

Supplement

Spatial characterization of human-puma interactions in social-ecological land systems in Argentina

Global Ecology and Conservation

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Supplementary Material on the Study Area

Table S1 Percentage share of SELS type areas in Argentina.

SELS type	Percentage share of area in Argentina
A1	3.08%
A2	6.7%
A3	25.04%
A4	9.57%
B	7.63%
C1	36.03%
C2	3.55%
D1	0.85%
D2	1.07%
D3	1.08%
E1	3.49%
E2	0.71%
E3	1.19%

Supplementary Material on the Methods

Table S2 Keywords and search queries used for literature review on 1) depredation interaction, and 2) hunting interaction in Argentina.

Depredation – keywords:	"puma", "cougar", "mountain lion", "livestock", "conflict", "predat*", "human wildlife conflict", "human carnivore conflict", "sighting", "attack"
Search query:	"Argentin* AND (puma OR cougar OR mountain lion OR carnivore) AND ((conflict* OR predat* OR human-wildlife OR human-carnivore OR sighting* OR attack) OR livestock)"
Hunting – keywords:	"hunt*", "kill*", "trophy", "sport", "people", "human"
Search query:	"Argentin* AND (puma OR cougar OR mountain lion) AND (hunt* OR trophy OR sport OR kill*) AND (human* OR people OR individuals) NOT ("predation" OR "prey")"

Identification and typification of interactions from literature review and news

The collection of news articles was in collaboration with Ypa (2025), who explored a wider range of interactions between humans and pumas in Argentina based on online news via Google News. Each hyperlink corresponding to an online article published between 2017 and 2022 was systematically cataloged in a table. This process involved the manual assignment of attributes such as the publication date and provincial origin, while the specific location was located with Google Earth Pro (Google Inc., 2022). To ensure data accuracy, diligent efforts were made to eliminate duplicates, resulting in a refined dataset, reduced from an initial count of more than 800 online news articles to a conclusive total of 291, devoid of duplications. These articles were then manually categorized into 12 different classes, whereby each article can fall into several categories. These categories were conceived based on potential interactions between humans and pumas, including e.g. "sightings", "rescue efforts", "road accidents", "domestication" (Ypa, 2025). For this study, we chose the categories "depredation on

livestock”, “retaliatory hunting”, and “trophy or sport hunting”. For depredation interactions, including retaliatory hunting, news articles had to explicitly mention livestock depredation or persecution related to a depredation event, whereas for hunting, only hunting puma was reported. After removing articles without an exact location (e.g. because they reported on the entire province), the final news dataset contained 43 articles that were classified "depredation interaction", and 29 articles addressed the topic of "hunting".

The hunting areas for this study were derived from maps provided by Gallo et al. (2020, 2022), as they utilized the same data on hunted pumas per municipality in Chubut from Llanos et al. (2014), whose database is not publicly available.

Variable calculation process and data sources

For roads, we calculated the cumulative length of paved and unpaved roads (in km). For protected areas, we determined the closest distance from each interaction area border to protected areas (borders) at national and sub-national level. Livestock variables were derived by calculating the total number of heads per interaction area for both cattle and small livestock, including goats and sheep. Population density was also calculated as the total number of heads per interaction area. Information on land cover within the interaction area was extracted from the MapBiomas Argentina (MapBiomas Argentina - Colección 1). Finally, we calculated the number of settlements per interaction area using data from the IGN (IGN, 2021). Figure S1 presents an overview of the spatial distribution of each variable.

Total length of roads (paved/ unpaved)

Geospatial road data for Argentina is available from the IGN (IGN, 2021). Various datasets are accessible at national, provincial, and tertiary levels containing relevant information on road surface characteristics, distinguishing between paved and unpaved surfaces. Since the official road designation is not relevant for the interaction analysis, a distinction was made between

paved and unpaved road sections for each data set and compiled into two coherent data sets independent of the level and based only on the road surface (paved or unpaved). The cumulative length of the roads (in km) within the designated buffers was then calculated using the vector analysis tool *sum line length* in QGIS.

Distance to protected areas (PA)

Data about PA's were taken from the IGN (IGN, 2021). For Argentina the database was more detailed in comparison to the data from the World Database on Protected Areas (WDPA) (UNEP-WCMC & IUCN, 2023). It includes national as well as subnational (at provincial, municipal or private scale) PA's. To calculate the distance to the closest PA, we created a dissolved dataset from the PA's to mitigate potential overlaps. The tool *shortest line between features* calculated the cartesian distance to the nearest polygon from the interaction buffer border. The distances were revised using the measure tool in QGIS. In cases where interaction areas overlapped with PA boundaries, resulting in a distance calculation of 0, a distance of 0.001 km was assigned to avoid inconsistencies in the model.

Livestock density

The 2015 livestock database contains information about the number of different livestock species per km² with a resolution of 10 km (Gilbert et al., 2022a, 2022b, 2022c). It is a worldwide database, which we first clipped to the extent of Argentina. We created three separate variables to include different types of livestock production that exist in Argentina and possible dietary preferences of pumas: one for “small livestock” including goats and sheep, and one for “cattle”, and a third that includes all three species (“livestock”). We used the *zonal statistics* tool to calculate the total (summarized) sum of heads per km² per variable in each interaction area.

Population density

The data about population density was downloaded from the GHSL (Schiavina et al., 2023).

Again, the *zonal statistics* tool was used to calculate the sum of population density for each interaction area. Here, we also chose the sum instead of the mean value to be consistent with the other variables.

Land Cover

MapBiomas Argentina was launched in May 2024 and provides land cover data (MapBiomas Argentina - Colección 1). We calculated the total area of the land cover/use classes defined by MapBiomas. For example, the class “agriculture and livestock area” (which we used as “agriculture”) includes pasture, agriculture, forest plantation, bush cultivation, agricultural mosaic. To determine the distribution of land cover types within each interaction area, we used the *zonal histogram* tool. Since the tool provides pixel counts, we converted the results to km². We checked the results by examining very homogeneous interaction areas and comparing them to the maximum possible area of 1256 km².

Settlement area

The ESA WorldCover database provides global land cover data with a resolution of 10 m from the year 2021 (Zanaga et al., 2022). They defined 11 classes based on the Land Cover Classification System (LCCS). This database offers a user-friendly process for downloading the data and provides relatively up-to-date data. Since we decided to use the more local land cover data product, we only calculated the settlement area based on this database. We used the *zonal histogram* tool and converted the results to km².

