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CARACARA CHERIWAY IN COSTA RICA

SPIZAETUS TYRANNUS IN VENEZUELA

CICCABA HUHULA IN COLOMBIA

BUTEO RIDWAYI IN DOMINICAN REPUBLIC

FALCO RUFIGULARIS IN PANAMA

EAGLES IN NICARAGUA

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Harpy Eagle (*Harpia harpyja*) and Crested Eagle (*Morphnus guianensis*) in indigenous territories of the Nicaraguan Mosquitia, one of the five great forests of Mesoamerica

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The Mosquitia of Mesoamerica constitutes one of the five most relevant natural landscapes in Mesoamerica. It encompasses a significant cultural and geographical environment shared between Honduras and Nicaragua, containing indigenous communities and traditions, and a remarkable landscape of natural ecosystems. It includes potentially sustainable populations of Harpy Eagle (*Harpia harpyja*), and Crested Eagle (*Morphnus guianensis*). These species are considered conservation emblems, as they require an extension of hundreds of square kilometers, including natural forests with minimal human intervention, prey, and an "adequate" level of connectivity on a large geographic scale. Thus Mosquitia has a high value for biodiversity conservation at the regional level and is a key region for the conservation of these species in Mesoamerica.

Both species belong to the Accipitridae family, and are the largest birds in Nicaragua and Mesoamerica. The Harpy Eagle has an estimated weight of 4.5-9 kg and the Crested Eagle weighs approximately 3 kg. Located at the top of the food chain, they feed on small arboreal and terrestrial mammals, some snakes, and smaller birds (Stiles and Skutch 1995, Howell and Webb 1995, Vargas et al 2006). Although very little is known about these species in Nicaragua, with the exception of some occasional sightings, both are under protection by law (Veda Nacional Indefinida, La Gaceta No 36 2019). Harpy and Crested Eagles are found respectively in Appendices I and II (Schulenberg 2009, Smith 2012), and BirdLife International (2019) categorizes them as Near Threatened (NT). However, the Red Book of Nicaragua categorizes the Harpy Eagle as Critically

