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Behaviour and diet of the Mantled Hawk *Leucopternis polionotus* (Accipitridae; Buteoninae) during deforestation of an Atlantic Rainforest landscape in Southeast Brazil

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RESUMO: Comportamento e dieta do Gavião-pombo-grande *Leucopternis polionotus* (Accipitridae; Buteoninae) durante o desmatamento de um remanescente de Mata Atlântica no sudeste brasileiro. Entre setembro e novembro de 2008, observou-se o comportamento e os hábitos alimentares um casal de Gavião-pombo-grande *Leucopternis polionotus* durante a supressão vegetal de um fragmento de Mata Atlântica estacional semidecidual localizado na região do Quadrilátero Ferrífero, MG, Brasil. Inicialmente a espécie se mostrou extremamente irritada com a presença humana no interior do remanescente florestal, realizando vôos circulares sobre o dossel, vocalizando intensamente, investindo contra trabalhadores e regurgitando conteúdo estomacal sobre o autor do presente trabalho. Com o avançar da frente de desmate, os indivíduos se tornaram mais tímidos e reservados, até abandonarem definitivamente o fragmento. Apesar de intimamente associados a cobertura florestal, os exemplares apresentaram hábitos oportunistas, realizando a captura em área aberta de um pequeno roedor desalojado pela atividade de desmate e utilizando a borda do fragmento para emboscar presas em locais recém desbastados. Foram também registradas cinco capturas de serpentes e uma tentativa frustrada de predação sobre *Penelope superciliaris*. Os rapinantes se mostraram ativos durante todo o fotoperíodo, com pico de atividade associado as horas mais quentes do dia. Apesar dos esforços despendidos, nenhum ninho foi detectado. Em outro fragmento de maior porte localizado na mesma região, a espécie foi também avistada, tendo sido registrados indivíduos adultos solitários e um casal formado.

PALAVRAS-CHAVE: *Leucopternis polionotus*, Gavião-pombo-grande, desmatamento, Mata Atlântica, Quadrilátero Ferrífero.

KEY-WORDS: *Leucopternis polionotus*, Mantled Hawk, deforestation, Atlantic Rainforest, Quadrilátero Ferrífero.

The genus *Leucopternis* is composed of small and medium-sized raptors that inhabit forested regions from Mexico to Argentina (Brown and Amadon 1968, Amadon 1982). The Mantled Hawk, *L. polionotus* is an Atlantic Rainforest endemic species (Mañosa and Pedrocchi 1997, Mañosa *et al.* 2003, Amaral *et al.* 2006), distributed from the Brazilian State of Alagoas to the Misiones province in Argentina, also occurring in Paraguay (Brown and Amadon 1968, Sick and Teixeira 1979, Beltran 1985, Sick 1997). In spite of its broad latitudinal distribution, this conspicuous buteonine is facing increasing threats, since the advanced destruction of its natural habitats (Galindo-Leal and Câmara 2003, Salvador-Jr. and Silva 2009), the remaining populations have experienced a significant reduction and became isolated from each other (Amadon 1982, Beltran 1985, Melo-Júnior 1998, Ferguson-Lees and Christie 2001).

Although not placed among the Brazilian threatened fauna (Machado *et al.* 2008), *L. polionotus* is considered probably threatened in the State of Rio de Janeiro (Bergallo

et al. 2000), near threatened in Paraná (Mikich and Bérnils 2004), vulnerable in São Paulo (Law No. 53,494 from October 2th 2008) and Espírito Santo (Simon *et al.* 2007), endangered in Rio Grande do Sul (Marques *et al.* 2002), and critically endangered in Minas Gerais State (COPAM 2008), being also listed in the IUCN Red List under the near threatened category (IUCN, 2010). According to Melo-Júnior (1998), the species may become rarer in the near future due to the deforestation of hillsides where Atlantic Forest fragments still remain.

Despite such threats, with the exception of the knowledge provided by Schubart *et al.* (1965), Albuquerque (1986, 1995), Luçolli (1991), Martuscelli (1996), Mañosa and Pedrocchi (1997), Sick (1997), Mañosa *et al.* (2002, 2003), Willis and Oniki (2002), Seipke *et al.* (2006) and Canuto (2010), basic aspects of this hawk's biology still remain unknown. Thus, the objective of the present study is to provide new information on the behaviour and diet of *L. polionotus*, as well as to report new

records of the Mantled Hawk in the Minas Gerais State, Southeast Brazil.