Number of settlements

To determine the number of settlements in each interaction area, we used the settlement data from IGN. It includes 3375 settlements in Argentina described as “Approximate urban area that includes the contiguous area of built-up development, whose limits are recognizable” (IGN, 2021). It is not limited to a minimum area size and does not consider the population sum or density of a settlement. Few settlements within one interaction buffer point at larger settlements, whereas a higher number of settlements per interaction buffer is an indication for smaller and more rural settlements. To calculate the number of settlements per interaction buffer, we first created a layer with settlement centroids using the "Centroid" vector tool and then calculated the number of points within each interaction area using the "Count points in polygon" tool.

Model selection

We considered multiple model types for our analysis (see below “Other model types”). We decided to proceed with two generalized linear models (one per each interaction type), because separating the models allows a clearer identification of patterns specific to each interaction (Lucherini et al., 2024). To select the best respective model, we used the corrected Akaike Information Criterion ($\Delta AICc < 2$) for small sample sizes as a relative measure of model parsimony, which is commonly used for model selection (Arnold, 2010), implemented via the *AICc()* function in the R package *AICcmodavg* (Anderson & Burnham, 2022; Mazerolle, 2023; Hurvich & Tsai, 1989). We retained covariates whose 90% confidence intervals excluded zero, indicating their usefulness for inference. We applied the likelihood ratio test for comparing the goodness-of-fit of nested models with the *lrtest* function of the *lmtest* package in R (Zeileis, 2022) to see if the additional parameters in the fitted model significantly improve the fit to the

data compared to the null model. A p-value below the significance levels shows an improvement by including the predictor variables, compared to the null model.

After that, we calculated the Variance Inflation Factor (VIF) with the *vif* function of the *car* package in R (Fox et al., 2023) to reassure that there is no multicollinearity among the predictor variables. Here, a value of 0 implies no correlation, values between 1 and <5 moderate but not severe correlation, and values >5 high correlation (Sheather, 2009).

The coefficients of the variables and confidence intervals are crucial to explore variable importance. The confidence interval was set to 90%. While p-values were not used for model selection or hypothesis testing, we solely report them for transparency (depredation model: intercept p=0.03, cattle density p=0.02, population model p=0.02, agriculture p=0.1; hunting model: intercept <0.01, small-livestock density p=0.06, number of settlements <0.01).

The general descriptive power of the model was evaluated with the commonly used McFadden pseudo R² measure. This metric measures the proportion of variance explained (McFadden, 1972) and was calculated with the *pR2* function of the *pscl* package in R (Jackman, 2024).

Finally, the Area Under the Curve (AUC) value is defined as the area under the Receiver Operating Characteristic (ROC) curve and was used to check the model's discriminatory power (Fielding & Bell, 1997), meaning the ability to distinguish between (here: binary) classes. An AUC of 1 means perfect classifier, whereas an AUC of 0.5 means rather random classification. To test for the AUC using the *pROC* package in R (Robin et al., 2023), we randomly divided the data into training and testing data with a 30/70 ratio. We used the Monte-Carlo cross-validation technique with 1000 iterations to stabilize the AUC estimate and mitigate the variability due to small sample sizes. AUC values close to 1 imply a good fit in terms of discrimination (>0.9), whereas values between 0.7 and 0.9 stand for moderate discrimination

and a value of 0.5 represents random chance (Benito & Peñas, 2007; Kihn et al., 2021; Rostro-García et al., 2016).

Table S3 Further social and ecological variables selected for analyzing human-puma interactions in Argentina. It contains the unit description, expected influence on depredation interactions (depr.) and hunting interactions (hunt.), and data source.

Variable	Description	Expected influence + Reason	Source
Unpaved roads	Total length of roads per interaction area (km)	Depr.: +/- Hunt.: +	(IGN, 2021)
Protected areas	Distance to nearest PA (km)	Depr.: - Hunt.: +	(IGN, 2021)
Small livestock	Total sum of heads from goats and sheep per km ² per interaction area	Depr.: + Hunt.: +	(Gilbert et al., 2022b, 2022c)
Cattle density	Total sum of heads from cattle per km ² per interaction area	Depr. & Hunt.: +	(Gilbert et al., 2022a)
Number of settlements	Number of settlements within a interaction area	Depr. & Hunt.: +	(IGN, 2021)
Population density	Number of population density within a interaction area	Depr.: + Hunt.: +	GHSL (Schiavina et al., 2023)
Agriculture	Area (km ²) per interaction area, includes pasture, agriculture, forest plantation, bush cultivation, agricultural mosaic as per MapBiomass definition)	Depr.: + Hunt.: +	MapBiomass Argentina

