

Habitat use and nest ecology of Long-tailed Manakins (*Chiroxiphia linearis*) in cloud forest ecosystems of Costa Rica

Ryan Malloy

Master of Science Candidate
Wildlife Ecology and Management
Warnell School of Forestry and Natural Resources
The University of Georgia

Major professor: Dr. Robert J. Cooper

Introduction

Habitat loss is the number one cause of species decline and extinction worldwide (Cayuela et al. 2006; Martinez-Morales 2005; Hale 2006). Tropical ecosystems are no exception. On average, forests are cut down at a rate of over 5% per year across Central America, with the majority of deforestation occurring in high-elevation cloud forest ecosystems (Sanchez-Afofeifa et al. 2001, Sader and Joyce 1998; Martinez-Morales 2005). Conservation efforts are in place for many threatened and endangered species; however, monitoring all species, whether threatened or not, is virtually impossible.

Costa Rica is known for its heavy involvement in conservation. Over 25 % of the country's land is designated as conservation land most commonly in the form of wildlife reserves. The government has made very progressive management and anti-development decisions with support from the public in an attempt to protect some of Costa Rica's natural beauty and resources. In addition, there are thousands of acres of suitable wildlife habitat in the form of private shade coffee plantations. Shade coffee is generally grown in small plots unlike large-scale sun coffee which covers vast expanses of landscape, providing little or no suitable habitat for wildlife. At higher elevations where there is considerably more precipitation, the climate is cooler, and the volcanic soil is rich with nutrients, shade coffee plantations can be found adjacent to natural forest ecosystems. Because shade coffee plantations are structurally similar to neighboring forest ecosystems, it is very common to see hundreds of species of birds commonly associated with forest habitats yet rarely (if ever) found in typical agricultural landscapes (Sekercioglu et al. 2007).

However, Costa Rica currently faces one of its biggest challenges yet: keeping private forest and shade coffee plantations from being converted into cattle pastures. This conversion of high quality wildlife habitat into unsuitable and unusable land will lead to further species decline for multiple taxa including birds.

Methods

My research proposes to better understand how neotropical resident birds use the landscape at cloud forest elevations. In particular, I plan on working with the Long-tailed Manakin (*Chiroxiphia linearis*) (Figure 1). Like most species in the neotropics, Long-tailed Manakins are data deficient. This simply means that very little is known about even some of the most basic biological characteristics for this species. The work that has been done with species has pertained almost exclusively to deciphering the peculiar habits and complex social hierarchy of males at lek sites (Foster 1987; Arevalo and Heeb 2005; Doucet et al. 2007; Trainer and McDonald 1993; Trainer and Parsons 2001). In short, anywhere from four to eleven males gather in specific areas, called lek sites, where the two dominant males of that particular lek site (alpha and beta males) perform a song and dance duet. Females visit the lek site to assess the performance. Once a female settles on a duet, she will mate with only the alpha male before

departing to begin the nesting process. Females are solely responsible all nesting duties (i.e., nest construction, incubation, feeding and protecting nestlings, and tending to fledglings) (Foster 1976). Unlike males, females are cryptic, quiet, and very difficult to locate in the field (Stiles and Skutch 1989). This is one of the main reasons why so little work has been done with them.

In this project, I will assess habitat use, quantify nest success, and determine nest territory size for female Long-tailed Manakins. To do so, I will attach small radio transmitters (see Rappole and Tipton 1991) to females that are in breeding condition and track them to their nests. Once nests are located, I can record habitat characteristics, materials used to construct the nest, female nest visitation rates and behavior, and nest survival rates. In addition to monitoring nest success, I will locate females fitted with transmitters at multiple locations across the landscape in order to construct a home range estimate. Data will be collected at four discrete forest sites using approximately five individuals from each site (Figure 2).

Study site

This project will be conducted within the property boundaries of the University of Georgia's San Luis Research Station in San Luis, Costa Rica. The field station is located in the cloud forest at 1100 meters in elevation (approximately 3,600 feet) (Holdridge 1966). This site contains over 66 hectares, approximately 165 acres, of primary and secondary forest as well as shade coffee plantations and open pastures for grazing horses and cattle (Figure 2). Over the last five years, I have become intimately familiar with this research facility, as I have worked there in various capacities and lived there for over a year. During that time, I have had the opportunity to observe hundreds of species of birds, both residents and migrants. Through working side by side and living with the people of San Luis, I have established and fostered a deep relationship with the community. This relationship will help me in my efforts to raise awareness and educate the people of San Luis about the habitat needs of the local avifauna.