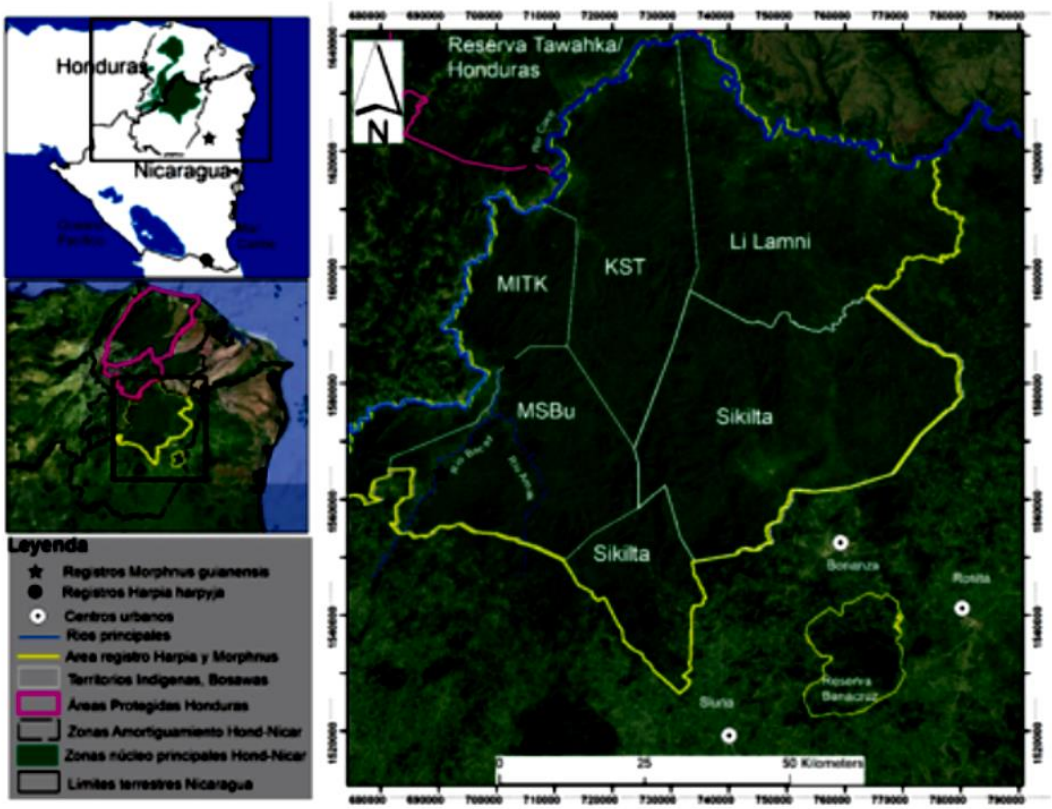

Figure 1. **Records of Harpy Eagle (*Harpia harpyja*) and Crested Eagle (*Morphus guianensis*) in indigenous territories of the Nicaraguan Mosquitia: Mayangna Sauni Bu (MSBu), Miskito Indian Tasbaika Kum (MITK), Kipla Sait Tasbaika (KST), Li Lamni and Sikilta. Map by Fabricio Díaz-Santos, WCS/Programa de Conservación de Jaguares Nicaragua. October, 2019.**

Endangered (CR), and the Crested Eagle is categorized as Endangered (EN) because these birds are at high risk in their wild state as a result of deforestation, forest fragmentation and land use change (Red List 2018).

The Wildlife Conservation Society (WCS) and the Darwin Initiative of the United Kingdom have made it a priority to contribute to the knowledge and conservation of biodiversity worldwide, with emphasis on the most relevant natural landscapes, such as the Northern Mesoamerican region. For that reason, between 2016-2019, both institutions generated a baseline of avifauna in the indigenous territories of the northern region of Nicaragua.

The baseline includes bird sampling and the use of landscape-scale camera traps, and evaluating different types of vegetation and human influence along a gradient of use in indigenous communities in the Coco and Bocay river basins. These territories include Mayangna Sauni Bu (MSBu), Miskito Indian Tasbaika Kum (MITK),

and Kipla Sait Tasbaika (KST), which together with three more Indigenous Territories, are part of the Bosawás Biosphere Reserve (RBB) (Figure 1), and represent an Important Bird Area (IBA) NI024 (Morales et al 2009).

The RBB includes other smaller areas, geographically separated from Indigenous Territories, with an altitudinal gradient between 100 and 1,700 meters above sea level, with tropical humid and rainforests (Holdridge et al 1971). Several authors have described how the indigenous people of the Mesoamerican Mosquitia have modified their environment on a landscape scale (Koster 2006, 2008a, 2008b, Dunn and Smith 2011, Dunn et al 2012) - a similar and widespread pattern that has been repeated in indigenous communities from other forested Neotropical regions. In general terms, the pattern of human use in areas close to the communities is intense and implies the modification of the landscape for small-scale migratory agriculture for self-consumption. These impacts are reduced the further away one is from settlements. Approximately 3 km away in each of the communities of MSBu, MITK, and KST, it is common to find a patchwork of natural and secondary forests. Hunting in the forest also decreases in areas farther away from the communities (Escamilla et al 2000, Smith 2005, 2008, 2010, Dunn and Smith 2011, Dunn et al 2012) - approximately 6 km in the case of the MSBu, MITK, and KST territories.

Additionally, some indigenous people engage in the incipient activity of cattle ranching in the Nicaraguan Mosquitia. This is exerting a grow-

Figure 2 (left). **Harpy Eagle, 23 April, 2019. Indigenous territory Pilawas Community, MSBu – Nicaraguan Mosquitia. WCS/Nicaragua Jaguar Conservation Program. 2019.**

Figure 3 (right). **Harpy Eagle, 23 April, 2019. Indigenous territory Pilawas Community, MSBu – Nicaraguan Mosquitia. WCS/Nicaragua Jaguar Conservation Program. 2019.**

***Figure 4 (left)* and *Figure 5 (right)*. Harpy Eagle, 2 November, 2009. Banacruz. Photo © Arnulfo Medina-Fitoria.**

ing negative impact on the natural forests of their territories, and is most evident in communities on the banks of the Río Coco channel that constitutes the border between Honduras and Nicaragua.

