

Reproductive behavior and habitat use of threatened Golden-plumed Parakeets (*Leptosittaca branickii*) at Tapichalaca Reserve, Ecuador

Nuttall Ornithological Club Report – December 2014-June 2015

Jessie Williamson
2014-2015 Fulbright Fellow, Ecuador
jwilliamson0110@gmail.com

INTRODUCTION

Scarce information exists on the ecology and natural history of threatened, range-restricted Golden-plumed Parakeets (*Leptosittaca branickii*) in Ecuador. Golden-plumed Parakeets are native to Colombia, Ecuador, and Peru, where they inhabit temperate cloud and elfin forests at 2,400-3,400 meters (m). Total population numbers are difficult to assess due to this species' nomadic behavior and inaccessible breeding locations, but current estimates for mature individuals range between 1,500-7,000 (BirdLife International 2015). The parakeets nest primarily in dead *Ceroxylon parvifrons* wax palm trees. In Ecuador, historic deforestation caused by the religious tradition of wax palm harvesting for Palm Sunday celebrations has resulted in a scarcity of natural nesting cavities. This has caused a sharp decline in Golden-plumed Parakeet population numbers over the last several decades. Little is known about this species' reproductive biology, and no formalized study on the parakeets' breeding behavior has even been conducted.

In 2007 the Ecuadorian Ministry of the Environment, the Jocotoco Foundation, ProAves Foundation (a Colombian non-profit organization), in conjunction with other conservation organizations, spearheaded an educational conservation campaign for Golden-plumed Parakeets and *C. parvifrons* palms. The campaign seeks to educate local communities about the plight of the parakeets and the importance of using locally common *C. parvifrons* alternatives in religious ceremonies to conserve remaining palms necessary for parakeet breeding. Although the campaign has achieved moderate success educating surrounding communities, more research on this poorly known parakeet' reproductive cycle is needed before appropriate conservation measures can be taken.

In April 2011 I studied artificial nest box use by Golden-plumed Parakeets at Tapichalaca Reserve, and returned in November 2011 for additional evaluation of their conservation campaign in the city of Loja and villages of Yangana, Valladolid, and Palanda. I used baseline data gathered from this study (Williamson, *unpubl. data*, 2011), as well as data and information from several Ecuadorian collaborators, to inform my research.

OBJECTIVES

My project sought to address major gaps in our understanding of *L. branickii* ecology, reproductive behavior, and natural history. Specifically, I aimed to:

1. Conduct a full-breeding season reproductive biology study in Ecuador to gain a better understanding of parakeet nest site selection and breeding biology, and;
2. Identify how Golden-plumed Parakeets utilize habitat in nest sites through vegetation surveys and behavioral observation.

METHODS

This project took place at Tapichalaca Reserve from December 2014 to June 2015. To offset the scarcity of natural cavities as a result of wax palm harvesting, in 2008 the Jocotoco Foundation installed 19 wooden nest boxes at Tapichalaca Reserve, of which 12 are still usable. Nest boxes are located in four key nesting areas: Quebrada Honda (S 04°29'26.6", W 079°08'04.7"), Tras de la Casa (S 04°29'43.5", W 079°07'59.6"), and Cruz del Soldado (S 04°29'58.3", W 079°08'03.8"), and Sendero las Pavas (S 04°29'11.8", W 079°08'19.2").

Reproductive Behavior

Eggs and chicks were monitored throughout the breeding season through regular nest checks and field observation. When monitoring eggs, I measured the length and width of each egg and weighed eggs on a weekly basis. Chicks were monitored every five days, which involved taking weights, standard morphological measurements (tarsus, total head length, bill depth, wing chord, and tail length), noting general health, parasite quantity (if any), and crop fullness of each chick. Additionally, each chick was photographed to visually track plumage development and growth (Fig. 1). Chicks were distinguished by red nail polish markings on one toenail of each foot. In the event that nail polish rubbed off between nest checks, chick identity was distinguished via identification of its siblings, as well as through its morphological measurements. In addition to examining each chick for parasites during a nest check, nest boxes were also tested for parasites by collecting and monitoring samples of sawdust substrate, following protocol used by biologist Martin Quiroga and his team studying development of *Philornis downsi*, a harmful parasitic fly, in coastal Ecuador the Galápagos Islands.

