**UNIVERSIDAD SAN FRANCISCO DE QUITO USFQ**

**Colegio de Posgrados**

# Evolutionary conservation hotspots: Key areas for threatened Neotropical glassfrogs under climate change scenarios

**Tesis de Maestría**

**Mateo Andrés Vega Yánez**

**Juan M. Guayasamin (PhD)**

**Carl R. Hutter (PhD)**

**Julián A. Velasco (PhD)**

**Directores de Trabajo de Titulación**

Trabajo de titulación de posgrado presentado como requisito

para la obtención del título de Magíster en Ecología Tropical y Conservación

Quito, 13 de mayo del 2025

# UNIVERSIDAD SAN FRANCISCO DE QUITO USFQ

# COLEGIO DE POSGRADOS

## HOJA DE APROBACIÓN DE TRABAJO DE TITULACIÓN

**Evolutionary conservation hotspots: Key areas for threatened Neotropical glassfrogs under climate change scenarios**

## Mateo Andrés Vega Yánez

Nombre del Directora del Programa:
Elisa Bonaccorso
Título académico:
PhD in Ecology and Evolutionary Biology
Director del programa de:
Maestría en Ecología Tropical y Conservación

Nombre del Decano del colegio Académico:
Carlos A. Valle Castillo
Título académico:
PhD in Ecology and Evolutionary Biology
Decano del Colegio:
Ciencias Biológicas y Ambientales

Nombre del Decano del Colegio de Posgrados:
Darío Niebieskikwiat
Título académico:
Doctor en Física

**Quito, May 2025**

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| | |
|---|---|
| Nombre del estudiante: | Mateo Andrés Vega Yánez |
| Código de estudiante: | 00336214 |
| C.I. o Pasaporte: | 1724021512 |
| Lugar y fecha: | Quito, 13 de mayo del 2025 |

# ACLARACIÓN PARA PUBLICACIÓN



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**AGRADECIMIENTOS**

A mis directores de tesis Juan M. Guayasamin, Carl R. Hutter y Julián A. Velasco por su ayuda durante el proceso de elaboración de la tesis. A las personas e instituciones que proporcionaron registros de ocurrencias de especies: Fernando Rojas-Runjaic (Museo de Historia Natural La Salle), Ignacio de la Riva y Marta Calvo (Museo Nacional de Ciencias Naturales), Luis A. Coloma (Centro Jambatu), Mario H. Yánez-Muñoz (Instituto Nacional de Biodiversidad), Sandra P. Galeano (Colección de Anfibios del Instituto Humboldt), Santiago Castroviejo-Fisher (Universidad de Sevilla). También a Jaime Culebras por proporcionar buen material fotográfico de ranas de cristal utilizado en las figuras. A Daniela Franco-Mena y Luis Amador por su ayuda en algunos procesos de la tesis. Un agradecimiento especial a Mario H. Yánez-Muñoz por su revisión previa al manuscrito, cuyo conocimiento invaluable, junto con sus ideas y sugerencias, contribuyeron significativamente. A Elisa Bonaccorso y al Laboratorio de Biología Evolutiva - USFQ por su apoyo durante el programa de Maestría. A Garrison Ferone, Amaru Rubio, Gabriela Mena, Evanna Jaramillo y a cada persona que lucha por conservar la biodiversidad desde su espacio.

## RESUMEN

Los anfibios son uno de los grupos de vertebrados más amenazados debido a una combinación de destrucción del hábitat, enfermedades y cambio climático. Entre las ranas de cristal neotropicales, 69 especies están catalogadas como amenazadas por la UICN. Nuestro conocimiento sobre cómo el cambio climático influirá en los patrones de distribución de su diversidad taxonómica y filogenética aún es limitado. En este estudio, modelamos la distribución futura de estas especies bajo diferentes escenarios de cambio climático, utilizando dos Modelos de Circulación General y dos Vías Socioeconómicas Compartidas para un horizonte temporal. También identificamos áreas prioritarias para la conservación basándonos en la diversidad filogenética y el índice EDGE (Especies Evolutivamente Distintas y Globalmente Amenazadas). Nuestros resultados sugieren que los Andes y la cuenca del Amazonas experimentarán los cambios climáticos más drásticos, con al menos seis especies proyectadas a extinguirse en todos los escenarios evaluados. Además, la mayoría de las especies muestran una tendencia a desplazarse hacia elevaciones más altas, acompañada de una reducción significativa en su rango geográfico. En promedio, estos cambios podrían resultar en una pérdida de aproximadamente el 30% de su diversidad filogenética. Los Andes del norte de Ecuador y Colombia se identifican como refugios clave para la diversidad taxonómica y filogenética futura de las ranas de cristal. Sin embargo, menos del 36% de su rango proyectado se superpone con áreas protegidas, lo que resalta la necesidad inmediata de acciones de conservación.



**Palabras clave:** Biodiversidad, conservación, anfibios, cambio climático, Andes

## TABLA DE CONTENIDOS

## ABSTRACT

Amphibians are one of the most endangered vertebrate groups because of a combination of habitat destruction, diseases, and climate change. Among the Neotropical glassfrogs, 69 species are listed as threatened by the IUCN. Our understanding on how climate change will influence the distribution patterns of their taxonomic and phylogenetic diversity is still unclear. In this study, we modelled the future distribution of these species under different climate change scenarios using two Global Circulation Models under two Shared Socio-economic Pathways for one-time horizon. We also identified priority areas for conservation based on phylogenetic diversity and the Evolutionarily Distinct and Globally Endangered (EDGE) index. Our results suggest that the Andes and Amazon Basin will experience the most drastic climatic changes, with at least six species projected to be extinct in all scenarios assessed. Additionally, most species exhibit a tendency to shift towards higher elevations, accompanied by a significant reduction in their geographic range. On average, these changes could result in a loss of approximately 30% of their phylogenetic diversity. The northern Andes of Ecuador and Colombia are identified as key refuges for future taxonomic and phylogenetic diversity of glassfrogs. However, less than 36% of their projected range overlaps with protected areas, highlighting the immediate need for conservation action.

**Key words:** Biodiversity, conservation, amphibians, climate change, Andes.

# INTRODUCTION

There are approximately 166 species of glassfrogs (family Centrolenidae) distributed throughout Central and South America (Guayasamin et al., 2020; Frost, 2024). The uplift of the Andes Mountains, the heterogeneity of the landscape and their evolutionary history related to niche conservatism has promoted allopatric speciation and high species richness at intermediate elevations (Hutter et al., 2013; Guayasamin et al., 2020). Likewise, patterns of phylogenetic diversity and phylogenetic endemism pinpoint the relevance of the northern Andes and in the humid forests of the Chocó-Darién region for this taxon (Mendoza & Arita, 2014). Approximately 44% of glassfrogs species are globally threatened (IUCN, 2024). Eleven species are listed as Critically Endangered (CR), 39 as Endangered (EN), and 19 as Vulnerable (VU), because of habitat loss, diseases and climate change (Wake, 2007; Delia Basanta et al., 2023; Luedtke et al., 2023).

Climate change has contributed to the decline of numerous amphibian species by reducing climatically suitable habitats (Carey & Alexander, 2003; Luedtke et al., 2023). A notable case is *Incilius periglenes* (Golden Toad) in Costa Rica, where rising temperatures and reduced rainfall may have disrupted reproductive conditions, indicating a potential population decline linked to climate change (Crump et al., 1992). Similarly, the effects of climate change are expected to have a higher impact in neotropical regions (Menéndez-Guerrero et al., 2020; Velasco et al., 2021). For example, montane species will experience drastic shifts in their distribution, being pushed upward to follow their climatic niches as temperatures rise. There is also potentially a risk that suitable areas for species adapted to mountain environments will be lost (Forero-Medina et al., 2011; Cordier et al., 2020; de Meyer et al., 2022). Also, the lowland species may gradually move to higher elevations or latitudes (Nogués-Bravo et al., 2007; Forero-Medina et al., 2011; de Meyer et al., 2022).

Furthermore, in lowland areas, species face a particular challenge to adapt to climate change, which is described by the niche conservatism (Wiens and Graham, 2005; Hutter et al., 2013). This process implies that species must move considerable distances to find climatic conditions suitable to their needs and therefore could have a higher risk of extinction, if dispersal is low (Bonetti & Wiens, 2014; Antão et al., 2020). Specifically, with glassfrogs, the potential effects of climate change on future shifts in distributions have been little explored, and being an Andean clade  (Hutter et al., 2013; Castroviejo-Fisher et al., 2014) it is estimated that may there is a risk of losing areas suitable for their survival (Forero-Medina et al., 2011; Ortega-Andrade et al., 2013). For the above mentioned, it is relevant to elucidate how climate change could affect the distribution of threatened lineages of glassfrogs and if they could be impacted through niche conservatism. Also, in what areas in the Neotropics the highest taxonomic and phylogenetic diversity of threatened glassfrogs are congregated and which of them represent unique or key evolutionary lineages for their conservation.

## MATERIALS AND METHODS

### Species distribution models

Based on the IUCN Red List for the family Centrolenidae, we have compiled occurrence records of the 69 threatened species in biodiversity and literature databases (Table S1: supplemental material). With these data, a taxonomic validation was conducted with the aim of updating the nomenclature of genera and species, considering that some taxonomies have been revised, reclassified or synonymized in recent years. In addition, geographic coordinates were validated in ArcGIS Pro and duplicate records were eliminated to ensure a robust database for subsequent analyses. For each species, area M or area of accessibility (Soberon & Peterson, 2005) was defined using a 500 km buffer. The other input for the species distribution models (SDM) are the bioclimatic variables that were obtained from the WorldClim version 2.1 platform (Fick & Hijmans, 2017) at a spatial resolution of 2.5 minutes for the present models. Whereas for the future models we downloaded the CMIP 6 (Eyring et al., 2016) climate projections at the same spatial resolution of the current variables for the time horizon 2061-2080 at two Shared Socio-economic Pathways; SSP245 and SSP370. The SP245 scenario represents an intermediate scenario, in which climate policies implemented are moderate. In this context, a medium use of fossil fuels is maintained, and sustainable development advances partially. Meanwhile SSP370 scenario corresponds to a high impact scenario, in which weak or minimal climate change policies are observed. This scenario is marked by intensive use of fossil fuels and limited progress in terms of sustainable development (Riahi et al., 2017).

Of the 11 global climate models (GCMs) available we selected two at random; CMCC-ESM2 and GISS-E2-1-G. The first model, CMCC-ESM2 has a higher equilibrium climate sensitivity (ECS), which leads to a more perceptible temperature increase compared to GISS-E2-1-G. This higher sensitivity induces more intense changes in atmospheric circulation and moisture distribution (Lovato et al., 2022). It is also worth noting that CMCC-ESM2 includes a more detailed representation of terrestrial biogeochemical cycles, which affects evapotranspiration and albedo, reducing the availability of moisture in the atmosphere and decreasing precipitation in some areas. On the other hand, the GISS-E2-1-G model simulates a stronger indirect effect of aerosols on clouds, which may contribute to increased precipitation (Lovato et al., 2022; Nazarenko et al., 2022). To explore the bioclimatic variables in relation to the current variables, with the raster package in R (Hijmans, 2024) we constructed map algebra to obtain differences in temperature and precipitation for each GCM in each SPP.

According to area M, a series of models were generated in R software (R Core Team 2024), species with less than five records were not modeled but had another treatment, which consisted of creating for occurrence record a pixel with a spatial resolution of 2.5 minutes for posterior analyses. While for the species modeled, we adopted a model ensemble approach due to the significant uncertainty in the selection of model algorithms in relation to their transferability to climate change scenarios (Thuiller et al., 2019; Castelblanco-Martínez et al. 2021). First, with the R package ecospat (Broennimann et al., 2024) we generated 1,000 random pseudo-absences for each species setting a minimum distance of ~ 4.5 km between the generated pseudo-absences and the confirmed occurrences. We then used the sdm package (Naimi & Araújo, 2016) to run three algorithms: BRT (Boosted Regression Trees), RF (Random Forest) and SVM (Support Vector Machine) with subsampling replication where 30% of the data were used for validation, and the remaining 70% for training, generating a total of 10 replicates for each algorithm (Engler et al., 2013). Finally, for each individual model we evaluated the predictive accuracy using the TSS and the omission rate (Allouche et al., 2006).

We also generated an ensemble model weighting for those models that maximize TSS values to obtain the model ensemble current for each glassfrog species. For the future distribution models, we performed a series of model transfers for the two GCMs (CMCC-ESM2 and GISS-E2-1-G) in each SSP (245 and 370). Using the consensus assemblage models for each species in its current and future distribution, binary maps were generated based on the R ecospat package, defining a threshold of 0.9 of the occurrences for analysis. A presence/absence matrix was created with the resulting maps to estimate taxonomic diversity (TD) and the following analyses. Species that were not modeled due to the low number of records were not included in the analysis of future distribution, most of these species have less than four records and in some cases have not been observed for more than a decade.

**Phylogenetic analyses**

Mitochondrial DNA sequences of glassfrogs available from previous studies (Guayasamin et al., 2020) as well as those of the outgroups, were downloaded from GenBank (http://www.ncbi.nlm.nih.gov/genbank/). Our DNA sequence data represent coverage of 80.7 % of the Centrolenidae family (Table S2: supplemental material). Taxon sampling includes 134 named glassfrog, species, eleven putative new species, and three outgroup taxa. The dataset contains complete or partial sequences of three genes representing 2,569 bp of data (mitochondrial: 12S rRNA, 16S rRNA, and ND1). The alignments of the three mitochondrial genes were previously reviewed and edited in Aliview (Larsson, 2014) and then concatenated in the AMAS program (Borowiec, 2016) for subsequent phylogenetic analyses.

Maximum Likelihood analysis was performed in IQ-TREE version 2.2.0 (Minh et al., 2020) under the GTR model and default values. Node support was evaluated with 1,000 ultrafast bootstrap replicates (Hoang et al., 2018). Bayesian Inference analysis was obtained with BEAST 2 (Bouckaert et al., 2019) implemented with a run of 5 x 107 generations sampled every 1,000 generations; topological convergence to a stable zone was analyzed in Tracer (Rambaut et al., 2018). For the time-calibrated ultrametric tree, the temporal calibration scheme described by Castroviejo-Fisher et al. (2014) for the most recent common ancestor of Centrolene was used. The maximum clade credibility tree (MCC) was estimated with TreeAnnotator v2 (distributed with BEAST 2) with the trees sampled after discarding 25% as burn-in. Species with their identification unconfirmed (e.g., cf. or aff. species) were removed with the drop.tip function of the ape package in R (Paradis & Schliep, 2019). The Bayesian and Maximum Likelihood tree was visualized using FigTree v1.4.3 (http://tree.bio.ed.ac.uk/software/figtree/). Matching the phylogeny generated with threatened species we calculated the phylogenetic diversity (PD) as the sum of the branch lengths of all species present in the presence/absence matrix (obtained previously) (Faith, 1992). To explore the relationship between phylogenetic diversity (PD) and taxonomic diversity (TD) we performed a Locally Estimated Scatterplot Smoothing where positive residuals indicate few recent speciation events and/or high dispersal rates while negative residuals suggest many recent speciation events and/or low dispersal rates (Ochoa-Ochoa et al., 2020). The residual values were rasterized to generate maps for each GCM at a resolution of 0.5 degrees latitude.

**Evolutionarily Distinct and Globally Endangered (EDGE)**

The Evolutionary Distinctiveness (ED) index was calculated for each threatened glassfrog species using the picante package in R (Kembel et al., 2010), based on its phylogeny. This index distributes branch lengths of the phylogenetic tree equally among descendant branches, applying proportional and fair splits (Isaac et al., 2007; Redding et al., 2014). The aim is to measure the degree of isolation of each species within the phylogeny, thus reflecting its evolutionary uniqueness (Molina-Venegas, 2021). The Globally Endangered (GE) for each species was assigned according to the probability of extinction for 100 years, following the criteria established by Mooers et al. (2008). With these values, the EDGE was calculated for each species by $\ln(1 + ED) + GE \times \ln(2)$ (Gumbs et al., 2023). With the EDGE values, an analysis of the distribution of continuous characters along the phylogenetic tree of the threatened species was performed using the phylotools package in R (Zhang, 2017).  In addition, the values were rasterized in the grid cells generated from the species distribution model for the current, using a resolution of 0.5 degrees latitude.

## RESULTS

### Temperature and precipitation differences between the Global Circulation Models (GCMs) and the present

**Temperature.** The climate models (CMCC-ESM2 and GISS-E2-1-G) for the different SSP (245 and 370) project changes in temperature and precipitation that exhibit varied spatial patterns in South America (Figure 1). The temperature difference projected by the climate models (GCM) for the SSP245 scenario, compared to current conditions, is 4.33 °C according to the CMCC-ESM2 model, and 3.27 °C according to the GISS-E2-1-G model. This suggests that the CMCC-ESM2 model projects an additional 1.06 °C increase over GISS-E2-1-G. The findings of both models indicate that the areas projected to be most affected by the increase in temperature are the central Andes, the Guyana Shield and a large part of the Amazon River basin. For the SSP370 scenario, the temperature differences indicate an increase of 5.15 °C according to the CMCC-ESM2 model, and 4.19 °C according to GISS-E2-1-G implying that the first model projects an increase of 0.96 °C more compared to the second. In this scenario, the models coincide in that almost the entire Amazon basin and the Andes region would be severely affected by the increase in temperature (Figure 1A). In addition, our results suggest that Critically Endangered (CR) and Endangered (EN) species would be exposed to the highest temperature increases (Table 1).

**Precipitation.** Future changes in precipitation in South America vary between GCMs. Indeed, differences in projected precipitation compared to current conditions show that, in the SSP245 scenario, the CMCC-ESM2 model projects a decrease of up to 726 mm of precipitation, mainly affecting the Amazon basin and northeastern South America. In contrast, the GISS-E2-1-G model projects a maximum reduction of 476 mm, mainly concentrated in the Amazon basin. For the SSP370 scenario, the projections suggest an even higher decrease: the CMCC-ESM2 model projects a decrease of up to 908 mm in South America, while the GISS-E2-1-G model projects a decrease of up to 814 mm. These differences highlight the variability of projections between models and scenarios, especially in critical regions such as Amazonia and the Andes (Figure 1B). In relation to the threat categories of glassfrog species, the CMCC-ESM2 models project a decrease in precipitation, which impacts mainly species classified as Endangered (EN). Conversely, the GISS-E2-1-G models project an increase in precipitation, affecting both Critically Endangered (CR) and Endangered (EN) species (Table 1).

## Data obtained

**Phylogenetics.** A total of 69 threatened species, 52 had genetic sequences available. Phylogenetic relationships of threatened glassfrog species show that the highest diversification occurred during the Miocene (~23 Ma) (Figure 2A). The ancient species is *Ikakogi tayrona*, which occurred in the Eocene, approximately 36.7 Ma. Currently, this species is distributed in northern Colombia, specifically in the Sierra Nevada, and is classified as Vulnerable (VU). The subfamily Hyalinobatrachinae, which includes the genera *Celsiella* and *Hyalinobatrachium*, is composed of species currently classified as Endangered (EN) and Vulnerable (VU). This subfamily diverged approximately 27.7 Ma. The other subfamily, Centroleninae, diverged approximately 33.8 Ma and comprises all other genera of threatened species (*Centrolene*, *Cochranella*, *Nymphargus*, *Rulyrana*, *Sachatamia* and *Vitreorana*), which are represented in all three threat categories: Critically Endangered (CR), Endangered (EN) and Vulnerable (VU). Within this subfamily, the *Centrolene* genus clade includes four species (*Centrolene buckleyi*, *Centrolene ballux*, *Centrolene lynchi*, and C*entrolene sabini*) that represent the most recent lineages, with a diversification that originated in the Pliocene, approximately 5 Ma. These species are classified in the three threat categories (Figure 2A).

**Occurrence record data.** A total of 986 validated occurrence records were obtained for the distribution models of threatened glassfrog species in the Neotropics, classified as follows: 430 records corresponding to Vulnerable species, 352 to Endangered species and 204 to Critically Endangered species. North of the Andes, in Ecuador and Colombia, there is the highest concentration of species classified as Critically Endangered (CR) (Figures 2B-2C). However, the majority of threatened glassfrog species (39) are in the Endangered (EN) category, widely distributed throughout the Andes, from the south (Bolivia and Peru) to the north (Ecuador, Colombia and Venezuela). Records of occurrence in the Vulnerable category (19 species) are similarly distributed throughout the Andes. Records of occurrence in Brazil correspond to only one species (*Vitreorana parvula*).

## Species distribution models

**Taxonomic diversity.** Fifty-five percent of the threatened glassfrog species (38 species) were modeled. Subsequently, these models were projected for the two climate change scenarios (SSP245 and SSP370) and for the two general circulation models (CMCC-ESM2 and GISS-E2-1-G).

**Current scenario.** The current model shows that the pattern of richness of threatened species is concentrated north of the Andes and its foothills, specifically in Ecuador and Colombia (Figure 3). This pattern is found mainly in the ecoregions Northwest Andean montane forest, Eastern Cordillera Real montane forest, Magdalena Valley montane forest, and Cauca Valley montane forest that correspond to the Tropical and Subtropical Moist Broadleaf Forests biome (Figure 4). In this model, the average temperature within the potential distribution range of the threatened glassfrog species is 18.4 ºC. The average precipitation is 1,912 mm, the average elevation reaches 1,757 meters, and the total area of distribution of the species covers 304,639 km².

**Scenario SSP245.** The results for the CMCC-ESM2 model shows a more dispersed pattern of taxonomic diversity across the Andes Mountain range and its foothills. In the eastern foothills of the range, particularly in Ecuador near Sumaco National Park, several pixels exhibit high taxonomic diversity. Similarly, in Colombia, regions with high values are observed in the Department of Cauca near Popayán and further north in the Department of Caldas. The ecoregions with the highest species richness in this model largely align with those identified in the current model, with the Northwest Andean Montane Forest emerging as the most species-rich ecoregion. However, there is a notable decline in species richness within the Eastern Cordillera Real Montane Forest ecoregion, accompanied by the extinction of some species in other ecoregions (Figure 4). Within the species distribution range of the CMCC-ESM2 model, the average temperature is 18.5 °C, average precipitation is 1,935 mm, and average elevation is 2,199 meters, covering a total surface area of 197,507 km². In comparison, the GISS-E2-1-G model highlights taxonomic diversity primarily in the southeastern Andes Mountains of Colombia (between 1° and 4° latitude) and the eastern foothills of the northeastern Andes Mountains in Ecuador. The pattern of species richness across ecoregions remains consistent with previous models, again identifying the Northwest Andean Montane Forest as the ecoregion with the highest species richness. For this model, the average values within the species distribution range are slightly different: temperature 18.3 °C, precipitation 1,976 mm, and elevation 2,248 meters. The predicted area for the distribution of threatened species covers 205,827 km², which is 8,320 km² more than the area estimated by the CMMC-ESM2 model.

**Scenario SSP370.** The results for the CMCC-ESM2 model shows that the distribution pattern is like that observed in previous models, with the highest taxonomic diversity concentrated in the northern Andes and its foothills. In Ecuador, pixels with high values are identified in the eastern foothills of the mountain range, specifically in the Cayambe-Coca and Sumaco Napo-Galeras National Parks, as well as to the west of the mountain range. On the other hand, in Colombia, pixels with high values are observed in the Department of Cauca, near the Puracé National Natural Park, and south of the Farallones de Cali National Natural Park. Relevant areas are also detected in the center-west of the country, particularly in the Department of Caldas and the Department of Antioquia. However, this model projects a decline in habitat suitability for glassfrogs in southern regions, particularly in Peru and Bolivia. The Northwest Andean Montane Forest ecoregion continues to harbor the highest number of threatened glassfrog taxonomic diversity. Additionally, this is the only model in which species extinction is observed in the Magdalena Valley dry forests ecoregion (Figure 4). In terms of average values, the temperature is 18.7 ºC, precipitation is 1,877 mm and elevation is 2,197 meters. The total area predicted by the model is 149,892 $km^2$. Finally, the GISS-E2-1-G model predicts a higher richness in taxonomic diversity in southern Colombia, particularly in the departments of Cauca and Nariño. Some of the pixels with high richness values are in protected areas such as the Munchique National Natural Parks and the Doña Juana-Cascabel Volcanic Complex. Likewise, in the eastern foothills of the Andes Mountains in Ecuador, between Cayambe-Coca and Sumaco National Parks, a pixel with high species richness has been identified. According to previous models, the ecoregion that will harbor the highest number of threatened species is the Northwest Andean Montane Forest, followed by the Eastern Cordillera Real Montane Forests ecoregion (Figure 4). In this model, the average temperature within the predicted distribution range is 17.9 °C, the lowest value compared to previous models. The average precipitation is 2,013 mm and the average elevation is 2,232 m. In addition, the total predicted distribution area is 194,701 $km^2$, which represents an increase of 44,809 $km^2$ compared to the previous model, CMCC-ESM2. The values for temperature, precipitation, elevation, and surface area for each species of threatened glassfrog are presented in Supplemental Table S3. While the minimum and maximum values of these variables for each GCM in each SSP are provided in Figure 5.

