studied areas, such as in the eastern piedmont of the Andes, among others. Additionally, the conflicts between humans and these large predators reveal a lack of knowledge and the absence of effective environmental education programs in the region. Environmental education efforts should go hand in hand with conservation programs that involve local communities.

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References

Acevedo-Charry, O.A., A. Pinto-Gómez, & J.O. Rangel-Ch. 2014. Las Aves de la Orinoquia colombiana: una revisión de sus registros. Colombia Diversidad Biótica 14: 691-750.

Blake, E.R. 1961. Notes on a Collection of Birds from northeastern Colombia. Fieldiana44: 25-44.

Bierregaard, R.O. Jr., & G.M. Kirwan. 2013. Black Hawk-eagle (*Spizaetus tyrannus*). En: del Hoyo, J., A. Elliot, J. Sargatal, D.A. Christie, y E. de Juana (eds). Handbook of the Birds of the World Alive. Lynx Edicions, Barcelona. (consultado en línea en http://www.hbw.com/node/53182 el 9 de diciembre de 2014).

Bierregaard, R.O. Jr., G.M. Kirwan, & A. Bonan. 2013. Harpy Eagle (*Harpia harpyja*). En: del Hoyo, J., A. Elliot, J. Sargatal, D.A. Christie, y E. de Juana (eds). Handbook of the Birds of the World Alive. Lynx Edicions, Barcelona. (consultado en línea en http://www.hbw.com/node/53182 el 10 de enero de 2015).

BirdLife International y NatureServe. 2014a. Bird Species Distribution Maps of the World. 2013. *Harpia harpyja*. The IUCN Red List of Threatened Species. Version 2014.3

BirdLife International y NatureServe. 2014b. Bird Species Distribution Maps of the World. 2013. Spizaetus tyrannus. The IUCN Red List of Threatened Species. Version 2014.3

Bohórquez, C.I. 2002. La avifauna de la vertiente oriental de los Andes de Colombia. Tres evaluaciones en elevación subtropical. Revista de la Academia Colombiana de Ciencias Exactas Físicas y Naturales 26: 419-442.

Chaparro-Herrera, S., & O. Laverde. 2014. Una nueva localidad para el Águila Solitaria (*Buteogallus solitarius*) en Colombia. Boletín SAO 23: 15-17.

Córdoba-Córdoba, S., M.A. Echeverry-Galvis, y F. Estela. 2008. Nuevos registros de distribución para el águila crestada (*Spizaetus isidori*) y el águila iguanera (*S. tyrannus*) para Colombia, con anotaciones para su identificación. Ornitología Colombiana 7: 66-74.

Hilty, S.L., & W.L. Brown. 1986. A guide to the Birds of Colombia. Princeton University Press. Nueva Jersey. 836 pp.

IUCN. 2014. The IUCN Red List of Threatened Species. Versión 2014.3 <www.iucnredlist.org>. Consultada el 10 de enero de 2015.

Kattan, G.H., H. Álvarez-López, & M. Giraldo. 1994. Forest fragmentation and bird extinctions, San Antonio 80 years later. Conservation Biology 8: 138-146.

Mantilla-Meluk, H. 2013. Subspecific variation: an alternative biogeographic hypothesis explaining variation in coat color and cranial morphology in *Lagothrix lugens* (Primates: Atelidae). Primate Conservation 26: 33-48.

Marquez, C., M. Bechard, F. Gast, & V.H. Vanegas. 2005. Aves rapaces diurnas de Colombia. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt. Bogotá, D.C., Colombia.

Olivares, A. 1963. Notas sobre aves de los Andes orientales en Boyacá. Boletín de la Sociedad Venezolana de Ciencias Naturales 25: 91-125.

Olivares, A. 1971. Aves de la ladera oriental de los Andes orientales, alto río Cusiana, Boyacá, Colombia. Caldasia 11: 203-226.

Renjifo, L.M., M.F. Gómez, J. Velásquez-Tibatá, A.M. Amaya-Villareal, G.H. Kattan, J.D. Amaya-Espinel, & J. Burbano-Girón. 2014. Libro rojo de aves de Colombia, Volumen I: bosques húmedos de los Andes y la costa Pacífica. Editorial Pontificia Universidad Javeriana e Instituto Alexander von Humboldt. Bogotá D.C., Colombia.

Restrepo-Calle, S., M. Lentino, & L.G. Naranjo. 2010. Aves. En: Lasso, C.A., L.S. Usma, F. Trujillo, y A. Rial (eds). Biodiversidad de la cuenca del Orinoco: bases científicas para la identificación de áreas prioritarias para la conservación y uso sostenible de la biodiversidad. Págs. 290-309. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt. Bogotá, D.C., Colombia.

Rettig, N. L. 1978. Breeding behavior of the Harpy Eagle (*Harpia harpyja*). The AUK 95 (4): 629-643.

Sánchez-Cuervo, A.M., & T.M. Aide. 2013. Consequences of the armed conflict, forced human displacement, and land abandonment on forest cover change in Colombia: A multi-scaled analysis. Ecosystem DOI 10.1007/s10021-013-9667-y.

Schulenberg, T.S. 2009. Harpy Eagle (*Harpia harpyja*), Neotropical Birds Online (T.S. Schulenberg, Editor). Ithaca: Cornell Lab of Ornithology; retrieved from Neotropical Birds Online: http://neotropical.birds.cornell.edu/portal/species/overview?p_p_spp=20613.

Umaña-Villaveces, A.M., J.I. Murillo, S. Restrepo-Calle, & M. Álvarez-Rebolledo. 2009. Aves. Pg: 48-78 en: Romero, M.H., J.A. Maldonado-Ocampo, J.D. Bogotá-Gregory, J.S. Usma, A.M. Umaña-Villaveces, J.I. Murillo, S. Restrepo-Calle, M. Álvarez-Rebolledo, M.T. Palacios-Lozano, M.S. Valbuena, S.L. Mejía, J. Aldana-Domínguez, y E.

Payán. Informe sobre el estado de la biodiversidad en Colombia 2007-2008: piedemonte orinoquense, sabanas y bosques asociados al norte del río Guaviare. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt. Bogotá, D.C., Colombia. 133 p.

Vargas G., J.J., D. Whitacre, R. Mosquera, J. Albuquerque, R. Piana, J-M. Thiollay, C. Márquez, J.E. Sánchez, M. Lezama-López, S. Midence, S. Matola, S. Aguilar, N. Rettig, & T. Sanaiotti. 2006. Estado y distribución actual del águila arpía (*Harpia harpyja*) en Centro y Sur América. Ornitología Neotropical 17: 39-55.

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Preliminary Study of Birds of Prey in the City of Cochabamba, Bolivia

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A pair of *Falco sparverius* in Colon Square, an area identified as a breeding site. © Tatiana Guerrero V.

Birds of prey, including eagles, falcons, vultures, and owls are an important group of birds. Both diurnal and nocturnal raptors play vital roles in maintaining the equilibrium in the ecosystems in which they are found - for example as natural biological controls or as bio-indicators (del Hoyo et al 1994).

Bolivia, considered a very diverse country, has 1,415 species of birds recorded, 87 of which are raptors. In fact, birds of prey represent 6% of the country's avian diversity (Hennessey et al, 2003). The city of Cochabamba, located between 17°23' 00"S and 66°10' 00"W, is found in the Department of the same name, at an altitude of 2,550 masl. Ecologically, it belongs to the eco-region of the Valles Secos Interandinos, a very important region because of the number of endemic species found there. The city constitutes an ecotone between the eco-region of the Valles Secos Interandinos and the Puna Subhúmeda, which favors

the presence of a diversity of native birds (Ibish & Merida, 2003; Balderrama et al 2009).

Within the city, there are a number of green areas, both natural and artificial, including the Alalay and Albarrancho Lagoons, which are ecologically important due to their extensive vegetation cover, and as an ideal refuge for many species. Together, they have allowed for the development of a diverse bird community which plays different roles in the environment - such as controllers of invertebrate and small vertebrate populations, and seed dispersers. Additionally, a community of native birds is an indicator of high environmental quality (Garitano & Gismondi, 2003; Seguinot, 2006; Laterra et al, 2010). Specifically, the city is an important point for a diverse mix of raptors, including resident species such as *Falco sparverius, Rupornis magnirostris* and *Tyto alba*, as well as those that use the city as a stopover point during migration, such as *Falco peregrinus* and *Geranoaetus polyosoma* (Fjeldså & Krabbe, 1990; Balderrama et al., 2009; MMAYA, 2012).

We believe that raptors play an important part in research and education programs related to urban ecology. Thus, we have begun to develop the "Urban Birds of Cochabamba Project" with a special focus on birds of prey that inhabit or that occasionally spend time within the city.

Left. Juvenile *Geranoaetu spolyosoma* perched in the green areas of the Alcide d'Orbigny Natural History Museum © Bo Ljungberg. Right. A pair of *Parabuteo unicinctus* perched in one of the tallest trees around the Albarrancho Lagoon.

Above: *Falco femoralis* **in the environs of the Jorge Wilsterman International Airport © Cindy D. Veizaga Luizaga. Below: Adult** *Rupornis magnirostrisen* **in the Martin Cárdenas Botanical Garden © Tatiana Guerrero V.**

This project aims to evaluate the distribution, diversity and ecology of raptor species present in the city of Cochabamba. In 2014, monthly surveys were conducted in the green areas of the city - both in the wet season and in the dry season. Additionally, intensive searches were carried out for potential sites where raptors could be found. Based on these results, we are currently working to establish an environmental education program focused on birds of prey which will combine the use of educational materials at schools, visits to the museum and workshops to help raise awareness of the importance of birds of prey in the city and to encourage raptor observation and conservation.

Here we present information on the birds of prey that were documented in the city of Cochabamba during these surveys. We observed a total of 13 raptor species: 5 eagles / hawks, 4 falcons, 1 vulture, and 3 species of owls.

Of these species, three are residents: *Rupornis magnirostris, Falco sparverius* and *Tyto alba*, and are distributed in different green areas around the city. Six are occasional visitors: a) *Geranoaetus polyosoma* - adults and juveniles have been observed around the city, b) *Geranoaetus melanoleucos* - has been observed flying over the largest green areas, c) *Cathartes aura* - has been seen around Laguna Alalay, d) *Athene cunicularia* - has been observed around Laguna Alalay, e) *Caracara plancus* - has been seen

Athene cunicularia **perched near Alalay Lagoon. © Aldo Igor Echeverria**

around the Alalay and Albarracho Lagoons, f) *Falco peregrinus* - has been seen at the Albarrancho Lagoon and occasionally flying over the city, and g) *Falco femoralis* - has been seen at the airport and around Laguna Albarrancho (Fjeldså & Krabbe, 1990; Balderrama et al., 2009; Remsen et al., 2014).

Additionally, in 2014, during the counts carried out by a the civil association, Armonía, during an annual census of shorebirds, a pair of *Parabuteo unicinctus*, three *Asio flammeus* and one *Elanus leucurus* were documented near Alarrancho Lagoon. This important diversity should be taken into account for the following fundamental reasons: (1) very few people are aware of the presence of these birds in the city and are even less aware of the importance they have for the city, and (2) the city is in a state of constant growth, but it lacks adequate planning, which could considerably affect this group of birds (Seguinot, 2006; Balderrama, 2009). Currently, we are collecting data on reproduction, and conducting nest searches and weekly observations of active nests, as well as evaluating habitat preferences of different species.

This will allow us to contribute to the knowledge of this group of little studied birds in Bolivia (Balderrama, 2009). We are also hoping to generate more interest among the locals to work to solve environmental and conservation problems.

In regards to areas of interest, we recommend giving high priority to studies that will increase our knowledge of the sites used by these raptors for roosting, hunting and breeding, in order to better plan for their conservation within the city.

