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LETTERS

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THE FIRST BLACK-AND-CHESTNUT EAGLE (*SPIZAETUS ISIDORI*) NEST DISCOVERED IN ARGENTINA REVEALS POTENTIAL HUMAN–PREDATOR CONFLICTS

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Raptors play a key role as top-down modulators in the ecosystem (Duffy 2002). Larger eagles and owls can have important effects on mesopredator populations through intraguild predation, as well as through competition for resources (Sergio and Hiraldo 2008). In addition, these larger predators are often perceived as dangerous for domestic animals and game species, and are therefore frequently persecuted in the context of conflict with humans (Thirgood et al. 2005). Identifying potential conflicts is therefore critical in order to prevent them and to design conservation measures to solve them.

The Black-and-chestnut Eagle (*Spizaetus isidori*) is a large eagle that inhabits subtropical or tropical montane cloud forests of the Andes slopes up to 3000 masl. Throughout its range, this species occupies relatively narrow habitats from northwestern Venezuela and northeastern Colombia extending through the center of Ecuador, Peru, and Bolivia to northwestern Argentina (Ferguson-Lees and Christie 2005).

The species, internationally categorized as Endangered (BirdLife International 2016), is one of the least known Neotropical raptors throughout its entire range (Valdez and Osborn 2004). In Argentina, the southern limit of its distribution, the species was described in 1954 in Jujuy Province when a pair of adults was shot, apparently close to a nest (Olrog 1956). A juvenile was shot in 1958 in northern Tucumán (Esteban 1960). For nearly 30 yr following this, the species was not recorded in the country and was considered regionally extirpated (Olrog 1985). However, in 1987, the species was observed again and since the mid-1990s, there have been scattered but regular sightings across the Yungas of Argentina, suggesting the species might be more common than previously thought (Chébez et al. 2008). The relatively large area in which the species has been recorded, as well as the sightings of some juveniles, strongly suggested the presence of a breeding population (Chébez et al. 2008). However, no nesting attempts were documented for the species in Argentina, other than the vague data from the 1950s (Olrog 1956).

On 17 February 2014, in an area of montane cloud forest in the Yungas (Dr. Manuel Belgrano County, Jujuy,

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northwestern Argentina), one of the authors (RA) discovered a large nest. In the same area a month earlier, he observed a pair of Black-and-chestnut Eagles with a fledgling. On 6 March, RA observed an adult perched in the nest, confirming its use by the eagles. The nest was located in a walnut tree (*Juglans australis*) at 1786 masl, on a steep slope of difficult access. The nest was 22 m above the ground on a secondary bifurcation of a tree that has no branches on the lower 18 m of the trunk. The nest, approximately 1.50 m wide and >1.2 m high, was made up of large sticks of different sizes, with a lining of green leaves. Although located within the UNESCO Biosphere Reserve of "Las Yungas," the nest was close (350–400 m) to human settlements and not far (around 4000 m) from a town of approximately 2000 inhabitants.

During the last week of May or first week of June, the female laid a single egg, and the nestling hatched on 9 July 2014. The eaglet fledged around the third week of October, although it frequently used the nest for roosting and feeding at least until the end of November. Therefore, breeding occurred during the coldest and driest months of the year, and the fledgling became independent during the rainy season (December to April).

To monitor diet and breeding success, we observed the nest from a blind for a total of 70 hr, from 9 July to 14 October 2014. Then, when the fledgling was approximately 3 mo old, on 14 October 2014, we installed a camera trap (Game Spy 4.0 MP DGTL, Moultrie Products, LLC, Alabaster, AL, U.S.A.) at 2.5 m from the nest, in an adjacent branch. Pictures were retrieved from the camera three times in a month. We replaced this camera with a Reconyx PC800 HyperFire Professional Semi-Covert IR camera trap (RECONYX, Inc., Holmen, WI, U.S.A.) on 16 November, and retrieved the pictures on 23 November. During visits to install and check the cameras, we also collected prey remains from the nest itself and from below the nest. We identified prey items visually from direct observations and from the photos. We identified the remains found in and below the nest (all bones) by comparing them with the collection at the Miguel Lillo Natural Sciences Museum in San Miguel de Tucumán, Tucumán province.

We identified all 83 bones to the family (one bone), genus (76 bones) or species level (six bones). From the analysis of these bones, we determined a minimum of 18 different prey items. Photos from the camera trap depicted 17 prey items, of which we were able to identify only nine (53%). From direct observations, we identified two of four prey items delivered to the nest. The comparison of prey items identified from all three sources allowed us to identify a minimum of 21 different prey items, 18 identified from remains (bones) plus three raptors observed in the photos from the camera trap, but from which there were no prey remains (there were four raptors in total; Table 1).

