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continued on the back inside cover

Caption: Malabar Slender Loris *Loris lydekkerianus malabaricus* © Dileep Anthikkad.

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ARTICLE

Argentinian odonates (dragonflies and damselflies): current and future distribution and discussion of their conservation

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Abstract: In terms of conservation, Argentinian odonates have not been assessed using a quantitative approach. One way to achieve this is by modelling their distribution to gather the extent of occurrence. Thus, we modelled the current and future (projected year, 2050) potential distribution of 44 odonate species that occur in Argentina as well as in neighboring countries. Our models of current times indicate a fairly wide distribution for most species but one exception is relevant for conservation purposes: *Lestes dichrostigma* has less than 30,000 km^2 and falls in the 'Near Threatened' category according to the IUCN Red List. Another seven species have less than or close to 100,000 km^2: *Elasmothemis cannacrioides, Erythemis credula, E. paraguayensis, Heteragrion angustipenne, H. inca, Lestes forficula*, and *Mecistogaster linearis.* Future distribution estimates suggest that: a) 12 species will lose or gain around 10%, four species will increase their distribution beyond 10% (up to 2,346%), and 28 species will lose more than 10% (up to 99%). Although current protected areas embrace most odonate species in Argentina, it is still premature to conclude whether this situation will remain in the future given the physiological tolerance and dispersal abilities of the study species among other drivers of distribution.

Keywords: Argentina, global change, IUCN, Odonata, potential distribution, status.

Resumen: En términos de conservación, los odonatos argentinos no han sido evaluados usando un enfoque cuantitativo. Una manera de hacer esto es modelando su distribución para obtener la extensión de la ocurrencia. En este trabajo modelamos la distribución actual y futura (año proyectado, 2050) de 44 especies de odonatos que se distribuyen en Argentina y países vecinos. Los modelos actuales indican una distribución amplia para la mayoría de especies aunque existe una excepción para propósitos de conservación: *Lestes dichrostigma* con menos de 30,000 km^2 y que cae en la categoría de "cercana a la amenaza" según la lista roja de la UICN. Otras siete especies tienen menos o cerca de 100,000 km^2: *Elasmothemis cannacrioides, Erythemis credula, E. paraguayensis, Heteragrion angustipenne, H. inca, Lestes forficula* y *Mecistogaster linearis.* Las estimas futuras sugieren que: a) 12 especies perderán o ganarán alrededor de 10% de área, cuatro especies incrementarán su distribución por más de 10% (hasta 2346 %), y 28 especies perderán más del 10% (hasta 99%). Aunque las áreas naturales protegidas actuales albergan la mayoría de especies en Argentina, es aún prematuro concluir que esta situación prevalecerá en el futuro dada la tolerancia fisiológica y capacidad de dispersión de las especies incluidas en este estudio así como otros efectores de su distribución.

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INTRODUCTION

Given their analytical strength, species distribution models have been widely used to assess the potential area where a species occurs as predicted by environmental variables (Peterson 2006). Odonates have not been an exception to this practice with at least 30 different studies in distinct world regions (reviewed by Collins & McIntyre 2015). Such interest is partly understood on the basis of the intrinsic threat that humankind has posed to freshwater bodies (e.g. Sala et al. 2000) related to the direct dependence of odonates on these bodies. Furthermore, a more recent analysis indicated that odonates can be used as the indicators of global change given their practicality as study models (i.e. large body size), well-described macro-ecological responses, key role as predators in aquatic and terrestrial habitats and their trend of becoming field-animal models for temperature-mediated responses (Hassall 2015). Paradoxically, our current knowledge of the extinction risk for most odonates is extremely limited. For example, the IUCN (2018) shows a shortage of species with strong geographical biases, with country-based assessments frequently lacking firm quantitative-supporting data (see for example, Paulson 2004). One case is that of Argentina: 86 species are listed of which one is 'Endangered', one is 'Vulnerable', two are 'Near Threatened', four are 'Data Deficient', and 78 are 'Least Concern' (IUCN 2018). This implies that a proper assessment is badly needed for this country.

