

New records of *Rhinella sebbeni* Vaz-Silva, Maciel, Bastos and Pombal Jr 2015 (Anura: Bufonidae) and a predictive distribution map based on ecological niche model

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The genus *Rhinella* Fitzinger, 1826 comprises 91 anuran species (Frost, 2017) of which 21 are part of the *Rhinella margaritifera* species group (Vaz-Silva et al., 2015). *Rhinella sebbeni* Vaz-Silva, Maciel, Bastos and Pombal Jr., 2015 is a recently described species from the *Rhinella margaritifera* species group, for which basic information about its natural history and distribution are lacking. A medium-sized species (male = 48.5 – 59.7 mm SVL; female = 54.7 – 66.7 mm SVL; Vaz-Silva et al., 2015) typically found in leaf-litter, *R. sebbeni* is known from gallery and dry seasonal forests

from Goiânia, Ouro Verde de Goiás, and Niquelândia municipalities, state of Goiás, Central Brazil (Vaz-Silva et al., 2015). Here, we provide new records for *R. sebbeni* (Fig. 1) in the state of Goiás, and predict its potential distribution based on ecological niche model (ENM) to guide further field surveys.

On 03 February 2014 at ~2030 hours, we observed two males (SVL = 52.38 and 62.95 mm) of *R. sebbeni* calling from leaf litter inside a native Gallery Forest (-14.778339°, -49.557542°, 659 m a.s.l., Fig. 2) in the municipality of Pilar de Goiás, state of Goiás, Central Brazil. On 07 January 2017 at ~2000 hours, we observed two individuals of *R. sebbeni* (SVL = 52 and 57.64 mm) among exposed roots of trees inside a shallow water body, not far from the river, through native riparian vegetation (-16.419722°, -49.104167°, 540 m a.s.l., Fig. 2), located at the Private Reserve of Natural Heritage Fazenda Santa Branca, municipality of Terezópolis de Goiás, state of Goiás, Central Brazil.

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Figure 1. Calling male of *Rhinella sebbeni* from Pilar de Goiás, state of Goiás, Brazil.

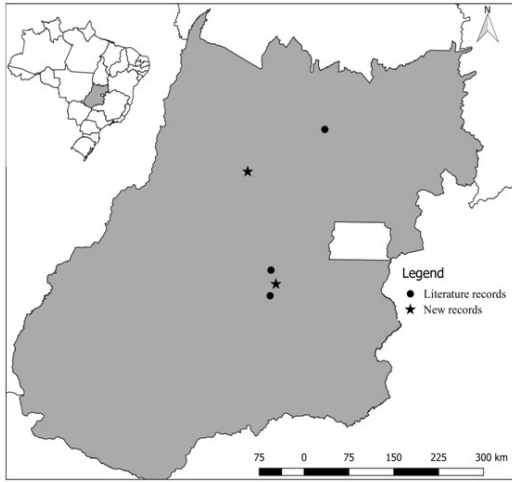


Figure 2. Known occurrence records of *Rhinella sebbeni*, including the two new ones described in this paper (stars).

All individuals were collected and identified from the morphological characters described by Vaz-Silva *et al.* (2015), notably: 1) the presence of a bony protrusion at the angle of jaws and rostral keel at the tip of snout; 2) few granules on dorsal skin, concentrated on the flanks; and 3) a small elliptical parotoid gland, well-delimited by a lateral line of tubercles. These vouchers were all deposited at the Zoological Collection of the Universidade Federal de Goiás (Pilar de Goiás: ZUFG 10741-42; Terezópolis de Goiás: ZUFG 10609-10).

Besides these new records, we computed ecological niche models to predict the potential distribution of *R. sebbeni* in order to support field sampling efforts and adaptively refine its distributional model (see Syfert *et al.*, 2014). Based on every known occurrence record (including the two localities described here, see Figure 2) and five bioclimatic variables (Mean Diurnal Range, Isothermality, Temperature Annual Range, Mean

