Spizaetus

Neotropical Raptor Network Newsletter

Issue 31

June 2021

Geranospiza caerulescens in El Salvador

Falco sparverius in El Salvador

Harpia harpyja in Brazil

Harpagus bidentatus in Venezuela

Spizaetus ornatus in Argentina

Geranoaetus polyosoma in Argentina

Spizaetus
NRN Newsletter

Issue 31 © June 2021
English Edition, ISSN 2157-8958

Cover Photo
Crane Hawk (*Geranospiza caerulescens)* photographed in Panama
© Yeray Seminario, Whitehawk Birding & Conservation

Editors/Translators
Daniel Young and Marta Curti

Graphic Design
Marta Curti

Spizaetus: Neotropical Raptor Network Newsletter © June 2021

www.neotropicalraptors.org

This newsletter may be reproduced, downloaded, and distributed for non-profit, non-commercial purposes. To republish any articles contained herein, please contact the corresponding authors directly

THE PEREGRINE FUND

@neotropicalraptors.org

neotropicalraptor

Red de Rapaces Neotropicales

Table of Contents

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.

Rescue and care of two Crane Hawk (*Geranospiza caerulescens*) nestlings en El Salvador

By **Luis Pineda**[1], **Mónica Pacas-Mejía**[2] and **Raúl Molina-Fuentes**[2]

[1]Dirección General de Ecosistemas y Biodiversidad, Ministerio de Medio Ambiente y Recursos Naturales (MARN). San Salvador, El Salvador
[2]Escuela de Biología, Universidad de El Salvador (UES) San Salvador, El Salvador
email: lpineda@marn.gob.sv, mpacas96@gmail.com, raul.emolina@hotmail.com

The Crane Hawk (*Geranospiza caerulescens*) is a species of bird in the Accipitridae family, characterized by its hoooked beak and sharp talons (Ridgely and Gwynne 2005). It measures between 43-51 cm tall and has a wingspan of 98 cm. It has a small head and a thin appearance, long reddish-orange legs, red irises, and long, rounded wings. It has slate black feathers, with white barring on the lower part of the belly, thighs and subcaudales. Its tail is long and black with two wide white stripes (Fagan and Komar 2016, Vallely and Dyer 2018).

The Crane Hawk forages in the woods, clumsily hopping from branch to branch. It can hang upside down in search of rodents, bats, small birds, frogs, lizards, snakes, and large insects hidden in epiphytes and crevices. Occasionally it goes down to the ground. It also flies low over open boggy areas in a harrier-like manner. Occasionally it soars, somewhat resembling a *Buteo* hawk (Sutter et al. 2001, Ridgely and Gwynne 2005, Vallely and Dyer 2018). It is distributed from Mexico to northern Argentina and Uruguay (Ridgely and Gwynne 2005). In general, its habitat ranges from the upper understory to the canopy and edges of semi-humid to humid second-growth broadleaf forests, swamps, mangroves, and marshes. It is more common in dense gallery forests in arid or semi-humid regions (Friedmann et al 1950, Vallely and Dyer 2018).

The first records of *G. caerulescens* in El Salvador date from the 1930s, when Dickey and van Rossem (1932) reported it as a fairly common resident in the coastal plains of the country, and less common in the surroundings of the Lempa River, reaching as far as Colima. Komar et al. (2007) proposed a national distribution where they consider it as a Critically Endangered, resident, forest generalist. Pérez León (2007), in his study on diurnal raptors and the effect of fragmentation and

Figure 1. **Crane Hawk (*Geranospiza caerulescens*) nestlings found in the vicinity of San Diego Beach, La Libertad Department, El Salvador. Photos © Samuel Pérez**

other environmental factors on biological diversity, describes *G. caerulescens* as a resident, wetland specialist. Currently in El Salvador, this species mainly frequents coastal marine ecosystems, wetlands, mangroves, and areas near rivers (Fagan and Komar 2016). Important sites where the species has been recorded are Bahía de La Unión, department of the same name, Bahía de Jiquilisco, Usulután Department, Laguna El Jocotal, San Miguel Department, Cerrón Grande reservoir, Chalatenango Department, San Salvador, Cuscatlán and Cabañas, and in the Normandía Natural Protected Areas (NPA), Usulután Department, San Diego and San Felipe Las Barras, Santa Ana Department, and in Santa Rita-Barra de Santiago, Ahuachapán Department. Morazán is the only department that does not have records for this species in eBird. Although Funes and Bolaños (2014), in their research on the avifauna of Normandía NPA, mention that *G. caerulescens* nests at this site, no detailed information exists.

On 25 May 2020, in the vicinity of San Diego Beach, La Libertad Department, at 13° 28'22.53 "N; 89° 16'3.76" W, a nest with two Crane Hawk nestlings was found. The nest, built in a coconut tree (*Cocos nucifera*), had been accidentally knocked down when trees in the area were being pruned.

The nestlings were rescued by local community members. Local authorities then transfered them to the veterinary medical clinic of the Ministry of Environment and Natural Resources (MARN) located in the department of San Salvador for veterinary and ethological medical evaluation, and rehabilitation. A medical check-up revealed that both nestlings were in good condition.

Between 25 May and 18 June, the growth and development of the nestlings was observed. Initially, they had been covered in white down with some black feathers emerging on the wings and part of the neck, their legs were yellowish / orange and their eyes were yellow (Figure 1). Over the month, their black feathers emerged nearly completely, which covered their entire bodies, except for their faces, which were ash white. The eyes were still yellow and their legs began to turn more orange (Figure 2).

During their rehabilitation, they were initially hand-fed (with pincers) pieces of chicken. Two weeks later, they were provided chopped chicken meat to eat on their own. Subsequently, they were provided a more varied diet that included day-old

Figure 2. **Immature Crane Hawks undergoing rehabilitation - clear changes in their plumage over time are visible. Photos © Dennys Valdez.**

***Figure 3*. Current status (October 31, 2020) Crane Hawks (*Geranospiza caerulescens*) in the process of rehabilitation, immature plumage. Photo © Wilber Ruíz.**

chicks and mice cut into pieces. After 45 days, the birds were provided whole day-old chicks and mice, which were opened slightly to provide the birds with easy access to exposed muscles, intestines, and the internal cavity. Finally, 15 days later, live chicks and mice were placed in the kennel (carrier cage).

On 19 June 2020, the juvenile hawks were transferred to the La Cañada Quarantine Center in La Unión Department. Here, they would begin their conditioning stage prior to their release. To build their flight skills, they were flown in an open area, uising falconry techniques.

On 31 October, according to J. Coto and K. Rubio (pers. comm.) both hawks were healthy. At the time of the writing of this publication, the two hawks remain under periodic veterinary medical controls and ethological observation, to determine when they should be released according to the indications of the veterinary medical staff and the biologist in charge (Figure 3).

These findings and observations reveal the importance of wildlife rehabilitation centers. In addition, they can be useful to generate interest in this species and motivate detailed research on it in El Salvador.

Acknowledgments

We thank Miguel Gallardo and Marcela Angulo from MARN, for the institutional support. To Kattia Gómez, Dennys Valdez, Veterinary Doc-

tors, who carried out the medical examination and assistance; to Kevin Rubio and Wilber Ruíz, veterinary assistants of La Cañada, to Samuel Pérez, for having delivered the hawks and to Ricardo Ibarra Portillo for motivating us to write the manuscript. We dedicate this publication in memory of our colleague, supervisor, and friend, Javier Arturo Magaña Rivas, Manager of Protected Natural Areas and Biological Corridor, who always supported our research R.I.P.

References

Dickey, D. and A.J. van Rossem, A.1932. The Birds of El Salvador. Field Museum of Natural History: Zoological series. Chicago

eBird. 2020. *Geranospiza caerulescens*. https://ebird.org/map/crahaw?neg=true&env.minX=&env.minY=&env.maxX=&env.maxY=&zh=false&gp=false&ev=Z&mr=1-12&bmo=1&&emo=12&yr=all&byr=1900&eyr=2020

Fagan, J. and O. Komar. 2016. Peterson field guide to birds of northern Central America. Peterson Field Guides. New York.

Friedmann, H., L., Griscom and R.T. Moore. 1950. Distributional Check-List of the Birds of Mexico. Part I. Pacific Coast Avifauna. 22 (2).

Funes, C.R.L., and O.A. Bolaños. 2014. Diversidad avifaunística en el Área Natural Protegida Normandía y los agropaisajes colindantes, departamento de Usulután, El Salvador.

Komar, O., N. Herrera, L. Girón and R. Ibarra-Portillo. 2007. The 2007 list of birds of El Salvador, with an assessment of national conservation status. Avian Conservation and Ecology. En prensa.

Pérez-León, R. 2007. Composición y Estructura de Comunidades de aves rapaces diurnas y sus Implicaciones para Sistemas Agropecuarios en paisajes fragmentados de la costa de El Salvador. Centro Agronómico Tropical de Investigación y Enseñanza (CATIE). Cartago, Costa Rica.

Ridgely, R.S. and J. A. Gwynne. 2005. Guía de las aves de Panamá Incluyendo Costa Rica, Nicaragua Y Honduras. Editorial de la Universidad de Princeton.

Sutter, J., W. E. Martínez A, F. Oliva T, N. Oswaldo J's, and D. Whitacre. 2001. Diet and Hunting Behavior of the Crane Hawk in Tikal National Park, Guatemala, The Condor , Volume 103, Issue 1, 1 de febrero de 2001 , P 70–77, https://doi.org/10.1093/condor/103.1.70

Vallely, A.C. and D. Dyer. 2018. Birds of Central America Belize, Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, and Panamá. Princeton University Press. New Jersey.

* * *

Nesting and Distribution of American Kestrel (*Falco sparverius)* [Linnaeus, 1758] in El Salvador

By **Luis Pineda**[1], **Danilo Orellana**[2], **Julio Pereira**[1], **Hermes Ramos**[1] and **Christian Aguirre-Alas**[2]

[1]Dirección General de Ecosistemas y Biodiversidad, de Medio Ambiente y Recursos Naturales, El Salvador
email: lpineda@marn.gob.sv

[2]Escuela de Biología, Universidad de El Salvador
email: danilog.orelm@gmail.com

The American Kestrel (*Falco sparverius* [Linnaeus, 1758]) is a bird of prey that belongs to the Falconidae family. Its general appearance is that of a small and slender falcon whose length ranges from 25 to 28 cm, with a long tail and wings. The adult male has a reddish-brown tail with a broad, black tip. Its body has reddish parts that contrast with its grayish-blue wings. Females have reddish wings with strong black bars. Their body is reddish brown, with many black stripes. The tail is pale reddish with thin dark brown bars. When perched, white cheeks and two vertical black bars are observed on each side of the face in both sexes. The legs are yellow. Immatures are almost identical to adults (Rand and Traylor 1954, West 1988, Stokes 1996, Sibley 2000, Stiles and Skutch 2003, Fagan and Komar 2016).

When hunting, *Falco sparverius,* perches on wires, electric poles or on the tips of isolated trees in order to search for its prey. It flies lightly and delicately before pouncing on its prey at high speed. Its most common prey include insects, although it can hunt mice, lizards, and other small birds (Rand and Traylor 1954, Stokes 1996, Stiles and Skutch 2003, Fagan and Komar 2016).

F. sparverius breeds in western Alaska and northern Canada, south through Central America and the Antilles, and in South America from Colombia to Tierra del Fuego (Stiles and Skutch 2003). It inhabits mainly open areas, including urban zones (Stokes 1996, Stiles and Skutch 2003). It nests in natural cavities such as holes in trees, in nest boxes or on the edges of cliffs (Stokes 1996), as well as in cavities excavated by other birds (Hamerstrom et al 1973). It doesn not use nesting materials. It lays three to seven eggs that are pinkish with dark spots. The incubation time is between 29 to 31 days. The time from when the

nestlings hatch to when they leave the nest is between 29 to 31 days (Stokes 1996).

In El Salvador, the American Kestrel is considered a resident and migratory species (Ibarra 2013, MARN 2018). It is distributed below 3,000 m.a.s.l. (Rand and Traylor 1954, Fagan and Komar 2016), and is an open space generalist, inhabiting semi-open fields with scattered trees and shrubs, upland valleys, and gentle slopes that have been deforested. It is sometimes found in occasional patches of tropical deciduous forest (Dickey and van Rossem 1938, Rand and Traylor 1954, Thurber et al 1987, Komar 1998, Rojas-Soto et al 2009, Andino and Galán 2011, Fagan and Komar 2016, MARN 2018, Herrera and Domínguez 2020). This species is classified globally as Least Concern, according to the IUCN Red List (BirdLife International 2020). For El Salvador, it is not on the official list of Threatened or Endangered wildlife species (MARN 2015).

Methods

Literature Review

An exhaustive review of 22 scientific publications, 62 gray literature (theses, consultancy reports, management plans, among others) (Table 1) and the eBird platform were carried out to enrich the present study (Table 2). With the information from those records, we prepared a distribution map of *F. sparverius* for El Salvador (Figure 1).