Distribution models of odonates have provided clues of how current distribution will be affected by increases in temperature (reviewed by Collins & McIntyre 2015). These studies have covered up to 25% of the total world odonate diversity, and have shown that in general there will be shifts in distribution, with lotic species and narrow-distribution species (e.g., endemic) showing a tendency to have their areas reduced (reviewed by Collins & McIntyre 2015). In this paper, we have carried out an exercise of calculating current and future distribution models for Argentinian odonates to supplement current studies of distribution gathered from provincial records (e.g. Muzón et al. 2014, 2015; von Ellenrieder & Muzón 1999, 2008; von Ellenrieder 2009, 2010). Our analysis is based on a fraction of the 271 species currently known to occur in Argentina (Muzón & von Ellenrieder 1999; von Ellenrieder & Muzón 2008). Our aim is to use our assessment to guide the current IUCN risk categories for Argentinian odonates based on criteria A and B, that define extent of occurrence.

MATERIAL AND METHODS

Occurrence data of species

Presence of odonate species was compiled from literature records, GBIF records (www.gbif.org as of 20 December 2017; GBIF Occurrence Download http://doi.org/10.15468/dl.mf6nh7), and odonate specialists (Rosser Garrison, Natalia von Ellenrieder, and Dennis Paulson). All data were checked carefully for geographic accuracy by removing duplicates and records with inconsistent georeferencing, for example coordinates on the sea, or missing as recommended in the literature of data cleaning (Chapman 2005). Most records were gathered by odonate experts, so we are confident that identification bias should be minimal. Niche models were built only when more than 10 records per species were available. Thus, the final data set included 1,734 unique presences of 44 species (see Table 1) which were those species with enough collecting data (range 11–158, see Table 1). The database of records is available upon request.

Study area, background and environmental predictors

We have modeled the potential distribution of Argentinian species including cases outside the country's boundaries. Our study area included land between latitudes -55.08 and -21.55S, and longitudes -75.30 to -53.13W. As bioclimatic variables, we used the WorldClim 1.4 (www.worldclim.org) data set (Hijmans et al. 2005) at 0.041666669 cell size. To establish a background and a set of uncorrelated climatic variables, we intersected the variables with target group points, and with 10,000 points randomly selected in the extension of the study area (M). We eliminated some variables with an exploratory data analysis and Pearson correlation analysis (values >0.7). Thus, we selected variables with low correlation and high contribution to reduce the parametrization of the models. After this, the final data set included uncorrelated variables which had more biological importance for our study species, and contributed the most according to the jackknife analysis. Variables were: mean diurnal range (bio 02), isothermality (bio 03), temperature seasonality (bio 04), mean temperature of driest quarter (bio 09), mean temperature of warmest quarter (bio 10), precipitation of wettest month (bio 13), precipitation seasonality (bio 15), precipitation of driest quarter (bio 17), precipitation of warmest quarter (bio 18), and precipitation of the coldest quarter (bio 19).

Table 1. Argentinian odonates species modeled, number of records, potential distribution of species in km², TSS values and current and proposed IUCN categories.