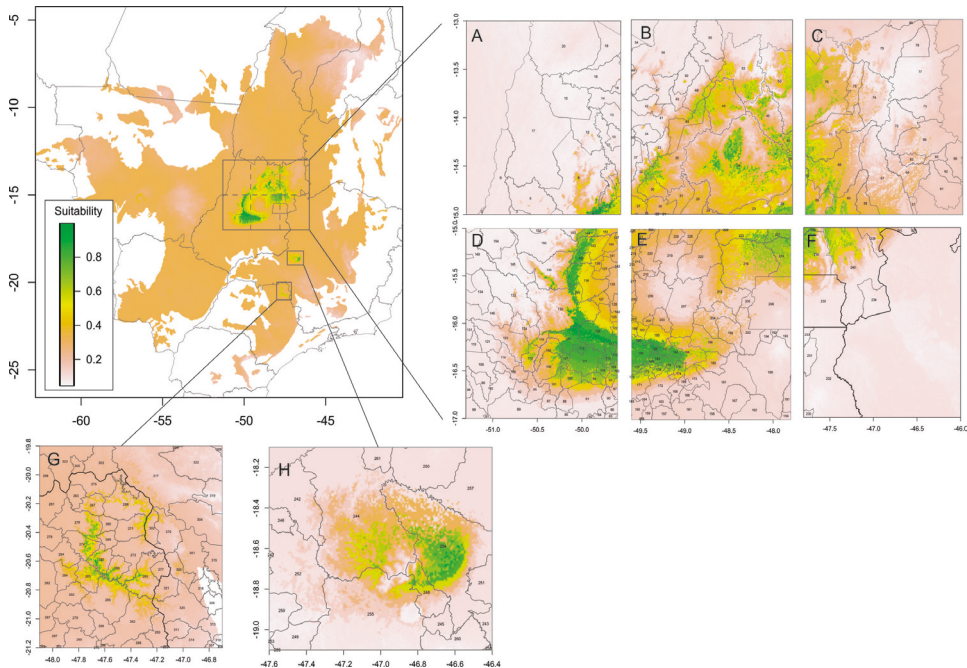


Figure 3. Potential distribution of *Rhinella sebbeni* across Brazilian Cerrado. To guide field survey, the following municipalities (see coordinates in Appendix I) with high suitabilities should be considered: N° 008 – Crixás, N° 029 – Água Fria de Goiás, N° 033 – Nova Iguaçu de Goiás, N° 039 – Uruaçu, N° 040 – Alto Paraiso de Goiás, N° 044 – Campinorte, N° 045 – Colinas do Sul, N° 052 – Minaçu, N° 053 – Cavalcante, N° 068 – São João da Aliança, N° 100 – Turvânia, N° 101 – Firminópolis, N° 104 – Caturai, N° 108 – São Luís de Montes Belos, N° 112 – Americano do Brasil, N° 113 – Córrego do Ouro, N° 116 – Sanclerlândia, N° 136 – Itapuranga, N° 140 – Morro Agudo de Goiás, N° 143 – Rubiataba, N° 148 – Nova América, N° 151 – Itapaci, N° 182 – Gameleira de Goiás, N° 184 – Campo Limpo de Goiás, N° 185 – Damolândia, N° 196 – Abadiânia, N° 223 – Mimoso de Goiás, N° 240 – Formosa.

Temperature of Warmest Quarter, and Precipitation of Wettest Quarter), we used three presence-only ENM-methods (Bioclim, Domain, and ENFA) to predict the potential distribution of *R. sebbeni* across the Brazilian Cerrado using an ensemble approach. Climate conditions were obtained from WorldClim database (www.worldclim.org) with 1 km of spatial resolution and models were built using the specific functions from R-package “dismo” (Hijmans et al., 2016). ENMs were evaluated using the leave-one-out test and consensus map was computed averaging the suitabilities predicted from the tree ENM-methods. Our models indicate a broad area of highly suitable habitats (suitability > 0.8) across the north of the state of Goiás (Fig. 3A-F), as well as two disjunct, narrow, and isolated areas in the states of Minas Gerais and São Paulo (Fig. 3G-H).

The present study reveals two new populations of *R. sebbeni* and, furthermore, expands its occurrence in the state of Goiás. The occurrence of *R. sebbeni* in the municipality of Pilar de Goiás represents the westernmost known record for this species, located about 145 km W from Niquelândia municipality, state of Goiás, the nearest locality provided by Vaz-Silva et al. (2015); and located about 200 km N from Goiânia municipality (type locality), state of Goiás (Figure 2). Additionally, because the disjunct suitable areas in Minas Gerais and São Paulo states are small, lesser suitable (suitability often < 0.8) and mainly spatially isolated from type locality, an important constrain for amphibian’s dispersal (e.g., Wells, 2007), based on potential distribution of *R. sebbeni* predicted by ENMs, we suggest that the north of Goiás state is the most likely area to sample new populations of this species. We recommend that further studies should direct efforts for field surveys in the north of Goiás (see municipalities listed in Figure 3) in order to improve the knowledge on the geographical range and natural history of *R. sebbeni* and, consequently, its conservation status.

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