Caldasia **43(2)** | **Julio-diciembre 2021**
http://www.revistas.unal.edu.co/index.php/cal

CALDASIA
Fundada en 1940
ISSN 0366-5232 (impreso)
ISSN 2357-3759 (en línea)

SUPPLEMENTARY MATERIAL

Supplementary material of the short note: Elevation as an occupancy determinant of the little red brocket deer (*Mazama rufina*) in the Central Andes of Colombia

Material suplementario de la nota corta: Elevación como un determinante de la ocupación del venado soche (*Mazama rufina*) en los Andes centrales de Colombia

Citation: Lizcano DJ, Álvarez SJ, Díaz-Giraldo V, Gutiérrez-Sanabria DR, Mantilla-Meluk H. 2021. Elevation as an occupancy determinant of the little red brocket deer (*Mazama rufina*) in the Central Andes of Colombia. Caldasia 43(2):392–395. doi: https://doi.org/10.15446/caldasia.v43n2.85449

Methods details

Camera placement: The cameras were installed using a minimum distance of 500 meters between each other. This distance corresponds to an average home range for the closely related species *Mazama gouazoubira* (Fischer, 1814).

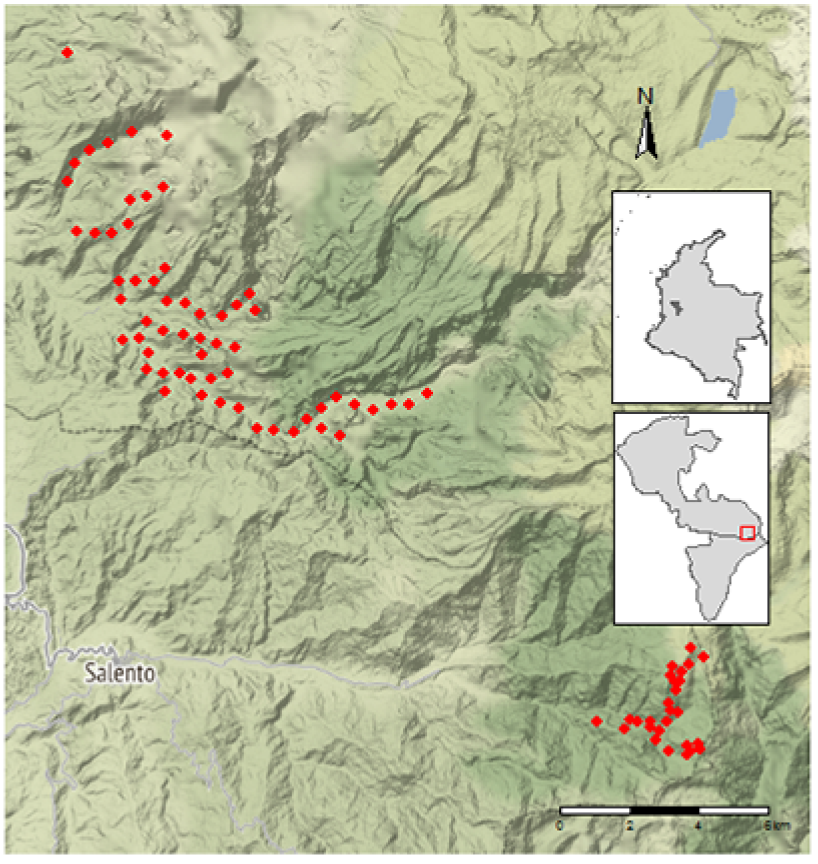

Figure 1. Study area map. Camera trap locations in red color.