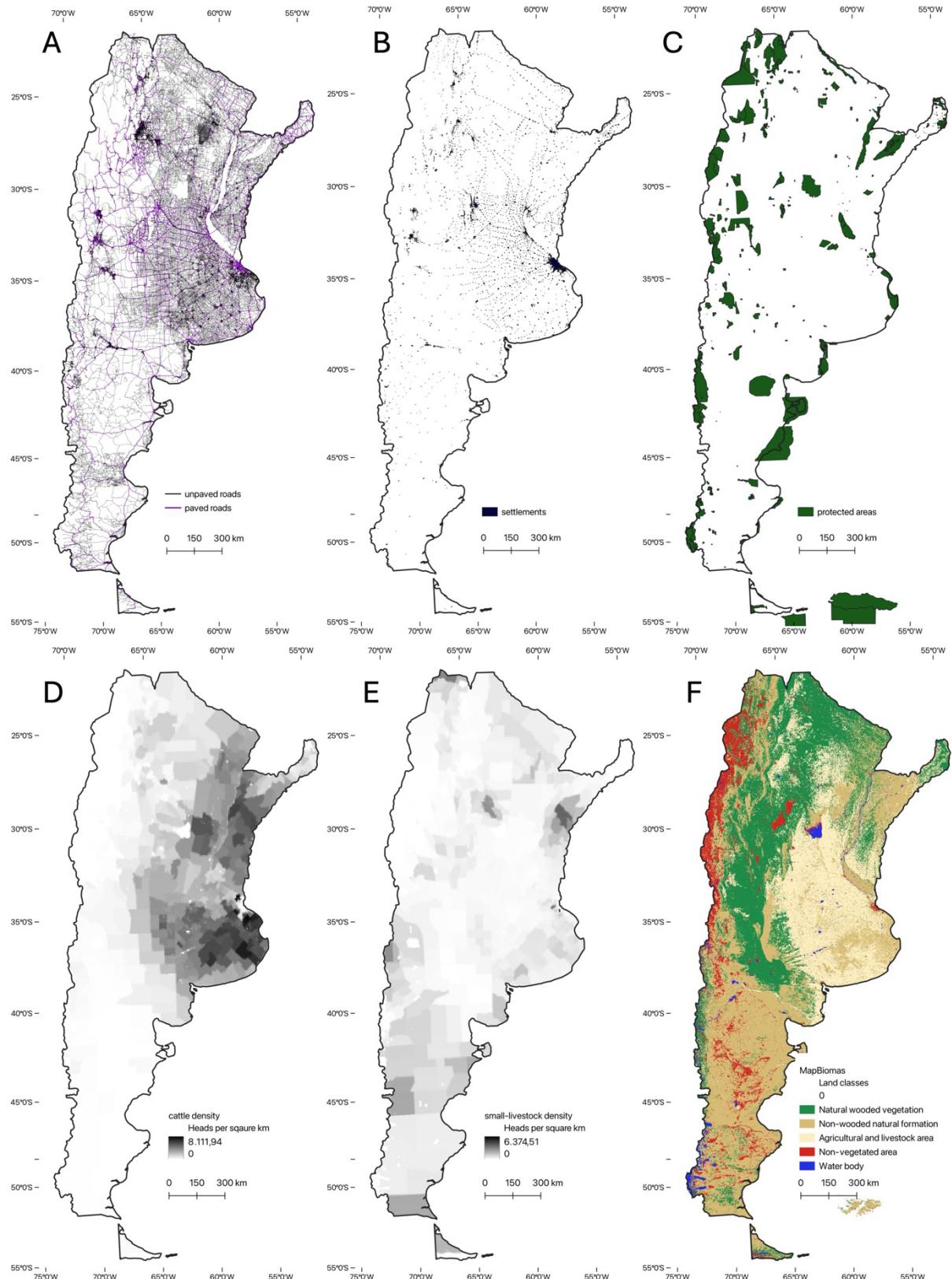
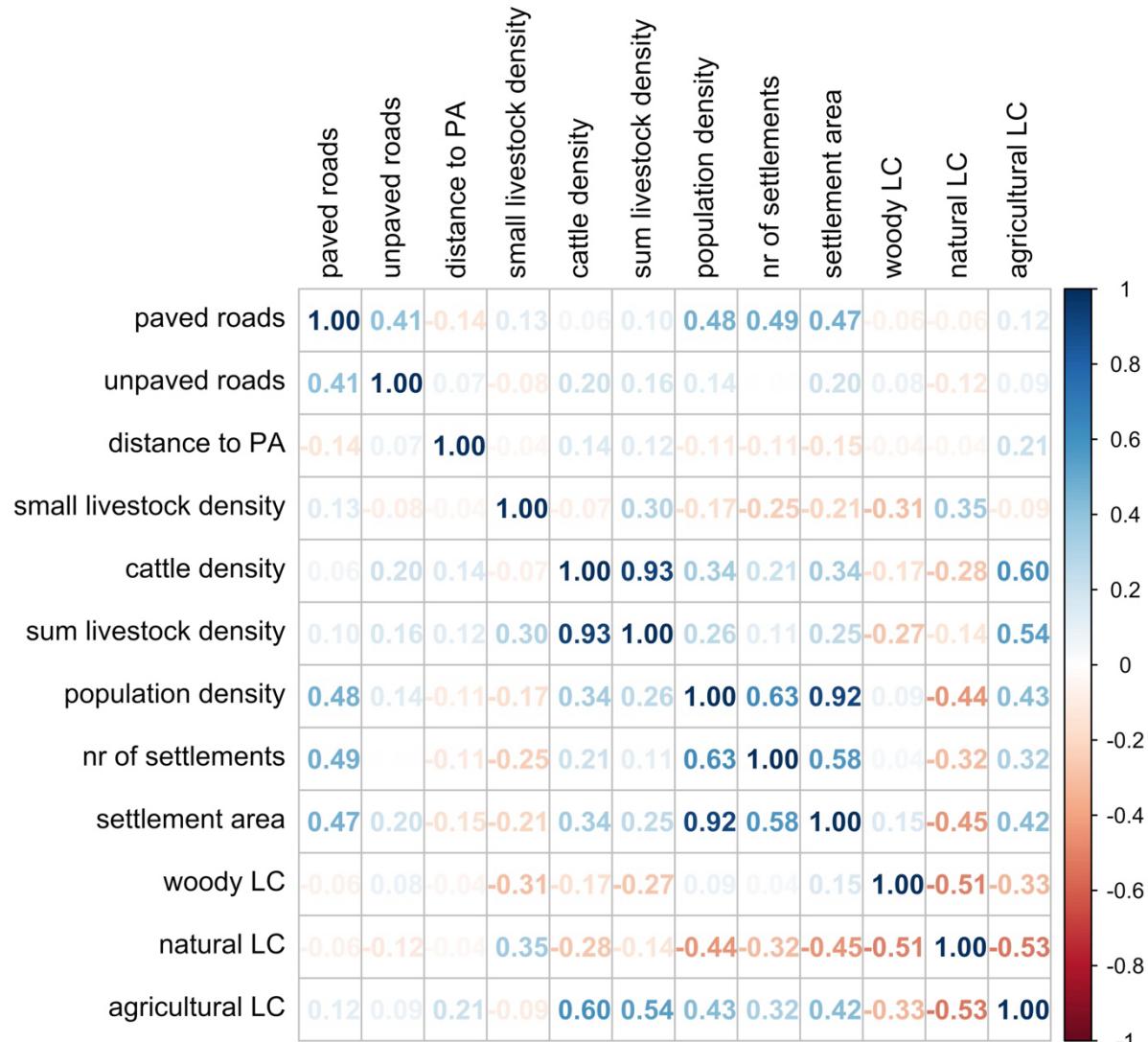


Figure S1 Multiplot of selected social or ecological variables of Argentina. **A** shows paved and unpaved roads (IGN, 2021); **B** shows protected areas (IGN, 2021); **C** shows settlements (IGN, 2021); **D** shows small-livestock density & **E** shows cattle density (Gilbert et al., 2022a, 2022b, 2022c); **F** shows land cover (MapBiomas Argentina, 2024).