Conclusion

With these data, I will be able to inform the local stakeholders of San Luis about the basic habitat requirements for Long-tailed Manakins during the breeding season. The Long-tailed Manakin is a highly sought after bird by many locals, naturalists, and ecotourists. Shade coffee tours are becoming more popular in the San Luis valley. If landowners have the appropriate knowledge about the species living on and sharing their land, they may be able to make better management decisions that will benefit themselves as well as the wildlife around them.

Figures

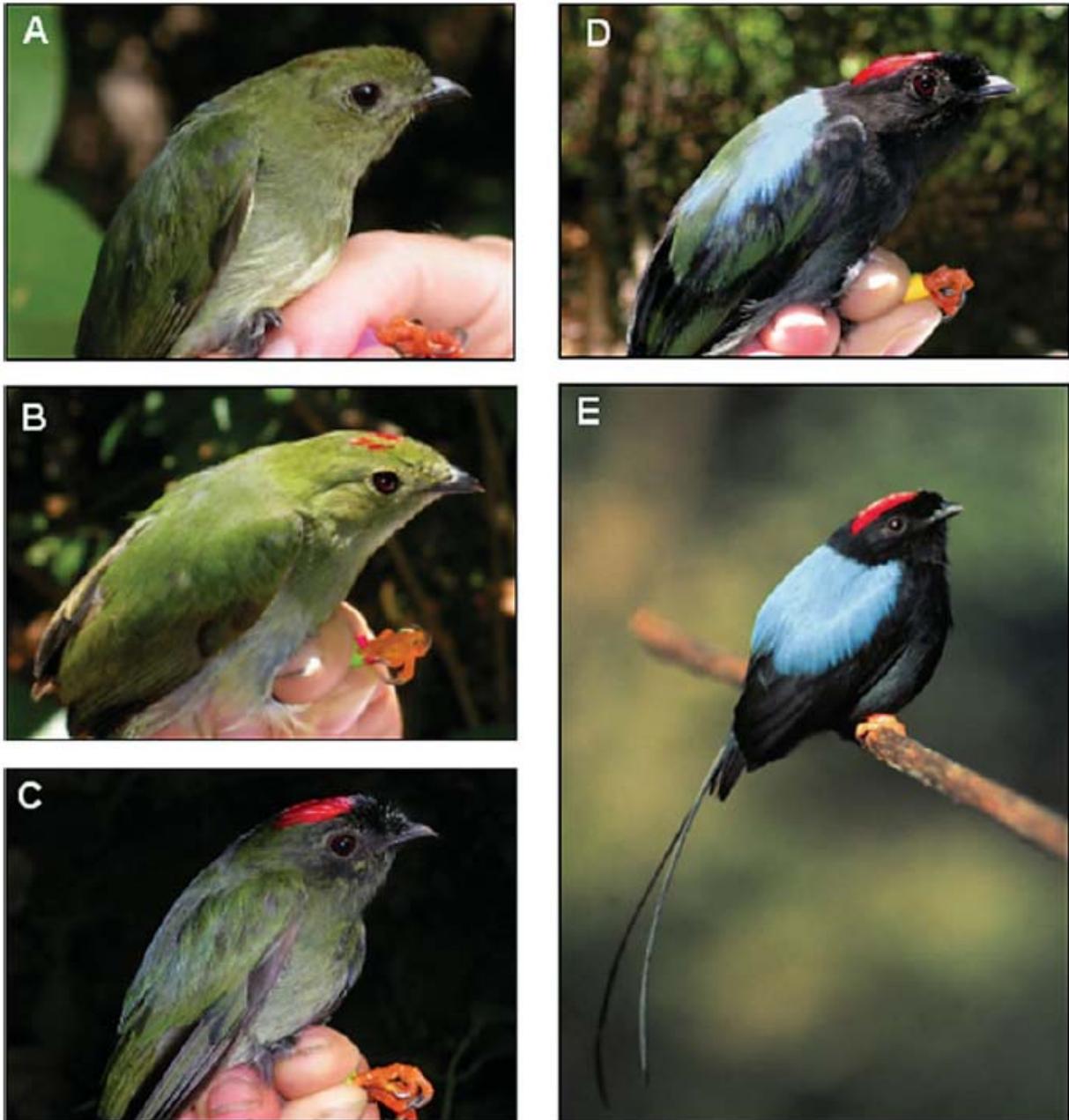


FIG. 1. Typical appearance of birds in different plumage stages: (A) female or male in juvenal plumage, (B) male in red-cap plumage, (C) male in black-face plumage, (D) male in blue-back plumage, and (E) male in definitive plumage. Photograph (E) courtesy of Richard Laval.