Habitat use

All known artificial and natural nest trees were cataloged and recorded with a Garmin GPSmap 64 handheld GPS unit, and information about the following characteristics was recorded: at breast height (DBH), total palm height, tree elevation, tree cavity diameter, tree cavity depth, cavity opening orientation, and proximity to other trees.

Following protocol from Juiña, M.E. (*unpubl. data*), I conducted vegetation surveys in each nesting site once throughout the breeding season to survey forest composition in nesting areas. I conducted habitat use surveys within 10 x 10 m randomly selected quadrats, surveying three quadrats each in Quebrada Honda and Tras de la Casa (larger nest box sites), and two quadrats each in Cruz del Soldado and Sendero Las Pavas (small nest box sites). During surveys I noted general characteristics of fruiting or flowering trees of the following species: *Podocarpus oleifolius*, *Podocarpus (Prumnopitys) montanus*, *Euphorbia latazi (laurifolia)*, *Hesperomeles ferruginea*, *Vallea stipularis*, *Ocotea infrafoveolata*, *Brunellia goudotii*, *Brunellia* sp., *Ceroxylon* sp., *Croton* sp., *Ficus* sp., *Struthanthus* sp. All trees whose DBH exceeded 10 cm were recorded. If habitat was found to be impassable, estimations for presence of fruit and/or flowers and DBH were made.