A



B

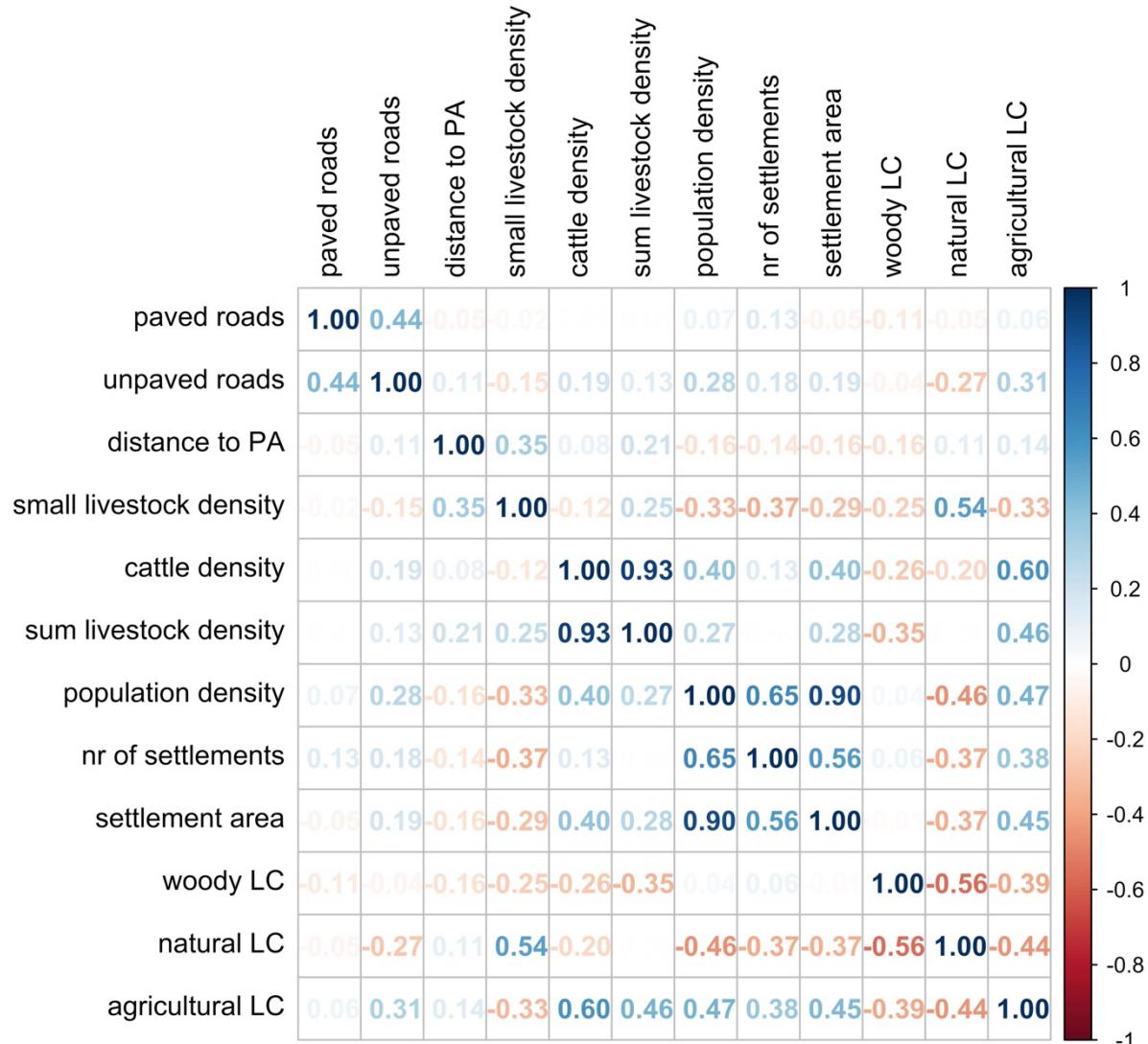


Figure S2 Pearson correlation (r) matrix of social and environmental variables that were considered for modeling human-puma interactions in Argentina. A for depredation interactions, **B** for hunting interactions. The threshold was set to $|r| \leq 0.60$. Positive correlations in blue, negative correlations in red.

Table S4 List of reviews research articles for literature review on livestock depredation interactions and trophy hunting interactions in Argentina between 2017 and 2022.

Author	Year	Location in Argentina	Interaction type	Citation
Cocimano et al.	2022	Puna ecoregion	Livestock depredation + Retaliatory killing	Cocimano, M. A., Nanni, A. S., & Izquierdo, A. E. (2022). Co-building knowledge on human-puma conflict: A case study in a village of the Argentine Puna ecoregion. <i>Human Dimensions of Wildlife</i> , 27(4), Article 4, https://doi.org/10.1080/10871209.2021.1954267
Gáspero et al.	2018	North-west Patagonia, Río Negro province	Livestock depredation + Retaliatory killing	Gaspero, P. G., Easdale, M. H., Pereira, J. A., Fernandez-Arhex, V., & Von Thungen, J. (2018). Human-carnivore interaction in a context of socio-productive crisis: Assessing smallholder strategies for reducing predation in North-west Patagonia, Argentina. <i>Journal of Arid Environments</i> , 150, 92–98. https://doi.org/10.1016/j.jaridenv.2017.12.005
Guerisoli et al.	2017	Southern Buenos Aires Province, Espinal Ecoregion	Livestock depredation + Retaliatory killing	Guerisoli, M., Luengos Vidal, E., Franchini, M., Caruso, N., Casanave, E. B., & Lucherini, M. (2017). Characterization of puma–livestock conflicts in rangelands of central Argentina. <i>Royal Society Open Science</i> , 4(12), 170852. https://doi.org/10.1098/rsos.170852
Guerisoli et al.	2021	-	Livestock depredation + Retaliatory killing	Guerisoli, M., Luengos Vidal, E., Caruso, N., Giordano, A. J., & Lucherini, M. (2021). Puma-livestock conflicts in the Americas: A review of the evidence. <i>Mammal Review</i> , 51(2), Article 2. https://doi.org/10.1111/mam.12224
Kihn et al.	2021	Northeast of Chaco province,	Livestock depredation +	Kihn, M. P., Caruso, N., Iaconis, K., Gonzalez, M. J. P., & Soler, L. (2021). Analysis of conflicts with wild carnivores in