The data set for the little red brocket deer was produced manipulating the output tables from WildID using the R code created by the TEAM network, available in the link: https://github.com/ConservationInternational/teamcode/tree/master/cameratrapping

The definition of an event for the camera trap data organization (Meek *et al.* 2014) was initially defined as one hour, meaning that all the little red brocket deer pictures in the same camera during one hour period were grouped and considered as one individual event. For the occupancy analysis, we grouped and coded all the events on the same day as one, and cero if there was no picture on that day. The data set was composed of 108 days and 87 sampling locations or camera sites. We did not collapse the data set to perform the analysis. We used the occupancy modeling framework to investigate possible relationships between occupancy and the geographical covariates (MacKenzie *et al.* 2017; Dénes *et al.* 2015; Bajaru *et al.* 2019). We compared a set of nine models testing the effect of the covariates on occupancy and detection. In this framework, we used the Akaike Information Criterion (AIC) to rank all the nine candidate models and calculate their weights. We considered two models as different if the delta AIC was bigger than two (Akaike 1973; Burnham and Anderson 2002; Johnson and Omland 2004). The models were coded using the package unmarked (Fiske and Chandler 2011). The spatial covariates used in the analysis were four; elevation, slope, aspect, and roughness (Fig. 1). The elevation was obtained from the CGIAR-SRTM (90 m resolution) using the function getData of the package raster (Hijmans 2020). Slope aspect and roughness were computed using the function terrain of the package raster. The four covariates were stacked, and the values were extracted for each camera trap location using the function extract from the package raster (Hijmans 2020).