## Projected species extinction

Our modeling results suggest that between 2061-2080, a total of twelve threatened glassfrog species would lose suitable conditions for survival under at least one General Climate Model (GCM) and one Shared Socio-economic Pathway (SSP). Of these species, six are projected to be extinct under both GCM and SSP (Table 2). These species (*Centrolene altitudinalis*, *Centrolene condor*, *Hyalinobatrachium duranti*, *Nymphargus lasgralarias*, *Nymphargus prasinus* and *Vitreorana helenae*) are distributed in northern South America, inhabiting five ecoregions, ranging in elevation from 89 to 3,680 m. In evolutionary perspective, *Vitreorana helenae* is the species with the longest evolutionary time, evolving for approximately 12 million years. It is currently categorized as Vulnerable (VU) and inhabits the Guiana Highlands Moist Forests, Guianan Savanna and Negro-Branco Moist Forests ecoregions. In contrast, *Centrolene altitudinalis* is the species with the shortest evolutionary time, with about 2.9 million years of evolution. This species is classified as Endangered (EN), and its distribution is restricted to the Mérida Mountain range in Venezuela.

## Spatial phylogenetic diversity

**Current scenario.** The map resulting from the residuals of the Locally Estimated Scatterplot Smoothing between PD ~ TD shows that the highest recent speciation events and/or low dispersal rates (negative residuals) are mainly concentrated in northern Ecuador, specifically in the eastern (Eastern Cordillera Real montane forests) and western (Northwest Andean montane forests) foothills of the Andes. Some pixels with similar characteristics are also heterogeneously distributed in regions of Venezuela (Guianan Highlands moist forests and Guianan piedmont moist forests), Colombia (Magdalena-Urabá moist forests and Eastern Cordillera Real montane forests) and Peru (Peruvian Yungas). However, lowest recent speciation events and/or high dispersal rates (positive residuals) of threatened glassfrogs are mostly distributed in Colombia (Northwest Andean montane forests, Northern Andean páramo, Magdalena Valley montane forests and Cauca Valley montane forests) and Venezuela (Venezuelan Andes montane forests and La Costa xeric shrublands) (Figure 6).

**Scenario SSP245.** For the CMCC-ESM2 model the map of residuals shows that the negative residuals are mainly concentrated in northern Ecuador, specifically in the western foothills (Northwest Andean montane forests). Similarly, some pixels are identified in the eastern foothills of the Eastern Cordillera Real Montane Forests ecoregion extending from southern Ecuador to southern Colombia. Positive residuals are mostly distributed in Colombia, along the Central Cordillera and north of the Eastern Cordillera. The GISS-E2-1-G model predicts a similar pattern, although more dispersed. The map of the residuals shows that most pixels with negative values are located along the Andes of Ecuador from north to south, and a few pixels in southern Colombia (Department of Nariño). While the positive residuals are observed in Colombia, and as in the previous model along the Cordillera Central and the Cordillera Oriental. Residuals tending to zero are more evident in the north of South America, especially in Venezuela and Guyana, as well as in the extreme south, in regions such as Peru, Bolivia and Brazil (Figure 6).

**Scenario SSP370.** The map of the residuals of the first CMCC-ESM2 model compared to the previous models shows that the negative residuals are very restricted to northwestern Ecuador (Pichincha province) in the Northwest Andean montane forests ecoregion. We can identify at least two pixels with similar values, one near Sumaco National Park (Ecuador) and the other, south of the Reserva Forestal Protectora de la Cuenca Alta del Río Mocoa (Colombia). The positive residuals for this model suggest that they are distributed according to the previous models (in the Cordillera Central and north of the Cordillera Oriental, Colombia), although with less intensity. Finally, the residual map of the GISS-E2-1-G model shows that the negative residuals are distributed on both sides of the foothills of the Andes in Ecuador, in a wider distribution compared to the previous model. The model also identifies certain pixels in southern

Colombia, in the departments of Cauca and Nariño, within the Eastern Cordillera Real montane forest ecoregion, that present negative residuals. Nevertheless, the positive residuals are mostly concentrated in the north of the Central Cordillera (Northwest Andean montane forests and Cauca Valley montane forests) in Colombia. In this model, pixels with values close to zero are even more evident throughout the future distribution of threatened glassfrogs (Figure 6).

Differences between current phylogenetic diversity and GCMs projections show that in the SSP245 scenario, CMCC-ESM2 projects a 34.2% loss of phylogenetic diversity, while GISS-E2-1-G estimates a 22.6% loss. While in the SSP370 scenario, CMCC-ESM2 projects the highest loss (41.3%), and GISS-E2-1-G 24.8%. All models together coincide that the phylogenetic diversity of threatened glassfrogs could be significantly reduced in the future.

**Conservation**

**Distribution in protected areas.** In the SSP245 scenario, the CMCC-ESM2 model projects, on average, a 40.7% contraction area of the threatened glassfrog species modeled. The estimated area of distribution is 197,507 km², of which 77,923 km² (39.4%) is within protected areas (Figure 7). Twelve species of glassfrogs will face a complete contraction (100%) in their area of distribution (Table 3). Among the most affected genera, *Vitreorana* will experience the highest contraction in its range, with an approximate reduction of 78.2%. It is followed by *Centrolene*, whose distribution area will be reduced by 66.5%. The other genera will have an area contraction of less than 55%, the only genus that shows a gain in its distribution area is *Sachatamia*. The GISS-E2-1-G model predicts an average area contraction of 49.3% in the distribution of the modeled species, which is an increase of 8.6% compared to the previous model.

According to the estimate, the potential area of distribution covers 205,827 $km^2$, of which 68,675 $km^2$ (33.3%) are within protected areas (Figure 7). Six species will experience a complete contraction (100%) in their ranges. As in the previous model, the genus *Vitreorana* is expected to have a high contraction area of 60.5%, followed by the genus *Ikakogi* (one species, *I. tayrona*) where its distribution will decrease by 77.5%. The other genera will have an area contraction of less than 32%, the only genus that will have a gain in distribution is *Cochranella* (one species, *C. litoralis*).

For the SSP 370 scenario, the CMCC-ESM2 model estimates an average area contraction of 53.8% for the species modeled. The total projected area occupied by the species in the future, according to this model, is 149,892 $km^2$, of which 57,607 $km^2$ (38.4%) are within protected areas (Figure 7). Twelve species will have a complete contraction (100%) in their ranges (Table 3). Coinciding with previous models, the genus *Vitreorana* presents a high percentage of contracted area (80.8%). However, this model predicts that the genus *Centrolene* will have the highest area of contraction in its range, 81.6%. The other genera show significant percentages of area contraction but below the 76% threshold. The GISS-E2-1-G model projects, on average, a 54.5% contraction in the area of distribution of the modeled species. The total area estimated for this projection is 194,701 $km^2$, and 65,218 $km^2$ (33.4%) of this area is within protected areas. Six species will face a complete contraction (100%) in their ranges. In this model, the genus *Ikakogi* (one species, *I. tayrona*) will face the highest area contraction (79.9%), followed by the genus *Vitreorana* with 65.3%. The other genera will have an area contraction below 50%. Only *Cochranella* (one species, *C. litoralis*) will have a gain in distribution.

**Evolutionarily Distinct and Globally Endangered (EDGE)**

The species with the highest EDGE value (4.09) is *Centrolene geckoidea*, which inhabits the northern Andes, between Ecuador and Colombia. This value indicates that it is the species with the highest conservation priority due to its evolutionary uniqueness and critical risk of extinction. It is followed by *Centrolene charapita* (3.86), which is restricted to southern Ecuador and northern Peru. *Nymphargus mixomaculatus* (3.72) comes next, with a distribution restricted to the province of Huánuco, Peru. The other species have values less than or equal to 3.71 (Figure 8A; Table 2).  The species with the lowest EDGE value (1.9) is *Centrolene sabini*, which is recorded only in Paucartambo province, Peru. This value suggests that, despite being classified as Vulnerable (VU), it has a low evolutionary distinction.

The distribution pattern of threatened glassfrog species according to the Evolutionarily Distinct and Globally Endangered (EDGE) index shows that the pixels with the highest values (~ 14 Ma) are located in northern South America (Ecuador and Colombia), in the ecoregion of Northwest Andean montane forests (Figure 8B). In Ecuador, they are located in the eastern and western foothills of the northern Andes, specifically in the provinces of Pichincha and Napo. In Colombia, they are located in the department of Huila, near the Puracé National Natural Park, and in the north, in the central mountain range, in the departments of Caldas and Antioquia. These locations indicate that evolutionarily unique and highly threatened species inhabit these areas. The other pixels have lower EDGE values and are distributed over most of South America, from Venezuela to Brazil (Figure 8B).

# DISCUSSION

## Species distribution models

One of the main limitations in the application of distribution models is the lack of species occurrence data, which can lead to a reduction in model accuracy and higher uncertainty in predictions, depending on the modeling algorithms (Wisz et al., 2008). Specifically in the case of the threatened glassfrogs, only 55% of the 69 species were modeled because the remaining species had very few occurrence records. This also enabled us to identify information gaps in the Neotropics, where threatened glassfrog species are distributed. For example, most of the species with few records are found in Venezuela, Peru and Bolivia, countries where there are also few biodiversity databases or open access information. This highlights the urgent need to implement efforts to generate and obtain open access and high-quality data in these countries (Canhos et al., 2015; Bermudez et al., 2022). Besides, SDMs predict the potential distribution of a species based on its climatic niche (Naimi & Araújo, 2016). These predictions alone are very useful, as they allow to elucidate and provide a panorama with more evidence on species distributions. However, it is also important to take into account models such as deforestation, threats and changes in land use (Chowdhury, 2006; Higgins et al., 2012), especially in regions such as the Andes and the Amazon, where habitats face multiple pressures (Sierra et al., 2022; Albert et al., 2023). The integration of several models (mentioned above) with climate niche models allows the generation of more complete and useful future scenarios for conservation.

## Species extinction

Differences between GCMs and SSPs have led to some variations in projections of the future distribution of threatened glassfrogs in the Neotropics (previous section). One of these differences relates specifically to projections of absolute loss of climatic niche conditions for some species, i.e. their extinction. This phenomenon is based on the niche contraction hypothesis, which suggests that as a species' niche contracts, it becomes increasingly difficult for it to survive and adapt to the new conditions.  In extreme cases, if it is unable to recolonise other areas or adapt quickly to changes, this process can lead to its extinction (Scheele et al., 2017). In fact, the projections of our models are so radical that they show that in the future (2061-2080), species that will go extinct will simply not have a chance to recolonise other areas or adapt quickly to changing climatic conditions in their niche. This is because the effects of climate variability will be drastic, especially in the Andes and the Amazon River basin (Menéndez-Guerrero et al., 2020).  It is important to mention that our models agree that at least six species will lose their climatic niche in both GCMs and SPPs for the period (2061-2080). These species have a restricted distribution and are endemic to Venezuela, Colombia and Ecuador, and are mainly associated with mountain systems (i.e. Cordillera de Mérida, Cordillera Occidental, Guiana Shield and Cordillera del Cóndor).  Also, this process may ultimately be constrained by climatic niche conservatism, as species with limited capacity to evolve their climatic tolerances must rely on niche tracking. If dispersal is insufficient, they may face extinction due to their inability to reach suitable habitats in time (Hutter et al., 2013). On the other hand, the modelled species that will survive tend to increase their elevational range in search of areas with more favorable climatic conditions for their survival, which is consistent with previous studies (Forero-Medina et al., 2011; Tiberti et al., 2021; Souza et al., 2023).

**Conservation implications**

The results obtained have enabled the identification of both current and future areas (climatic refugia) that are of fundamental importance and priority for the conservation of the threatened glassfrogs, as well as for biodiversity in general, considering that these species serve as a model organism (Hopkins 2007). This identification of conservation areas is supported by a robust approach, as the taxonomic diversity and, complementarily, the phylogenetic diversity of threatened glassfrog species have been assessed for current and future scenarios. It is important to emphasise that the phylogenetic diversity analyses and the Evolutionarily Distinct and Globally Endangered (EDGE) index have allowed the identification of key species for urgent conservation action due to their evolutionary relevance. In addition to species, there are certain areas with high EDGE scores, which coincide with the EDGE zones of Pipins et al. (2024), where patterns of high distinctiveness and extinction risk are observed mainly in amphibians.

Nevertheless, these areas, which have been identified as key to the survival of glassfrogs, need to be placed under a conservation scheme (Le Saout et al., 2013). Our results suggest that in future scenarios, approximately 36% of the distribution of threatened glassfrogs will be found within a protected area. We expect that increasing the proportion of glassfrog distribution within protected areas will be challenging due to the inherent threats already evidenced, such as climate change, habitat loss and fragmentation caused by changes in land use (Ochoa-Ochoa and Velasco, 2024).

## CONCLUSIONS

Most endangered glassfrog species are distributed in the Andes, from Peru to Colombia. We found a gap in the information on the occurrence records of glassfrogs, mainly in Venezuela, Peru and Bolivia, which paradoxically harbor endemic species at high risk of extinction. Our current and future distribution models suggest that the northern Andes of Ecuador and Colombia, especially the Northwest Andean Montane Forests ecoregion, will be an important refuge for the taxonomic and phylogenetic diversity of these species, despite the drastic climatic changes that part of the Andes and the Amazon basin are expected to face. In addition, six species are projected to become extinct according to the two General Circulation Models (GCMs) and the two Shared Socio-economic Pathways (SSPs) for 2061-2080 *Centrolene altitudinalis*, *Centrolene condor*, *Hyalinobatrachium duranti*, *Nymphargus lasgralarias*, *Nymphargus prasinus* and *Vitreorana helenae*. Furthermore, under the SSP245 scenario, an average loss of 28.4% of the phylogenetic diversity among threatened glassfrogs is projected, whereas under the SSP370 scenario, the average loss could increase to 33%. From an evolutionary and conservation perspective, based on the Evolutionarily Distinct and Globally Endangered (EDGE) index, *Centrolene geckoidea* and *Centrolene charapita* are keystone species for conservation due to their evolutionary history. This means that the loss of these lineages would be irreplaceable, as they have no close relatives and have evolved in isolation for millions of years. In contrast, the other glassfrog species modelled tend to increase their elevation range but show a decrease in their distribution area. Less than 36% of their projected range is within protected areas; since the survival of species is linked with elevational migrations, the expansion of protected areas, considering elevation gradients and corridors, is key.

## ACKNOWLEDGEMENTS

To the people and institutions that provided records of species occurrences: Fernando Rojas-Runjaic (Museo de Historia Natural La Salle), Ignacio de la Riva and Marta Calvo (Museo Nacional de Ciencias Naturales), Luis A. Coloma (Centro Jambatu), Mario H. Yánez-Muñoz (Instituto Nacional de Biodiversidad), Sandra P. Galeano (Colección de Anfibios del Instituto Humboldt), Santiago Castroviejo-Fisher (Universidad de Sevilla). Also, to Jaime Culebras for providing good photographic material of glassfrogs used in the illustrations of the figures. Special thanks to Mario H. Yánez-Muñoz for his review prior to the manuscript, whose invaluable knowledge, together with his ideas and suggestions, contributed significantly. To Garrison Ferone, Amaru Rubio, Gabriela Mena, Evanna Jaramillo and to each person who struggles to conserve biodiversity from their space.

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## Tables and Figures legend

**TABLE 1:** Differences between average temperature and precipitation values by threat category for each global climate models (GCMs) and Shared Socio-economic Pathways (SSPs).

**TABLE 2:** Species projected to become extinct by 2061–2080 based on the SDM, values for each variable represent present conditions. (*) Represent species that will become extinct in both global climate models (GCMs) and Shared Socio-economic Pathways (SSPs).

**TABLE 3:** Percentage of area of contraction of species modeled. The table includes the Evolutionarily Distinct and Globally Endangered (EDGE) index.

**FIGURE 1:** Difference between Global Climate Models (GCMs) and Shared Socio-economic Pathways (SSP) by 2061-2080, with respect to current climate conditions. **A.** Temperature and **B.** Precipitation. Dark gray dots show records of occurrences of threatened glassfrogs.

**FIGURE 2:** **A.** Phylogeny and estimated divergence times of threatened glassfrogs (Vulnerable, Endangered and Critically Endangered). **B.** Map of threatened species occurrence records **C.** Number of glassfrog species by threat IUCN category.

**FIGURE 3:** Current and future distribution pattern of taxonomic diversity (TD) of threatened Neotropical glassfrogs species.

**FIGURE 4:** **A.** Number of threatened glassfrog species by ecoregion, according to the different global climate models (GCMs) and Shared Socio-economic Pathways (SSPs). Table S4 (supplemental material) details the species present in each ecoregion, together with the corresponding number of species. **B.** Distribution map of the biomes encompassing the ecoregions, highlighting the geographic areas corresponding to the glassfrog species in each ecoregion.

**FIGURE 5:** Boxplots of variables for the current and future distributions of threatened glassfrogs for each global climate models (GCMs) and Shared Socio-economic Pathways (SSPs). Temperature (min-max), Precipitation (min-max), Elevation (min-max) and Surface logarithm. Letters on the x-axis correspond to GCMs: **a** = Current, **b** = CMCC-ESM2 SSP 245, **c** = GISS-E2-1-G SSP 245, **d** = CMCC-ESM2 SSP 370, and **e** = GISS-E2-1-G SSP 370. Detailed values for each species are provided in Table S3 (supplemental material).

**FIGURE 6.** Residuals between phylogenetic diversity (PD) and taxonomic diversity (TD) of threatened Neotropical glassfrogs, where positive residuals indicate few recent speciation events and high dispersal rates, while negative residuals suggest many recent speciation events and/or low dispersal rates.

**FIGURE 7.** Area inside and outside protected areas for the current and future distribution of threatened glassfrogs. Protected areas were obtained from the World Database on Protected Areas (WDPA).

**FIGURE 8. A.** Phylogeny of threatened glassfrogs based on Evolutionary Distinctiveness and Global Endangerment (EDGE). **B.** Distribution of threatened glassfrogs evolutionary history.

# TABLES

## TABLE 1

| | SSP 245 | | SSP 370 | | SSP 245 | | SSP 370 | |
|---|---|---|---|---|---|---|---|---|
| | CMCC-ESM2 | GISS-E2-1-G | CMCC-ESM2 | GISS-E2-1-G | CMCC-ESM2 | GISS-E2-1-G | CMCC-ESM2 | GISS-E2-1-G |
| | Temperature º C | | | | Precipitation mm | | | |
| **Critically Endangered** | 2.497 | 2.433 | 2.737 | 2.960 | -78.01 | 172.833 | -145.44 | 208.23 |
| **Endangered** | 2.509 | 2.437 | 2.763 | 2.986 | -123.08 | 187.849 | -195.40 | 238.27 |
| **Vulnerable** | 2.232 | 2.274 | 2.417 | 2.759 | -21.46 | 50.456 | -76.52 | 15.25 |

**TABLE 2**

| Species | IUCN Category | Current distribution | Temperature (ºC) | Evolution time (Ma) | Precipitation (mm) | Elevation (m) | CMCC-ESM2 SSP245 | GISS-E2-1-G SSP245 | CMCC-ESM2 SSP370 | GISS-E2-1-G SSP370 |
|---|---|---|---|---|---|---|---|---|---|---|
| *Centrolene altitudinalis* * | EN | Venezuelan Andes montane forests | 13.8 - 15.8 | 2.9 | 1,000 - 1,090 | 1,735 - 3,544 | Extinction | Extinction | Extinction | Extinction |
| *Centrolene condor* * | EN | Eastern Cordillera Real montane forests | 16.9 - 19.6 | 5.0 | 1,318 - 1,623 | 946 - 2,674 | Extinction | Extinction | Extinction | Extinction |
| *Centrolene medemi* | EN | Cordillera Oriental montane forests<br>Eastern Cordillera Real montane forests<br>Magdalena Valley dry forests | 16.8 - 22.4 | - | 1,872 - 2,509 | 640 - 2,382 | Extinction | - | Extinction | - |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Napo moist forests | | | | | | | | |
| *Centrolene pipilata* | CR | Eastern Cordillera Real montane forests | 16.3 - 18.7 | 3.9 | 2,198 -3,001 | 1,103 - 2,457 | Extinction | - | Extinction | - |
| *Hyalinobatrachium duranti* * | EN | Venezuelan Andes montane forests | 13.7 - 17.4 | 6.7 | 946 - 1,129 | 1,453 - 3,680 | Extinction | Extinction | Extinction | Extinction |
| *Nymphargus balionotus* | EN | Northwest Andean montane forests | 14.3 - 22.2 | 16.4 | 1,564 - 2,706 | 525 - 2,751 | Extinction | - | Extinction | - |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| *Nymphargus bejaranoi* | EN | Bolivian montane dry forests<br>Bolivian Yungas<br>Central Andean puna<br>Southern Andean Yungas | 14.1 - 19 | 9.5 | 652 - 2,262 | 1,080 - 3,596 | Extinction | - | Extinction | - |
| *Nymphargus cariticommatus* | EN | Eastern Cordillera Real montane forests | 12.1 - 21.3 | 8.2 | 1,082 - 1,676 | 864 - 3,517 | Extinction | - | Extinction | - |
| *Nymphargus lasgralarias* * | EN | Northwest Andean montane forests | 15.4 - 18.4 | 7.3 | 1,036 - 2,185 | 1,293 - 2,663 | Extinction | Extinction | Extinction | Extinction |
| *Nymphargus megistus* | EN | Cauca Valley montane forests<br>Northwest Andean montane forests | 12 - 21.5 | 3.6 | 1,729 - 3,035 | 489 - 3,629 | Extinction | - | Extinction | - |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| *Nymphargus prasinus* * | VU | Cauca Valley montane forests<br>Northwest Andean montane forests | 16 - 20 | - | 1,627 - 3,462 | 883 - 2,638 | Extinction | Extinction | Extinction | Extinction |
| *Vitreorana helenae* * | VU | Guiana Highlands moist forests<br>Guianan savanna<br>Negro-Branco moist forests | 21.5 - 25.3 | 12.0 | 1,683 - 2,427 | 89 - 1,401 | Extinction | Extinction | Extinction | Extinction |

**TABLE 3**

| **Species** | **CMCC-ESM2 SSP245** | **GISS-E2-1-G SSP245** | **CMCC-ESM2 SSP370** | **GISS-E2-1-G SSP370** | **EDGE** |
|---|---|---|---|---|---|
| *Centrolene altitudinalis* | 100.0 | 100.0 | 100.0 | 100.0 | 2.69 |
| *Centrolene ballux* | 58.2 | 45.2 | 89.4 | 41.4 | 2.38 |
| *Centrolene buckleyi* | 28.0 | 23.0 | 37.4 | 30.9 | 2.61 |
| *Centrolene condor* | 100.0 | 100.0 | 100.0 | 100.0 | 3.64 |
| *Centrolene geckoidea* | 55.3 | 42.7 | 54.9 | 41.4 | 4.09 |
| *Centrolene heloderma* | 65.3 | 46.2 | 72.8 | 61.9 | 2.72 |
| *Centrolene huilensis* | -25.8 | 76.3 | 74.2 | 65.6 | 2.51 |

| | | | | | |
|---|---|---|---|---|---|
| *Centrolene lynchi* | 72.7 | 58.5 | 85.2 | 68.8 | 2.29 |
| *Centrolene medemi* | 100.0 | 16.2 | 100.0 | -38.7 | - |
| *Centrolene pipilata* | 100.0 | -96.1 | 100.0 | -123.0 | 3.29 |
| *Centrolene quindianum* | 70.7 | -2.2 | 78.9 | 1.5 | - |
| *Centrolene sanchezi* | 89.2 | -74.3 | 75.7 | -64.8 | 3.06 |
| *Centrolene solitaria* | 51.7 | 87.4 | 93.1 | 55.2 | - |
| *Cochranella litoralis* | 27.8 | -248.9 | 15.6 | -256.7 | 3.47 |
| *Hyalinobatrachium duranti* | 100.0 | 100.0 | 100.0 | 100.0 | 3.64 |
| *Hyalinobatrachium esmeralda* | 20.3 | -29.2 | 33.3 | -25.1 | 3.14 |

| | | | | | |
|---|---|---|---|---|---|
| *Hyalinobatrachium guairarepanense* | 45.2 | 60.7 | 52.4 | 81.0 | 3.17 |
| *Hyalinobatrachium orientale* | 54.1 | 43.3 | 59.6 | 41.4 | 3.04 |
| *Ikakogi tayrona* | 48.0 | 77.6 | 42.4 | 80.0 | 3.71 |
| *Nymphargus anomalus* | 90.4 | 49.3 | 83.3 | 66.0 | 2.82 |
| *Nymphargus balionotus* | 100.0 | 84.6 | 100.0 | 89.2 | 3.43 |
| *Nymphargus bejaranoi* | 100.0 | 56.7 | 100.0 | 74.6 | 3.21 |
| *Nymphargus buenaventura* | 29.4 | -21.6 | 21.5 | 19.6 | 3.03 |
| *Nymphargus cariticommatus* | 100.0 | 24.5 | 100.0 | 21.0 | 2.80 |

| | | | | | |
|---|---|---|---|---|---|
| *Nymphargus garciae* | 9.0 | 13.3 | 53.7 | -67.6 | 3.07 |
| *Nymphargus lasgralarias* | 100.0 | 100.0 | 100.0 | 100.0 | 3.03 |
| *Nymphargus megistus* | 100.0 | 91.1 | 100.0 | 75.6 | 3.52 |
| *Nymphargus pluvialis* | -87.0 | -17.4 | 46.4 | 14.5 | 3.21 |
| *Nymphargus prasinus* | 100.0 | 100.0 | 100.0 | 100.0 | - |
| *Nymphargus rosada* | 49.9 | 45.5 | 88.6 | 74.2 | 2.80 |
| *Nymphargus ruizi* | 7.4 | -8.1 | 77.2 | -20.4 | - |
| *Nymphargus siren* | 21.2 | 8.4 | 24.5 | 3.9 | 2.88 |
| *Rulyrana adiazeta* | 3.3 | 22.1 | 13.1 | 36.9 | 3.08 |

| | | | | | |
|---|---|---|---|---|---|
| *Sachatamia electrops* | -50.0 | 59.6 | 53.4 | 79.4 | 3.42 |
| *Sachatamia punctulata* | -104.5 | 4.7 | -35.0 | -3.3 | 3.03 |
| *Vitreorana antisthenesi* | 94.3 | 71.7 | 88.6 | 41.4 | 3.07 |
| *Vitreorana helenae* | 100.0 | 100.0 | 100.0 | 100.0 | 3.45 |
| *Vitreorana parvula* | 40.3 | 49.4 | 53.9 | 54.6 | 3.07 |