Figure 1. **Distribution records and nesting sites of *Falco sparverius* in El Salvador**

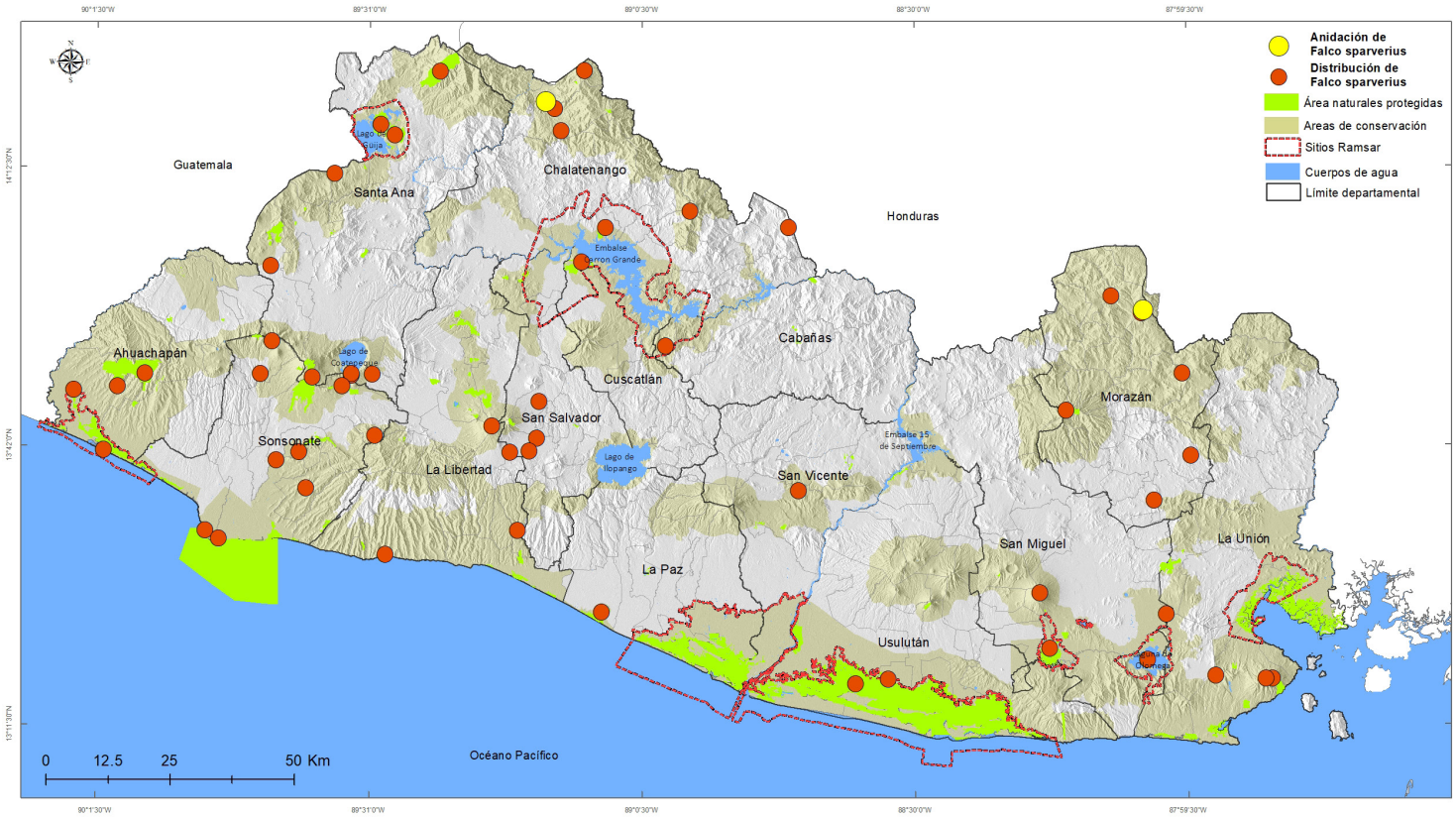

Figure 2. **Female *Falco sparverius* guarding the nest in a Yellow Pine (*Pinus oocarpa)* tree, in the La Ermita Natural Protected Area. Photo © Julio Pereira**

Nesting site locations

La Ermita Natural Protected Area

The La Ermita Natural Protected Area is 169.87 hectares. It is located in the northern part of the Morazán Department, in the mountainous area of the municipalities of Arámbala and Joateca, in the upper Sapo River Basin, which in turn forms the Torola River Basin.

It is a mosaic of intervened vegetation, mainly pine-oak forest, with signs of a marked overexploitation of the forest, due to the incidence of fires, selective logging and damage by invasive plague species (Pineda et al 2016).

Here, we made daily observations of 10 minutes each, for a period of 20 continuous days. During these observations, we made notes on behavior and created a photographic record, using a Canon 16.1 Megapixel Full HD camera. We took geographic coordinates with a Garmin X30 GPS (Global Positioning System).

San Ignacio

San Ignacio is a municipality in the Chalatenango Department. It covers an area of 69.15 km^2 and is located at 1,010 m.a.s.l. The Sumpúl, Los Pozos, San Ignacio, Nunuapa, Jupula, Chiquito, El Valle, and El Rosario Rivers irrigate the municipality.

Figure 3. Lt. **Adult male and female American Kestrels feeding on orthoptera, in the La Ermita Protected Natural Area, municipalities of Arambala and Joateca, Morazán Department. Photo © Julio Pereira.**

Figure 4. Rt. **Two male (adult above and juvenile below) American Kestrels, perched above an adult female, in a dry *Pinus oocarpa* snag, in the La Ermita Natural Protected Area, municipalities of Arámbala and Joateca, Morazán Department. Photo © Julio Pereira**

Its main tourist attractions are El Peñón de Cayaguanca, Cerro El Pital located at 2,730 m.a.s.l., and Cantón Las Pilas where there are crops of a great variety of fruits and vegetables. It has pine-oak and oak forests, with alterations in the environment due to agricultural practices and burning of the soil (Moreno et al 1995).

At this site, we collecte data during a single observation period of 30 minutes. We used a Canon 16.1 Megapixel Full HD camera to create photographic records and geographic coordinates were taken with a Garmin X30 GPS (Global Positioning System).

Results and Discussion

On 7 March 2019, a breeding pair of American Kestrels was documented in a dry pine forest within the La Ermita Natural Protected Area, municipality of Joateca, Morazán Department (13° 56'52.3 "N; 88° 04 ' 20.1 "W, at 1,071 m.a.s.l). A female was observed several times entering a nest cavity with food - mainly orthoptera (grasshoppers and crickets). The cavity was 15 m high in a

dry Yellow Pine (*Pinus oocarpa)* tree [Schiede ex. Schltdl]. The cavity had been made by an Acorn Woodpecker (*Melanerpes formicivorus*) in previous years according to notes taken by the park rangers during their routine patrols.

During our observations, we heard the nestling calling from inside the nest cavity. The female remained guarding the nest, sticking her head out of the hole (Figure 2). At one point, both adults were also observed feeding near the nest (Figure 3). On another occasion, all three individuals (Figure 4) - the adult pair and a fledgling - were observed. The fledgling was distinguished by its streakless chest and the evident down still present on parts of its body.

On 16 March 2019, in San Ignacio, three American Kestrels were observed. The adult female and a juvenile were perched in a Kapok tree (*Ceiba pentandra)* at a height of approximately 25 m. On the same branch was a nest, made of dry twigs, built on a *Tillandsia* sp. (Family Bromeliaceae). The male was perched on the perimeter of the nest, keeping watch. The female approached to feed the juvenile a rodent (Family Cricetidae) (Figure 5). After feeding, the juvenile and the female moved to another tree 500 m away to join the male. They were not subsequently observed at the site again. Due to the fact that we observed these individuals only once, we cannot conclude if the mentioned nest was used by the pair for nesting or not. Although *F. sparverius* tends to nest within cavities and crevices (Hamerstrom et al 1973, Stokes 1996) there are occasional reports of the species using twig nests built and subsequently abandoned by other bird species (GRIN 2021).

This nest was located at 14° 19'47.2 "N; 89° 11'14.7" W, at 960 m.a.s.l. in an open ecosystem (paddock) 900 m away from the "Hotel Entre Pinos", municipality of San Ignacio, department of Chalatenango. It is worth mentioning that one of the adults (female due to its plumage coloration) had a mark on her right leg, similar to an atypical band, more similar to something homemade (Figures 6 and 7). Possibly it is a bird that had been in captivity and has escaped or been released (M. Curti pers. comm. 2020).

Neither of the two nests in this study matches the documented clutch size for the species, which ranges from two to five chicks (Richards 1970, Hamerstrom 1973, Pacheco 1987, Balgooyen 1989, Stokes 1996, Liébana et al 2009, Salazar et al 2012). This difference may be due to the availability and quality of food, as stated by Balgooyen (1989). However, it is possible that the rest of the chicks had been predated upon prior to our discovery of the nests, as noted by Salazar et al. (2012) who documented a nest with four chicks, that eventually failed as evidenced by an empty nest and remains of the nestlings on the ground.

Conclusion

These observations constitute the first published documentation of *F. sparverius* nesting in El Salvador. The species has been documented in El Salvador since 1938 by Dickey and van Rossem, it occurs throughout the country, and is common in urban areas. However, in spite of this, the American Kestrel has been little studied in El Salvador.

In general, nesting sites for *F. sparverius* are not difficult to access (Stokes 1996). However, due to the fact that they tend to nest in cavities excavated by other bird species (Richards 1970, Balgooyen 1989, Stokes 1996) the nests may be confused as belonging to other species, such as those of the Corvidae family (Richards 1970) or from the Picidae family (Stokes 1996, Richards 1970).

Documentation of these nests are important for the conservation of this species in El Salvador. These obervations help increase knowledge related to the reproduction and nesting of *F. sparverius*, nest sites, the tree species used for nesting, and nesting success, among others. This information can serve as a basis for future research and conservation studies of the species.

Figure 5. Lt. **Juvenile *F. sparverius* feeding on a rodent (Cricetidae); in a *Tillandsia* sp. where the nest was located, within a paddock, in San Ignacio, Chalatenango Department. Photo © Christian Aguirre**

Figure 6. Rt. **Adult female *F. sparverius*, with a mark on her right leg, seemingly an atypical band, perched in a *Ceiba pentandra*. San Ignacio, Chalatenango Department. Photo © Christian Aguirre**

Acknowledgments

We are grateful for the valuable support of Miguel Gallardo, General Director of Ecosystems and Biodiversity (MARN); Javier Magaña, Manager of Protected Natural Areas and Biological Corridor; Alcides Sorto for coordinating the retrieval of information and photographs, Frank Cardoza for the botanical identification, Melissa Rodríguez for identifying the rodent, Yesenia Peñate for preparing the map, Marta Curti for her analysis regarding the brand that presented one of the adult specimens, to Dominic Pineda for his support and inspiration.

***Figure 7*. A pair of adult American Kestrels guarding nest and nestling on a branch of *Ceiba pentandra*. San Ignacio, Chalatenango. Photo © Christian Aguirre**

Table 1. **Distribution of *F. sparverius* in El Salvador according to scientific publications and gray literature.**

Departament	Location	Number	Coordinates	Source
Ahuachapán	Parque Nacional El Imposible	4	N 13°49'59.57'' O 89°56'04.80''	West 1988, Komar y Herrera 1995, Pérez 2002
	Área Natural Protegida Santa Rita	-	N 13°48'09.7'' O 90°04'02.0''	Ramos 2009
	Rio Cara Sucia	-	N 13°48'35.7'' O 89°59'08.3''	Pineda y Rodríguez 2008
	Barra de Santiago	-	N 13°41'37.0'' O 90°00'40.5''	Herrera 1998
	Parque Nacional El Imposible	4	N 13°49'59.57'' O 89°56'04.80''	West 1988, Komar y Herrera 1995, Pérez 2002
	Área Natural Protegida Santa Rita	-	N 13°48'09.7'' O 90°04'02.0''	Ramos 2009
Cabañas	Área Natural Montaña de Cinquera	4	N 13°53'03.7'' O 88°57'49.2''	Herrera et al 2004, Pineda y Aguirre 2019
	Municipio de San Isidro	-	N 13°50'00.7'' O 88°43'11.5''	Flores et al 2006
Chalatenango	Área Natural La Montañona	5	N 14°7'45.38'' O 88°55'3.78''	Andino et al 2005, Pineda et al 2016
	Municipio La Palma	2	N 14°19'01.3'' O 89°10'14.5''	Dickey y van Rossem 1938
	Cerro La Cañada	2	N 14°05'59.6'' O 88°43'60.0''	Ibarra et al 2008
	San José Sacare	-	N 14°16'33.13'' O 89°09'32.33''	Dickey y van Rossem 1938
	Los Esesmiles	3	N 14°23'7.60'' O 89° 6'54.18''	Dickey y van Rossem 1938
	Área Natural Santa Bárbara	-	N 14°06'01.2'' O 89°04'31.5''	Herrera 1999
Cuscatlán	Área Natural Protegida Colima	-	N 14°02'14.4'' O 89°07'13.7	Herrera et al 2006
La Libertad	Área Natural San Juan Buenavista	-	N 13°32'52.8'' O 89°14'21.5''	Rivera y Herrera 1998
	Área Natural Protegida Complejo Taquillo	1	N 13°30'16.3'' O 89°29'10.5''	Pineda y Rodríguez 2007
La Paz	Bosque Santa Clara	-	N 13°23'58.0'' O 89°04'59.1''	Ibarra 2008
La Unión	Área Natural Protegida Complejo Conchagua	-	N 13°16'34.8'' O 87°50'01.8''	Espinal 2001
	Volcán de Conchagua	1	N 13°16'34.00'' O 87°50'46.00''	Dickey y van Rossem 1938
	Sistema Lagunar Los Negritos	2	N 13°16'56.9'' O 87°56'20.0''	Domínguez 2003

Table 1. Con't. **Distribution of *F. sparverius* in El Salvador according to scientific publications and gray literature.**