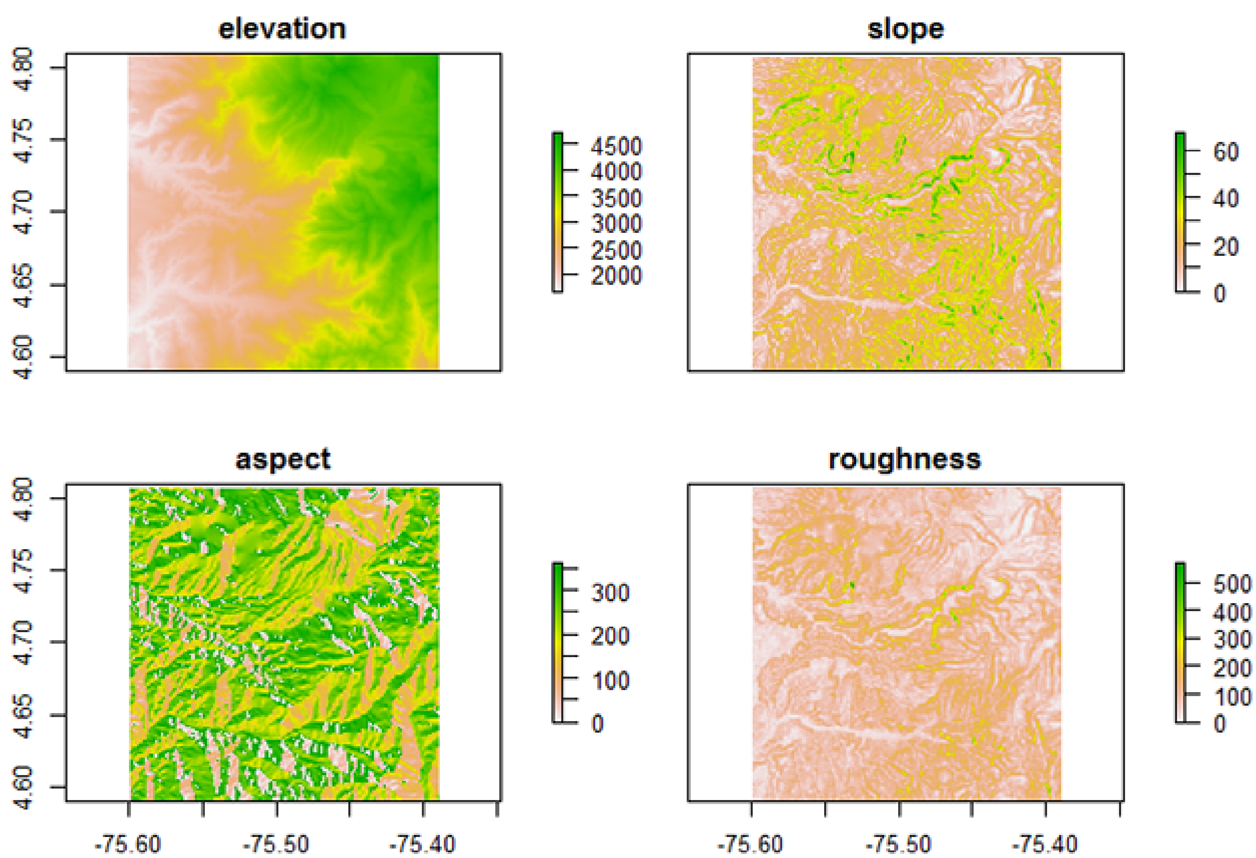

Figure 2. Four spatial covariates were used in the occupancy analysis for the little red brocket deer (*Mazama rufina, Pucheran 1851*).

Table 1. Model assessment to select the best-fit model for detection probability (p) and occupancy (ψ) of M. rufina. The point in the model indicates that the parameter (detection or occupancy) is constant and variables inside the parenthesis represent the covariate related to the parameter.

Model	nPars	AIC	delta	cumltvWt
p(roughness) ψ(elevation^2)	5	359.00	0.0	0.84
p(slope) ψ(elevation ^2)	5	362.46	3.46	0.99
p(.) ψ(elevation ^2)	4	368.33	9.33	0.99
p(.) ψ(elevation)	3	369.73	10.73	1.00
p(elevation ^2) ψ(elevation ^2)	6	372.25	13.25	1.00
p(.) ψ(aspect)	3	374.04	15.03	1.00
p(.) ψ(roughness)	3	378.38	19.37	1.00
p(.) ψ(.)	2	417.05	58.05	1.00
p(.) ψ(slope)	3	419.05	60.05	1.00

R code and data to reproduce the analysis and figures are at: https://github.com/dlizcano/Mazama_rufina

CITED LITERATURE

Akaike H. 1973. Information theory and an extension of the maximum likelihood principle. 2nd International Symposium on Information Theory.:267–281. doi: https://doi.org/10.1016/j.econlet.2011.12.027.

Bajaru SB, Kulavmode AR, Manakadan R. 2019. Influence of microhabitat and landscape-scale factors on the richness and occupancy of small mammals in the northern Western Ghats: A multi-species occupancy modeling approach. Mamm Biol. 99:88–96. doi: https://doi.org/10.1016/J.MAMBIO.2019.10.003.

Burnham KP, Anderson DR. 2002. Model selection and multimodel inference: a practical information-theoretic approach. Springer Science & Business Media, New York. doi: https://doi.org/10.1007/b97636

Dénes FV, Silveira LF, Beissinger SR. 2015. Estimating abundance of unmarked animal populations: accounting for imperfect detection and other sources of zero inflation. Isaac N, editor. Methods Ecol Evol. 6(5):543–556. doi: https://doi.org/10.1111/2041-210X.12333

Fiske I, Chandler R. 2011. unmarked : An R Package for fitting hierarchical models of wildlife occurrence and abundance. J. Stat Softw. 43(10):1–23. doi: https://doi.org/10.18637/jss.v043.i10

Hijmans RJ. 2020. raster: Geographic Data Analysis and Modeling. R package version 3.4-5. [Revisada en: 01 Ene 2020] https://cran.r-project.org/package=raster.

Johnson JB, Omland KS. 2004. Model selection in ecology and evolution. Trends Ecol. Evol. 19(2):101–108. doi: https://doi.org/10.1016/j.tree.2003.10.013

MacKenzie DI, Nichols JD, Royle JA, Pollock KH, Bailey L, Hines JE. 2018. Occupancy Estimation and Modeling. 2nd ed. London: Academic press. Elsevier. doi: https://doi.org/10.1016/C2012-0-01164-7.

Meek PD, Ballard G, Claridge A, Kays R, Moseby K, O'Brien T, O'Connell A, Sanderson J, Swann DE, Tobler M, Townsend S. 2014. Recommended guiding principles for reporting on camera trapping research. Biodivers. Conserv. 23:2321–2343. doi: https://doi.org/10.1007/s10531-014-0712-8.