Spider monkeys use high-quality core areas in a tropical dry forest

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Keywords
Ateles geoffroyi; home range; kernel estimators.

Abstract
Core areas are thought to be critical parts of animal home ranges for sustaining the population, but few studies have tested this important assumption. We examined whether core areas of spider monkeys Ateles geoffroyi had better habitat quality than the rest of their home range (non-core areas). Habitat quality parameters, including density and diversity of food trees, degree of forest maturity and density of sleeping trees in core and non-core areas were analyzed using Moran eigenvector generalized linear model (GLM) filtering using spatial eigenvector mapping to control for spatial autocorrelation. The best fitting GLM revealed that spider monkeys’ core areas had higher habitat quality than non-core areas. This study provides quantitative evidence supporting the concept of core areas including the most critical resources for an animal population. In this respect, spider monkeys’ core areas are a key to understand their movement ecology and habitat preferences.

Introduction
Core areas are defined as small areas of intense use within the home ranges of animals on which their sustainability may depend (Leuthold, 1977; Samuel, Pierce & Garton, 1985). Core areas are expected to contain critical resources for survival and reproduction, which implies that they are more ecologically relevant than other less-frequently used areas (Powell, 2000; Passinelli, Hegelbach & Reyer, 2001; Plowman et al., 2006). Individuals with better quality core areas may have better fitness as they have easier access to important resources (Emery Thompson et al., 2007). Quantitative analysis on whether core areas contain key biological features can provide a better understanding of habitat selection (Samuel & Green, 1988) and the potential role of core areas in establishing priorities for conservation (Bingham & Noon, 1997). While core areas are frequently reported as an aspect of animal ranging along with home ranges (e.g. Hellickson et al., 2008; Spehar, Link & Di Fiore, 2010), only a few published studies provide quantitative evidence for core areas containing the most critical resources in the home range (da Silva Júnior et al., 2009; Thompson, Chambers & McComb, 2009).

Spider monkeys (Ateles spp.) living in dry tropical forests, which is the most endangered ecosystem of the lowland tropics (Janzen, 1986), are an appropriate species to investigate the use and quality of core areas relative to non-core areas, as the extreme habitat fragmentation present in dry forests means that spider monkeys should use core areas in a more distinct manner than they would in more pristine forests. Spider monkeys tend to disappear from disturbed areas because they are especially susceptible to habitat destruction, fragmentation and hunting (Peres, 2001; Ramos-Fernández & Wallace, 2008). They are among the first species to disappear from over-exploited forests (Bodmer, Eisenberg & Redford, 1997) and are rarely found in small forest fragments (Gilbert, 2003) because they are generally found in low densities (but see Wallace, Painter & Taber, 1998), have large home ranges, reproduce slowly, are highly dependent on a fruit diet and have large body sizes (van Roosmalen & Klein, 1988; Gonzalez-Zamora et al., 2009; Di Fiore, Link & Campbell, 2010). They are also slower than sympatric primate species in returning to regenerating dry forest (Sorensen & Fedigan, 2000). Furthermore, their role as seed dispersers is critical for ecological processes in the Neotropical forests (Link & Di