

Collared Forest-falcon *Micrastur semitorquatus* courtship and mating, with take-over of a macaw nest

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Se describe el cortejo, apareamiento y usurpación de un nido de *Ara ambigua* por parte de una pareja de *Micrastur semitorquatus*, en la Reserva Cerro Blanco, Guayas, Sudoeste de Ecuador. Los nidos y comportamiento reproductivo de *Micrastur* spp. son poco conocidos y escasos, aportándose nuevos conocimientos tanto para la especie como para el género, el cual presenta especies en peligro de extinción. La usurpación del nido se atribuye a la competencia por sitios aptos para anidar en dos especies que necesitan cavidades en árboles para su reproducción.

Introduction

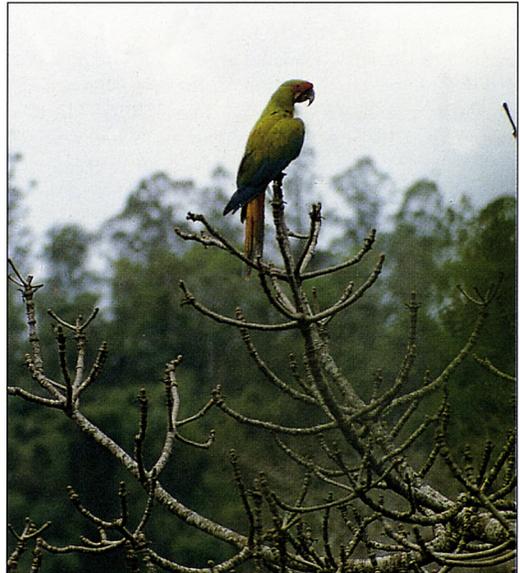
There are few descriptions of nests, courtship, or mating for the genus *Micrastur* (forest-falcons). In 1979, Mader⁶ presented the first description of a nest, that of a Collared Forest-falcon *M. semitorquatus*. Subsequently, considerable information on the reproduction of this species and Banded Forest-falcon *M. ruficollis* was collected by Thorstrom & Morales⁸ and Thorstrom *et al.*^{9–11}. In 1997, during a study of Great Green Macaw *Ara ambigua* biology in the Cerro Blanco Reserve, Guayas province, Ecuador⁵, I had the opportunity to make observations of a pair of Collared Forest-falcons that courted, mated, and finally usurped a Great Green Macaw nest under observation by myself and other workers. Although Collared Forest-falcon is not threatened (Collar *et al.*^{1,2}, Granizo *et al.*⁴), these data may increase our understanding of the reproductive dynamics of a genus that includes several threatened species.

Methods

A pair of Collared Forest-falcons was observed over the course of 97 days (24 July–8 November 1997), while monitoring a Great Green Macaw nest (12 hours per day). Two hides were constructed at c.60 and 200 m from the nest. The closer hide was used only to make detailed observations of the nest, while the farther one was used for watching general movements. Binoculars and a telescope were used at both hides. Sexual dimorphism (in size and coloration) permitted sexual identification of the forest-falcon pair after observing the initial copulation: the male had cinnamon-phase plumage and the female white-phase plumage. Attacks on the macaw nest were analysed according to behavioural variables, several of which were also graphed against time.

Study site

The observations were made in the Bosque Protector Cerro Blanco (BPCB), Guayas province (02°10'S 80°02'W) and areas adjacent to its northern edge. The BPCB covers 4,500 ha and ranges in elevation



Great Green Macaw *Ara ambigua*, Cerro Blanco Reserve, Ecuador (Bernabé López-Lanús)

from 12–400 m. The terrain is mountainous with flat summits. In normal years, the rainy season is from December–March and a pronounced dry season lasts the rest of the year (pers. obs.). During the dry season, vegetation on the summits and slopes loses its leaves, while in the ravines the vegetation tends to be evergreen. The BPCB is located in the coastal Chongón–Colonche Mountain range, c.10 km north-west of the city of Guayaquil. The vegetation is considered Tumbesian tropical dry forest^{3,7}, with semi-deciduous and evergreen forest in the ravines. The forest is largely secondary, with the predominant tree species being *Cavanillesia platanifolia* (Bombacaceae) and *Centrolobium ochroxylum* (Fabaceae). The main tree and shrub families present are: Bombacaceae, Fabaceae, Cecropiaceae, Verbenaceae and Bignoniaceae⁵.

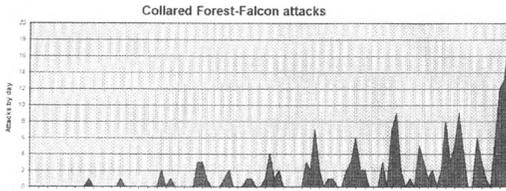


Figure 1. Frequency of attacks by Collared Forest-Falcons on a Great Green Macaw nest in the Cerro Blanco Reserve, Ecuador, August–October 1997. Note the gradual increase in attacks leading up to the take-over of the nest.