		Humid Chaco, rural areas	Retaliatory killing	the Humid Chaco, Argentina. <i>Animal Biodiversity and Conservation</i> , 44(2), Article 2. https://doi.org/10.32800/abc.2021.44.0251
Llanos et al.	2020	Chubut province, central Patagonia	Livestock depredation + Retaliatory killing	Llanos, R., Andrade, A., & Travaini, A. (2020). Puma and livestock in central Patagonia (Argentina): From ranchers' perceptions to predator management. <i>Human Dimensions of Wildlife</i> , 25(1), Article 1. https://doi.org/10.1080/10871209.2019.1668987
Llanos & Travaini	2020	Eastern Chubut province, central Patagonia	Livestock depredation	Llanos, R., & Travaini, A. (2020). Diet of puma (Puma concolor) in sheep ranches of central Patagonia (Argentina). <i>Journal of Arid Environments</i> , 177, 104145. https://doi.org/10.1016/j.jaridenv.2020.104145
Lucherini et al.	2018	Global (mostly Americas), here: Southern Buenos Aires province	Livestock depredation	Lucherini, M., de las Mercedes Guerisoli, M., & Luengos Vidal, E. M. (2018). Surplus killing by pumas Puma concolor: Rumours and facts. <i>Mammal Review</i> , 48(4), Article 4. https://doi.org/10.1111/mam.12135
Nanni et al.	2021	Dry Chaco ecoregion	Livestock depredation + Retaliatory killing	Nanni, A. S., Teel, T., & Lucherini, M. (2021). Predation on livestock and its influence on tolerance toward pumas in agroecosystems of the Argentine Dry Chaco. <i>Human Dimensions of Wildlife</i> , 26(5), Article 5. https://doi.org/10.1080/10871209.2020.1843742
Pereira et al.	2020	Central Argentina, Monte ecoregion	Livestock depredation + Retaliatory killing	Pereira, J. A., Thompson, J., Di Bitetti, M. S., Fracassi, N. G., Paviolo, A., Fameli, A. F., & Novaro, A. J. (2020). A small protected area facilitates persistence of a large carnivore in a ranching landscape. <i>Journal for Nature Conservation</i> , 56, 125846. https://doi.org/10.1016/j.jnc.2020.125846

Gallo et al.	2020	Provinces Río Negro, Chubut, Buenos Aires	Trophy hunting	Gallo, O., Castillo, D. F., Godinho, R., & Casanave, E. B. (2020). Genetic diversity, population structure, and immigration, in a partially hunted puma population of south-central Argentina. <i>Journal of Mammalogy</i> , 101(3), 766–778. https://doi.org/10.1093/jmammal/gyaa039
Gallo et al.	2022	Provinces Río Negro, Chubut, Buenos Aires	Trophy hunting	Gallo, O., Castillo, D. F., Godinho, R., & Casanave, E. B. (2022). Assessing landscape connectivity for South-Central Argentine pumas dispersing under genetic source-sink dynamics. <i>Landscape Ecology</i> , 38(4), 999–1012. https://doi.org/10.1007/s10980-022-01585-8

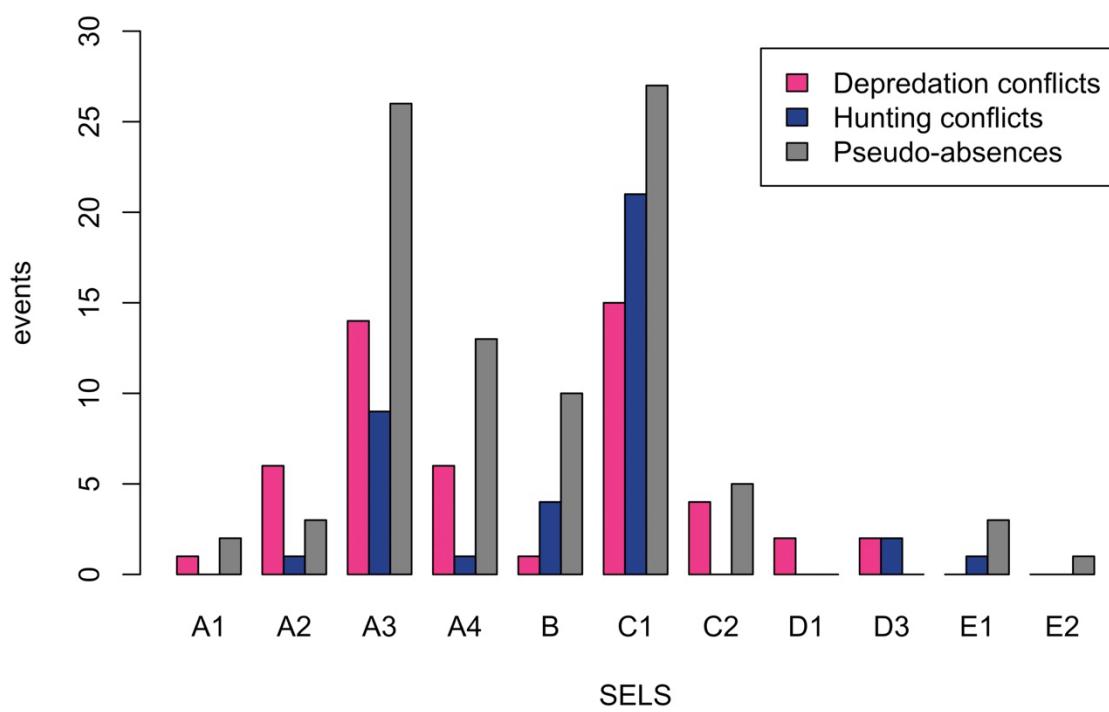


Figure S3 Distribution of human-puma interaction areas per SELS. Depredation interactions (pink), hunting interactions (blue), and pseudo-absences (grey) per social-ecological land system (SELS) type in Argentina. For detailed SELS description legend see Figure 1.

Table S5 Number of different SELS types present within a single (depredation and hunting) interaction area. A single SELS type within an interaction area indicates homogeneous interactions, whereas the presence of four SELS types within one interaction area suggests heterogeneous interactions.

