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SHORT NOTE

Notes on Bat Falcon (*Falco rufigularis*) distribution, nesting, and diet in central-western Mexico

Notas sobre distribución, anidación y dieta del Halcón murcielaguero (*Falco rufigularis*) en el centro-oeste de México

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ABSTRACT

The Bat Falcon may nest in constructions in urban areas. It feeds on bats, birds, and insects. We present records on its distribution, nesting, and diet in western central Mexico. We observed a Bat Falcon couple breeding in 2013 and 2015 in a wall's cavities from a town's construction. We collected the remains of the prey consumed by the juveniles in the nest cavities after the juveniles abandoned them in 2013 and 2015, and additionally the remains of prey under the parent's perches next to the nest cavity in 2015. The nesting period was from March to at least the middle of June. Some of the dietary items during the nesting period were one rodent, four bats, six birds, grasshoppers, and beetles. This study confirms that the Bat Falcon breeds in urban areas and preys upon local species.

Keywords: bats, birds, mice, rural area, tropical dry forest.

RESUMEN

El Halcón murcielaguero puede anidar en construcciones en áreas urbanas. Se alimenta de murciélagos, aves e insectos. Presentamos registros sobre su distribución, anidación y dieta en el centro occidente de México. Se observó una pareja de halcones anidando en 2013 y 2015 en cavidades en una pared de una construcción en un pueblo. Se recolectaron los restos de las presas consumidas por los juveniles en las cavidades después de que estos abandonaron el nido, además de los restos de cadáveres bajo las perchas usadas por los padres junto a la cavidad nido en 2015. El periodo de anidación fue de marzo a mediados de junio. Algunos elementos de la dieta durante el periodo de anidación fueron un ratón, cuatro murciélagos, seis aves, saltamontes y escarabajos. Este estudio confirma que el Halcón murcielaguero anida en áreas rurales y depreda sobre las especies locales.

Palabras clave: área rural, aves, bosque tropical caducifolio, murciélagos, ratones.

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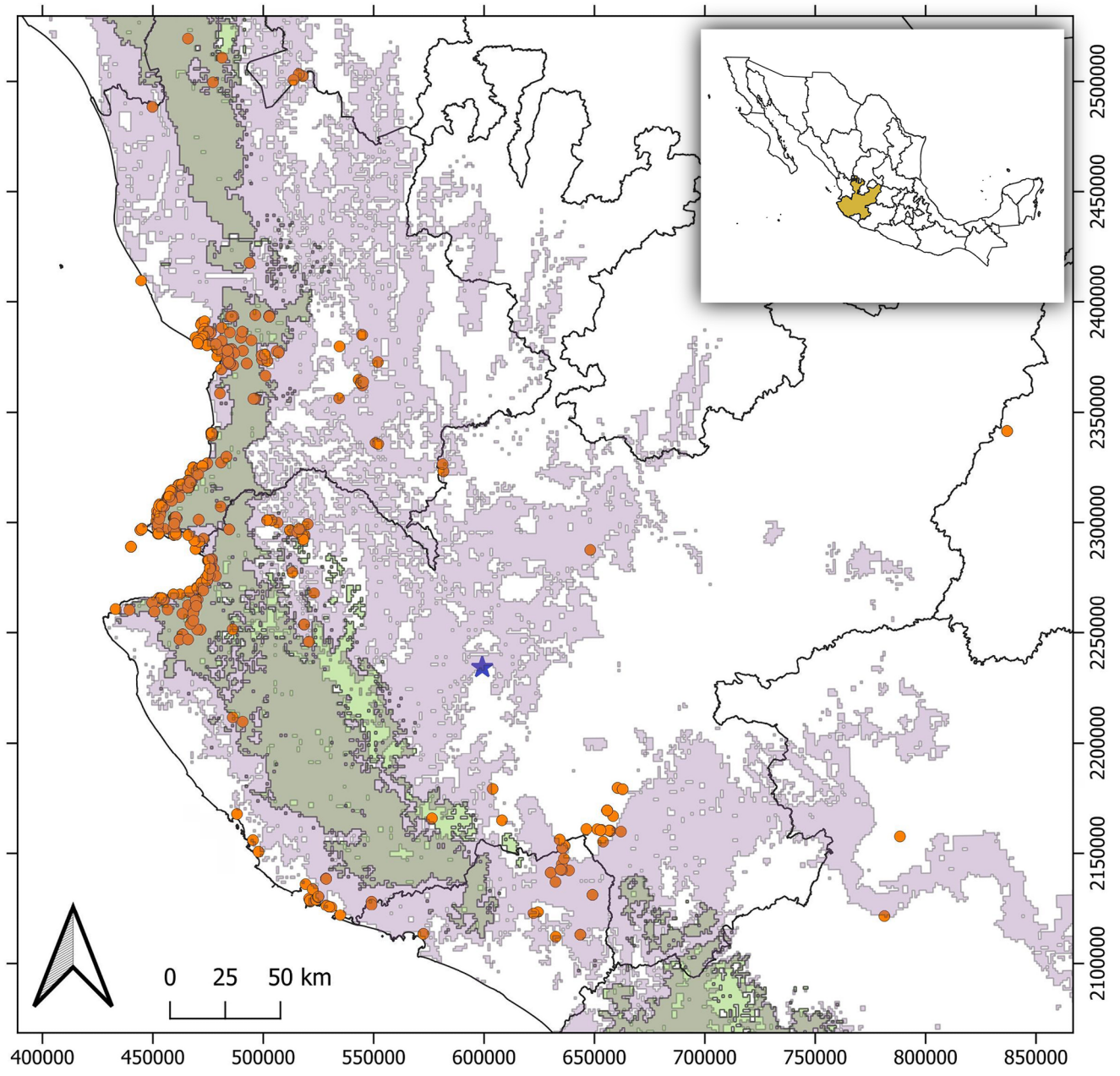

