



Research note

The use of tree cavities and cliffs by the Military Macaw (*Ara militaris*) in Salazares Nayarit, Mexico

Uso de las cavidades de los árboles y acantilados por la guacamaya verde (Ara militaris) en Salazares Nayarit, México

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Abstract

We recorded a population of Military Macaws in the community of Salazares, Nayarit, Mexico. The observations were made in 2 sites, the Pilas and Mirador del Águila; both sites have vegetation of tropical semi-deciduous forest with trees of 8–28 m high with a diameter at breast height greater to 40 cm. The objective of this study was to describe the activities of the Military Macaw, as well as the use of the cavities presents at cliff and trees. For 5 years of non-continuous counts, we recorded 43.5 ± 2.6 individual encounters; most records were made in the morning. Reproductive activity was also observed in the tree cavities ($n = 1$), and in the cliff ones ($n = 1$). Nine cavities were also recorded that served for roosting. This species record is important because it provides information about the existence of a breeding population in central Nayarit. We suggest working with the community and encourage efforts to make the zone a natural protected area.

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Keywords: Breeding and feeding sites; Tropical semi-deciduous forest

Resumen

Se registró una población de guacamaya verde en la comunidad de Salazares, Nayarit, México. Las observaciones se realizaron en 2 sitios, las Pilas y el Mirador del Águila; ambos tienen la vegetación del bosque tropical semideciduo con árboles de 8 a 28 m de altura con un diámetro a la altura del pecho mayor de 40 cm. El objetivo de este estudio fue describir las actividades realizadas por la guacamaya verde, así como también el uso de las cavidades presentes en el acantilado y los árboles. Durante 5 años de conteos no continuos, se registraron 43.5 ± 2.6 encuentros individuales; la mayoría de los registros se realizaron en la mañana. También se observó la actividad reproductiva en las cavidades de los árboles ($n = 1$) y del acantilado ($n = 1$). Se registraron 9 cavidades que sirvieron como dormitorios. Este registro de la especie es importante ya que proporciona información sobre la existencia de una población reproductora en el centro de Nayarit. Se aconseja trabajar con la comunidad y fomentar los esfuerzos para hacer de la zona un área natural protegida.

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Palabras clave: Sitios de reproducción y alimentación; Bosque tropical subcaducifolio

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Macaws are a group of Psittacidae (Psittaciformes: Aves) exclusive to the American continent. In Mexico there are 2 species of macaws, Military Macaw (*Ara militaris*) and Scarlet Macaw (*Ara macao*). The Military Macaw is categorized as vulnerable worldwide (CITES, 1998; IUCN, 2014). Mexican law considers it an endangered species (Semarnat, 2010) due to the reduction of its populations caused by illegal trade and the fragmentation of its natural habitat (Ríos-Muñoz & Navarro-Sigüenza, 2009; Rivera-Ortíz et al., 2013).

The Military Macaw is closely associated with tropical deciduous forest and semi-deciduous forest, due to the relationship between availability of food resources and breeding sites that these forests provide (Collar & Juniper, 1992; Saunders, 1977; Rivera-Ortíz et al., 2013). Historically, this species nests in cavities of emergent trees or cliffs in hard-to-reach isolated areas (Íñigo-Elías, 1999; Rivera-Ortíz et al., 2013). Most observations report the species nesting in cavities in cliffs (Forshaw, 2010; Gaucín, 2000; Rivera-Ortíz, Contreras-González, Soberanes-González, Valiente-Banuet, & Arizmendi, 2008).

The sites where the Military Macaw nests in cliffs are characterized as being karst rock with tropical deciduous forest vegetation; the tree species present in these sites have a height of not more than 12 m and a DBH of 5–35 cm, so their nests can only be made in the cavities of the cliffs (De la Parra-Martínez, Renton, Salinas-Melgoza, & Muñoz-Lacy, 2015; Rivera-Ortíz et al., 2013). Unlike sites where the Military Macaw nests in trees, the vegetation is tropical semi-deciduous forest and this site has the structural characteristics required for nesting in trees, because in these places the trees have heights greater than 16 m and DAPs of 67–205 cm (Rivera-Ortíz et al., 2013).

The breeding season of the Military Macaw in Mexico is varied. In northwest Mexico the breeding season is reported to take place from March to October (Forshaw, 2010; Nocedal, Sierra, & Arroyo, 2006; Rubio, Beltrán, Aviléz, Salomón, & Ibarra, 2007). The reproductive season in western Mexico, mainly on the coast of Jalisco, begins with the selection of nests from October to November and ends with the departure of juveniles between January and March (Carreón, 1997; De la Parra-Martínez et al., 2015). In central Mexico, the breeding season is from May to September, much like the sites in the northwest of the country (Gaucín, 2000; Rivera-Ortíz et al., 2008). Differences between reproduction seasons in Mexico are based on the phenology of tree species and resource availability (Íñigo-Elías, 1999).

