

Aves, Accipitridae, *Spizaetus tyrannus* (Wied, 1820): New records in the Quadrilátero Ferrífero region, Minas Gerais, Brazil

Luiz Fernando Salvador-Jr.^{1*}, Marcus Canuto², Carlos Eduardo Alencar Carvalho² and Giancarlo Zorzin^{2,3}

1 Neotropical Research – Grupo de Estudo para a Conservação da Fauna Neotropical. Rua Dona Cecília 50 / 05, Serra. CEP 30220-070. Belo Horizonte, MG, Brasil.

2 SOS Falconiformes – Centro de Pesquisa para a Conservação das Aves de Rapina Neotropicais. Rua Odilon Braga 1370, Mangabeiras. CEP 30310-390. Belo Horizonte, MG, Brasil.

3 Universidade Federal de Viçosa, Departamento de Biologia Animal, Museu de Zoologia João Moojen. Vila Gianetti 32. CEP 36570-000. Viçosa, MG, Brasil.

* Corresponding author. E-mail: neotropicalresearch@hotmail.com

ABSTRACT: The Black Hawk-Eagle *Spizaetus tyrannus* (Wied, 1820) is a typical forest raptor classified as an endangered species in the state of Minas Gerais, southeast Brazil. Threats include deforestation and fragmentation of forest areas. Although the present investigation points 16 new records of the species in the Quadrilátero Ferrífero, it is noteworthy that the advance of mining activity and expansion of forestry of *Eucalyptus* spp. in this region are subtracting the forest remnants and increasingly reducing available habitats for this predator inside its limits.

The Black Hawk-Eagle *Spizaetus tyrannus* (Wied, 1820), is an average-sized raptor that is widely distributed throughout the eastern and central regions of the Neotropics, ranging from southern Mexico to eastern Paraguay and northeastern Argentina (Ferguson-Lees and Christie 2001). Like its congeners, it is a typical forest eagle (Brown and Amadon 1968; Amadon 1982; Ferguson-Lees and Christie 2001; Katzner and Tingay 2010), although it often soars over semi-open country and has been found nesting there (Amadon 1982).

Even though it is not listed among the endangered species of the Brazilian fauna (Machado *et al.* 2008) due to the existence of a great population of the *S. t. serus* race in the Amazonian domains, the *S. t. tyrannus*, endemic to the Atlantic Rainforest, (Brown and Amadon 1968; Ferguson-Lees and Christie 2001), is present in the red lists for the states of Espírito Santo (Simon *et al.* 2007), Paraná (Mikich and Bérnills 2004), Rio de Janeiro (Bergallo *et al.* 2000), Rio Grande do Sul (Marques *et al.* 2002), São Paulo (Granzinolli 2009) and Minas Gerais (COPAM 2008), the latter being classified as endangered specially due to deforestation (Andrade 1998).

Covering an area of approximately 7,200 km² (Jacobi and do Carmo 2008) located in the transition zone between the Cerrado and the Atlantic Rainforest (Drummond *et al.* 2005), the Quadrilátero Ferrífero has been intensely explored by mining throughout history, as it shelters one of the largest iron reserves in the planet and is also considered to be one of the main auriferous deposits in Brazil (Ribeiro-Kwitko and Oliveira 2004). Despite its considerable size and the fact that it shelters important natural reserves which maintain part of the ecological integrity of the environments protected by them, to date only Pinto (1952), Carnevali (1980) and Zorzin *et al.* (2006) have indicated in scientific literature the presence of *S. tyrannus* within this region. The data was recorded

between Sabará and Santa Luzia counties, Caraça mountain ridge and municipality of Nova Lima, respectively.

Considering the scarce knowledge on the current distribution, habitat use and level of tolerance to impacted environments by *S. t. tyrannus*, the present study has the objective of indicating new records of the Black Hawk-Eagle in the Quadrilátero Ferrífero, describing aspects related to the use of habitat and characterizing the recorded environments. Thus, the results presented here may not only contribute to a better understanding of its biology, but mainly provide a basis for the efforts in preserving this predator in this region.