Results

Courtship and mating

Although the forest-falcons' interest in the nest was first detected on 6 August, courtship was not observed until 16 October, 23 days before the nest take-over. Despite the macaws' occupancy of the nest, the forest-falcons displayed on a 10 m-tall, dead and decaying, branchless and barkless *C. platanifolia* (locally known as Pigió), just 15 m from the Pigió containing the nest cavity. This 'display snag' was in a prominent position and unconcealed by surrounding foliage. The male's display consisted in leaping and beating its wings atop the snag, while the female perched in bushes 10–14 m away. The display, which lasted up to 10 seconds and was repeated two or three times, at intervals of up to 50 seconds, was observed on six occasions at various times of day, but never during rain. On 26 October, 13 days before the nest take-over, copulation was first observed. The female was perched atop the display snag and the noticeably smaller male mounted for at least 10 seconds. The female immediately left and the male remained for a few seconds. Copulation was again observed two days later. No further observations of courtship or mating were made.

The nest

The nest was located in a 20 m-tall, stunted, living *C. platanifolia* tree (02°07'S 80°04'W). The diameter of this Pigió tree was c.2 m at human breast height and 0.9 m at the nest's height. The main trunk's bark was green, but the upper wood appeared to be rotting. The nest chamber was at the top of this trunk and open to the sky. The nest site was in a valley with many side ravines and the forest cover was secondary, consisting of scattered Pigió trees and other species. In the early stages of the study, the nest cavity was hidden by foliage, but as the dry season advanced it became completely exposed. The isolated nest tree was situated at the foot of a ravine⁵.

Take-over of the nest

On 14 July, the pair of forest-falcons began to perch near the macaw nest, which was in the early stages of incubation⁵. Subsequently, the same pair continued to visit the nest, judging from plumage colorations (see Methods). On 6 August, the female forest-falcon entered the nest chamber when the adult macaws were not present, leaving after c.15 seconds when the macaws returned to protect the nest. It is unknown whether the clutch was damaged during this invasion, but this is considered the first attack. In late August, such attacks increased in frequency (Fig. 1), reaching a peak of 18 attacks in a single day, which coincided with an increase in courtship and mating. Finally, on 8 November, the female forest-falcon removed a macaw chick from the nest. The chick fell to the ground where it remained for 30 minutes until it was rescued⁵. Once the forest-falcons had usurped the nest, they ceased attacking the macaws. In the three days leading the take-over, the forest-falcon pair made 67 of the 180 observed attacks on the nest. Of these 180 attacks, 168 (93%) were made by the female. The male began to attack on 2 October, 37 days before the take-over, whereas the female began 94 days prior to the take-over. Attacks consisted of rapid flights, stooping very close to the macaws, who protected the nest by screaming and beating their wings. On seven occasions, the female forest-falcon pulled the male macaw from the nest and struggled with him until almost hitting the ground. Most attacks by both male and female were directed against the male macaw. On only one occasion, prior to the take-over of the nest (12 October), did the female forest-falcon attack the macaw nestling in the absence of the adult macaws, walking back and forth for two minutes along the edge of the nest trying unsuccessfully to grab the nestling while making threatening pecks of its beak and flapping its wings.

On 5 November, the forest-falcons appeared to change their strategy for usurping the nest, at the same time as they reached a peak in courtship and mating. When the macaws left in search of food, the forest-falcons would occupy the area and attempt to prevent the macaws' return⁵. On 13 occasions, the macaws attempted to reach the nest but were interrupted by the forest-falcons' flight attacks, sometimes chasing them up to 100 m from the nest. This caused the nestling to starve for three days. On 8 November, this strategy culminated in the female forest-falcon seizing the macaw chick, in the upper nest, in her talons and dropping it to the ground. The falcons immediately occupied the nest and, when checked 27 days later, were apparently incubating eggs.

Conclusion

Due to the lack of previous data, it is unknown whether either species—forest-falcon or macaw—had previously used this nest cavity. Therefore, it is impossible fully to comprehend the origins of this nest take-over behaviour. Nonetheless, there is an apparent scarcity of acceptable nest cavities for these two species within the study area. Thorstrom *et al.*⁹ noted that many *M. ruficollis* and *M. semitorquatus* have been observed pursuing parrots, woodpeckers and toucans, but do not mention any instances of nest take-over. Data on the duration of copulation, in general, coincide with that indicated by Thorstrom *et al.*^{9,11}, as does that on the considerable height of the nest, also noted by Mader⁶. As expected, the descriptions of the display and nest presented here in general do not differ from the species' model.

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