For more information about the project please visit: http://avesdecochabamba.blogspot.com/

An individual *Asio flammeus* in the area around the Albarrancho Lagoons
© Tatiana Guerrero V.

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References

Balderrama J. A., M. Crespo & L. F. Aguirre. 2009. Guía Ilustrada de Campo de las Aves del Parque Nacional Tunari. Centro de Biodiversidad y Genética, UMSS, Cochabamba – Bolivia. 208 p.

Balderrama J. A. 2009. Aves. Pp. 307 – 314. En: Ministerio de Medio Ambiente y Agua 2009. Li-

bro rojo de la fauna silvestre de vertebrados de Bolivia. La Paz, Bolivia.

Fjeldså, J. & N. Krabbe. 1990. Birds of the High Andes. University of Copenhagen & Svendborg, Apollo Books. Copenhagen. 876 pp.

Garitano A. & P. Gismondi. 2003. Variación de la Riqueza y Variación de la Ornitofauna en Áreas Verdes Urbanas de las Ciudades de La Paz y El Alto (Bolivia). Ecología en Bolivia 38 (1): 65-78 pp.

Hennessey B., S. K. Herzog & F. Sagot. 2003. Lista Anotada de Aves de Bolivia. Asociación Civil Armonía/BirdLife International. Santa Cruz de la Sierra. 238 p.

del Hoyo, J., Elliott, A. & Sargatal, J. eds. (1994). Handbook of the birds of the world. Vol.2. New-World Vultures to Guineafowl. Lynx Edicions, Barcelona

Ibish P. L. & G. Mérida (eds.) (2003). Biodiversidad: La riqueza de Bolivia. Estado de conocimiento y conservación. Ministerio de Desarrollo Sostenible. Editorial FAN, Santa Cruz de la Sierra – Bolivia. 76 – 80 pp.

Laterra P., E. Jobbagy, J. Paruelo. 2010. Valoración de Servicios Ecosistémicos. Instituto Nacional de Tecnología Agropecuaria. Argentina. 362 p.

MMAYA. 2012. Áreas Protegidas Subnacionales en Bolivia. Situación actual 2012. La Paz – 87 p.

Remsen, J. V., Jr., C. D. Cadena, A. Jaramillo, M. Nores, J. F. Pacheco, J. Pérez-Emán, M. B. Robbins, F. G. Stiles, D. F. Stotz, and K. J. Zimmer. Version [20 June 2014]. A classification of the bird species of South America. American Ornithologists' Union. http://www.museum.lsu.edu/~Remsen/SACCBaseline.html

Seguinot J. 1996. La Ecología Urbana de San Juan (Una Interpretación Geográfico Social). Anales de Geografía de la Universidad Complutense, Madrid. No 16, 161 - 184 pp.

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Ecological Aspects of Variable hawk (*Geranoaetus polyosoma*) in an Urban Context in N. S. de La Paz, Bolivia

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The Variable Hawk (locally known as "aymara") (*Geranoaetus polyosoma*) is a medium-sized bird of prey with a wide distribution throughout much of South America (Jiménez 1995). In 1995, Jiminez stated that this species is very poorly studied, with little information available.

Posteriorly, there have been specific contributions and / or complementary studies concerning different aspects of this hawk's natural history - especially for Argentina and Chile (Valenzuela 1962, Banchs et al. 1983, De Lucca and Saggese 1989, Cabot 1991 Farquhuar 1998 Pávez 1998 Bellati 2000 Cabot and de Vries 2003, Figueroa at the 2003 Alvarado and Figueroa 2005, 2006, Baladrón et al 2006;. Filloy and Bellocq 2007; Alvarado 2008, Capllonch and Ortiz 2009; De Lucca, 2011; Baladrón et al 2011, De Lucca et al 2012, 2013; Travaini et al 2012, Baladrón et al 2014, De Lucca 2014, *inter aliis*). De Lucca (2011) indicates no studies evaluating the response of the species to anthropogenic activities have been carried out.

In Bolivia, Cabot (1991) defines the species as a solitary winter resident of the highlands, with records for altitudes between 400 and 3840 m. No records exist for urban areas.. Villegas and Garitano-Zavala (2008) did not include *G. polyosoma* in their work on bird communities of the city of La Paz, however, when referring to raptors in general, they indicated that "their presence does not necessarily imply the use of resources in the urban environment." Later, Martinez et al (2010), in their study of birds of the city of La Paz, listed *G. polyosoma* as an uncommon species, and only seen flying over the periphery of La Paz and in less urbanized locations in the city. Flores and

Variable Hawk soaring rectilinearly, preparing to flush the pigeons from the rooftops and from Plaza Murillo. 20/09/2014, 09:20 hs. Plaza Murillo © E. Richard.

Capriles (2010) listed it is a common species of the Bolivian Andes, but one not found in urban areas. More recently, Rossel (2013) in his "Common birds in urban areas of the city of La Paz", said: "It is not very common, but you can see it on the edges of urban areas."

Worldwide, major environmental problems include loss of biodiversity (and therefore culture as well), climate change and exponential population growth - all factors that interact synergistically together (Luniak 2004, Maffi 2005, Muller et al 2010). Of all the human activities which cause habitat loss, urbanization is considered one of the main activities responsible for high rates of local extinction, frequently eliminating the majority of native species (Luniak 2004, McKinney 2002, 2006) and allowing for the entry of aggressive invasive species such as is the case with the domestic pigeon (*Columba livia domestic*a: Columbidae) in La Paz, where their populations have become a health, aesthetic and economic problem (La Razon, 2011).

It is expected that by 2050 two-thirds of the world's population will be concentrated in urban centers and that urban biodiversity will play an important role in mitigating the reduction of

View from the blind in Area 2 toward the city of La Paz, Área 2 is La Plaza Murillo (km zero) and includes the La Paz Cathedral and the Government Palace. 27 March 2012 © E. Richard.

global biodiversity, if we implement environmental education policies that allow for the development of biophilia and a culture of contemplation (fide Richard and Contreras, 2013a).

Hence studies on urban species and biodiversity (*sensu* Luniak 2004) are important, as was demonstrated by Muller et al (2010) and others (2004 Luniak, McKinney 2002, 2006). The aim of our study, therefore, is to contribute to the knowledge of the natural history of *G. polyosoma* in an urban, high altitude ecosystem - the city of Nuestra Señora de La Paz (Bolivia).

Study Area

The city of Nuestra Señora de La Paz (hereinafter La Paz), is an urban center which was developed in 1548 on the Valle Altiplánico de Chuquiago Marka. It has 764,617 inhabitants (La Razon, 2012). It is a rare and unique city, located within a watershed caused by the erosion of the La Paz River and its tributaries, extending along an elevational gradient between 4100-3000 m altitude. It has an irregular relief with hills, streams, valleys, terraces, plateaus and alluvial plains (Liberman, 1991). The landscape has been urbanized, giving it the appearance of an area "trampled" with

relentless growth beginning in the 1900s and continuing to date. This expansion, and that of the neighboring cities of El Alto and Palca, has diminished the physical and natural boundaries between these localities (MMAyA, 2013). From the city of El Alto, down the highway, one can see that almost all the slopes are carpeted with neighborhoods and urban structures, many of which were unplanned, leaving little room for green space that once held local biodiversity. In fact, the almost exponential growth of the city up until now (2014) has led to a proportional loss of green spaces and their respective biodiversity which was typical of the valley. In La Paz, the arid conditions, the characteristics of the plateau synergized by low atmospheric pressure and therefore lower relative pressure of oxygen in the air, in addition to significant daily and seasonal variations of temperature and a greater amount of non-ionizing solar radiation (UV), among others, naturally influence the development of biodiversity and human life.

Variable Hawk preparaing to dive 20/09/2014, 09:45 hs, Plaza Murillo
© E. Richard.

Materials & Methods

The study took place between August 10, 2010 and September 28, 2014 and included different locations within the city of La Paz. In that period we determined when the hawks were present and identified hunting areas by using 4 observers present through all day light hours, accounting for a sampling effort of n = 470 hours. In Villa Pabon, we made observations from a hide. In the other locations, we observed from the street, with Zenith 12 x 25 binoculars. We documented the observations with a Nikon D3100 camera with Nikkor 55-300 mm zoom, and a Garmin eTrex H GPS. In addition, we used high-resolution video, which helped us analyze common hunting strategies of the Variable Hawk. The number of pigeons (*Columba livia*) recorded in the flocks is based on counts made from photographs. To get an estimate of the biomass of the pigeons, we captured a total of 12 pigeons randomly and

weighed them with a precision scale (1.5 kg + - 10 g).

Results & Discussion

Between August 10, 2010 and September 28, 2014 we located and identified two pairs of Variable Hawks in the heart of La Paz, with a total of 267 days of activity recorded cumulatively. One pair was in Villa Pabon (3781 m 19K 0592932 UTM 8176479) (44 observations, Area 1) and another in Plaza Murillo, in the center (zero km) of the city (3650m UTM 8,176,043 0,592,483 19K) (223 observations, Area 2). We concentrated the majority of our observations on the latter, because of the "relative" ease of observing these birds.

During the study period we were able to make detailed observations of *G. polyosoma*, particularly of the hunting strategy it uses on the only prey visually identified in the area: the domestic pigeon (*Columba livia*), as well as other aspects of the species' natural history.

These are the first records for the species exhibiting permanent trophic activity in a category 7 urban area (*sensu* Villegas and Garitano-Zavala, 2008) - a commercial area that is almost 100% covered with buildings and has little vegetation cover. These probably also constitute the first records of the species' behavior in large, high altitude cities (*cfc* Bird et al., 1996; Richard Contreras and 2013b, *inter aliis*).

Left: Variable Hawk in a rectilinear soar within a flock of pigeons moving in the opposite direction. 20/09/2014, 09:24 hs. Plaza Murillo © E. Richard. Right: Variable Hawk in a rectilinear soar within a flock of pigeons moving in the same direction. 20/09/2014, 09:25 hs. Plaza Murillo © E. Richard.

<u>Left</u>: Front of the Catedral de La Paz - typically covered with pigeons. The red circle indicates the usual spot that *G. polyosoma* uses when feeding on pigeons. 05/10/2014, 08:22 hs Plaza Murillo © E. Richard. <u>Right</u> Front of the Catedral de La Paz, when *G. polyosoma* is feeding. The rest of the pigeons disappear. 26/09/2014, 07:59 hs Plaza Murillo © E. Richard.

The domestic pigeon is, without a doubt, the most abundant bird in La Paz,especially in plazas, landfills and roofs in general (*cfc.* Garitano Zavala & Gismondi 2003, Villegas & Garitano Zavala 2008, La Razón 2011, Pers. Obs.). These pigeons mainly inhabit the roofs in the city and the green spaces, where they are fed by people. They also invade landfills.

These suburban populations *(fide* Luniak 2004) fly very little in their search for sustenance and they are over-fed due to the high availability of food. In fact, many people make their living from the sale of pigeon food (*cfc.* La Razón 2011, Pers. Obs.). In this sense, the domestic pigeon is one of the most representative examples of an "urban exploiter" (*sensu* McKinney 2002, 2006), a commensal species that finds food and other necessities in an urban environment.. In Plaza Murillo, *Columba livia* represents 95 % of the relative abundance of birds documented for the area (*fide* Garitano Zavala y Gismondi 2003).

During the study period we characterized two distinct hunting strategies used by the Variable Hawk. Particularly for Area 2 (Plaza Murillo), we were able to document a total of 28 successful hunts and, more frequently, hunting attempts (n = 56). At times, we would not observe the entire hunt due to the difficulties of monitoring the hawks in the city center, among other factors (The Plaza Murillo is the center of civic rallies, demonstrations, festivals, marches, dynamiting, etc.).