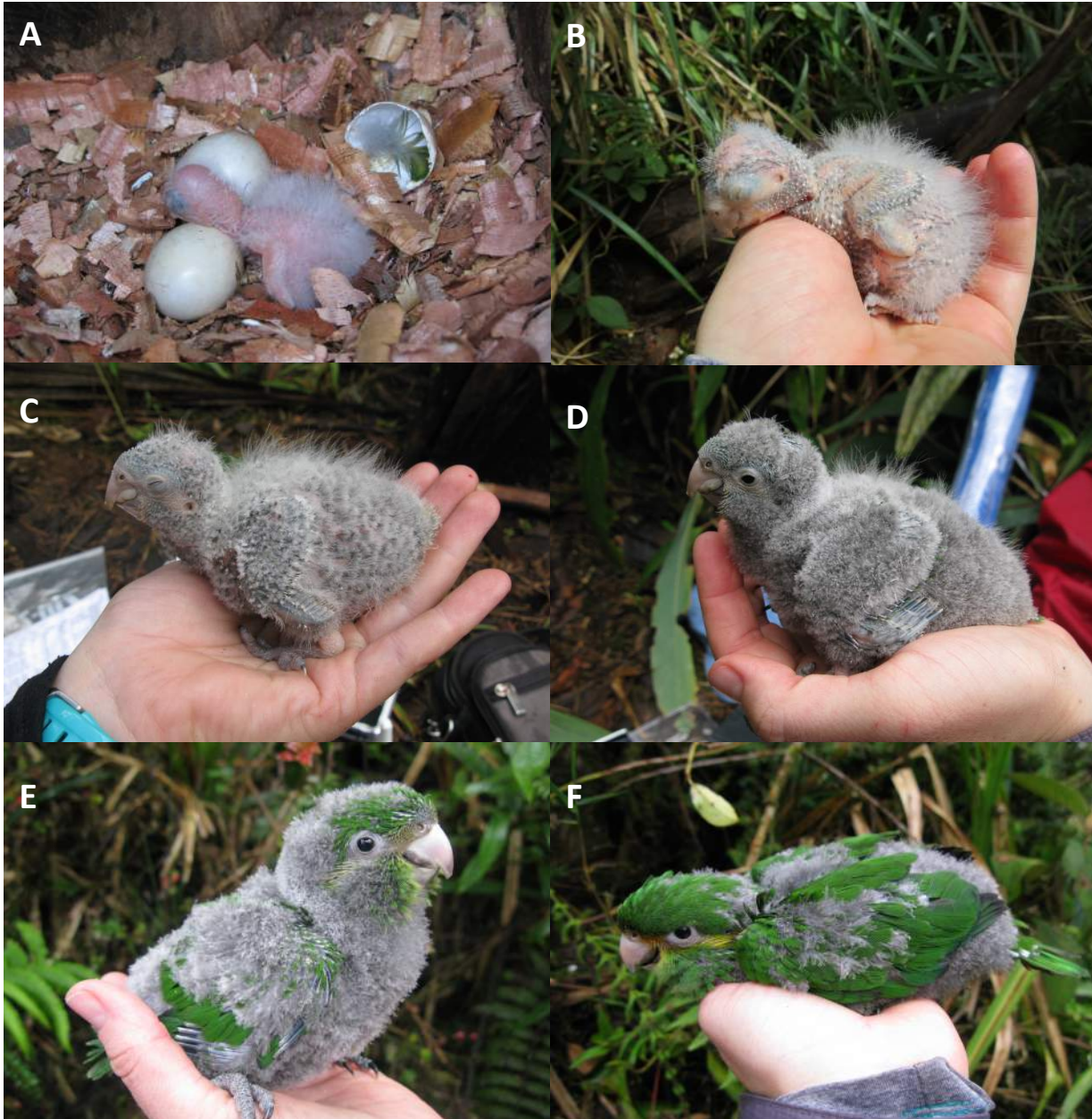


Figure 1. Golden-plumed Parakeet chick growth and development in the first five weeks of life. All ages are approximate based on estimated egg lay date for the 2014-2015 breeding season: A) 4 days; B) 12 days; C) 17 days; D) 22 days; E) 29 days; F) 32 days. Chicks typically fledge between 64-68 days of age. Photo E copyright J. Williamson for the *Washington Post*.

PROJECT HIGHLIGHTS

- 35 total eggs laid between Jan 7th and March 30th (dates are estimates based on egg and chick ages)
- 22 healthy chicks hatched (63% hatch rate; compare to 56% hatch rate in 2011)
- 92% of reserve nest boxes utilized (highest recorded rate from known data)

- 0% bee occupancy rate (compare to 37% bee occupancy rate in 2011, the only other year with recorded bee occupancy rate data)
- 0% predation rate (compare to 16% predation rate in 2011, the only other year with recorded predation rate data)
- Two confirmed natural cavities in dead wax palms in Quebrada Honda; one confirmed natural cavity in a living wax palm on Sendero Jocotoco (popular trail in Tapichalaca Reserve)
- Presented my research to the International Conservation Fund of Canada in January, as well as to a larger group from Naturaleza y Cultura Internacional in Loja in February
- Published photos of Tapichalaca Reserve and the Golden-plumed Parakeets for a [Washington Post travel article](#) (published May 2015); additionally conducted an interview about my research and the importance of Golden-plumed Parakeet conservation for *La Hora*, a local newspaper in Loja, for Palm Sunday conservation efforts.

PROJECT DETAILS

The 2015 breeding season was a successful one, with 22 hatched and fledged chicks (63% hatch rate, as mentioned above). Impressively, parakeets utilized nearly all available nest boxes (92% total) in working/usable condition (those not in usable condition had their doors left open and/or were not given a bed of sawdust to prevent parakeets from nesting in unsafe boxes). This year's breeding season aligned with proposed timelines from Colombian studies (Carantón 2004; Quevedo *et al.* 2006), which suggested earlier breeding season dates than I had expected at Tapichalaca. In my 2011 research with *L. branickii* at Tapichalaca, I noted that parakeets began laying eggs February-March; this year, breeding pairs began laying eggs as early as the first week in January (January 7th is the first estimated egg lay date). In general, chicks fledged between 64-68 days of age, consistent with the findings of other *L. branickii* reproductive studies.

All chicks were born healthy and grew steadily throughout the breeding season, although one chick did show signs of physical deformity: a Quebrada Honda chick had what was identified by a German veterinarian as 'constricted toe syndrome', which presents as constrictive lesions around the bird's toes (may be present on one or more toes). Inadequate brooder humidity, as well as nutritional deficiencies, bacterial infections, or fungal toxins often cause the disease in baby birds. It is suspected that wet and overly humid nest conditions within this particular nest box may have played a role in constrictive toe syndrome development in this particular chick, as its nest box was one of the original 2008 boxes and was consistently wet or damp at each nest check. Although the constricted toe syndrome at first appeared to hinder the chick's balance and perching abilities, as the chick grew larger and stronger it was able to perch on outstretched fingers/a hand, seemingly without issue. The chick fledged successfully around the same time as its peer chicks.

