**SUPPORTING INFORMATION**

**Critical shifts on spatial traits and the risk of extinction of Andean anurans: an assessment of the combined effects of climate and land-use changes in Colombia**

**Appendices**

**Appendix S1.** Pre-processing of presence data and list of species of anurans selected for the modeling of their distribution in the Andes of Colombia**.**

Each occurrence datum was reviewed by WA in a GIS to reduce the uncertainty associated with geographic errors following the protocol proposed by Escobar et al., (2014). We used Colombian national cartography at a scale of 1:100,000 (IGAC 2015) and a DEM at 90 m resolution. The altitudinal ranges reported in the literature (Bernal and Lynch 2008; Acosta 2015), and the unpublished data on the altitudinal ranges of the species reported in the databases were considered. Only species with more than eight records (after cleaning) were modelled .We prepared the final list of the species assigning the scientific name, updated according to the taxonomic classification proposed by Frost (2019) *Amphibian Species of the World* V. 5.1 (<http://research.amnh.org/vz/herpetology/amphibia/index.php>). According to orographic distributions, 5 species inhabit the Eastern Cordillera, 13 species inhabit the Central Cordillera, 6 species inhabit the Western Cordillera and 1 species has been recorded in both the Central and Western Cordillera.

**References**

Acosta-Galvis A.R. (2015). Una nueva especie del genero *Pristimantis* (Anura: Craugastoridae) del complejo de páramos Merchán-Iguaque (Boyacá, Colombia). Biota Colombiana, vol. 6, núm. 2. pp. 107-127.

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**Appendix S2:** Atmosphere-Ocean General Circulation Models selection

We downloaded 28 AOGCMs at a resolution of ~1km2 from Worldclim (www.worldclim.org) and from the Research Program on Climate Change, Agriculture and Food Security(www.ccafs-climate.org). Each AOGCMS contains the same number of bioclimatic variables considered for model calibration. To cover the climatic variability of the Andean region, the layers were cut for the Andean zone of Colombia, Venezuela and Ecuador. We created two databases with the average values of three biologically important climate variables for amphibians: mean annual temperature (Bio1), mean annual precipitation (Bio12) (Sodhi et al. 2008; Whitton et al. 2012), and an extreme climate variable or physiological limitation for ectotherm species, i.e. the maximum temperature of the warmest month (Bio5) (Sunday et al. 2014) (Table S3). These three variables were only used to objectively select a subset of AOGCMS. The calibration and projection of the final models were made using the 19 bioclimatic variables. We analyzed databases using the k-mean method. This method iteratively partitions *n* objects, described by *p* variables, into *k* clusters in which each object belongs to the cluster with the nearest cluster centroid. A hierarchical grouping using Ward's minimum variance method is applied from a climatic distance matrix (euclidean) elaborated with the three selected variables (more information on the method in Casajus et al., 2016). The selection of the groups is represented in a Rsq profile graphic (Figure S1) and Table S4. Once we obtained the subset of AOGCMS, we used the 19 bioclimatic variables to project the calibrated models for each species into the future. The selection of the scenarios was made in R using the command lines provided by the authors of the method (Casajus et al. 2016).

**Reference**

Casajus, N., Périé, C., Logan, T., Lambert, M.-C., Blois, S. de, & Dominique Berteaux. (2016). An Objective Approach to Select Climate Scenarios when Projecting Species Distribution under Climate Change. PloS One, 11(3), 1–17. <https://doi.org/10.1371/journal.pone.0152495>

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**Appendix S3. Additional description of model calibrations**

For each species we construed a set of models with the combinations of different values for the parameters FC and RM (β). The Feature Classes used were: linear (L), linear and quadratic (LQ), hinge (H), linear-quadratic and hinge (LQH), linear-quadratic-hinge and product (LQHP) and linear-quadratic-hinge-threshold and product (LQHTP). The values of β ranged from 0.5 to 5 with intervals of 0.5 (0.5; 1; 1.5; 2; 2.5; 3; 3.5; 4; 4.5; 5), for a total of 60 combinations for each species. Modeling and evaluation were developed in R using the ENMeval package (Muscarella et al. 2014). The final parameters for the modeling of each species were selected from the recommendations made by Warren and Seifert (2011) and Galante et al., (2018).