## FIGURES

### FIGURE 1

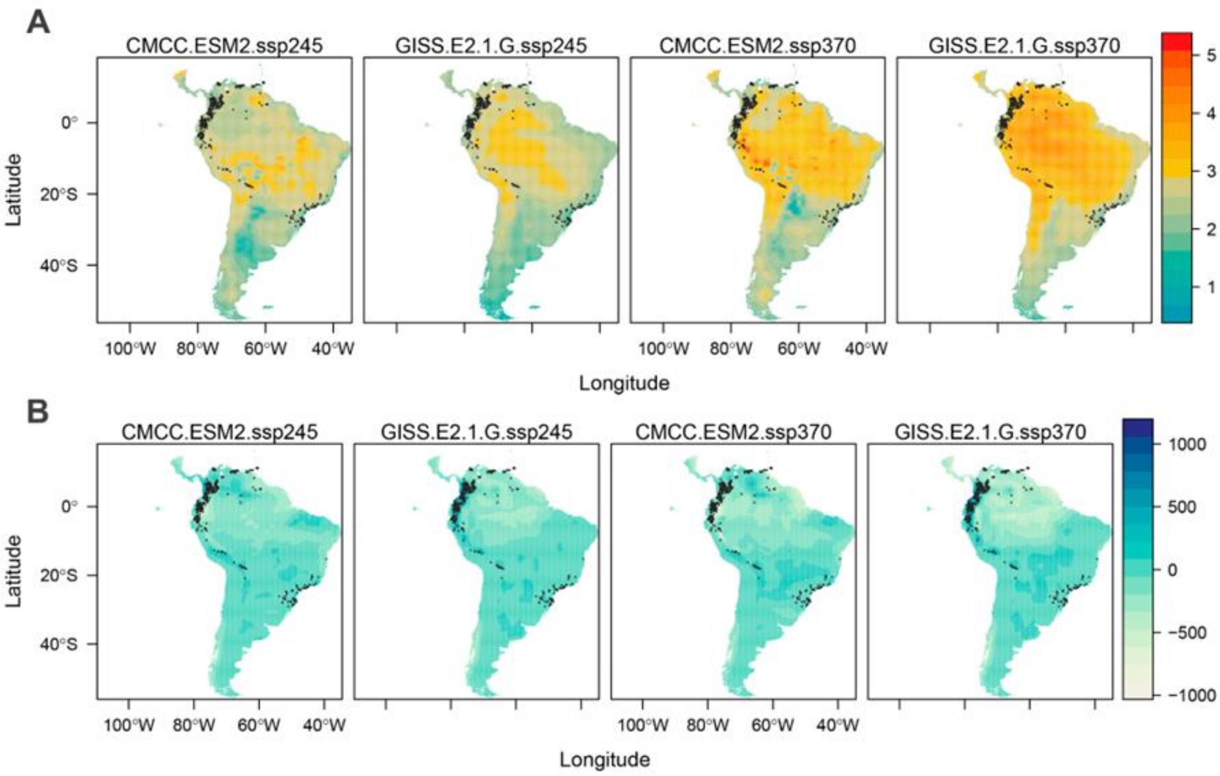
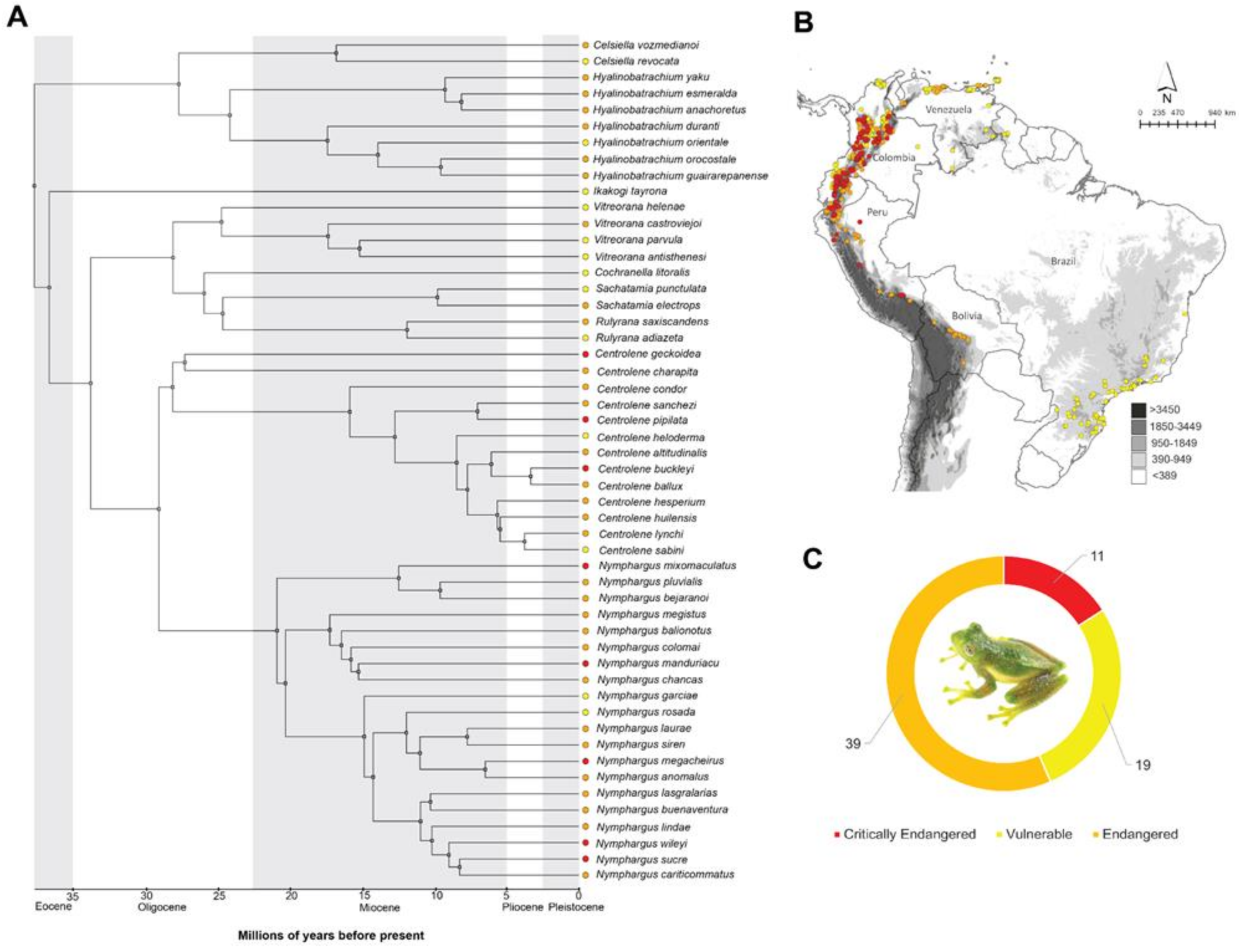
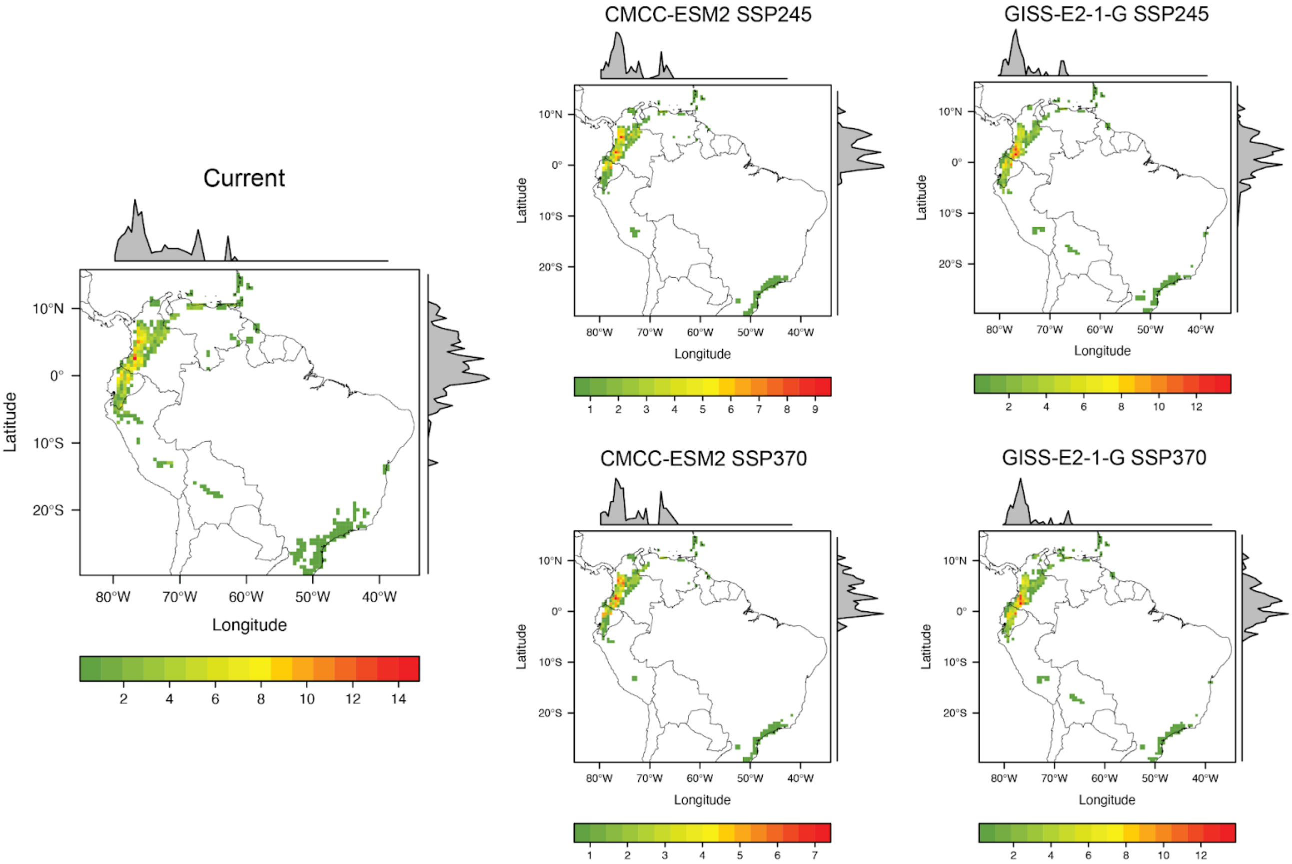


**FIGURE 2**



A
Celsiella vozmedianoi
Celsiella revocata
Hyalinobatrachium yaku
Hyalinobatrachium esmeralda
Hyalinobatrachium anachoretus
Hyalinobatrachium duranti
Hyalinobatrachium orientale
Hyalinobatrachium orocostale
Hyalinobatrachium guairarepanense
Ikakogi tayrona
Vitreorana helenae
Vitreorana castroviejoi
Vitreorana parvula
Vitreorana antisthenesi
Cochranella litoralis
Sachatamia punctulata
Sachatamia electrops
Rulyrana saxiscandens
Rulyrana adiazeta
Centrolene geckoidea
Centrolene charapita
Centrolene condor
Centrolene sanchezi
Centrolene pipilata
Centrolene heloderma
Centrolene altitudinalis
Centrolene buckleyi
Centrolene ballux
Centrolene hesperium
Centrolene huilensis
Centrolene lynchi
Centrolene sabini
Nymphargus mixomaculatus
Nymphargus pluvialis
Nymphargus bejaranoi
Nymphargus megistus
Nymphargus balionotus
Nymphargus colomai
Nymphargus manduriacu
Nymphargus chancas
Nymphargus garciae
Nymphargus rosada
Nymphargus laurae
Nymphargus siren
Nymphargus megacheirus
Nymphargus anomalus
Nymphargus lasgralarias
Nymphargus buenaventura
Nymphargus lindae
Nymphargus wileyi
Nymphargus sucre
Nymphargus cariticommatus
35
30
25
20
15
10
5
0
Eocene
Oligocene
Miocene
Pliocene
Pleistocene
Millions of years before present
B
N
0 235 470 940 km
Venezuela
Colombia
Peru
Brazil
Bolivia
>3450
1850-3449
950-1849
390-949
<389
C
11
19
39
Critically Endangered
Vulnerable
Endangered

**FIGURE 3**



Current
CMCC-ESM2 SSP245
GISS-E2-1-G SSP245
CMCC-ESM2 SSP370
GISS-E2-1-G SSP370
Latitude
Longitude
10°N
0°
10°S
20°S
80°W
70°W
60°W
50°W
40°W

# FIGURE 4

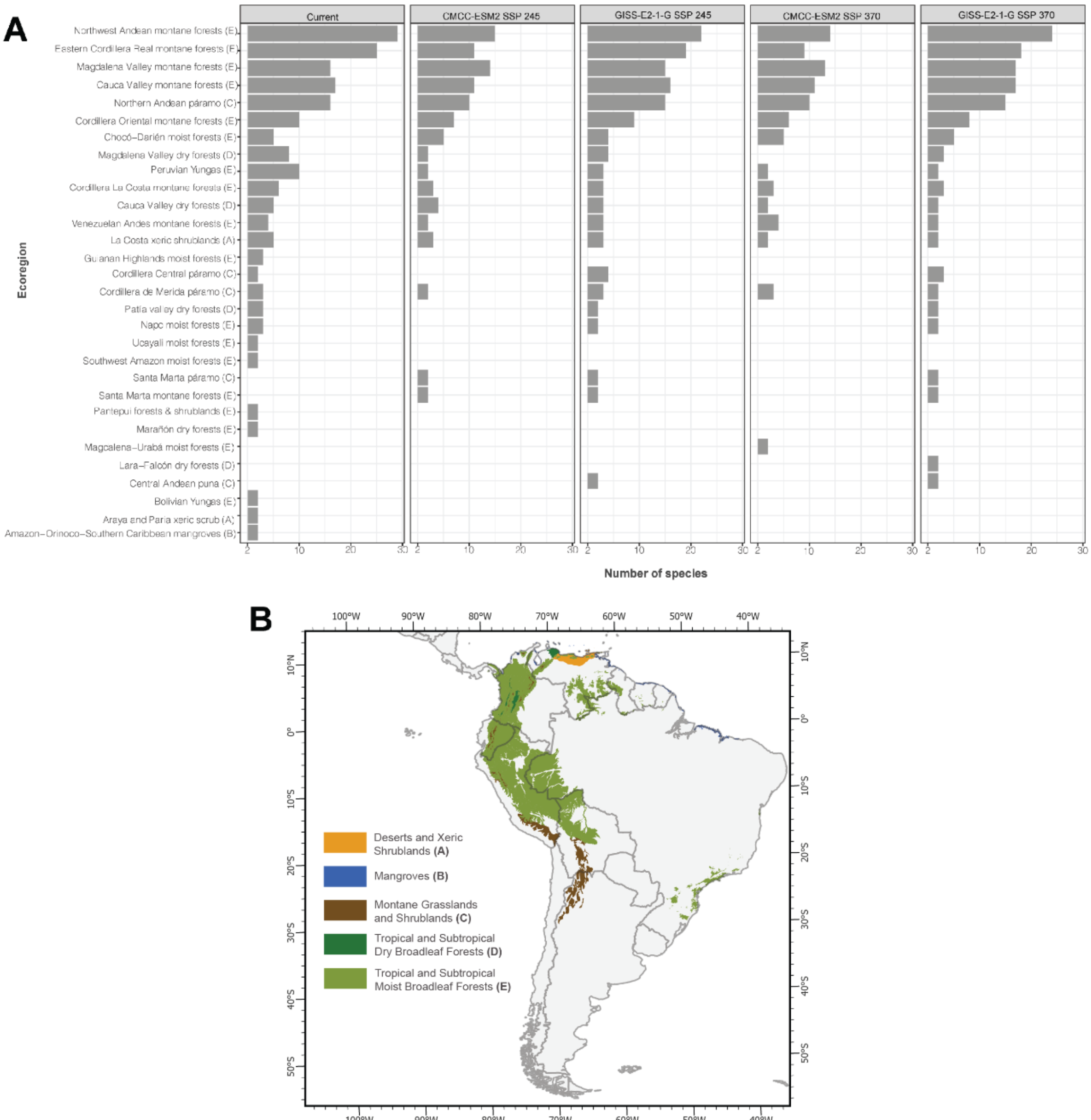

A
Current
CMCC-ESM2 SSP 245
GISS-E2-1-G SSP 245
CMCC-ESM2 SSP 370
GISS-E2-1-G SSP 370
Northwest Andean montane forests (E)
Eastern Cordillera Real montane forests (E)
Magdalena Valley montane forests (E)
Cauca Valley montane forests (E)
Northern Andean páramo (C)
Cordillera Oriental montane forests (E)
Chocó–Darién moist forests (E)
Magdalena Valley dry forests (D)
Peruvian Yungas (E)
Cordillera La Costa montane forests (E)
Cauca Valley dry forests (D)
Venezuelan Andes montane forests (E)
La Costa xeric shrublands (A)
Guianan Highlands moist forests (E)
Cordillera Central páramo (C)
Cordillera de Merida páramo (C)
Patía valley dry forests (D)
Napo moist forests (E)
Ucayali moist forests (E)
Southwest Amazon moist forests (E)
Santa Marta páramo (C)
Santa Marta montane forests (E)
Pantepui forests & shrublands (E)
Marañón dry forests (E)
Magdalena–Urabá moist forests (E)
Lara–Falcón dry forests (D)
Central Andean puna (C)
Bolivian Yungas (E)
Araya and Paria xeric scrub (A)
Amazon–Orinoco–Southern Caribbean mangroves (B)
Ecoregion
2
10
20
30
Number of species
B
100°W
90°W
80°W
70°W
60°W
50°W
40°W
10°N
0°
10°S
20°S
30°S
40°S
50°S
Deserts and Xeric Shrublands (A)
Mangroves (B)
Montane Grasslands and Shrublands (C)
Tropical and Subtropical Dry Broadleaf Forests (D)
Tropical and Subtropical Moist Broadleaf Forests (E)