All chicks and nest boxes were found to be parasite-free throughout the breeding season. I was also pleased that to see that 0% of boxes were predated during the breeding season. During my research in 2011 I noted that hardwoods were much more susceptible to predation than wax palms due to crossing tree limbs in the canopy, giving snakes and long-tailed weasels (*Mustela frenata*) easy access to boxes (predation rate from the 2011 breeding season was 16%, and included predation of both eggs and adults). Although I do not have data to support this conjecture, I believe moving all nest boxes located on hardwoods to nearby wax palms prevented

predation. This was done by park guards last year. Wax palms are generally located farther apart from other trees and understory brush, and are difficult to climb due to their smooth trunks; these two factors make them much safer options for nest box locations.

Similarly, bees occupied 0% of boxes utilized by parakeets. One box in Tras de la Casa did contain a beehive at the beginning of the breeding season, but the bees were found dead several weeks after the discovery. Tapichalaca experienced a particularly heavy amount of rain this year – in a few instances it rained nearly 10 days without stopping – and I believe the bees were unable to survive in the extremely humid conditions within the nest box. Heavy rain and increased humidity levels may have also contributed to the lack of bee occupation in boxes in general this season, although this is also conjecture.

RECOMMENDATIONS & FUTURE DIRECTION

Publications in progress

At present, I am working with Ecuadorian colleagues to publish two papers related to my project: the first, on Golden-plumed Parakeet reproductive behavior, will utilize data collected on egg weights for an analysis of water weight loss during incubation (estimated to be greater in this species than in others), as well as morphological measurements of chicks. No morphological data exist for this species and this information will deepen knowledge of the nestling incubation period prior to fledging and allow for estimation of hatch date ranges and nesting success. The second publication will address parakeet nest site selection preferences and habitat use, utilizing data collected on nest tree characteristics and vegetation sampling in nesting areas.

Construction of new nest boxes

The number of nest boxes at Tapichalaca has decreased substantially since their original establishment in 2008 due to lack of funding for upkeep and new box construction (many are leaking, rotting/molding, missing chunks of wood/have holes, or are unstable). The fact that the *L. branickii* utilized > 90% of available nest boxes is an indication that additional – and newer – boxes are severely needed, as this simple solution to a lack of natural nesting cavities continues to be of importance.