**References**

Galante, P. J., Alade, B., Muscarella, R., Jansa, S. A., Goodman, S. M., & Anderson, R. P. (2018). The challenge of modeling niches and distributions for data-poor species: a comprehensive approach to model complexity. Ecography, 41(5), 726–736. https://doi.org/10.1111/ecog.02909

Muscarella, R., Galante, P. J., Soley-Guardia, M., Boria, R. A., Kass, J. M., Uriarte, M., & Anderson, R. P. (2014). ENMeval: An R package for conducting spatially independent evaluations and estimating optimal model complexity for Maxent ecological niche models. Methods in Ecology and Evolution, 5(11), 1198–1205. https://doi.org/10.1111/2041-210X.12261

Warren, D. L., & Seifert, S. N. (2011). Ecological niche modeling in Maxent: the importance of model complexity and the performance of model selection criteria. Ecological Applications, 21(2), 335–342. https://doi.org/10.1890/10-1171.1

**Appendix S4.** Methodology for selecting the potential or accessible dispersal area for the species

We first constructed a geographic distribution model α-hull (Burgman and Fox, 2003) for each species, a method commonly recommended by the IUCN for the calculation of the extension of occurrence area (EOO) for species with restricted or discontinuous distributions (IUCN 2017; Pena et al. 2014). We combined this with the elaboration of a buffer area whose distance is equivalent to the longest line reported in the polygon α-hull. The polygon α-hull was drawn from lines that connect all the points of occurrence of the species (Triangulation of Delaunay). The external lines that join the points of occurrence of the polygon are equivalent to the construction of a Minimal Convex Polygon (MPC) (IUCN, 2017). The lines connecting the points do not intercept. The length of each of the lines was measured and the average length of the set of vertices was calculated. We applied a multiple (usually ≥2x) to the average value of the lines to obtain a value α, this value was used as a criterion to exclude the lines greater than that value of the polygon, leaving a set of triangles giving rise to a new polygon more delimited (Burgman y Fox, 2003). In this case the multiple for the average lines ranged from 3-5, depending on the species obtaining the value α. That is, a polygon for a species with average lines of 50 km was multiplied by the multiple that best delimits the polygon, for example 3, resulting in 150 km, while lines greater than this value were excluded.

From this new set of lines, we selected the value of the longest line to build the buffer area around the polygon α-hull, using the following adjustment rules: 1) lines of length ≤ at 50 km: buffer = 50 km; 2) lines of length between 51-100 km: buffer = 100 km, and 3) lines >100 km: buffer = the length of the line. If the longest line was 45 km, we adjusted the distance to 50 km and applied this distance as a buffer to the polygon α-hull to obtain the potential area of dispersion or M. In addition and given the proximity of the cordilleras in some areas, the new buffer area was limited to the cordillera that the species inhabits, thus excluding inter-Andean valleys and other mountain formations that are not suitable habitat for each species and where there is no possibility of natural dispersion. This new polygon representing the M area was used as a mask for the extraction of environmental variables and to perform distribution modeling analyses.

**Reference**

Burgman, M. A., & Fox, J. C. (2003). Bias in species range estimates from minimum convex polygons: implications for conservation and options for improved planning. Animal Conservation, 6(1), 19–28. https://doi.org/10.1017/S1367943003003044