Species	Records	Current area (km²)	TSS	Current IUCN status	Suggested IUCN status
Acanthagrion aepiolum Tennessen, 2004	23	206259	0.90	N/A	LC
A. cuyabae Calvert, 1909	55	1136583	0.86	LC	LC
A. floridense Fraser, 1946	47	166257	0.89	N/A	LC
A. gracile (Rambur, 1842)	43	865415	0.85	N/A	LC
A. hidegarda Gloger, 1967	27	112352	0.90	N/A	LC
A. lancea Selys, 1876	48	645339	0.87	N/A	LC
Elasmothemis cannacrioides (Calvert, 1906)	12	79208	0.83	N/A	LC
Erythemis attala (Selys in Sagra, 1857)	70	368120	0.89	LC	LC
E. credula (Hagen, 1861)	16	67990	0.86	N/A	LC
E. peruviana (Rambur, 1842)	72	1056558	0.86	LC	LC
E. plebeja (Burmeister, 1839)	94	1523637	0.84	LC	LC
E. vesiculosa (Fabricius, 1775)	132	2228200	0.81	LC	LC
Erythrodiplax fusca (Rambur, 1842)	22	173798	0.90	LC	LC
E. paraguayensis (Förster, 1905)	11	40995	0.80	LC	LC
E. umbrata (Linnaeus, 1758)	59	184811	0.90	LC	LC
Heteragrion angustipenne Selys, 1886	14	74209	0.84	N/A	LC
H. inca Calvert, 1909	13	102730	0.82	N/A	LC
Ischnura capreolus (Hagen, 1861)	139	734839	0.88	N/A	LC
I. fluviatilis Selys, 1876	158	1714797	0.83	LC	LC
I. ultima Ris, 1908	34	11808573	0.90	N/A	LC
Lestes dichrostigma Calvert, 1909	11	28823	0.80	LC	NT
L. forficula Rambur, 1842	14	72423	0.83	N/A	LC
L. spatula Fraser, 1946	30	504657	0.88	N/A	LC
L. undulatus Say, 1840	34	195329	0.89	LC	LC
Mecistogaster linearis (Fabricius, 1777)	13	71030	0.82	N/A	LC
Miathyria marcella (Selys in Sagra, 1857)	44	4166276	0.87	LC	LC
Micrathyria hesperis Ris, 1911	19	7900041	0.87	N/A	LC
M. hypodidyma Calvert, 1906	33	653996	0.88	N/A	LC
M. longifasciata Calvert, 1909	48	416857	0.89	LC	LC
M. tibialis Kirby, 1897	11	184013	0.80	LC	LC
Orthemis ferruginea (Fabricius, 1775)	13	1401215	0.79	LC	LC
Pantala flavescens (Fabricius, 1798)	17	387339	0.85	LC	LC
Perithemis mooma Kirby, 1889	15	829042	0.83	N/A	LC
Rhionaeschna absoluta (Calvert, 1952)	133	934413	0.86	N/A	LC
R. bonariesis (Rambur, 1842)	158	1417407	0.84	N/A	LC
R. confusa (Rambur, 1842)	52	261179	0.88	N/A	LC
R. diffinis (Rambur, 1842)	40	226574	0.89	LC	LC
R. pallipes (Fraser, 1947)	26	142412	0.89	N/A	LC
R. planaltica (Calvert, 1952)	51	163524	0.89	LC	LC
R. variegata (Fabricius, 1775)	41	365158	0.88	N/A	LC
R. viginpunctata (Ris, 1918)	47	155497	0.90	N/A	LC
Tramea darwini Kirby, 1889	16	321819	0.85	LC	LC
Uracis fastigiata (Burmeister, 1839)	17	760515	0.85	N/A	LC
U. imbuta (Burmeister, 1839)	22	830556	0.84	N/A	LC

Background selection

To choose the best background, preliminary species distribution models were generated with Maxent 3.3.3k (Phillips et al. 2006) with target group points (with 10,000 points randomly selected in the extension of the study area, M), and with a special extent delineating M for each particular species with ecoregions (World Wildlife Fund; www.worldwildlife.org/ date accessed 20 January 2018). Models were constructed by setting several parameters to default ('Auto features', convergence= 10-5, maximum number of iterations= 500). However, we used random seed (with a 30 test percentage), 10 replicates, removed duplicate records, ran bootstrap replicated type, with no extrapolation and no clamping. All this to find which combination of settings and variables generated the best outcomes (highest area under the curve, or AUC) while minimizing the number of model parameters, as well as producing 'closed', bell-shaped response curves guaranteeing model calibration (Elith et al. 2010). The best background by the preliminary analyses was 10,000 points randomly selected in the extension of the study area.

Training ecological niche models

Final models were built with BIOMOD (Biodiversity Modelling) package in R software. This package is a platform for predicting species' distribution, including the ability to model the distribution using various techniques and test patterns (Thuiller et al. 2009). We trained models using four widely used algorithms: maximum entropy (Maxent), random forest (RF), generalized boosting methods (GBM), and multivariate adaptive regression splines (MARS). These models have shown good performance in terms of predictive power (Broennimann et al. 2012; Pliscoff & Fuentes-Castillo 2011; Reiss et al. 2011). From individual models obtained with these different algorithms, we generated a 'consensus model'. Such model combination is the best logistic compromise to avoid either overfitting and overpredicting (Merow et al. 2014). In other words, this reduces biases and limitations of using only individual models. Seventy percent of data was used for training, and 30% for validation with 10 replicates. Final model validation was performed with TSS (True Skill Statistics), average net rate of successful prediction for sites of presence and absence (Liu et al. 2009), ranging from -1 to 1, where the more positive values indicate a higher degree of accuracy and discrimination model (Allouche et al. 2006) (Table 1). Notice that the result of these models is not the area that species occupy absolutely, because they do not consider population dynamics, dispersibility, interactions with other species, and human impacts. However, these models predict where species can be potentially found given their environmental conditions. This assumes that the distribution known of each species provides enough information to characterize its environmental requirements.

