Tufts UNIVERSITY
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Do No Harm: Suitable Areas for Puma Noninvasive Monitoring Stations in Torres del Paine National Park Boundaries, Chile.

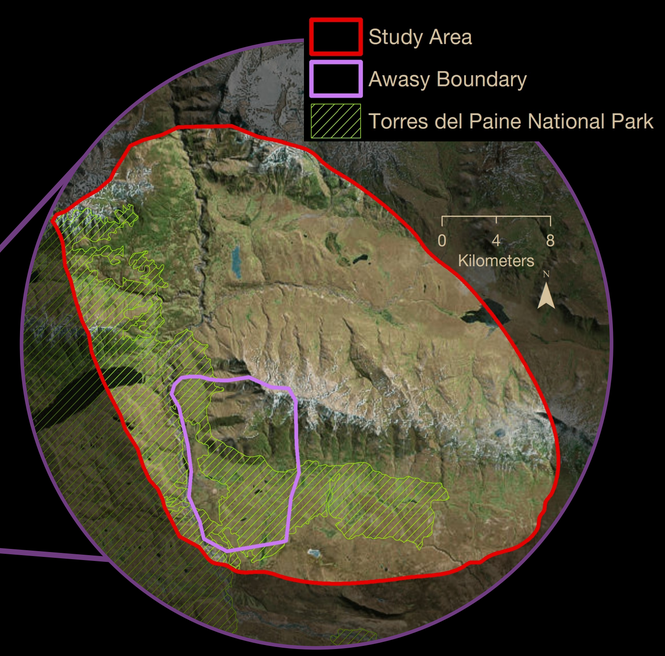
THE PUMA PROJECT

Individual identification is crucial for estimating densities and monitoring population general status. Invasive monitoring for individual recognition has been associated with deleterious effects ranging from decreased fertility to death. Noninvasive wildlife monitoring allows data collection without disturbance or direct contact with the subject.

The footprint identification technique (FIT) is a tool that, from digital images alone, can identify a subject at the species, age-class, gender and individual levels. Currently there is an available recognition algorithm software for pumas (*Puma concolor*).

The puma is the largest carnivore inhabiting Patagonia, and it plays a key role in its ecosystem functionality. Torres del Paine National Park is not large enough to assure the species' long-term survival, making its conservation within the buffer zone and nearby biological corridors fundamental. The collection of population data is important to create adequate management protocols. Because faunal monitoring requires a great logistical effort, it is important to know the most suitable areas to optimize the collection of reliable data.

This project aims to use the environmental features associated with puma signs findings near Awasy reserve as criteria for puma´s habitat preference on PUMA Project Study Area. These criteria will allow to predict which sites within the Study Area are most suitable for monitoring stations, consisting on camera trap and soft substrate trails prepared to collect footprint samples for FIT.

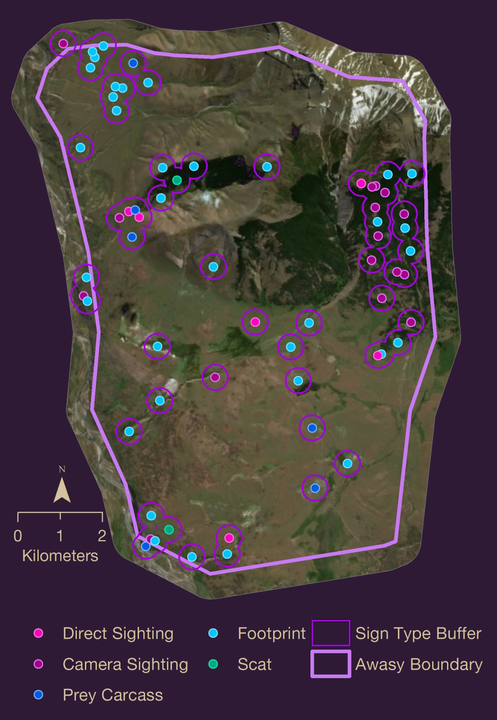


CRITERIA

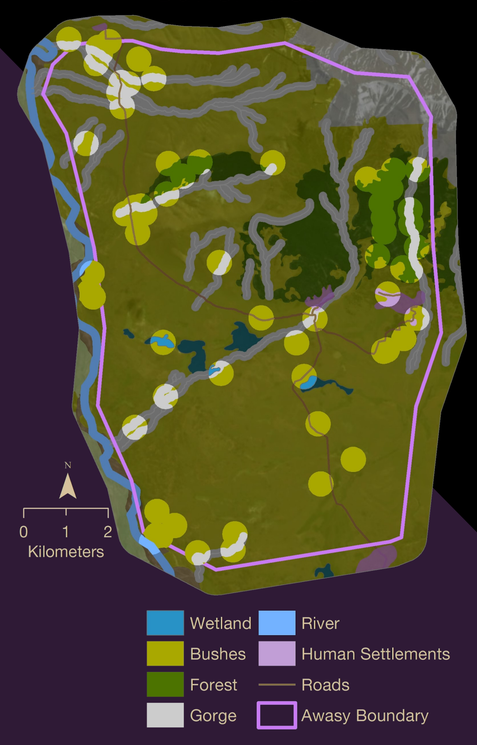
Georeferenced indirect puma signs collected from 2014 to 2018 within and close Awasy boundaries where used to select the most relevant environmental features associated with puma presence. A buffer of 200 meter was applied to each sign point. Then, the intersect tool was used to highlight the features located within the buffer. The factors within the buffer were: bush, forest, slope from 0 to 60%, gorges, riverbeds, human settlements, lakes and wetlands. For these last two traits a buffer of 100 meter was added, representing average width.