Figure 1. Distribution of ***Falco rufigularis*** in central-western Mexico. The blue star is the nest location in Tecolotlán, Jalisco state, Mexico. The orange dots show records on the GBIF database (c2021), eBird (c2021), and Enciclovida (CONABIO c2021). The purple polygon represents its permanent distribution according to Navarro and Peterson (2007) and the current potential distribution is indicated in the green polygon (Navarro-Sigüenza ***et al***. 2018).

The Bat Falcon (*Falco rufigularis* Daudin, 1800, Falconidae) is a small raptor (23-28 cm in length) (Howell and Webb 1995). It has sexual dimorphism (Howell and Webb 1995, Márquez *et al.* 2005), in which the female is larger and heavier than the males (Márquez *et al.* 2005). It is resident in Mexico and its distribution extends along the Pacific and Gulf slopes to the southeast (Howell and Webb 1995). It is associated with tropical forests (Márquez *et al.* 2005), forest edges and clearings, as well as open areas with few trees (Howell and Webb 1995). Also, it was reported in urban areas (Howell and Webb 1995, Seijas 1996).

Bat Falcons nest in natural cavities in trees (Cadena-Ortiz *et al.* 2012), human constructions (Cadena-Ortiz *et al.* 2012), and even in nests built by other species such as large woodpeckers (*Campephilus*) (Haverschmidt 1968).

The female incubates the eggs, and the male provides the food (Márquez et al. 2005). Parents have perches near the cavity nest (Cadena-Ortiz *et al.* 2012). Dead animals underneath the perches are reasonably assumed to be prey from the falcon. Its hunting activity spans from sunrise to sunset (Seijas 1996). It feeds on bats, birds, and large insects (Chávez-Ramírez and Enkerlin 1991, Seijas 1996, Cadena-Ortiz *et al.* 2012). Here, we report on the distribution, nesting, and some diet elements of *F. rufigularis* in central-western Mexico.

The study site was an elementary school surrounded by constructions in Tecolotlán town, Jalisco state in central-western Mexico (20°12'12.23" North, 104°3'1.81" West; WGS 84; elevation 1195 m). The school's patio was next to a church with a brick wall 20 m tall. The nearest green area was 15 m from the school, and the tropical dry forest was 3.5 km away.

We searched the GBIF database (c2021), and the Enciclovida platform (CONABIO c2021) to find Bat Falcon's records. We observed a couple using different cavities for nesting from 2010 to 2015. From early April to early July in 2013 and 2015, we searched for the falcons in the school or nearby to register their activity almost every day one time a day. We climbed a ladder and measured, with a laser distance measurer meter, the height of the Bat Falcon cavities nest. Besides, we collected any evidence of prey in the cavity in the 2013 and 2015 breeding seasons (after the juveniles left the cavity), and prey dead bodies lying on the roof floor from the parent's perches near the cavity in 2015.