FIGURE 5

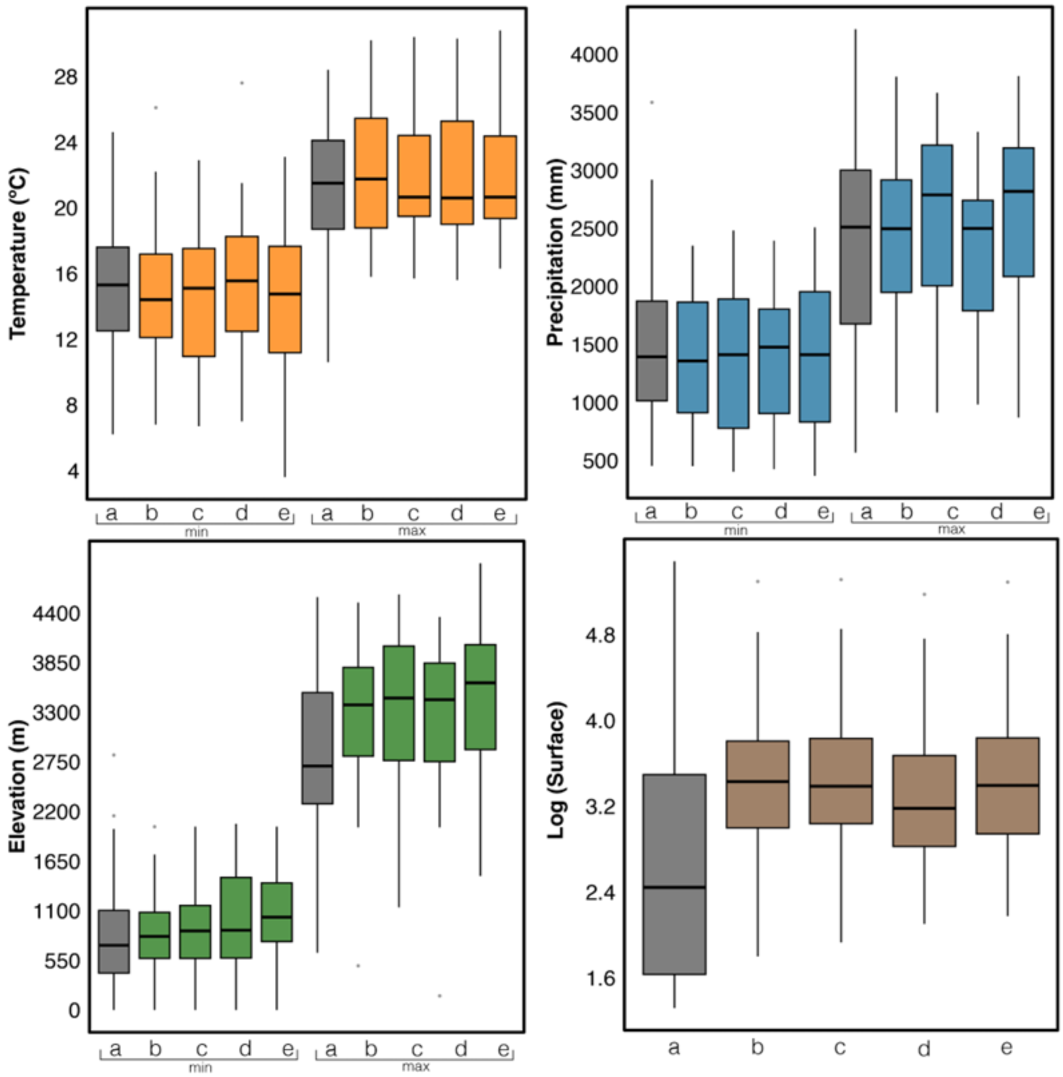
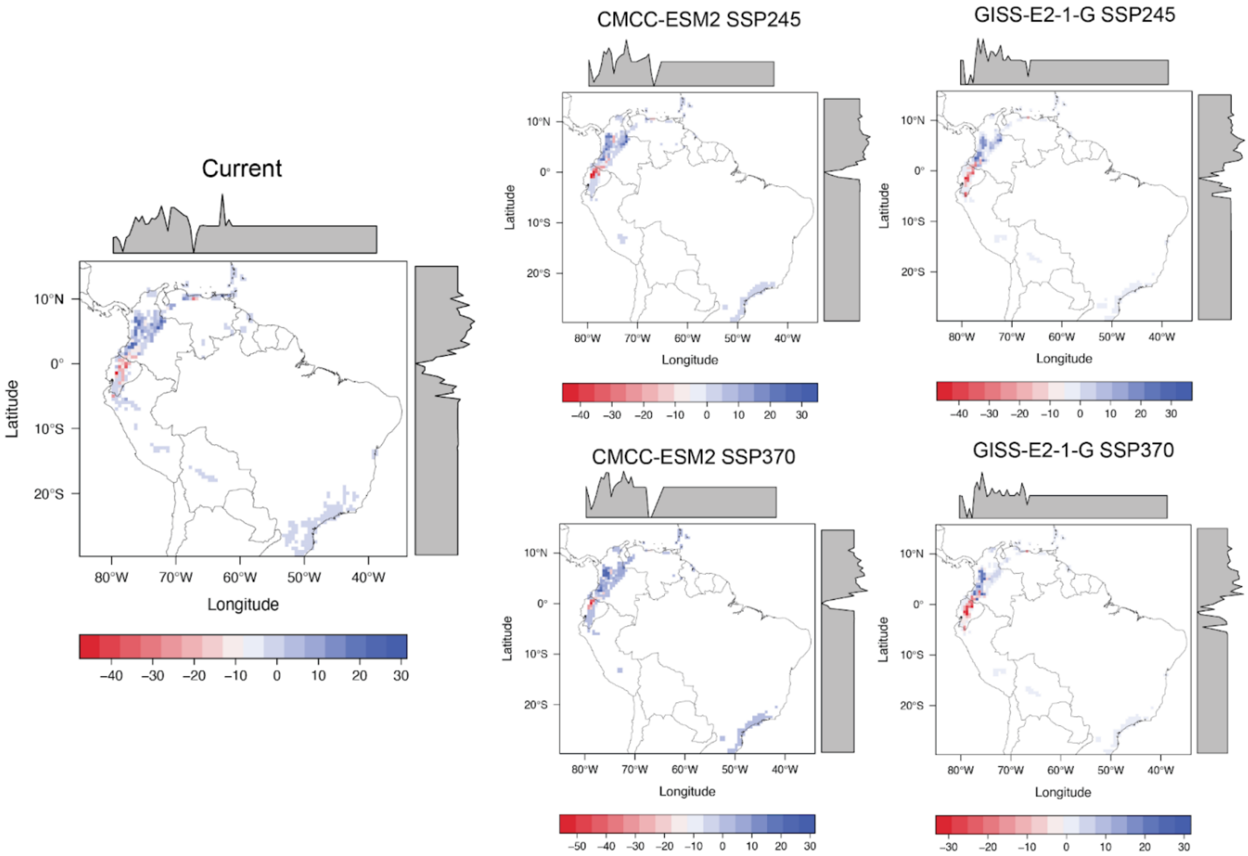
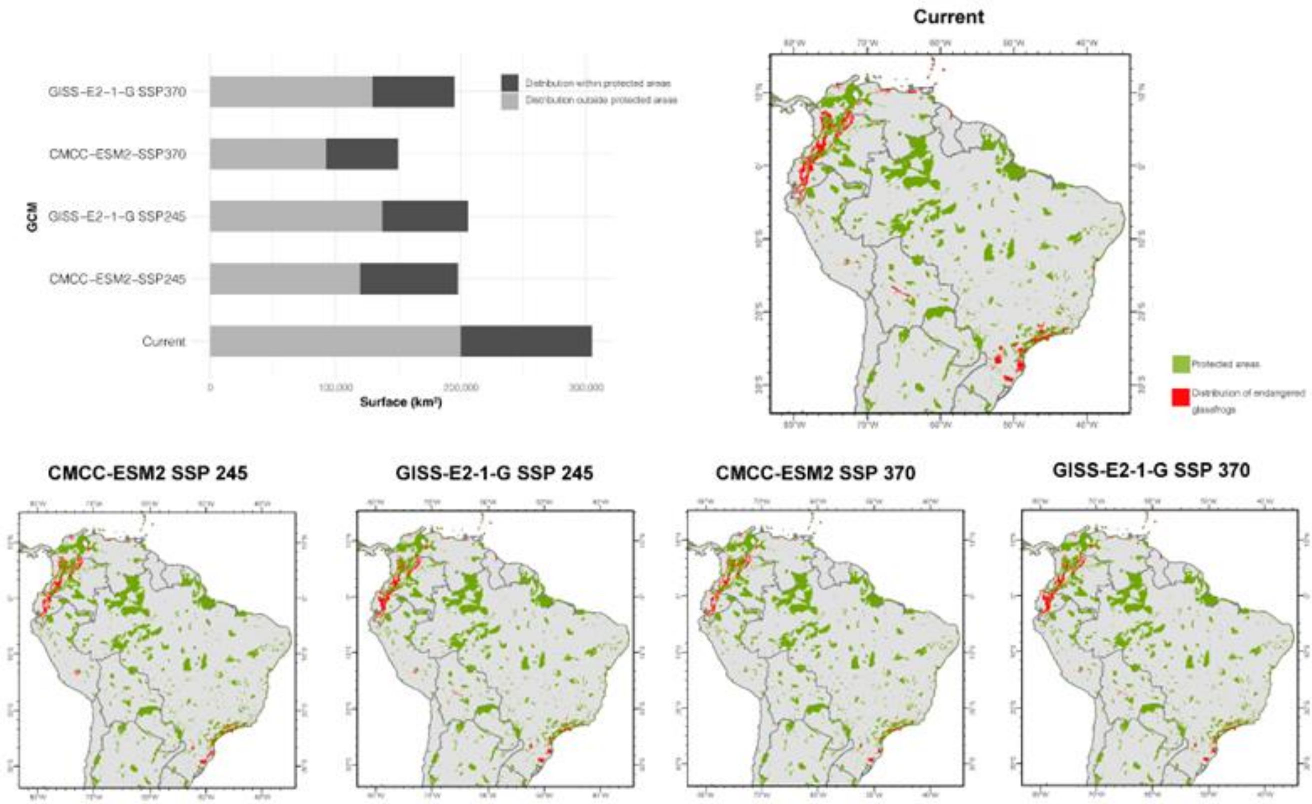

Temperature (ºC)
28
24
20
16
12
8
4
a b c d e a b c d e
min max
Precipitation (mm)
4000
3500
3000
2500
2000
1500
1000
500
a b c d e a b c d e
min max
Elevation (m)
4400
3850
3300
2750
2200
1650
1100
550
0
a b c d e a b c d e
min max
Log (Surface)
4.8
4.0
3.2
2.4
1.6
a b c d e

**FIGURE 6**



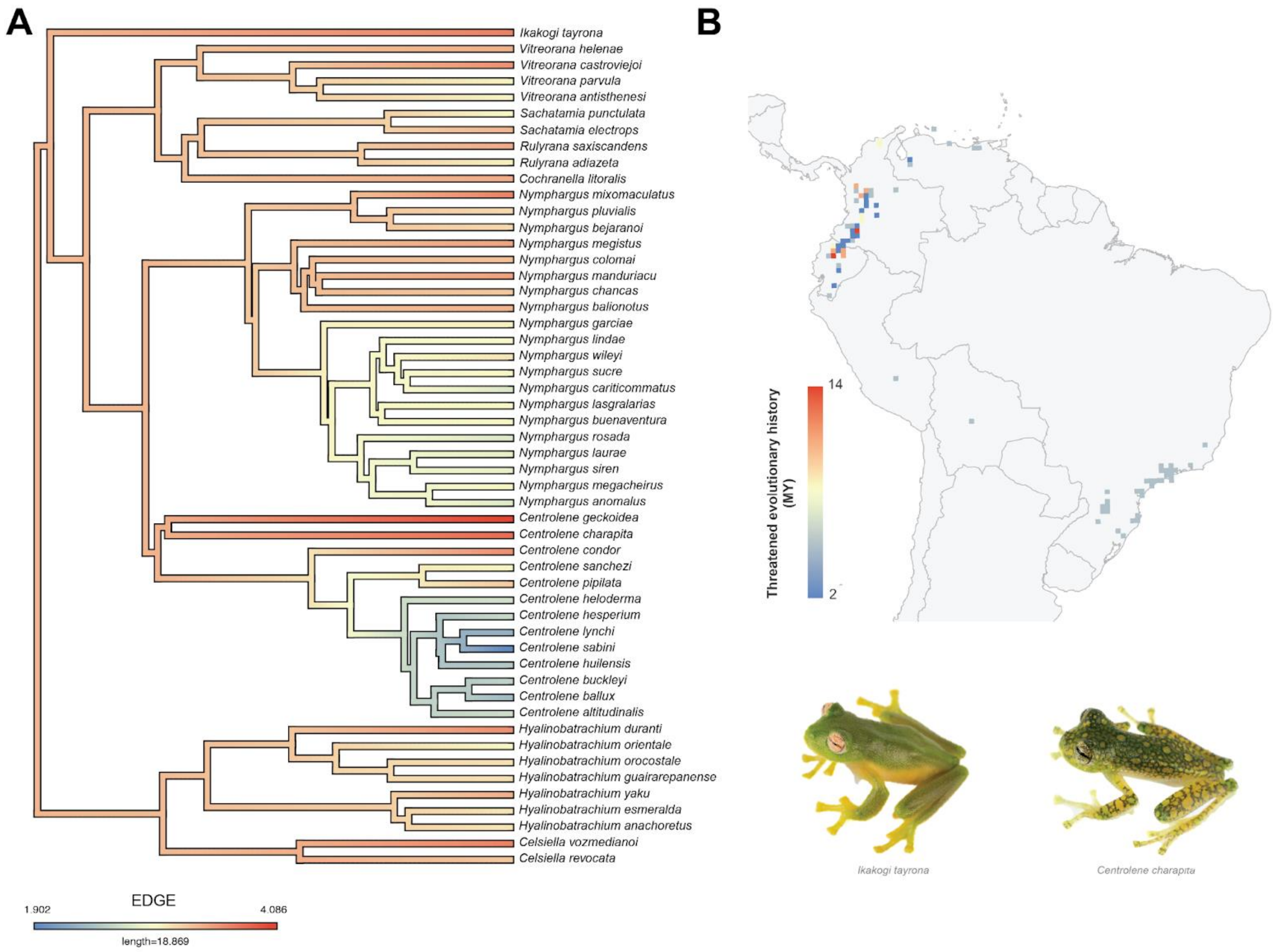
Current
CMCC-ESM2 SSP245
GISS-E2-1-G SSP245
CMCC-ESM2 SSP370
GISS-E2-1-G SSP370
Latitude
Longitude
10°N
0°
10°S
20°S
80°W
70°W
60°W
50°W
40°W
−40
−30
−20
−10
0
10
20
30
−50

# FIGURE 7



Current
GISS-E2-1-G SSP370
CMCC-ESM2-SSP370
GISS-E2-1-G SSP245
CMCC-ESM2-SSP245
Current
GCM
0
100,000
200,000
300,000
Surface (km²)
Distribution within protected areas
Distribution outside protected areas
Protected areas
Distribution of endangered glassfrogs
CMCC-ESM2 SSP 245
GISS-E2-1-G SSP 245
CMCC-ESM2 SSP 370
GISS-E2-1-G SSP 370

**FIGURE 8**


A
Ikakogi tayrona
Vitreorana helenae
Vitreorana castroviejoi
Vitreorana parvula
Vitreorana antisthenesi
Sachatamia punctulata
Sachatamia electrops
Rulyrana saxiscandens
Rulyrana adiazeta
Cochranella litoralis
Nymphargus mixomaculatus
Nymphargus pluvialis
Nymphargus bejaranoi
Nymphargus megistus
Nymphargus colomai
Nymphargus manduriacu
Nymphargus chancas
Nymphargus balionotus
Nymphargus garciae
Nymphargus lindae
Nymphargus wileyi
Nymphargus sucre
Nymphargus cariticommatus
Nymphargus lasgralarias
Nymphargus buenaventura
Nymphargus rosada
Nymphargus laurae
Nymphargus siren
Nymphargus megacheirus
Nymphargus anomalus
Centrolene geckoidea
Centrolene charapita
Centrolene condor
Centrolene sanchezi
Centrolene pipilata
Centrolene heloderma
Centrolene hesperium
Centrolene lynchi
Centrolene sabini
Centrolene huilensis
Centrolene buckleyi
Centrolene ballux
Centrolene altitudinalis
Hyalinobatrachium duranti
Hyalinobatrachium orientale
Hyalinobatrachium orocostale
Hyalinobatrachium guairarepanense
Hyalinobatrachium yaku
Hyalinobatrachium esmeralda
Hyalinobatrachium anachoretus
Celsiella vozmedianoi
Celsiella revocata
EDGE
1.902
4.086
length=18.869
B
14
Threatened evolutionary history (MY)
2
Ikakogi tayrona
Centrolene charapita

**SUPPLEMENTAL MATERIAL**

**TABLE S1:** Source of databases of occurrence data for threatened glassfrog species

| Institution | Responsible person | Number of occurrence record |
|---|---|---|
| Museo de Historia Natural La Salle | Fernando Rojas | 47 |
| Global Biodiversity Information Facility | - | 37 |
| Instituto de Ciencia Naturales | - | 2 |
| Museo Nacional de Ciencias Naturales | Ignacio De la Riva & Marta Calvo | 1 |
| iNaturalist | - | 294 |
| Personal Data Base | Juan M. Guayasamin & Carl R. Hutter | 319 |
| Literature | - | 20 |
| Centro Jambatu de Investigación y Conservación de Anfibios | Luis A. Coloma | 61 |
| Lista Rojas de Anfibios del Ecuador | Mario H. Yánez-Muñoz | 187 |
| Instituto Humboldt | Sandra Galeano | 18 |

**TABLE S2:** Glassfrog sequence information obtained from GenBank for the three mitochondrial genes (12S, 16S and ND1).

| Genus and species | Voucher | Locality | 12S | 16S | ND1 |
|---|---|---|---|---|---|
| Celsiella revocata | MHNLS 17319 | Venezuela: Estado Aragua: Colonia Tovar (10°24'16" N, 67°17'06" W; 1800 m). | EU663379 | EU663019 | EU663113 |
| Celsiella vozmedianoi | MHNLS 17877 | Venezuela: Estado Sucre: Península de Paria, Cerro Humo (10°42' N, 62°37' W; 800 m). | EU663385 | EU663025 | EU663163 |
| Centrolene acanthidiocephalum | UPTC-Am 1250 | Colombia:Departamento de Santander, vertiente occidental de la Cordillera Oriental, Municipio de Charalá, Virolí | OQ450182 | OQ450181 | — |
| Centrolene altitudinalis | MHNLS 17194 | Venezuela: Estado Mérida: Quebrada Albarregas (08°37' N, 71°09' W; 2100 m). | EU663333 | EU662974 | EU663070 |
| Centrolene altitudinalis | MHNLS 17225 | Venezuela: Estado Mérida: Quebrada Albarregas (08°37' N, 71°09' W; 2100 m). | EU663334 | EU662975 | EU663071 |
| Centrolene antioquiensis | NRPS 014 | Colombia: Departamento Antioquia: Municipio Anori: Vereda El Roble, bosque de la Forzosa, 2127 m. | EU663336 | EU662977 | EU663073 |
| Centrolene ballux | QCAZ 40182 | Ecuador: Pichincha: Reserva las Gralarias, road Calacalí- La Independencia, km 72 after Nanegalito, left turn 3.5 km to the west (2075 m) | — | JX126954 | JX187506 |
| Centrolene ballux | QCAZ 40183 (en genbank | Ecuador: Pichincha: Reserva las Gralarias, | KF639754 | HG764783 | HG764783 |

| | | | | | |
|---|---|---|---|---|---|
| | esta como 40196) | road Calacalí- La Independencia, km 72 after Nanegalito, left turn 3.5 km to the west (2075 m) | | | |
| Centrolene buckleyi | KU 178031 | Ecuador: Provincia Imbabura: Near Lago Cuicocha (00º18'09" N, 78°36'67’’ W; 3010 m). | EU663338 | EU662979 | EU663075 |
| Centrolene buckleyi | MZUTI 763 | Ecuador: Provincia Napo: Parroquia Oyacachi: trail from Oyacachi to Chaco (0.2189 S, 78.044 W, 3012 m) | MH844843 | MH844849 | — |
| Centrolene buckleyi | DHMECN 13828 | Ecuador: Carchi | OR479108 | OR479085 | — |
| Centrolene camposi | MECN 11408 | Ecuador: Azuay, La Enramada | — | — | OQ248676 |
| Centrolene camposi | MECN 11407 | Ecuador: Azuay, La Enramada | OQ225629 | OQ225616 | — |
| Centrolene charapita | MHNC 13933 (AJC 2733) | Peru: Departamento Amazonas: La Oliva (5°18'3.86"S, 78°23'44.57"W; 682 m) | KM068247 | KM068256 | — |
| Centrolene charapita | MNCN 45392 (AJC 2732) | Peru: Departamento Amazonas: Pongo de Rentema, road Bagua-Sara Merisa, stream before La Oliva (05°18'03.9'' S, 78°23'44.5'' W; 664 m) | KF639760 | KF534358 | — |
| Centrolene condor | QCAZ 44896 | Ecuador: Provincia Zamora Chinchipe: Los Encuentros, basecamp Tigre Alto | KF639755 | JX126955 | JX187513 |
| Centrolene condor | QCAZ 72514 | Ecuador: Provincia Zamora Chinchipe: Los Encuentros, basecamp Tigre Alto | — | OQ225617 | OQ248678 |
| Centrolene daidalea | MHUA 3271 | Colombia: Departamento Cesar: Municipio González: Vereda San Cayetano (08˚25'30.1" N, 73˚24'3.4" W; 1600 m; MHUAN 3271). | EU663366 | EU663007 | EU663101 |

| | | | | | |
|---|---|---|---|---|---|
| | | Venezuela: Estado Zulia: Sierra de Perijá (MHNLS 18890) | | | |
| Centrolene elisae | MZUTI 83 | Ecuador: Napo, Yanayacu | MH844840 | MH844846 | — |
| Centrolene elisae | MZUTI 84 | Ecuador: Napo, Yanayacu | MH844841 | MH844847 | — |
| Centrolene elisae | ZSFQ 4228 | Ecuador: Tungurahua, Chamana | OR479117 | OR479099 | — |
| Centrolene ericsmithi | MECN 11406 | Ecuador: Azuay, La Enramada | OQ225628 | — | OQ248674 |
| Centrolene geckoidea | KU 178015 | Ecuador: Provincia Pichincha: 1 km SW San Ignacio (00°26'55'' S, 78°44'52" W; 1920 m). | EU663341 | EU662982 | EU663077 |
| Centrolene heloderma | QCAZ 40200 | Ecuador: Provincia Pichincha: Reserva las Gralarias, road Calacalí-La Independencia, km 72 after Nanegalito, left turn 3.5 km to west, Río Santa Rosa (2100 m) | KF639757 | JX126956 | JX187509 |
| Centrolene hesperia | MHNSM 25802 | Peru: Departamento Cajamarca: Provincia Santa Cruz: Quebrada Chorro Blanco (06°50'49"S, 79°05'13.3W, 1795 m), 3.1 Km NE Monte Seco (air distance). | EU663345 | EU662986 | EU663081 |
| Centrolene huilensis | AMMH 177 | Colombia: Departamento de Huila | OP765509 | OP765513 | — |
| Centrolene hybrida | MAR 347 | Colombia: Departamento Boyacá: Municipio Garagoa: Vereda Ciénega Balvanera: Sitio Reserva Natural El Secreto: Quebrada Las Palmitas, 2000 m. | EU663346 | EU662987 | EU663082 |
| Centrolene kutuku | QCAZ 71386 | Ecuador: Morona Santiago, Santiago de Mendez, San Francisco de Chinimbimi, Cordillera del Kutukú | PP868294 | PP868288 | PP870124 |
| Centrolene lynchi | QCAZ 40192 | Ecuador: Provincia Pichincha: Reserva las | OQ249693 | — | KF639758 |

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| | | Gralarias, road Calacalí-La Independencia, km 72 after Nanegalito, left turn 3.5 km to he west, Río Lucy (1800 m) | | | |
| Centrolene marcoreyesi | ZSFQ 4417 (MRy 547) | Ecuador: Zamora Chinchipe, Estación Científica San Francisco | MH844838 | MH844844 | — |
| Centrolene marcoreyesi | ZSFQ 4418 (MRy 548) | Ecuador: Zamora Chinchipe, Estación Científica San Francisco | MH844839 | MH844845 | — |
| Centrolene marcoreyesi | CJ 11564 | Ecuador: Zamora Chinchipe, Estación Científica San Francisco | OR479118 | OR479094 | — |
| Centrolene marcoreyesi | UTPL 271 | Ecuador: Zamora Chinchipe, Estación Científica San Francisco | OR479119 | OR479095 | — |
| Centrolene marcoreyesi | CJ 12631 | Ecuador: Zamora Chinchipe, Estación Científica San Francisco | OR479120 | OR479096 | — |
| Centrolene marcoreyesi | CJ 11364 | Ecuador: Zamora Chinchipe, Estación Científica San Francisco | OR479121 | OR479097 | — |
| Centrolene muelleri | PV (Pablo Venegas) | Peru: Departamento Amazonas: Chachapoyas: Cataratas de Gokta (6° 1'23.49"S, 77°53'7.53"W; ~2000 m) | KF639759 | JX126958 | HG764785 |
| Centrolene muelleri | CORDIBI 14667 (JD 2011) | Peru: Departamento Amazonas: Puente – Vilcaniza (5°48'52.25" S, 77°50'6.19"W; 1858 m) | — | KM068267 | — |
| Centrolene muelleri (antes huilensis) | QCAZ 37230, 45905 | Ecuador: Provincia Napo: Yanayacu Biological Station (00º41' S, 77º53' W; 2100 m). | — | JX126959 | JX187510 |
| Centrolene notosticta | MAR 510 | Colombia: Departamento Norte de Santander: Municipio La Playa de Belem: Vereda Piritama: Quebrada Piritama, 1800 m | EU663351 | EU662992 | EU663087 |
| Centrolene peristicta | QCAZ 22312 | Ecuador: Provincia Pichincha: Mindo Biology Station | EU663352 | EU662993 | EU663088 |

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| | | (00°04'40.8" S, 78º43'55" W; 1600 m). | | | |
| Centrolene peristicta | QCAZ 40189 | Ecuador: Provincia Pichincha: Reserva Las Gralarias (0.01675 S, 78.73165; 1852 m) | MT225171 | — | MT225126 |
| Centrolene pipilata | KU 178154 | Ecuador: Provincia Napo: Río Salado, 1 km upstream from Río Coca (00°11'30" S, 77°41'59" W; 1420 m). | EU663353 | EU662994 | EU663089 |
| Centrolene sabini | MUSM 28018 | Peru: 13°10’41” S, 71°36’31” W, 2750 m | — | JX126960 | JX187511 |
| Centrolene sabini | MUSM 28017 | | — | JX126961 | JX187512 |
| Centrolene sanchezi | QCAZ 22728 | Ecuador: Provincia Napo: Yanayacu Biological Station (00º41' S, 77º53' W; 2100 m). | EU663337 | EU662978 | EU663074 |
| Centrolene sanchezi | QCAZ 65013 | Ecuador: Provincia Napo: Yanayacu Biological Station (00º41' S, 77º53' W; 2100 m). | OQ225630 | — | OQ248677 |
| Centrolene sanchezi | MECN 10221 | Ecuador: Provincia Napo: Yanayacu Biological Station (00º41' S, 77º53' W; 2100 m). | OQ225626 | — | OQ248671 |
| Centrolene sanchezi | MECN 10222 | Ecuador: Provincia Napo: Yanayacu Biological Station (00º41' S, 77º53' W; 2100 m). | OQ225627 | — | OQ248673 |
| Centrolene savagei | MHUA 4094 | Colombia: Departamento Antioquia: Municipio Anorí: Vereda El Retiro: Finca El Chaquiral (06°58' N, 75˚7.83' W, 1732 m). | EU663380 | EU663020 | EU663114 |
| Centrolene venezuelense | EBRG 5244 (MHNLS/ADN 17340) | Venezuela: Estado Mérida: Páramo de Maraisa (08°50'31" N, 70°43'52" W; 2450 m; EBRG 5244). | EU663359 | EU663000 | EU663094 |

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| Centrolene venezuelense | MHNLS 16497 | Venezuela: Estado Mérida: Cordillera de Mérida (MHNLS 16497). | EU663360 | EU663001 | EU663095 |
| Centrolene zarza | QCAZ 58687 | Ecuador: Zamora Chinchipe Province, Refugio de Vida Silvestre El Zarza, quebrada “Las Mariposas” (3.8341°S, 78.5458°W) | PP868292 | PP868286 | PP870121 |
| Centrolene zarza | QCAZ 58686 | Ecuador: Zamora Chinchipe Province, Refugio de Vida Silvestre El Zarza, quebrada “Las Mariposas” (3.8341°S, 78.5458°W) | PP868291 | PP868285 | PP870120 |
| Centrolene zarza | QCAZ 58688 | Ecuador: Zamora Chinchipe Province, Refugio de Vida Silvestre El Zarza, quebrada “Las Mariposas” (3.8341°S, 78.5458°W) | — | PP868287 | PP870122 |
| Centrolene zarza | QCAZ 69118 | Ecuador: Zamora Chinchipe Province, Refugio de Vida Silvestre El Zarza, quebrada “Las Mariposas” (3.8341°S, 78.5458°W) | PP868293 | — | PP870123 |
| Centrolene zarza | DHMECN 10223 | Ecuador: Zamora Chinchipe Province, Refugio de Vida Silvestre El Zarza, quebrada “Las Mariposas” (3.8341°S, 78.5458°W) | PP868290 | — | PP870119 |
| Centrolene zarza | ZSFQ 2631 | Ecuador: Zamora Chinchipe Province, Refugio de Vida Silvestre El Zarza, quebrada “Las Mariposas” (3.8341°S, 78.5458°W) | — | — | PP870125 |
| Centrolene zarza | MUTPL 932 | Ecuador: Zamora Chinchipe Province, Refugio de Vida Silvestre El Zarza, quebrada “Las Mariposas” (3.8341°S, 78.5458°W) | OP751417 | OP751400 | — |
| Centrolene zarza | MUTPL 933 | Ecuador: Zamora Chinchipe Province, | OP751418 | OP751401 | — |