Departament	Location	Number	Coordinates	Source
Morazán	Área Natural Protegida La Ermita	10	N 13°56'36.24'' O 88°4'30.36''	Pineda et al 2016
	Área Natural Protegida San Carlos - Cacahuatique	4	N 13°45'57.98" O 88°12'57.76"	Herrera y Rivera 2000, Bolaños y Pérez 2007, Pineda et al 2017
	Monte Mayor	1	N 13°40'60'' O 87°58'59.999''	Dickey y van Rossem 1938
	Sabanetas	-	N 13°58'26.16 O 88°7'53.62	Thurber et al 1987
	Área Natural Río Sapo	2	N 13°56'50.679'' O 88°06'25.87''	Ibarra et al 2005, Pineda et al 2016, Herrera y Domínguez 2020
	Área de Conservación Nahuaterique	1	N 13°49'59.6'' O 87°59'59.6''	MARN 2010
	Municipio El Divisadero	5	N 13°36'04.35'' O 88°03'07.92	Dickey y van Rossem 1938
San Miguel	Volcán Chaparrastique	2	N 13°26'00.00'' O 88°16'00.00''	Dickey y van Rossem 1938
	Laguna de Olomega	-	N 13°18'39.2'' O 88°03'56.2''	Herrera et al 2003
	Área Natural Protegida San Antonio Silva-Tierra Blanca	-	N 13°23'38.0'' O 88°01'49.0''	MARN 2017
	Área Natural del Complejo del Jocotal	-	N 13°19'57.02'' O 88°14'54.79'''	MARN 2004, MARN 2016
San Salvador	Área Natural Protegida El Espino - Bosque Los Pericos	1	N 13°41'24.40'' O 89°15'13.88''	Andino y Galán 2011
	Ciudad Valle El Ángel	3	N 13°46'57.4" O 89°11'56.6"	Ibarra 2018
	Universidad de El Salvador	-	N 13°42'57.97'' O 89°12'12.49''	Pablo-Cea et al 2018
	San Salvador	3	N 13°41'34.59 O 89°13'05.49''	Dickey y van Rossem 1938
	Complejo Volcán de San Salvador	-	N 13°44'16.8 O 89°17'15.0''	AAVSS 2008
San Vicente	Área Natural Protegida La Joya	1	N 13°37'12.8'' O 88°42'55.5''	Hernández y Carranza 2004
Santa Ana	Área Natural San Diego La Barra	1	N 14°16'05.08'' O 89°28'10.17''	Komar y Herrera 1995, Herrera et al 2001, MAG 2003, Pineda et al 2006, Herrera et al 2008, Molina 2013
	Lajas Parte Alta	1	N 13°49'48.0'' O 89°33'00.0''	Vega 2011

Table 1. Con't. **Distribution of *F. sparverius* in El Salvador according to scientific publications and gray literature.**

Departament	Location	Number	Coordinates	Source
Santa Ana (con't)	Lajas Parte Baja	1	N 13°50'01.0'' O 89°33'54.8''	Vega 2011
	Bosque La Presa	1	N 13°49'58.6'' O 89°30'40.3''	Vega 2011
	Municipio San Antonio Pajonal	1	N 14°11'52.3'' O 89°34'51.5''	Aguilar et al 2016
	Complejo Lago de Güija	-	N 14°17'13.7'' O 89°29'41.7''	Herrera 2005
	Parque Nacional Montecristo	5	N 14°23'3.05'' O 89°23'3.58''	Komar 2002, MAG 2003
	Área Natural Protegida La Magdalena	14	N 14°01'47'' O 89°42'02''	Dueñas y Rodríguez 2001, García et al 2010, MARN 2011, MARN 2014
Sonsonate	Complejo San Marcelino	-	N 13°48'38.6'' O 89°34'03.8''	Komar y Herrera 1995, Rivera 2000, Pineda et al 2013
	Área Natural Protegida El Balsamar	1	N 13°37'27.9'' O 89°38'04.5''	Franco y Galán 2010, Madrid et al 2010
	Área Natural Los Volcanes	-	N 13°49'38.0'' O 89°37'24.0''	MARN 2004
	Área Natural Protegida Plan de Amayo	3	N 13°41'27.2'' O 89°38'50.7''	Herrera y Andrade 2003, Funes 2008
	Área Natural Protegida Complejo Los Farallones	1	N 13°40'34.0'' O 89°41'23.6''	Ramos 2012
	Área Natural Protegida Santa Águeda-El Zope	-	N 13°32'51.6'' O 89°49'20.5''	Ibarra 2005
	Área Natural Protegida Cerro El Águila	1	N 13°53'34.5'' O 89°41'52.1''	AAP-FIAES 2013
	Área Protegida Municipal San Eugenio La Concordia	2	N 13°43'14.04'' O 89°30'23.83''	Ramos 2018
	Área Natural protegida Complejo Los Cóbanos	3	N 13°31'59.9'' O 89°47'48.1''	Funes y Komar 2008
Usulután	Municipio Puerto El Triunfo	1	N 13°16'36.02'' O 88°32'57.41''	Dickey y van Rossem 1938
	Bahía de Jiquilisco	-	N 13°16'05.8'' O 88°36'34.6''	MARN 2004, Molina et al 2010, García 2012

Table 2. **Observations of *F. sparverius* in El Salvador in eBird up to 2020.**

Location	Number	Date	Coordinates	Source
Laguna El Jocotal, San Miguel	1	09/12/2017	N 13°56'17.2", O 88°04'24.6"	Amaya 2017 Lista de eBird: S62805245
Bailadero del Diablo, Morazán	1	04/08/2020	N 13°57'20.2" O 88°08'25.1"	La Gabio 2020 Lista de eBird: S72119379
Laguna de Alegría, Usulután	1	28/12/2019	N 13°29'34.1" O 88°29'29.0"	Flores 2019 Lista de eBird: S62713938
ANP La Ermita, Morazán	2	22/12/2019	N 13°56'17.2" O 88°04'24.6"	Funes 2019 Lista de eBird: S62574440
Calle a Los Amates, Chalatenango	1	20/12/2019	N 14°02'30.1" O 88°49'59.2"	Serrano 2019 Lista de eBird: S62471740
El Sitio Zapotal, Cuscatlán	1	14/12/2019	N 13°56'21.8" O 89°04'40.1"	Miranda 2019 Lista de eBird: S62329279
ANP Complejo El Playón, La Libertad	1	26/12/2017	N 13°47'43.4" O 89°19'15.2"	Calderón 2017 Lista de eBird: S41322280
Carretera a San Isidro, Sonsonate	1	01/12/2019	N 13°46'40.8" O 89°33'09.4"	Acosta 2019 Lista de eBird: S61912357
Carretera 2E, La Paz	1	08/11/2019	N 13°29'03.8" O 88°59'06.0"	Trejo 2019 Lista de eBird: S61270289
El Sitio, Usulután	2	24/10/2019	N 13°18'10.1" O 88°32'52.4"	Herrera 2019 Lista de eBird: S60887226
Suchitoto, Chalatenango	1	09/10/2019	N 13°56'14.6" O 89°01'33.2"	Trejo 2019 Lista de eBird: S60479487
ANP La Ermita, Morazán	1	26/05/2019	N 13°56'17.2" O 88°04'24.6"	Herrera 2019 Lista de eBird: S56758291
San Francisco Echeverria, Cabañas	1	28/12/2017	N 13°52'49.8" O 88°56'25.8"	Miranda 2017 Lista de eBird: S41389806
Cerro Verde, Sonsonate	1	26/03/2017	N 13°49'13.8" O 89°37'52.3"	La Gabio 2017 Lista de eBird: S55982368

Table 2. Con't. **Observations of *F. sparverius* in El Salvador in eBird up to 2020.**

Location	Number	Date	Coordinates	Source
Rio Sapo, Morazán	1	08/01/2019	N 13°55'50.2" O 88°06'08.3"	Funes 2019 Lista de eBird: S51511821
Cerro Verde, Sonsonate	1	06/01/2019	N 13°47'00.6" O 89°33'15.8"	Trejo 2019 Lista de eBird: S51408733
Parque Nacional Los Volcanes-Sector San Blas, Santa Ana	1	19/12/2018	N 13°50'13.2" O 89°37'35.8"	Broz 2018 Lista de eBird: S50833621
La Pila, Morazán	1	29/07/2018	N 13°55'23.9" O 88°05'24.7"	Andino 2018 Lista de eBird: S47564598
Lotificación Minerva, Santa Ana	1	25/10/2018	N 13°57'51.8" O 89°34'04.4"	Calderón 2018 Lista de eBird: S49450411
Eco Parque Santa Cruz La Vega, La Paz	1	24/11/2017	N 13°37'21.4" O 89°03'24.1"	Funes 2017 Lista de eBird: S40705018
Llano del Muerto, Morazán	1	25/03/2018	N 13°58'54.8" O 88°08'08.5"	Trejo 2018 Lista de eBird: S43996310
Cerro El Pericón, Morazán	1	26/03/2018	N 13°56'12.1" O 88°07'52.3"	Aguilera 2018 Lista de eBird: S44279424
Laguna El Jocotal, San Miguel	1	09/12/2017	N 13°20'11.0" O 88°15'30.2"	Bonilla 2017 Lista de eBird: S42206777
Mirador Planes de Renderos, San Salvador		14/10/2019	N 13°38'39.8" O 89°11'03.1"	Amaya 2019 Lista de eBird: S60857819
Laguna El Jocotal, San Miguel	1	27/02/2019	N 13°19'59.9" O 88°14'56.0"	Herrera 2019 Lista de eBird: S53214871
Parque Nacional Los Volcanes-Sector San Blas, Santa Ana	1	01/02/2018	N 13°50'47.8" O 89°37'53.0"	Herrera 2018 Lista de eBird: S42425858

References

AAP-FIAES. 2013. Evaluación Ecológica Rápida de la flora y fauna vertebrada de la zona núcleo Área Natural Protegida Cerro El Águila en la Reserva de la Biosfera Apaneca-Ilamatepec, Sonsonate, El Salvador, Centro América, 150 pp.

Acosta, J. 2019. Lista de aves: S61912357. eBird, Ithaca. Disponible en: https://ebird.org/checklist/ S61912357

Aguilar, J.A., D.R. Delcid, E.S. Morán, A.M. Barrios, J.A. Ramos, D.E. Ramos. 2016. Estudio de línea base de flora y fauna vertebrada que habita en los distintos parches de vegetación de los municipios de Chalchuapa, Candelaria de La Frontera, Santiago de La Frontera, San Antonio Pajonal y Cantón Belén Güijat de Metapán. En el marco del proyecto: Establecimiento del Sub Corredor Biológico Bosque Seco Tropical Volcán Chingo como parte del Corredor Biológico Montecristo, El Salvador. ASAPROSAR/USFWS.

Aguilera, J. 2018. Lista de aves: S44279424. eBird, Ithaca. Disponible en: https://ebird.org/checklist/S44279424

Amaya, R. 2019. Lista de aves: S60857819. eBird, Ithaca. Disponible en: https://ebird.org/checklist/S60857819

Amaya, R. 2019. Lista de aves: S62805245 eBird, Ithaca. Disponible en: https://ebird.org/checklist/S62805245

Andino, L., A.V. Galán, N. Herrera, and O. Komar. 2005. Aves del Bosque La Montañona, Chalatenango, El Salvador. Prisma. San Salvador, El Salvador. 14 pp.

Andino, L., and A.V. Galán. 2011. Inventario de Aves Área Natural Protegida El Espino – Bosque Los Pericos - Parque del Bicentenario. SalvaNATURA. San Salvador. 27 pp.

Asociación Amigos del Volcán de San Salvador (AAVSS). 2008. Levantamiento de inventario de fauna vertebrada del Área Natural Protegida: Santa María, Las Mercedes y El Mirador, del Volcán de San Salvador. FIAES.

Balgooyen, T.G. 1989. Natural history of the American Kestrel in Venezuela. Journal of Raptor Research 23:85-93.

BirdLife International. 2020 Species factsheet: *Falco sparverius.* Downloaded from http://www.birdlife.org on 17/09/2020.

Bolaños, O., and R. Perez-Leon. 2007. Inventario previo de fauna del Área Natural Protegida Cacahuatique. Informe de consultoría, municipio de Chilanga, departamento de Morazán. ADESCOCA. 14 pp.

Bonilla, M. 2017. Lista de aves: S42206777. eBird, Ithaca. Disponible en: https://ebird.org/checklist/S42206777

Broz, R. 2018. Lista de aves: S50833621. eBird, Ithaca. Disponible en: https://ebird.org/checklist/S50833621

Calderón, E. 2017. Lista de aves: S41322280. eBird, Ithaca. Disponible en: https://ebird.org/checklist/ S41322280

Calderón, E. 2018. Lista de aves: S41322280. eBird, Ithaca. Disponible en: https://ebird.org/checklist/ S41322280

Dickey, D. and A. J. van Rossem. 1938. The Birds of El Salvador (Vol. 23). Chicago: Field Museum of Natural History.

Domínguez, J.P. 2003. Diagnóstico Básico de la Biodiversidad y Sugerencias Prácticas para su Conservación y Aprovechamiento Sistema Lagunar Los Negritos, Municipio de Conchagua, Departamento de La Unión. Fundación PROESA.

Dueñas, C., and Rodríguez, W. 2001. Estudio de la fauna vertebrada del Área Natural La Magdalena, Santa Ana, municipio de Chalchuapa. FUDEMCO. San Salvador.

Espinal, M. 2001. Evaluación Ecológica Rápida Área Natural Protegida Complejo Conchagua. CODECA-PROARCA-COSTAS. El Salvador. 57 pp.

Fagan, J. and O. Komar. 2016. Peterson field guide to birds of Northern Central America. Roger Tory Peterson Institute and the National Wildlife Federation. New York (NY). Houghton Mifflin Harcourt Publishing Company.

Flores, E., C. Miranda, A. Salazar, E. Caceros, J. Herrera, J. Ramos, E Fajardo, G. García. 2006. Estudio preliminar de la vegetación Arborea y fauna vertebrada del municipio San Isidro, departamento de Cabañas. Estudiantes de Biología de la Universidad de El Salvador, Facultad Multidisciplinaria Occidental. (UES-FMOcc).