A total of 224 models were generated, whose performance was assessed by means of the AUC and TSS statistics (Table 1), while minimizing the number of model parameters, and the best presence/absence models using the '10 percentile-training presence' are shown. This threshold was used because we prefer to err in the side of caution accepting that a 10% of our presences could be problematic (for a similar rationale, see Sánchez-Guillén et al. 2013). The best models of current climatic conditions of species were used to generate projections.

Future projections

The best models of current climatic conditions of species were used to generate projections for the 2050 year assuming climatic change scenarios. The data for future projections were: Global Climate Models (GCM) (CNRM-CM5, HadGEM2-ES, and MPI-ESM-LR) in WorldClim (http://worldclim.org/CMIP5v1; date accessed 12 December 2017), these climate projections were gathered from the Fifth Assessment (CMIP5) (http://cmip-pcmdi.llnl.gov/cmip5/ date accessed 19/7/2017) report of The Intergovernmental Panel on Climate Change (IPPC) (http://www.ipcc.ch/). The representative concentration pathways used (RCP) were 4.5 and 8.5, for year 2050. A RCP 8.5 is considered a pessimistic scenario, where CO_2 emissions would continue to rise while a RCP 4.5 is considered a more optimistic situation.

We estimated areas of potential distribution of odonate species occurring within Argentinian borders in km^2, and calculated the percentage of loss or gain of geographic areas with respect to current potential distribution. 2050 distribution was represented by a consensus model where only pixels-predicted-present by all models were considered as representing the presence of the species. We estimated areas with a function with stringr and raster packages in R (R Core Team 2017).

RESULTS

Table 1 shows the potential current distribution (in km^2) for each species, and the summary of the performance of the best models (with TSS). This table also shows the current IUCN Red List categories (as of 28 January 2018) and the new categories we suggest based on our analysis of distribution area. From these data, only *Lestes dichrostigma* Calvert, 1909 appears as 'Near Threatened' as its estimated distribution area is 28,823 km^2 (Figure 1). This as well as other seven species deserve some attention given that their distribution is less than- or close to 100,000 km^2 (Figure 1): *Elasmothemis cannacrioides* (Calvert, 1906), *Erythemis credula* (Hagen, 1861), *Erythrodiplax paraguayensis* (Förster, 1905), *Heteragrion angustipenne* Selys, 1886, *H. inca* Calvert, 1909, *Lestes forficula* Rambur, 1842 and *Mecistogaster linearis* (Fabricius, 1777). Distributions of all species are included in supplementary material Figure 1.

In regard to climate change projections for the year 2050 the RCP 8.5 estimated the following: 12 species would maintain their distribution with loss or gain of only around 10% of change of their current distribution, four species would increase their distribution beyond 10%, and 28 species would lose their area of their distribution for more than 10% (Table 2). These changes, in general, were fairly consistent with the scenario RCP 4.5 with three species keeping their distribution for around 10% of change, 11 species increasing their distribution beyond 10%, and 30 species losing their distribution for more than 10% (Table 2). These coincidences for both scenarios include, for example, *Micrathyria tibialis* Kirby, 1897 and *Heteragrion angustipenne* Selys, 1886 which represent the extremes in terms of gaining and losing area, respectively.