The first hunting strategy begins with the hawk's arrival to the square (08:00 am approx.) either with its mate or individually. It enters the square in a rectilinear soar (VPR, "vuelo planeado rectilíneo" in Spanish) (*fide* Dellacasa 2005) at low altitudes (about 3 or 4 meters above the roofs of houses, which are generally one or two stories). This causes the pigeons, which are perched on roofs and on the plaza floor, to rise in cohesive flocks of hundreds of individuals (X = 134, n = 76). The pigeons begin to fly at a low altitude around the square. The hawk then enters the flock in a rectilinear soar. It sometimes flies in the same direction as the pigeons, but more often flies in the opposite direction. From within the flock, the hawk makes a quick lateral movement, catching an unsuspecting pigeon (n = 14). Although the hawk moves within the flock or very closely to it, we did not observe any reactions or evasive maneuvers by the pigeons. This differs from behavior observed occasionally when they are hunted by Black-chested Buzzard-eagle (*Geranoaetus melanoleucus)* (Richard Contreras and 2013b).

The second hunting strategy begins in the same way as the first. Using the VPR flight strategy, the hawk flushes the pigeons, causing them to lift off and fly together. The hawk then pursues its prey (n = 11) from above. At some point the hawk dives (VPP, "vuelo planeado en picada" in Spanish) (f*ide* Dellacasa 2005) with partially folded wings and takes a pigeon from the flock. When both hawks are present, sometimes (n = 3) one of the hawks will use hunting strategy 1 while the other uses strategy 2, though both are going after the same flock; i.e. one takes advantage of the flight of pigeons caused by the other. In all cases, the hawk that captures a pigeon lands on a nearby eave or roof, where it begins plucking its prey. It does not share with its mate, who does not display any begging behavior. This is in contrast to what was observed in La Paz and El Alto. *G. melanoleucus,* after capturing a pigeon, carried it in its talons to a nearby forest or somewhere outside the city (Richard and Contreras 2013), meaning it does not consume its prey close within its hunting grounds, as does *G. polyosoma*.

In Area 1, we observed the hawks engaging in the second hunting strategy (n = 21) only. Unlike in Area 2, however, here the hawk flushes the pigeons, which fly considerably higher (30 - 150 m above the roofs). The hawk then attacks from above with a dive. In both Area 1 and Area 2, we have observed that most often pairs hunt simultaneously, although each individual hunts independently of the other. In the case of Area 2, we noticed the hawks appear and start hunting on a regular schedule. Throughout the study period, the start of hunting activities (arrival in Plaza Murillo) occurred between 07:20 (earliest) and 09:12 pm (latest). The hawks showed up at the later time normally on colder (2-5^0 C) and/or cloudy days. On days that were permanently overcast

Plaza Murillo in the morning. It is the place with the highest concentration of pigeons in La Paz. 27/03/2012, 14:36 hs © E. Richard.

and/or rainy, the hawks did not appear (n = 11). Hunting activity can last between 15 min and 2 hours (minimum and maximum respectively) and only twice have we observed hawks hunting two doves per individual in one morning.

The Variable Hawk shows great flexibility in hunting strategies according to the type of prey and its availability. In Buenos Aires (Argentina) it has been described as a relatively specialist predator that uses passive hunting strategies (Baladrón et al 2006); while in the breeding season in La Pampa (Argentina) it uses active strategies (De Lucca 2011). The hunting strategies we described allow the species to be categorized as an active hunter in the city of La Paz.

Social foraging behavior of birds of prey has been poorly studied and underestimated, mainly because of the difficulty of observing these birds (Ellis et al 1993, Alvarado and Figueroa 2005). Alvarado and Figueroa (2005) provided the first data on social foraging of *G. polyosoma* for the North Central region of Chile and for

the species. According to their observations they proposed that *G. polyosoma* shows group hunting behavior, improved local efficiency, and foraging of flocks in pseudo-cooperative hunting. Our observations complement and reaffirm the observations made by these authors. We believe that the hunting strategies we observed when the hawks converged together in pairs to the same hunting area (Plaza Murillo and Villa Pabon) - with sometimes one or the other hunting, but never sharing their prey, is a clear example of both cooperative searching and pseudo-cooperative hunting (Classes 3 and 4 social foraging *fide* Ellis et al 1993).

Notably, Area 2 is also an occasional hunting area for G. *melanoleucus*. However, this raptor uses a very different hunting strategy (Richard Contreras and 2013b). Unlike the Variable Hawk, the Black-chested Buzzard-eagle usually arrives after 15:00 hs., and after trapping its prey, flies far off with it. To date, we have been unable to determine where this raptor goes to feed on its prey. The Variable Hawk probably eats its prey "in situ" due to its weight (X = 475 g. N = 12) relative to the weight of the Black-chested Buzzard-eagle (960 g *fide* Schlatter et al 1980). Interestingly, *G. polyosoma* and *G. melanoleucus* use the same hunting areas at different times (time fragmentation niche). During the study period, we didn't observe any encounters between the two species, which, if they did occur, could be conflictive, as has been documented by some studies on the subject (Jimenez and Jacksic 1989, 1990, Alvarado 2008).

We have observed some agonistic behavior between this hawk and other species. On one occasion (04.23.2013, 7:55 pm, 40% H 10^{0}C clear sky) a Variable Hawk was perched on a balcony on the first floor of a building in the Plaza Murillo (Area 2). It was harassed for about 2 minutes by a Sparkling Violetear (*Colibri coruscans),* until finally the hawk took off. The hummingbird flew across the street and hovered only a few centimeters away from the hawk's face. It flew off only to repeat the maneuver again. The hawk never showed any reaction to the maneuvers of the hummingbird. This is the first mention of a Sparkling Violetear harassing a Variable Hawk. On another occasion, in Alto Irpavi, in the southern part of La Paz, on the premises of the Military Academy of Engineering (3415 m, 19K0597920, UTM 8172438, 09.22.2014, 10:27 pm, clear sky, 18^0 C, 38% H), we observed a Variable Hawk perched on a horizontal branch of a eucalyptus tree (*Eucalyptus globosus*) about 12 m high. An American Kestrel (*Falco sparverius*) began to harass the hawk, flying about 3 or 4 m in front of it in a horizontal direction. It then came within 10 to 15 cm of the hawk's face. After a few seconds he withdrew again to repeat the maneuver. A few minutes later the hawk flew off, but at no time made any move-

ment against the maneuvers of the kestrel. This "indifference" to the harassment by American Kestrels and other species coincides with what was previously observed for the species in Argentina (De Lucca 2011). Meanwhile Baladrón et al (2006), during their work in the southeast coast of Buenos Aires (Argentina), documented pigeons (*Columba* spp, referring to wild species, Baladrón pers. comm. 2014) showing aggression toward the hawk. We have not observed this in our study area, where, apart from *Columba livia* in large flocks and numbers, there is a permanent presence of Eared Doves, Bare-faced Ground Dove and other species.

Regarding perching behavior, in four years of study and monitoring in the city, we only observed *G. melanoleucus* perched twice on lamp posts on the La Paz - El Alto highway. In contrast, *G. polyosoma* is often seen perched on different urban structures. In Plaza Murillo (Area 2) it frequently used the same four perches: the edge of a white wall (approx. 7 m in height) opposite the cathedral in La Paz, which is sunlit during hunting activities; the front lintel of the Cathedral of La Paz, often used as a place to feed on freshly caught doves; the top of the dome of the right front steeple of the cathedral; and a balcony (first floor) of an abandoned building just in front of the Cathedral of La Paz. These four sites are used interchangeably by the *G. polyosoma* pair in the mornings before, during or after the hunt. These perches are used almost constantly by domestic pigeons until the hawk flies in. Then the pigeons are completely displaced, leaving only the hawk on the perch. In Area 1 (Villa Pabon) we never observed the hawks perched during the entire study period. According to Jimenez (1995) individuals of this species use different structures as perches according to the habitat in which they are found throughout the species' wide geographical distribution. However, the use of frames, walls etc. had not been previously documented. This could be explained by the fact that, as noted by De Lucca (2011), no studies evaluating this species' response to anthropogenic modifications has been conducted. In this study, this hawk clearly takes advantage of perches provided by urban structures. It should be noted that in Plaza Murillo (Area 2) there are trees, however they are relatively short (up to 4 m) and are almost always surrounded by people, so these probably are disincentives for use as perches.

Hunting activities were verified during the study period - at least once a week throughout the year. This would indicate that the species is resident in the area or nearby, which contradicts Cabot (1991) who considered it a winter resident in the Bolivian highlands. Alternatively, another interpretation could be that because of the regular availability of food resources of relatively high

biomass which require relatively low energy costs throughout the year (*Columba livia*), the Variable Hawk is a permanent resident only in the urban ecosystem of La Paz in the Bolivian highlands. The reduction or disappearance of migration patterns is one of the characteristics of urban species (*fide* Luniak 2004). It is also important to consider that large cities act as heat islands (*fide* McKinney 2002, 2006) as compared to suburban and rural environments - so the species may not need to migrate due to bad weather.

The Variable Hawk eats a wide variety of prey that includes mammals (mainly rodents), birds, reptiles, amphibians and invertebrates (Jimenez 1995, Figueroa et al 2003, Baladrón et al 2006, De Lucca 2011, Travaini et al 2012, Baladrón et al 2014, *inter aliis*) and occasionally carrion (Brown and Amadon 1968, Woods 1975). This raptor's diet varies along its latitudinal distribution. In Colombia it appears to have the highest consumption of birds, but diets of individuals further south include birds, lagomorphs, reptiles, amphibians and insects. Finally in the southern-most portion of its range, its diet includes small mammals almost exclusively (Jimenez 1995, Figueroa et al 2003, Baladrón et al 2006, De Lucca 2011, Travaini et al 2012, Baladrón et al 2014, *inter aliis*).

Diet studies based on analysis of pellets indicate the species is a generalist in northwestern Patagonia (Argentina) (Monserrat et al 2005), and Baladrón et al (2006), identified it as a rodent specialist on the southeast coast of Buenos Aires (Argentina). Travaini et al (2012) documented the species as a specialist in mammals (particularly *Ctenomys sp*) representing 97.1% of the biomass consumed in the Petrified Forest Natural Monument; and in the town of Junin de Los Andes mammals accounted for 88.9% of biomass consumed. Both of these towns are located in southern Argentina.

Also interesting to note is that Travaini et al (2012) found that in Junin de Los Andes, 60% of the biomass consumed by the hawk was composed of European Hares (*Lepus europaeus*) which provide a lot of biomass (300 g per pellet, Trejo et al 2006) indicating, according to these authors, an ability of the species to adapt or change its diet from native species to introduced species depending on their availability. This adaptive plasticity has been documented in relation to other prey too (Jimenez 1995, Figueroa et al 2003, Travaini et al 2012, Baladrón et al 2014).

Based on this, it is clear that the Variable Hawk in La Paz is an opportunistic specialist with a great ecological and trophic plasticity. It has the ability to adapt to an urban ecosystem that provides it with a high availability of introduced species (*Columba livia*) as prey (approx. 50,000 individuals in 100 m2 *fide* La Razon 2011). According to our measurements, the pigeons in Plaza Murillo weigh an average of 475 g (min 270 g, max. 680 g, n = 12) so that, even considering the feathers,

they provide a high contribution of biomass for the hawk, which weighs 960 g (*cfc.* Schlatter et al 1980). This explains the hunting of one dove/ day per hawk observed.

Introduced species in different ecosystems and their proliferation has triggered the reorganization of trophic guilds among species (Luniak 2004 Travaini et al 2012) as apparently happened with raptors in the cities of La Paz and El Alto based on the overabundance and availability of *Columba livia* (Richard 2013, Richard Contreras and 2013b). This would also explain the overlapping of hunting areas and trophic niches with other species (*G. melanoleucus*, Mountain Caracara (*Phalcoboenus megalopterus,)* and *Falco sparverius*) (Richard 2013, Richard and Contreras 2013b, 2014), the reduction of hunting territories and of course, and the elimination of the need to migrate (*cfc.* McKinney 2002, 2006).