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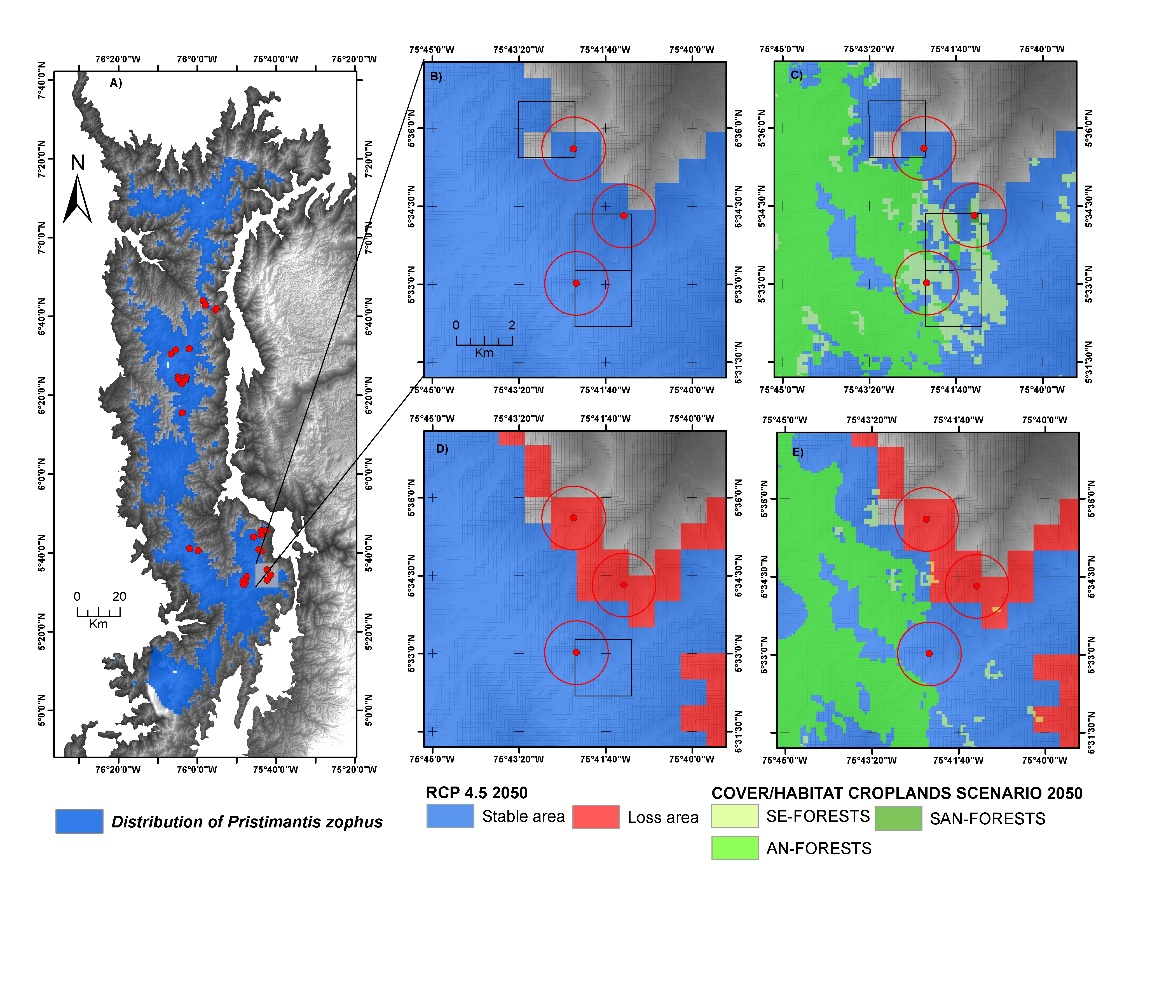
|  |  |
| --- | --- |
| RCP4.5 | RCP8.5 |

Imagen que contiene cielo, foto

Descripción generada con confianza muy altaImagen que contiene cielo, mapa, foto

Descripción generada con confianza muy alta

**Figure S1.** Rsq profile graphs (sum of squares) that determine the optimal number of clusters under a trade-off-based logic between costs (cluster number) and profit (variance explained) and that identify the number of clusters in which the net profit decreases. Number of clusters optimal for PCR 4.5 2050 and PCR 8.5 2050.



