**Conserving predators across agricultural landscapes in Colombia: habitat use and space partitioning by jaguars, pumas, ocelots, and jaguarundis**

### Valeria Boron, Panteleimon Xofis, Andres Link, Esteban Payan and Joseph Tzanopoulos

### Supplementary Material 1: Land cover mapping.

We identified land cover types using object oriented image analysis on three Landsat 8 images, captured on 4 January 2015, 9 March 2015, and 12 July 2015, courtesy of the U.S. Geological Survey. We increased the spatial resolution of the multispectral image bands by pansharpening, employing the High Pass Filter technique and five as Kernel size. The pansharpened multispectral bands had > 90% correlation to the original ones in all cases, resulting in limited loss of spectral information. We applied Tasseled Cap Transformation on all images using the coefficients suggested by Liu et al. (2015) for Landsat 8 data, after converting the Digital Numbers (DN) to Top of Atmosphere (TOA) reflectance values. The classification was further assisted by two vegetation indices: the normalized difference vegetation index and the normalized difference moisture index. We employed a step-wise object based image analysis in *eCognition Developer 9* (Trimble, 2014) for the image classification. In the object based image analysis, spectrally similar adjacent pixels are grouped into meaningful objects, which are then classified into one of the possible classes, using spectral, spatial, neighbourhood and other characteristics (Bock et al., 2005). For training the classifier and testing the result we collected 343 ground truth validation points. We used two thirds of the ground-truth dataset for training and one third for testing. Finally, we performed an overall accuracy assessment using an error confusion matrix method and calculated classification accuracy and kappa statistics.

**References**

Bock, M., Xofis, P., Mitchley, J., Rossner, G. & Wissen, M. (2005) Object-oriented methods for habitat mapping at multiple scales—case studies from northern Germany and Wye Downs, UK. *Journal for Nature Conservation*, 13, 75–89.

Liu, Q., Liu, G., Huang, G. & Xie, C. (2015) Comparison of tasselled cap transformations based on the selective bands of Landsat 8 OLI TOA reflectance images. *International Journal of Remote Sensing*, 36, 417–441.

Trimble (2014) *eCognition Developer Reference Book.* Trimble Documentation, Munich, Germany.

Supplementary Table 1.Species capture rates (species capture events divided by sampling effort in each habitat), expressed per 100 trap nights.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Wetland | Wetland–oil palm edge | Forest | Forest–oil palm edge | Pasture | Oil Palm |
| Jaguar | 11.11 | 8.55 | 2.53 | 0 | 0 | 0 |
| Puma | 0.59 | 1.39 | 1.85 | 4.98 | 0 | 0 |
| Ocelot | 4.89 | 2.58 | 1.69 | 3.32 | 0.25 | 1.97 |
| Jaguarundi | 1.63 | 5.17 | 0.17 | 0.95 | 0.25 | 0 |

Supplementary Table 2. Model selection results (combined weight ≥ 0.95) for variables influencing occupancy (ψ) and probability of detection (P) of jaguars, pumas, ocelots and jaguarundis across the study site in the Magdalena river valley of Colombia (Fig. 1). (.) indicates that no covariates were included in the model.

