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NOTE

POWER LINES AS A THREAT TO A CANOPY PREDATOR: ELECTROCUTED HARPY EAGLE IN SOUTHWESTERN BRAZILIAN AMAZON


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Power lines as a threat to a canopy predator: electrocuted Harpy Eagle in southwestern Brazilian Amazon

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Harpy Eagle Harpia harpyja Linnaeus, 1758 is the largest bird of prey in the Americas (Sick 1997). Globally listed as a Near Threatened (NT) species (Birdlife International 2017), it is threatened with extinction in several countries within its Central to South American geographic range. In Brazil, the species was classified in 2014 as Vulnerable (VU) (Brasil/MMA 2014a). Deforestation, habitat loss and hunting are the main impacts affecting Harpy Eagle populations (Álvarez-Cordero 1996; Trinca et al. 2008; Deluca 2012; Gusmão et al. 2016; Birdlife International 2017). Electrocution from power transmission lines is another threat affecting large birds (e.g., eagle owls, Sergio et al. 2004; cranes, Shaw et al. 2010; raptors, Lasch et al. 2010; storks, Kaluga et al. 2011; condors, Rideout et al. 2012; vultures, Angelov et al. 2013). Such impacts
may sometimes be sufficiently severe to alter local species distributions (Sergio et al. 2004). The effects on Harpy Eagle population dynamics of electrocution from collisions with power lines is unknown. Modelling of a Bonelli’s Eagle *Aquila fasciata* population predicted that even low levels of electrocution may threaten the overall population viability of long-lived raptors (Hernández-Matías et al. 2015).

Concern over negative interaction between birds and transmission lines began to emerge early in the 20th century (Michener 1928). Most reported case studies were of migratory birds and resident birds in North America, Europe, Africa, Asia, and Oceania (Avery 1978; Salvador & Ibanez 2006; Lehman et al. 2007; Kagan 2016; Mojica et al. 2018). More recently this problem started attracting attention in South American countries such as Argentina (Orellana & Cornejo 2010; Ibarra & Delucca 2015; Galmes et al. 2017), however, there has been little attention in Brazil, a country that has an extensive network of high-tension transmission lines (see Raposo 2013). Transmission lines drive several threats to Brazilian Amazon conservation (Hyde et al. 2018), among which are bird collision risk and mortality. Studies of bird collision on high voltage lines are still limited to licensing studies and mitigation measures (such as bird flight diverters), with uncertainty as to their effectiveness (Biasotto et al. 2017; Biasotto & Kindel 2018).

Harpy Eagle nesting trees have been mapped in Rondonia State (Costa et al. 2015; Gusmão et al. 2016; Costa & Nunes 2017), a region of Brazilian Amazonia with extensive anthropic impacts on biodiversity over the last 50 years (Fearnside et al. 2012; Ochoa-Quintero et al. 2015). Here we present a case study of a juvenile Harpy Eagle electrocution in the southern region of the Amazon forest known as the “arc of deforestation”.

The study site was located in Alta Floresta D’Oeste municipality, in the southwest center of Rondônia State, Brazil (Figure 1). In this area, the native forest is highly fragmented as a result of land-use changes,
resulting in a matrix of pasture and commercial crops, with small blocks of poorly-connected forest (Fearnside 1989; Piontekowski et al. 2019). The average annual precipitation is 2,000mm and the average annual temperature is 24°C (Alvares et al. 2014).

On 29 August 2018, a juvenile Harpy Eagle female was found dead (Image 1) below a Rural Aerial Power Distribution Network (RDR) with standardized voltage Level of 13.8kV (low voltage). The bird was found beside the Linha 47.5 Highway in a terra firme forest, 10km from the nearest urban area and 6.5km from a known Harpy Eagle nest (Gusmão et al. 2016). Inspection of external and internal morphology found no evidence of trauma, body lesions, or firearm-associated damage. The claws had a crumbled and flaking surface texture and appeared blackened, giving an overall appearance typical of burned tissue (Kagan 2016). Thus, while the incident was not witnessed, inspection of the body during dissection with the evidence of the burnt claws, and the positioning of the body near the pole and below the power transmission network were consistent with the animal having tried to perch on the high-tension wire, with subsequent death by electrocution. Post mortem examination at the Laboratório de Mastozoologia in Centro de Pesquisa em Limnologia, Biodiversidade e Biotecnologia (CELBE - Limnology, Biodiversity and Biotechnology Research Center), Mato Grosso State confirmed electrocution. The specimen was later taxidermized and deposited in the UFMT reference collection (accession number UFMT 4910).

This is the second record of a fatal Harpy Eagle electrocution in Rondonia. The first reported case was of an adult electrocuted in 2008, around 105km west Seringueira municipality on a similar type of power line, and 6km away from a Harpy Eagle breeding site (Gusmão et al. 2016). According to Urios et al. (2017), juvenile Harpy Eagles are known to disperse more than 35km from the natal nest.

There are two other records of Harpy Eagle interaction with power lines in Brazil. One was an adult female that was rescued and rehabilitated in the wild after a collision with a low voltage electricity distribution line in a rural area of Senador José Porfírio municipality, Para state (Aguiar-Silva et al. 2014). The other was a juvenile born in captivity and released as a part of a reintroduction program, that died in Panama after contact with power lines (Watson et al. 2016).

These data compiled from different reports indicate
that power transmission networks are potentially a threat to adult and dispersing juvenile Harpy Eagles (Urios et al. 2017; Mojica et al. 2018). Juvenile eagles in general were electrocuted at approximately twice the rate of subadults or adults (Mojica et al. 2018). Harpy Eagles are at particular risk in human-modified landscapes, as habitat discontinuity may force juveniles to cross deforested areas to pair up, and establish breeding territories and reproductive sites. Due to the loss of tall trees in forest fragments (Nascimento & Laurence 2006), Harpy Eagles might use the pylons of power line systems as perches (Rettig 1978).

The impact of habitat loss on electrocution of raptors has been noted in other sites, affecting species that include the Black-chested Buzzard Eagle Geranoaetus melanoleucus (Ibarra & DeLucca 2015), Griffon Vulture Gyps fulvus, Golden Eagle Aquila chrysaetos, Bonelli’s Eagle Aquila fasciata. Eurasian Eagle Owl Bubo bubo (Hernández-Matías et al. 2015, Pérez-García et al. 2017) and Crowned Solitary Eagle Buteagallus coronatus (Galmes et al. 2017).

A number of mitigation measures such as retrofitting (Fox & Wynn 2010; Chevallier et al. 2015; Dwyer et al. 2019) have been implemented successfully in Europe and elsewhere (Bevanger 1994; Janss & Ferrer 2001; Tintó et al. 2010). These practices could be followed in Brazil and included in action plans (Plano de Ação Nacional para Conservação das Aves da Amazônia, Brasil 2014b). In addition, future research should focus on impacts on juvenile raptors, since they seem to be disproportionately involved in collisions with power lines (Harnes & Wilson 2001; Sergio et al. 2004; Tabolka 2014).

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