The issue of domestic pigeon has other connotations. Indeed the species is considered a plague in La Paz where it is estimated that there is one pigeon for every 13 inhabitants and 50,000 individuals just in Plaza Murillo (Reason 2011), the center of the highest concentration of pigeons across the city (Garitano *fide* Zavala and Gismondi 2003). In 2011 the Honorable Mayor of La Paz had invested more than US $ 35,000 trying to reduce the number of pigeons by 20% (La Razon, 2011). In this regard, our observations show that the Variable Hawk preys on a minimum (underestimated and limited to the observations of the authors during the study period) of more than 200 pigeons per individual per year, not including predation by *G. melanoleucus*, *Phalcoboenus megalopterus,* and *Falco sparverius* (Richard and Contreras 2014). If nest boxes for raptors were placed in the city center and an awareness campaign implemented to protect these species, they probably could effectively serve as a biological control to maintain the populations of *Columba livia* and, as an added value, provide important educational resources and tourist attractions to the cities of La Paz and El Alto (Richard and Contreras 2014).

Behaviors and habits of *G. polyosoma* described in this work include practically all the characteristics mentioned for urban species, i.e. species that demonstrate ecological and ethological plasticity in populations under anthropogenic pressure *(cfc.* Luniak 2004). Also, provisionally we believe that it is an "urban adapter" (*fide* McKinney 2002, 2006), a species adapted to the urban context and certainly attracted by the possibilities offered by an urban ecosystem in terms of availability of great dietary biomass - the domestic pigeon. This species' status could change to "urban exploiter"(*sensu* McKinney, 2002) once it is confirmed that *G. polyosoma*, apart from hunting in the city of La Paz, also nests there.

The need to prioritize studies on urban biodiver-

sity and adaptations has been demonstrated by several authors (Luniak 2004, McKinney 2002, 2006, Müller et al 2010, Richard and Contreras 2013a). These authors suggest that urban biodiversity is established in samples of natural ecosystems and unique adaptations and therefore also plays an educational and ecological service to raise awareness and educate people about the importance of having protected areas and biodiversity (Richard and Contreras 2013a). That is why studies of urban biodiversity and its incorporation into formal education contribute to the construction of critical and active environmental citizens in the defense and conservation of our natural heritage and the development of biophilia and culture of contemplation (Fide Richard and Contreras 2013a) so necessary in today's cities and for the conservation of urban and global biodiversity.

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References

Alvarado Orellana, S. 2008. Inusual caza aérea de una gaviota capucho café (*Chroicocephalus maculipennis*) y posible muerte de un aguilucho común (*Buteo polyosoma*) por un águila mora (*Geranoaetus melanoleucus*). Nuestras aves 53: 14 – 15.

Alvarado Orellana, S. y R. A. Figueroa Rojas. 2005. Possible social foraging behaviour in the Red-Backed Hawk (*Buteo polyosoma*). Ornitologia Neotropical 16: 271-275.

Alvarado Orellana, S. y R. A. Figueroa Rojas. 2006. Unusual observation of three Red-Baked Hawks (*Buteo polyosoma*) defending a nest. Journal Raptor Research 40 (3): 248-249.

Baladrón, A.V., M.S. Bo y A.I. Malizia. 2006. Winter diet and time-activity budgets of the Red-Backed Hawk (*Buteo polyosoma*) in the coastal grasslands of Buenos Aires province, Argentina. Journal Raptor Research 40(1): 65-70.

Baladrón, A.V., A.I. Malizia y M.S. Bó. 2009. Predation upon tuco-tucos (*Ctenomys talarum)* by red-backed hawks (*Buteo polyosoma)* in coastal grasslands of Buenos Aires Province, Argentina. Studies on Neotropical Fauna and Environment, 44: 61-65.

Baladrón, A.V., M.S. Bo y A.I. Malizia y M.J. Bechard. 2011. Food habits of the Roadside Hawk (*Buteo magnirostris*) during the nonbreeding season in the southeastern Pampas of Argentina. Journal of Raptor Research, 45: 257-261.

Baladrón, A. V., M. Cavalli y G. Martínez. 2014. Dieta del aguilucho común (*Geranoaetus polyosoma*) en pastizales costeros y zonas periurbanas de la región pampeana. Nótulas Faunísticas (segunda serie), 143: 1-5

Banchs, R., E. Bucher, M.A. Palermo y B. Mar-

chetti. 1983. El aguilucho común. Fauna Argentina 72. Centro Editor de América Latina.

Bellati, J. 2000. Comportamiento y abundancia relativa de rapaces de la patagonia extraandina argentina. Ornitologia neotropical 11: 207–222.

Bird, D. , D. Varland y J. Negro (Eds.). 1996. Raptors in Human Landscapes: Adaptations to built and cultivated environments. Academic Press y Raptor Research International. 417 págs.

Bo, M. S., A. Baladrón y L. Biondi. 2007. Ecología trófica de Falconiformes y Strigiformes: tiempo de síntesis. Rev. El Hornero, 22 (29: 97 – 115.

Brown, L. y D. Amadon.1968. Eagles, hawks and falcons of the world. McGraw-Hill, New York.

Cabot, J. 1991. Distribution and habitat selection of *Buteo polyosoma* and *B. poecilochrous* in Bolivia and neigh-bouring countries. Bulletin British. Ornithologist. Club. 114: 199-209 pags.

Cabot, J. y T. Vries. 2003. *Buteo polyosoma* and *Buteo poecilochrous* are two distinct species. Bulletin BOC 123 (3):190-207.

Capllonch, P. y D. Ortiz. 2009. Migración del Aguilucho Común *(Buteo polyosoma*) en Tafí del Valle, Tucumán, Argentina. Nuestras Aves 54: 33-35.

Dellacasa Muñoz, V. 2005. Estudio de los tipos de vuelo del aguilucho común (*Buteo polyosoma*) durante el período estival en nevados de Chillán, centro-sur de Chile. Memoria de Título presentada como parte de los requisitos para optar al título de médico veterinario. Univ. Austral de Chile. 53 p.

De Lucca, E. R. 2011. Observaciones del Aguilucho Común *(Buteo polyosoma*) en el Centro y Sur de la Argentina. Nótulas Faunísticas (segunda serie), 77: 1-15.

De Lucca, E. R. 2014. Nidificación del aguilucho común (*Buteo polyosoma*) en la provincia de Buenos Aires, Argentina. Nótulas Faunísticas (segunda serie), 151: 1-4

De Lucca, E. R. y M. D. Saggese. 1989. Rapaces patagónicas: Factores que las afectan. Nuestras Aves 17: 33, Buenos Aires.

De Lucca, E. R., M. Bertini y A. Quaglia. 2012. Nidificación del águila mora (*Geranoaetus melanoleucus*) y del aguilucho común (*Buteo polyosoma*) en el litoral marítimo del noreste patagónico, Argentina. Nótulas Faunísticas (segunda serie), 103: 1-10.

De Lucca, E. R., A. Quaglia y M. Bertini. 2013. Numerosas parejas de aguilucho común (*Buteo polyosoma*) nidificando en postes de electricidad en el norte patagónico, Argentina. Nótulas Faunísticas (segunda serie), 120: 1-10.

Ellis, D. E., J. C. Bednarz, D. G. Smith, & S. P. Flemming. 1993. Social foraging classes in raptorial birds. Bioscience 43: 14–20.

Farqhuar, C.C. 1998. *Buteo polyosoma* and *B. poe-*

cilochrous, the "Red-Backed Buzzards" of South America, are conspecifc. Condor 100: 27-43.

Figueroa Rojas, R.A., E.S. Corales Stappung y S. Alvarado. 2003. Diet of the Red –Backed Hawk (*Buteo polyosoma*) in a forested area of the Chilean Patagonia and its relation to the abundance of rodent prey. El Hornero 18 (1): 43-52

Filloy, J.; Bellocq, M. I. 2007 Respuesta de las aves rapaces al uso de la tierra: un enfoque regional. Hornero 22 (2): 131-140.

Flores Bedregal, E. y C. Capriles Farfan. 2010. Aves de Los Andes Bolivianos. Ed. Sagitario. La Paz, Bolivia. 305 p.

Galende, G., y A. Trejo. 2003. Depredación del águila mora (*Geranoaetus melanoleucus*) y el búho (*Bubo magellanicus*) sobre el chinchillón (*Lagidium viscacia*) en dos colonias del noroeste de patagonia, Argentina. Mastozoología Neotropical, 10 (1): 143 - 147

Garitano Zavala, A. y P. Gismondi. 2003. Ornitofauna de las ciudades de La Paz y El Alto: Variación de la riqueza y diversidad de la ornitofauna en áreas verdes urbanas de las ciudades de La Paz y El Alto (Bolivia). Ecología en Bolivia, 38 (1): 65-78.

Jiménez, J. E. 1995. Historia natural del Aguilucho *Buteo polyosoma*: una revisión. El Hornero 14 (1 y 2): 1-8.

Jiménez J. y F. Jaksic. 1989. Behavioral ecology of Grey Eagle-buzzards, *Geranoaetus melanoleucus*, in central Chile. Condor 91:913-921

Jiménez J. E. y F. M. Jaksic.1991. Behavioral ecology of Red-backed hawks in central Chile. Wilson Bulletin 103, 132-137.

Jiménez, J. y F. Jaksic. 1990. Historia natural del águila *Geranoaetus melanoleucus*: Una revisión. El Hornero 13: 97 – 110.

La Razón. 2011. La alcaldía alista dos medidas para controlar la población de palomas. Periódico La Razón, 21 de agosto de 2011, La Paz.

La Razón. 2012. Bolivia tiene 10.389.913 habitantes. http://www.la-razon.com/sociedad/Bolivia-habitantes_0_1766223386.html (Consultado el 20 de Agosto de 2014)

Liberman, M. 1991. Geología del valle de La Paz. pp 19-26. En: BAUDOIN, M. y E. FORNO (EDS.). Historia Natural de un Valle en Los Andes: La Paz. Instituto de Ecología, Universidad Mayor de San Andrés, La Paz.

Luniak, M. 2004. Synurbization – adaption of animal wildlife to urban development. Pp 50 – 55. In Shaw, W, L. Harris y L. et al, VanDruff (Eds.). Proc. 4th International Urban Wildlife Symposium on Urban Wildlife Conservation. May 1-5, 1999, Tucson, Arizona. 368 pages.

Maffi, L. 2005. Linguistic, cultural and biological diversity. The Annual Review of Anthropology 29: 599–617.

Martínez, O., M. Olivera, C. Quiroga E., I. Gómez. 2010. Evaluación de la avifauna de la ciudad de La Paz, Bolivia. Rev. Perú. Biol. 17 (2): 197 – 206.

McKinney, M. L. 2002. Urbanization, biodiversity and conservation. BioScience 52 (10): 883 – 890.

McKinney, M. L. 2006. Urbanization as a major cause of biotic homogenization. Biological Conservation 127: 247 -260.

Ministerio de Medio Ambiente y Agua. 2013. Plan Maestro Metropolitano de Agua Potable y Saneamiento La Paz - El Alto, Bolivia. Vol I: Crecimiento demográfico. MMAyA. 88 p. La Paz, Bolivia.

Monserrat, A., M. Funes y A. Novaro. 2005. Respuesta dietaria de tres rapaces frente a una presa introducida en Patagonia. Revista Chilena de Historia Natural 78: 425-439.

Muller, N., P. Werner y J. Kelcey. 2010. Urban biodiversity and design. Wiley Blackwell & Zoological Society of London. UK.