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| | | Refugio de Vida Silvestre El Zarza, quebrada "Las Mariposas" (3.8341°S, 78.5458°W) | | | |
| Centrolene zarza | MUTPL T22 | Ecuador: Zamora Chinchipe Province, Refugio de Vida Silvestre El Zarza, quebrada "Las Mariposas" (3.8341°S, 78.5458°W) | — | OP751402 | — |
| Centrolene savagei (aff) | MAR 1152 | Colombia: Departamento del Chocó: Municipio de Unguia: Corregimiento de Balboa: Comunidad Eyakera, rio Tanelita, estribaciones del Cerro Tacarcuna, 260 m | KM068295 | KM068295 | — |
| Centrolene sp. | ZSFQ 4423 | Zamora Chinchipe | OR479127 | OR479105 | — |
| Centrolene sp. | ZSFQ 4422 | Zamora Chinchipe | OR479126 | OR479104 | — |
| Centrolene sp. | ZSFQ 621 | Tungurahua | OR479128 | OR479106 | — |
| Centrolene cf. elisae | ZSFQ 2134 | Tungurahua | OR479116 | OR479098 | — |
| Centrolene cf. venezuelense | IAvH_Am_17407 | Colombia | OR479125 | OR479103 | — |
| Centrolene cf. venezuelense | IAvH_Am_17403 | Colombia | OR479124 | OR479102 | — |
| Centrolene cf. venezuelense | IAvH_Am_17410 | Colombia | OR479123 | OR479101 | — |
| Centrolene cf. venezuelense | IAvH_Am_17401 | Colombia | OR479122 | OR479100 | — |
| Centrolene cf. venezuelense | MAR 371 (170) | Colombia: Departamento Cundinamarca: Municipio Fomeque: Sitio Monte Redondo: Parque Nacional Chingaza, 3035 m. | EU663339 | EU662980 | EU663069 |
| Chimerella corleone | MVTIS28547 | Peru: Departamento San Martin: Provincia San Martin: road Tarapoto-Yurimaguas stream before San Jose | OQ888212 | OQ888203 | — |

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| | | (6°25'2.59" S, 76°17'21.33" W; 610 m) | | | |
| Chimerella corleone | CORBIDI10466 | Peru: Departamento San Martin: Provincia San Martin: road Tarapoto-Yurimaguas stream before San Jose (6°25'2.59" S, 76°17'21.33" W; 610 m) | ON614214 | ON613533 | — |
| Chimerella corleone | CORBIDI 10465 | Peru: Departamento San Martin: San José, Cainarachi valley (6°25'2.59"S, 76°17'21.33"W; 610 m) | — | KM068275 | — |
| Chimerella corleone | CORBIDI 10467 | Peru: Departamento San Martin: San José, Cainarachi valley (6°25'2.59"S, 76°17'21.33"W; 610 m) | — | KM068274 | — |
| Chimerella mariaelenae | QCAZ 21252 | Ecuador: Provincia de Tungurahua: near Río Negro (01˚24' S, 78˚15' W, 1423 m), on the Río Negro–Río Verde road | — | — | MT225127 |
| Chimerella mariaelenae | QCAZ 31729 | Ecuador: Provincia Tungurahua: Stream on the Río Negro–Río Verde road (01°24'24" S, 78°15'19" W; 1423 m). | EU663350 | EU662991 | EU663086 |
| Chimerella mariaelenae | MVTIS28553 | Ecuador: Provincia Tungurahua: Stream on the Río Negro–Río Verde road (01°24'24" S, 78°15'19" W; 1423 m). | OQ888214 | OQ888205 | — |
| Chimerella mariaelenae | MVTIS28546 | Ecuador: Provincia Tungurahua: Stream on the Río Negro–Río Verde road (01°24'24" S, 78°15'19" W; 1423 m). | OQ888213 | OQ888204 | — |
| Chimerella mira | MUSM40278 | Peru: Río Patay Rondos, Provincia Leoncio Prado, Departamento Huánuco | — | — | — |
| Chimerella mira | FGZC6233 | Peru: Río Patay Rondos, Provincia Leoncio Prado, Departamento Huánuco | OQ888216 | OQ888207 | — |

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| Chimerella mira | FGZC6215 | Peru: Río Patay Rondos, Provincia Leoncio Prado, Departamento Huánuco | OQ888215 | OQ888206 | — |
| Cochranella erminea | MHNC 13932 (AJC 2772) | Peru: Departamento Amazonas: La Oliva (5°18'3.86"S, 78°23'44.57"W; 682 m) | KM068249 | KM068258 | — |
| Cochranella erminea | MNCN 45949 (AJC 2735) | Peru: Departamento Amazonas: La Oliva (5°18'3.86"S, 78°23'44.57"W; 682 m) | KM068248 | KM068257 | — |
| Cochranella erminea | CORDIBI 10477 | Peru: Departamento San Martín: 28 km S – from Juanjui (7°25'38.62"S, 76°39'53.28"W; 366 m) | — | KM068264 | — |
| Cochranella erminea | MHNC 7247 | Peru: Departamento Junin: Prov Satipo: Dist Mazamari: Valle de Tsiriari, Catarata Arco Iris (11°19'35.05" S, 74°30'46.1" W; 640 m) | KF639762 | KF534360 | HG764786 |
| Cochranella euknemos | CH 5109 | Panama: Provincia Coclé: Cerro Escaliche, Quebrada Escaliche. | EU663367 | EU663008 | EU663102 |
| Cochranella euknemos | AJC 1687 | Darien, Distrito de Pinogana, Cana, Main Camp (7.756 N, 77.684 W) | — | KR863138 | — |
| Cochranella euknemos | CH 6423 | Panama: Darien, Distrito de Pinogana, Cloud Forest- Camp (7.762 N, 77.724 W) | — | KR863136 | — |
| Cochranella euknemos | CH 6696 | Panama: Darien, Distrito de Pinogana, Cloud Forest- Camp (7.762 N, 77.724 W) | — | KR863141 | — |
| Cochranella euknemos | CH 6864 | Panama: Darien, Distrito de Pinogana, Cloud Forest- Camp (7.762 N, 77.724 W) | — | KR863140 | — |
| Cochranella euknemos | CH 6440 | Panama: Darien, Distrito de Pinogana, Cloud Forest- Camp (7.762 N, 77.724 W) | — | KR863139 | — |
| Cochranella euknemos | KRL 1055 | Panama: Darien, Distrito de Pinogana, Cloud | — | FJ784459 | — |

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| | | Forest- Camp (7.762 N, 77.724 W) | | | |
| Cochranella granulosa | CH 5121 | Panama: Provincia Coclé: Quebrada Guabalito, Palmarazo, Parque Nacional Omar Torrijos. | EU663369 | EU663010 | — |
| Cochranella granulosa | QCAZ 32769 | Ecuador: Provincia Esmeraldas: 4 km N of Durango (1.042˚N, 78.1081˚W; 253 m). | MT225172 | — | — |
| Cochranella granulosa | USNM 559082 | Honduras: Departamento Gracias a Dios: Rus Rus (14°43' N, 82°27' W; 60 m). | EU663370 | EU663010 | EU663104 |
| Cochranella granulosa | 1033 | Panama: rio Frijoles at Pipeline Rd, north of Gamboa Colón, ~80 m | — | EF107174 | — |
| Cochranella granulosa | KRL 1011 | Panama: rio Frijoles at Pipeline Rd, north of Gamboa Colón, ~80 m | — | FJ784455 | — |
| Cochranella guayasamini | MHNC 13930 (AJC 2719) | Peru: Departamento San Martín: San Jose, Cainarachi valley (6°25'14.67"S, 76°17'28.47"W; 517 m) | KM068250 | KM068259 | — |
| Cochranella guayasamini | CORDIBI 8930 (ET 11 054) // ES NUMERO 8956 | Peru: Departamento San Martín: San Jose, Cainarachi valley (6°25'14.67"S, 76°17'28.47"W; 517 m) | — | KM068265 | — |
| Cochranella guayasamini | MHNC 13929 (AJC 2718) | Peru: San Martin: road Tarapoto-Yurimaguas stream before San Jose (06°25'16.7'' S, 76°17''28.5 W; 523 m) | KF639764 | KF534362 | — |
| Cochranella litoralis | QCAZ 27693 | Ecuador: Provincia Esmeraldas: Stream near Durango (01º02'49" N, 78º37'05" W; 220 m). | EU663349 | EU662990 | EU663085 |
| Cochranella mache | QCAZ 27747 | Ecuador: Provincia Esmeraldas: Río Balthazar (00°58'28" N, 78°37'0.3" W; 645 m). | EU663373 | EU663013 | EU663107 |
| Cochranella nola | CBG 1094 | Bolivia: Departamento Cochabamba: Villa Fatima, 700 m | EU663375 | EU663015 | EU663109 |

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| Cochranella nola | CBG 814 | Bolivia: Departamento La Paz: Boquerón (15°3606300 S, 67°2006000 W; 1000 m) | EU663376 | EU663016 | EU663110 |
| Cochranella nola | CBG 1096 | Bolivia: Cochabamba: Chapare: Repechón (17º06'S, 65º30'W; 500 m) | EU663381 | EU663021 | EU663115 |
| Cochranella resplendens | QCAZ 3809 | Ecuador: Provincia Napo: Reserva Yachana (00˚52'21.71" S, 77˚14'13.43" W; 300–350 m) | — | — | MT225129 |
| Cochranella resplendens | MHUA A9540 | El Eden, vereda San Antonio, municipality of Alejandría, department of Antioquia (6°22’2.1” N, 75°1’38.03” W, 1309 m) | — | KY347027 | — |
| Cochranella resplendens | MHUA A9140 | Finca El Chaquiral, vereda El Retiro, municipality of Anorí, Department of Antioquia (6°58’56.06”N, 75°7’48.72” W, 1699 m) | — | KY347026 | — |
| Cochranella resplendens | QCAZ 38088 | Ecuador: Provincia Morona Santiago, stream tributary of río Napinaza, 6.6 km north towards Macas from parque central de Limón (-2.92665, -78.40701; 1100 m) | KF639763 | KF534361 | HG764787 |
| Espadarana andina | AJC 3387 | Colombia: Santander, Puente Nacional | — | KP149447 | — |
| Espadarana andina | AJC 2302 | Colombia: Santander, Puente Nacional, Quebrada 'La Resbaladera' | — | KP149354 | — |
| Espadarana andina | JMG 366 | Venezuela: Estado de Mérida: Quebrada Azul, on the road between La Azulita and El Hato (08°41'13" N, 71°29'55" W). | EU663335 | EU662976 | EU663072 |

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| Espadarana andina | MHNLS 17206 | Venezuela: Estado de Mérida: Quebrada Azul, on the road between La Azulita and El Hato (08°41'13" N, 71°29'55" W). | — | — | — |
| Espadarana audax | QCAZ 48202 | Ecuador: Provincia Zamora Chinchipe: Cordillera del Cóndor, Centro Shuar El Tink, ca. 1050 m | — | — | MT225130 |
| Espadarana audax | QCAZ 37871 | Ecuador: Provincia Morona Santiago: Gral. Leonidas Plaza Gutiérrez (Limón), stream tributary of río Napinaza, 6.6 km north towards Macas (-2.92665, -78.40701; 1100 m) | — | KF534355 | — |
| Espadarana audax | QCAZ 41653 | Ecuador: Provincia Zamora Chinchipe: Miazi Alto, downstream river of basecamp (-4.25026, -78.61746; 1250 m) | — | HG764782 | HG764782 |
| Espadarana audax | QCAZ 23910 | Ecuador: Morona Santiago: La “Y” (bifurcación desde Gualaquiza via a Cusuco y a Paquisha; 3.43236 S, 78.60449, 835 m). | MT225173 | MT225187 | MT225131 |
| Espadarana audax | QCAZ 29439 | Ecuador: Provincia Morona Santiago: 6.6 km de Limón vía Macas (2.926 S, 78.407 W) | MT225174 | — | — |
| Espadarana audax | JD-2011-07 | Peru: Amazonas: Qbda Goca on Yambrasbamba road, about 1 km N from road entrance (-5.764106 S, -77.912921 W; 1711 m) | — | KF534357 | — |
| Espadarana callistomma | QCAZ 33514 | Ecuador: Provincia Esmeraldas: 4 km N of Durango (1.02832 N, 77.595 W; 253 m). | MT225175 | MT225188 | MT225132 |
| Espadarana callistomma | QCAZ 28555 | Ecuador: Provincia Esmeraldas: Stream | EU663340 | EU662981 | EU663076 |

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| | | affluent of Río Bogotá, nearby San Francisco de Bogotá (01˚05'13.8" N, 78˚41'25.8" W; 83 m). | | | |
| Espadarana durrellorum | QCAZ 47909 | Ecuador: Provincia Napo Comunidad Ñukanchi Allpa, cabecera del río Canoayacu (-0.99965 -77.39619; 403 m) | — | KF534356 | HG764784 |
| Espadarana durrellorum | QCAZ 27832 | Ecuador: Provincia Sucumbíos: Zábalo Familia Criollo (-0.318133333, -75.76625; 220 m) | KF639756 | — | — |
| Espadarana prosoblepon | QCAZ 22416 | Ecuador: Provincia Esmeraldas: Reserva Ecológica Bilsa, Río Agucacatal (0.34694 N, 79. 71 W; 500 m) | MT225176 | — | MT225133 |
| Espadarana prosoblepon | QCAZ 28796 | Ecuador: Provincia Guayas: Reserva Loma Alta, conexión entre el río El Chorrillo y el comienzo del sendero La Mona | MT225177 | — | MT225134 |
| Espadarana prosoblepon | QCAZ 51400 | Ecuador: Provincia Guayas: Reserva Loma Alta, conexión entre el río El Chorrillo y el comienzo del sendero La Mona | — | MT018469 | MT025732 |
| Espadarana prosoblepon | CH 6863 | Panama: Distrito de Panamá, Corregimiento de Chilibre, Estación Río Chico de la ACP, Río Chagres sur, arriba del lago Alajuela (9.265 N, 79.508 W) | — | KR863246 | — |
| Espadarana prosoblepon | CH 6435 | Panamá: Darien, Distrito de Pinogana, Río Cana (7.762 N 77.724 W) | — | KR863234 | — |
| Espadarana prosoblepon | MVZ 149741 | Costa Rica: Provincia Puntarenas: Monteverde (10.3000 N, 84.8167 W). | — | — | AY286061 |
| Espadarana prosoblepon | UCR 17102 | Costa Rica: Provincia Cartago: Cantón Paraíso: | EU663354 | EU662995 | — |

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| | | Distrito Cachí: Bajos de Cachí (09˚50'2.4" N; 83˚48'22.32" W; 1010 m). | | | |
| Espadarana sp. | MHUA 4099 | Colombia: Departamento Antioquia: Municipio Anorí: Vereda El Retiro: finca El Chaquiral (6°58'00"N, 75°7'50"W, 1730 m). | EU663355 | EU662996 | EU663090 |
| Hyalinobatrachium adespinosai | ZSFQ 1647 | Ecuador: Tungurahua, San Jacinto River (1.3447°S, 78.1814°W) | — | MN604038 | — |
| Hyalinobatrachium adespinosai | ZSFQ 1648 | Ecuador: Tungurahua, San Jacinto River (1.3447°S, 78.1814°W) | — | MN604036 | — |
| Hyalinobatrachium adespinosai | ZSFQ 1650 | Ecuador: Tungurahua, San Jacinto River (1.3447°S, 78.1814°W) | — | MN604039 | — |
| Hyalinobatrachium adespinosai | ZSFQ 1651 | Ecuador: Tungurahua, San Jacinto River (1.3447°S, 78.1814°W) | — | MN604037 | — |
| Hyalinobatrachium anachoretus | CORBIDI 10472 (ET-11-002) | Peru: Departamento San Martín: Puente Nieva (5°40'39.06"S, 77°46'23.99"W, 2001 m) | KM068300 | KM068254 | — |
| Hyalinobatrachium anachoretus | CORBIDI 10462 (ET-11-001) | Peru: Departamento San Martín: Puente Nieva (5°40'39.06"S, 77°46'23.99"W, 2001 m) | — | KM068268 | — |
| Hyalinobatrachium aureoguttatum | QCAZ 32105 | Ecuador: Provincia Esmeraldas: 2 km E San Francisco, on the road San Francisco–Durango (01°05'09" N, 78°41'26" W; 63 m). | EU663391 | EU663032 | EU663124 |
| Hyalinobatrachium aureoguttatum | MZUTI 4327 | Ecuador: Provincia Esmeraldas: 2 km E San Francisco, on the road San Francisco–Durango (01°05'09" N, 78°41'26" W; 63 m). | — | OK383433 | — |
| Hyalinobatrachium aureoguttatum | ZSFQ 1541 | Ecuador: Provincia Esmeraldas: 2 km E San Francisco, on the road San Francisco–Durango | — | OK383421 | — |

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| | | (01°05'09" N, 78°41'26" W; 63 m). | | | |
| Hyalinobatrachium bergeri | MHNC 5676; MNCN/ADN 5547 | Peru: Deptartamento Cusco: Provincia Ouispicanchis: 6.1 km from Puente Fortaleza towards Quincemil (13º11'09.5" S, 70º34'50.1" W; 464 m). | EU663392 | EU663033 | EU663125 |
| Hyalinobatrachium bergeri | MHNCP 5713 | Peru: Deptartamento Cusco: Provincia Ouispicanchis: 6.1 km from Puente Fortaleza towards Quincemil (13º11'09.5" S, 70º34'50.1" W; 464 m). | — | GQ142062 | — |
| Hyalinobatrachium bergeri (aff) | MTD 46305 | Peru: Departamento Pasco: km 34 on the Oxapampa–Yaupi road (10°44'44.4" S, 75°30'02.2" W; 1770 m). | EU663393 | EU663026 | EU663119 |
| Hyalinobatrachium bergeri (aff) | MHNC 5577 | Kiñancaroni, Qda Yanari,RCM, Bajo Urubamba, Dist. Echarate, Prov. La Convencion, Dpto. Cusco 73°21'49''W, 11°34'96.2'S': 460 | — | — | — |
| Hyalinobatrachium cappellei | MHNLS 16475, 17125 | Venezuela: Estado Bolívar: 13 km S Las Claritas, on the road Las Claritas–Santa Elena de Uairén (MHNLS 16475). Venezuela: Estado Bolivar: San Ignacio de Yuraní: Quebrada de Jaspe (04°55' N, 61°05'W; 800–1000 m, MHNLS 17125). | EU663401 | EU663040 | EU663132 |
| Hyalinobatrachium cappellei | MHNLS 17125 | Venezuela: Estado Bolívar: 13 km S Las Claritas, on the road Las Claritas–Santa Elena de Uairén (MHNLS 16475). Venezuela: Estado Bolivar: San Ignacio de Yuraní: Quebrada de | — | JN870852 | — |

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| | | Jaspe (04°55' N, 61°05'W; 800–1000 m, MHNLS 17125). | | | |
| Hyalinobatrachium carlesvilai | CBG 1099 | Bolivia: Cochabamba: Chapare: Repechón (17º06' S, 65º30' W; 500 m) | EU663388 | EU663030 | EU663122 |
| Hyalinobatrachium carlesvilai | MHNC 13958 | Bolivia: Cochabamba: Chapare: Repechón (17º06' S, 65º30' W; 500 m) | KM068255 | KM068260 | — |
| Hyalinobatrachium chirripoi | UCR 17424 | Costa Rica: Provincia Limón: Aguas Zarcas, Cuenca del Río Banano. | EU663398 | EU663037 | EU663129 |
| Hyalinobatrachium chirripoi | USNM 538586 | Honduras: Departamento Olancho: Quebrada El Guasimo (14°35' N, 85°18' W; 140 m). | EU663399 | EU663038 | EU663130 |
| Hyalinobatrachium chirripoi | AJC 1841 | Panama: Provincia Darien: Cana | — | KF604294 | — |
| Hyalinobatrachium colymbiphyllum | UCR 17423 | Costa Rica: Provincia Puntarenas: Reserva Monteverde. | EU663400 | EU663039 | EU663131 |
| Hyalinobatrachium colymbiphyllum | MAR 1010 | Colombia: Departamento Chocó: Municipio Unguia: Corregimiento de Bilbao: foothills of Cerro Tacarcuna, ca 200 m. | KM068297 | KM068297 | — |
| Hyalinobatrachium colymbiphyllum | CH 6844 | Panama: Río Chico | — | KF604295 (es COI) | — |
| Hyalinobatrachium colymbiphyllum | KRL 1140 | Panama (8.667 N, 80.592 W) | — | FJ784471 | — |
| Hyalinobatrachium colymbiphyllum | KRL 0727 | Panama (8.667 N, 80.592 W) | — | FJ784346 | — |
| Hyalinobatrachium colymbiphyllum | KRL 1159 | Panama (8.667 N, 80.592 W) | — | FJ784475 | — |

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| Hyalinobatrachium colymbiphyllum | KRL 1424 | Panama (8.667 N, 80.592 W) | — | FJ784527 | — |
| Hyalinobatrachium duranti | MHNLS 16493, 17164 | Venezuela: Estado Mérida: El Chorotal Alto, on the road between Mérida and La Azulita, 2100 m (MHNLS 16493). Venezuela: Estado Mérida: La Mucuy (08°37' N, 71°03' W; 2400 m; MHNLS 17164) | EU663402 | EU663041 | EU663133 |
| Hyalinobatrachium esmeralda | LSB 384 | Colombia: Departamento Boyaca: Pajarito, Pajarito, quebrada la Colonera | — | KP149361 | — |
| Hyalinobatrachium fleischmanni | USNM 559092 | Honduras: Departamento Gracias a Dios: Rus Rus Biological Reserve (14°43' N, 82°27' W; 60 m). | EU663406 | EU663045 | EU663137 |
| Hyalinobatrachium fleischmanni | JAC 21365 | Mexico: Oaxaca: Carretera San José Pacífico-Candelaria Loxicha, 480 m. | DQ283453 | DQ283453 | — |
| Hyalinobatrachium fleischmanni | MVZ 207146 | Costa Rica: Provincia Guanacaste: trail Casa mengo to Casa Frank, first stream N of summit of trail, Volcán Cacao. | JX564869 | JX564869 | JX564869 |
| Hyalinobatrachium fragile | MHNLS 17161 | Venezuela: Estado Cojedes: Road Manrique-La Sierra (09°52'52.3" N, 68°33'03.3" W; 530 m). | EU663407 | EU447286 | EU663138 |
| Hyalinobatrachium guairarepanense (cf) | MIZA 0281 | Venezuela: Estado Aragua: Choroní: north versant of Parque Nacional Henri Pittier, road Maracay-Choroní, 9 km of Puerto Colombia,  Los Cerritos, 180 m | KF639765 | KF534363 | HG764788 |
| Hyalinobatrachium iaspidiense | MHNLS 17126 | Venezuela: Estado Bolivar: San Ignacio de Yuraní: Quebrada de | EU663408 | EU663047 | EU663139 |

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| | | Jaspe (04°55' N, 61°05'W; 800–1000 m; MHNLS 17126). French Guiana: Cayenne: Aya, Trinité (4°37' N, 53°25' W; 140 m; MTD 48145) | | | |
| Hyalinobatrachium ibama | MAR 503 | Colombia: Departamento de Santander: Municipio Playa de Belén: Vereda Piritama: Quebrada Piritama, 1780 m. | EU663409 | EU663048 | EU663140 |
| Hyalinobatrachium kawense | MNHN 2011.0119, MTD 48144 | French Guiana: Cayenne: Rivière de Kaw (4°36'33'' N, 52°3'25'' W, 1 m; MNHN 2011.0119). French Guiana: Crique Gabrielle (4°41' N, 52°18' W, 2 m; MTD 48144) | EU663387 | EU663029 | EU663121 |
| Hyalinobatrachium mashpi | DHMECN13967 | Ecuador: Pichincha, Mashpi, San Vicente River (0.16334 N, 78.86736 W) | OQ418104 | OQ418105 | — |
| Hyalinobatrachium mashpi | MZUTI 3921 | Ecuador: Pichincha, Mashpi, San Vicente River (0.16334 N, 78.86736 W) | — | OK383432 | — |
| Hyalinobatrachium mashpi | CJ 11644 | Ecuador: Pichincha, Mashpi, San Vicente River (0.16334 N, 78.86736 W) | — | OK383436 | — |
| Hyalinobatrachium mondolfii | MHNLS 17119 | Venezuela: Delta Amacuro: Slopes of Serranía de Imatáca, first stream of Caño Acoima, tributary of río Grande (08°22' N, 61°32' W; 15 m). | EU663411 | EU663050 | EU663142 |
| Hyalinobatrachium mondolfii | CBF 6453 | Venezuela: Delta Amacuro: Slopes of Serranía de Imatáca, first stream of Caño Acoima, tributary of río Grande (08°22' N, 61°32' W; 15 m). | JF266567 | JF266569 | — |