DISCUSSION

One benefit species distribution models can bring about is the conservation aspects. In this extent, our results suggest that although most Argentinian species have relatively large distributions, a few species deserve some attention. According to the current IUCN Red List (IUCN 2018), the following species face some risk: *Andinagrion garrisoni* von Ellenrieder & Muzón, 2006 and *Progomphus kimminsi* Belle, 1973 (Near Threatened), *Phyllogomphoides joaquini* Rodrigues Capitulo, 1992 (Vulnerable) and *Staurophlebia bosqi* Navás, 1927 (Endangered). The remaining 82 are categorized as Data Deficient (4 species) or Least Concern (78 species). The threatened four species were classified as such given the paucity of collecting records and their restricted areas of distribution. We were not able to locate enough collecting points for any of these four species. However, our work suggests that *Lestes dichrostigma* Calvert, 1909 deserves some attention, as its area is above but close to 20,000 km^2. Although the remaining 43 species can be categorized as least concern, another five have less than 100,000 km^2 so we suggest their populations should be also monitored: *Elasmothemis cannacrioides* (Calvert, 1906), *Erythemis credula* (Hagen, 1861), *Erythrodiplax paraguayensis* (Förster, 1905), *Heteragrion angustipenne* Selys, 1886, *H. inca* Calvert, 1909, *L. forficula* Rambur, 1842, and *Mecistogaster linearis* (Fabricius, 1777). Of course, several other population parameters should be gathered to complement IUCN categorization for all species, for example to detect the population reduction or less of variability. Notice that future projections would not help most species we modelled as 28–30 species would reduce their distribution dramatically in some cases. According to this, some other species not in danger currently would face threat according to these future scenarios: *Acanthagrion hidegarda* Gloger, 1967, *Heteragrion angustipenne* Selys, 1886, *Lestes dichrostigma* Calvert, 1909, *Mecistogaster linearis* (Fabricius, 1777), and *Rhionaeschna viginpunctata* (Ris, 1918). These five species may reduce their area to less than 20,000 km^2.

Essential to our present estimates of area is the fact that 70% of Argentinian species are currently present in protected areas (Muzón & von Ellenrieder 1999). However, given that global change will lead to shifts in current distribution (Sánchez-Guillén et al. 2016), a necessary step is to define whether current Argentinian protected areas will still embrace future odonate geographical distributions. A key issue here is to carry out more intensive collections to construct models for the remaining 227 odonate species that occur within Argentinian boundaries (von Ellenrieder & Muzón 2008). Moreover, research should pay attention to answer whether dispersal abilities can allow odonates catch up with different habitats located at different temperature regimes (Bush et al. 2014).

Related to global change scenarios, it is not surprising to find an inter-specific variation in projected responses to raising temperatures in odonates. Our explanations for this are incomplete yet but may have to do with odonate physiological abilities that affect themoregulatory responses (e.g., Corbet & May 2008) and development (especially at egg and larval stages; Pritchard & Leggot 1987). Given this, it is also not surprising that the largest