MATERIALS AND METHODS

The study was carried out from September to November 2008 during the follow up of the partial deforestation of a 37.05 ha seasonal semi deciduous forest fragment located 1,290 m a.s.l. at the top of a mine dig in the border between the counties of Caeté and Barão de Cocais (19°57'S, 43°36'W). The sightings were registered using 10 x 25 and 10 x 50 binoculars, voice recorder, video and digital photographic cameras.

Searches at the borders and through the fragment were carried out in order to follow the specimens and register their activities. Tree tops that were supposedly suitable for nesting were carefully inspected from several angles. Visual searching on access roads and nearby human settlements was also made. Sex identification was based on the larger size of the female in comparison to the male (Brown and Amadon 1968, Amadon 1982, Beltran 1985, Ferguson-Lees and Christie 2001). Additional observations were carried out in a larger and well preserved fragment (20°00'S, 43°34'W) located 1170 m a.s.l. and 7,1 km away from the main studied area, on the border between the counties of Barão de Cocais and Santa Bárbara, where a pair and solitary adult Mantled Hawk individuals were also registered.

RESULTS

The first sighting was on September 18th, when the deforestation activity was still limited to the fragment's edges. At 2:35 p.m. an individual was observed soaring from the canopy and gliding over the edge of the mine dig. From that moment on, there were several sightings of the species, being possible to register not only individuals gliding and soaring alone, but a couple displaying mutual flights with the male positioned above and behind the female.

As the deforestation front advanced on the 25th of September, at 02:10 p.m., one of the individuals was attracted by the human presence in the fragment. This raptor seemed to be disturbed, as it glided and flew actively over the canopy emitting repeated alert calls. It also perched on the highest trees nearby the area it was intensely calling from (Figure 1).

Due to a temporary interruption of the deforestation, the area was visited again only on the 30th of September, when both male and female seemed to be much distressed by the human presence. In that occasion the female charged at two workers in four instances, and the male regurgitated fresh stomachal content all over the author of the present paper (Figures 2 and 3).

On the 1st of October, while watching the deforestation process from a nearby perch, the male attacked a Rusty-margined Guam *Penelope superciliaris* (Cracidae) but its chase was unsuccessful. From that day on, both individuals conspicuously changed their behaviour in



FIGURE 1: Disturbed Mantled Hawk calling right in front of the author during the deforestation of its home range in the Quadrilátero Ferrífero. Photo: Luiz F. Salvador-Jr.



FIGURE 2: Male Mantled Hawk ready to regurgitate all over the author of the present paper. Photo: Luiz F. Salvador-Jr.

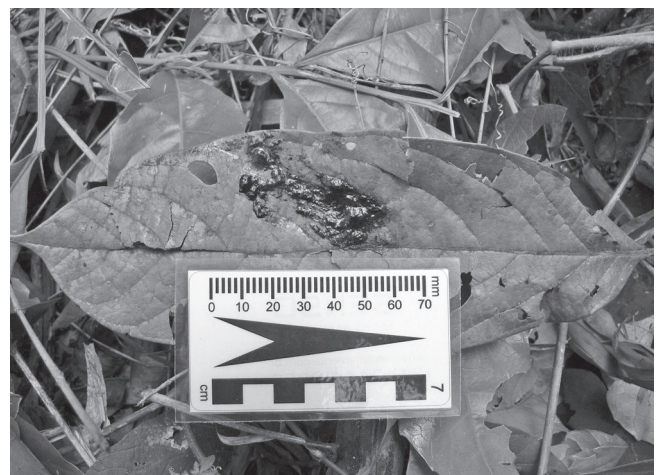


FIGURE 3: Stomachal content thrown all over the author by male Mantled Hawk. Photo: Luiz F. Salvador-Jr.

TABLE 1: Preys consumed by Mantled Hawk *L. polionotus* already reported in the literature, including the results of the present study.

Preys	Site	Source
Snake and Rufous-sided Crake <i>Laterallus melanophaius</i>	Linhares, ES, Southeast Brazil	Schubart <i>et al.</i> (1965)
Birds and rodents	Southeast Brazil	Albuquerque (1986)
Birds (including Muscicapidae, Trogonidae, Thraupidae, Emberizidae, Cuculidae, Psittacidae and Cracidae)	Parque Estadual da Ilha do Cardoso, SP, Southeast Brazil	Martuscelli (1996)
Birds and lizards/Rock Cavie <i>Kerodon rupestris</i>	—/Vale do Jequitinhonha, MG, Southeast Brazil	Sick (1997)
Snake and dove	Parque Estadual Intervales, SP, Southeast Brazil	Mañosa <i>et al.</i> (2002)
Bird	Santa Tereza, ES, Southeast Brazil	Willis and Oniki (2002)
Lizard	South Brazil	Seipke <i>et al.</i> (2006)
Snakes and Sigmodontinae rodent	Quadrilátero Ferrífero, MG, Southeast Brazil	Present study

relation to the workers, reducing the calling frequency and avoiding direct human contact within the fragment. Even so, it was possible to register the chase of a small rodent (Sigmodontinae) by male Mantled Hawk in an already cleared area, right in front of the author and the saw operators, as well as the capture of three colubrids and two unidentified snakes, all of them carried by the raptors in their beaks to areas out of reach of the observer.