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| Hyalinobatrachium muiraquitan | LZA 841 | Brazil: Pará: Vitória do Xingu: Vitoria farm (02°58' S, 52°13' W) | — | KY310571 | — |
| Hyalinobatrachium muiraquitan | LZA 844 | Brazil: Pará: Vitória do Xingu: Vitoria farm (02°58' S, 52°13' W) | — | KY310570 | — |
| Hyalinobatrachium munozorum | QCAZ 33261 | Ecuador: Provincia Pastaza: Finca km 6 vía San Ramón-El Triunfo (1.355S, 77.86456) | — | — | MT225135 |
| Hyalinobatrachium munozorum | QCAZ 31056 | Ecuador: Provincia Zamora Chinchipe: Destacamento Militar Shaime, 920 m. | EU663395 | EU663034 | EU663126 |
| Hyalinobatrachium munozorum | NMP6V 74059 | Ecuador: Provincia Zamora Chinchipe: Destacamento Militar Shaime, 920 m. | JF266568 | JF266570 | — |
| Hyalinobatrachium nouns | MZUTI 3299 | Ecuador: Imbabura, Toisan, Bosque Protector Los Cedros (0.310 N, 78.781 W) | — | OK383422 | — |
| Hyalinobatrachium nouns | ZSFQ 3906 | Ecuador: Imbabura, Toisan, Bosque Protector Los Cedros (0.310 N, 78.781 W) | — | OK383423 | — |
| Hyalinobatrachium nouns | ZSFQ 0537 | Ecuador: Imbabura, Toisan, Bosque Protector Los Cedros (0.310 N, 78.781 W) | — | OK383424 | — |
| Hyalinobatrachium orientale | MHNLS 17878, 17117 | Venezuela: Estado Sucre: Península de Paria, Cerro Humo (10°41' N, 61°37' W; 850 m; MHNLS 17878). Venezuela: Estado Monagas: Cueva del Guacharo (10°10'27'' N, 63°33'03'' W; 1065 m; MHNLS 17117). | EU663413 | EU447289 | EU663144 |
| Hyalinobatrachium orientale | MHNLS 17117 | Venezuela: Estado Sucre: Península de Paria, Cerro Humo (10°41' N, 61°37' W; 850 m; MHNLS 17878). Venezuela: Estado Monagas: Cueva del | — | EU447283 | — |

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| | | Guacharo (10°10'27'' N, 63°33'03'' W; 1065 m; MHNLS 17117). | | | |
| Hyalinobatrachium orocostale | MHNLS 17247 | Venezuela: Estado Guárico: Cerro Platillón, southern slope, Hacienda Picachito, main creek (09°51' 23" N, 67°30' 09.1" W; 1500 m). | EU663414 | EU447284 | EU663145 |
| Hyalinobatrachium pallidum | MHNLS 17881, 17238 | Venezuela: Estado Barinas: San Isidro (08°50'05" N, 70°34'41" W; 1500 m; 17881). Venezuela: Estado Táchira: Road from Sabana Grande to La Grita, Quebrada Guacharaquita (08°10'02.8" N; 71°58'44.2" W; 1650 m; MHNLS 17238). | EU663396 | EU663035 | EU663127 |
| Hyalinobatrachium pallidum | MHNLS 17238 | Venezuela: Estado Barinas: San Isidro (08°50'05" N, 70°34'41" W; 1500 m; 17881). Venezuela: Estado Táchira: Road from Sabana Grande to La Grita, Quebrada Guacharaquita (08°10'02.8" N; 71°58'44.2" W; 1650 m; MHNLS 17238). | EU663415 | EU663052 | EU663146 |
| Hyalinobatrachium pellucidum | QCAZ 29438 | Ecuador: Provincia de Morona Santiago: km 6.6 on the Limón–Macas road. | EU663397 | EU663036 | EU663128 |
| Hyalinobatrachium pellucidum (aff) | MHNC 13930 (MAR 2195)? | Colombia: Dpartamento Boyacá: Municipio Chivor, km 6.4 on the Santa María-Chivor road, ca 1400 m | KM068296 | KM068259 | — |
| Hyalinobatrachium pellucidum | MHNCP 4880 | Peru: Cusco: La Convención: Río Kimbiri, Comunidad Machiguenga Pomereni | — | GQ142065 | — |

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| | | (12°35'26.5"S, 73°41'36.8"W, 1100 m) | | | |
| Hyalinobatrachium talamancae | CH 5330 | Panama: Provincia Coclé: Río Indio. | EU663418 | EU663054 | EU663149 |
| Hyalinobatrachium tatayoi | MHNLS 17174 | Venezuela: Estado Zulia: stream near Tokuko (09° 50' 30.6" N, 72° 49' 13.6" W; 301 m). | EU663419 | EU663055 | EU663150 |
| Hyalinobatrachium taylori | MHNLS 17141 | Venezuela: Estado Bolivar: Salto Karuay (05°41'27" N, 61°51'40" W; 900 m). | EU663420 | EU663056 | EU663151 |
| Hyalinobatrachium tricolor | MNCN 44828 | French Guiana: Cambior, Kaw (4°32' N, 52°13' W; 10 m) | — | JN870874 | HG764789 |
| Hyalinobatrachium tricolor | MNHN 2011.0116 | French Guiana: Crique Wapou (4°26' N, 52°9' W; 2 m) | EU663386 | EU663027 | — |
| Hyalinobatrachium valerioi | UCR 17418 | Costa Rica: Provincia Puntarenas: Rincón de Osa. | EU663421 | EU663057 | EU663152 |
| Hyalinobatrachium vireovittatum | CH 6443 | Panama: Provincia Darien: Cana | — | KF604303 | — |
| Hyalinobatrachium yaku | MZUTI 5001 | Ecuador: Provincia Pastaza: stream affluent of the Kallana river (1.4696°S, 77.2784°W, 325 m), nearby the Kichwa community of Kallana. | MF002067 | MF002065 | MF002063 |
| Hyalinobatrachium yaku | MZUTI 5002 | Ecuador: Provincia Pastaza: stream affluent of the Kallana river (1.4696°S, 77.2784°W, 325 m), nearby the Kichwa community of Kallana. | MF002068 | MF002066 | MF002064 |
| Hyalinobatrachium sp. | MIZA 317 | Venezuela: Estado Aragua: Parque Nacional Henri Pittier, Estación Biológica Rancho Grande, 1000 m. | EU663417 | EU447290 | EU663148 |
| Hyalinobatrachium sp. | MAR 2147 | Colombia: Departamento Risaralda, Municipio | KM068298 | KM068298 | — |

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| | | Pueblo Rico , quebrada San José on the way to Villa Claret, ca. 1400 m | | | |
| Hyalinobatrachium sp. | MAR 2222 | Colombia, departamento Valle del Cauca, Municipio Buenaventura, corregimiento San Cipriano, ca 200 m. Collected by Beatriz E. Velásquez | KM068299 | KM068299 | — |
| Ikakogi tayrona | MAR 544 | Colombia: Departamento Magdalena, Sierra Nevada de Santa Marta: road to San Lorenzo, 1800 m. | EU663356 | EU662997 | EU663091 |
| Ikakogi tayrona | MAR 545 | Colombia: Departamento Magdalena, Sierra Nevada de Santa Marta: road to San Lorenzo, 1800 m. | EU663357 | EU662998 | EU663092 |
| Nymphargus anomalus | QCAZ 41312 | Ecuador: Provincia Napo: Pacto Sumaco, Volcán Sumaco (-0.61497, -77.59065; 1770 m) | — | KF534364 | HG764790 |
| Nymphargus anomalus | QCAZ 45703 | Ecuador: Provincia Pastaza: Río Challuwa Yaku (-1.26764, -78.04797; 1668 m) | — | — | — |
| Nymphargus anomalus | QCAZ 45702 | Ecuador: Provincia Pastaza: Río Challuwa Yaku (-1.26764, -78.04797; 1668 m) | MH746585 | MH746559 | — |
| Nymphargus balionotus | JMG 0798 | Ecuador: Pichincha, Mindo | MH746564 | MH746538 | — |
| Nymphargus balionotus | JMG0796 | Ecuador: Pichincha, Mindo | MH746563 | MH746537 | — |
| Nymphargus balionotus | JMG0607 | Ecuador: Pichincha, Mindo | MH746562 | MH746536 | — |
| Nymphargus bejaranoi | MNK 5242 | Bolivia: Santa Cruz, Caballero, Canton San Juan, Amboro National Park | AY843576 | AY843576 | — |

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| Nymphargus bejaranoi | CBG 1488 | Bolivia: Departamento Cochabamba: Chaquisacha (17°41' S, 65°25' W; 1500 m). | EU663422 | EU663059 | EU663155 |
| Nymphargus buenaventura | MECN 10902 | Ecuador: El Oro, Piñas, Reserva Buenaventura (03° 38′ S, 79° 45′ W) | — | — | MT733055 |
| Nymphargus buenaventura | QCAZ 54825 | Ecuador: El Oro, Piñas, Reserva Buenaventura (03° 38′ S, 79° 45′ W) | — | MT734665 | MT733052 |
| Nymphargus cariticommatus | MZUTI 1417 (ANF 634) | Ecuador: Provincia Morona Santiago: Camino entre Plan de Milagro y Gualaceo (3.00774 S, 78.53318 W, 2159 m) | MH746580 | MH746554 | MT225139 |
| Nymphargus cariticommatus | MRy 544 | Ecuador: Provincia Zamora Chinchipe: Shucos, on the old road from Loja to Zamora | MH746581 | MH746555 | MT225140 |
| Nymphargus cariticommatus | QCAZ54871 | Ecuador: Provincia Zamora Chinchipe: Shucos, on the old road from Loja to Zamora | — | MT734667 | MT733054 |
| Nymphargus cariticommatus | QCAZ54870 | Ecuador: Provincia Zamora Chinchipe: Shucos, on the old road from Loja to Zamora | — | MT734666 | MT733053 |
| Nymphargus chancas | CORBIDI 10471 | Peru: Departamento San Martín: stream 3 km – E from Lejia, near Abra Tangarana (6° 19.373'S, 76°41.726'W; 1007 m) | — | KM068277 | — |
| Nymphargus chancas | CORBIDI 14148 | Peru: Departamento San Martín: stream 3 km – E from Lejia, near Abra Tangarana (6° 19.373'S, 76°41.726'W; 1007 m) | — | KM068278 | — |
| Nymphargus chancas | CORBIDI 9197 | Peru: Departamento San Martín: stream 3 km – E from Lejia, near Abra Tangarana (6° 19.373'S, 76°41.726'W; 1007 m) | ON614215 | ON613534 | — |
| Nymphargus chancas (aff) | QCAZ 41590 | Ecuador: Provincia Zamora Chinchipe: Miazi Alto, stream of main river going up from | KF639767 | KF534365 | HG764791 |

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| | | basecamp (-4.25044, -78.61356; 1260 m) | | | |
| Nymphargus cochranae | QCAZ 22196 | Ecuador: Provincia de Orellana: km 13 on Loreto–Coca road (0.5836 S, 77.234 W) | MH746584 | MH746558 | MT225141 |
| Nymphargus cochranae | QCAZ 31113 | Ecuador: Provincia Napo: Pacto Sumaco (00°43' S, 77°34' W; 1400 m). | EU663425 | EU663061 | EU663156 |
| Nymphargus colomai | QCAZ 41590 | Ecuador: Zamora Chinchipe, Miazi Alto (4.25044° S, 78.61356° W) | KF639767 | HG764791 | HG764791 |
| Nymphargus garciae | KU 20801 | Ecuador: Provincia Sucumbíos: 18 km E Santa Bárbara, 2550 m | AY326022 | AY326022 | — |
| Nymphargus grandisonae | QCAZ 16288 | Ecuador: Provincia Pichincha: Quebrada Zapadores, 5 km ESE of Chiriboga on Chiriboga–Quito road (0.2375 S, 78.735278 W; 2010 m) | MH746574 | — | MT225142 |
| Nymphargus grandisonae | QCAZ 22310 | Ecuador: Provincia Pichincha: Mindo Biology Station (00°04'40.8" S, 78º43'55" W; 1600 m). | EU663344 | EU662985 | EU663080 |
| Nymphargus griffithsi (aff) | KU 202801 | Ecuador: Provincia Carchi: ca. 5 km W La Gruel, 2340 m | AY326025 | AY326025 | — |
| Nymphargus griffithsi (aff) | KU 202796 | Ecuador: Provincia Carchi: ca. 5 km W La Gruel, 2340 m | AY326025 | AY326025 | — |
| Nymphargus griffithsi | QCAZ 24824 | Ecuador: Provincia Pichincha: La Victoria (1.6285 S, 77.9097 W; 2104 m) | MH830306 | MH830302 | — |
| Nymphargus griffithsi | QCAZ 24825 | Ecuador: Provincia Pichincha: La Victoria (1.6285 S, 77.9097 W; 2104 m) | MT232661 | MT232431 | MT238202 |
| Nymphargus griffithsi | MZUTI 99 | Ecuador: Provincia Pichincha: Reserva Las Gralarias, Hercules Creek (0°01.529' S, 78°42.243' W; 2175 m). | MH830305 | MH830301 | MT225145 |

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| Nymphargus griffithsi | MZUTI 100 | Ecuador: Provincia Pichincha: Reserva Las Gralarias, Hercules Creek (0°01.529' S, 78°42.243' W; 2175 m). | MH830303 | MH830299 | MT225146 |
| Nymphargus lasgralarias (aff) | QCAZ 40177 | Ecuador: Provincia Carchi: Chilma Bajo, Finca de Aníbal Pozo (0.8647 N, 78.0497 W; 2076) | — | — | MT225147 |
| Nymphargus humdoldti | ZSFQ 0388 | Ecuador: Napo, Volcán Sumaco | — | — | MT225154 |
| Nymphargus humdoldti | QCAZ_45713 | Ecuador: Napo, Volcán Sumaco | MH746587 | — | MT225155 |
| Nymphargus lasgralarias | QCAZ 42164 | Ecuador: Provincia Imbabura: San Antonio de Cuellaje, Finca de Estuardo Ayala (0.4775 N, 78.56263 W) | MH746567 | MH746542 | MT225149 |
| Nymphargus lasgralarias | MZUTI 95 | Ecuador: Provincia Pichincha: Reserva Las Gralarias, Five Frog Creek (0°01.87' S, 78°42.358' W; 2150 m). | MH746568 | MH746543 | MT225150 |
| Nymphargus lasgralarias | MZUTI 97 | Ecuador: Provincia Pichincha: Reserva Las Gralarias, Five Frog Creek (0°01.87' S, 78°42.358' W; 2150 m). | MH746570 | MH746545 | MT225152 |
| Nymphargus lasgralarias | QCAZ 31768 | Ecuador: Provincia Imbabura: Santa Rosa, Reserva Biológica Alto Chocó (00°23' N, 78°26' W; 2100 m). | EU663426 | EU663062 | EU663157 |
| Nymphargus lasgralarias | QCAZ 11689–90 | Ecuador: Provincia Cotopaxi: Bosque Intengral Otonga (0.676 S, 76.397 W, 1950 m) | MH746572 | MH746547 | KF208514 |
| Nymphargus lasgralarias | QCAZ 46012 | Nanegal Grande (0.1167ºN, 78.6667ºW; 2300 m) | — | — | — |
| Nymphargus laurae | HMOA 1897 | Ecuador: Napo, Volcán Sumaco | MZ820691 | — | — |
| Nymphargus laurae | INABIO 15383 | Ecuador: Napo, Volcán Sumaco | — | MZ831508 | — |
| Nymphargus lindae | QCAZ 41071 | Ecuador: Provincia Napo: Volcán Sumaco | — | — | — |

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| | | (0.61497ºS, 77.59065ºW; 1770 m) | | | |
| Nymphargus lindae | QCAZ 45713 | Ecuador: Provincia Pastaza: Río Yana Challuwa Yaku (1.26764ºS, 78.04797ºW; 1800–2400 m) | MH746583 | MH746557 | MT225138 |
| Nymphargus lindae | QCAZ 41572 | Ecuador: Provincia Pastaza: Río Yana Challuwa Yaku (1.26764ºS, 78.04797ºW; 1800–2400 m) | MH746582 | MH746556 | MT225137 |
| Nymphargus manduriacu | JMG0616 | Ecuador: Imbabura, Reserva Río Manduriacu (0.310755°N, 78.8569°W) | MH746566 | MH746540 | — |
| Nymphargus manduriacu | JMG0615 | Ecuador: Imbabura, Reserva Río Manduriacu (0.310755°N, 78.8569°W) | MH746565 | MH746539 | — |
| Nymphargus manduriacu | JMG0622 | Ecuador: Imbabura, Reserva Río Manduriacu (0.310755°N, 78.8569°W) | — | MH746541 | — |
| Nymphargus mariae | QCAZ 37927, DFCH-USFQ D285 | Ecuador: Provincia Pastaza: Villano, basecamp K4, tributary of río Lliquino (-1.72553, -78.98058; 400 m; QCAZ 37927); Ecuador: Provincia Napo: 45 E of Narupa, on the Hollín–Loreto road, 800 m, DFCH-USFQ D285. | KF639771 | KF534368 | HG764793 |
| Nymphargus megacheirus | KU 143272 | Ecuador: Provincia Napo: 16.5 km NNE Santa Rosa (00º13' S; 77º43' W; 1700 m). | EU663427 | EU663063 | EU663158 |
| Nymohargus megistus | ZSFQ 3924 | Ecuador: Pichincha, Mindo | MW327545 | MZ314502 | — |
| Nymohargus megistus | ZSFQ 4071 | Ecuador: Pichincha, Mindo | MW327544 | MZ314501 | — |
| Nymphargus mixomaculatus | MTD 45200 | Peru: Departamento Huánuco: Provincia Huánuco: Cordillera | KF639768 | EU663064 | EU663159 |

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| | | Carpish, vicinity of Caserío Carpish de Mayobamba (09º43'50" S, 76º06'46" W; 2625 m). | | | |
| Nymphargus ocellatus | GCI 363 | Peru: Departamento Pasco: Provincia Oxapampa: Distrito Oxapampa: Chacos (UTM E461580–N8826212; 1977 m) | KF639769 | KF534366 | HG764792 |
| Nymphargus pijao | ICN_60227 | Colombia: El Tambo, department of Cauca (2°56′2′′N, 76°56′19′′W) | ON614125 | ON614132 | — |
| Nymphargus pijao | ARUQ_1377 | Colombia: El Tambo, department of Cauca (2°56′2′′N, 76°56′19′′W) | ON614124 | ON614131 | — |
| Nymphargus pijao | JJS_032 | Colombia: El Tambo, department of Cauca (2°56′2′′N, 76°56′19′′W) | ON614123 | ON614129 | — |
| Nymphargus pijao | ICN_59957 | Colombia: El Tambo, department of Cauca (2°56′2′′N, 76°56′19′′W) | ON614126 | — | — |
| Nymphargus pluvialis | MNCN/ADN 5004 | Peru: Departamento. Ayacucho: Provincia La Mar: Quebrada 2.2 km from Toccate towards San Antonio (12º59'15.4" S, 73º39'18.5" W; 2250 m) | — | — | — |
| Nymphargus pluvialis | KU 173224 | Peru: Departamento Cusco: Pistipata, Rio Umasbamba, 12 km SE Huyro, 1820 m | EU663428 | EU663065 | EU663160 |
| Nymphargus posadae | QCAZ 25090 | Ecuador: Provincia Napo:Estación Científica Yanayacu. 2100 m) | — | KF534367 | — |
| Nymphargus posadae | QCAZ 26023 | Ecuador: Provincia Napo: Yanayacu Biological Station (00º41' S, 77º53' W; 2100 m). | KF639770 | — | — |
| Nymphargus rosada | MHUA 4308 | Colombia: Departamento Antioquia: Municipio Anorí: Vereda El Retiro: Finca El Chaquiral | EU663429 | EU663066 | EU663161 |

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| | | (06˚58' N, 75˚7.83' W; 1732 m). | | | |
| Nymphargus siren | QCAZ 30977 | Ecuador: Provincia Napo: tributary of the Río Salado, about 1 km upstream from the Río Coca (0.19167 S, 77.6997 W; 1410 m) | MH746588 | — | MT225156 |
| Nymphargus siren | KU 179171 | Ecuador: Provincia Napo: 3.2 km NNE Oritoyacu (00º27' S, 77º52' W; 1910 m). | EU663430 | EU663067 | EU663162 |
| Nymphargus spilotus | JD060-MAR1563 | Colombia: Samaná | MH746590 | MH746561 | — |
| Nymphargus sucre | MZUTI 1421 (ANF 639) | Ecuador: Provincia Morona Santiago: Camino entre Plan de Milagro y Gualaceo (3.00774 S, 78.53318 W, 2159 m) | MH746578 | MH746552 | MT225157 |
| Nymphargus sucre | MZUTI 1422 (ANF 640) | Ecuador: Provincia Morona Santiago: Camino entre Plan de Milagro y Gualaceo (3.00774 S, 78.53318 W, 2159 m) | MH746579 | MH746553 | MT225158 |
| Nymphargus vicenteruedai | AAV 119 | Colombia: Departamento Santander: Santuario de Fauna y Flora Guanentá–Alto Río Fonce, Río Cercados, 2650 m. | EU663424 | EU663058 | EU663154 |
| Nymphargus wileyi | QCAZ 27435 | Ecuador: Provincia Napo: Yanayacu Biological Station (00º41' S, 77º53' W; 2100 m). | EU663431 | EU663068 | EU663164 |
| Nymphargus cochranae (aff) | QCAZ 31340 | Ecuador: Provincia Zamora Chinchipe: Estación Cientifica San Francisco (03°58' S, 79°04' W; 1960 m) | EU663423 | EU663060 | EU663153 |
| Rulyrana adiazeta | MAR 483 | Colombia: Departamento Santander: Municipio Charala: Correjimiento | EU663361 | EU663002 | EU663096 |

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| | | de Virolín: Vereda El Reloj. | | | |
| Rulyrana flavopunctata (aff) | LSB 376 | Colombia: Departamento Boyaca: Pajarito, Quebrada La Limona (5.294 N, 72.706 W) | — | KP149462 | — |
| Rulyrana flavopunctata | QCAZ 32265 | Ecuador: Provincia Morona Santiago: 7.6 W of 9 de Octubre (02°13'30.5" S, 78°17'25.6" W; 1715 m), on the 9 de Octubre–Guamote road. | EU663368 | EU663009 | EU663103 |
| Rulyrana mcdiarmidi | QCAZ 26545 | Ecuador: Provincia Morona Santiago: 6.6 kn N of Limón (2.92665 S, 78.407 W; 1013 m) | MT225183 | — | MT225163 |
| Rulyrana mcdiarmidi | MNCN/ADN 51730 | NA | KY611470 | KY611470 | — |
| Rulyrana mcdiarmidi | CORBIDI-HE-2010-6848 | Peru: Departamento Amazonas: near village of Cocachimba (6°3'44.28"S, 77°53'36.47"W; 1811 m) | — | KM068279 | — |
| Rulyrana mcdiarmidi | CORBIDI 10470 | Peru: Departamento Amazonas: north slope of Utcubamba canyon, 11.3 km WNW from Pedro Ruiz (5°54'50.93"S, 78°4'35.20"W, 1077 m) | — | KM068281 | — |
| Rulyrana mcdiarmidi | CORBIDI 10473 | Peru: Departamento Amazonas: Quebrada Goca on Yambrasbamba road (5°45'50.78"S, 77°54'46.52"W; 1711 m) | — | KM068280 | — |
| Rulyrana saxiscandens | CORIDIBI-HE-2012-14149 | Peru: Departamento San Martín: Ahuashiyacu waterfalls (6°27'19.69"S, 76°18'32.33"W; 797 m) | — | KM068290 | — |
| Rulyrana saxiscandens | CORDIBI 14149 | Peru: Departamento San Martín: Abra Tangarana (6°16'52.86"S, 76°43'57.86"W; 1047 m) | — | KM068285 | — |
| Rulyrana saxiscandens | CORDIBI 10476 | Peru: Departamento San Martín: Abra Tangarana | — | KM068291 | — |