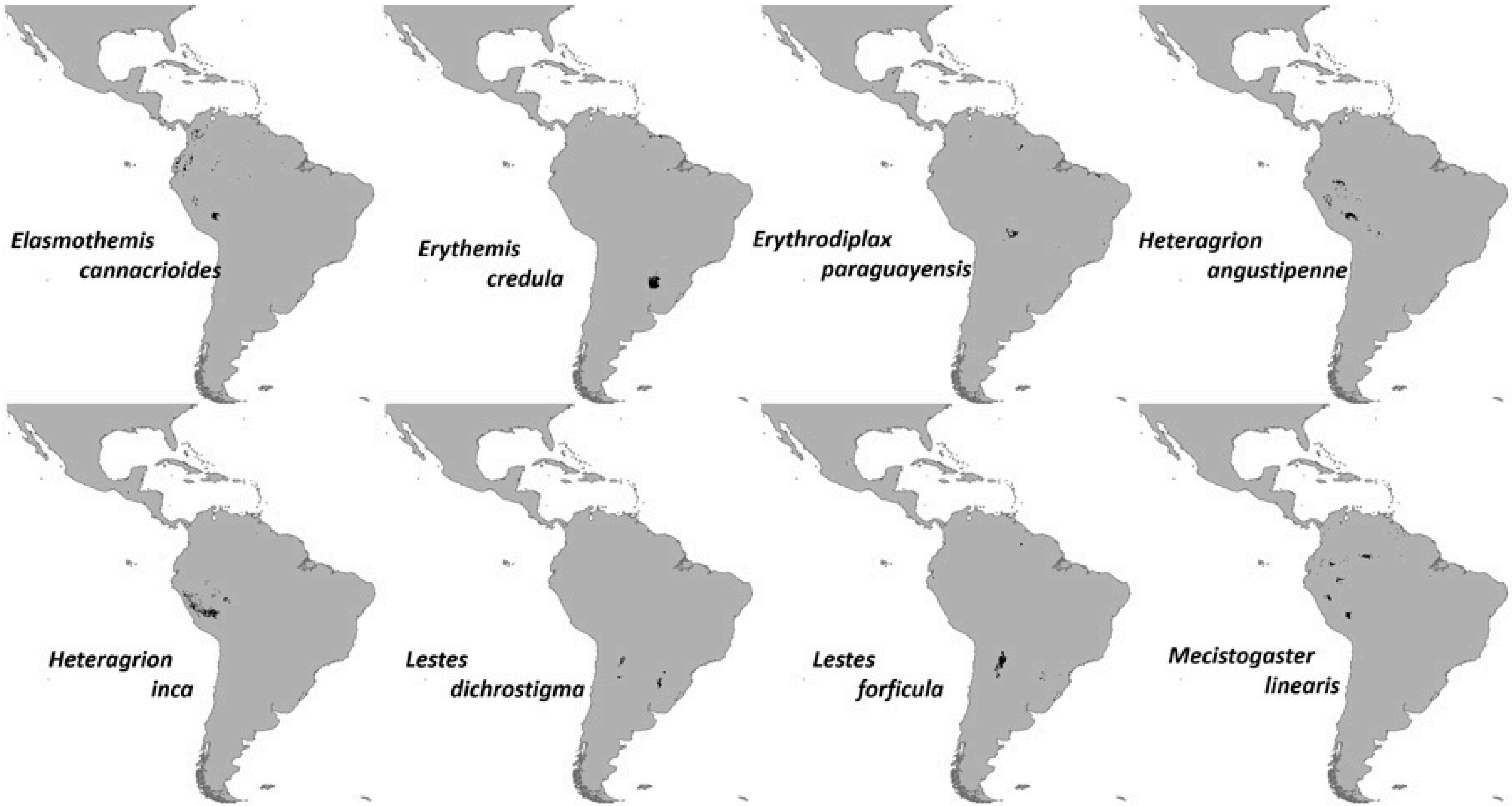

Figure 1. Potential distribution of a subset of Argentinian odonate species as predicted by ecological niche models: *Elasmothemis cannacrioides, Erythemis credula, E. paraguayensis, Heteragrion angustipenne, H. inca, Lestes dichrostigma, L. forficula*, and *Mecistogaster linearis*.

Table 2. Absolute (in km²) and relative changes in suitable area per Argentinian odonate species according to different climatic changes scenarios. Losses are shown as negative values while gains are shown as positive values.