During the ongoing project “*Aves de rapina em ambientes antrópicos: os rapinantes diurnos do Quadrilátero Ferrífero*” conducted since 2005, we have recorded 16 new sightings of *S. tyrannus* (Table 1), which significantly increased the number of documented records in the region (Figure 1).

The species was recorded five times in the portion of the Quadrilátero Ferrífero which comprises the Metropolitan Area of Belo Horizonte. In this city an immature was seen on 30 June 2005 crossing the extent of the Parque Municipal Paredão da Serra do Curral on a SW NE direction, until it dove and disappeared into the trees located near the Parque Municipal das Mangabeiras. On 15 August 2008, we recorded an adult crossing the road which connects the municipalities of Caeté and Barão de Cocais in the proximity of the Rancho Novo district. Still in Caeté, on 3 November 2008, an adult was recorded in the proximity of Serra do Itamarã while gliding. In the municipality of Sabará *S. tyrannus* was recorded on 28 and 30 November 2008, both sightings occurred in the district of Pompéu and involved soaring solitary adult individuals.

At Barão de Cocais, a municipality located near Caraça mountain ridge, the species was also detected on five occasions with all records made during 2008. On 7 August an adult was sighted gliding at the edge of a forest fragment

located near the border of the Santa Bárbara municipality, then wind soaring over large extensions of open areas until it was out of the observer's sight. On 13 September an adult was recorded perched on a small tree on the margin of the dirt road that connects the downtown to Jazida do Baú. As we approached, the raptor moved to another perch and crossed the road, taking refuge on a tree canopy (Figure 2A) until it left permanently. Still in the proximity of Jazida do Baú, on 27 September an adult was seen soaring over a rupestrian field (Figure 2B) until it disappeared behind the top of the elevation. On 11 October we recorded an immature soaring over the MG 436 road (Figure 2C) while on the 16th of the same month an adult was detected gliding over forest fragments located near the border with the Caeté municipality. Still on the proximity of the Caraça mountain ridge, on 14 May 2010 an adult was sighted from the BR 381 road taking advantage of thermal air currents over a semi-open landscape in the municipality of São Gonçalo do Rio Abaixo (Figure 2D).

On the west portion of the region we recorded the species only on 22 July 2008, when an adult was detected soaring over a forest fragment located on the bank of the Reserva Ambiental de Rio Manso's artificial reservoir, on the municipality of Brumadinho.

Near the eastern limit of the Quadrilátero Ferrífero, in the county of Rio Piracicaba, the species was recorded during 22, 23 and 24 June 2010 soaring and calling over semi-open areas located on the right-side bank of the river from which the municipality takes its name (Figures 2E and 2F).

The only record made in the Quadrilátero Ferrífero's southern stretch occurred in Ouro Preto on 17 March 2008 at the Parque Estadual do Itacolomi, near the border with the Mariana municipality, when an adult was detected wind soaring until it left the observer's sight.

Although inserted in a genus that comprises typically forest species (Brown and Amadon 1968, Amadon 1982, Ferguson-Lees and Christie 2001, Katzner and Tingay