Flores, J. 2019. Lista de aves: S62713938. eBird, Ithaca. Disponible en: https://ebird.org/checklist/S62713938

Franco, F., and P. Galán. 2010. Estudio de la Avifauna presente en el Área Natural Protegida El Balsamar, Cuisnahuat, Sonsonate. GAIA/CATIE-MAP. El Salvador.

Funes, C. 2008. Informe de Campo: Aves del Área Natural Protegida Plan de Amayo, Sonsonate. Proyecto USAID Mejor Manejo y Conservación de Cuencas Hidrográficas Críticas, Serie Inventarios de Biodiversidad Nº 11. San Salvador. 26 pp.

Funes, C., and O. Komar. 2008. Informe de Campo: Aves del Área Natural Protegida Complejo Los Cóbanos. Proyecto USAID Mejor Manejo y Conservación de Cuencas Hidrográficas Críticas, Serie Inventarios de Biodiversidad Nº 8. San Salvador. 24 pp.

Funes, G. 2017. Lista de aves: S40705018. eBird, Ithaca. Disponible en: https://ebird.org/checklist/S40705018

Funes, G. 2019. Lista de aves: S51511821. eBird, Ithaca. Disponible en: https://ebird.org/checklist/S51511821

Funes, G. 2019. Lista de aves: S62574440. eBird, Ithaca. Disponible en: https://ebird.org/checklist/S62574440

Funes, G. 2019. Lista de aves: S62574440. eBird, Ithaca. Disponible en: https://ebird.org/checklist/S62574440

García, G., E. Caceros, E. Fajardo, J. Linares, and L. Samayoa. 2010. Establecimiento del Sistema de Monitoreo de Especies Indicadoras de la Biodiversidad del Área Natural Protegida La Magdalena, Chalchuapa, Santa Ana. Informe de consultoría. ASAPROSAR/FIAES/MARN. 106 pp.

García, S.I. 2012. Propuesta para el Plan de Manejo actualizado para el periodo 2012-2017 del Área de Conservación Bahía de Jiquilisco. MARN-PACAP/USAID. 161 pp.

Hamerstrom, F., F.N. Hamerstrom, J. Hart. 1973. Nest boxes: an effective Management tool for Kestrels. Journal of Wildlife Management 37:400-403.

Hernández, J.M., and O.A. Carranza. 2004. Estudio de la biodiversidad, componente aves, del Área Natural Protegida "La Joya"; departamento de San Vicente. FUNPROCOOP/FIAES. San Salvador.

Herrera, N. 1998. Diagnóstico de la Vida Silvestre en Barra de Santiago. In: Diagnóstico de los Recursos Naturales de Barra de Santiago. Ministerio del Ambiente y Recursos Naturales y Ministerio de Agricultura y Ganadería, General de Recursos Naturales Renovables. 25 pp.

Herrera, N. 1999. Fauna Vertebrada y Flora Arbórea del Área Natural Santa Barbara, Municipio de El Paraíso, Departamento de Chalatenango, El Salvador. FUNDALEMPA. San Salvador.

Herrera, N. 2005. Estudio ambiental: Estado de conservación del Complejo Lago de Güija. Informe final, MARN-CNR. El Salvador. 131 pp.

Herrera, N. 2018. Lista de aves: S42425858. eBird, Ithaca. Disponible en: https://ebird.org/checklist/ S42425858

Herrera, N. 2019. Lista de aves: S53214871. eBird, Ithaca. Disponible en: https://ebird.org/checklist/ S53214871

Herrera, N. 2019. Lista de aves: S56758291. eBird, Ithaca. Disponible en: https://ebird.org/checklist/S56758291

Herrera, N. 2019. Lista de aves: S60887226. eBird, Ithaca. Disponible en: https://ebird.org/checklist/ S60887226

Herrera, N., L. Murcia, M. Vásquez. 2006. Plan de Manejo del Área Natural Protegida Colima. Informe de consultoría para Tragsatec. San Salvador. 131 pp.

Herrera, N., L. Pineda, R. Ibarra Portillo, and G. García. 2008. Monitoreo de la Avifauna del Parque Nacional San Diego La Barra. Centro de

Protección de Desastres (CEPRODE)/Grupo de Trabajo en Conservación de Aves de El Salvador, Partners in flight – El Salvador. El Salvador. 84 pp.

Herrera, N., R. Ibarra, et al. 2003. Listado de aves avistadas en la laguna Olomega durante los conteos de anátidas. Documento sin publicar.

Herrera, N., R. Rivera, y R. Ibarra. 2001. Estudio de flora y fauna vertebrada del bosque San Diego y La Barra, Metapán, Santa Ana. CEPRODE. San Salvador. 104 pp.

Herrera, N., V. Henríquez, and M.J. Menéndez. 2004. Levantamiento del Inventario de Fauna Silvestre del Área Natural Protegida Montaña de Cinquera, Departamentos de Cabañas y Cuscatlán El Salvador. Ministerio de Medio Ambiente y Recursos Naturales. 37 pp.

Herrera, N., and J.P. Domínguez. 2020. Aves de la Cuenca del Río Sapo, departamento de Morazán, El Salvador. Revista Minerva. 3(1). 38-64 pp.

Herrera, N., and O.V. Andrade. 2003. Estudio de Flora y Fauna vertebrada de Área Natural Protegida Plan de Amayo, Caluco, departamento de Sonsonate, El Salvador. Asociación Agape de El Salvador. Sonsonate. 48 pp.

Herrera, N., and R. Rivera. 2000. Fauna Vertebrada del Complejo Cacahuatique, Morazán. CODECA. El Salvador. 33 pp.

Ibarra, R. 2005. Flora y Fauna Vertebrada del Área Natural Protegida "Santa Águeda-El Zope". MARN. San Salvador.

Ibarra, R. 2008. Avifauna del Bosque Santa Clara, La Paz, El Salvador. 12 pp.

Ibarra, R. 2013. Aves de El Salvador: Estado actual del conocimiento e iniciativas de conservación. Bioma. 9: 12-91.

Ibarra, R. 2018. Estudio Flora y Fauna para Proyecto Ciudad Valle El Ángel. Sociedad, Empresa y Ambiente Sostenible. San Salvador.

Ibarra, R., F. Franco, L. Samayoa, I. Pérez. 2005. Fauna de Río Sapo, Arambala, Morazán. El Salvador. 17 pp.

Ibarra, R., L. Samayoa, F. Franco, and I. Pérez. 2008. Flora y Fauna de Arcatao y sus alrededores, Chalatenango, El Salvador.

Komar, O. 1998. Avian Diversity in El Salvador. Wilson Ornithological Society. The Wilson Bulletin, Vol. 110. 511-533 pp.

Komar, O. 2002. Priority Conservation Areas for Birds in El Salvador. Animal Conservation. 5: 173-183.

Komar, O. 2002. Birds of Montecristo National Park, El Salvador. Ornitología Neotropical. 13: 167-193.

Komar, O. 2003. Notes on Autumn Bird Migration in Coastal El Salvador. Ornitología Neotropical. 14: 39-46.

Komar, O., and N. Herrera. 1995. Diversidad de Avifauna en el Parque Nacional El Imposible y el Refugio de Vida Silvestre Complejo San Marcelino, El Salvador. Wildlife Conservation Society. New York.

La Gabio. 2017. Lista de aves: S55982368. eBird, Ithaca. Disponible en: https://ebird.org/checklist/S55982368

La Gabio. 2020. Lista de aves: S72119379. eBird, Ithaca. Disponible en: https://ebird.org/checklist/ S72119379

La Gabio. 2020. Lista de aves: S72119379. eBird, Ithaca. Disponible en: https://ebird.org/checklist/ S72119379

Liébana, M.S., J.H. Sasarola, and M.S. Bó. 2009. Parental care and behavior of breeding American Krestels (Falco sparverius) in central Argentina. Journal of Raptor Research 43:338-344.

Madrid, E., F.F. Franco, J.G. Marroquin, M.I. Lopez, and P.O. Galan. 2010. Realización de línea base de biodiversidad y componentes abióticos del Área Natural Protegida El Balsamar, Cuisnahuat, Sonsonate. Informe final de consultoría por CATIE-MAP, Asociación GAIA El Salvador. San Salvador. 16 pp.

Ministerio de Agricultura y Ganadería (MAG). 2003. Proyecto MAG-PAES/CATIE Plan de Manejo del Área Natural San Diego – La Barra. El Salvador.

Ministerio de Agricultura y Ganadería (MAG). 2003. Proyecto MAG-PAES/CATIE Plan de Manejo del Parque Nacional Montecristo. El Salvador.

Ministerio de Medio Ambiente y Recursos Naturales (MARN). 2004. Plan de manejo del Área Natural del Complejo del Jocotal. San Salvador, El Salvador. 214 pp.

Ministerio de Medio Ambiente y Recursos Naturales (MARN). 2004. Plan de manejo del área natural y humedal bahía de Jiquilisco. San Salvador, El Salvador. UCA Editores. 258 pp.

Ministerio de Medio Ambiente y Recursos Naturales (MARN). 2004. Plan de manejo del Área Natural Los Volcanes. San Salvador, El Salvador. 173 pp.

Ministerio de Medio Ambiente y Recursos Naturales (MARN). 2010. Evaluaciones ecológicas rápidas de las áreas de conservación menos estudiadas en El Salvador. Documento de la Serie del Estudio de Racionalización y Priorización del Sistema de Áreas Naturales Protegidas de la República de El Salvador. MARN/Banco Mundial/GEF/WICE/SalvaNATURA. San Salvador. 175 pp.

Ministerio de Medio Ambiente y Recursos Naturales (MARN). 2011. Plan de Manejo del Área Natural Protegida La Magdalena. Proyecto de fortalecimiento al ANP/convenio de compensación ambiental/, con financiamiento de la Empresa Propietaria RED/EPR/Proyecto Sistema de In-

terconexión Eléctrica para los Países de América Central/SIEPAC.

Ministerio de Medio Ambiente y Recursos Naturales (MARN). 2014. Plan de Manejo del Área Natural Protegida La Magdalena. SIEPAC-ASAPROSAR. El Salvador.

Ministerio de Medio Ambiente y Recursos Naturales (MARN). 2015. Listado oficial de especies de vida silvestre amenazada o en peligro de extinción en El Salvador. Diario Oficial Tomo No. 409, Número 181. Acuerdo No. 74.

Ministerio de Medio Ambiente y Recursos Naturales (MARN). 2016. Plan de manejo de las Áreas Naturales Protegidas: Laguna El Jocotal, Casamota-El Pezote y El Triunfo, Paso las Iguanas. Categoría de Manejo: AREA DE MANEJO DE HABITAT/ESPECIES. El Salvador. 98 pp.

Ministerio de Medio Ambiente y Recursos Naturales (MARN). 2017. Plan de Manejo de las Áreas Naturales Protegidas: San Antonio Silva – Tierra Blanca, Municipios de San Miguel, El Cármen y Chirilagua, Categoría de Manejo: Área de Manejo de Hábitat. El Salvador. 72 pp.

Ministerio de Medio Ambiente y Recursos Naturales (MARN). 2018. Listado de fauna silvestre registrada para El Salvador. San Salvador, El Salvador.

Miranda, C. 2017. Lista de aves: S41389806. eBird, Ithaca. Disponible en: https://ebird.org/checklist/S41389806

Miranda, C. 2019. Lista de aves: S62329279. eBird, Ithaca. Disponible en: https://ebird.org/checklist/ S62329279

Molina, D.A. 2013. Distribución de las Aves Rapaces Diurnas Residentes en el Parque Nacional San Diego-La Barra, Municipio de Metapán, Departamento de Santa Ana. Universidad de El Salvador. Santa Ana.

Molina, O., A. Arteaga, L. Calles, R. Guevara, R. Ruiz. 2010. Documento Final Línea Base del Área de Conservación Bahía de Jiquilisco. Proyecto PACAP-MARN. San Salvador.

Moreno, M.E., J.R. Núñez, L. Meza, and A. de Bremond. 1995. Desarrollo Económico, Social y Ambiental para Tres Microrregiones de Chalatenango Diagnóstico Agro-Socioeconómico Microrregión V "La Palma-Citalá-San Ignacio". Fundación Nacional para el Desarrollo (FUNDE). San Salvador.

Pablo-Cea, J.D., G. Funes, and A.C. Chinchilla-Rodríguez. 2018. Aves de la Universidad de El Salvador. Huitzil, Revista Mexicana de Ornitología.

Pacheco. C.C. 1987. Biología Reproductiva y Distribución del Quilico Falco sparverius en la Hoya del Guayllabamba. Tesis de licenciatura, Pontificia Universidad Católica del Ecuador, Quito.

Pérez, R.A. 2002. Distribución Local de las Aves Rapaces Diurnas en el Parque Nacional el Impo-

sible, El Salvador. Trabajo de Graduación, para optar al grado de Licenciado en Biología. Universidad de El Salvador. San Salvador.

Pineda L., E. Martínez de Navas, M. López–Martínez, J. Segura, R. Pineda, K. Zeledón, E. Fajardo, A. Paz, E. Aguilera and J. Sermeño. 2016. Informe Final: Línea base de biodiversidad en sitios de interés (norte de Chalatenango, Cabañas y Morazán). Ministerio de Medio Ambiente y Recursos Naturales. San Salvador, El Salvador. 259 pp.

Pineda, L., C. Funes, R. Vaquerano, and M. Rodríguez. 2006. Asistencia Técnica Para el Establecimiento del Sistema de Monitoreo de Indicadores de Biodiversidad en el Área Natural Protegida San Diego-La Barra, Metapán. CEPRODE-FIAES. 334 pp

Pineda, L., S. Vásquez, K. Zaldaña, J. Segura, R. Morán, L. Quintanilla, and C. Nerio. 2013. Inventarios de fauna vertebrada terrestre en la zona noroccidental de El Salvador – AN Complejo San Marcelino. MARN/GTMES. 68 pp.