**Figure S2**. Example of the assessment of the collapse or loss of the AOO due to the combined effect of climate change and the loss of potential extent of suitable habitat due to changes in land use. SE-FOREST: Secondary forest; SAN-FORESTS: Sub-Andean forest; AN-FOREST: Andean forest. A) potential range for the species *Pristimantis zophus*; B) three occurrence and AOO data per grid and circular superimposed on the potential range; C) AOO, potential range and natural cover where the species lives. It is evident that the extent of suitable habitat to 2005 in one of the AOO is collapsed by the absence of natural cover, in spite of having ideal climatic conditions; D) potential distribution area: stable and loss due to climate change in the RCP4.5 to 2050 scenario. It is observed that two AOO are collapsed due to the loss of suitable climatic conditions; E) under the same climatic scenario but combined with the crop intensification scenario in 2050, it is observed that the AOO for this species collapsed due to the absence of climatic and habitat conditions in 2050

**Table S1**. List of species of selected anurans and their habitat preference. Status IUCN: LC= Least Concern; NT= Near Threatened; VU= Vulnerable; EN= Endangered. Cordilleras: C-OO= Cordillera Occidental; C-CEN= Cordillera Central and C-ORI= Cordillera Oriental.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| FAMILY/S*pecies* | STATUS  IUCN | Cordillera | N° Occ/No filter | Habitats preference  (IUCN) | Population trend |
| BUFONIDAE |  |  |  |  |  |
| *Rhinella macrorhina* | VU | C-CEN | 23 | Sub-andean/Andean forests | Unknown |
| *Atelopus marinkellei* | EN | C-ORI | 20 | Páramos/Andean forests | Decreasing |
| *Atelopus muisca* | EN | C-ORI | 19 | Páramos/Andean forests | Decreasing |
| *Osornophryne percrassa* | VU | C-CEN | 31 | Páramos/Andean forests | Decreasing |
| CENTROLENIDAE |  |  |  |  |  |
| *Centrolene notostictum* | LC | C-ORI | 17 | Sub-andean/Andean forests | Stable |
| *Nymphargus ignotus* | LC | C-OCC | 26 | Sub-andean forests | Decreasing |
| CRAUGASTORIDAE |  |  |  |  |  |
| *Hypodactylus babax* | LC | C-OCC | 12 | Sub-andean/Andean forests | Decreasing |
| *Hypodactylus latens* | VU | C-CEN | 12 | Sub-páramos/Andean forests | Decreasing |
| *Pristimantis alalocophus* | EN | C-CEN | 10 | Sub-páramos/Andean forests | Decreasing |
| *Pristimantis angustilineatus* | EN | C-OCC | 19 | Sub-andean/Andean forests | Unknown |
| *Pristimantis anolirex* | NT | C-ORI | 23 | Páramos/Andean forests | Stable |
| *Pristimantis bacchus* | EN | C-ORI | 15 | Sub-andean/Andean forests | Stable |
| *Pristimantis bicolor* | VU | C-OCC | 18 | Sub-andean/Andean forests | Decreasing |
| *Pristimantis calcaratus* | VU | C-OCC | 22 | Sub-andean/Andean forests | Decreasing |
| *Pristimantis dorsopictus* | VU | C-CEN | 26 | Sub-páramos/Andean forests | Decreasing |
| *Tachiramantis douglasi* | VU | C-ORI | 18 | Páramos/Andean forests | Decreasing |
| *Pristimantis elegans* | VU | C-ORI | 31 | Páramos/Andean forests | Decreasing |
| *Pristimantis factiosus* | LC | C-CEN | 22 | Sub-andean/Andean forests | Stable |
| *Pristimantis gracilis* | VU | C-OCC; C-CEN | 36 | Sub-andean/Andean forests | Decreasing |
| *Pristimantis lynchi* | DD | C-ORI | 25 | Páramos/Andean forests | Decreasing |
| *Pristimantis merostictus* | EN | C-ORI | 18 | Sub-andean/Andean forests | Decreasing |
| *Pristimantis miyatai* | LC | C-ORI | 31 | Sub-andean/Andean forests | Stable |
| *Pristimantis peraticus* | LC | C-CEN | 19 | Sub-páramos/Páramo | Stable |
| *Pristimantis piceus* | LC | C-CEN | 26 | Páramos/Andean forests | Stable |
| *Pristimantis racemus* | LC | C-CEN | 18 | Páramos/Andean forests | Stable |
| *Pristimantis simoteriscus* | EN | C-CEN | 11 | Sub-páramos/Páramo | Decreasing |
| *Pristimantis simoterus* | NT | C-CEN | 30 | Sub-páramos/Páramo | Decreasing |
| *Pristimantis zophus* | NT | C-OCC | 29 | Andean forests | Stable |
| HYLIDAE |  |  |  |  |  |
| *Dendropsophus norandinus* | LC | C-CEN | 16 | Sub-andean forests | Stable |
| *Hyloscirtus antioquia* | VU | C-CEN | 15 | Páramos/Andean forests | Stable |

