Comparison of primate abundance in four Costa Rican habitats

Justin E. Campbell, P. Bjorn Erickson, Christina L. Glastris, Shane R. Heath, Melissa R. Kang, and Christopher M. Leander

Abstract: We censused, compared and contrasted the abundances and population structures of four species of primates (*Alouatta palliata, Ateles geoffroyi, Cebus capucinus,* and *Saimiri oerstedii*) across four different habitats in Costa Rica: tropical dry forest, mid-elevation cloud forest, Pacific lowland tropical forest, and Atlantic lowland tropical forest. At each site, monkeys were located along trails and their species and troop size were noted. Species diversity and composition differed among sites. Corcovado was the only site containing all four species. *Alouatta palliata* was the only species observed in the censuses at all four sites. Average troop size differed between species; *Alouatta palliata* had the largest average troop size overall, but these varied among sites. These data contribute to knowledge about primate species distribution within Costa Rica, which could be useful for conservation planning.

Key Words: distribution, howler monkey, population structure, squirrel monkey, spider monkey, white-faced capuchin

Introduction

In recent decades, non-human primate populations have been on the decline as a result of a number of anthropogenic impacts, such as hunting and habitat fragmentation (R.T. Holmes, pers. comm.). In Costa Rica, primate species occur in most forested habitats, and have been intensively studied in areas such as Santa Rosa National Park and along the Pacific coast. However, there is relatively little quantitative information about how their abundances and population structure (group composition, etc.) vary among habitats. Such information is needed for understanding the environmental factors that affect these species, as well as for developing conservation policies and long-term management plans.

In this comparative project we assessed the abundances and population characteristics of four species of primates (*Alouatta palliata, Ateles geoffroyi, Cebus capucinus,* and *Saimiri oerstedii*) across four sites in Costa Rica, each site representing a different habitat type: tropical dry forest (Palo Verde National Park), mid-elevation cloud forest (Monteverde Cloud Forest Preserve), Pacific lowland tropical forest (Corcovado National Park), and Atlantic lowland tropical forest (La Selva Biological Preserve).

Methods

Primate populations were censused in tropical dry forest at Palo Verde National Park on 11 January 2001, in cloud forest at the Monteverde Cloud Forest Preserve above the Monteverde Biological Station on 19 January, in Pacific lowland tropical forest near Estación Sirena at Corcovado National Park on 2 February, and in Atlantic lowland tropical forest at La Selva Biological Station on 13 February .

Within each site, three pairs of observers walked existing trails for four hours between 05:30 and 11:00. When a primate troop was located, observers watched for 3-5 min, recording the species and the number of monkeys, by age and sex class when possible.

Results

We found 146 monkeys at Corcovado National Park, 79 at Palo Verde National Park, 23 at the La Selva Biological Station, and 14 at the Monteverde Cloud Forest Preserve (Fig. 1). Four species were found at Corcovado, three at La Selva, two at Palo Verde, and only one at Monteverde. Howler monkeys were found at all four sites, capuchins at three sites, spider monkeys at two sites, while squirrel monkeys were found at only one site.

Howler troop size differed significantly across sites (ANOVA, $F = 19.8$, $df = 3$, $P = 0.007$) with the largest group ($n = 30$) being at Palo Verde. Troop size differed significantly among species (ANOVA, $F = 4.94$, $df = 3$, $P = 0.005$). Howlers had the largest, spiders had the smallest, and capuchins had intermediate troop sizes (Fig. 2).

Discussion

Differences in troop size between species indicate that different primates may exhibit different foraging strategies, as well as different levels of vigilance for predators. There may also be differences in overall troop dynamics between the different species, which affect troop size. Despite differences between species, some of the variation in troop size may also be affected by other factors. The fact that howler monkeys, the only species present at all four sites, had different troop sizes at different sites suggests that habitat may influence troop size. In Palo Verde, where troop size was greatest, the forest includes many deciduous trees with fallen leaves, as well as a seemingly thinner canopy (personal observation). This more open forest type may make monkeys more visible to predators, thereby increasing the benefit of higher predator vigilance that a large troop provides.

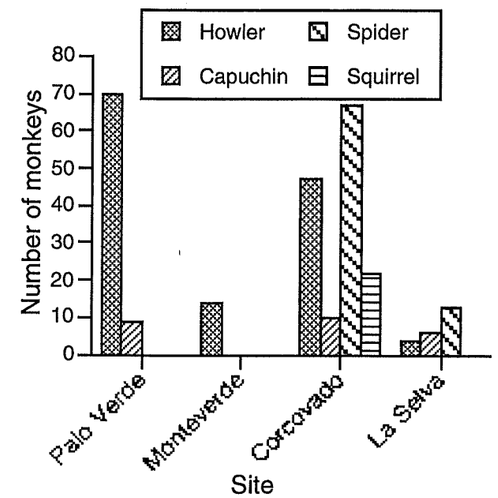

Fig. 1. Monkey abundance by species at four Costa Rican sites. Total numbers recorded on one day between 05:30 and 11:00 by three teams of observers (see Methods).

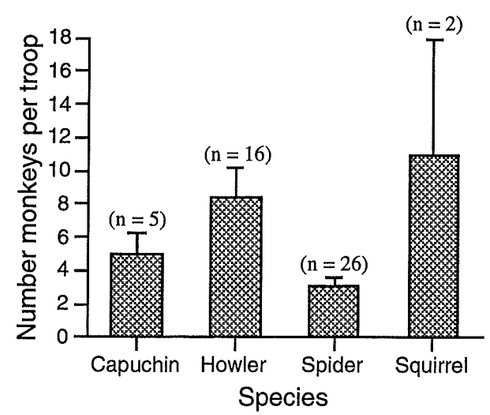

Fig. 2. Mean number (± 1 SE) of monkeys per troop as censused in four Costa Rican sites. Data pooled from all four locations.

The differences in distribution between species and the difference in diversity between sites both have important conservation implications. Although howler monkeys were found at every site, and therefore may be more adaptable, squirrel monkeys were limited to the Pacific lowland forest at Corcovado. This more limited range may put squirrel monkeys at a greater risk from habitat loss (Boinski et al. 1998). Additionally, Corcovado was the only site at which all four species were found, indicating that this type of lowland rainforest, especially with an area comparable to that at Corcovado, may be particularly important for primate conservation.

The thoroughness of our study was constrained by short sampling times and the lack of replication at each site. Further investigation of primate abundance and distribution should involve more extensive sampling and should examine other sites within Costa Rica.

Literature Cited

Boinksi, S., K. Jack, C. Lamarsh, and J. A. Coltrane. 1998. Squirrel monkeys in Costa Rica: drifting to extinction. Oryx 32: 45-58.