Integrating Telemetry Data into Spatial Capture-Recapture to Better Infer Densities and Rest Site Selection of Ringtails in Northwestern California

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Objective – Understanding ringtail habitat selection

Introduction

Ringtails (*Bassariscus astutus*) are a species of conservation concern in California and Oregon, yet little is known about their distribution, abundance, habitat selection, and appropriate survey methods to monitor population trends over time (CDFW 2015, ODFW 2016). It is difficult to determine any ecological and conservation needs for ringtails without information on their basic ecology, or understanding their role in the environment. We used spatial capture-recapture and radio telemetry to determine habitat selection by ringtails in northern California.

Methods

We captured and radio collared 19 ringtails on the Hoopa Valley Indian Reservation (Figure 1). We located animals using VHF telemetry and triangulation from Jan – Aug 2008, and followed animals to diurnal rest-sites.

We attempted to locate each ringtail in a rest site weekly throughout the study period. We used spatial capture-recapture with integrated telemetry information and spatial covariates to estimate the density and distribution of ringtails on Hoopa (Royle et. al 2013).

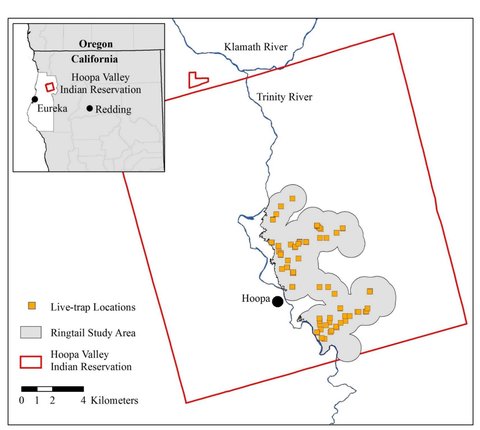

Figure 1: Study area (shaded gray, 9 km^2) on the Hoopa Valley Indian Reservation in northern California.

Spatial covariates predicted to influence the location of ringtail activity centers

Covariate	Acronym	Description
Elevation	elevation	Mean elevation in grid cell
Solar Exposure	solar	Mean annual solar radiation in grid cell
Multistoried Forest	MSF	Proportion of grid cell in mature and multistoried maturing forest
Young Forest without Residual	YF	Proportion of grid cell in dense brush and sapling or pole-size trees without larger residual trees
Young Forest with Residual	YFR	Proportion of grid cell in dense brush and sapling or pole-size trees with larger residual trees
Stem Exclusion	SX	Proportion of grid cell in dense pole-size trees, no residual trees, little to no shrub cover
True Oak Woodland	TOW	Proportion of grid cell dominated by mature true oak trees
Open	OPEN	Proportion of grid cell in a non-forested condition (e.g., prairie, development, logging)
Diversity Index	DIV	Proportion of classes of stand age and tree species composition in grid cell

Results

Estimated ringtail density and distribution

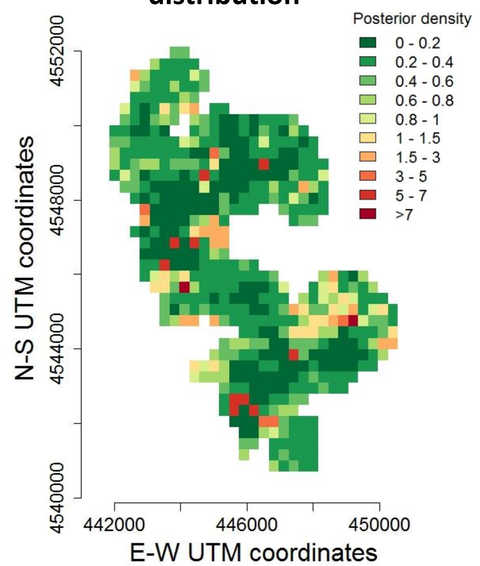

Figure 2: Estimated densities of ringtails throughout the study area in Hoopa Valley Indian Reservation. Posterior density indicates the estimated number of ringtail activity centers in the 9 km^2 encompassing each 300 x 300 m grid cell.

Effects of elevation, solar exposure and vegetation on ringtail activity centers

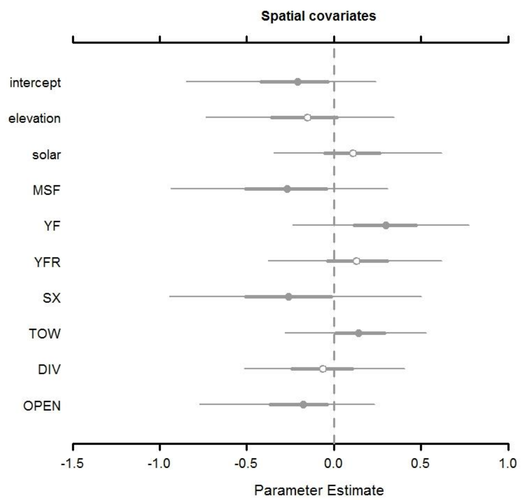

Figure 3: Various classes of stand age and tree species composition had a >50% probability of influencing the location of ringtail activity centers (denoted by the filled dot). Dots indicate the median value, thick line denotes 50% credible interval, thin line is the 95% credible interval.

Conclusions

Ringtails occupy relatively low elevation forests on Hoopa and selected for young forests and true oak woodlands. They selected against multistoried forests, stem exclusion and open. Our results suggest that ringtails are selecting forest patches based on availability of food resources and suitable structural components, which young forest and true oak woodland would provide, while stem exclusion and open would not. Selecting against multistoried forest could be in part to insufficient food resources and the presence of fisher.

Future directions

- Quantify prey composition of ringtails in different forest classes
- Implement long-term population monitoring to evaluate trends and species interactions
- Investigate ringtail responses to more direct measures of forest management and conditions

Acknowledgments

We thank the Hoopa Tribal Council, the Hoopa Tribal Forestry Wildlife staff and to all those who gave their support and time to this project. We also thank Hoopa Tribal Forestry, the Norcross Wildlife Foundation, the Western Section of TWS, Thomas and Dorris Montgomery, the Marin Rod and Gun Club, the Stockton Sportmen's Club, and the Humboldt Area Foundation for providing funding.

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