**Table S2.** Bioclimatic variables considered.

Source: Wordlclim v 1.4 (Hismant et al., 2005)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No | Variable | Units | No | Variables | Units |
| Bio1 | Annual mean temperature | °C | **Bio11** | Mean temperature of the coldest quarter | °C |
| Bio2 | Mean diurnal range | °C | **Bio12** | annual precipitation | mm |
| Bio3 | Isothermality | % | **Bio13** | Precipitation of the wettest period | mm |
| Bio4 | Temperature seasonality | °C | **Bio14** | Precipitation of the driest period | mm |
| Bio5 | Maximum temperature of the warmest period | °C | **Bio15** | Precipitation seasonality | mm-1 |
| Bio6 | Minimum temperature of the coldest period | °C | **Bio16** | Precipitation of the wettest quarter | mm |
| Bio7 | Temperature annual range | °C | **Bio17** | Precipitation of the driest quarter | mm |
| Bio8 | Mean temperature of the wettest quarter | °C | **Bio18** | Precipitation of the warmest quarter | mm |
| Bio9 | Mean temperature of the driest quarter | °C | **Bio19** | Precipitation of coldest quarter | mm |
| Bio10 | Mean temperature of the warmest quarter | °C |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *Scenario* | RCP4.5 | | | RCP8.5 | | |
| *Year* | **2050** | | | **2050** | | |
| AOGCM | **Bio1** | **Bio5** | **Bio12** | **Bio1** | **Bio5** | **Bio12** |
| CCCMA CANESM2 | 18.9 | 25.5 | 1648.6 | 19.8 | 26.5 | 1490.5 |
| CESM1 CAM5 | 18.2 | 24.2 | 1974.7 | 18.9 | 25.1 | 2000.5 |
| CNRM-CM5 | 17.4 | 23.3 | 1927.7 | 17.9 | 23.6 | 1909.8 |
| CSIRO ACCESS 1.0 | 18.1 | 24.0 | 1988.6 | 18.9 | 24.9 | 2001.3 |
| CSIRO MK3 6.0 | 18.2 | 24.2 | 1974.7 | 18.7 | 24.6 | 1982.9 |
| GFDL CM3 | 19.0 | 25.6 | 1818.5 | 19.6 | 26.2 | 1801.9 |
| GISS E2 R | 17.7 | 23.5 | 1900.9 | 18.2 | 24.2 | 1840.2 |
| INM CM4 | 17.1 | 22.8 | 1813.7 | 17.5 | 23.3 | 1809.4 |
| IPSL CM5A MR | 17.5 | 23.0 | 2055.7 | 19.2 | 24.9 | 2183.0 |
| MIROC ESM | 17.9 | 24.0 | 1771.0 | 18.7 | 24.9 | 1908.0 |
| MIROC MIROC5 | 17.6 | 23.4 | 1909.1 | 18.1 | 24.0 | 2019.0 |
| MOHC HADGEM2 ES | 18.4 | 24.1 | 2118.6 | 19.0 | 25.0 | 2101.4 |
| MPI ESM LR | 17.2 | 22.2 | 2022.4 | 19.0 | 25.3 | 2024.3 |
| MRI CGCM3 | 17.6 | 23.9 | 1869.8 | 18.2 | 24.6 | 1866.4 |

**Table S3.** Average values of the three bioclimatic variables selected as important for the Andean anurans in k-mean analysis in two climate change scenarios (RCP4.5 and RCP8.5) by 2050. BIO1 and BIO5 units in °C and BIO12 units in mm of rainfall.

