

The effect of habitat fragmentation on the genetic structure of a top predator: loss of diversity and high differentiation among remnant populations of Atlantic Forest jaguars (*Panthera onca*)

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Abstract

Habitat fragmentation may disrupt original patterns of gene flow and lead to drift-induced differentiation among local population units. Top predators such as the jaguar may be particularly susceptible to this effect, given their low population densities, leading to small effective sizes in local fragments. On the other hand, the jaguar's high dispersal capabilities and relatively long generation time might counteract this process, slowing the effect of drift on local populations over the time frame of decades or centuries. In this study, we have addressed this issue by investigating the genetic structure of jaguars in a recently fragmented Atlantic Forest region, aiming to test whether loss of diversity and differentiation among local populations are detectable, and whether they can be attributed to the recent effect of drift. We used 13 microsatellite loci to characterize the genetic diversity present in four remnant populations, and observed marked differentiation among them, with evidence of recent allelic loss in local areas. Although some migrant and admixed individuals were identified, our results indicate that recent large-scale habitat removal and fragmentation among these areas has been sufficiently strong to promote differentiation induced by drift and loss of alleles at each site. Low estimated effective sizes supported the inference that genetic drift could have caused this effect within a short time frame. These results indicate that jaguars' ability to effectively disperse across the human-dominated landscapes that separate the fragments is currently very limited, and that each fragment contains a small, isolated population that is already suffering from the effects of genetic drift.

Keywords: Atlantic forest, carnivora, genetic drift, Neotropical, population structure

Received 12 April 2010; revision received 9 August 2010; accepted 17 August 2010

Introduction

Severe anthropogenic changes have caused worldwide loss and fragmentation of natural habitats, contributing

significantly to the decline and isolation of wild populations, thus increasing their risk of extinction (Frankham *et al.* 2002; Schipper *et al.* 2008). In this context, large carnivores such as the jaguar (*Panthera onca*) are thought to be particularly sensitive to population decline and local extinction (Gittleman *et al.* 2001). The jaguar is the largest wild felid in the Americas (Nowell & Jackson

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