Species	2050 (km²) RCP4.5	2050 (km²) RCP8.5	2050 (%) RCP4.5	2050 (%) RCP8.5
Acanthagrion aepiolum Tennessen, 2004	95025	77268	-53.93	-62.54
A. cuyabae Calvert, 1909	1085251	1128738	-4.52	-0.69
A. floridense Fraser, 1946	124121	148521	-25.34	-10.67
A. gracile (Rambur, 1842)	511056	459049	-40.95	-46.96
A. hidegarda Gloger, 1967	7430	7418	-93.39	-93.40
A. lancea Selys, 1876	334559	328591	-48.16	-49.08
Elasmothemis cannacrioides (Calvert, 1906)	26652	20123	-66.35	-74.59
Erythemis attala (Selys in Sagra, 1857)	1040509	1672709	182.65	354.39
E. credula (Hagen, 1861)	104121	181602	53.14	167.10
E. peruviana (Rambur, 1842)	3475030	3977046	228.90	276.42
E. plebeja (Burmeister, 1839)	2875597	3578859	88.73	134.89
E. vesiculosa (Fabricius, 1775)	6394736	8249237	186.99	270.22
Erythrodiplax fusca (Rambur, 1842)	203928	185469	17.34	6.72
E. paraguayensis (Förster, 1905)	29488	30549	-28.07	-25.48
E. umbrata (Linnaeus, 1758)	1107621	1462042	499.33	691.10
Heteragrion angustipenne Selys, 1886	2709	566	-96.35	-99.24
H. inca Calvert, 1909	27552	18234	-73.18	-82.25
Ischnura capreolus (Hagen, 1861)	5444382	6676849	640.89	808.61
I. fluviatilis Selys, 1876	1087445	1034849	-36.58	-39.65
I. ultima Ris, 1908	1438693	1637097	-87.82	-86.14
Lestes dichrostigma Calvert, 1909	1497	1456	-94.81	-94.95
L. forficula Rambur, 1842	61821	78055	-14.64	7.78
L. spatula Fraser, 1946	297025	323398	-41.14	-35.92
L. undulatus Say, 1840	177025	181143	-9.37	-7.26
Mecistogaster linearis (Fabricius, 1777)	5896	2538	-91.70	-96.43
Miathyria marcella (Selys in Sagra, 1857)	8903701	9675724	113.71	132.24
Micrathyria hesperis Ris, 1911	1325471	1539839	-83.22	-80.51
M. hypodidyma Calvert, 1906	360230	360273	-44.92	-44.91
M. longifasciata Calvert, 1909	301298	304006	-27.72	-27.07
M. tibialis Kirby, 1897	3288689	4500751	1687.21	2345.89
Orthemis ferruginea (Fabricius, 1775)	856545	573823	-38.87	-59.05
Pantala flavescens (Fabricius, 1798)	345606	358468	-10.77	-7.45
Perithemis mooma Kirby, 1889	586843	671876	-29.21	-18.96
Rhionaeschna absoluta (Calvert, 1952)	775879	740279	-16.97	-20.78
R. bonariesis (Rambur, 1842)	713468	711143	-49.66	-49.83
R. confusa (Rambur, 1842)	211253	216912	-19.12	-16.95
R. diffinis (Rambur, 1842)	262980	259209	16.07	14.40
R. pallipes (Fraser, 1947)	70805	75227	-50.28	-47.18
R. planaltica (Calvert, 1952)	45782	44497	-72.00	-72.79
R. variegata (Fabricius, 1775)	295227	300756	-19.15	-17.64
R. viginpunctata (Ris, 1918)	89497	89484	-42.44	-42.45
Tramea darwini Kirby, 1889	343101	337055	6.61	4.73
Uracis fastigiata (Burmeister, 1839)	223876	175053	-70.56	-76.98
U. imbuta (Burmeister, 1839)	416894	126006	-49.81	-84.83

species turnover will occur at intermediate altitudes where drastic changes in temperature currently occur (Maes et al. 2010). The case of Argentina is actually very relevant to this altitude phenomenon given its sharp changes in elevation. Thus, special attention should be given to these areas. Given the small number of records for most species, we are far from ensuring a well-known distribution for a large number of Argentine species, where field work, as well as the digitization of records, is advisable to document regions that are poorly explored. One tool to help in this regard is the use of repositories of citizen science photographs.

Apart from North America (Canada and USA; Hassall 2012; Rangel-Sanchez et al. 2018) and Brazil (Nóbrega & De Marco 2011), our study adds a substantially high number of odonate species with projected distributions for America. Considering that there exist around 5,680 described odonate species, of which 25% had been modelled (Collins & McIntyre 2015), our study makes a valuable global contribution for the Southern Hemisphere. This importance can be seen not only in terms of conservation as discussed above, but also in terms of biogeography given the southerly location of our study species (currently, the southern extreme was Brazil with mainly tropical species; De Marco et al. 2015; Nóbrega & De Marco 2011). Thus our results can be used to understand biogeographical patterns based on odonate ecology (e.g., preference for lentic and lotic waters and global distribution; Hof et al. 2006).

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Supplementary material figure. Current potential distribution of Argentinian odonate species as predicted by ecological niche models. Predictions of suitable area appear in black.

Acanthagrion aepiolum

Acanthagrion cuyabae

Acanthagrion floridense

Acanthagrion gracile

Acanthagrion hidegarda

Acanthagrion lancea

Elasmothemis cannacrioides

Erythemis attala

Erythemis credula

Erythemis plebeja

Erythemis peruviana

Erythemis vesiculosa

Erythrodiplax umbrata

Erythrodiplax fusca

Ischnura capreolus

Ischnura fluviatilis

Ischnura ultima

Lestes undulates

Lestes spatula

Mecistogaster linearis

Miathyria marcella

Micrathyria hypodidyma

Micrathyria hesperis

Micrathyria longifasciata

Rhionaeschna absoluta

Rhionaeschna bonariesis

Rhionaeschna pallipes

Rhionaeschna planaltica

Rhionaeschna variegata

Rhionaeschna viginpunctata

Tramea darwini

Uracis fastigiate

Uracis imbuta

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