|  | AICc1 | | ΔAICc2 | AICc weight | ML3 | *K*4 | LL5 |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Jaguar (46 detections, 15 stations)** |  | |  |  |  |  |  |
| *ψ* (% wetland), P (roads) | | 172.06 | 0.00 | 0.38 | 1.00 | 4 | 164.06 |
| *ψ* (% wetland, distance to settlement), P (roads) | | 173.84 | 1.78 | 0.16 | 0.41 | 5 | 163.84 |
| *ψ* (% wetland, % pasture), P (roads) | | 173.95 | 1.89 | 0.15 | 0.39 | 5 | 163.95 |
| *ψ* (% wetland, distance to water), P (roads) | | 174.02 | 1.96 | 0.14 | 0.38 | 5 | 164.02 |
| *ψ* (% wetland, prey > 10 kg), P (roads) | | 174.06 | 2.00 | 0.14 | 0.37 | 5 | 164.06 |
| **Puma (28 detections, 14 stations)** | |  |  |  |  |  |  |
| *ψ* (distance to water, prey >10 kg), P (roads) | | 158.54 | 0.00 | 0.20 | 1.00 | 5 | 148.54 |
| *ψ* (distance to water, % forest), P (roads) | | 158.93 | 0.39 | 0.17 | 0.82 | 5 | 148.93 |
| *ψ* (distance to water, % pasture), P (roads) | | 159.82 | 1.28 | 0.11 | 0.53 | 5 | 149.82 |
| *ψ* (distance to water, prey >10 kg), P (roads) | | 160.61 | 2.07 | 0.07 | 0.36 | 4 | 152.61 |
| *ψ* (all prey, % wetland), P (roads) | | 161.15 | 2.61 | 0.05 | 0.27 | 5 | 151.15 |
| *ψ* (% pasture), P (roads) | | 161.31 | 2.77 | 0.05 | 0.25 | 4 | 153.31 |
| *ψ* (distance to water, %oil palm), P (roads) | | 161.74 | 3.20 | 0.04 | 0.20 | 5 | 151.74 |
| *ψ* (% pasture, prey > 10 kg), P (roads) | | 161.78 | 3.24 | 0.04 | 0.20 | 5 | 151.78 |
| *ψ* (distance to water, % wetland), P (roads) | | 162.43 | 3.89 | 0.03 | 0.14 | 5 | 152.43 |
| *ψ* (distance to water, all prey), P (roads) | | 162.6 | 4.06 | 0.03 | 0.13 | 5 | 152.6 |
| *ψ* (prey > 10 kg), P (roads) | | 162.64 | 4.10 | 0.03 | 0.13 | 4 | 154.64 |
| *ψ* (.), P (roads) | | 163.07 | 4.53 | 0.02 | 0.10 | 3 | 157.07 |
| *ψ* (% pasture, all prey), P (roads) | | 163.26 | 4.72 | 0.02 | 0.09 | 5 | 153.26 |
| *ψ* (% pasture, % oil palm), P (roads) | | 163.27 | 4.73 | 0.02 | 0.09 | 5 | 153.27 |
| *ψ* (% pasture, % wetland), P (roads) | | 163.3 | 4.76 | 0.02 | 0.09 | 5 | 153.3 |
| *ψ* (% pasture, % forest), P (roads) | | 163.31 | 4.77 | 0.02 | 0.09 | 5 | 153.31 |
| *ψ* (prey > 10 kg, % oil palm), P (roads) | | 163.99 | 5.45 | 0.01 | 0.07 | 5 | 153.99 |
| *ψ* (prey > 10 kg, % wetland), P (roads) | | 164.45 | 5.91 | 0.01 | 0.05 | 5 | 154.45 |
| *ψ* (prey > 10 kg, % forest), P (roads) | | 164.49 | 5.95 | 0.01 | 0.05 | 5 | 154.49 |
| **Ocelot (58 detections, 23 stations)** | |  |  |  |  |  |  |
| *ψ* (% pasture), P (roads) | | 259.74 | 0.00 | 0.28 | 1.00 | 4 | 251.74 |
| *ψ* (% pasture, distance to settlement), P (roads) | | 261.05 | 1.31 | 0.15 | 0.52 | 5 | 251.05 |
| *ψ* (% pasture, % forest), P (roads) | | 261.26 | 1.52 | 0.13 | 0.47 | 5 | 251.26 |
| *ψ* (% pasture, % wetland), P (roads) | | 261.51 | 1.77 | 0.12 | 0.41 | 5 | 251.51 |
| *ψ* (% pasture, % oil palm), P (roads) | | 261.55 | 1.81 | 0.11 | 0.40 | 5 | 251.55 |
| *ψ* (% pasture, distance to water), P (roads) | | 261.71 | 1.97 | 0.10 | 0.37 | 5 | 251.71 |
| *ψ* (%oil palm, % wetland), P (roads) | | 265.16 | 5.42 | 0.02 | 0.07 | 5 | 255.16 |
| *ψ* (% forest), P (roads) | | 265.61 | 5.87 | 0.01 | 0.05 | 4 | 257.61 |
| *ψ* (% forest, % oil palm), P (roads) | | 266.06 | 6.32 | 0.01 | 0.04 | 5 | 256.06 |
| *ψ* (% forest, % wetland), P (roads) | | 266.26 | 6.52 | 0.01 | 0.04 | 5 | 256.26 |
| *ψ* (% forest, distance to water), P (roads) | | 266.69 | 6.95 | 0.01 | 0.03 | 5 | 256.69 |
| Supplementary Table 2, continued. | |  |  |  |  |  |  |
|  | | AICc1 | ΔAICc2 | AICc weight | ML3 | *K*4 | LL5 |
| **Jaguarundi (25 detections, 12 stations)** | |  |  |  |  |  |  |
| *ψ* (% pasture), P (.) | | 153.55 | 0 | 0.29 | 1.00 | 3 | 147.55 |
| *ψ* (% pasture, % wetland), P (.) | | 155.05 | 1.5 | 0.14 | 0.47 | 4 | 147.05 |
| *ψ* (% pasture, % forest), P (.) | | 155.11 | 1.56 | 0.14 | 0.46 | 4 | 147.11 |
| *ψ* (% pasture, % oil palm), P (.) | | 155.38 | 1.83 | 0.12 | 0.40 | 4 | 147.38 |
| *ψ* (% pasture, distance to water), P (.) | | 155.51 | 1.96 | 0.11 | 0.38 | 4 | 147.51 |
| *ψ* (% pasture, distance to settlement), P (.) | | 155.54 | 1.99 | 0.11 | 0.37 | 4 | 147.54 |
| *ψ* (% wetland, % forest), P (.) | | 157.16 | 3.61 | 0.05 | 0.16 | 4 | 149.16 |

1Akaike’s information criterion adjusted for small sample size.

2Difference in AICc between each model and the best one.

3Model likelihood.

4Number of parameters.

52log-likelihood.