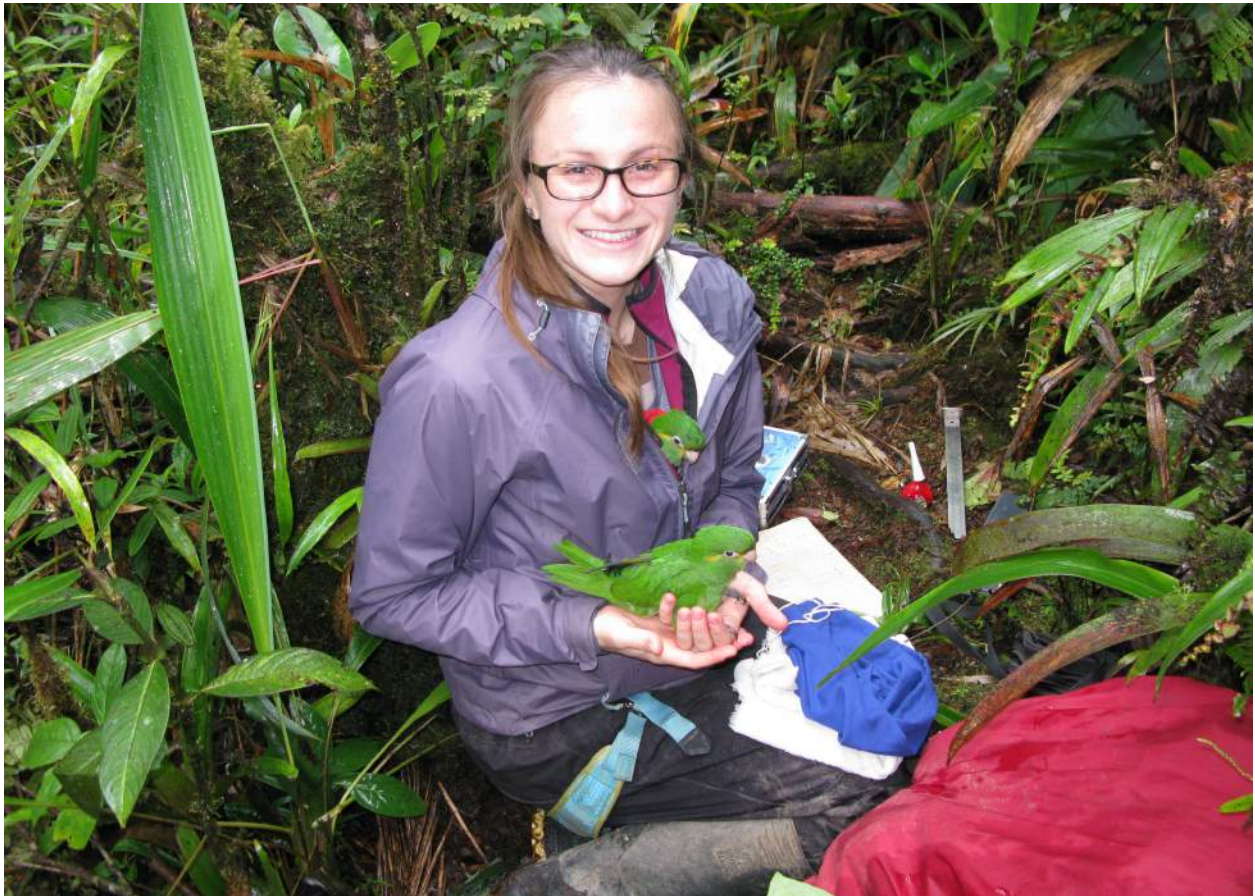
Securing funding for the construction and installation of new nest boxes is of highest priority, as all original nest boxes from 2008 have deteriorated to the point where they are mostly unusable and unsafe (the few constructed and installed in the last 1-3 years remain working condition). I recommend that the Jocotoco Foundation work with local organizations to construct and install 20-30 new nest boxes to be placed on wax palms in Quebrada Honda and Tras de la Casa, the more popular nesting sites (with some overflow to Cruz del Soldado and Sendero las Pavas, if needed). Additionally, I encourage the Jocotoco Foundation to allocate a small amount each year to the maintenance of existing nest boxes at Tapichalaca.

ACKNOWLEDGEMENTS

I would like to thank the Jocotoco Foundation for providing logistical support and site access for this project. I extend warm thanks to my field assistants, Manuela Brugger and Will Ford, for their positive attitudes and energy in the field. Finally, without generous funding from the Fulbright U.S. Student Program and Blake-Nuttall Fund, this project would not have been possible.

LITERATURE CITED

- BirdLife International. 2015. Species factsheet: *Leptosittaca branickii*. Downloaded from <http://www.birdlife.org> on December 4, 2015.
- Carantón, D. 2004. Biología y aspectos ecológicos de una nueva población del perico paramuno *Leptosittaca branickii*. Fundación ProAves, Colombia.
- Quevedo, A., P. Salaman, A. Mayorquin, N. Osorno, H. Valle, C. Solarte, R. Reinoso, J. Sanabria, D. Carantón, G. Osorno, and J.C. Verhelst. 2006. Loros amenazados de la Cordillera Central de los Andes de Colombia: una iniciativa de conservación basada en la investigación y la educación ambiental. *Conservación Colombiana* 1: 21-57.
- Williamson, J.L. 2011. Dos especies de pericos amenazados en el sureste del Ecuador: Biología reproductiva y aspectos ecológicos del Perico Cachetidorado (*Leptosittaca branickii*) y el Perico Pechiblanco (*Pyrrhura albipectus*) en la Reserva Tapichala, Zamora-Chinchipec, Ecuador con notas sobre su campaña de protección. Unpublished manuscript.



Muchísimas gracias por todo su apoyo!