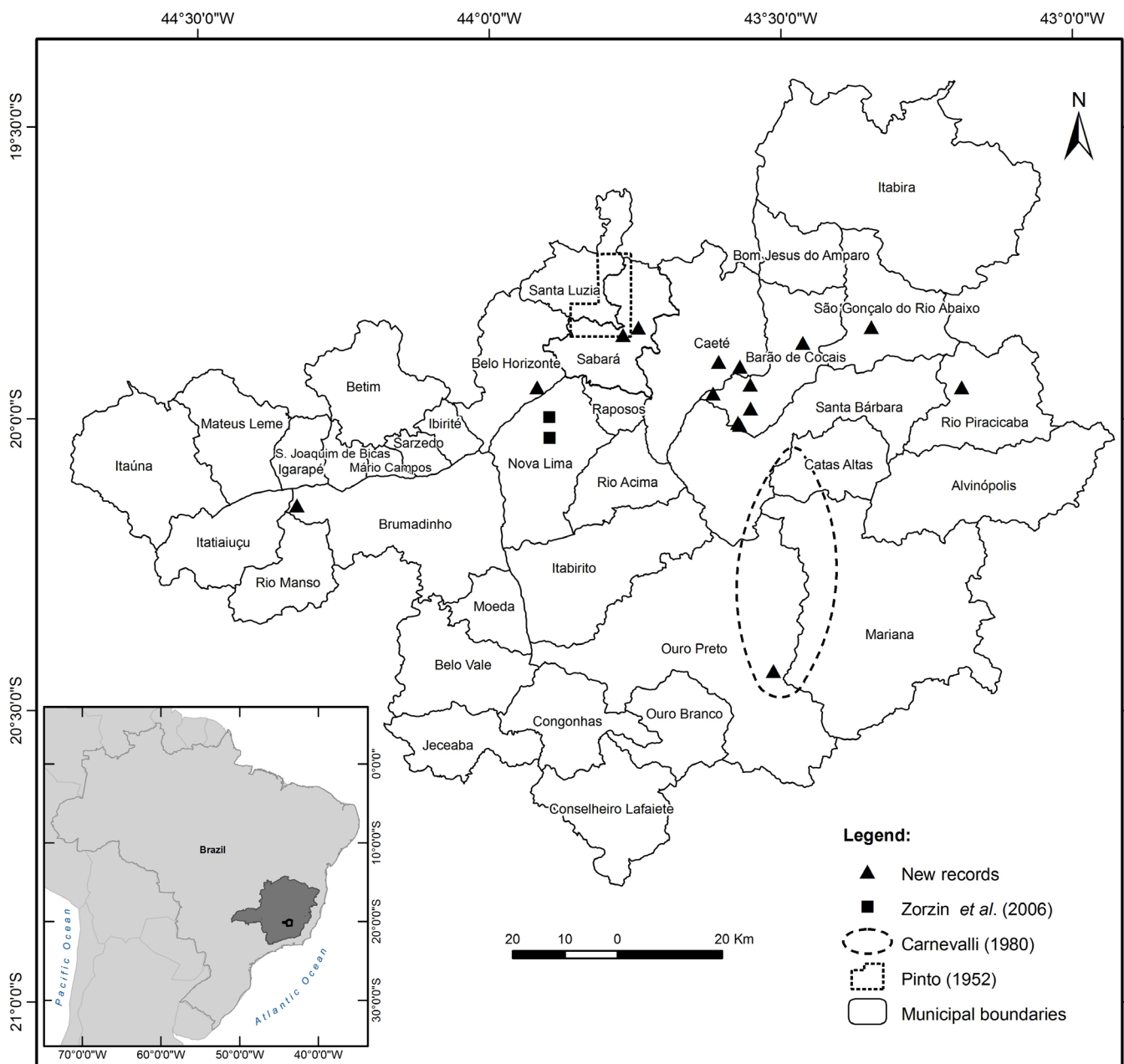


FIGURE 1. New and historical records of the Black Hawk-Eagle *Spizaetus tyrannus* within the counties that compose the Quadrilátero Ferrífero region, Minas Gerais, Brazil.