All identified prey items were medium-sized to large birds, with Dusky-legged Guan (*Penelope obscura*) or Red-faced Guan (*P. dabbenei*) being the most common prey (we were not able to distinguish prey remains between these two species and therefore combined them into *Penelope* spp.), followed by Falconiforms (with at least one Southern Crested Caracara [*Caracara plancus*]), domestic fowl (*Gallus gallus*), and finally by an unidentified *Tinimidae* (Table 1). Birds unidentified in camera trap photos or by direct observation might have corresponded to some of the birds already identified by bones and thus were not counted when we tallied the minimum number of prey (Table 1).

The area where the nest was found is disturbed by the presence of cattle and human settlements, which may have depleted the native mammal community. Common prey items of the Black-and-chestnut Eagle in other countries, such as monkeys and squirrels, are not present at this location (Malizia 2009). Nevertheless, there is substantial availability of other potential prey for the eagles, including guans, parrots, and some mammals such as opossums, agoutis, and rabbits. The successful rearing of probably two fledglings in two consecutive years (the pair was seen interacting and flying with a juvenile in the area some days before the nest was found in February 2014), suggests that

Table 1. Prey items identified by direct observations, prey remains, and camera trap, in a Black-and-chestnut Eagle nest in Jujuy Province, northern Argentina.

		Prey Remains in Nest	Camera Trap	Total
Prey Type	Direct Observation	Min. Prey Number (*n* of Bones)	Min. Prey Number	Min. Prey Number (%)
Penelope spp.	2	14 (76)	5	14 (67)
Falconiform	0	1 (1)[a]	4	4 (19)
Tinimidae	0	1		1 (5)
Gallus gallus	0	2 (5)		2 (9)
Unidentified birds	2	0	8	
Total[b]	4	18	17	21

[a] The Falconiform bone was from a Southern Crested Caracara (*Caracara plancus*).

[b] The 10 unidentified birds from camera trap photos and direct observation may have corresponded to some of the 18 prey already identified by bone analyses and thus were not counted in the minimum number of identified prey.

the area has an adequate supply of food despite being close to a town. The presence of Black-and-chestnut Eagle nests in the vicinity of human settlements is not exclusive to this study and has been described in Colombia (Lehmann 1959) suggesting that the species can be quite tolerant of people if not disturbed or persecuted.

Unlike the diets of the species in northern areas of its distribution (Peru or Colombia; Lehmann 1959, Valdez and Osborn 2004, Echeverry-Galvis et al. 2014), the observed diet of this pair consisted entirely of birds, suggesting that the species could be more ornithofagous here than in northern populations. As a caveat, we note that we have observed only 21 prey items at only one nest. However, the eagle collected in the 1950s in Valle Grande, Argentina, an area where squirrels and tufted capuchins were present, also had guan remains in its stomach (Olrog 1956). The only identified mammalian prey of this species in Argentina was an agouti (*Dasyprocta punctata*) hunted on the road in Calilegua National Park, Jujuy (R. Clark pers. comm.). The two primary natural prey items we identified, guans and medium-sized to large raptors, suggest that the Black-and-chestnut Eagle could play an important ecological role in subtropical environments of the Andes. Guans are key seed dispersers in these forests (Ruggera et al. 2011). Predation by the Black-and-chestnut Eagle could eventually limit guan numbers or alter their behavior, which may affect seed dispersal and plant recruitment processes at local scale within specific areas of forest. The number of these medium-sized to large raptors consumed by this Black-and-chestnut Eagle pair suggests that the eagle could be playing, at least in this impoverished subtropical forest, a role as a regulator of mesopredators, thereby affecting species at lower trophic levels.

The presence of domestic fowl in the eagle's diet was also significant. At least in Colombia and Ecuador, this eagle is persecuted for its habit of hunting domestic fowl (Lehmann 1959, Echeverry-Galvis et al. 2014). No cases of persecution have been reported in Argentina since the first eagles were collected back in the 1950s (Olrog 1985). However, a local farmer told a naturalist in Salta that his relatives in the area knew the eagle, and would shoot it if they saw it close to their houses because they believe the eagle kills domestic fowl (R. Clark pers. comm.). Although the density of people is relatively low and decreasing through most of the species' range in Argentina, the potential negative effect of persecution should not be ignored. It is thus important to assess the knowledge that local people have of this species, as well as their attitude toward the eagle, to confirm the magnitude of this potential form of conflict and to identify the anthropogenic threats the eagle may face. Intensive education and awareness work among local people in the areas where the species is present would be valuable. The potential role of the Black-and-chestnut Eagle as a mesopredator controller might elicit positive attitudes of local residents, especially given that one of its prey was a Southern Crested Caracara, which is considered a threat to domestic animals throughout Argentina (Ferguson-Lees and Christie 2001, J.M. Grande unpubl. data). The knowledge we have about this species' ecology is scarce and patchy, and certainly, further fieldwork is needed to better understand the ecological relevance of this charismatic top predator.

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