Effects of Roads on Space Use, Habitat Selection, Population Dynamics and Health of the Ringtail in San Diego County

J.P. Montagne[1], Scott Tremor[2], Justin Chung[3], Cassidy Sadowski[4], Debra M. Shier[1,4]

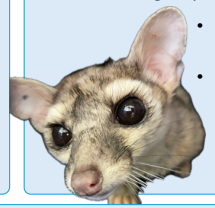
[1]San Diego Zoo Wildlife Alliance; [2]San Diego Natural History Museum; [3]Universidade Nova de Lisboa, Portugal, [4]University of California Los Angeles

Introduction – Why did the ringtail cross the road?

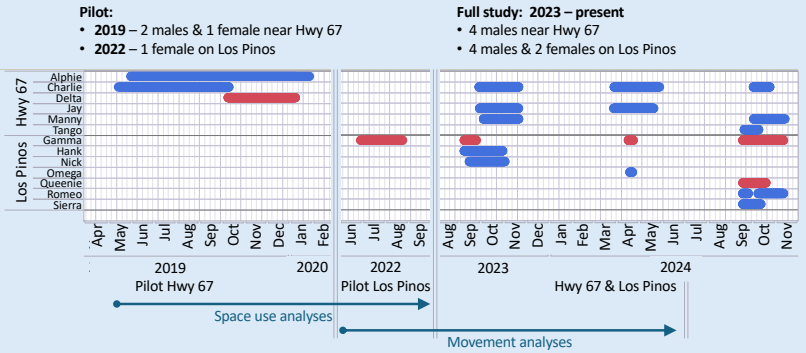
- Ringtails (*Bassariscus astutus*) nocturnal and reclusive procyonids, have been fully protected in California since 1968.
- They can rotate their hind feet 180 degrees, enabling them to climb vertical features easily, and ringtails are often found in habitats with significant elevation change.
- Roadways pose significant threats to wildlife, leading to habitat loss, mortality from vehicle strikes, habitat degradation, and reduced landscape connectivity.
- As mesopredators, ringtails are particularly vulnerable to road mortality; we identified several road-strike hotspots in San Diego.
- In this study, we aim to investigate the impact of a single highway on ringtail movement ecology using motion cameras and GPS collars that also record accelerometer movement.

Experimental Design

- We recorded GPS and accelerometer data to examine how roadways affect ringtail movement at two sites.
- One site is near heavily-trafficked **Highway 67** in San Diego County, while the control site is on **Los Pinos Mountain**, about five miles from the nearest highway.



- To assess seasonal variation, we collared ringtails in spring & fall.
- Our veterinary team conducted comprehensive health screenings during every capture.



Results – what have we learned so far?

Disclaimer: Here we present preliminary results. Please do not cite this poster, contact the authors instead.

Space Use:

a) Using Continuous-Time Movement Modeling, we estimated 50% and 95% utilization distributions for each ringtail, revealing male spatial separation with both overlapping the female's range.

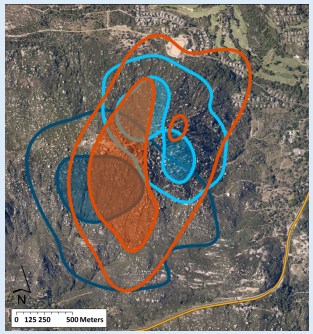
b) We will use a 2.5D model that incorporates elevation for a more accurate estimate of space use.

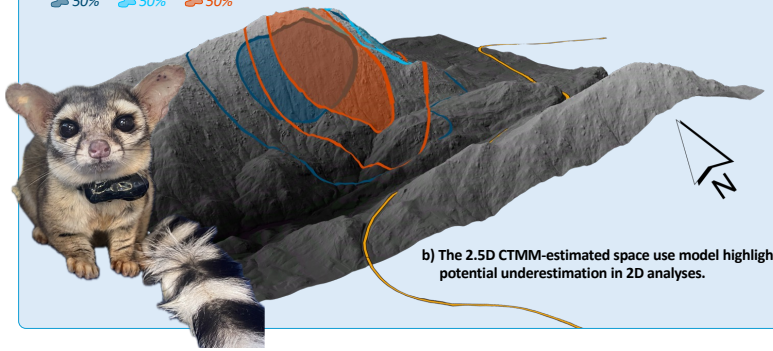
Movement:

c) We documented one male crossing Hwy 67 multiple times in fall and spring. These data will be used for step-wise analyses to further describe movement behaviors.

d) Using accelerometer data, we estimated the proportion of time ringtails spent moving per hour, showing variation between sites and individuals.

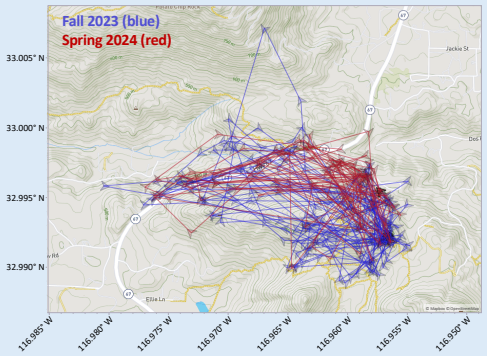
a) Overlapping space use for 3 ringtails in 2019.



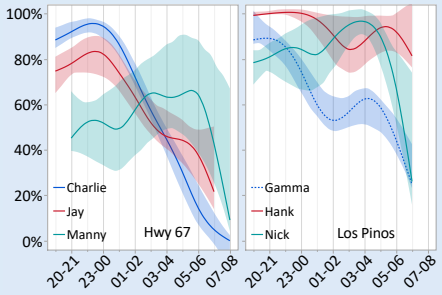


b) The 2.5D CTMM-estimated space use model highlights potential underestimation in 2D analyses.

c) One ringtail, Jay, crossed Hwy 67 multiple times throughout the nights.



d) Proportion of time ringtails spent moving per hour during the night for 5 males (—) and 1 female (---).



Conclusions … pending

- Understanding road impacts on ringtail health, behavior, and space-use will help us recommend mitigation measures to reduce human impacts and aid ringtail recovery for one of southern California's most understudied mammals.
- **Space Use** — By integrating GPS technology with elevation data, we can provide a more precise description of the spatial requirements for ringtails in chaparral-dominated communities, especially those affected by development in San Diego County.
- **Movement** — Ringtails near highly-trafficked roadways may alter their foraging and movement behaviors, while those away from roads exhibit a more bimodal activity pattern.
- We will investigate the underlying mechanisms responsible for these patterns and evaluate whether ringtails exhibit positive responses to corridors or other mitigation measures.

Acknowledgments

Special thanks Dave Fillion, SDNHM volunteer who donated 300+ hours to this project, and to the City of San Diego Parks & Recreation; City of Poway; USDA Forest Service, Cleveland National Forest, Descanso Ranger District; California State Parks Colorado Desert District; and CalTrans for allowing site access.