**Table S4**. Results of selection of AOMCGs by k-media analysis and percentage of variation summarizing for two climate change scenarios (RCP4.5 and 8.5) to 2050.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| N° of Models | AOMCG | Cluster | Number of AOMCG grouping | Summary Percentage of Variance |
| RCP4.5 2050 | |  |  |  |
| 1 | CSIRO\_ACCESS1.0 | 1 | 4 | **81 %** |
| 2 | GISS\_E2\_R | 2 | 6 |
| 3 | ESM\_LR | 3 | 2 |
| 4 | GFDL\_CM3 | 4 | 2 |
| RCP8.5 2050 | |  |  |
| 10 | CSIRO\_ACCESS1.0 | 1 | 2 | **79 %** |
| 11 | CNRM-CM5 | 2 | 7 |
| 12 | GFDL\_CM3 | 3 | 5 |

**Table S5**. Final parameters for run Maxent and development of the Species Distribution Models for each Anuran specie and evaluation metrics (omission rate, sensibility and partial ROC)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| SPECIES | N° Occ filter to 4km | FC | RM | AUCTEST | AUCDIFF | Parameter number | AICc | Omission rate | Sensibility | pROC |
| BUFONIDAE |  |  |  |  |  |  |  |  |  |  |
| *Rhinella macrorhina* | 13 | H | 1.5 | 0.955 | 0.024 | 7 | 253.037 | 0.000 | 1.000 | 1.876 |
| *Atelopus marinkellei* | 15 | L | 0.5 | 0.952 | 0.025 | 6 | 273.359 | 0.050 | 0.950 | 1.848 |
| *Atelopus muisca* | 11 | LQHP | 1.5 | 0.947 | 0.019 | 3 | 180.65 | 0.052 | 0.948 | 1.829 |
| *Osornophryne percrassa* | 23 | LQHP | 1.5 | 0.942 | 0.022 | 7 | 438.131 | 0.068 | 0.932 | 1.796 |
| CENTROLENIDAE |  |  |  |  |  |  |  |  |  |  |
| *Centrolene notostictum* | 14 | LQHP | 2.5 | 0.808 | 0.086 | 4 | 328.006 | 0.000 | 1.000 | 1.551 |
| *Nyrphagus ignotus* | 16 | LQH | 3 | 0.866 | 0.083 | 4 | 337.432 | 0.153 | 0.847 | 1.481 |
| CRAUGASTORIDAE |  |  |  |  |  |  |  |  |  |  |
| *Hypodactylus babax* | 9 | H | 2.5 | 0.776 | 0.096 | 2 | 204.759 | 0.000 | 1.000 | 1.601 |
| *Hypodactylus latens* | 11 | H | 2 | 0.933 | 0.028 | 3 | 207.414 | 0.083 | 0.917 | 1.767 |
| *Pristimantos alalocophus* | 8 | LQ | 3 | 0.884 | 0.044 | 3 | 169.234 | 0.100 | 0.900 | 1.687 |
| *Pristimantis angustilineatus* | 9 | H | 1.5 | 0.893 | 0.058 | 4 | 162.469 | 0.157 | 0.843 | 1.695 |
| *Pristimantis anolirex* | 14 | LQ | 1.5 | 0.909 | 0.048 | 5 | 265.111 | 0.000 | 1.000 | 1.642 |
| *Pristimantis bacchus* | 11 | LQHP | 2.5 | 0.843 | 0.090 | 3 | 216.638 | 0.000 | 1.000 | 1.536 |
| *Pristimantis bicolor* | 14 | H | 2.5 | 0.872 | 0.070 | 5 | 304.433 | 0.055 | 0.945 | 1.523 |