Pineda, L., and A. Rodríguez. 2007. Inventario de Avifauna del Área Natural Protegida Complejo Taquillo, en la época transicional lluviosa – seca. FUTECMA/Partners in Flight – Mesoamérica. El Salvador. 52 pp.

Pineda, L., and A. Rodríguez. 2008. "Estudio caudal ambiental: identificación de la herpetofauna, avifauna y mastofauna asociada al manglar y ecosistemas aledaños al Río Cara Sucia". Proyecto Caracterización biofísica de ecosistemas acuáticos asociados al Río Cara Sucia, en el Municipio de San Francisco Menéndez, departamento de Ahuachapán, El Salvador. UICN. 69 pp.

Pineda, L., and C. Aguirre. 2016. Aves del Área Natural Montaña de Cinquera, departamento de Cabañas, El Salvador. Bioma. 52: 25-63.

Ramos, D.E., and Ramos, J.A. 2018. Estudio de línea base de la flora, herpetofauna, avifauna y mastofauna en Área Protegida Municipal San Eugenio La Concordia, Armenia Sonsonate. ASAPROSAR. El Salvador.

Ramos, J.A. 2009. Elaboración del plan de manejo de las Áreas Naturales Protegidas Santa Rita - El Chino, y Área Natural Cara Sucia. MARN/AECID/CATIE.

Ramos, J.A. 2012. Estudio de línea base de la avifauna del Área Natural Protegida Complejo Los Farallones, Sonsonate. MARN/CATIE-FIAES. El Salvador.

Rand, A. L. and M. A. Traylor. 1954. Manual de las Aves de El Salvador. San Salvador: Editorial Universitaria. 126 pp.

Richards, G.L. 1970. American Kestrel, Falco sparverius, Exhibits Relic Nest Building Behavior. The Condor (Vol. 72). 4:476.

Rivera, J.R. 2000. Conservación, Protección y Recuperación de los Recursos Naturales del Refugio de Vida Silvestre Complejo San Marcelino. ASACMA. San Salvador.

Rivera, J.R., and N. Herrera. 1998. Fauna Vertebrada y Flora Arbórea del Área Natural San Juan Buenavista. El Salvador. 34 pp.

Rojas-Soto, O.R., A.O. de Ita, R.C. Almazán-Núñez, A.G. Navarro-Sigüenza, and L.A. Sánchez-González. 2009. Avifauna de Campo Morado, Guerrero, México. Revista Mexicana de Biodiversidad. Ciudad de México. (80): 741-749.

Salazar, M., H.F. Cadena, and E. Bonaccorso. 2012. Desarrollo de los polluelos y cuidado parental en el Quilico (Falco sparverius) en el suroeste de Ecuador. Boletín SAO (Vol.20). 2: 61-66.

Serrano, K. 2019. Lista de aves: S62471740. eBird, Ithaca. Disponible en: https://ebird.org/checklist/S62471740

Sibley, D.A. 2000. The Sibley Guide to Birds. First Edition. National Audubon Society. Maryland (MD). Alfred a Knopf Inc.

Stiles, F., and A.F. Skutch. 2003. Guía de Aves de Costa Rica. Tercera Edición. Costa Rica. Instituto Nacional de Biodiversidad (INBio).

Stokes D., and L.Q. Stokes. 1996. Stokes Field Guide to Bird: Western Region. First Edition. Canada. Little, Brown and Company.

Thurber, W.A., J.F. Serrano., A. Sermeño., and M. Benítez. 1987. Status of Uncommon and Previously Unreported Birds of El Salvador (Vol 3). Western Foundation of Vertebrate Zoology. California.

Trejo, M. 2018. Lista de aves: S43996310. eBird, Ithaca. Disponible en: https://ebird.org/checklist/S43996310

Trejo, M. 2019. Lista de aves: S51408733. eBird, Ithaca. Disponible en: https://ebird.org/checklist/S51408733

Trejo, M. 2019. Lista de aves: S60479487. eBird, Ithaca. Disponible en: https://ebird.org/checklist/S60479487

Trejo, M. 2019. Lista de aves: S61270289. eBird, Ithaca. Disponible en: https://ebird.org/checklist/ S61270289

Vásquez, R., E.N. Martínez., and A.C. Chinchilla. 2015. Informe Anual de Disposición de Fauna Silvestre. Ministerio de Medio Ambiente y Recursos Naturales. San Salvador. 32 pp.

Vega, I. 2011. Informe de viaje al Área Natural Protegida Complejo San Marcelino, municipio El Congo, departamento de Santa Ana. Proyecto: "Dispersión de aves de bosque y migratorias en el corredor biológico de La Sierra de Apaneca, El Salvador 2008-2010. SalvaNATURA. San Salvador.

West, J.N. 1988. Raptors of El Imposible Forest, El Salvador, C.A. A thesis presented to The Graduate Faculty Central Washington University. In partial fulfillment of the Requirements for the Degree Master of Science. Washington (WA).

* * *

Double-toothed Kite (*Harpagus bidentatus*) nesting in Yurubí National Park, Yaracuy State, Venezuela

By **Miguel Ángel Torres[1], Juan Escudero[1]** and **Jesús Escudero[1]**

[1]Coordinación de Investigación, Dirección Regional Yaracuy, Instituto Nacional de Parques, Venezuela
e-mail: miguelangelrnr@gmail.com

In Venezuela there are 45 species of birds of prey in the Accipitridae family (Remsen et al. 2019 and Ascanio et al. 2020), 27 of which are registered in Yaracuy State (eBird 2020). The Double-toothed Kite (*Harpagus bidentatus*) inhabits the Neotropics from Mexico to Bolivia. In Venezuela it is reported in the states of Zulia, Táchira, Mérida, Trujillo, Barinas, Portuguesa, Falcón, Yaracuy, Carabobo, Aragua, Miranda, Vargas, Monagas, Sucre, Delta Amacuro, Bolívar, Amazonas, and the Capital District. North of the Orinoco River, it is found from sea level up to 1,800 m.a.s.l. in semi-deciduous, evergreen and cloudy forests. South of the river, it lives up to 1,200 m.a.s.l. in fields, forest edges, clearings, grasslands, and near streams.

This raptor's diet consists of lizards, insects, and birds (Phelps et al. 1994, Hilty 2003, eBird 2020). In Guatemala, Schulze (2000) documented a diet consisting of a total of 59.2% insects and 40.8% vertebrates, with the order Homoptera (49%) and lizards (40%) making up a large portion of this raptor's during nesting periods.

Study Area

On 5 June 2020, during a routine biodiversity survey in the semi-deciduous forest of Cerro Chimborazo in Yurubí National Park, Yaracuy State, Venezuela (10 ° 36 ' 87 "N; 68 ° 72'24" W), we discovered a Double-toothed Kite nest at about 14.5 meters from the ground. The vegetation in the area is composed of *Bursera simaruba*, *Hura crepitans*, *Spondias mombin*, *Brownea macrophylla*, *Pterocarpus acapulcensis*, *Hamelia patens*, *Inga* sp., *Ceiba* sp., *Cedrela* sp., *Ceroxilum* sp. and *Tabebuia* sp.

During the first two days, observations were made from a single observation point which we called "observation point A" (at an altitude of 516 m.a.s.l. at the coordinates 10 ° 36'85 "N; 68 ° 75 '22 "W, 44 linear meters from the nest). On the third day of observation, we identified a second observation point, point "B" (at an altitude of 519 m.a.s.l. at the coordinates 10 ° 36'86 "N; 68 ° 75'20" W, 45 linear meters from the nest).

Observations

5 June, 11:31 hrs, Observation Time (OT): 30 mins., Observation Point (OP): A

An adult Double-toothed Kite was observed perched one meter from a nest structure composed of plant material. After several minutes of observation, we detected the presence of a white nestling inside the nest (Figures 1 and 2). The nestling was small, covered in down, and exhibited clumsy movements. The adult was present at all times and appeared attentive to the activity around the area.

6 June, 10:15 hrs, OT: 2 hrs., OP: A

We observed the nestling alone in the nest. It was watching something close to it (presumably insects). Minutes later, an adult arrived in the area with what appeared to be a juvenile *Iguana iguana* or an adult *Polychrus auduboni,* based on ts size and coloration according to Señoris et al. 2018. The nestling observed what the adult was doing, but without leaving the nest. After several minutes, the adult approached the nest and proceeded to tear the remaining part of the reptile (lower half of the body and tail) into small portions and place them in the nestling's beak. At first, the young hawk appeared to put up resistance, but then accepted the food soon after (Figures 3 and 4). After feeding the nestling until the prey was gone, the adult began preening the nestling extensively. Afterwards, the chick walked to the edge of the nest and excreted white excreta with a creamy texture. The adult remained in the nest for a few moments, before moving to a perch about two meters from the nest.

10 June, 11:37 hrs, OT: 3 hrs & 5 mins., OP: B

We had set up observation point "B" in order to be more discreet. However, we noted that the nestling could observe the photographer from this point. The nestling was active. It stood on its two legs at the edge of the nest, making some

Figure 1. Lt. **On observation day 1, a chance with an adult *Harpagus bidentatus*, which was perched on the branch of a large tree. Photo © Juan Escudero**

Figure 2. Rt. **On the same day, the adult approached the nest for periodic check-ups, and then moved away a little, no more than two meters away from it. Photo © Juan Escudero.**

Figure 3. Lt. **On observation day 2, an adult brought a reptile to the chick, likely a juvenile *Iguana iguana*, or an adult *Polychrus auduboni*. Photo © Juan Escudero**

Figure 4. Rt. **On day 2, we observed the adult feeding the nestling. Photo © Juan Escudero**

small jumps. As it stretched its wings, we could see the growth of dark feathers on its back and both wings. However, it remained predominantly white (Figure 5). Halfway through the observation, an adult could be seen and heard hunting approximately 30 meters from observation point "B", and approximately 70 meters from the nest. Then it flew away and was not seen again.

13 June, 11:35 hrs, OT: 30 mins., OP: B

We observed that the nestling was alone. However, a few minutes later, the adult arrived, again with a reptile. This time it was not possible to photograph it because of the speed and unexpectedness of the moment. By the color of the prey and the tail, it is presumed that it could have been a reptile of the genus *Anolis* or something similar. The adult, upon arrival, did not vocalize and neither did the nestling. TThe latter waited for the adult to offer it portions. The adult appeared to be encouraging the young hawk to take portions of meat himself. In the end, the nestling began to feed on the prey the adult had brought.

Once the nestling finished feeding, the adult began to preen it. No more than two minutes after feeding, the nestling perched on the edge of the nest to excrete excreta. After completing the entire feeding and grooming process, the adult flew about four meters from the nest, where it perched.

17 June, 13:35 hrs, OT: 60 mins., OP: B

We were able to observe notable differences in the advancement of the nestling's development. It had much less white down, was growing, and appeared much more agile in its movements (Figure 6).

During the observation period, the adult shielded the nestling from direct exposure to intense sunlight (Figure 7). They remained together in the nest seemingly always attentive to what was hap-

pening around. Minutes before the completion of the observation, the adult withdrew to a perch approximately 10 meters away, while the chick walked to the edge of the nest.

22 June 12:50 hrs, OT: 60 mins., OP: A

It rained a lot this afternoon. Before reaching the observation point, we observed an adult *Harpagus bidentatus* (Figure 9) perched very high in a Yagrumo (*Cecropia peltata*) about 25 linear meters from the nest. The adult took advantage of the brief pause in the rain to dry itself in an open area. It appeared to remain attentive to its surroundings and vigilant in the direction of the nest.

After reaching the observation point, we observed the juvenile a few centimeters from the nest. While its head remained covered in white down, the rest of its body showed dense dark brown plumage. Its breast and belly were more ochre in color with a diffuse horizontal band of faint white. No increased activity was observed on this day.

26 June, 13:30 hrs, OT: 60 mins. OP: A

The nest was empty. Neither the adult nor the juvenile were found in the tree. After an intense search in a radius of approximately 100 meters around the nest, we observed an adult about 10 meters in a straight line from the nest in a southwesterly direction.

After a few minutes, we found the juvenile at about 15 linear meters from the nest in a southwesterly direction. It had ochre-colored plumage on the breast and belly, with dark stripes on the breast and back. Its wings were dark in color, and its head was predominantly white with a few dark feathers (Figures 10 and 11). Both individuals re-

Figure 5. **During the three hours of observation on day 3, the adult was completely absent. Photo © Juan Escudero.**

Figure 6. **By day 4 of observations, we noticed the clear development of the nestling - it was larger, extensive feather growth (less and less white), and was more agile. Photo © Juan Escudero.**

mained around the site during the observation period. The juvenile excreted excreta which made us think that it had fed not long before. The juvenile and the adult were perched approximately 30 linear meters apart. The juvenile was about 19 meters above the ground, while the adult was perched at approximately 15 meters from the ground.

29 June, 12:00 hrs, OT: 20 mins.

Observations on this day were similar to the previous observations. There are no new details to report.

5 July

One week later, we did not observe any hawks in the area. From 22 June to 5 July, on three consecutive visits, we did not observe the juvenile in or near the nest.

Final Notes

Based on our observations, the Double-toothed Kite nests between the months of April and July, in the rainy season. This corresponds to other nesting data of individuals raised in clutches (Laughlin 1952 and Schulze 2000). On this occasion, the breeding of a single individual between June and July was documented in a semi-deciduous forest of the Yurubí National Park in the Yaracuy State, Venezuela. However, it must be taken into account that the event is described from the rearing of a nestling that had already hatched and where the abandonment of the nesting site by the individuals could not be verified.

Nesting territory for this species has been estimated at between 2 and 2.65 km² per territory and 2.3 and 3 km² per pair (Schulze 2000). In addition, pairs were observed every 1.66 km².