Number of SELS types per interaction area	Depredation interaction	Hunting interaction
1	20	27
2	24	8
3	7	3
4	0	1

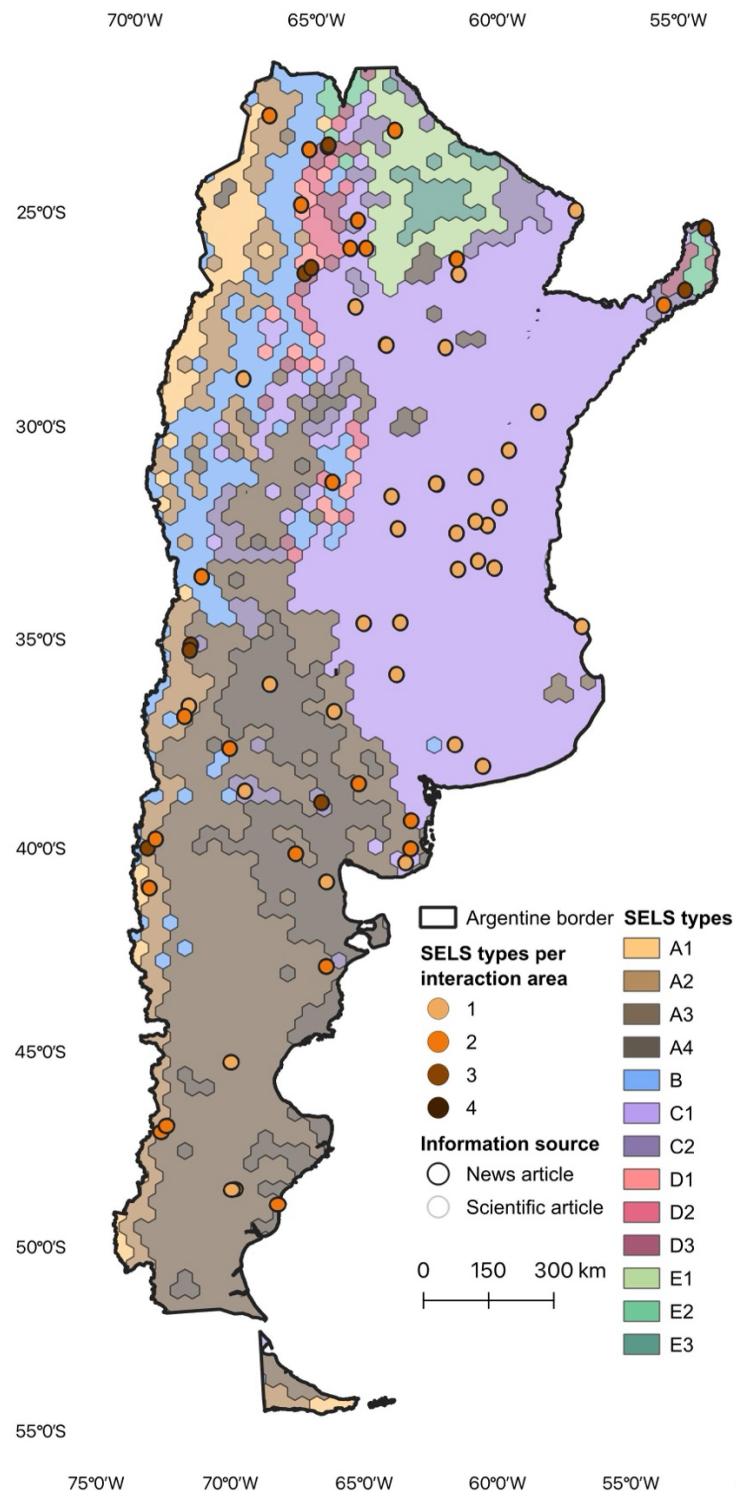


Figure S4 Amount of different Social-Ecological Land Systems (SELS) within interaction areas in Argentina. The lighter the point color, the homogeneous the SELS in that area; the darker the point color, the heterogeneous the area. Point border colors indicate data sources (black = news article; white = scientific articles). Map background color represents social-ecological land system (SELS) types (data source: Zarbá et al. (2022)). For detailed SELS description legend see Figure 1.

Other models that we have tested

Global model

We started with fitting a global model (multinomial logarithmic model), which allows to include both interaction types within one single model and calculates the logistic regression between response and predictor variables. The model was fitted with the multinom function as part of the nnet package in R (Ripley, 2023). As response variables, depredation interactions were coded as "1", hunting interaction as "2", and pseudo-absences as "0".

The multinomial logarithmic model with the best fit incorporates the predictor variables: distance to protected areas, total length of unpaved roads, small-livestock density, woody landcover area, and number of settlements per interaction buffer.

Table S6 Model results for depredation (depr.) and hunting (hunt.) interactions per variable: Predictor coefficients, p-values, and confidence intervals with confidence level of 90%.

Predictor variable	Coefficient	p-value	10% conf. int.	90% conf. int.
Intercept	Depr.: -0.59 Hunt.: -0.91	Depr.: <0.001 Hunt.: <0.001	Depr.: -0.9 Hunt.: -1.25	Depr.: -0.28 Hunt.: -0.56
Woody landcover	Depr.: 0.09 Hunt.: 0.13	Depr.: 0.63 Hunt.: 0.53	Depr.: -0.22 Hunt.: -0.21	Depr.: 0.4 Hunt.: 0.46
Unpaved roads	Depr.: -0.07 Hunt.: 0.22	Depr.: 0.74 Hunt.: 0.25	Depr.: -0.4 Hunt.: -0.1	Depr.: 0.26 Hunt.: 0.54
Small livestock	Depr.: 0.3 Hunt.: 0.46	Depr.: 0.13 Hunt.: 0.02	Depr.: -0.03 Hunt.: 0.13	Depr.: 0.64 Hunt.: 0.8
Number of settlements	Depr.: 0.41 Hunt.: 0.77	Depr.: 0.06 Hunt.: 0.0006	Depr.: 0.05 Hunt.: 0.4	Depr.: 0.77 Hunt.: 1.14
Distance to PA	Depr.: -0.51 Hunt.: 0.04	Depr.: 0.02 Hunt.: 0.83	Depr.: -0.87 Hunt.: -0.29	Depr.: -0.15 Hunt.: 0.37