The features associated to the puma signs are shown on the bar graphs. The six more prevalent features where selected as suitability predictors and applied to the final suitability map on the extended Study Area. To the resulting areas, a 200 m buffer was added. Then all the unsuitable features where erased from the buffered area. Finally, since monitoring stations can not be positioned over water , roads or to close to human settlements, these three factors where subtracted from the suitable area.

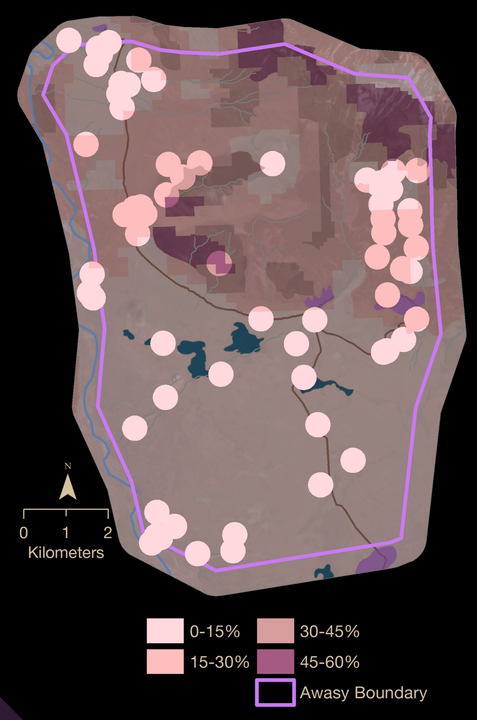
Puma Signs on Awasy Area



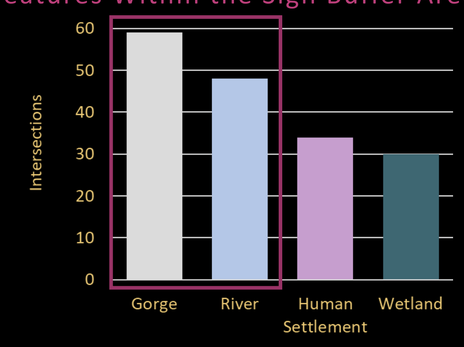
Environmental Features Within Sign Buffer Area



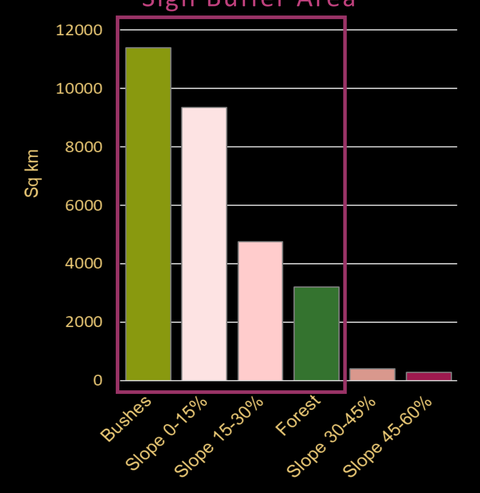
Slope Features Within Sign Buffer Area



Number of Intersections of Focal Features Within the Sign Buffer Area



Size of Areal Features Within the Sign Buffer Area



Vegetation Cover on Suitable Area

SUITABLE AREA

The suitable area was defined as zones with a slope between 0 to 30%, presence of forest and/or bush, and within 50 meters of the axis of a gorge and/or riverbed.

The total suitable area is 19.3653 $km^{2.}$ and is displayed in the main map. A secondary map shows the vegetation cover featured on this area.

To generate monitoring station locations within the suitable zone, Data Management Tools was used. On the Sampling section, Create Random Points was used to pinpoint up to 100 locations with a Minimum Allowed Distance of 500 meters.

This map will prioritize the prospective zones for the installation of camera traps and footprint samples in this unexplored area. The 200 meter buffer gives the possibility of the in situ adjustment of the location of the monitoring point in case of local undesired traits.

These results are similar to those reported as habitat preferences of pumas in other zones of Patagonia; avoidance of grassland and use of more flat open area when searching for prey and preference of more forested

Suitable Area for Noninvasive Monitoring Stations

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Projection: WGS 1984 Web Mercator Auxiliary Sphere

Sources: ArcGIS Hub, Biblioteca del Congreso Nacional de Chile (BCN), Puma Project Data, Sistema de Información territorial-CONAF.

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