Pavez, E. F. 1998. Observaciones sobre el patrón de coloración en machos y hembras de aguilucho *(Buteo polyosoma*, Quoy y Gaymard, 1924). Boletín Chileno de Ornitología 5: 21-23.

Richard, E. 2013. Nuevas localidades para el Águila Mora (*Geranoaetus melanoleucus*) en el altiplano de La Paz y Oruro, Bolivia y área circumlacustre del lago Titicaca (Bolivia y Perú). Ecoregistros 3 (9): 36-40. Argentina

Richard, E. y D.I. Contreras Z. 2013a. Reflexiones en torno a las reservas naturales urbanas como espacio de diálogo de saberes en la construcción de un ciudadano urbano crítico, responsable y comprometido con la problemática ambiental, la biofilia y la cultura de la contemplación para el buen vivir en Bolivia y Latinoamérica. Revista de Didáctica Ambiental 9 (13): 1- 31. España.

Richard, E. y D. Contreras Z. 2013b. Primeros registros del águila mora (*Geranoaetus melanoleucus*) para las ciudades de La Paz y El Alto (Departamento de La Paz, provincia Murillo, Bolivia) y comentarios sobre su historia natural. Notulas faunísticas (Segunda Serie) 139: 1- 10.

Richard, E. y D. Contreras Z. 2014. Aves rapaces diurnas de la ciudad de Nuestra Señora de La Paz: Conservación e Importancia ecológica, cultural, ecoturística, educativa y terapéutica. Actas I Congreso Municipal de la Historia de La Paz (En prensa).

Rossel, J. 2013. Aves comunes de las zonas urbanas de la ciudad de La Paz. Un libro para reconocer las aves más comunes de La Paz. La Paz, Bolivia. 143 p.

Schlatter R. P., Yañez J. L., Jaksic F. M. 1980. Food-niche relationships between Chilean Eagles and Red-backed Buzzards in Central Chile. The

Auk. 97:897–898.

Travaini A., M. Santillán y S.C. Zapata. 2012. Diet of the Red-backed Hawk (*Buteo polyosoma*) in two environmentally contrasting areas of Patagonia. Studies on Neotropical Fauna and Environment, 47: 25-32.

Trejo A., Ojeda V., Kun M., Seijas S. 2006. Prey of White-throated Hawks (*Buteo albigula*) in the southern temperate forest of Argentina. J Field Ornithol. 77:13–17.

Valenzuela, R.B. 1962. Apuntes acerca del Peuco y del Aguilucho Común. Revista Universitaria 47: 219-227

Villegas, M. y A. Garitano Zavala. 2008. Las comunidades de aves como indicadores ecológicos para programas de monitoreo ambiental en la ciudad de La Paz, Bolivia. Ecología en Bolivia, 43 (2): 146-153.

Wood, R. 1975. The Birds of the Falkland Islands. The Compton Press Ltd. Great Britain.

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Nesting and social behaviour of White-tailed Kites ((*Elanus leucurus*) in urban areas of Costa Rica

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The White-tailed Kite (*Elanus leucurus* Vieillot 1818) is a widespread raptor in America, from the United States to Patagonia and southern Chile (Figueroa & Mella 2006). It was first recorded in Costa Rica in 1958 (Stiles &Skutch 1989). In temperate areas, most aspects of its breeding biology are well known. For example, in the U.S. nesting activity occurs mainly from

White-tailed Kites landing at a communal roost in a *Ficus jimenezi* tree, San Roque de Barva, December 2010. Photo © Pablo Camacho

January to July (Barlow 1847, Hawbecker 1940, More & Barr 1941, Dixon et al. 1957,Henry & Annear 1978, Wright 1979). In Chile and Argentina breeding is reported from September to November (del Hoyo et al. 1994). In Panama nests have been observed in December (del Hoyo et al. 1994), while in Costa Rica its reproduction period spans from January to April (Stiles & Skutch 1989). According to the literature, this raptor lays between three to six eggs, most frequently four, and has an incubation period of 30 to 32 days (Barlow 1947, Hawbecker 1940, More & Barr 1941). Reported hatchling recruitment success ranges from 0 to 75% (Barlow 1947, Hawbecker 1940, More & Barr 1941). Other aspects of its breeding biology are more disputed, such as the role of males in nest building, due to some evidence which suggests that only females may be involved (Hawbecker 1940, Dixon et al. 1957, del Hoyo et al. 1994).

Additionally, the formation of communal roosts by the White-tailed Kite is known since the 1940's in California and other locations of the United States, mainly during winter. In central Chile and Patagonia large groups of White-tailed Kites also form communal roosts during winter (Meserve 1977, Sarasola et al. 2010). Roost size varies from 10 to 200 individuals, up to a reported maximum of 500 (Morgan 1948, Dixon et al. 1957, Clark and Wheeler 1989, Sarasola et al. 2010). No information is available on communal roosts for any resident raptor species in Central America. Here we describe the White-tailed Kite nesting activity and document the formation of communal roosts in the urban area of Heredia Province, Costa Rica

Study Site

The study took place in Heredia (Ulloa district; 9º 58' 30" N 84º 07' 44" W (WGS 84)) and Barva (San Roque district; 10º 01' 08" N 84º 08' 11" W (WGS84)), two cantons of Heredia Province, Costa Rica, Central America. Both places have undergone considerable expansion since the 1980's, after sprawling urbanized areas replaced the shaded coffee plantations that had once dominated the cities. Currently only a few old coffee plantations subsist, often dotted with isolated trees and surrounded by degraded riparian forests (Acosta-Chaves 2013). Both study sites are in the Subtropical Humid Zone, with five to six dry months in the year (Herrera & Gómez 1993).

Monitoring and Tracking

In January 2009 and December 2010, we found several pairs of White-tailed Kites (5) in two types of foraging zones: abandoned lots and coffee fields, respectively. We spotted the pairs shortly before sunset, and followed them back to their overnight shelter. They sometimes stood in isolated roosts, while others gathered in the late afternoon in communal roosts or were observed

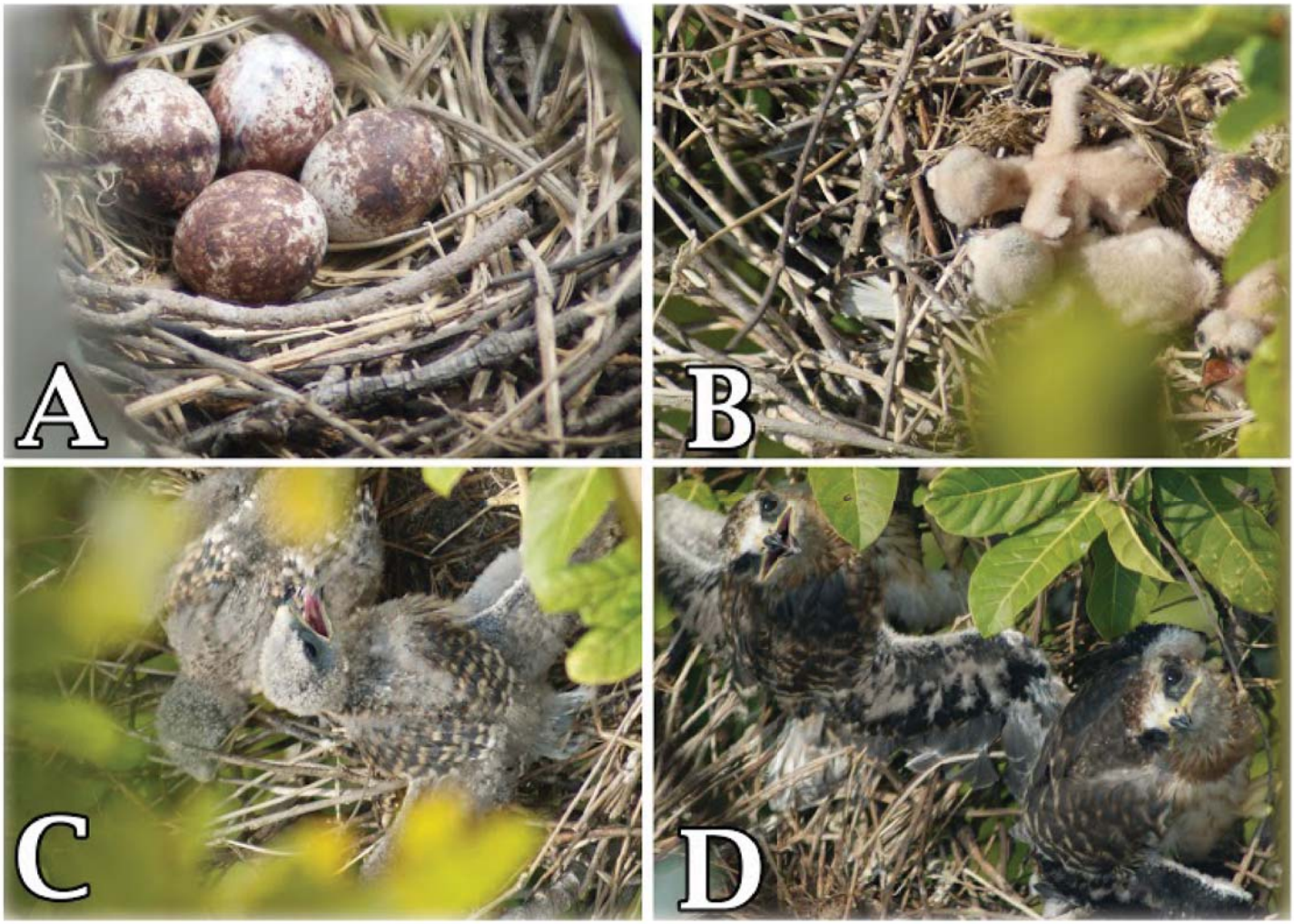

Figura 1. Nest, eggs, nestlings and fledglings of White tailed Kites from Ulloa, Heredia Province, Costa Rica (2011) : a) Four eggs (March), b) Three altricial chicks on the nest (April), c) Two nestlings exploring on branches (May) and d) Two fledglings remain on the nest, fed by adults (May). Photos © P. Camacho.

returning to their nests. A few isolated pairs performed courtship behavior indicating forthcoming nest building. We monitored nesting activity from March to July 2009 and from February to June 2011.

We also monitored the number of individuals in two main communal roosts from March to May 2009 and from December 2010 to March 2011, from 17:00 to 19:00 h. Also, we made occasional observations at different nests and roosts which were found during the year in the country.

Results

Nests

We found a total of six nests in four locations: one in a coffee field in the town of Barreal (Ulloa), three inside the Campus Benjamín Nuñez (CBN)

of the National University (Ulloa) and two in a coffee field in San Pedro (Barva). Four nests were built in fig trees (*Ficus jimenezi*). As most nests were already at least partially built, only two nests were monitored from the early start of their construction: one from Barreal (2009) and a second in CBN (2011).

The first of the two fully monitored nests was built only by the female, although the male offered thin branches in exchange for copulation. In the second case both birds built the nest. We were only able to measure the first nest, it was a branch platform 30 x 30.5 cm large and 11.5 cm high, at 8.5 m from the ground. The interior was lined only with leaves of bamboo (*Bambusa vulgaris*) - an introduced species. The eggs were white with brown spots. For more detailed information about both nests see Table 1.

At the first nest, incubation lasted between 30-34 days. It took 90 days for the flight of the oldest offspring, 102 days for this first chick to be fed in flight and 117 days for the youngest chick to fledge from the nest. At the second nest, incubation time was the same as at the first nest. One of the young fledged at 99 days and the younger chick left the nest on the 120th day.

We also observed courtships in June and September, a wounded juvenile in October, chicks out of their nest in November and February, and adults feeding juveniles in July and November in Central Valley. This suggests that White-tailed Kite reproduction in the Central Valley takes place all year long.