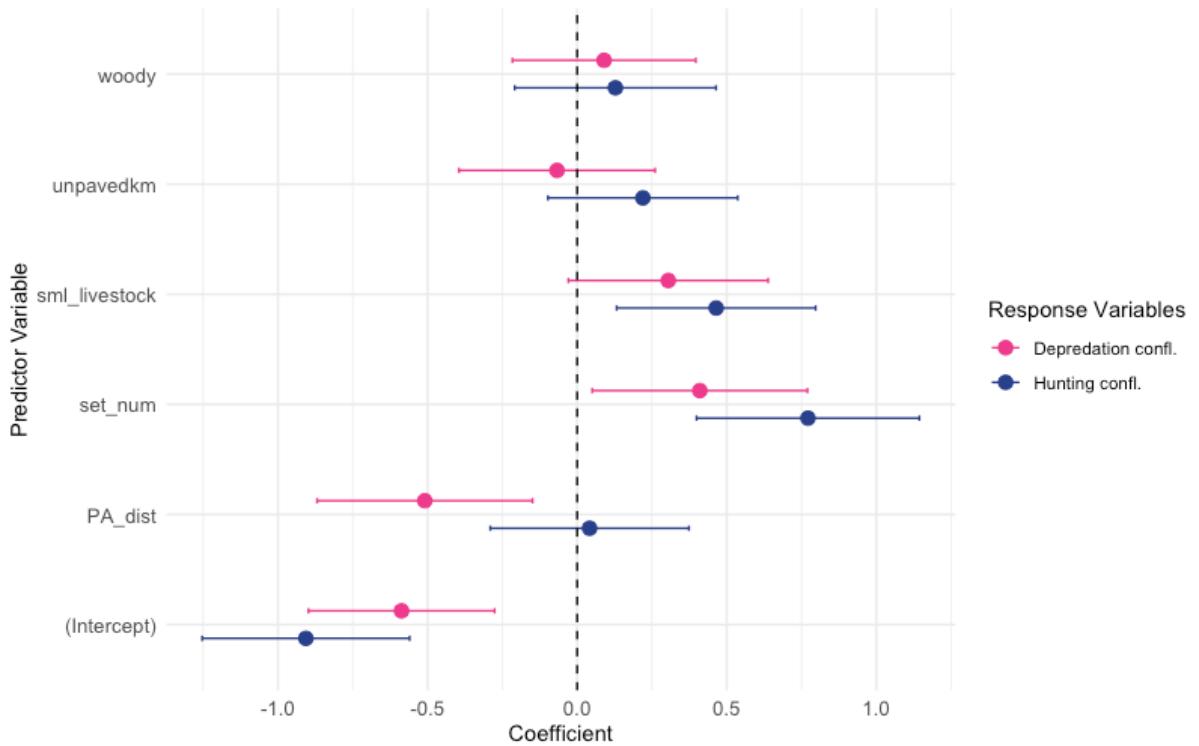


Figure S5 Confidence interval plot (confidence level = 90%) of predictor variables per interaction type (depredation interaction = pink; hunting interaction = blue). “woody” = woody land cover; “unpavedkm” = length of unpaved roads per interaction area (km); “sml_livestock” = small-livestock density (goats and sheep) as sum of heads per km² per interaction area; “set_num” = number of settlements per interaction area; “PA_dist” = distance to protected area.

Set of candidate models per interaction type

In Table S7 and S8 we show a selection of candidate models we have considered. In each model, we included each one social (e.g. population density, numbers of settlements, settlement area) and one land cover (e.g. woody land cover, agricultural land cover; as per MapBiomas definition) variable alongside with variables that have shown significant effects in other studies (e.g. different livestock variables, distance to protected areas; see e.g. Guerisoli et al., 2021; Kihn et al., 2021; Miller, 2015; Nanni et al., 2021). We tested models with up to five variables to account for our sample size and ensured that no highly correlated variables were included in the same model. The expectations of the influence of each variable is shown in Table S3.

Table S7 Three example models for depredation interaction showing the coefficient, p-value, and CI (90% confidence level). The abbreviations of the variables are written out in the predictor variable column and can also be found in the figure caption of Figure S5.

Predictor variable	Coefficient	p-value	10% conf. int.	90% conf. int.
MODEL 1: $glm(depr \sim PA_dist + unpavedkm + sml_livestock + set_num + MB_woody)$				
$\rightarrow AICc 147.8$				
Distance to PA	-1	0.328	-2.76	0.64
Unpaved roads	0.17	0.879	-1.67	2.02
Small livestock density	-0.11	0.923	-1.95	1.72
Nr. of settlements	2.1	0.105	0.09	4.4
Woody LC	-1.13	0.154	-2.48	0.15
MODEL 2: $glm(depr \sim pavedkm + cattle_sum + MB_agri + PA_dist)$				
$\rightarrow AICc 138.2$				
Paved roads	9.21	0.04	2.33	17.18
Cattle density	-3.31	0.05	-6.25	-0.71
Agricultural LC	2.18	0.02	0.68	3.82
Distance to PA	-1.15	0.3	-3.04	0.61
MODEL 3: $glm(depr \sim logpop + sml_livestock + MB_agri)$				
$\rightarrow AICc 142.6$				
Population density	2.73	0.03	0.70	4.89
Small livestock density	0.46	0.66	-1.30	2.20
Agricultural LC	0.32	0.66	-0.88	1.55

Table S8 Three example models for hunting interaction showing the coefficient, p-value, and CI (90% confidence level):

Predictor variable	Coefficient	p-value	10% conf. int.	90% conf. int.
<i>MODEL 1: glm(hunt ~ PA_dist + unpavedkm + sml_livestock)</i>				
→ AICc 116				
Distance to PA	0.28	0.77	-1.31	1.89
Unpaved roads	0.71	0.58	-1.39	2.86
Small livestock density	0.46	0.7	-1.47	2.44
<i>MODEL 2: glm(hunt ~ sml_livestock + cattle_sum + logpop)</i>				
→ AICc 100.1				
Small livestock density	2.49	0.07	0.35	4.92
Cattle density	-1.77	0.21	-4.28	0.52
Population density	6.53	<0.001	3.66	9.81
<i>MODEL 3: glm(hunt ~ pavedkm + sml_livestock + set_num)</i>				
→ AICc 99.2				
Paved roads	-1.23	0.63	-7.40	2.29
Small livestock density	2.49	0.06	0.44	4.83
Nr of settlements	6.78	<0.001	3.77	10.44

