Land use and accessibility impacts on mammal occupancy in the Chiquitano Dry Forest

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Abstract

Agricultural expansion is one of the primary drivers of landscape change globally, altering habitat structure, connectivity, and resource availability for wildlife (Davison et al., 2021). In the Chiquitano Dry Forest of eastern Bolivia, increasing agricultural intensification has transformed large portions of the landscape into grazing systems, croplands, and remnant forest habitats. Understanding how mammals respond to these changes is essential for balancing biodiversity conservation with agricultural development.

This study investigated the influence of land systems, accessibility, and environmental covariates on the occupancy of four focal mammal species: collared peccary (*Pecari tajacu*), ocelot (*Leopardus pardalis*), puma (*Puma concolor*), and lowland tapir (*Tapirus terrestris*). Camera trap data from over 100 sampling locations were combined with environmental and anthropogenic covariates, including accessibility, distance to water, forest cover, forest edge, and pasture cover. Single-species occupancy models were developed using Bayesian occupancy modelling and model averaging was applied to account for uncertainty among competitive models.

Model results indicated strong species-specific responses to environmental conditions. Ocelot occupancy was most strongly associated with proximity to water and exhibited the highest overall occupancy estimate (0.382). Collared peccary occupancy was moderately high (0.376) and showed weak responses to measured covariates, suggesting broad ecological flexibility. Puma occupancy (0.267) was negatively associated with pasture cover and positively associated with accessibility, while tapir occupancy was lowest overall (0.106) and was primarily influenced by accessibility and distance to water.

Occupancy probabilities varied among land systems, with forest-dependent grazing systems generally supporting higher occupancy than intensive agricultural systems. However, Kruskal Wallis analyses indicated that occupancy differences among land-system categories were not statistically significant for collared peccary, ocelot, or tapir. Puma occupancy was the

only species that differed significantly among land-system categories, suggesting greater sensitivity to landscape variation.

Spatial projections revealed that environmental predictors influenced occupancy at broad scales, although these projections should be interpreted cautiously because they represent correlations derived from camera trap locations and may extrapolate beyond observed environmental conditions.

Overall, this study demonstrates that mammal responses to landscape change are highly species-dependent. Environmental factors such as water availability, pasture cover, and accessibility were often stronger predictors of occupancy than broader land system classifications, highlighting the importance of maintaining habitat connectivity, forest remnants, and water-associated habitats within expanding agricultural landscapes.

Figure 1. Overall Species Occupancy by Land Use Type Boxplot

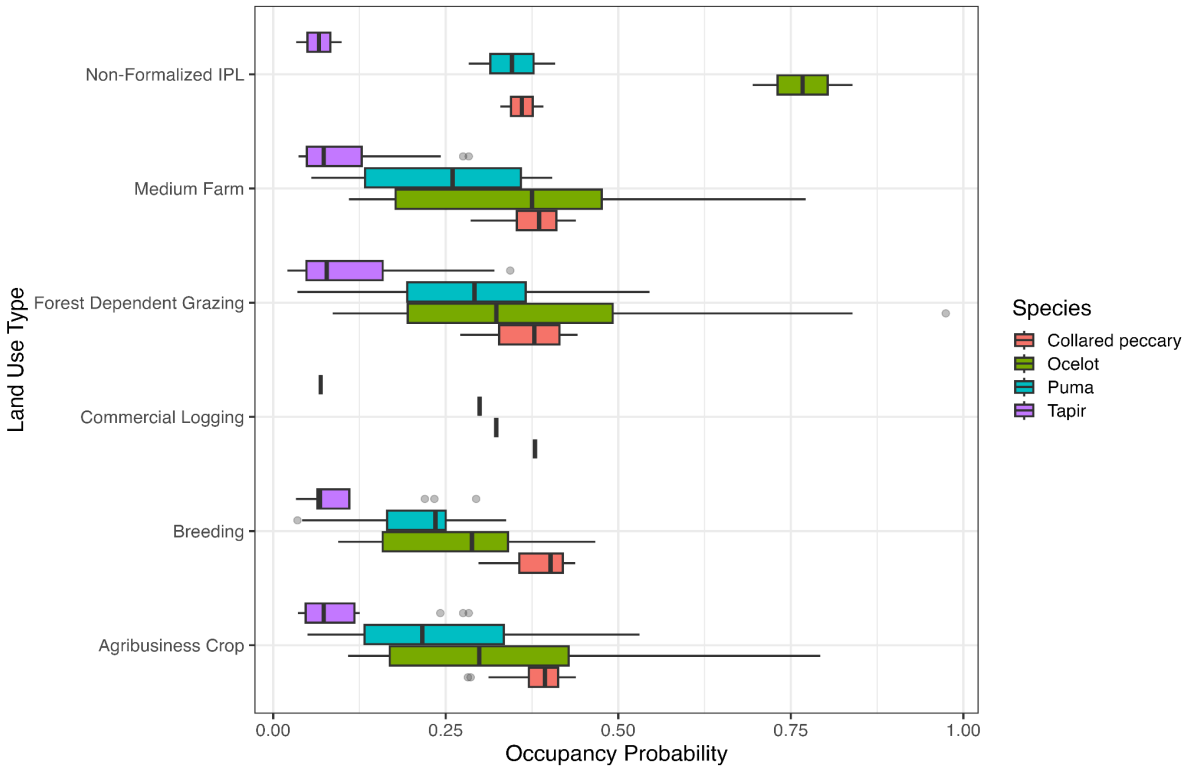

Figure 2. Species Occupancy Projection onto Study Area - Puma