| *Pristimantis calcaratus* | 17 | LQHPT | 2.5 | 0.812 | 0.093 | 4 | 327.26 | 0.095 | 0.905 | 1.482 |
| *Pristimantis dorsopictus* | 20 | LQH | 2.5 | 0.903 | 0.058 | 7 | 385.895 | 0.384 | 0.616 | 1.400 |
| *Tachiramantis douglasis* | 12 | LQ | 3.5 | 0.825 | 0.075 | 3 | 241.106 | 0.000 | 1.000 | 1.634 |
| *Pristimantis elegans* | 24 | LQ | 1 | 0.922 | 0.041 | 7 | 458.116 | 0.258 | 0.742 | 1.467 |
| *Pristimantis factiosus* | 15 | H | 4 | 0.887 | 0.075 | 4 | 272.983 | 0.000 | 1.000 | 1.674 |
| *Pristimantis gracilis* | 25 | LQ | 0.5 | 0.925 | 0.043 | 11 | 528.763 | 0.055 | 0.945 | 1.558 |
| *Pristimantis lynchi* | 21 | LQ | 4 | 0.855 | 0.063 | 3 | 416.722 | 0.280 | 0.720 | 1.303 |
| *Pristimantis merostictus* | 11 | LQHP | 2.5 | 0.867 | 0.060 | 3 | 236.555 | 0.312 | 0.688 | 1.502 |
| *Pristimantis miyatai* | 22 | LQH | 2.5 | 0.896 | 0.050 | 8 | 447.708 | 0.142 | 0.858 | 1.482 |
| *Pristimantis peraticus* | 11 | LQHP | 2.5 | 0.937 | 0.031 | 3 | 206.973 | 0.052 | 0.948 | 1.745 |
| *Pristimantis piceus* | 18 | LQ | 1 | 0.853 | 0.060 | 5 | 379.776 | 0.115 | 0.885 | 1.516 |
| *Pristimantis racemus* | 11 | LQ | 2 | 0.924 | 0.037 | 3 | 201.133 | 0.111 | 0.889 | 1.753 |
| *Pristimantis simoteriscus* | 10 | LQ | 4 | 0.921 | 0.027 | 2 | 174.964 | 0.182 | 0.818 | 1.730 |
| *Pristimantis simoterus* | 18 | LQHP | 4.5 | 0.936 | 0.016 | 1 | 303.702 | 0.033 | 0.967 | 1.781 |
| *Pristimantis zophus* | 14 | H | 4 | 0.889 | 0.041 | 1 | 255.522 | 0.172 | 0.828 | 1.505 |
| HYLIDAE |  |  |  |  |  |  |  |  |  |  |
| *Dendropsophus norandinus* | 9 | H | 2.5 | 0.878 | 0.050 | 3 | 188.072 | 0.133 | 0.867 | 1.741 |
| *Colomascirtus antioquia* | 12 | LQ | 1.5 | 0.922 | 0.033 | 5 | 248.214 | 0.187 | 0.813 | 1.748 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | RCP4.5 | | RCP8.5 | |
| Species | **RCP4.5 2050** | **RCP8.5 2050** | **IPS** | **CIS** | **IPS** | **CIS** |
| *Atelopus marinkellei* | 0.7222 | 0.6667 | 0.9286 | 0.9286 | **1.0000** | 0.9286 |
| *Atelopus muisca* | 0.1250 | 0.3750 | 0.1875 | 0.1875 | 0.2500 | 0.2500 |
| *Osornophryne percrassa* | 0.2000 | 0.3600 | 0.5000 | 0.4545 | 0.5909 | 0.5909 |
| *Rhinella macrorhina* | 0.3571 | 0.4286 | 0.2727 | 0.5455 | 0.2727 | 0.5455 |
| *Centrolene notostictum* | 0.2353 | 0.4118 | 0.7692 | 0.6154 | 0.8462 | 0.6923 |
| *Nymphargus ignotus* | 0.7368 | 0.8421 | 0.8824 | 0.8235 | 0.8824 | 0.8824 |