Supplement Reference List

- Arnold, T. W. (2010). Uninformative Parameters and Model Selection Using Akaike's Information Criterion. *The Journal of Wildlife Management*, 74(6), 1175–1178.
<https://doi.org/10.1111/j.1937-2817.2010.tb01236.x>
- Benito, B., & Peñas, J. (2007). Aplicación de modelos de distribución de especies a la conservación de la biodiversidad en el sureste de la Península Ibérica. *Geofocus: Revista Internacional de Ciencia y Tecnología de La Información Geográfica*, 7, 7.
- Fox, J., Weisberg, S., Price, B., Adler, D., Bates, D., Baud-Bovy, G., Bolker, B., Ellison, S., Firth, D., Friendly, M., Gorjanc, G., Graves, S., Heiberger, R., Krivitsky, P., Laboissiere, R., Maechler, M., Monette, G., Murdoch, D., Nilsson, H., ... R-Core. (2023). *car: Companion to Applied Regression (3.1-2) [Computer software]*. <https://cran.r-project.org/web/packages/car/index.html>
- Fielding, A. H., & Bell, J. F. (1997). A review of methods for the assessment of prediction errors in conservation presence/absence models. *Environmental Conservation*, 24(1), 38–49.
- Gallo, O., Castillo, D. F., Godinho, R., & Casanave, E. B. (2020). Genetic diversity, population structure, and immigration, in a partially hunted puma population of south-central Argentina. *Journal of Mammalogy*, 101(3), 766–778.
<https://doi.org/10.1093/jmammal/gyaa039>
- Gallo, O., Castillo, D. F., Godinho, R., & Casanave, E. B. (2022). Assessing landscape connectivity for South-Central Argentine pumas dispersing under genetic source-sink dynamics. *Landscape Ecology*, 38(4), 999–1012. <https://doi.org/10.1007/s10980-022-01585-8>
- Gilbert, M., Cinardi, G., Da Re, D., Wint, W. G. R., Wisser, D., & Robinson, T. P. (2022a). Global cattle distribution in 2015 (5 minutes of arc) (Version V1) [dataset]. *Harvard Dataverse*. <https://doi.org/10.7910/DVN/LHBICE>
- Gilbert, M., Cinardi, G., Da Re, D., Wint, W. G. R., Wisser, D., & Robinson, T. P. (2022b). Global goats distribution in 2015 (5 minutes of arc) (Version V1) [dataset]. *Harvard Dataverse*. <https://doi.org/10.7910/DVN/YYG6ET>
- Gilbert, M., Cinardi, G., Da Re, D., Wint, W. G. R., Wisser, D., & Robinson, T. P. (2022c). Global sheep distribution in 2015 (5 minutes of arc) (Version V1) [dataset]. *Harvard Dataverse*. <https://doi.org/10.7910/DVN/VZOYHM>

- IGN. (2021). *Instituto Geográfico Nacional de la República Argentina (IGN), Capas SIG [Shapefile]*.
<https://www.ign.gob.ar/NuestrasActividades/InformacionGeoespacial/CapasSIG>
- Jackman. (2024). *pscl package—R Documentation (1.5.9) [R]*.
<https://www.rdocumentation.org/packages/pscl/versions/1.5.9>
- Kihn, M. P., Caruso, N., Iaconis, K., Gonzalez, M. J. P., & Soler, L. (2021). Analysis of conflicts with wild carnivores in the Humid Chaco, Argentina. *Animal Biodiversity and Conservation*, 44(2), Article 2. <https://doi.org/10.32800/abc.2021.44.0251>
- Llanos, R., Travaini, A., Montanelli, S., & Crespo, E. (2014). Estructura de edades de pumas (*Puma concolor*) cazados bajo el sistema de remoción por recompensas en Patagonia. ¿Selectividad u oportunismo en la captura? *Ecología Austral*, 24(3), 311–319.
<https://doi.org/10.25260/EA.14.24.3.0.8>
- Lucherini, M., Vidal, E. M. L., Nanni, V., Caruso, N., & Engel, M. T. (2024). American big cats on the spotlight. *Human Dimensions of Wildlife*, 0(0), 1–16.
<https://doi.org/10.1080/10871209.2024.2378183>
- McFadden, D. (1972). *Conditional logit analysis of qualitative choice behavior*.
- MapBiomas Argentina- Colección 1 de los Mapas Anuales de Cobertura y Uso del Suelo en Argentina, accedido en 12.07.24 a través del enlace: <https://argentina.mapbiomas.org/>
- Robin, X., Turck, N., Hainard, A., Tiberti, N., Lisacek, F., Sanchez, J.-C., Müller, M., & CI), Z. B. (2023). *pROC: Display and Analyze ROC Curves (1.18.5) [Computer software]*.
<https://cran.r-project.org/web/packages/pROC/index.html>
- Rostro-García, S., Tharchen, L., Abade, L., Astaras, C., Cushman, S. A., & Macdonald, D. W. (2016). Scale dependence of felid predation risk: Identifying predictors of livestock kills by tiger and leopard in Bhutan. *Landscape Ecology*, 31(6), 1277–1298.
<https://doi.org/10.1007/s10980-015-0335-9>
- Schiavina, M., Freire, S., Carioli, A., & MacManus, K. (2023). GHS-POP R2023A - GHS population grid multitemporal (1975-2030) [dataset]. *European Commission, Joint Research Centre (JRC)*.
<https://doi.org/10.2905/2FF68A52-5B5B-4A22-8F40-C41DA8332CFE>
- Sheather, S. (2009). *A Modern Approach to Regression with R*. Springer Science & Business Media.
- UNEP-WCMC & IUCN. (2023). Protected Planet: The World Database on Protected Areas (WDPA) [dataset]. <https://doi.org/www.protectedplanet.net>

Ypa, M. Agustina. (2025). Explorando las interacciones entre humanos y puma (*Puma concolor*) en distintos sistemas socio-ecológicos de Argentina en base a noticias periodísticas. Unpublished bachelor thesis. Facultad de Cs. Naturales e IML, San Miguel de Tucumán, Argentina.

Zanaga, Van De Kerchove, Daems, De Keersmaecker, Brockmann, Kirches, Wevers, Cartus, Santoro, Fritz, Lesiv, Herold, Tsendlbazar, Xu, Ramoino, & Arino. (2022). ESA WorldCover 10m 2021 v200 [dataset]. <https://doi.org/10.5281/zenodo.7254221>

Zarbá, L., Piquer-Rodríguez, M., Boillat, S., Levers, C., Gasparri, I., Aide, T. M., Álvarez-Berrios, N., Anderson, L., Araoz, E., Arima, E., Batistella, M., Calderón-Loor, M., Echeverría, C., Gonzalez-Roglich, M., Jobbág, E., Mathez-Stiefel, S.-L., Ramirez-Reyes, C., Pacheco, A., Vallejos, M., ... Grau, R. (2022). Mapping and characterizing social-ecological land systems of South America. *Ecology and Society*, 27(2). <https://doi.org/10.5751/ES-13066-270227>

Zeileis. (2022). *lmtest package—R Documentation (0.9-40) [Computer software]*. <https://www.rdocumentation.org/packages/lmtest/versions/0.9-40>