Communal Roosts

For the communal roots found in 2009 (February 28th), we found a minimum of six and a maximum of eleven raptors using the roost as an overnight resting place. They roosted in a "gavilancillo" tree (*Albizia adinocephala*) in the middle of a sunny coffee field in San Roque de Barva. In 2010 (December 10th) the raptors moved to a fig tree (*Ficus jimenezi*), possibly due to the damage caused to the former tree following a lightning strike (pers.. obs).

This roost was used by one to 39 White-tailed Kites at any point in time. The raptors always came to the roost in pairs, and arrived on average at 18:30. The decrease in the number of raptors in the communal roosts between February and May correlates with the beginning of the nesting season.

We also discovered 12 roosting spots. Five were used by isolated pairs and located respectively in a shaded coffee field in San Francisco de Heredia (1), a pasture with large trees and a shaded coffee field at CBN (3) and a coffee field in San Pedro de Barva (1). Most of the roosts were in a "gavilancillo" tree (5), one in a fig tree and one

in a cedar tree (*Cedrella odorata*). No other raptor species shared the communal roosts with the White-tailed Kite.

Discussion

Most of our findings on White-tailed Kite nesting activity in Heredia are in accordance with previously reported data, except for the fact that the nests were not lined with pellets (Hawbecker 1940, Gonzáles-Acuña et al. 2009) and both sexes can play a role in nest building.

Perhaps an outstanding result was the discovery that the raptors breed all year round in the Central Valley, and possibly in most of Costa Rica.

This is not unexpected as, unlike in North and South America where kite breeding season is restricted to the spring months, Central America has more stable climatic conditions overall. Generally, only two main climate patterns occur: dry and wet season or wet season all year, depending on the region of the country (Savage 2002).

Table 1. Behavior of White-tailed Kite pairs

Observations	Years	
	2009	2010-2011
Courtship	31 March	2 February
Pairing	31 March	2 March
Material collection	31 March	2 March
Nest construction	31 March	2 March
First egg in the nest	13 April	24 March
A clutch of 4 eggs	30 April	28 March
One altricial chick in the nest	-	25 April
Two altricial chicks in the nest	18 May	-
One un-hatched egg	-	29 April
Three nestlings	-	29 April
Four nestlings	29 May	-
Three nestlings, both adults feeding the young	21 June	-
Nestling dead beneath the tree	-	1 May
Two young branching out	26 June	13 May
Oldest chick makes first flight (20 m)	2 July	-
Three juveniles receive food in flight	10 July	25 May
Juveniles hunting	12 August	-
Juveniles leave the nest	25 August	30 June

The transition from the dry to the rainy season happens in April or May (Savage 2002). Many native birds in Costa Rica nest during this time owing to the abundant food supply (Stiles & Skutch 1989). This behavioral flexibility in tropical urban environments may be explained by the urbanization of this raptor (Luniak 2004).

To the best of our knowledge, this is the first record of communal roosts of any resident raptor in Central America. The increase in roost size between 2009 and 2011 was probably a product of recruitment during 2009 and 2010: the raptors increased in abundance in the urban area. Some authors hypothesize that the function of communal roosting is to provide protection against potential predators or in response to cold (Beauchamp 1999). But in our scenario both hypotheses are rejected because most large potential predators are absent from urban areas in Costa Rica due to habitat loss (Biamonte et al. 2010, Acosta-Chaves 2013), and there are no harsh winters prompting the formation of roosts (Beauchamp 1999). An increase in foraging efficiency (Beauchamp 1999) or collective knowledge (Buckley 1996, Sarasola et al. 2010, Chaves-Campos 2011) might better explain the purpose of these roosts. The Black Vulture (*Coragyps atratus)* establishes communal roosts close to food sources (Novaes & Cintra 2013), similar to what we observed with our kites because coffee plantations are near open areas which this species uses for hunting.

Studies have found that when kites spend most of their day foraging, there is a significant decrease in insect and rodent abundance in cities (e.g. González-Acuña et al. 2009). These species, therefore, play an important role in the control of potential urban plagues. The trees *Ficus jimenezi* and *Albizia adinocephala* are important species for nesting and social interaction of the White-tailed Kite in the Central Valley of Costa Rica. Unfortunately tree species as well as coffee fields and pastures are threatened by urbanization and will probably disappear within the next few years (Acosta-Chaves 2013). The future of the population of these urban raptors is still unknown and they require ongoing monitoring.

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References

Acosta-Chaves, V. 2013. Pérdida de hábitas y biodiversidad desvanecida en la ciudad de Heredia (Costa Rica). Ambientico. 232-233: 64-74.

Barlow, C. 1847. Some notes in the nesting habits of the White-tailed Kite. Auk. 14: 14-21.

Beauchamp, G. 1999.The evolution of communal roosting in birds: origin and secondary losses. Behav. Ecol. 10(6): 675-687.

Biamonte, E., L. Sandoval, E. Chacón & G. Barrantes. 2011. Effect of urbanization on the avifauna in a tropical metropolitan area. Landscape Ecol. 26: 183-194.

Buckley, N.J. 1996. Food finding and the influence of information, local enhancement, and communal roosting on foraging success of North American vultures. Auk. 113(2): 473-488.

Chaves-Campos, J. 2011. Ant colony tracking in the obligate army ant following antbird *Phaenostictus mcleannani*. J.Ornithol. 152: 497-504.

Clark, W.S. 2006. Interspecific communal winter night roost in South Texas. J.Raptor.Res. 40(2): 177-178.

Clark, W. S. & B. Wheeler. 1989. Unusual roost site selection and staging behaviour of Black-shouldered kites. J.Raptor.Res. 23(3): 116-117.

del Hoyo J., A. Elliott & J. Sargatal. Eds.1994. Handbook of the Birds of the World. Vol. 2. New World Vultures to Guineafowl, Lynx editions, Barcelona.

Dixon J., R. Dixon & J. Dixon. 1957. Natural history of the White-tailed Kite in San Diego County, California. Condor. 59: 156-165.

Figueroa, M. & J. Mella. 2006. The most southern records of the White-tailed kite (*Elanus leucurus*) in Patagonia. J.Raptor.Res. 40(2): 176-177.

González- Acuña, D., E. Briones., K. Ardiles., G. Valenzuela-Dellarossa, S. Corales S. & R. Figueroa. 2009. Seasonal variation in the diet of the White-Tailed Kite (*Elanus leucurus*) in a suburban area of Southern Chile. J.Raptor.Res. 43(2): 134-141.

Hawbecker, A.C.1940.The nesting of the White-tailed kite in Southern Santa Cruz County, California. Condor. 170: 106-114.

Henry C. & J. Annear. 1978. A White-tailed Kite breeding record in Oregon. Western Birds. 9: 131-133

Herrera W. & L.D.Gómez. 1993. Mapa de Unidades bióticas de Costa Rica. 1: 685000. San José, INCAFO

Luniak, M. 2004. Synurbanization—adaptation of animal wildlife to urban development. In: Shaw W.W., Harris L.K. & Vandruff L. Proceedings of the 4 th International Urban Wildlife Symposium. University of Arizona, Arizona, USA, pp.50-55.

Meserve, P.L. 1977. Food habits of a white-tailed kite population in Central Chile. Condor. 79 (2): 263-265.

More, R. & A. Barr.1941. Habits of the White-tailed Kite. Auk.4 (58): 453-462.

Morgan A.H.1948.White-tailed Kites roosting together. Condor.50: 92-93.

Novaes, W. & R. Cintra. 2013. Factors influenc-

ing the selection of communal roost sites by the Black Vulture *Coragyps atratus* (Aves: Cathartidae) in an urban area in Central Amazon. Zoologia.30 (6): 607-614.

Sarasola J.H., C. Solaro, M. Santilla & M. Galmes. 2010. Communal roosting behaviour and winter diet of the White-tailed Kite (*Elanus leucurus*) in an agricultural habitat on the Argentine Pampas. J.Raptor.Res. 44(3): 202-207.

Savage, J. 2002. The amphibians and reptiles of Costa Rica: A herpetofauna between two continents, between two seas. The University of Chicago Press. Chicago. EEUU.

Stiles G. & A.Skutch.1989. Guide to the birds of Costa Rica. Cornell University Press, New York.

Wright, B.A. 1979. Ecology of the White-tailed kite in San Diego County. J.Raptor.Res. 1(13): 26-27.

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First Nesting Record for *Buteogallus meridionalis* in Costa Rica and Notes on its Diet During Breeding Season

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The Savanna Hawk (*Buteogallus meridionalis*) was traditionally distributed from western Panama (Chiriqui), to South America, west of the Andes to northwestern Peru, east of the Andes to Guyana and Trinidad, and south through Ecuador, Peru, Bolivia, Brazil and northern Argentina (Thiollay 1994, Ferguson-Lees & Christie 2001, Márquez et al. 2005).

Slud (1964) mentioned *B. meridionalis* on a "list of species not recorded" in Costa Rica, but that can be expected occasionally or accidentally. Since then, numerous publications have listed the species as possibly occurring within the country, but all without confirmation (Lewis & Stiles 1980, Stiles & Skutch 1989, Ferguson-Lees & Christie 2001). Stiles & Skutch (1989) cataloged the species as expected for Costa Rica, and suggested searching for it in the southern Pacific side of the country, believing it would soon begin to appear in the lowlands of Golfo Dulce. However, nearly 20 years had elapsed before this raptor was first confirmed in Costa Rica - in April 2008, in Zancudo, Golfito (Obando et al. 2008, Sandoval et al. 2010). As a result of this absence, the species was excluded from publications during that period of time (Garrigues & Dean 2007). It was included in the Official List of the Birds of Costa Rica the year it was first documented in the country (Obando et al. 2008) and has been documented in subsequent publications (Garrigues & Dean 2014). This suggests that the species probably established itself in Costa Rica, but more data are needed to confirm this.

The objective of this study is to document the first nesting record of *B. meridionalis* and provide information on its diet during breeding season in the southern Pacific region of Costa Rica.

Study Area & Methods

In March 2014, we documented one Savanna Hawk nest in Coto 47, Laurel de Corredores, Puntarenas Province, Costa Rica (09º31 N, 82º58 W; 7 masl), 11.5 km northwest of the Panamanian border (Figure 1). According to the Map of Biotic Units of Costa Rica, by Herrera and Gómez (1993), it is located in a very Humid Tropical Zone that has 1 or 2 dry months. The habitat consists of plains where rice (*Oryza sativa*) and palm oil (*Elais oleifera*) cultivations predominate (Figure 2). We monitored the pair from March to June, during the courtship period, nest building, egg laying, hatching, parental care, nestling survival and fledging. To gain information on their diet, we collected prey remains and pellets from both beneath and within the nest and also documented visual records of prey.

Map 1: Location of *B. meridionalis* nest in the Laurel region, Corredores, Puntarenas, Costa Rica. March 2014.

Results & Discussion

The nest was located 7.47 m high, in a branch of a *Persea americana* (Lauraceae). The tree measured 9.25m high in total and had a 33cm DBH (diameter at breast height -1.30m-) (Figure 2). Both the male and the female actively participated in the nest building and carrying of materials for nest construction. They also were observed bringing gifts during courtship. The female began incubating in mid-March. We documented only one egg and, subsequently one chick. Incubation lasted approximately 42 days, and 38 days after the nestling hatched it fledged from the nest (Figure 3). We do not know the juvenile's period of dependence on the adults post-fledging. The total breeding period is estimated to last about 97 days (approximately 3 months) from courtship, nest building, incubation and hatching until fledging.

