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Title: Understanding and managing isolation in a fragmented population of Golden Lion Tamarins, *Leontopithecus rosalia*

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ABSTRACT

UNDERSTANDING AND MANAGING ISOLATION IN A FRAGMENTED POPULATION OF GOLDEN LION TAMARINS, *LEONTOPITHECUS ROSALIA*

Habitat fragmentation is one of the most pervasive threats affecting wildlife populations around the world. The resulting fragments are often small and isolated, increasing a population's risk of extinction. Demographic variation, such as fluctuation in birth or death rates, can cause a small population's numbers to plunge so low that recovery is impossible. Due to lack of gene flow, small, isolated populations eventually lose genetic diversity, become inbred, and suffer from inbreeding depression. These threats, however, can be reduced if there is some movement of animals, and gene flow, between populations. Unfortunately, movement of individuals between populations is restricted due to often unsuitable or even hostile environments separating the populations. Improving connectivity in these cases is vital for long term population persistence and viability. Therefore it is critical for conservation planning to include strategies that promote gene flow and metapopulation management strategies. The path to creating these successful plans begins with an understanding of the population's status and the factors that affect movement in a fragmented landscape. The golden lion tamarin (*Leontopithecus rosalia*; GLT), an endangered primate native to the Atlantic Coastal forest in Brazil, lives in a landscape that is highly fragmented providing a perfect platform to investigate the effects of fragmentation and isolation on genetic status, movement, and long-term population viability. Currently around 1,600 GLTs are divided among at least 7 isolated populations (management units).

The first study in this dissertation evaluates the genetic status of the reintroduced population of golden lion tamarins and determines if future reintroductions from captivity could further contribute to the wild population's genetic diversity. Results indicate that the overall genetic status of the reintroduced GLT population is favorable; the population is currently maintaining relatively high levels of genetic diversity. However, this population is small and fragmented and is still at risk. Further reintroductions could enhance the genetic diversity and carefully selected translocations could help increase the genetic diversity of the isolated management units. This study demonstrates the power of using pedigree analysis for assessing wild populations and further using this information to make management recommendations for the conservation of the species.

The second study investigates the level of connectivity in the GLT reintroduced population as well as factors that affect movement by examining the movements that occurred between groups and populations. This study demonstrates that distance is the most important factor that will affect movement in this fragmented population. Additionally, movement within seemingly connected habitats can actually be quite limited such that within a single management unit, there may be functional groups that do not have movement between them despite their structural connectivity. From the 7 management units that have been classified, this study demonstrates that there are actually a minimum of 11 functional units.

Based on the population structure as defined by the second study, the third study uses *VORTEX*, an individual based modeling program, to model the long term metapopulation and functional unit viability, measured by probability of extinction and retained genetic diversity. The model indicates that the metapopulation is viable for the 100 years modeled. Notably however, only the two largest units were needed to meet the minimum requirements for population viability. The smaller units were vulnerable to the loss of genetic diversity and require an increase in gene flow to meet the genetic target for viability. Even with an increase in connectivity however, the genetic diversity of the 11 isolated units is not able to match that of the metapopulation modeled as a panmictic population. Collectivity, these studies contribute to the understanding of the effect of isolation on population viability, genetic status, and movement. Specifically, this information helps form the scientific basis on which effective management strategies can be based to promote population persistence in the fragmented population of golden lion tamarins.