This suggests that during next nesting season, an exhaustive survey should be carried out - taking into account these territorial distances.

Laughlin (1952) described the diet of the species in Panama during the nesting season, and documented males provisioning incubating females with insects, lizards, and small birds. On the occasion described by Laughlin, the nesting attempt failed due to egg predation by Chestnut-mandibled Toucan (*Ramphastos swainsonii*). In the event described here for Venezuela, we do not have any data on the male provisioning the female during incubation. However, we observed the adults provisioning the offpring, mostly with reptiles.

The species has been evaluated with the SUMIN index at Hacienda Guáquira (Quintero 2017), a town near the Yurubí National Park. It was included in the "Special Attention" conservation category. At the local level, the species is sensitive and vulnerable, and is a key species (top predator).

Figure 7 Lt. **On day 5 of observation, the adult protected the nestling from direct exposure to intense sunlight. Photo © Juan Escudero**

Figure 8: Below. **On day 5 of observation, the noticeable development in the growth of the nestling could be seen. Photo © Juan Escudero.**

Figure 9. Above. **On observation day 6, we observed an adult perched very high on a Yagrumo (*Cecropia peltata*), approximately 25 meters from the nest. Photo© Juan Escudero.**

Figure 10. Lt. **On day 6 of observation, white down is only visible on the nestling's head. Photo © Juan Escudero.**

Figure 11. Rt. **Day 7 of observation, the nestling is noticeably bigger with changing plumage. Photo © Juan Escudero.**

Acknowledgments

To the Civil Corps of Park Rangers of the Yurubí National Park for always having your accompaniments.

References

Ascanio, D., C. A Marantz, J. Miranda, J. Kvar¬nbäck, G. Rodríguez, J. G. León, A. Nagy, P. A. Amaro, and T. Crease. 2020. Species lists of birds for South American countries and territories: Venezuela. Version 22/10/2020 http://www.museum.lsu.edu/~Remsen/SACCCountryLists.html.

eBird. 2020. eBird: An online database of bird distribution and abundance. Audubon and Cornell Lab of Ornithology, Ithaca, USA. Documento en línea. URL: http://www.ebird.org. Visitado: octubre 2020.

Hilty, S. 2003. Birds of Venezuela. Segunda edición. Princeton University Press.

Laughlin, R. M. 1952. A nesting of the Double-toothed Kite in Panama. Condor 54:137-139.

Phelps, W., W. H. Phelps JR, and R. M. Schauensee. 1994. Una Guía de las Aves de Venezuela. Ex Libris, Caracas.

Quintero, R. 2017. Estrategias para la conservación de la avifauna en la Hacienda Guáquira, Municipio San Felipe – Estado Yaracuy. Tesis de grado, Universidad Nacional Experimental de los Llanos Occidentales Ezequiel Zamora (UNELLEZ), Guanare, Portuguesa, Venezuela.

Remsen, J. V., Jr., J. I. Areta, 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.2019. A classification of the bird species of South America. American Ornithologists' Union. Recuperado el 3 de octubre de 2019, de: http://www.museum.lsu.edu/~Remsen/SACCBaseline.html.

Schulze, M. D., Córdova, J. L., Seavy, N. E., and Whitacre, D. F. 2000. Behavior, diet, and breeding biology of Double-toothed Kites at a guatemalan lowland site. The Condor 102: 113-126.

Señaris J.C., M.M.Aristeguieta Padrón, H. Rojas Gil, and F.J.M. Rojas-Runjaic (2018). Guía ilustrada de los anfibios y reptiles del valle de Caracas, Venezuela. Ediciones IVIC, Instituto Venezolano de Investigaciones Científicas (IVIC). Caracas, Venezuela. 348 pp.

* * *

Rescue, rehabilitation, and release of an Ornate Hawk-Eagle (*Spizaetus ornatus*) in Misiones Provincia, Argentina

By **Gabriel S. Acevedo**[1] and **Dante L. Di Nucci**[1]

[1]Fundación de Historia Natural Félix de Azara. Refugio de Animales Silvestres Güirá Oga. Ruta nacional 12, km 1637 (3370) Puerto Iguazú, Misiones, Argentina
e-mail: gabrielacevedo.vet@gmail.com
dinuccidante@gmail.com

Güirá Oga – a center for the rescue, rehabilitation and breeding of wild animals - is located in northern Misones Province, Argentina, in the border city of Puerto Iguazú (25 ° 36'39 "S; 54 ° 34'49" W). It was founded more than 20 years ago, and receives several wildlife species that have been victims of illegal trafficking, the pet-trade, vehicle collisions, and/or have been traumatized by hunting or other anthropic causes (collisions with windows or high tension cables, shot with slingshots). It also receives orphaned mammals and of a great variety of birds from all over the province.

The objective of this article is to share our experience with the rescue, rehabilitation, and release of an Ornate Hawk-Eagle (*Spizaetus ornatus*) in Misiones Province, Argentina. On 25 August 2020, a call was received from a family in the rural area of El Soberbio (27 ° 17'44 "S; 54 ° 11'47" W), a city located about 250 km from Puerto Iguazú. They reported that they found a "hawk" that could not fly and that they had been taking care of it for two days in their field. They also sent a photograph where it was possible to verify what species it was. The next day, we went to the farm and found the Ornate Hawk-Eagle inside a wooden structure that they used as a "cage," - a structure commonly used to contain production animals, such as as piglets (Figure 1). The family was feeding chicken and pigeons to the eagle.

Upon visual inspection the eagle appeared active and alert. The edge of some of its feathers were beginning to be damaged and fouled with feces and urates. Its cere had a recent wound, probably produced by the edges of the cage. After the inspection, we proceeded to capture and transfer the eagle to the hospital at Güirá Oga. Upon arrival, we placed the eagle in an enclosure in the quarantine area and continued with the checks the following day. The enclosure featured a stain-

less steel arch perch covered with synthetic grass. We placed a bowl of water and a whole quail in the enclosure, which the eagle consumed completely. The position of its right wing quickly attracted our attention. It remained slightly drooped and the bird was unable to accommodate it to its correct anatomical position. The edge of the primary feathers brushed on the ground (Figure 2). In addition, the eagle remained on the floor and did not use the perch.

The next morning, we continued the clinical review, which included: weighing, complete inspection of the musculoskeletal system, ophthalmological and oral cavity evaluation, swabbing of the oral cavity and crop for the diagnosis of *Trichomonas* spp. (due to the fact that she had been fed pigeons), extraction of blood for microhematocrit and blood smear and two radiographs: one ventral-dorsal and the other lateral.

As part of the management, we sedated the bird with midazolam (Midazolam, Richmond Vet Pharma, Buenos Aires, Argentina) at a rate of 1 mg/kg. It was applied intranasally before starting the check-ups in order to reduce stress during the evaluation.

Based on the eagle's weight, 1.8 kg, we considered it to be a female. After palpating the pectoral muscles, we determined that its body condition was low (CC:2/5) (Welle, 1995; Doneley et al 2006). We took blood from the medial metatarsal vein. The X-ray showed the presence of a structure with metallic radiodensity, suggestive of ammunition or pellet. This pellet was lodged in the subcutaneous tissue at the level of the right scapula. (Figure 3). Fortunately, the ammunition impacted the scapular region without compromising any bone/muscle structure, temporarily disabling its flight. The other determinations did not yield any other results of note.

Figure 1. **Ornate Hawk-Eagle (*Spizaetus ornatus)* found in El Soberbio. Photo © Gabriel S. Acevedo**

***Figure 2*. Ornate Hawk-Eagle in quarantine, where you can observe the wing's position and the slight abrasion of the bird's cere. Photo © Gabriel S. Acevedo**

Subsequently, we removed the pellet and started the eagle on the following treatment scheme: meloxicam (Meloxivet tablets, Lab. John Martin, Argentina) at a rate of 1 mg/kg orally every 24 hours for 10 days. We placed the medication within the food (rat/quail).

We also moved the eagle to a larger enclosure, with a perch raised one meter above the ground made with the branch of a tree and covered with synthetic grass and a second perch with the same characteristics placed from the ground to the first perch as a "bridge" so that it could access the high perch. This enclosure allowed safe daily observations for both the eagle and the caretaker and/or veterinarians, checking the daily consumption of the prey with medication. In addition, faeces were collected for coproparasitological studies.

After we began the treatment, the bird began to hold its wing in the correct position, and also began to use the perch without much effort. At this point, we decided to capture and band (GO230897) the bird. We also weighed the eagle and retrofitted the enclosure, adding a perch at a height of about 2 meters. This allowed the eagle to begin making short flights from one perch to another (Figure 4).

After the minimum quarantine time and due to the eagle's favorable evolution, we decided to transfer the eagle to a flying tunnel so that it could begin to exercise with long flights. During this time, we maintained the same feeding management with dead quail and whole rats. Administering the medication through the food favorably contributed to the rapid recovery of the eagle,

Figure 3. **X-ray showing the pellet. Photo © Gabriel S. Acevedo**

reducing stress, and avoiding daily captures and constant contact with people. Gradually granting more flight space and different perch heights allowed for a constant and measured increase in the return of its flight capacity. With the medical discharge, on 11 November 2020, we released the ealge in the Uruzú section of the Urugua-í Provincial Park (25 ° 51'26 "S; 54 ° 10'07" W) north of the Province of Misiones.

Conclusions

The Ornate Hawk-Eagle is one of the five great eagles documented in Misiones Province (Chebez et al. 2008, Bodrati et al. 2010, Narosky and Yzurieta 2010, Escobar and Moya 2019, Lodeiro Ocampo et al. 2020) and is considered Endangered in Argentina (MAyDS and AA 2017).

It inhabits primary forests in a good state of conservation, in remnants of the Paranaense Forest (Chebez et al. 2008) and even occasionally in and 2001). However, the massive clearing of its habitat - together with hunting - constitute some of its main conservation threats (BirdLife International 2016).

The site where the eagle was found and rescued belongs to one of the areas of "chacras", where the land is worked for the cultivation of yerba mate and tobacco, logging and production of cattle, pigs and chickens. This area is heavily intervened, with great landscape changes due to these activities. A few kilometers away and bordering the farm where we go, is the Yabotí Biosphere Reserve. It is a protected area with an area of 221,155 hectares of the Paranaense Forest (26º37'S 53º40'W), where unfortunately there is a constant poaching pressure.

Due to this situation, it was determined, together with the provincial enforcement agency (Ministry of Ecology), that the release be carried out in the Urugua-í Provincial Park. This protected natural area has an area of 84,000 hectares, and next to the border of the Iguazú National Park (67,698 hectares) and its neighbor Parque Nacional do

Figure 4. **Ornate Hawk-Eagle (*Spizaetus ornatus*) after being banded. Photo © Gabriel S. Acevedo**

Iguaçu (Brazil) (185.262 has) they make up the largest reserve in the Paranaense jungle.

Faced with these hunting events, it is essential to approach and dialogue with the population of the area, and raise awareness of the importance of these species due to the ecological role they play.

References

BirdLife International. 2016. *Spizaetus ornatus*. The IUCN Red List of Threatened Species 2016: e.T22696197A93548774. https://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T22696197A93548774.en. Downloaded on 07 March 2021.

Bodrati, A., K. Cockle, J. M. Segovia, I. Roesler, J. I. Areta and E. Jordán. 2010. La avifauna del Parque Provincial Cruce Caballero, Provincia de Misiones, Argentina. Cotinga 32: 41-64.

Chebez, J. C., J. Baigorria, and J. Anfuso, J. 2008. Águila crestuda real, vol. 2, p. 211 – 215. En: Chebez, J. C. Los que se van. Fauna argentina amenazada. Buenos Aires, Albatros.

Doneley, B, GJ Harrison, TL Lightfoot. Maximimizing information from the physical examination. In: Harrison, GJ, TL Lightfoot (eds). Clinical Avian Medicine. Palm Beach, FL: Spix Publishing; 2006: 153-211.

Escobar, J. and S. Moya (Recop.) 2019. Listado de Aves del Refugio Privado de vida silvestre Yacutinga. Aves Argentinas / FVSA. 19 pp

Ferguson-Lees J. and D.A. Christie. 2001. Raptors of the world. Boston: Houghton Mifflin Company.

Lodeiro Ocampo, N.; Nigro. N.A.; Peralta, N.D.; Wioneczak, M.J.; Pradier, L. 2020. Predación

de Águila Crestuda Real (*Spizaetus ornatus*) sobre Taguató (*Rupornis magnirostris)* en la Reserva Natural Militar Puerto Península, Misiones, Argentina. Spizaetus – Boletín de la Red de Rapaces Neotropicales. 30:38-43

MAyDS and AA (Ministerio de Ambiente y Desarrollo Sustentable y Aves Argentina) (2017). Categorización de las Aves de la Argentina (2015). Informe del Ministerio de Ambiente y Desarrollo Sustentable de la Nación y de Aves Argentinas, edición electrónica. C. A. Buenos Aires, Argentina. 148 pp.

Narosky T., D. Yzurieta, 2010. Guía de identificación de aves de Argentina y Uruguay. 16ª ed. Vazquez Mazzini editores.

Welle K. 1995. Body condition scoring in birds. Annu Conf Proc Assoc Avian Vet.