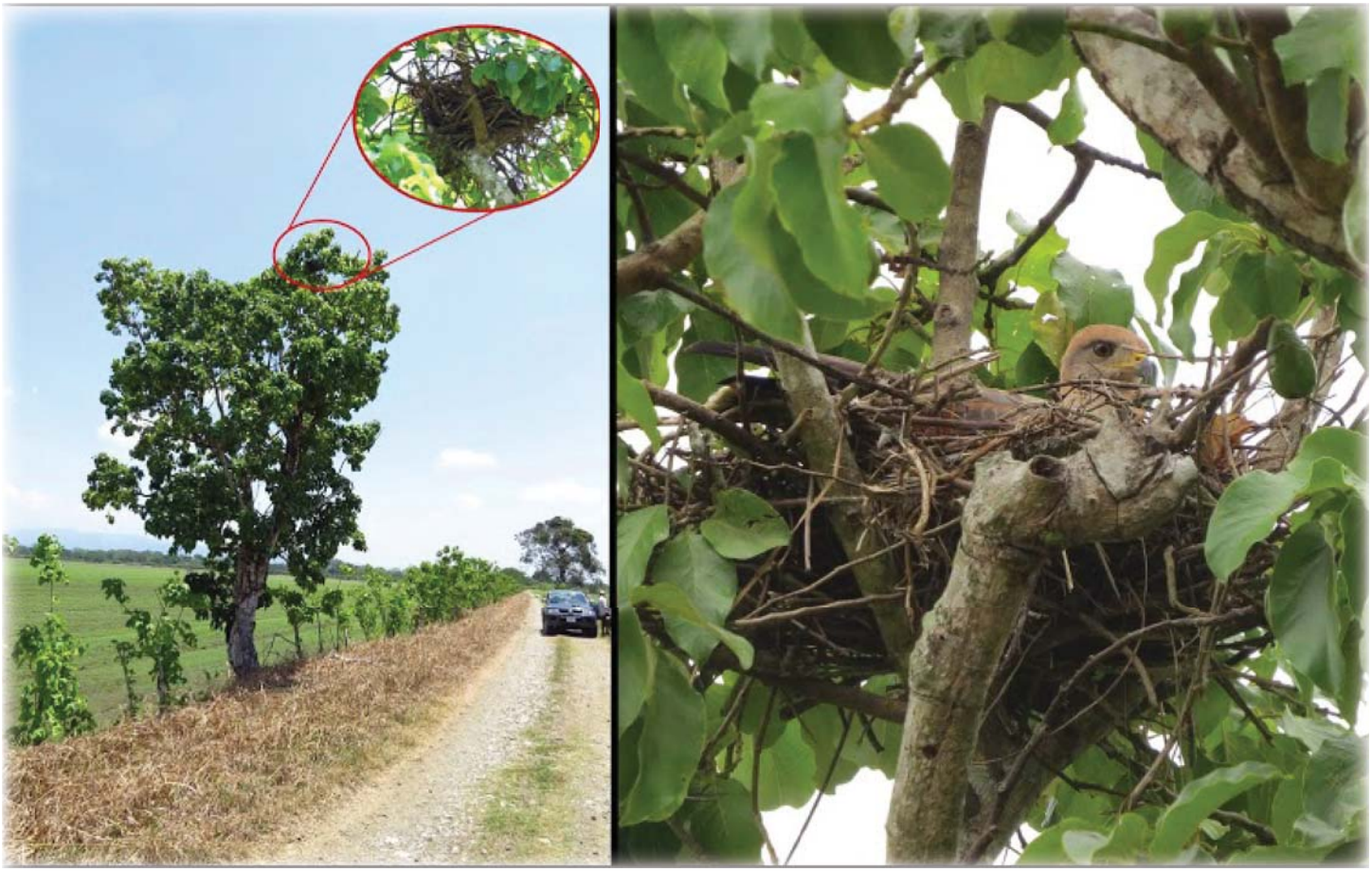

Figure 1. Habitat and location of *B. meridionalis* **nest in the Laurel region, Corredores, Puntarenas, Costa Rica. March 2014 Photos © P. Camacho.**

In Venezuela, *B. meridionalis* lays a single egg between January to September, and chicks are reported from May to December, with the greatest reproductive activity from April to October (Mader 1982, Hilty 2003, Navarro et al. 2007). Full breeding season lasted an average of 250 days (117 nests evaluated) and largely coincided with the wet season. The incubation time we determined for the nest in Puntarenas was very similar to the incubation period of 39 days reported by Mader (1982). Meanwhile Hilty (2003) indicates that young leave the nest at 6.5-7.5 weeks.

We identified 5 prey species based on direct observations and collection of remains (Table 1 and Figure 4). Haverschmidt (1962) indicated that in Suriname *B. meridionalis* feeds on small mammals, snakes and lizards, including *Ameiva ameiva* and *Iguana iguana*. Mader (1982), indicated that food was the factor that determined the start of the breeding season, and reported that frogs played an important part in this species' diet (16.3%) during the rainy season. However, he also mentions the capture of fish, crabs, snakes, iguanas and birds.

This study identified the first prey items for this raptor in Costa Rica and the northernmost

Figure 2. Breeding chronology of *B. meridionalis* **in Laurel region, Costa Rica, March-June 2014. Photos: D. Hernández and P. Camacho.**

part of its distribution, as well as the first data on their reproductive ecology. Moreover, Thiollay (1994) mentions that this species' numbers could increase as a result of continued deforestation, therefore it is expected that it (like other raptors from South America-Table 1), may begin colonizing northern Central America in the coming years. In this regard, Orlando Jarquín

Table 1. Documented prey in the diet of *B. meridionalis* **in Laurel, Costa Rica, March-June 2014.**

Prey	Detection	
	Visual	Collected
Mammalia		
Rodentia		
Sigmodon hirsutus	x	x
Sp. 1	x	
Amphibia		
Anura		
Sp. 1	x	
Leptodactylus insularum	x	x
Chaunus marinus	x	
Reptilia		
Squamata		
Sp. 1	x	
Ameiva ameiva	x	x
Norops sp.	x	
Spilotes pullatus	x	x

(pers. comm.) reported and photographed an individual *B. meridionalis* in February 2012 in Pueblo Nuevo de Chinandega, northwestern Nicaragua. This is the northernmost record reported to date. Likewise, we include as a means of comparison, a list of raptor species recorded in recent years for the first time in Costa Rica (Table 1) and the way in which they were dispersed and recorded north of the isthmus. All of them, except *A. poliogaster* are raptors of open areas (savannas) that are expanding their range from South America to northern Central America. For example, *M. chimachima* was recorded for the first time in Costa Rica in 1965 (Arnold 1966); in Nicaragua in 2001

Figure 3. Prey in the diet of *B. meridionalis* in Laurel, Costa Rica, March-June 2014. A. Bolivian Toadfrog (*Leptodactylus insularum*) B. Cane Toad (*Chaunus marinus*) C. Giant Ameiva (*Ameiva ameiva*) D. Southern Cotton Rat (*Sigmodon hirsutus*). Photos: A & C (P. Camacho); B & D (D. Hernández).

(McCrary & Young, 2008); and more recently in Honduras (Jutiapa) in 2005. A second record in the Pacific (Sabana Grande) occurred in 2012 (Jones & Komar 2013). Meanwhile van Dort et al. (2010) reported the first records of *Gampsonyx* for Honduras and El Salvador. This species was first recorded in Costa Rica in 1996 (Sandoval et al. 2010).

We would like to highlight the importance of social networks like Facebook (Grupo Rapaces de Costa Rica, Asociación Ornitológica de Costa Rica (AOCR), AOCR Bird Alarm) and the online form "Report your observations" (http://www.rapacesdecostarica.com/reporte-sus-observaciones/) in the creation of this report. This monitoring network allows for the participation of members and informers, in the form of "citizen science", generating an important source of information throughout the country.

Relatively little is known about the reproductive ecology of Neotropical accipiters and the ever-accelerating habitat loss justifies and makes it absolutely necessary to research and obtain information about this species. For example, one of the prey items reported (*S. hispidus*) has been regarded as the most harmful species of rodent in small farms in Latin America (Monge 2008). More studies are needed to understand the implications for the ecosystem.

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Table 2. Latest records of new raptors reported for Costa Rica 1958-2008.

Species	Name in English	Common Name in Costa Rica	First Record (year)	Location	Source
Elanus leucurus	White-tailed Kite	Elanio Coliblanco (Gavilán Bailarín, Gavilancillo Blanco)	1958	Río Frío, Alajuela.	Slud (1964)
Milvago chimachima	Yellow-headed Caracara	Caracara Cabecigualdo (Gavilán Blanco)	1965	Golfito, Puntarenas	Arnold (1966)
Gampsonyx swainsonii	Pearl Kite	Elanio Enano	1996	La Trocha de Pérez Zeledón, San José.	Sandoval et al. (2010)
Accipiter poliogaster	Gray-bellied Hawk	Gavilán Vientrigris	2008	Puerto Viejo, Sarapiquí, Heredia.	Garrigues & Dean (2014)
Buteogallus meridionalis	Savanna Hawk	Gavilán Sabanero	2008	Zancudo, Golfito, Puntarenas.	Obando et al. (2008); Sandoval et al. (2010)

References

Arnold, K. 1966. Distributional Notes on Costa Rican Birds. Wilson Bulletin 78(3): 316–317.

Garrigues, R. & R. Dean. 2007. The birds of Costa Rica, a field guide. Zona Tropical Publication. Nueva York, EEUU. pp. 387.

Garrigues, R. & R. Dean. 2014. The birds of Costa Rica, a field guide, second edition.. Zona Tropical Publication. Nueva York, EEUU. pp. 425.

Ferguson-Lees, J. & Christie, D.A. 2001. Raptors of the World. Christopher Helm, London.

Haverschmidt, F. 1962. Notes on the feeding habits and food of some hawks of Surinam. The Condor 64: 154–158.

Herrera, W. & L.D. Gómez. 1993. Mapa de Unidades bióticas de Costa Rica. 1: 685000. San José, INCAFO.

Hilty, S. L. 2003. Birds of Venezuela. 2nd Ed. Princeton Univ. Press, Princeton, New Jersey.

Jones, H. L., y O. Komar. 2013. Central America. North American Birds 66 (4): 739–742.

Lewis, T.J. & F.G. Stiles. 1980. Locational checklist of the birds of Costa Rica. Costa Rica Expeditions. San José, Costa Rica.

Mader, W. J. 1982. Ecology and breeding habits of the Savanna Hawk in the Llanos of Venezuela. Condor 84: 261–271.

Márquez, C., M. Bechard, F. Gast & V. H. Vanegas. 2005. Aves rapaces diurnas de Colombia. Instituto de Investigación de Recursos Biológicos "Alexander von Humboldt". Bogotá, D.C. - Colombia.

McCrary, J. & D. P. Young. 2008. New and noteworthy observations of raptors in southward migration in Nicaragua. Ornitología Neoptropical 19: 573–580. 2008

Monge, J. 2008. Estado del conocimiento sobre la rata de campo (*Sigmodon hirsutus*) en Costa Rica. Manejo Integrado de Plagas y Agroecología79–80: 1-6.

Navarro R., G. Marín & J. Muñoz. 2007. Notas sobre la ecología reproductiva de tres Accipítridos en Venezuela. Ornitología Neotropical 18: 453–457.

Obando-Calderón, G., J. Chaves-Campos, R. Garrigues, G. Monge, M. Montoya, O. Ramírez, L. Sandoval & J. Villarreal-Orias. 2008. Lista Oficial de las Aves de Costa Rica. Actualización 2008. Zeledonia 12 (2): 27–35.

Sandoval, L., C. Sánchez, E. Biamonte, J.R. Zook, J.E. Sánchez, D. Martínez, D. Loth & J. O'Donahoe. 2010. Recent records of new and rare bird species in Costa Rica. Bull. B.O.C. 130(4): 237–245.

Slud, P. 1964. The Birds of Costa Rica. Distri-

bution and ecology. Bull. Amer. Mus. Nat. Hist., 128.