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| | | (6°16'52.86"S, 76°43'57.86"W; 1047 m) | | | |
| Rulyrana saxiscandens | ET-10-124 | Peru: Departamento San Martín: Ahuashiyacu waterfalls (6°27'19.69"S, 76°18'32.33"W; 797 m) | — | KM068284 | — |
| Rulyrana saxiscandens | CORDIBI 14668 | Peru: Departamento San Martín: 2 km E from Ahuashiyacu (6°27'30.28"S, 76°17'14.35"W; 988 m) | — | KM068289 | — |
| Rulyrana saxiscandens | CORIDIBI-HE-2012-14152 | Peru: Departamento San Martín: Ahuashiyacu waterfalls (6°27'19.69"S, 76°18'32.33"W; 797 m) | — | KM068283 | — |
| Rulyrana saxiscandens | MNCN/ADN 51737 | Peru: Departamento San Martin: Ahuashiyacu (6°27'19.69" S, 76°18'32.33" W; 797 m) | KF639772 | KF534369 | — |
| Rulyrana saxiscandens | MNCN/ADN 51751 | Peru: Departamento San Martin: stream on east slope of Abra Tangarana, 3.5 km E Lejia (6°19'22.40" S, 76°41'43.55" W; 1003 m) | — | KF534370 | — |
| Rulyrana spiculata | MHNSM 24867 | Peru: Departamento Junin: Provincia Satipo: Distrito Llaylla: Vista Alegre (11°40’95’’ S, 74°64’92’’ W; 1340 m). | EU663382 | EU663022 | EU663116 |
| Rulyrana spiculata | CBG 806 | Bolivia: Departamento La Paz: Boquerón (15°3606300 S, 67°2006000 W; 1000 m) | EU663364 | EU663006 | EU663100 |
| Rulyrana susatamai | MAR 337 | Colombia: Departamento Tolima: Municipio Ibagué: Vereda El Tutumo: Finca La Magnolia, Quebrada El Coral, 1100 m. | EU663384 | EU663024 | EU663118 |
| Rulyrana sp | EVACC023 | Panama: Darien, Darien National Park, Cana (7.76223 N 77.7241 W) | — | KC014783 | — |
| Rulyrana sp | ACA7839 | Panama: Darien, Darien National Park, Cana (7.76223 N 77.7241 W) | — | KC014781 | — |

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| Sachatamia albomaculata | AJC 1755 | Panama: Distrito de Chilibre, Urbanización de los Altos de Cerro Azul (9.231 N, 79.403 W) | — | KR863349 | — |
| Sachatamia albomaculata | USNM 534151 | Honduras: Departamento Gracias a Dios: Quebrada Machin (15°19'10" N, 85°17'30" W; 540 m). | EU663362 | EU663003 | EU663097 |
| Sachatamia albomaculata | USNM 538584 | Honduras: Departamento Olancho: Quebrada El Guasimo (14°35' N, 85°18' W; 140 m). | — | — | — |
| Sachatamia electrops | MHUA:A 9715 | Colombia: Antioquia | KY611461 | KY611462 | — |
| Sachatamia ilex | AJC 1911 | Panama: Distrito de Chepo: Corregimiento de Nargana: Refugio ANAM, Cerro Brewster 'hacia Cerro Guajaral'. Límite P.N. Chagres (9.32 N, 79.289 W) | — | KR863360 | — |
| Sachatamia ilex | AJC 1956 | Panama: Distrito de Chepo: Corregimiento de Nargana: Refugio ANAM, Cerro Brewster 'hacia Cerro Guajaral'. Límite P.N. Chagres (9.32 N, 79.289 W) | — | KR863358 | — |
| Sachatamia ilex | AJC 1947 | Panama: Distrito de Chepo: Corregimiento de Nargana: Refugio ANAM, Cerro Brewster 'hacia Cerro Guajaral'. Límite P.N. Chagres (9.32 N, 79.289 W) | — | KR863350 | — |
| Sachatamia ilex | UCR 16861 | Costa Rica: Provincia de Limón: Finca owned by Brian Kubicki. | EU663347 | EU662988 | EU663083 |
| Sachatamia orejuela | QCAZ 45993 | Ecuador: Provincia Imbabura: Buffer zone of Reserva Cotacachi-Cayapas, surroundings of Río Aguas Verdes (0.33101, -78.93152; 669 m) | KF639773 | KF534371 | HG764794 |

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| Sachatamia punctulata | MHUA 4071 | Colombia: Departamento Antioquia: Municipio de Maceo: Vereda Las Brisas, Hacienda Santa Bárbara (06°32'49" N, 74°38'37" W; 520 m). | EU663378 | EU663018 | EU663112 |
| Teratohyla adenocheira | LSUMZ H-17409 | Brazil: Rondonia: Rio Formoso, Parque Estadual Guajara-Mirim, approx. 90 km N Nova Mamore (10°19' S, 64°33' W; 2 m) | KF639774 | HG764795 | HG764795 |
| Teratohyla adenocheira | LSUMZ H-17463 | Brazil: Rondonia: Rio Formoso, Parque Estadual Guajara-Mirim, approx. 90 km N Nova Mamore (10°19' S, 64°33' W; 2 m) | — | KF534372 | — |
| Teratohyla amelie | QCAZ 37912 | Ecuador: Provincia Pastaza: km 6 vía San Ramón-El Triunfo, Centro Ecológico Sancha Arajuno. | — | MT225192 | MT225164 |
| Teratohyla amelie | MHNC 5646 / MNCN ADN 20619 | Peru: Departamento Cusco: Provincia Ouspicanchis: Stream 10 km from Quincemil towards Puerto Maldonado (13°12’03.6’’ S; 70°40’28.9’’ W; 572 m). | EU663365 | EU663005 | EU663099 |
| Teratohyla midas | QCAZ 33226 | Ecuador: Provincia Pastaza: Pomona, Estación Hola Vida, 837 m | MT225185 | — | MT225169 |
| Teratohyla midas | MNCN 45963 | Ecuador: Provincia Pastaza: Pomona, Estación Hola Vida, 837 m | KM068253 | KM068263 | — |
| Teratohyla midas | KHJ | Ecuador: Provincia Napo: Jatun Sacha, 450 m. | EU663374 | EU663014 | EU663108 |
| Teratohyla pulverata | USNM 538588 | Honduras: Departamento Olancho: Matamoros (14°40' N, 85°23' W; 150 m). | EU663416 | EU663053 | EU663147 |

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| Teratohyla spinosa | CH 6780 | Panama: Distrito de Chilibre, Urbanización de los Altos de Cerro Azul (9.231 N, 79.403 W) | — | KR863371 | — |
| Teratohyla spinosa | AJC 1770 | Panama: Distrito de Chilibre, Urbanización de los Altos de Cerro Azul (9.231 N, 79.403 W) | — | KR863370 | — |
| Teratohyla spinosa | USNM 538863 | Honduras: Departamento Olancho: Quebrada El Guasimo (14°35' N, 85°18' W; 140 m). | EU663383 | EU663023 | EU663117 |
| Vitreorana antisthenesi | MHNLS 17909 | Venezuela: Estado Aragua: Parque Nacional Henri Pittier, Estación Biológica Rancho Grande, 1000 m. | EU663390 | EU663031 | EU663123 |
| Vitreorana antisthenesi | MHNLS 17050 | Venezuela: Estado Aragua: Parque Nacional Henri Pittier, Estación Biológica Rancho Grande, 1000 m. | — | EU447287 | — |
| Vitreorana baliomma | MCP14115 | Brasil: Mata de Cabruca, Fazenda Novo Pau | MW366908 | MW366912 | — |
| Vitreorana baliomma | MCP14123 | Brasil: Mata de Cabruca, Fazenda Novo Pau | MW366907 | MW366911 | — |
| Vitreorana castroviejoi | MHNLS 16446 | Venezuela: Estado Sucre: Península de Paria, 2.5 km W and 3.2 km N of Macuro (10°41'32" N, 61°57'44" W; 580 m). | EU663363 | EU663004 | EU663098 |
| Vitreorana castroviejoi | MHNLS 17310 | Venezuela: Estado Sucre: Península de Paria, Cerro Humo (10°42' N, 62°37' W; 800 m). | KY611484 | KY611484 | — |
| Vitreorana eurygnatha | CFBHT02671b | Brazil: Minas Gerais, Itatiaia, Itamonte (22.359 S, 44.735 W) | — | KU495608 | — |
| Vitreorana eurygnatha | CFBH 5729 | Brazil: Estado Minas Gerais: Itamontes. | EU663404 | EU663043 | EU663135 |
| Vitreorana eurygnatha | CFBHT15374 | Brazil: Espirito Santo, Santa Teresa (19.904 S, 40.561 W) | MT771842 | KU495606 | MH988066 |

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| Vitreorana franciscana | MZUFV9970 | Brazil:State of Minas Gerais: Serra da Canastra National Park, Vargem Bonita, Sao Francisco River, near base of Casca D’Anta waterfall (20°18'05" D, 46°31'19" W, 850 m) | — | — | — |
| Vitreorana gorzulae | MHNLS 16036 | Venezuela: Estado Bolívar: Parque Nacional Canaima, Cuenca alta del río Cucurital, Atapare, (05°42' N, 62°33' W). | EU663343 | EU662984 | EU663079 |
| Vitreorana gorzulae | MHNLS 17325 | Venezuela: Estado Bolívar: Parque Nacional Canaima, Auyan-tepuy, Campamento Guayaraca (05°41’06’’ N, 62°31’32’’ W; 1005 m) | — | — | — |
| Vitreorana helenae | MHNLS 17139 | Venezuela: Estado Bolivar: Salto Karuay (05°41'27" N, 61°51'40" W; 990 m). | EU663372 | EU663012 | EU663106 |
| Vitreorana ritae | MB 165 | French Guiana: Terrain Comté (4°39' N, 52°21 W; 3 m) | — | EU663017 | — |
| Vitreorana ritae | MB 292 | French Guiana: Cayenne: Aya, Trinité (4°37' N, 53°25' W; 140 m) | EU663377 | — | EU663111 |
| Vitreorana uranoscopa ahora parvula | CFBHT13096 | Brazil: Rio de Janeiro, Rio de Janeiro (22.962 S, 43.289 W) | — | KU495614 | — |
| Vitreorana parvula | CFBH7610 | Brazil: Sao Paulo, Sao Luis do Paraitinga, PESM Santa Virginia | KY202833 | — | — |
| Vitreorana parvula | CFBHT1257 | Brazil: Sao Paulo, Sao Luis do Paraitinga, PESM Santa Virginia | KY202834 | — | — |
| Vitreorana parvula | MTR 15819 | Brazil: ES: Corrego do Viadinho, PARNA Caparaó | — | — | — |
| Vitreorana parvula | UFRGS 4381 | Brazil: RGS: Nononai, rio Baú, near by the Albano-Machado hydroelectric | KF639776 | — | — |

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| Vitreorana parvula | UFRGS 4380/MAR 180 | Brazil: RGS: Nononai, rio Baú, near by the Albano-Machado hydroelectric | — | KF639775 | — |
| Allophryne relicta | CFBH 29209 | Brazil: State of Bahia: Urucuca (14°35' S, 39°17' W, 90 m) | KF582053 | KF582053 | — |
| Allophryne resplendens | MZUNAP-01-605 | Peru: Departamento Loreto: Provincia Ramon Castilla: Rio Yavari, Lago Preto (4°27'35.0'' S, 71°45'3.5'' W; 120 m) | JQ436697 | JQ436698 | — |
| Allophryne ruthveni | MAD 1852 | Guyana: Pakatau Creek Camp | AY819328 | — | AY819458 |
| Allophryne ruthveni | MAD 1857 | Guyana: Pakatau Creek Camp | — | EU662973 | — |

**TABLE S3:** Average values of temperature, precipitation, elevation and surface for each species in each SSP and GCM

| Species | Present | | CMCC_ESM2_245 | | GISS_E2_1_G_245 | | CMCC_ESM2_370 | | GISS_E2_1_G_370 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | min | max | min | max | min | max | min | max | min | max |
| *Celsiella_revocata* | 16.2 | 21.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Celsiella_vozmedianoi* | 22.7 | 24.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Centrolene_altitudinalis* | 13.8 | 15.8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Centrolene_ballux* | 11.7 | 20 | 12.1 | 19.9 | 7.1 | 22.3 | 14.8 | 19.6 | 5.1 | 23.2 |
| *Centrolene_buckleyi* | 6.2 | 18.1 | 6.8 | 17.8 | 6.7 | 17.8 | 7 | 17.5 | 6.8 | 17.8 |
| *Centrolene_charapita* | 21.7 | 23.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Centrolene_condor* | 16.9 | 19.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Centrolene_geckoidea* | 11.2 | 20.5 | 12.1 | 20.1 | 13.8 | 20.6 | 12.3 | 20.3 | 12.4 | 20.7 |
| *Centrolene_heloderma* | 11 | 17.5 | 12.1 | 17.6 | 10.8 | 17.8 | 13 | 17.2 | 11.2 | 17.5 |
| *Centrolene_hesperium* | 15.3 | 17.9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Centrolene_huilensis* | 16 | 21.7 | 16.6 | 21.6 | 15.9 | 19.4 | 17.4 | 20.3 | 15.8 | 19.8 |
| *Centrolene_lynchi* | 14 | 19.7 | 16.4 | 19.9 | 15.8 | 19.8 | 17.9 | 19.6 | 14.7 | 19.7 |
| *Centrolene_medemi* | 16.8 | 22.4 | 0 | 0 | 16.5 | 24.4 | 0 | 0 | 16.2 | 20.8 |
| *Centrolene_petrophilum* | 14 | 27.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Centrolene_pipilata* | 16.3 | 18.7 | 0 | 0 | 15.2 | 18.8 | 0 | 0 | 15.3 | 18.8 |
| *Centrolene_quindianum* | 13.8 | 18.2 | 15.4 | 17.8 | 14.1 | 17.9 | 15.5 | 17.8 | 14.8 | 17.8 |
| *Centrolene_sabini* | 10.6 | 10.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Centrolene_sanchezi* | 9.5 | 22 | 13.1 | 17.5 | 10.5 | 17.8 | 13.5 | 18 | 11.1 | 17.7 |
| *Centrolene_solitaria* | 16.8 | 21.7 | 17 | 21.5 | 17.6 | 20.7 | 18.6 | 19.9 | 14 | 20.5 |
| *Cochranella_duidaeana* | 19 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Cochranella_euhystrix* | 14.8 | 15.3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Cochranella_litoralis* | 22.7 | 26.1 | 26.1 | 28.1 | 22.9 | 28.2 | 27.6 | 28.4 | 22.7 | 28.5 |
| *Cochranella_riveroi* | 24.6 | 24.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Cochranella_xanthocheridia* | 12.7 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Hyalinobatrachium_anachoretus* | 14 | 18.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Hyalinobatrachium_duranti* | 13.7 | 17.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Hyalinobatrachium_esmeralda* | 6.8 | 24.6 | 9.4 | 24.2 | 9.4 | 24.1 | 10.4 | 23.9 | 10.1 | 24.2 |
| *Hyalinobatrachium_guairarepanense* | 15.6 | 20.4 | 17.2 | 20.7 | 17.5 | 20.4 | 17.2 | 20.5 | 18 | 20.1 |
| *Hyalinobatrachium_orientale* | 14.8 | 28.4 | 17.1 | 30 | 17.1 | 30.4 | 17.2 | 30.1 | 17.6 | 30.8 |
| *Hyalinobatrachium_orocostale* | 20.6 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Hyalinobatrachium_yaku* | 22.5 | 24.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Ikakogi_tayrona* | 14.1 | 26.2 | 12.6 | 25.8 | 15 | 24.8 | 8.1 | 25.6 | 4.5 | 24.6 |
| *Nymphargus_anomalus* | 14.1 | 20.5 | 14.9 | 18.4 | 14.5 | 20.3 | 13.5 | 18.8 | 13.6 | 19.6 |
| *Nymphargus_armatus* | 15.9 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_balionotus* | 14.3 | 22.2 | 0 | 0 | 18 | 20.2 | 0 | 0 | 18.4 | 20.6 |
| *Nymphargus_bejaranoi* | 14.1 | 19 | 0 | 0 | 14.9 | 19.5 | 0 | 0 | 14.8 | 19.5 |
| *Nymphargus_buenaventura* | 16.7 | 25.1 | 22.2 | 25.6 | 22 | 27.1 | 21.5 | 25.4 | 23.1 | 26.8 |
| *Nymphargus_cariticommatus* | 12.1 | 21.3 | 0 | 0 | 12.6 | 19.5 | 0 | 0 | 12.9 | 17.7 |
| *Nymphargus_caucanus* | 17.2 | 20.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_chancas* | 22.1 | 24.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_colomai* | 22.5 | 22.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_cristinae* | 15.1 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_garciae* | 6.2 | 17.5 | 7.4 | 15.8 | 7.4 | 15.7 | 9.4 | 15.6 | 3.6 | 16.3 |
| *Nymphargus_lasgralarias* | 15.4 | 18.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_laurae* | 17.1 | 23.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_lindae* | 22.5 | 22.5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_luminosus* | 17.6 | 24.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_luteopunctatus* | 18.7 | 19.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_manduriacu* | 18.7 | 18.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_megacheirus* | 14.1 | 18.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_megistus* | 12 | 21.5 | 0 | 0 | 18.8 | 19.6 | 0 | 0 | 17.8 | 19.5 |
| *Nymphargus_mixomaculatus* | 12.4 | 17.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_phenax* | 16.9 | 23.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_pluvialis* | 12.5 | 21.2 | 17.4 | 23.9 | 16.8 | 23.5 | 18.3 | 22.9 | 16.7 | 22.6 |
| *Nymphargus_prasinus* | 16 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_rosada* | 10.6 | 22.7 | 13.1 | 22.3 | 16.1 | 22.5 | 18.1 | 22.2 | 16.6 | 22 |
| *Nymphargus_ruizi* | 9.7 | 24.4 | 11.7 | 26.7 | 11 | 25.4 | 15.6 | 30.3 | 11.5 | 25.3 |
| *Nymphargus_siren* | 9 | 18.7 | 10.7 | 18.4 | 10.1 | 18.8 | 10.8 | 18.5 | 10.4 | 18.9 |
| *Nymphargus_sucre* | 13.7 | 13.7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_truebae* | 12.5 | 23.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_wileyi* | 9.5 | 15.4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Rulyrana_adiazeta* | 15.7 | 26.5 | 18 | 23.7 | 18 | 23.9 | 18.4 | 23.8 | 18.6 | 24.1 |
| *Rulyrana_saxiscandens* | 24 | 25.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Sachatamia_electrops* | 16.4 | 24.5 | 17.3 | 26.1 | 18.5 | 23.8 | 18.5 | 25.3 | 20.6 | 24.3 |
| *Sachatamia_punctulata* | 18.7 | 27.7 | 13.1 | 30.2 | 22.1 | 28.8 | 21.1 | 29.3 | 18.7 | 28.9 |
| *Vitreorana_antisthenesi* | 18.6 | 26.7 | 20.7 | 21.9 | 10 | 24.4 | 10.2 | 20.7 | 7.6 | 26 |
| *Vitreorana_castroviejoi* | 23.8 | 25.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Vitreorana_helenae* | 21.5 | 25.3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Vitreorana_parvula* | 10.9 | 24.7 | 13.9 | 25 | 12.9 | 26.9 | 13.4 | 25.2 | 13.3 | 27.4 |

| Species | Present | | CMCC_ESM2_245 | | GISS_E2_1_G_245 | | CMCC_ESM2_370 | | GISS_E2_1_G_370 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | min | max | min | max | min | max | min | max | min | max |
| *Celsiella_revocata* | 974 | 1079 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Celsiella_vozmedianoi* | 1200 | 1289 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Centrolene_altitudinalis* | 1000 | 1090 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Centrolene_ballux* | 856 | 2636 | 777 | 2400 | 652 | 2821 | 803 | 2173 | 710 | 2940 |
| *Centrolene_buckleyi* | 470 | 2913 | 466 | 2931 | 612 | 3195 | 425 | 2773 | 661 | 3230 |
| *Centrolene_charapita* | 1501 | 1757 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Centrolene_condor* | 1318 | 1623 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Centrolene_geckoidea* | 1132 | 3333 | 1155 | 2874 | 1156 | 3033 | 1253 | 2741 | 1098 | 2994 |
| *Centrolene_heloderma* | 795 | 2661 | 774 | 2459 | 661 | 2047 | 801 | 2428 | 777 | 2619 |
| *Centrolene_hesperium* | 537 | 798 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Centrolene_huilensis* | 1501 | 2003 | 1347 | 1862 | 896 | 1846 | 1505 | 1758 | 839 | 2128 |
| *Centrolene_lynchi* | 1274 | 2706 | 1310 | 2400 | 1363 | 2799 | 1516 | 2180 | 1296 | 2842 |
| *Centrolene_medemi* | 1872 | 2509 | 0 | 0 | 1875 | 2668 | 0 | 0 | 1836 | 2576 |
| *Centrolene_petrophilum* | 1179 | 2801 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Centrolene_pipilata* | 2198 | 3001 | 0 | 0 | 2054 | 2742 | 0 | 0 | 2078 | 2793 |
| *Centrolene_quindianum* | 1693 | 2863 | 2077 | 2690 | 1827 | 2785 | 2079 | 2570 | 1916 | 2889 |
| *Centrolene_sabini* | 566 | 566 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Centrolene_sanchezi* | 1327 | 3170 | 1972 | 2845 | 1814 | 3563 | 1632 | 2712 | 1859 | 3603 |
| *Centrolene_solitaria* | 1450 | 2237 | 1432 | 1862 | 1582 | 2190 | 1518 | 1643 | 1416 | 2405 |
| *Cochranella_duidaeana* | 2918 | 2918 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Cochranella_euhystrix* | 798 | 1031 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Cochranella_litoralis* | 2099 | 2766 | 2151 | 2806 | 2144 | 3667 | 2393 | 2741 | 2114 | 3812 |
| *Cochranella_riveroi* | 2758 | 2758 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Cochranella_xanthocheridia* | 2153 | 2829 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Hyalinobatrachium_anachoretus* | 1129 | 1169 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Hyalinobatrachium_duranti* | 946 | 1129 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Hyalinobatrachium_esmeralda* | 1963 | 3651 | 1775 | 3423 | 1766 | 3260 | 1744 | 3153 | 1696 | 3284 |
| *Hyalinobatrachium_guairarepanense* | 863 | 1136 | 833 | 1022 | 770 | 943 | 834 | 1033 | 755 | 869 |
| *Hyalinobatrachium_orientale* | 461 | 2337 | 450 | 2152 | 402 | 2083 | 459 | 2129 | 367 | 1878 |
| *Hyalinobatrachium_orocostale* | 1079 | 1122 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Hyalinobatrachium_yaku* | 3585 | 4216 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Ikakogi_tayrona* | 1088 | 1931 | 1300 | 1880 | 1220 | 1877 | 1244 | 1882 | 1213 | 1558 |
| *Nymphargus_anomalus* | 1439 | 3989 | 1894 | 2533 | 1935 | 3524 | 1822 | 2712 | 2157 | 3367 |
| *Nymphargus_armatus* | 2046 | 2748 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_balionotus* | 1564 | 2706 | 0 | 0 | 1981 | 2956 | 0 | 0 | 2095 | 2957 |
| *Nymphargus_bejaranoi* | 652 | 2262 | 0 | 0 | 732 | 1522 | 0 | 0 | 803 | 1431 |
| *Nymphargus_buenaventura* | 621 | 1096 | 804 | 1212 | 781 | 1340 | 716 | 1099 | 943 | 1482 |
| *Nymphargus_cariticommatus* | 1082 | 1676 | 0 | 0 | 1078 | 1655 | 0 | 0 | 1141 | 1953 |
| *Nymphargus_caucanus* | 2507 | 2572 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_chancas* | 1336 | 1652 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_colomai* | 1676 | 1676 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_cristinae* | 2301 | 2592 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_garciae* | 1134 | 2314 | 1142 | 2391 | 886 | 2331 | 1112 | 1701 | 946 | 2662 |
| *Nymphargus_lasgralarias* | 1036 | 2185 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_laurae* | 2229 | 3870 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_lindae* | 1676 | 1676 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_luminosus* | 2403 | 3202 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_luteopunctatus* | 2372 | 2510 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_manduriacu* | 2134 | 2134 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_megacheirus* | 1766 | 2607 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_megistus* | 1729 | 3035 | 0 | 0 | 2082 | 2316 | 0 | 0 | 2146 | 2711 |
| *Nymphargus_mixomaculatus* | 717 | 1007 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_phenax* | 1013 | 3128 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_pluvialis* | 452 | 1663 | 1211 | 1799 | 499 | 1803 | 1293 | 1600 | 515 | 1680 |
| *Nymphargus_prasinus* | 1627 | 3462 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_rosada* | 2225 | 3727 | 2349 | 3423 | 2481 | 3338 | 2392 | 3153 | 2474 | 3234 |
| *Nymphargus_ruizi* | 1495 | 3912 | 1437 | 3807 | 1531 | 3267 | 2113 | 2610 | 1463 | 3755 |
| *Nymphargus_siren* | 1400 | 3447 | 1406 | 2407 | 1346 | 3017 | 1447 | 2316 | 1404 | 3054 |
| *Nymphargus_sucre* | 1106 | 1106 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_truebae* | 514 | 3141 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_wileyi* | 1392 | 2226 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Rulyrana_adiazeta* | 1681 | 2650 | 1366 | 2613 | 1539 | 2791 | 1426 | 2732 | 1458 | 2676 |
| *Rulyrana_saxiscandens* | 1622 | 1756 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Sachatamia_electrops* | 2396 | 3100 | 2333 | 3203 | 2457 | 3203 | 2360 | 3064 | 2507 | 3149 |
| *Sachatamia_punctulata* | 2157 | 3321 | 2034 | 3388 | 2075 | 3335 | 2052 | 3331 | 2064 | 3179 |
| *Vitreorana_antisthenesi* | 730 | 1319 | 814 | 914 | 755 | 912 | 816 | 982 | 713 | 897 |
| *Vitreorana_castroviejoi* | 1289 | 1692 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Vitreorana_helenae* | 1683 | 2427 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Vitreorana_parvula* | 1270 | 3153 | 1507 | 3223 | 1457 | 3259 | 1524 | 3112 | 1489 | 3276 |