(From Doucet et al. 2007)

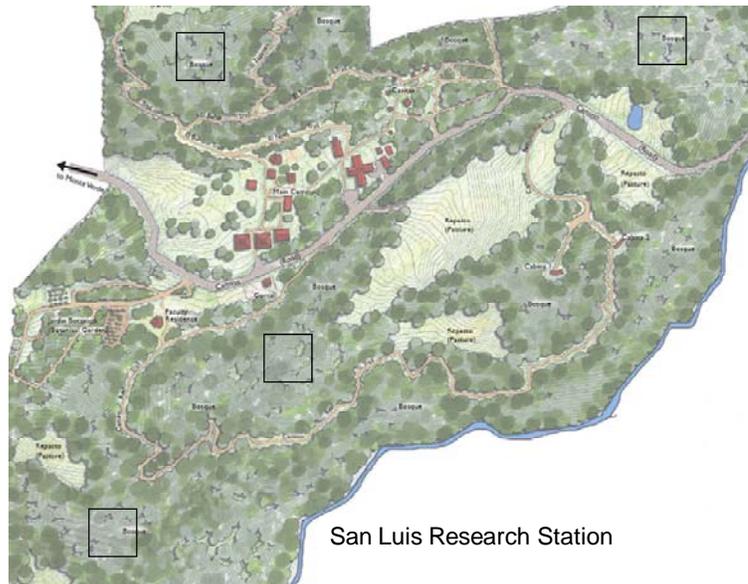


Figure 2. Field site locations within San Luis Research Station property. Not to scale.

References

- Arevalo, J.E., AND Phillip Heeb. 2005. Ontogeny of sexual dimorphism in the Long-tailed Manakin *Chiroxiphia linearis*: long maturation of display trait morphology. *Ibis*. 147:697-705.
- Cayuela, L., Golicher, D.J., Maria Rey Benayas, J., Gonzalez-Espinosa, M., AND N. Ramirez-Marcial. 2007. Fragmentation, disturbance, and tree diversity conservation in tropical montane forests. *Journal of Applied Ecology*. 43:1172- 1181.
- Doucet, S., McDonald, D., Foster, M., AND R. Clay. 2007. Plumage Development and Molt in Long-tailed Manakins (*Chiroxiphia linearis*): Variation According to Sex and Age. *Auk*. 124:29-43.
- Foster, M. 1976. Nesting Biology of Long-tailed Manakin. *Wilson Bulletin*. 88:400-420.
- , 1987. Delayed Maturation, Neoteny, and Social System Differences in two Manakins of the Genus *Chiroxiphia*. *Evolution*. 41:547-558.
- Hale, A.M. 2006. Group living in the Black-breasted Wood-quail and use of playbacks as a survey technique. *The Condor*. 108:107-119.
- Holdridge, L.R. 1966. The life zone system. *Adansonia* 6: 199-203.
- Martinez-Morales, M.A. 2005. Landscape patterns influencing bird assemblages in a fragmented neotropical cloud forest. *Biological Conservation*. 121:117-126.

- Rappole, J.H., AND A.R. Tipton. 1991. New harness design for attachment of radio transmitters to small passerines. *Journal of Field Ornithology*. 62(3): 335-337.
- Sader, S.A., AND A.T. Joyce. 1998. Deforestation rates and trends in Costa Rica, 1940 to 1983. *Biotropica*. 20(1):11-19.
- Sanchez-Azofeifa, G.A., Harriss, R.C., AND D.L. Skole. 2001. Deforestation in Costa Rica: A quantitative analysis using remote sensing imagery. *Biotropica*. 33(3):378-384.
- Sekercioglu, C.H., Loarie, S.R., Oviedo Brenes, F., Ehrlich, P.R., AND G.C. Daily. 2007. Persistence of forest birds in the Costa Rican agricultural countryside. *Conservation Biology*. 21(2):482-494.
- Stiles, F.G., AND A.F. Skutch. 1989. *A Guide to the Birds of Costa Rica*. Cornell University Press, Ithaca, New York.
- Trainer, J., AND David McDonald. 1993. Vocal Repertoire of the Long-tailed Manakin and Its Relation to Male-Male Cooperation. *The Condor*. 95:769-781.
- Trainer, J., AND Ryan Parsons. 2001. Uniformity of Long-tailed Manakin Songs from Three Localities in Costa Rica. *Wilson Bulletin*. 113:431-434.