What seemed to be the same Bat Falcon pair selected different nearby cavities to nest on a wall from 2010-2015. Since the middle of March 2013, a pair of Bat Falcons were observed in the surroundings of the elementary school. In early April 2013, the pair selected the nest cavity, and the female was observed entering the wall's cavity at different moments. The cavity was located on the wall up to a height of 6 m. The female laid four eggs which were seen on April 13, 2013. We utilized a ladder to reach the cavity on one occasion when the parents were absent. In the middle of May, the four juveniles hatched. We saw at least two of them for the first time on May 17, 2013, when the female came into the cavity to feed them a bird, and juveniles got near the cavity entrance and screeched. The chicks were not banded or measured. The four juveniles and the parents left the site on July 7, 2013. Both parents were around the cavity nest feeding the juveniles and flying extremely low into the school patio every time a person walked across it. The parents frequently caught non-native rodents (*Mus musculus* Linnaeus, 1758) from the school patio to feed the juveniles. The cavity nest remains were one rodent species (*M. musculus*), three bats (*Lasiurus blossevillii* (Lesson & Garnot, 1826), *Tadarida brasiliensis* (I. Geoffroy, 1824), and *Sturnira lilium* (E. Geoffroy, 1810)), six bird species (an unidentified passeriform, *Passerina caerulea* (Linnaeus, 1758), *Setophaga nigrescens* (J. K. Townsend, 1837), *Mniotilta varia* (Linnaeus, 1766), *Ramosomyia violiceps* (Gould, 1859), and unidentified hummingbird), grasshoppers, and beetles.

After February 2015, the possible same pair of Bat Falcons were observed near the elementary school. In early March 2015, the female was observed getting into the cavity used to nest in 2013. The female laid two eggs. The juveniles hatched in the middle of April 2015. The fledglings started to fly out of the cavity nest in late May, and in the middle of June 2015, they and the parents left the area. During the nesting period, the parents would perch on a lightning rod on the roof of a building 15 m away from the cavity nest. The remains of the nest cavity belong to one rodent (*Mus musculus*,), two bats (*Lasiurus blossevillii*, and *Tadarida brasiliensis*) and four birds (*P. caerulea*, *M. varia*, *R. violiceps*, and unidentified hummingbird), and the ones of the school's roof were one rodent species (*M. musculus*), four bats (*L. blossevillii*, *T. brasiliensis*, *Eptesicus fuscus* (Palisot de Beauvois, 1796), and *S. lilium*) and four birds (*P. caerulea*, *S. nigrescens*, *M. varia*, *R. violiceps*) as well as grasshoppers and beetles.

The distribution of Bat Falcon in Jalisco state is towards the Pacific slope. However, Navarro and Peterson (2007) reported its permanent residence until the middle part of the state. Nevertheless, Navarro-Sigüenza *et al.* (2018) showed a smaller potential distribution (Fig. 1). Our encounter is the first record in the middle part of Jalisco state, and a range extension of 55 km away from its recently and nearest reported locality (Autlán de Navarro) (eBird c2021).

The nesting place and breeding months here reported (March/April to June) matched Seijas (1996) breeding records (May and June). Our data also agreed with van Strien (2019) observations where the egg-laying happened in Panama between April and June. Cadena-Ortiz *et al.* (2012) reported the nesting of two couples of *F. rufigularis*

in Ecuador. The first was observed between July and September at Yuri's National Park. The second one was at Ciudad Milagro in a hollow space behind an advertising sign on an antenna, in October and December. The discrepancy in the dates is explained by the difference between localities in the south and north hemisphere, since in all, egg laying, through hatching happened in the months with warm weather and little to no precipitation. The number of eggs laid consists of what is mentioned in GRIN (c2019), where a nesting size of two to four eggs is reported.

Regarding prey's remains, evidence of animal content was obtained. These match with different authors' records (e.g., Chávez-Ramírez and Enkerlin 1991, Cadena-Ortiz *et al.* 2012). Chávez-Ramírez and Enkerlin (1991) affirmed *F. rufigularis* is opportunistic, therefore, it hunts different prey depending on their abundance in the area. These results highlight the ecological plasticity of the Bat Falcon (Seijas 1996).

AUTHOR PARTICIPATION

VCRE conception, design, and writing; ESBP, ESGM, KABF data collection and determination of prey's remains; MPRS, ALSP analysis, and writing.

CONFLICT OF INTERESTS

The authors declare no conflict of interest.

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