| Species | Present | | CMCC_ESM2_245 | | GISS_E2_1_G_245 | | CMCC_ESM2_370 | | GISS_E2_1_G_370 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | min | max | min | max | min | max | min | max | min | max |
| *Celsiella_revocata* | 648 | 2284 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Celsiella_vozmedianoi* | 143 | 1100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Centrolene_altitudinalis* | 1735 | 3544 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Centrolene_ballux* | 876 | 3471 | 1081 | 3879 | 940 | 4426 | 1081 | 3438 | 897 | 4612 |
| *Centrolene_buckleyi* | 806 | 4041 | 806 | 4390 | 813 | 4480 | 813 | 4355 | 813 | 4615 |
| *Centrolene_charapita* | 507 | 1518 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Centrolene_condor* | 946 | 2674 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Centrolene_geckoidea* | 601 | 3565 | 806 | 3710 | 806 | 3629 | 806 | 3710 | 806 | 3710 |
| *Centrolene_heloderma* | 806 | 3565 | 1421 | 3956 | 1348 | 4113 | 1421 | 3843 | 1386 | 4113 |
| *Centrolene_hesperium* | 1171 | 3045 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Centrolene_huilensis* | 936 | 2667 | 921 | 2813 | 1203 | 3374 | 1610 | 2813 | 1293 | 3442 |
| *Centrolene_lynchi* | 735 | 3013 | 1081 | 2900 | 1081 | 3306 | 1081 | 2751 | 1081 | 3547 |
| *Centrolene_medemi* | 640 | 2382 | 0 | 0 | 672 | 3073 | 0 | 0 | 1477 | 3022 |
| *Centrolene_petrophilum* | 236 | 3289 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Centrolene_pipilata* | 1103 | 2457 | 0 | 0 | 1511 | 3184 | 0 | 0 | 1547 | 3184 |
| *Centrolene_quindianum* | 1304 | 3040 | 1468 | 3565 | 806 | 3710 | 1468 | 3565 | 1474 | 3710 |
| *Centrolene_sabini* | 2825 | 3715 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Centrolene_sanchezi* | 848 | 3538 | 1723 | 3538 | 1915 | 3634 | 1723 | 3538 | 1915 | 3725 |
| *Centrolene_solitaria* | 847 | 2479 | 962 | 2759 | 1049 | 3001 | 1571 | 2709 | 1049 | 3703 |
| *Cochranella_duidaeana* | 543 | 2123 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Cochranella_euhystrix* | 1663 | 3083 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Cochranella_litoralis* | 0 | 633 | 0 | 489 | 0 | 1138 | 0 | 156 | 0 | 1484 |
| *Cochranella_riveroi* | 526 | 669 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Cochranella_xanthocheridia* | 583 | 3900 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Hyalinobatrachium_anachoretus* | 1554 | 2906 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Hyalinobatrachium_duranti* | 1453 | 3680 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Hyalinobatrachium_esmeralda* | 408 | 3729 | 816 | 3823 | 796 | 3902 | 801 | 3802 | 801 | 3802 |
| *Hyalinobatrachium_guairarepanense* | 475 | 2467 | 575 | 3285 | 575 | 3285 | 575 | 3206 | 927 | 2467 |
| *Hyalinobatrachium_orientale* | 0 | 2697 | 0 | 2653 | 0 | 2467 | 0 | 2648 | 0 | 2467 |
| *Hyalinobatrachium_orocostale* | 487 | 1412 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Hyalinobatrachium_yaku* | 295 | 847 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Ikakogi_tayrona* | 29 | 3054 | 330 | 3758 | 510 | 3758 | 330 | 4227 | 632 | 4725 |
| *Nymphargus_anomalus* | 716 | 3224 | 1551 | 3310 | 1144 | 3538 | 1551 | 3538 | 1144 | 3538 |
| *Nymphargus_armatus* | 1136 | 2567 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_balionotus* | 525 | 2751 | 0 | 0 | 1081 | 2751 | 0 | 0 | 1081 | 2751 |
| *Nymphargus_bejaranoi* | 1080 | 3596 | 0 | 0 | 1380 | 4061 | 0 | 0 | 1609 | 4068 |
| *Nymphargus_buenaventura* | 88 | 2284 | 158 | 2023 | 195 | 1889 | 158 | 2023 | 158 | 1773 |
| *Nymphargus_cariticommatus* | 864 | 3517 | 0 | 0 | 1699 | 3918 | 0 | 0 | 1611 | 3769 |
| *Nymphargus_caucanus* | 1112 | 2607 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_chancas* | 436 | 1432 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_colomai* | 1039 | 1518 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_cristinae* | 1481 | 3582 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_garciae* | 1604 | 4574 | 2030 | 4515 | 2030 | 4604 | 2063 | 4259 | 2030 | 4949 |
| *Nymphargus_lasgralarias* | 1293 | 2663 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_laurae* | 433 | 2326 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_lindae* | 1039 | 1518 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_luminosus* | 622 | 2591 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_luteopunctatus* | 1291 | 2065 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_manduriacu* | 959 | 1585 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_megacheirus* | 1144 | 2592 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_megistus* | 489 | 3629 | 0 | 0 | 1095 | 2716 | 0 | 0 | 1285 | 2930 |
| *Nymphargus_mixomaculatus* | 1943 | 3596 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_phenax* | 630 | 3018 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_pluvialis* | 1033 | 3662 | 868 | 4159 | 1079 | 4159 | 1304 | 3866 | 1127 | 4159 |
| *Nymphargus_prasinus* | 883 | 2638 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_rosada* | 376 | 3472 | 719 | 3380 | 650 | 3087 | 825 | 3087 | 818 | 3104 |
| *Nymphargus_ruizi* | 174 | 3909 | 261 | 3795 | 996 | 4039 | 97 | 3078 | 1006 | 4039 |
| *Nymphargus_siren* | 1013 | 3862 | 1309 | 3722 | 1403 | 4030 | 1547 | 4079 | 1570 | 4030 |
| *Nymphargus_sucre* | 2151 | 2904 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_truebae* | 630 | 3354 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Nymphargus_wileyi* | 2006 | 3458 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Rulyrana_adiazeta* | 191 | 2960 | 949 | 3023 | 564 | 2769 | 949 | 2765 | 564 | 3023 |
| *Rulyrana_saxiscandens* | 317 | 1039 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Sachatamia_electrops* | 345 | 2398 | 572 | 3129 | 756 | 2664 | 644 | 2513 | 891 | 2336 |
| *Sachatamia_punctulata* | 149 | 2648 | 0 | 0 | 198 | 2449 | 164 | 2286 | 237 | 2449 |
| *Vitreorana_antisthenesi* | 0 | 2177 | 752 | 2177 | 448 | 4135 | 883 | 4135 | 287 | 4479 |
| *Vitreorana_castroviejoi* | 0 | 1100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Vitreorana_helenae* | 89 | 1401 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Vitreorana_parvula* | 0 | 2703 | 0 | 2703 | 0 | 2703 | 0 | 2703 | 0 | 2703 |

| Species | Present | CMCC_ESM2_245 | GISS_E2_1_G_245 | CMCC_ESM2_370 | GISS_E2_1_G_370 |
|---|---|---|---|---|---|
| *Celsiella_revocata* | 63.11 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Celsiella_vozmedianoi* | 42.02 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Centrolene_altitudinalis* | 84.54 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Centrolene_ballux* | 4444.66 | 1859.12 | 2435.71 | 470.11 | 2606.63 |
| *Centrolene_buckleyi* | 92351.66 | 66536.29 | 71152.65 | 57843.91 | 63832.88 |
| *Centrolene_charapita* | 85.22 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Centrolene_condor* | 639.93 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Centrolene_geckoidea* | 17412.72 | 7789.31 | 9976.50 | 7853.91 | 10209.94 |
| *Centrolene_heloderma* | 6278.68 | 2178.63 | 3375.69 | 1708.88 | 2392.83 |
| *Centrolene_hesperium* | 42.44 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Centrolene_huilensis* | 1986.11 | 2498.89 | 470.14 | 512.52 | 683.83 |
| *Centrolene_lynchi* | 3760.88 | 1025.72 | 1559.90 | 555.59 | 1175.26 |
| *Centrolene_medemi* | 661.99 | 0.00 | 555.08 | 0.00 | 918.16 |
| *Centrolene_petrophilum* | 85.10 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Centrolene_pipilata* | 555.61 | 0.00 | 1089.49 | 0.00 | 1238.81 |
| *Centrolene_quindianum* | 2834.00 | 831.10 | 2896.80 | 597.18 | 2791.23 |
| *Centrolene_sabini* | 20.82 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Centrolene_sanchezi* | 1581.03 | 170.94 | 2755.48 | 384.63 | 2605.90 |
| *Centrolene_solitaria* | 1858.14 | 897.02 | 235.01 | 128.07 | 833.20 |
| *Cochranella_duidaeana* | 21.34 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Cochranella_euhystrix* | 42.47 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Cochranella_litoralis* | 1922.91 | 1388.83 | 6709.71 | 1623.72 | 6859.43 |
| *Cochranella_riveroi* | 21.36 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Cochranella_xanthocheridia* | 63.74 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Hyalinobatrachium_anachoretus* | 42.49 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Hyalinobatrachium_duranti* | 359.04 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Hyalinobatrachium_esmeralda* | 5764.87 | 4592.45 | 7446.69 | 3847.55 | 7212.43 |
| *Hyalinobatrachium_guairarepanense* | 1766.25 | 967.50 | 694.14 | 841.15 | 336.42 |
| *Hyalinobatrachium_orientale* | 9949.64 | 4567.59 | 5642.04 | 4021.77 | 5831.26 |
| *Hyalinobatrachium_orocostale* | 42.12 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Hyalinobatrachium_yaku* | 106.84 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Ikakogi_tayrona* | 2624.22 | 1364.74 | 588.22 | 1512.13 | 525.05 |
| *Nymphargus_anomalus* | 4465.45 | 427.32 | 2264.44 | 747.80 | 1516.68 |
| *Nymphargus_armatus* | 63.89 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Nymphargus_balionotus* | 1388.93 | 0.00 | 213.69 | 0.00 | 149.58 |
| *Nymphargus_bejaranoi* | 4106.98 | 0.00 | 1777.04 | 0.00 | 1041.99 |
| *Nymphargus_buenaventura* | 1087.96 | 768.21 | 1322.65 | 853.59 | 874.74 |
| *Nymphargus_cariticommatus* | 3134.68 | 0.00 | 2366.45 | 0.00 | 2475.13 |
| *Nymphargus_caucanus* | 42.70 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Nymphargus_chancas* | 84.94 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Nymphargus_colomai* | 21.31 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Nymphargus_cristinae* | 63.74 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Nymphargus_garciae* | 7833.87 | 7125.21 | 6790.47 | 3627.16 | 13133.12 |
| *Nymphargus_lasgralarias* | 213.70 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Nymphargus_laurae* | 42.74 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Nymphargus_lindae* | 21.31 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Nymphargus_luminosus* | 106.14 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Nymphargus_luteopunctatus* | 42.70 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Nymphargus_manduriacu* | 21.37 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Nymphargus_megacheirus* | 85.48 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Nymphargus_megistus* | 960.37 | 0.00 | 85.23 | 0.00 | 234.24 |
| *Nymphargus_mixomaculatus* | 42.14 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Nymphargus_phenax* | 41.70 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Nymphargus_pluvialis* | 1436.52 | 2685.82 | 1686.22 | 769.85 | 1228.08 |
| *Nymphargus_prasinus* | 170.29 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Nymphargus_rosada* | 13437.39 | 6736.74 | 7322.97 | 1530.52 | 3473.00 |
| *Nymphargus_ruizi* | 3457.48 | 3201.51 | 3736.48 | 789.63 | 4163.68 |
| *Nymphargus_siren* | 7669.60 | 6045.36 | 7027.03 | 5788.91 | 7368.40 |
| *Nymphargus_sucre* | 21.34 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Nymphargus_truebae* | 166.64 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Nymphargus_wileyi* | 42.74 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Rulyrana_adiazeta* | 6339.53 | 6127.32 | 4935.74 | 5509.79 | 4000.09 |
| *Rulyrana_saxiscandens* | 42.48 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Sachatamia_electrops* | 3102.66 | 4652.66 | 1254.33 | 1444.48 | 637.75 |
| *Sachatamia_punctulata* | 8042.20 | 16448.17 | 7666.02 | 10855.51 | 8304.18 |
| *Vitreorana_antisthenesi* | 1114.76 | 63.10 | 315.72 | 126.70 | 653.05 |
| *Vitreorana_castroviejoi* | 63.02 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Vitreorana_helenae* | 191.55 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Vitreorana_parvula* | 77952.83 | 46557.69 | 39479.70 | 35947.00 | 35394.74 |
| Total | 304639 | 197507 | 205827 | 149892 | 194702 |

**TABLE S4:** Number of species per ecoregion for present and future scenarios

| Current Scenario | |
|---|---|
| Biome | Species |
| Alto Paraná Atlantic forests | 1 |
| Amazon-Orinoco-Southern Caribbean mangroves | 2 |
| Apure-Villavicencio dry forests | 1 |
| Araucaria moist forests | 1 |
| Araya and Paria xeric scrub | 2 |
| Atlantic Coast restingas | 1 |
| Bahamian-Antillean mangroves | 1 |
| Bahia coastal forests | 1 |
| Bahia interior forests | 1 |
| Bolivian montane dry forests | 1 |
| Bolivian Yungas | 2 |
| Campos Rupestres montane savanna | 1 |
| Caribbean shrublands | 1 |
| Cauca Valley dry forests | 5 |
| Cauca Valley montane forests | 17 |
| Central Andean puna | 1 |
| Central Andean wet puna | 1 |
| Cerrado | 1 |
| Chocó-Darién moist forests | 5 |
| Cordillera Central páramo | 2 |
| Cordillera de Merida páramo | 3 |
| Cordillera La Costa montane forests | 6 |
| Cordillera Oriental montane forests | 10 |
| Eastern Cordillera Real montane forests | 25 |
| Guajira-Barranquilla xeric scrub | 1 |
| Guianan Highlands moist forests | 3 |
| Guianan lowland moist forests | 1 |
| Guianan savanna | 1 |
| La Costa xeric shrublands | 5 |
| Lara-Falcón dry forests | 1 |
| Lesser Antillean dry forests | 1 |
| Magdalena Valley dry forests | 8 |
| Magdalena Valley montane forests | 16 |
| Magdalena-Urabá moist forests | 1 |
| Marañón dry forests | 2 |
| Napo moist forests | 3 |
| Northern Andean páramo | 16 |
| Northwest Andean montane forests | 29 |
| Pantepui forests & shrublands | 2 |

| | |
|---|---|
| Patía valley dry forests | 3 |
| Peruvian Yungas | 10 |
| Santa Marta montane forests | 1 |
| Santa Marta páramo | 1 |
| Serra do Mar coastal forests | 1 |
| Sinú Valley dry forests | 1 |
| South American Pacific mangroves | 1 |
| Southern Andean Yungas | 1 |
| Southern Atlantic Brazilian mangroves | 1 |
| Southwest Amazon moist forests | 2 |
| Trinidad and Tobago dry forest | 1 |
| Trinidad and Tobago moist forest | 1 |
| Tumbes-Piura dry forests | 1 |
| Ucayali moist forests | 2 |
| Uruguayan savanna | 1 |
| Venezuelan Andes montane forests | 4 |
| Western Ecuador moist forests | 1 |
| Windward Islands moist forests | 1 |

| Scenario SSP245: CMCC-ESM2 | |
|---|---|
| Biome | Species |
| Alto Paraná Atlantic forests | 1 |
| Amazon-Orinoco-Southern Caribbean mangroves | 1 |
| Araucaria moist forests | 1 |
| Bahamian-Antillean mangroves | 1 |
| Bahia interior forests | 1 |
| Campos Rupestres montane savanna | 1 |
| Caribbean shrublands | 1 |
| Cauca Valley dry forests | 4 |
| Cauca Valley montane forests | 11 |
| Central Andean puna | 1 |
| Central Andean wet puna | 1 |
| Chocó-Darién moist forests | 5 |
| Cordillera Central páramo | 1 |
| Cordillera de Merida páramo | 2 |
| Cordillera La Costa montane forests | 3 |
| Cordillera Oriental montane forests | 7 |
| Eastern Cordillera Real montane forests | 11 |
| Guajira-Barranquilla xeric scrub | 1 |
| Guianan lowland moist forests | 1 |
| La Costa xeric shrublands | 3 |
| Lesser Antillean dry forests | 1 |

| | |
|---|---|
| Magdalena Valley dry forests | 2 |
| Magdalena Valley montane forests | 14 |
| Magdalena-Urabá moist forests | 1 |
| Marañón dry forests | 1 |
| Napo moist forests | 1 |
| Northern Andean páramo | 10 |
| Northwest Andean montane forests | 15 |
| Pantepui forests & shrublands | 1 |
| Patía valley dry forests | 1 |
| Peruvian Yungas | 2 |
| Santa Marta montane forests | 2 |
| Santa Marta páramo | 2 |
| Serra do Mar coastal forests | 1 |
| Sinú Valley dry forests | 1 |
| South American Pacific mangroves | 1 |
| Southern Atlantic Brazilian mangroves | 1 |
| Trinidad and Tobago dry forest | 1 |
| Trinidad and Tobago moist forest | 1 |
| Tumbes-Piura dry forests | 1 |
| Venezuelan Andes montane forests | 2 |
| Western Ecuador moist forests | 1 |
| Windward Islands moist forests | 1 |

| Scenario SSP245: GISS-E2-1-G | |
|---|---|
| Biome | Species |
| Alto Paraná Atlantic forests | 1 |
| Amazon-Orinoco-Southern Caribbean mangroves | 1 |
| Araucaria moist forests | 1 |
| Atlantic Coast restingas | 1 |
| Bahamian-Antillean mangroves | 1 |
| Bahia coastal forests | 1 |
| Bahia interior forests | 1 |
| Bolivian montane dry forests | 1 |
| Bolivian Yungas | 1 |
| Campos Rupestres montane savanna | 1 |
| Caqueta moist forests | 1 |
| Caribbean shrublands | 1 |
| Cauca Valley dry forests | 3 |
| Cauca Valley montane forests | 16 |
| Central Andean puna | 2 |
| Central Andean wet puna | 1 |
| Chocó-Darién moist forests | 4 |

| | |
|---|---|
| Cordillera Central páramo | 4 |
| Cordillera de Merida páramo | 3 |
| Cordillera La Costa montane forests | 3 |
| Cordillera Oriental montane forests | 9 |
| Eastern Cordillera Real montane forests | 19 |
| Ecuadorian dry forests | 1 |
| Guajira-Barranquilla xeric scrub | 1 |
| Guianan lowland moist forests | 1 |
| La Costa xeric shrublands | 3 |
| Lesser Antillean dry forests | 1 |
| Magdalena Valley dry forests | 4 |
| Magdalena Valley montane forests | 15 |
| Marañón dry forests | 1 |
| Napo moist forests | 2 |
| Northern Andean páramo | 15 |
| Northwest Andean montane forests | 22 |
| Patía valley dry forests | 2 |
| Peruvian Yungas | 3 |
| Santa Marta montane forests | 2 |
| Santa Marta páramo | 2 |
| Serra do Mar coastal forests | 1 |
| Sinú Valley dry forests | 1 |
| South American Pacific mangroves | 1 |
| Southern Atlantic Brazilian mangroves | 1 |
| Trinidad and Tobago dry forest | 1 |
| Trinidad and Tobago moist forest | 1 |
| Tumbes-Piura dry forests | 1 |
| Venezuelan Andes montane forests | 3 |
| Western Ecuador moist forests | 1 |
| Windward Islands moist forests | 1 |

| Scenario SSP370: CMCC-ESM2 | |
|---|---|
| Biome | Species |
| Alto Paraná Atlantic forests | 1 |
| Amazon-Orinoco-Southern Caribbean mangroves | 1 |
| Araucaria moist forests | 1 |
| Bahamian-Antillean mangroves | 1 |
| Bahia interior forests | 1 |
| Campos Rupestres montane savanna | 1 |
| Caribbean shrublands | 1 |
| Cauca Valley dry forests | 2 |
| Cauca Valley montane forests | 11 |

| | |
|---|---|
| Central Andean puna | 1 |
| Central Andean wet puna | 1 |
| Chocó-Darién moist forests | 5 |
| Cordillera Central páramo | 1 |
| Cordillera de Merida páramo | 3 |
| Cordillera La Costa montane forests | 3 |
| Cordillera Oriental montane forests | 6 |
| Eastern Cordillera Real montane forests | 9 |
| Guajira-Barranquilla xeric scrub | 1 |
| Guianan lowland moist forests | 1 |
| La Costa xeric shrublands | 2 |
| Lesser Antillean dry forests | 1 |
| Magdalena Valley dry forests | 1 |
| Magdalena Valley montane forests | 13 |
| Magdalena-Urabá moist forests | 2 |
| Napo moist forests | 1 |
| Northern Andean páramo | 10 |
| Northwest Andean montane forests | 14 |
| Pantepui forests & shrublands | 1 |
| Patía valley dry forests | 1 |
| Peruvian Yungas | 2 |
| Santa Marta montane forests | 1 |
| Santa Marta páramo | 1 |
| Serra do Mar coastal forests | 1 |
| Sinú Valley dry forests | 1 |
| South American Pacific mangroves | 1 |
| Southern Atlantic Brazilian mangroves | 1 |
| Trinidad and Tobago dry forest | 1 |
| Trinidad and Tobago moist forest | 1 |
| Tumbes-Piura dry forests | 1 |
| Venezuelan Andes montane forests | 4 |
| Western Ecuador moist forests | 1 |
| Windward Islands moist forests | 1 |

| Scenario SSP370: GISS-E2-1-G | |
|---|---|
| Biome | Species |
| Alto Paraná Atlantic forests | 1 |
| Amazon-Orinoco-Southern Caribbean mangroves | 1 |
| Araucaria moist forests | 1 |
| Atlantic Coast restingas | 1 |
| Bahamian-Antillean mangroves | 1 |

| | |
|---|---|
| Bahia coastal forests | 1 |
| Bahia interior forests | 1 |
| Bolivian montane dry forests | 1 |
| Bolivian Yungas | 1 |
| Campos Rupestres montane savanna | 1 |
| Caqueta moist forests | 1 |
| Caribbean shrublands | 1 |
| Cauca Valley dry forests | 2 |
| Cauca Valley montane forests | 17 |
| Central Andean puna | 2 |
| Central Andean wet puna | 1 |
| Chocó-Darién moist forests | 5 |
| Cordillera Central páramo | 3 |
| Cordillera de Merida páramo | 2 |
| Cordillera La Costa montane forests | 3 |
| Cordillera Oriental montane forests | 8 |
| Eastern Cordillera Real montane forests | 18 |
| Ecuadorian dry forests | 1 |
| Guianan lowland moist forests | 1 |
| La Costa xeric shrublands | 2 |
| Lara-Falcón dry forests | 2 |
| Lesser Antillean dry forests | 1 |
| Magdalena Valley dry forests | 3 |
| Magdalena Valley montane forests | 17 |
| Napo moist forests | 2 |
| Northern Andean páramo | 15 |
| Northwest Andean montane forests | 24 |
| Patía valley dry forests | 2 |
| Peruvian Yungas | 2 |
| Santa Marta montane forests | 2 |
| Santa Marta páramo | 2 |
| Serra do Mar coastal forests | 1 |
| Sinú Valley dry forests | 1 |
| South American Pacific mangroves | 1 |
| Southern Atlantic Brazilian mangroves | 1 |
| Trinidad and Tobago dry forest | 1 |
| Trinidad and Tobago moist forest | 1 |
| Tumbes-Piura dry forests | 1 |
| Venezuelan Andes montane forests | 2 |
| Western Ecuador moist forests | 1 |
| Windward Islands moist forests | 1 |