Stiles G. & A. Skutch. 1989. Guide to the birds of Costa Rica. Cornell University Press, New York.

Thiollay, J. M. 1994. Family Accipitridae (hawks and eagles). Pp. 52–205 in del Hoyo, J., Elliott, A. & Sargatal, J. (eds.) Handbook of the Birds of the World. Vol. 2. New World Vultures to Guineafowl, Lynx editions, Barcelona.

van Dort, J., O. Komar, R. C. Juárez-Jovel & M. Espinal. 2010. First records of Pearl Kite *Gampsonyx swainsonii* for El Salvador and Honduras. Cotinga 32: 129–130.

* * *

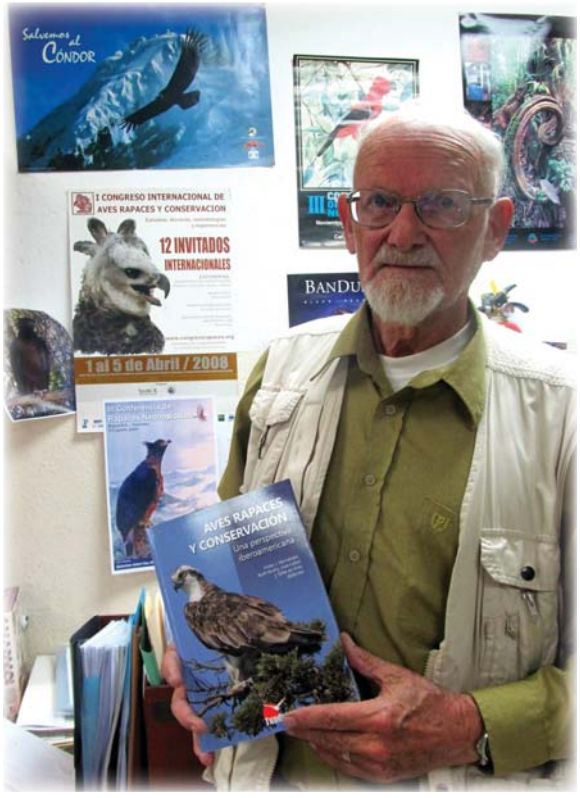
Conversations from the Field

By **Héctor Cadena**

Héctor Cadena graduated with a degree in Biology and his passion is birds. He has participated in numerous field expeditions studying bird diversity in Ecuador. He is just getting started in the world of scientific publishing; his first efforts were related to the ecology of birds, and birds of prey in particular. He recently conducted an interview with one of his mentors, Dr. Tjitte de Vries. Tjitte is Dutch but lives with his family in Ecuador, has extensive experience in the study of bird ecology, and has a particular affinity for raptors. He has worked with the Galapagos Hawk, a species endemic to the Galapagos Islands, since 1965.

Héctor Cadena *When and how did your interest in raptors begin?*

Tjitte de Vries: My interest in studying raptors started during my Master's program, when I chose to study two species of the genus *Circus* on Terschelling Island in the north of Holland. These raptors have a very interesting ecology, having adapted to the different habitats in the island's dunes, which allows for ecological differentiation. Later, my interest was stoked when I went to the Galapagos Islands in Ecuador. I had the option of studying seabirds or birds of prey; but the former were being studied by another ornithologist, Mike Harris, and at the time, very little was known about the only diurnal raptor on the Islands, the Galapagos Hawk (*Buteo galapagoensis*). So, I opted for the second option. At the time, we only knew that the species exhibited tame behavior and that Charles Darwin had associated the Galapagos hawk with Caracaras (scavengers), because they had been observed feeding on sea lion placentas.



Tjitte holding his book "Aves Rapaces y Conservación. Una perspectiva Iberoamericana" and, in the background, a poster from the I International Conference on Raptors and Conservation. © Héctor Cadena

HC: *What has been your best experience working with raptors?*

TdV: Perhaps the most interesting aspect has been working with such a tame species as the Galapagos Hawk, and

Tjitte capturing a Galapagos Hawk to get data. © Paolo Piedrahita

observing their polyandrous behavior. However one should not misinterpret their tame behavior as meekness. These hawks are very territorial and protective of their nests, sometimes they are so persistent in their defensive behavior that they have hit my helmet, sometimes to the point of drawing blood from my head. Another memorable experience working on the islands, specifically in Santa Fe where there is an abundance of native rats, occurred while I was resting at night under a small awning canvas with my knees drawn up under the sheet. Suddenly an owl (*Asio flammeus*) landed on my knee. It could see the rats that prowled around my camp; suddenly it took off and within three meters pounced on a rat. It was very exciting for me to see this so close.

HC: *Which of your scientific publications, so far, have had the most significance?*

TdV: I obtained my doctoral thesis in Amsterdam, on the Galapagos Hawk. Later in collaboration with three universities (University of Missouri-Columbia, Arkansas State University, and Saint Louis Missouri University) I continued my research on this species and the results were reflected in various publications. An example of these publications is: Faaborg, J., P.G. Parker, L. De Lay, Tj. de Vries, J.C. Bednarz, S. María Paz, J. Naranjo, T.A. Waite. 1995. Confirmation of Cooperative polyandry in the Galapagos Hawk *(Buteo galapagoensis)*. Behav. Ecol. Sociobiol. 36: 83-90. In this text, we detailed

information on a behavioral peculiarity of the Galapagos Hawk - its polyandrous behavior - and the relationship of the males (in some cases up to eight of them) with the only female in a defined territory. Also relevant to this study was fact that nestlings of the same clutch may come from different males. This contrasts with *Buteo poecilochrous,* a species of the grassland plateau, where in spite of polyandrous behavior, the "extra" males only assist at the nest. Also important has been the study I and José Cabot conducted at the Doñana Biological Station, Spain, stressing that *Buteo poecilochrous* and *Buteo polyosoma* are two different species. In this study the differences between the two taxa are described, and illustrated in four color plates with 40 photographs (Cabot, J., de Vries, Tj. 2010. (Cabot, J., de Vries, Tj. 2010.Taxonomic and plumage relationship between red-backed buzzards *Buteo polyosoma* and *Buteo poecilochrous*. Pags. 163-179; in Aves rapaces y conservación. Una perspectiva iberoamericana. Victor J. Hernandez, Ruth Muñiz, José Cabot andTjitte de Vries (eds), Tundra Ediciones, Valencia, España).

HC*: Why did you choose to study on the Galapagos Islands?*

TdV: I think every student would like to have a professor like my professor, Karel Voous. He was the one who told me that UNESCO was looking for a biologist on the Galapagos Islands to help in the research on the conservation ecology of endangered species. He knew my experience and recommended that I apply for the position. That was how I ended up connected with the Galapagos Islands as an expert in ecology, supporting conservation projects in the Charles Darwin Research Station. This was how my relationship with the universities of continental Ecuador began.

HC: *How does the future look for the Galapagos Hawk?*

TdV: On the islands where this hawk currently lives, there aren't any major problems. These islands have been designated as national parks, and are protected by the State. However, on the islands inhabited by humans, such as San Cristobal, Floreana, Santa Cruz and Baltra, the hawk has become extinct because of human actions. The idea of reintroducing this species in these islands is not feasible because the hawk rarely flies from one island to another. The native environment on these islands would need to be restored and the problems affecting the hawk's prey, which are caused by invasive species, would need to be resolved. The black rat (*Rattus rattus*), for example, has caused the disappearance of endemic rats; and together with feral cats, has generated pressure on populations of lizards and of endemic pigeons on the islands.

HC: *Which raptors require the most attention in Ecuador?*

TdV: In my opinion, they all require attention. Together with my students, I have worked with a couple of species of the moors, of the Amazonias and one of the cloud forest. But in Ecuador there are 66 species of Accipitriformes, 18 Falconiformes and 28 Strigiformes, for most of which we know very little about their distribution patterns and have little or no information about their ecology. For example, as I mentioned before, this ignorance has caused *Buteo polyosoma* and *B. poecilochrous* to be considered (in some bird guides, for example, the guide book for Ecuador and Peru) as a single species; but these hawks have marked differentiation in morphology, in their plumage morphs (light and dark, with a process of change of plumage over six years to reach final plumage). It is therefore necessary to continue studies in different habitats, such as grassland moors, shrub grasslands and in the inter-Andean valley of the country.

HC: *What are the greatest threats to raptors in Ecuador?*

TdV: Mainly, they face the same threats as other groups of wildlife - habitat change, deforestation and hunting. Just as people fear snakes because of their fangs, people fear raptors because of their talons. So education is important from the very start to change people's perceptions about birds of prey, make them aware that raptors are not harmful and that they play a role in maintaining the ecological balance in the environment.

HC: *What can you say about the conservation of raptors in Ecuador?*

TdV: Most raptors are found in protected areas, but it is necessary to create conservation plans, meaning it is important to know about the ecological role that each raptor has in a given area. The

Left: *Buteo poecilochrous* perched on a *Puya hamata,* a characteristic plant of the páramos altoandinos © Héctor Cadena Right: Galapagos Hawk on Santiago Island, banded for this study. © Héctor Cadena

usual method is to study a species when it is already in danger of extinction, but it is better to have information on all species to prevent possible population declines. As an example, I am currently developing a study on *Leucopternis plumbeus,* a Near Threatened species, according to IUCN. This hawk may be present in coastal zones, atypical of its known distribution areas. The area where there have been sightings is very difficult to access. Therefore to develop specific research, such a thesis, one must have prior information and an understanding of the logistics of the study area.

HC: *Where should future efforts in research and conservation be directed?*

TdV: In my opinion we need to address the endemic species and those which are difficult to study because of their low presence in areas of difficult access. In many geographical areas, there are specific priorities, for example in the province of Esmeraldas, which is within the eco-region of Choco, there is high species endemism but there is also much deforestation. Studying Neotropical raptors is complicated because they are very diverse (such as genus *Micrastur* in the Amazon) and are found in low numbers, so it is difficult to observe them. Reliable data and long-term studies are needed and I'm talking about at least 15 years, and this requires strong financial and institutional support.

HC: *One of the most recent books you edited was "Birds of Prey and Conservation. A Latin American perspective. Why the Iberoamerican nuance?*

TdV: The background for this publication was the First International Conference on Birds of Prey and Conservation, held in Quito, Ecuador in 2008. Scientists and conservationists from Spain, the United States and Latin America shared their research and experiences in working with birds of prey. There, it became clear that there is still a big difference in scientific knowledge between countries, emphasizing the need to exchange information with other countries to continue contributing to scientific development, conservation and management of birds of prey. For example, Europe and the United States are strong benchmarks for science. Spain has made many advances in the study of birds of prey and is very knowledgeable about techniques for working in the field. Chile and Argentina, on a regional level, are the countries with the most advancement in the knowledge and dissemination about this group of birds.

* * *

Of Interest...

Resources

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Please include as much of the citation as you can so that they can get back to you as soon as possible.

Conferences

IV NRN Conference

The Peregrine Fund and the NRN, together with the Fundación Rapaces de Costa Rica are n the process of organizing the IV NRN Conference. It will be held in La Fortuna, Costa Rica between **10 and 13 October 2016.** Very soon, we will have more information available on the NRN website regarding registration, and other pertinent information.

XNOC- XXIICBO Conference
http://noc-cbo2015.com.br

X Neotropical Ornithological Congress & XXII Congresso Brasileiro de Ornitologia: 19-24 July 2015. Ornithology and Society: Bridging the GAp between Science and Citizens. For the first itme, For the first time, the Neotropical and Brazilian Ornithological Societies join forces to carry out this conference. There will be workshops on "sound recording and analysis" and ¨bird banding, molt and plumage analysis." The conference will be held at the Tropical Manaus Ecoresort in Mauaus, Brazil.