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LETTERS

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RECORDS OF ORANGE-BREASTED FALCONS IN URBAN AND SUBURBAN AREAS OF NORTHWESTERN ARGENTINA

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Growing and expanding urban environments occupy and displace native habitats, partially or completely. Some species adapt to these changes while others, typically more specialized species or species requiring particular types or large tracts of natural habitat, decline or disappear (Chace and Walsh 2006, Eduardo et al. 2007). Until the second half of the 20th century when they became legally protected, many heavily persecuted animals such as raptors, were scarce or absent in urban environments (e.g., Mannan and Boal 2004, Rutz et al. 2006). However, in recent decades many of these species have colonized urban areas or increased their populations in urban landscapes (Chace and Walsh 2006).

Currently, several species of raptors have well established urban populations or use urban habitats in many cities worldwide. Examples include Southern Caracaras (*Caracara plancus*, Eduardo et al. 2007) in Brazil, Chimango Caracaras (*Milvago chimango*) in Argentina (Solaro and Sarasola 2017), Peregrine Falcons (*Falco peregrinus*, Kauffman et al. 2004) and Cooper's Hawks (*Accipiter cooperii*, Mannan and Boal 2004) in North America, Northern Goshawks (*Accipiter gentilis*) in Europe (Rutz et al. 2006), Crested Goshawks (*Accipiter trivirgatus*) in Taiwan (Lin et al. 2015), and Black Sparrowhawks (*Accipiter melanoleucus*, Martin et al. 2014) and African Crowned Eagles (*Stephanoaetus coronatus*, McPherson et al. 2015) in South Africa.

The occupation of urban areas even by large eagles may be due to reduced persecution, habituation by raptors to human disturbance, or to the existence of high structural diversity suitable for raptors' roosting and nesting in some urban areas (Mannan and Boal 2004, Chace and Walsh 2006, McPherson et al. 2015). In addition, urban areas concentrate large numbers of potential prey species for raptors, such as mice (*Mus* sp.), rats (*Rattus* spp.), and Rock Pigeons (*Columba livia*; McKinney 2002, Rutz et al. 2006). Theoretically, it might be expected that more generalist raptors would be most successful at exploiting urban environments (Chace and Walsh 2006, Eduardo et al. 2007), but this is not always the case. For example, several of the thriving urban raptors mentioned above, such as the Northern Goshawk, the Cooper's Hawk, the Crested Goshawk, and the Black Sparrowhawk were previously considered forest specialist species (Ferguson-Lees and Christie 2001).

The Orange-breasted Falcon (*Falco deiroleucus*) is a medium-sized falcon that inhabits South American evergreen and semi-deciduous tropical and subtropical rainforests. The species ranges from southern Mexico to northern Argentina (Ferguson-Lees and Christie 2001) and is usually considered rare across its range (Chébez 2009, Baker et al. 2012). This falcon typically nests in cavities and crevices in cliffs, although there are a few records of Orange-breasted Falcons nesting in large emergent trees and several records of a pair nesting on a human-made structure, a stone ledge in the crest of a Mayan temple in Tikal National Park, Guatemala (Baker et al. 2012). This falcon usually hunts its prey, mostly medium-sized to large birds (particularly doves, parakeets, and swifts), bats, and large insects, from high perches in the

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canopy or in forest clearings, or along forest borders (Ferguson-Lees and Christie 2001, Baker et al. 2012). Individuals also may forage in forest fragments or in modified landscapes with cultivated fields, orchards and pastures, although breeding territories are usually in areas dominated by mature forest (Baker et al. 2012).

Here we report observations from 2014 to 2016 of Orange-breasted Falcons in two different urban or suburban areas in northwestern Argentina. Natural habitats in the region consist of Yungas rainforests in the eastern Andes slopes and nearby lowlands, and semi-arid Chaco forests in the drier slopes and drier lowlands to the east of the Yungas (Cabrera 1976). The Orange-breasted Falcon has been recorded in both habitats although according to various sources, the rainforests of the Yungas likely would be the better nesting habitat for the species (Chébez 2009, Baker et al. 2012). The diverse rainforest known as the Austral Yungas or Selvas Tucumano-Bolivianas has three well-defined vegetation strata depending on elevation and the associated precipitation: piedmont, montane, and cloud forest (Cabrera 1976). Although montane and cloud forests are relatively well-preserved, almost 90% of the lowest-elevation piedmont forest (particularly in the flat areas at the base of the mountains) has been converted to industrial agriculture, particularly soybean and sugarcane (Brown and Malizia 2004).