The Military Macaw has a specialized diet composed mainly of seeds and fruits of a few plant species (Contreras-González, Rivera-Ortíz, Soberanes-González, Valiente-Banuet, & Arizmendi, 2009). The plant genera *Bunchosia*, *Hura*, *Lysiloma*, and *Bursera* have been reported as important sources of food within the distribution of the Military Macaw in Mexico (Carreón, 1997; Contreras-González et al., 2009; Gaucín, 2000; Loza, 1997; Rivera-Ortíz et al., 2008, 2013). These plant species contain a large amount of nutrients, such as lipids, carbohydrates, and proteins, that are important for egg laying and the development of chicks (Contreras-González et al., 2009).

The distribution of the Military Macaw in Mexico is along the Sierra Madre Occidental and Sierra Madre del Sur (Pacific slope) (Almazán-Núñez and Nova-Muñoz, 2009; Howell & Webb,

1995; Peterson & Chalif, 1989), in northeastern Mexico in the Sierra Madre Oriental (Gulf of Mexico slope) (Arizmendi & Márquez, 2000; Íñigo-Elías, 1999; Rivera-Ortíz et al., 2013), and in central Mexico (Hernández-Castán, Villordo-Galván, Canogarcía, Gaspariano-Martínez, & Rodríguez-Cantalapiedra, 2012; Jiménez-Arcos, Santa Cruz-Padilla, Escalona-López, Arizmendi, & Vázquez, 2012; Rivera-Ortíz et al., 2008; Urbina-Torres, Monroy-Vilchis, González-Martínez, Amador-Solís, & Celis-Murillo, 2012). However, in recent years its distribution has been drastically reduced by the change in land use and illegal trade (Marín-Togo et al., 2012; Monterrubio-Rico, Labrada-Hernández, Ortega-Rodríguez, Cancino-Murillo, & Villaseñor, 2010; Ríos-Muñoz & Navarro-Sigüenza, 2009; Rivera-Ortíz et al., 2013).

The Royal Botanical Expedition of New Spain published the first records of the Military Macaw from the Pacific coast between 1787 and 1803 (Navarro-Sigüenza, Peterson, Puig-Samper, & Zamudio, 2007). In the state of Nayarit, the Military Macaw has been registered in the Cañón del Oro (Velásquez-Noguerón et al., 1987), and on the central coast in Tuxpan and Santiago (Escalante & Navarro-Sigüenza, 1988). In central Nayarit, García (1995) reported a flock of 5 individuals in the micro-region of the municipality of Tepic. Howell (1999) reported the species on a road leading to El Mirador del Águila, near Tepic; however, neither study gave exact localities or particular data on the location of the species.

Although the species has been reported in Nayarit, there are no recent reports with specific information on the use of habitat by the species, and there is a great need for such studies in the state given that Marín-Togo et al. (2012) indicate areas of extirpation of the species in Nayarit. The objective of this study was to report a population of Military Macaws in the central part of the state of Nayarit. We describe the activities of the Military Macaw at the study sites, as well as their use of cavities in trees and hillside cliff, and we estimate the number of encounters of individuals of the species over a 5 year period (2008–2014). Furthermore, we provide observations of the natural history for the species.

The studied sites of the Mirador del Águila and Pilas are located to the southwest of the community of Salazares Nayarit, Mexico. The southwestern slope of the cliff named Mirador del Águila is located at 21°39'1.33" N, 104°58'26.90" W at an altitude of 400 m. The Pilas is a small valley located at 21°40'23.82" N, 104°58'26.90" W at an altitude 180 m. The distance between the sites is 3.7 km. Both sites have a vegetation type of tropical semi-deciduous forest, with trees measuring 8–28 m in height with diameters at breast height (DBH) greater than 40 cm. Annual rainfall is 300–650 mm and temperature range is between 24 and 43 °C. The climate is subtropical humid (Caw) (Rivera-Ortíz et al., 2013).

The first record of the species in the community of Salazares was obtained in 2007, when we observed a flying flock of 35 individuals about 4 km from El Mirador del Águila. After that, we conducted 5 censuses between the 2 study sites – Las Pilas and Mirador del Águila, 3 in the rainy season (June and July), and 2 during the dry season (November and December), between December 2008 and June 2014.

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