2010), *S. tyrannus* also explores semi-open landscapes (Brown and Amadon 1968, Amadon 1982, Ferguson-Lees and Christie 2001, Canuto 2008), demonstrating a certain degree of tolerance regarding deforestation and other anthropic disturbances (Jullien and Thiollay 1996; Thiollay 1999; Ferguson-Lees and Christie 2001; Canuto 2008). Although these characteristics were not evident in a study conducted in a fragmented Atlantic Rainforest landscape near the Quadrilátero Ferrífero (Salvador-Jr. and Silva 2009), they could explain the fact that many of the new records described here occurred in impacted areas that no longer have their original ecological characteristics. However, we must emphasize that many of these localities are situated near expressive forest fragments where there have been historic recordings of

the species, including Caraça mountain ridge (Carnevali 1980) and RPPN Mata do Jambreiro (Zorzin *et al.* 2006), as well as other important remaining areas such as RPPN AngloGold-Cuiabá, Estação Ecológica de Peti and some hillsides covered by secondary vegetation in advanced state of regeneration.

Nevertheless, we point out that according to Jullien and Thiollay (1996), the mere presence of a species in a certain location doesn't mean that it has a viable population in the region where it was recorded. In the case of *S. tyrannus*, for the maintenance of healthy populations, large forest areas are necessary (Ferguson-Lees and Christie 2001, Canuto 2008), since in regions that have been severely modified by human action, as is the case of the Quadrilátero Ferrífero, the density of forest eagles tends to decrease dramatically,



FIGURE 2. Photographic records of the Black Hawk-Eagle *Spizaetus tyrannus* in the Quadrilátero Ferrífero region, Minas Gerais, Brazil (properly deposited at <http://www.wikiaves.com.br>): A and B, adult individuals sighted in Barão de Cocais, near the border with Santa Barbara county; C, immature soaring over the road MG 346, Barão de Cocais municipality; D, adult soaring over semi-open landscape in the county of São Gonçalo do Rio Abaixo; E and F, adult individuals soaring in the Rio Piracicaba municipality. Photos A, B, C, E and F: Luiz F. Salvador-Jr. Photo D: Marcus Canuto.

as detected by Albuquerque (1986), in the south of Brazil. Added to this is the fact that small populations are more prone to inbreeding, and are also vulnerable to extreme environmental changes and stochastic processes (Galindo-Leal 2003, Ayres *et al.* 2005). Thus, taking into consideration the information discussed above, we deduce that the *S. tyrannus* in the Quadrilátero Ferrífero faces problems, not only related to lack of extensive forest

areas, but also due to the high probability of occurring phenomena that usually affect small populations more severely. We also point out that due to the reduced population, it is likely that many of the records reported here involve the same individuals in different locations.

Still regarding its distribution in the region, although we have been sampled part of the municipalities of Rio Acima, Santa Bárbara, Jeceaba and Itaúna, the efforts

TABLE 1. New records of the Black Hawk-Eagle *Spizaetus tyrannus* in the Quadrilátero Ferrífero region, Minas Gerais, southeast Brazil.

