



Landscape Genetics of Ocelots in Belize

Effects of Landscape Features on Gene Flow

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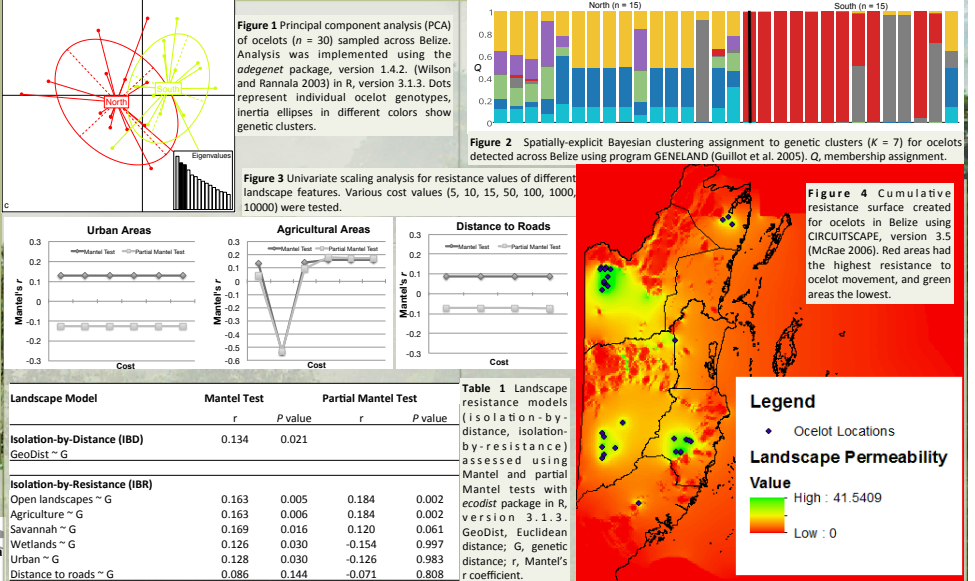


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Abstract

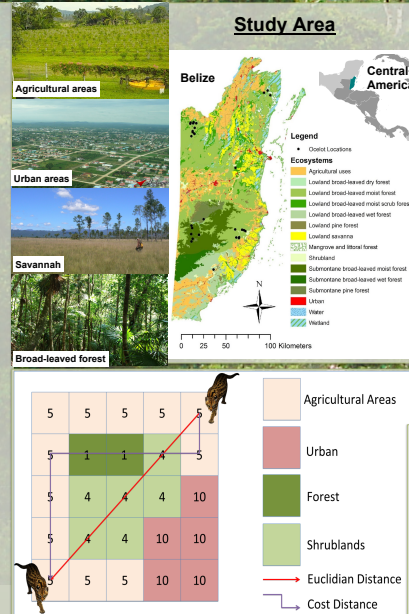
- Ocelots (*Leopardus pardalis*) are medium-sized Neotropical felids, which are still relatively understudied and decreasing in numbers due to direct persecution, habitat loss and fragmentation. We aimed to estimate genetic connectivity of wild ocelot populations across fragmented landscapes of Belize and understand how the landscape may affect their gene flow.
- We applied noninvasive genetic sampling and an individual-based landscape genetics approach for ocelots sampled across five different study sites in Belize, Central America to:
 - identify genetic structure by using 14 microsatellite loci and Bayesian clustering methods
 - and to assess the influence of different landscape features (agriculture and urban areas, distance to roads, savannah, wetlands) on gene flow.
- Spatially explicit Bayesian clustering showed that ocelots in Belize exhibit moderate levels of genetic differentiation, roughly separating northern and southern ocelots in two genetic clusters with moderate levels of admixture. Our fine-scale study showed that movement of ocelots and thus gene flow is primarily restricted by agricultural areas. This result is not surprising considering prior findings which indicated that this species is less likely to be found in more open, less covered habitat types.
- Understanding of species-specific habitat and connectivity requirements is crucial for managing threatened species across fragmented landscapes. These results suggested that ocelot populations in most northern and southern Belize, which are surrounded by agricultural areas are at risk to become genetically isolated. Ocelots in centra

Results



Methods

- Field Sampling**
 - Noninvasive genetic sampling – fecal DNA
- Genetic Analysis – assess genetic connectivity among Belize ocelots**
 - Microsatellite genotyping
 - Bayesian clustering analysis using GENELAND
 - Principal component analysis using R package *ade4*
 - Individual-based genetic distances (*D_{ps}*)
- Landscape Genetics – do certain landscape features influence gene flow?**
 - Univariate scaling analysis
 - Cost values (5, 10, 15, 50, 100, 1000, 10000)
 - Landscape resistance models
 - Isolation-by-distance (IBD)
 - Isolation-by-resistance (IBR)
 - Factors: Urban areas, agriculture, open landscapes, wetlands/water, distance to roads
 - Simple & partial Mantel tests – correlate individual genetic distances with Euclidean and cost distances using R package *ecodist*



Discussion

- Habitat loss and fragmentation are among the largest threats to wild felids (Macdonald and Loveridge 2010).
- Medium-sized ocelots remain understudied in a conservation and landscape genetics context. This represents the first landscape genetics study on wild ocelot populations, examining the effects of different landscape features on gene flow.
- Our study showed that agricultural areas negatively impact gene flow by restricting movement. The findings of our study support previous studies that showed that ocelots prefer habitats with high canopy cover and forest density (Jackson et al. 2005, Shindle and Tewes 1998, Horne et al. 2009). It was also suggested that ocelots avoid more open areas since they are more exposed to predators (large cats) and human disturbance (Emmons et al. 1998).
- The results of our study highlight the importance of landscape genetics research and provide crucial baseline information for conservation and management planning of wild ocelot populations in Belize.

Literature Cited

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Acknowledgements: Special thanks to Dr. Mark Weckel, and the entire SRMP staff and program for this wonderful opportunity. We would also like to thank Drs. Marcella Kelly and Lisette Waits who have supervised the data collection of this research project.