The forest in the Indigenous Territories of the Nicaraguan Mosquitia includes a single block of approximately 6,000 km², plus another 2,000 km² of other protected areas around these territories, including the Banacruz Reserve. It is precisely its size and its well-preserved forest that allows the Nicaraguan Mosquitia to be part of the Five Great Forests Initiative of Mesoamerica (WCS Newsroom 2019). These areas in Nicaragua are also ecologically linked to natural areas of the Honduran Mosquitia, which includes the Río Coco and Patuca basins, with 8,300 km² of the Río Plátano Biosphere Reserve and 2,331 km² in the Tawahka Biosphere Reserve.

Harpy Eagle

The most recent photographic record of a Harpy Eagle in Nicaragua occurred on MSBu in RBB, (14 ° 18′38.7" N, 85 ° 07′12.3" W) at an elevation of 239 m.a.s.l. on 23 April 2019. The individual was photographed with a Bushnell camera trap. This constitutes the third photographic record for the country in three and a half years (Figure 1). The bird remained in the area for 25 minutes (Figures 2 and 3) and had prey in its talons, which we were not able to identify.

Before this above-described record, Howell (in Martínez-Sánchez and Will 2010) mentions two other Harpy Eagle records. The first, a sighting in the department of Rivas / San Juan del Sur Pacific region of Nicaragua, was with no specific date. The second record was in the year 1907 in Matagalpa. The individual was collected and the skin is in the American Museum of Natural

Figure 6 (above left). **Crested Eagle, 29 November 2018. Indigenous territory, Ahsawas Community, MSBu – Moskitia Nicaragüense. Photo © Carlos Gonzales Dixon - WCS Nicaragua.**

Figure 7 (above right) **and** ***Figure 8 (below left).*** **Crested Eagles in dark morph and light morph, respectively. Photographed on 26 February, 2017 in the indigenous territory, Puluwas Community, MSBu - Nicaraguan Moskitia. Photos © Fabricio Díaz-Santos, WCS/Programa de Conservación de Jaguares Nicaragua.**

History (AMNH) (Martínez-Sánchez and Will 2010). The first photographic record of a Harpy Eagle in Nicaragua took place on 2 November 2009 (Figures 4 and 5). This was a casual sighting in the protected area of Banacruz, (N 13 ° 52'32", w 84 ° 34'08.8 ') at 236 m.a.s.l. (Figure 1). The second photographic record was in Río San Juan, Nicaragua, on 16 February 2016 (eBird List S27703613).

Crested Eagle

There are two records for this species - one in 2018 and one in 2017. These represent three individual Crested Eagles in Nicaragua. The most recent ocurred on 29 November, 2018 in the community of Ahsawas, Bocay River, MSBu, RBB (N 14 ° 11´14.3, W 85 ° 05´11.1´´) at 192 m.a.s.l. (Figure 6). The other record was of two - one dark morph and one light morph - observed on 26 February, 2017, in the Puluwas Community, MSBu Territory (N 14 ° 11´14,3´´, W 85 ° 05´11.1 ´´) at 296 m.a.s.l. (Figures 1, 7, and 8).

Although Howell does not report this species in Nicaragua, it is described as an "expected species" since it is present north and south of the

country (Martínez-Sánchez and Will 2010). The first records were reported on eBird in May and December 2001 (Lists S9151143 and S9151576 respectively), in Alamikamba, North Caribbean Coast Autonomous Region (RACCN) (Kjeldsen 2003, 2005), and then in March 2015, in Río San Juan , (eBird S22510801, Figure 1).

Connectivity Assessment of the Nicaraguan Mosquitia

WCS has carried out biodiversity research and management activities with the communities of the Indigenous Territories of the Nicaraguan Mosquitia since 2006, and is now initiating a similar process in the Indigenous Areas and Territories on the Honduran side. The recent record of *H. harpyja* in a camera trap constitutes the first record of this species in a study of this type in Nicaragua. In addition, the recent records of *Morphnus guianensis* in the communities of Ahsawas and Puluwas are evidence of the importance of the Indigenous Territories of the Nicaraguan Mosquitia for the conservation of large raptors.

Traditional land use by indigenous communities at the landscape level and their dependence on natural forest, prior to the introduction of livestock, has favored the conservation of this natural wooded landscape that, interconnected with secondary forests, has made the conservation and preservation of these species possible. The records of these eagles in the Honduran Mosquitia, (Vargas et al 2006, Gallardo 2014, eBird 2012), show that the ecosystem on both sides of the border constitutes a single ecological region and that it is a high priority for the balance and conservation of the biodiversity at a regional level, and in particular of these two magnificent raptors.

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