All Orange-breasted Falcon observations reported here were in or within the vicinity of cities and towns, in flat terrain formerly covered by piedmont forest at the base of the mountains. In 2014, 2015, and 2016, we recorded Orange-breasted Falcons regularly, in the town of Palma Sola and its surroundings, in southeastern Jujuy Province (23°58.683'S, 64°18.217'W). This town of about 5000 inhabitants encompasses approximately 0.7 km² in area, is at 600 masl and is surrounded by a 1–3-km wide belt of orchards, crops and pastures. Outside that belt there are large tracts of well-preserved lowland Chaco and piedmont forests that connect with montane and cloud forests in the Santa Bárbara and El Centinela Mountains. Palma Sola's economy depends basically on cattle production and small-scale agriculture. This town is approximately 20 km from the only Orange-breasted Falcon nest recorded in Argentina that is located in the montane forests of Santa Bárbara Mountains (a pair bred there in 2014 and 2015; C. Strelkov, S. Seipke, and B. Pereira pers. comm.). Most observations of the falcon in and around Palma Sola were recorded in July and August (mid-winter), when the falcons were observed almost weekly during all three years. There is also one record of the falcon from March 2016, and a few scattered records from April, May, and June 2015, also from this town. In 2014, at least two different falcons (a male and a female) were seen in or around Palma Sola, whereas in 2015 and 2016 on all occasions, the bird observed was a male. Most observations in Palma Sola were of falcons perched on tops of dead trees along the border of the town or in its surrounding orchards and crop fields (usually <500 m from the town limits) or flying over those orchards

and crop fields. In 2014, falcons were observed feeding once on a White-tipped Dove (*Leptotila verreauxi*), once on an unidentified pigeon, and once on an unidentified cowbird; in 2016 a falcon was seen once feeding on a White-tipped Dove (all the feeding observations were in crop fields located just outside the town limits; C. Strelkov unpubl. data).

On 7 May 2016, we observed an adult Orange-breasted Falcon in San José de Metán City, at approximately 850 masl, in Salta Province, Argentina (25°29.833'S 64°58.25'W). Although this city is surrounded on three sides by agricultural lands (formerly Yungas piedmont forests), at the city's western boundary there is a large tract of subtropical forest that rises up to the Sierras de Metán, a large north-south mountain chain that extends to >3000 masl. All the eastern slopes of these mountains are covered by mature Yungas forest and thus likely have suitable nesting habitat for the falcon. As San José de Metán is an important node for the concentration and distribution of agricultural products, trucks carry seeds and grains throughout the town and its surroundings. Spilled seeds attract large flocks of pigeons, doves, and other granivorous birds (J. M. Grande, C. Strelkov, and F. López unpubl. data), potential prey for the falcon. The Orange-breasted Falcon observed in San José de Metán was feeding on an unidentified passerine while perched in a tall *Eucalyptus* sp. tree by the major road that runs through the city.

The Orange-breasted Falcon is a typical rainforest species (Baker et al. 2012) and thus the Yungas should be the only habitat where the species could breed in northwestern Argentina. Environmental conditions in these montane and cloud forests vary seasonally. During the rainy and hot season, from November to April, 80% of the annual precipitation falls. The dry and mild season extends from May through the austral winter until mid-spring in October (Bianchi 1981). These seasonal environmental changes in the region produce large fluctuations in resource availability for birds (Malizia 2001) and as a result, many species undergo seasonal movements. According to some studies, in winter, up to 50% of the avian species inhabiting montane forests move to lower-elevation piedmont forests (Vides 1992, Blake and Rougès 1997, Malizia 2001, Rivera and Politi 2004). Coinciding with these seasonal movements of birds, most records of the Orange-breasted Falcon in lowland urban areas were obtained during winter; there are as yet no known records of the species in these urban areas during the summer. It is reasonable to hypothesize that reduced food availability in winter in forests at higher elevations could induce falcons to move to lowland areas, following prey. Given the large-scale deforestation that converted most piedmont forest to homogeneous soybean or sugarcane monocultures (Brown and Malizia 2004), it would also be plausible that once in the lowlands, falcons move from large-scale monocultures where food availability may be lower to the smaller-scale orchards and fields surrounding urban areas, or even to well-developed urban areas of towns and cities in search of

the highly available prey, such as the pigeons, doves, and parrots that may be concentrated there.

Orange-breasted Falcons have rarely been reported in urban areas, however, there are records of two falcons in Quito, Ecuador, in June–July 2007 (Carrion and Vargas 2008) and of one falcon in Calama, Chile, in June–October 2007 (Jara 2008); in both cases, the falcons seemed to take advantage of abundant dove species. This species' exploitation of some urban and suburban areas, at least seasonally, suggests that the species may be more resilient to human presence and disturbance than previously thought. Given the scarce knowledge we have about the species' ecological requirements, the next steps would be to identify factors that may be driving Orange-breasted Falcons toward urban areas and to assess the potential effects (both positive and negative) this behavior could have on the species.

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