It became increasingly difficult to monitor the activities of the raptors because the frequency of the sightings decreased as the deforestation progressed to other parts of the fragment. In that phase the use of the digital cameras was very useful since video sequences made it possible to still detect both genders feeding while soaring. On 21st of November there was a total of 6.2 ha deforested and no more sightings of the hawks were made.

While monitored the raptors never flew over the dig nucleus, despite gliding regularly at its edge. Although activity peaked from 10:30 a.m. to 03:00 p.m., flights over the forest canopy were registered between 07:10 a.m. and 05:35 p.m. and under several meteorological conditions, including sunny, foggy and rainy days.

Despite all efforts, no nest was found. With the exception of the mutual flights and the agonistic behaviours displayed by both genders against people in the fragment, no other indication of reproductive activity was observed in the studied area.

Sporadic observations in the second sampled area showed that the species seems not to use only the continuous evergreen forest, but also its edges, natural gaps within the fragment and patches of dry trees located along the hills around it, perching for long periods while searching for prey. During one occasion, a *P. supercilialis* individual was registered emitting a warning call in the presence of a solitary Mantled Hawk gliding over the forest.

DISCUSSION

Although some researchers have reported behavioural aspects of *L. polionotus* (Martuscelli 1996, Sick 1997, Mañosa *et al.* 2002, 2003), up to now only Seipke *et al.* (2006) and Canuto (2010) provided information

about interactions between Mantled Hawk and man. The formers affirm that the species can be quite vocal in human presence. The later concluded that this raptor presents a significant territorial behaviour, based on the recording of some individuals gliding around and calling right in front of the observer during his investigation.

Although Mantled Hawk showed to be attracted and called repeatedly in human presence during the present study, the species displayed a strong and remarkable territorial conduct, having both genders clearly defending a given area through extreme actions, such as charging against workers and regurgitating stomachal content all over the author.

This scenario raised the hypothesis that *L. polionotus* could be breeding during deforestation, since the behaviours adopted by the couple were similar to those displayed by *Buteo melanoleucus* in the vicinities of its nest in Serra do Curral mountain ridge (Salvador-Jr. *et al.* 2008), being also in agreement with other raptors that defend their nests in a vigorous manner (Newton 1979).

Nevertheless, the absence of other breeding indicators such as nest presence, repetitive carrying of preys to a given site, callings or sightings of a third individual (sibling), as well as the deserting of the fragment by the couple, all that together indicate that the species did not breed in this area during the present study. Thus, the most likely reason for the agonistic behaviour adopted by both genders against people in the fragment was the stress unchained by the invasion and deforestation of the Mantled Hawk's territory, giving support to the thought that the species may be very sensitive to habitat intervention.

The behavioural aspects related to flying patterns, activity time, prey consumption during flight and selection of exposed perches are coincident with the reports of Sick (1997), Mañosa *et al.* (2003) and Seipke *et al.* (2006). The capture of preys on the ground was previously reported for the Mantled Hawk (Sick 1997, Seipke *et al.* 2006), as well as the ambush strategy adopted by this raptor when perching and waiting for prey at forest edges (Mañosa *et al.* 2002). Like its congener *L. lacernulatus* (Martuscelli 1996), in the present study Mantled Hawk also manifested some opportunistic feeding habits using recently cleared areas to ambush and capture preys.

The attack towards the guam and the predation on snakes and a rodent are in agreement with the feeding habits previously reported for the Mantled Hawk, considering that birds, reptiles and mammals seem to be important components of its diet (Table 1).

Even though the Quadrilátero Ferrífero is considered an area of special biological importance (Drummond *et al.* 2005), located in the transition zone between the Atlantic Rainforest and the Cerrado biomes, it is still subjected to extensive exploitation of iron ore. Despite the creation of a few natural reserves and the existence of several environmental programs carried out by the mining companies, the continuous deforestation of new iron deposits is here pointed out as the main threat to Mantled Hawk, since this practice is directly related to the reduction and isolation of the remaining populations of the species.

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