* * *

The influence of solar altitude on Variable Hawk (*Geranoaetus polyosoma*) behavior in the Valle de Tafi, Tucuman, Argentina

By **Thania Moreno Ten**[1-2], **Esteban Martínez Pastur**[1-2], **Daniel Andrés Dos Santos**[3], **Rodigo Araoz**[1-2] and **Diego Ortiz**[1-2]

[1]Centro Nacional de Anillado de Aves, Facultad de Ciencias Naturales e IML. Tucumán, Argentina.
e-mail: aves77-99@hotmail.com
[2]Centro de Rehabilitación de Aves Rapaces. Reserva Experimental Horco Molle, Facultad de Ciencias Naturales e IML. Tucumán, Argentina
[3]Instituto de Biodiversidad Neotropical (Concejo Nacional de Investigaciones Científicas y Técnicas) - Universidad Nacional de Tucumán

The Variable Hawk (*Geranoaetus polyosoma*) is a medium-sized, frequently observed raptor with sexual dimorphism, complex phases and plumage morphs (Canevari et al. 1991). It is distributed throughout the Andes from the Northwest of Colombia to Tierra del Fuego, the Pacific lowlands and even in the Falkland Islands (Ferguson-Lees and Christie 2005, De la Peña 2016). It inhabits a wide variety of mountainous and flat environments with xerophilous vegetation, also in anthropized areas and agro-ecosystems. It is considered a species of Least Concern (IUCN 2018) and not threatened (MAyDS and AA 2017). However, De Lucca (2011) considers that it could be in a population decline in certain areas.

This species is considered to be a resident in central Chile (Schlater 1979) and in the Argentine Patagonia (Hellmayr 1932), but altitudinal and latitudinal displacements were also identified (Olrog 1959, Woods 1975, De la Peña 1978, Venegas and Jory 1979, Jiménez 1995, Capllonch and Ortiz 2009, De la Peña 2016). Brandan and Navarro (2009) describe it as a partial migrant that nests in southern Argentina and arrives north during winter without leaving the country. In Bolivia, it is considered a resident of La Paz (Richard and Contreras Zapata 2015) and a migrant from the South during the winter (Rocha and Peñaranda 1995). Capllonch and Ortiz (2009) have identifed Valle de Tafí, Tucumán, as a point on *G. polyosoma*'s migration route. They have been documented in the Salta Chaco in the

winter (Capurro and Bucher 1988), as well as in Mar de Cobos on the Buenos Aires coast, where they arrive in April and leave at the end of August (Baladrón et al. 2009).

The flight of large birds is restricted by climatic conditions and topography that favor the development of an upward flight (Duerr et al. 2015). Duerr et al. (2015) concluded that the most important factors that influenced the migration of Golden Eagles (*Aquila chrysaetos*) in spring and autumn were the greater thermal formations, descending solar radiation, and thermal energy. They also suggest that environmental variables influence differently the migration of juvenile and adult Golden Eagles, with adults being the most efficient and the first to migrate when solar radiation was lowest. The selective pressures that act on birds are subject to environmental factors and how these affect the maturation of individuals and the development of new behaviors (Cavalcante et al. 2019). Although solar altitude is not a frequently used variable in flight studies, Duerr et al. 2015 consider it as an influential variable in their study

The Valle de Tafí (26°49'20"S; 65°43'16"W) is located west of Tucumano, in the Department of the same name, in Argentina. It is a tourist town, represented by forests of alder (*Alnusacuminata*), queñoa (*Polylepisaustralis*) and high grasslands. This valley is 30 km long and located at 3,000 m.a.s.l between the Aconquija and Cumbres Calchaquíes mountain ranges. It has a temperate climate, somewhat humid and with winter snowfalls (Brown et al. 2013). The Department of Tafí del Valle has a population of 14,933 inhabitants and a density of 5.1 inhabitants/km^2. The inhabitants of the valley primarily carry out livestock activities (equine, sheep, cattle) that cause overgrazing on the land. Secondarily, and on a smaller scale, they grow varied crops depending on the communities (Brown et al. 2013). These activities, added to the uncontrolled expansion of housing, transformed the vegetation structure of the valley to a basically herbaceous one with little presence of native woody plants (Brown et al. 2013).

It is part of a migratory route for several species of birds including White-throated Hawk (*Buteo albigula)*, Chimango Caracara (*Milvago chimango)*, Long-winged Harrier (*Circus buffoni)*, Upland Sandpiper (*Bartramia longicauda)*, Cinnamon-bellied Ground Tyrant (*Muscisaxicola capistratus)*, and Rufous-collared Sparrow (*Zonotrichia capensis)* (Olrog 1949, Handford 1983, Rumboll et al. 2005, Trejo et al. 2007) that travel from southern Argentina through the buttresses of the Andean and sub-Andean Valleys.

The present work is part of the study carried out by the Argentine bird banding center (CeNAA), and the rehabilitation center for birds of prey of the Horco Molle Reserve (CeRAR). It was de-

signed to analyze the annual dynamics in the frequency of observation, habitat selection and behavior of the Variable HawkValle del Tafí. One of the objectives was to analyze the probability that certain behaviors - flying verus perching - would occur in relation to the solar inclination angle.

Methods

A total of 20 surveys were carried out, each one had an average duration of 57 mins 15 secs with a standard deviation of 15 mins 13 secs. It was possible to carry out 6 samplings during the afternoon, 7 during noon and 7 during the morning. A total of 618 km were covered. We observed a total of 119 individual *Geranoaetus polyosoma* and georeferenced the position of 90 of them. The samplings were carried out from April 2017 to April 2018. Two samplings were carried out per month. A single sampling was performed each day within a time range and in a single direction along the transect to avoid pseudo-replication and double counting. One of the three defined hourly ranges were alternated in each sampling (morning between 08:00 to 10:00 hrs., noon between 12:00 and 15:00 hrs, and evening between 17:00 and 19:00 hrs.) to calculate the solar altitude throughout one year based on information obtained during specific dates and times. Surveys were carried out by vehicle at a constant speed of 40 km/h (Bellati 2000, Palomino and Valls 2011, Bird and Bildstein 2007) along Route 307 from the Mollar Roundabout to the Infiernillo Post. For the location and observation of the individuals, we used CARSON 10x50 binoculars 3D model. The sightings were made in conditions with good visibility, and we avoided making observations during adverse weather conditions such as rain or fog. The data were entered into spreadsheets specifically designed for sampling.

This work seeks to analyze the probability of flight as a function of date and time. We used a boxplot to compare the interquartile intervals of a) perching (control adjustment level) and b) flight (case) as a function of the inclination angles of the sun. Time and date variables allowed us to calculate

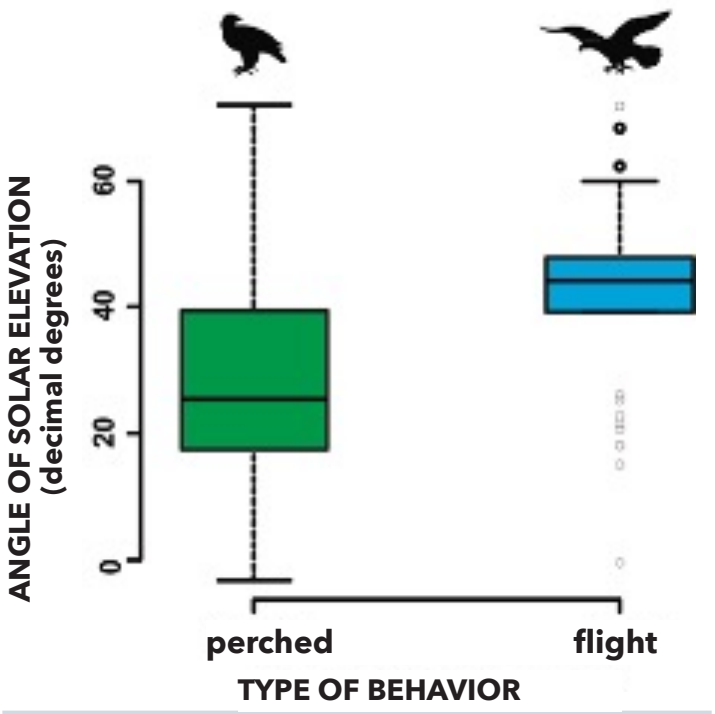

Figure 1. **Boxplot diagram showing the statistical distribution of the angular height of the sun when observing the behavior of the hawks. Each specific observation corresponds to independent individuals, on different dates and times of the day. Note that the solar elevation of 40 ° is a reliable delimiter of behaviors (on either side of it, the interquartile ranges are segregated). For elevations of the sun above this threshold, the activity of flight prevails.**

Figure 2. Lt. **Juvenile light morph *G. polyosoma* in flight. Photo © Esteban Martínez Pastur**
Figure 3. Rt. **Adult dark morph *G. polyosoma*. Photo © Diego Ortiz**

the solar altitudes in order to study the influence of the sun's position on flight. Solar altitude is an angle measured in a plane perpendicular to the plane of the earth (0 ° at sunrise, to its maximum value equal to 90 ° at the zenith) (Fuentes Freixanet 2015). We first calculated solar time from official weather data; then we obtained the sun's inclination angles by using the *get function* (suncalc package) from the date and time taken during the samplings. Finally, to identify the cut-off value at solar altitude that best separates both behaviors (flight versus perching), the ROC curve technique was used.

Results

In this study, we analyzed the influence of solar altitude on flight and perching behavior. The distribution of the angular values shows a clear segregation between these two behavioral groups (Figure 1). Perching behavior prevails when the angle oscillates between 20 ° and 40 °, while flight is more common when the solar angle exceeds 40°. The ROC curve analysis was significant (it is possible to separate both groups), and the precise cut-off value to diagnose both groups was defined at a solar inclination of 39.072°. That is, this value corresponds to the threshold of the sun's height that defines whether the hawk will be perched or in flight.

The mutually exclusive dispersion of these two behaviors (perched versus flight) with respect to the solar elevation angle suggests the relevance of the position of the sun in the landscape. From 0° to 39°, the hawks will prefer to be perched. This coincides with the results of Dellacasa Muñoz (2005) who documented a lower frequency of flights during the morning hours. When the

altitude of the sun is at 40°, *Geranoaetus polyosoma* will be mostly in flight. This is surely related to the direct irradiation of the sun on the surface and the convective rise of hot air masses. This finding is important since the flight of large birds is restricted by climatic conditions and the topography that favors the development of an upward flight (Duerr et al. 2015).

Conclusions

This type of study shows the importance of analyzing the influence of physical variables (eg barometric pressure, flight efficiency, ground inclination, etc.) on the flight of birds, and on their flight during migrations (Duerr et al. 2015). In addition, it must be taken into account that the types of flights and ascents may vary throughout birds' migratory ranges as they travel through different ecoregions with marked differences in topography (Duerr et al. 2015). This information is important for understanding migrations, as well as for designing conservation strategies for this and other species that use different locations throughout the year. It will aid in making conservation decisions at a local and regional level.

References

Baladrón, A.V., L.M Biondi, M.S. Bó, A. L. Malizia, and M. J. Bechard. 2009. Red-backed Hawks supply food to scavenging Chimango Caracaras. Emu, 109, 260-264.

Bellati, J. 2000. Comportamiento y abundancia relativa de rapaces de la Patagonia extra-andina argentina. Ornitología Neotropical. The Neotropical OrtnitologicalSociety, 11, 207-222.

Bird, D.M. and K. L. Bildstein. 2007. Raptor research and management techniques manual. 1° ed. Hancock House Publishers. Pgs. 462.

Brown, A., R. Ordoñez, B. Velásquez, S. Albanesi, S. Pacheco, L. Cristóbal, K. Buzza, M. García Moritan, and M. Lepez. 2013. Plan de manejo: Reserva Provincial La Angostura. Áreas Naturales Protegidas de Tucumán y Fundación Proyungas.

Brandán, Z.J. y Navarro C.I. 2009 Lista actualizada de aves de la provincia de Tucumán. Fundación Miguel Lillo.

Canevari M., P. Canevari, G. R. Carrizo, G. Harris, J. Rodriguez Mata, R. J. Straneck. 1991. Nueva guía de las Aves Argentinas, Tomo II. Fundacion Acindar. Pgs. 118.

Capllonch P. and D. Ortiz. 2009. Migración del aguilucho común (*Geranoaetuspolyosoma*) en Tafí del Valle, Tucumán, Argentina. Nuestras Aves 54, 33-35.

Capurro H. A. and E. H. Bucher. 1988. Lista comentada sobre las aves del bosque chaqueño de Joaquín V. Gonzalez, Salta, Argentina. Hornero 13,039-046.

Cavalcante, T., C. A. Tuyuma, y I. Mourthe. 2019. Insights into the development of a juvenile harpy eagle's hunting skills. Acta Amazonica 49(2), pg.114-117.

De la Peña, M.R. 1978. Enciclopedia de las aves argentinas. Fascículo 11.Editorial Colmegna, Santa Fe.

De la Peña, M.R. 2016. Aves Argentinas: descripción, comportamiento, reproducción y distribución. Comunicaciones del Museo Prov. De Cs.Nat. "Florentino Ameghino" (Nueva Serie). 19 (2).

Dellacasa Muñoz V. 2005. Estudio de los tipos de vuelo de aguilucho común (*Buteo polyosoma*) durante el periodo estival en los nevados de Chillán, Centro-Sur de Chile. Facultad de Ciencias Veterinarias, Universidad Austral de Chile. Pgs. 49.

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.

Duerr, A.E., Miller, T.A, Lanzone, M., Brandes, D., Cooper, J., O'Malley, K., les Maisonneuve, C., Tremblay, J.A., and Katzner, T. 2015. Flight response of slope-soaring birds to seasonal variation in thermal generation. Functional Ecology 2015, 29, 779–790

Ferguson Lees, J. and D. A. Christie. 2005. Raptors of the world. Princeton University Press. Pgs. 992.

Fuentes Freixanet, V.A. 2015. Arquitectura Bioclimática. Universidad Autónoma Metropolitana Azcapotzalco. División de Ciencias y Artes para el Diseño Departamento del Medio Ambiente 15(1), 31-40.

Handford, P. 1983. Breves notas sobre las aves del Valle de Tafí, Provincia de Tucumán. Neotrópica, 29 (81): 97-106.

Hellmayr, C.E. 1932. The birds of Chile. Field Museum of Natural History, Chicago. Publication 308, Zoological Series, 19(1), 492.