| *Hypodactylus babax* | 0.4545 | 0.7273 | 0.5455 | 0.5455 | 0.8182 | 0.7273 |
| *Hypodactylus latens* | 0.6000 | 0.9000 | 0.6667 | 0.6667 | 0.8889 | 0.8889 |
| *Pristimantis alalocophus* | 0.1111 | 0.2222 | 0.6667 | 0.6667 | 0.7778 | 0.7778 |
| *Pristimantis angustilineatus* | 0.2000 | 0.2667 | 0.1429 | 0.4286 | 0.2143 | 0.5000 |
| *Pristimantis anolirex* | 0.7727 | 0.9091 | 0.7500 | 0.7500 | 0.9000 | 0.9000 |
| *Pristimantis bacchus* | 0.4615 | 0.8462 | 0.5000 | 0.5000 | 0.8333 | 0.8333 |
| *Pristimantis bicolor* | 0.1250 | 0.6875 | 0.3846 | 0.4615 | 0.6923 | 0.7692 |
| *Pristimantis calcaratus* | 0.4444 | 0.7778 | 0.5000 | 0.5556 | 0.7778 | 0.8333 |
| *Pristimantis dorsopictus* | 0.3500 | 0.5500 | 0.5000 | 0.5833 | 0.5000 | 0.5000 |
| *Pristimantis elegans* | 0.7500 | **1.0000** | 0.7917 | 0.7917 | **1.0000** | **1.0000** |
| *Pristimantis factiosus* | 0.0000 | 0.0500 | 0.1176 | 0.2941 | 0.1176 | 0.3529 |
| *Pristimantis gracilis* | 0.3333 | 0.5152 | 0.5556 | 0.5185 | 0.7037 | 0.7037 |
| *Pristimantis lynchi* | 0.1765 | 0.2941 | 0.3636 | 0.3636 | 0.6364 | 0.6364 |
| *Pristimantis merostictus* | 0.5000 | 0.9167 | 0.1818 | 0.6364 | **1.0000** | **1.0000** |
| *Pristimantis miyatai* | 0.3846 | **1.0000** | 0.4500 | 0.6000 | **1.0000** | **1.0000** |
| *Pristimantis peraticus* | 0.3077 | 0.7692 | 0.6154 | 0.6154 | 0.8462 | 0.7692 |
| *Pristimantis piceus* | 0.3750 | 0.5833 | 0.4545 | 0.4545 | 0.5909 | 0.5909 |
| *Pristimantis racemus* | 0.5714 | **1.0000** | 0.6154 | 0.5385 | **1.0000** | **1.0000** |
| *Pristimantis simoteriscus* | 0.1000 | 0.9000 | 0.0000 | 0.0000 | 0.8889 | 0.8889 |
| *Pristimantis simoterus* | 0.6400 | 0.8000 | 0.6667 | 0.6667 | 0.8095 | 0.8095 |
| *Pristimantis zophus* | 0.1852 | 0.2222 | 0.2800 | 0.2800 | 0.2800 | 0.2800 |
| *Tachiramantis douglasi* | 0.1667 | 0.1667 | 0.2778 | 0.6667 | 0.2778 | 0.6667 |
| *Dendropsophus norandinus* | 0.3077 | 0.6154 | 0.3333 | 0.5833 | 0.5000 | 0.5000 |
| *Hyloscirtus antioquia* | 0.8462 | **1.0000** | **1.0000** | **1.0000** | **1.0000** | **1.0000** |

Table S6. Percentage of loss of the Area of Occupancy for climate only and combined scenarios (climate change + changes in land use). The values were calculated with respect to the current AOO values in the climate only and combined scenarios. Filled purple values indicate species with potential extinction status in wildlife.