DATE	MUNICIPALITY	LOCATION	COORDINATES	HABITAT	LANDSCAPE
30 Jun 2005	Belo Horizonte	Parque Municipal Paredão da Serra do Curral	19°57'31" S 43°54'38" W	Airspace / wood located at the base of the wall	Rocky wall located at the southern limit of the municipality, characterized by the marked anthropic occupation on both slopes, presence of rupestrian fields on the top, as well as woods and grass fields on the foot of elevation
17 Mar 2008	Ouro Preto	Parque Estadual do Itacolomí	20°25'58" S 43°30'44" W	Airspace	Valley covered with semi-deciduous seasonal forest bordered by rupestrian fields
22 Jul 2008	Brumadinho	Estação Ecológica Rio Manso	20°07'32" S 44°16'12" W	Airspace	Semi-deciduous seasonal forest fragment located at the margin of the artificial reservoir
7 Aug 2008	Barão de Cocais	Near the border with the Santa Bárbara municipality	20°00'38" S 43°34'14" W	Airspace	Valley covered with semi-deciduous seasonal forest bordered by rupestrian fields and open areas
15 Aug 2008	Caeté	Near the district of Rancho Novo	19°54'10" S 43°36'23" W	Edge of forest fragment located at the margins of dirt road	Mosaics of semi-deciduous seasonal forest fragments, open areas and plantations of <i>Eucalyptus</i> spp.
13 Sep 2008	Barão de Cocais	Near the border with the Santa Bárbara municipality	19°58'58" S 43°33'06" W	Edge of forest fragment located at the margins of dirt road	Fragments of semi-deciduous seasonal forest and open areas
27 Sep 2008	Barão de Cocais	Near the border with the Santa Bárbara municipality	20°00'26" S 43°34'24" W	Airspace	Rupestrian field bordered by valley covered with semi-deciduous seasonal forest and open areas
11 Oct 2008	Barão de Cocais	Over the MG 436 road	19°53'18" S 43°27'18" W	Airspace	Open area surrounded by <i>Eucalyptus</i> spp. plantations
16 Oct 2008	Barão de Cocais	Near the boundarie with the Caeté municipality	19°57'25" S 43°36'58" W	Airspace	Semi-deciduous seasonal forest located near iron mine digs
3 Nov 2008	Caeté	Near the Serra do Itamaráen	19°54'43" S 43°32'21" W	Airspace	Mosaic of semi-deciduous seasonal forest fragments, open areas and large rocky outcrops
28 Nov 2008	Sabará	Pompéu District	19°51'23" S 43°46'13" W	Airspace	Small village surrounded by semi-deciduous seasonal forest, <i>Eucalyptus</i> spp., open areas and rupestrian fields
30 Nov 2008	Sabará	Pompéu District	19°50'38" S 43°44'38" W	Airspace	Small village surrounded by semi-deciduous seasonal forest, <i>Eucalyptus</i> spp., open areas and rupestrian fields
14 May 2010	São Gonçalo do Rio Abaixo	Over the BR 381 road	19°50'10" S 43°20'47" W	Airspace	Semi-open area composed by semi-deciduous seasonal forest fragments and pastures.
22-24 Jul 2010	Rio Piracicaba	Right bank of the Piracicaba river	19°56'46" S 43°11'22" W	Airspace	Mosaic of semi-deciduous seasonal forest fragments and large open areas

employed weren't sufficient to detect *S. tyrannus* neither in the central stretch, nor in the extremes south and west of the Quadrilátero Ferrífero. However, due to the existence of some remaining forests fragments of considerable size in these locations, the presence of the species cannot be discarded and should be the subject of further investigations.

Although classified as a special area for biodiversity conservation in the state of Minas Gerais (Drummond *et al.* 2005), the region of the Quadrilátero Ferrífero continues to suffer with the advance of mining activities (Salvador-Jr. 2010) and silviculture of *Eucalyptus* spp. on the lands located outside the conservation units. Thus, both the decrease in size of the remaining native fragments and interruption of the connectivity between them in the region are diminishing the habitats still available for typical forest raptors (Salvador-Jr. 2010), including *S. tyrannus* and its congeners. Regarding *S. ornatus* and *S. melanoleucus*, our observations allow us to assert that both species have even smaller populations in the region when compared to *S. tyrannus*, since throughout the present investigation we recorded only one sighting of each. *Spizaetus ornatus* was seen wind soaring over a forest fragment located between the Instituto Cultural Inhotim and the Reserva Ecológica Rio Manso, in the Brumadinho municipality (20°07'26" S, 44°14'10" W) on 22 July 2008; *S. melanoleucus* was detected soaring over a rupestrian field near the Pompéu district in the Sabará municipality (19°50'56" S, 43°46'34" W) on 30 November of the same year.

With the conservation of *S. tyrannus* and other typical forest raptors of this region in mind, we suggest establishing both new conservation units and ecological corridors that maintain the connectivity between protected areas. Thus, as well as insuring that adequate habitats for these species are not going to be suppressed, the availability of their prey will also be guaranteed, providing the minimum necessary conditions to maintain these predators within the limits of the Quadrilátero Ferrífero.

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