IUCN. 2018. The IUCN Red List of Threatened Species. IUCN Red List. http://www.iucnredlist.org.

Jiménez, J.E. and Jaksid, F.M. 1991. Behavioral Ecology of Red-Backed Hawks in Central Chile. The Wilson Bulletin. 103(1), 132-137.

MAyDS and AA (Ministerio de Ambiente y Desarrollo Sustentable y Aves Argentina). 2017. Categorización de las Aves de la Argentina. Informe del Ministerio de Ambiente y Desarrollo Sustentable de la Nación y de Aves Argentinas, edición electrónica. C. A. Buenos Aires, Argentina. Pgs. 148.

Olrog, C.C. 1959. Las aves argentinas, una guía de campo. Universidad Nacional de Tucumán, Instituto Miguel Lillo, Tucumán. Pgs. 351.

Palomino, D. and J. Valls. 2011. Las rapaces forestales en España. Población reproductora en 2009-2010 y método de censo. SEO/BirdLife. Madrid.Pgs. 154.

Richard E. and D. Contreras Zapata. 2015. Aspectos ecobiológicos sobre aguilucho común (*Buteo polyosoma*) en el contexto sinúrbico de la ciudad N. S. de La Paz (La Paz, Bolivia). Spizaetus. 19, 18-35.

Rocha O. and E. Peñaranda. 1995. Avifauna de Huaraco: una localidad de la puna semiarida del altiplano central, Departamento de La Paz, Bolivia. Cotinga. 3, 17-25.

Rumboll M, P. Capllonch, R. Lobo, and G. Punta. (2005) Sobre el anillado de aves en Argentina: recuperaciones y avistajes.Nuestras Aves 50:21–24.

Schlatter, R.P. 1979. Avances de la ornitología en Chile. Archivos de Biología y Medicina Experimentales (Chile). 12, 153-168.

Trejo, A., P. Capllonch, and L. Sympson. 2007. Migratory status of the white-throated hawk (*Buteo albigula*): what do we know up to now?.OrnitologíaNeotropica. 18, 11–19.

Venegas, C. and J. Jory. 1979. Guía de campo para las aves de Magallanes. Publicaciones del Instituto de la Patagonia. Punta Arenas. Series Monografias.11. Pgs.253.

Woods, R.W. 1975. The birds of the Falkland Islands. Compton Press Ltd., Wiltshire. Pgs. 240

* * *

Conversations from the Field: Interview with Everton Miranda about his work with Harpy Eagles (*Harpia harpyja*) in Brazil

By **Markus Jais**
E-mail: markusjais@googlemail.com

Everton Miranda crossing a river after a flash flood in Mato Grosso, Brasil. Photo © Rachel Nuwer.

Markus Jais: *What is known about the current situation of the Harpy Eagle across its distribution?*

Everton Miranda: The Harpy Eagle's range has contracted by 41% and is nowadays mostly confined to the Amazon forest. Our models indicate that 93% of the current range is encompassed by the Amazon forest, while the remaining 7% is mostly in Central America, with few remaining Harpy Eagle populations in sections in the Atlantic Forest of Brazil.

MJ: *What is the preferred habitat of Harpy Eagles?*

EM: Harpy Eagles inhabit lowland tropical moist forest. They can also be found— although in lower densities—in forest enclaves in savanna landscapes, as well as in higher altitudes in some sections of the Andes, Sierra Imataca and Atlantic Forest.

MJ: *What is known about the prey choice of Harpy Eagles?*

EM: They prey mostly on sloths in tropical for-

Harpy Eagle nestling being filmed by a documentary film crew n Mato Grosso, Brasil. Photo © Everton Miranda, personal collection

ests, and their distribution coincides largely with that of sloths. After sloths, the most important prey are primates such as howler (*Alouatta* ssp) and capuchin monkeys (*Cebus* and *Sapajus* ssp).

MJ: *How do Harpy Eagles affect prey species and what is known about so-called trophic cascades involving Harpy Eagles?*

EM: They control both population and behavior of prey species. Population is affected by top-down control, where Harpy Eagles keep primate populations in check by direct predation. Primate populations lacking top-down control have grown to the extent of negatively affecting the plant populations they depend on to feed. Additionally, primate populations have behavioral adaptations to deal with predators, and those behaviors are strongly modulated by Harpy Eagle presence.

MJ: *How could a forest ecosystem change if Harpy Eagles were absent?*

EM: An increase in primate populations within those ecosystems could create imbalance. For instance, howler monkey populations have been killing whole trees from over-browsing them, while in Atlantic Forests capuchin monkeys decimate palm trees to obtain the palm heart. Those interactions do not happen if prey populations are under top-down control by Harpy Eagles.

MJ: *What is known about the interactions of Harpy Eagles with other neotropical Eagles? Do smaller species avoid areas where Harpy Eagles are present?*

EM: I never studied that process myself; however, several other researchers have recorded interesting behaviors of Harpy Eagles interacting with other raptor species. For instance, José Vargas documented a Crested Eagle (*Morphnus guianensis)*

Everton Miranda climbing a *Bertholletia excelsa* to test camera traps in a Harpy Eagle nest in Mato Grosso, Brasil. Photo © Niki Huizinga.

feeding a Harpy Eagle fledgling. Helena Aguiar Silva and Karla Aparicio have published interesting observations of *Morphnus guianensis* interacting with Harpy Eagles at their nesting habitat. Nests of *Morphnus guianensis* have been found 1.3-2km distance from Harpy Eagle nests, therefore they don't seem to prey on other raptor species. In my study region, one Ornate Hawk-Eagle (*Spizaetus ornatus*) pair used an inactive Harpy Eagle nest during one breeding cycle, successfully fledging a chick.

MJ: *What are the main threats to Harpy Eagles?*

EM: Poaching in rural communities where they are killed out of curiosity, as a preventive action to avoid livestock predation, or in retaliation for livestock predation. Logging of the same tree species that are used as nest-trees by Harpy Eagles is also a threat. Finally, and most important is habitat loss—in the form of cattle ranching—which is incinerating the last stronghold of Harpy Eagles: the amazon forest.

MJ: *You have researched the importance of large trees for Harpy Eagles and the effects of selective logging. What can you tell us about this?*

EM: In the Amazon Forest, 92% of the nest trees used by Harpy Eagles are species of commercial interest to loggers. Therefore, vast extensions covered by forest are degraded by logging, and therefore do not represent good nesting habitat for Harpy Eagles. If this is the case in the Harpy

Eagles' last stronghold, a much larger proportion of other habitats must be compromised by logging.

MJ: *What are the difficulties studying a rare and secretive raptor that lives in a forest at low densities?*

EM: Finding nests is the main challenge, since it takes a couple years to find a significant number of nests required for research. We overcame that by offering a reward to anyone able to point us to a nest, around $100 US. This allowed us to find a large number of nests in a relatively short span of time. Additionally, this creates concrete value for the knowledge of traditional communities.

MJ: *How fast can a Harpy Eagle population recover if habitat is restored?*

EM: It is hard to say, because we have no information on Harpy Eagles recolonizing degraded landscapes. However, considering the slow breeding cycle of the species, perhaps one of the slowest among the more than 10,000 avian species on Earth, any recolonization process would be tremendously slow. Finally, the excellent work of The Peregrine Fund to create a reintroduced population teaches us the remarkable challenges related with putting the species back in the wild.

A Harpy Eagle moments after laying a second egg in its nest in Mato Grosso, Brasil. Photo © Everton Miranda, personal collection.

Female Harpy Eagle arrives at the nest with the lower half of a Gray Woolly Monkey (*Lagothrix cana*) in Mato Grosso, Brasil. Photo © Everton Miranda, personal collection

MJ: *What gaps in our knowledge of this magnificent eagle still exist and where should research focus on in the coming years?*

EM: One of the main gaps, never approached as a specific question by a researcher, is to evaluate Harpy Eagle movement ecology. Although a few fledglings have been equipped with radio-transmitters, those studies present small sample sizes and radios do not have a lifespan long enough to allow learning the fledglings home range when they reach adult age. Few adults have been equipped with radio transmitters and with such a limited sample sizes we cannot infer much about their home ranges. A major advance could then be provided if the Harpy Eagle researchers' community could simultaneously radio tag a large number (20-30) of adult eagles so that we could know their densities, habitat use, range patterns and learn how all these are affected by the breeding cycle.

MJ: *Have you ever caught Harpy Eagles in the wild and measured them? How big and heavy were these birds?*

EM: No, my research is completely non-invasive, and I have never captured a wild eagle. Whereas they are frequently mentioned as the largest or "the most powerful eagle on Earth", the first (data on morphology and body size) has never been systematically evaluated and published by the researchers who own this important data, while the second (powerfulness) is quite subjective and hard to evaluate systematically. Therefore, whereas the few published data indicates that Harpy Eagles are on average much heavier than any other large eagle species, no one has objectively approached the topic yet.

MJ: *Are there any conservation programs for Harpy Eagles and are you involved in any of these?*

EM: There are several programs, and four that are worth mentioning are: Harpy Eagle Project in Brazil (led by Tânia Sanaiotti and Helena Aguiar-Silva), the Fundación Esfera in Venezuela (led by Alexander Blanco), the SIMBIOE (led by Ruth Muñiz-López) in Ecuador, and the long-term conservation effort conducted by Jose J. V. Gonzalez together with The Peregrine Fund in Panamá. I'm not involved in any of these and started my own initiative after failing to collaborate with one research group.

MJ: *How do you see the future of the Harpy Eagle?*

EM: I hope Harpy Eagles can become an asset of

Harpy Eagle nestilng photographed during the installatino of a nest camera in Mato Grosso, Brasil. Photo© Everton Miranda, personal collection.

the Amazon forest in the form of new ecotourism products associated with the region. In this way, they can bring concrete economic benefits to the local communities that share the forest with them. Controlled and responsible tourism will certainly play a role in the conservation of this species in the future, especially outside protected areas. This can bring a sense of pride and ownership that will at the same time benefit Harpy Eagles and the millions of people who live in the amazon and dream about more prosperous lives.

MJ: *What was your most amazing experience with Harpy Eagles?*

EM: People normally think of an attack or any near-death experience while climbing nests as an "amazing experience". For me, the most amazing moment of my research was when, after a few weeks searching for nests in the amazon by myself, I saw something I believed to be a Harpy Eagle nest. After walking to its base, I noticed one jaw of a two-toed sloth, confirming that I had found a nest. That was a heartwarming moment that I will keep forever in my memory.

* * *

Raptor Research Foundation and Neotropical Raptor Network Conference

Welcome to the World Center for Birds of Prey in Boise, Idaho, USA. We invite you to join us in the celebration of the 50th anniversary of The Peregrine Fund and at the same time participate in the the Raptor Research Foundation and Neotropical Raptor Network joint conference.

On behalf of The Peregrine Fund and our conference co-hosts, Boise State University, Intermountain Bird Observatory, Golden Eagle Audubon, Birds of Prey National Conservation Area Partnership, and USGS Idaho, we invite you to join us in Boise, Idaho this October 8-14, 2021.

We are incredibly excited to host you at what we hope will be the largest RRF Conference ever, and we can't wait to share our beautiful city and state with you. Boise is the capital of the state of Idaho and is a small city located between the Boise Hills and the plains of the Snake River.

Just outside of town is access to a national treasure: Morley Nelson's Snake River National Bird of Prey Conservation Area (NCA). The 485,000 acre NCA is a breeding hotspot for raptors and home to the largest known concentration of nesting birds of prey in North America with some 800 pairs of hawks, owls, eagles and falcons flocking to the area each spring. In October, you are likely to see some of our resident raptors and take in views of the canyon with its spectacular cliffs towering 700 feet above the Snake River. If you want to check out the NCA, be sure to sign up for one of the post-conference field trips that will visit the area.

Important Dates

Registration
30 June: final day for early registration
30 August: mid registration ends

Scientific Program
30 June: deadline for abstract submission

Travel Awards
30 June: deadline to submit for the Anderson and Koplin Awards

Conference Dates
October 8: Raptor Research Foundation Board of Directors Meeting
October 9: Workshops and social events
October 10-12: Scientific Program
October 13-14: Excursions

* * *

Of Interest...

Grants

IDEAWILD
https://ideawild.org/apply.htmlt

IDEAWILD is a non-profit organization that provides small grants and equipment supplies in support of biodiversity conservation to conservation professionals in developing countries. Equipment provided through Idea Wild includes binoculars, mist nets, climbing equipment, computers, printers, global positioning systems, slide projectors, video and digital cameras, telemetry equipment, and other items in support of biodiversity conservation. The maximum application for an equipment grant is US $ 1,500.

HOLOHIL SYSTEMS
https://www.holohil.com/grant-program/

The Holohil Grant Program (HGP) aims to offer Holohil transmitters at reduced (or no) cost to projects that deserve support. The Holohil Grant Program wishes to support projects that generally meet the following criteria: The project makes significant use of Holohil transmitters for data collection, the project aims to promote scientific knowledge, the project contributes to conservation, the project engages / educates the public, and the project involves underrepresented study species of high value for research or conservation. Each quarter, Holohil will support projects by donating up to CAD $ 2,500.00 towards the purchase of Holohil transmitters.

Opportunities

VOLUNTEER HAWKWATCH COSTA RICA

The Kèköldi Hawkwatch in Talamanca, Costa Rica is looking for volunteers for its fall season 2021 (from August 15 to December 15). It is the second largest Hawkwatch in America. The study site is located in the Talamanca region of Costa Rica, between Puerto Viejo and the Cahuita National Park, Limón province, in the southern Caribbean. Volunteers must be physically fit and willing to work long hours in hot and humid conditions while maintaining enthusiasm. For more information, contact: Pablo Porras volunteer@kekoldi.org, WhatsApp: +506.8841.5999.Or visit us at www.kekoldi.org