Filling gaps in the southern range of the endangered snake *Philodryas agassizii*: new localities in Tandilia highland grassland, Argentina

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Abstract

*Philodryas agassizii* is an endangered snake of shrubland and grasslands well preserved in Argentina, Paraguay, Brazil, and Uruguay. In the southeastern area of its range, this snake was only found associated with highland grassland of the Tandilia and Ventania mountain systems, Argentina. In this work, we described six new records of *Philodryas agassizii* from the Tandilia Mountain System, which represent four new localities for the species. These records extend the known range of *Philodryas agassizii* in the Tandilia mountain system, 100 km from the closest previously known site.

Keywords

geographic distribution, grasslands, snakes
Philodryas agassizii (Jan, 1863) is a habitat specialist snake occurring in Atlantic forest, Cerrado, Pampa and Pantanal biomes from the center of Argentina, through Uruguay, Paraguay and Brazil (Peters and Orejas-Miranda 1970; Viñas 1985; Cei 1993; Carreira et al. 2005; Marques et al. 2006; Etchepare and Ingaramo 2008; Ghi-zoni et al. 2009; Hamdan and Lira-da-Silva 2012; Di Pietro et al. 2013; Smith and Clay 2015; Cacciali et al. 2016; Costa and Bêrnls 2018; Ríos et al. 2020). Philo-
dryas agassizii is prevalent in well preserved natural grasslands with dense coverage
of native grass (Marques et al. 2006; Etchepare et al. 2012). Even when this snake
had a large range, which includes many Argentine provinces, the current number of
reported specimens remains low (Di Pietro et al. 2013). The southernmost record of
this snake is in Río Negro province, Argentina (Perez et al. 2012). Natural grasslands
of southern South America are among the most fragmented and disturbed ecosys-
tems, and this could be one of the main reasons for the rarity of this snake (Giraudo
et al. 2011). While at the international level, the conservation status of Philodryas
agassizii was not evaluated, this snake was listed as Endangered in the Argentinean
and the Paraguayan Red Lists (Motte et al. 2009, Giraudo et al. 2012). In Brazil,
some authors proposed the use of Philodryas agassizii as a potential bioindicator for
the Pampa biome, as well as the inclusion of Philodryas agassizii in the Brazilian list
of threatened vertebrates (Winck et al. 2007).

In its southern range, in Buenos Aires province, Philodryas agassizii was only
reported in highland grasslands of the two mountain systems of the Pampa ecore-
gion: Tandilia and Ventania (Viñas et al. 1989; Vega and Bellagamba 1990; Di Pi-
etro 2016). These mountain systems conserve remnants of native grassland, and
maintain a high number of endemic plants and animal taxa, so they are considered
orographic islands (Crisci et al. 2001). In this work, we described six new records of
Philodryas agassizii in the Tandilia mountain system.

For each record, we provided geographic location, elevation, photographs, a de-
scription of the habitat, and, whenever possible, sex and morphometric traits. We
examined specimens with a binocular microscope to count the number of scales to
gauge its taxonomic determination. We used a GPS (Garmin Etrex 20) to record
elevation and geographic location (Datum WGS84) of each specimen. We used a
digital caliper to measure morphometric lengths (i.e., head, snout-vent, tail and to-
tal lengths) and we used a digital scale (nearest to 0.1 g) to obtain the body mass.
We determined the sex of each specimen based on measurements and following the
sexual dimorphism established by Di Pietro et al (2013). Collected specimens and
photo-vouchers were sent to the Colección Herpetológica del Museo de La Plata
(MLP) that provided us collection numbers for collected specimens, and photo col-
lection numbers for the photographed specimens. This study required collecting
authorization, which was provided by Dirección de Flora y Fauna de la provincia de
Buenos Aires (NO-2019-16058740-GDEBA-DFYFMAGP).

We identified the specimens by their color pattern and scale counting. All speci-
mens have 13 dorsal scale rows, a diagnostic feature of Philodryas agassizii (Jan,
1863). All specimens showed greenish color with yellowish tones. Some specimens
(Fig. 1A, C, D) had a clear brownish-reddish longitudinal band on the back.
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**Figure 1.** Photographic records of *Philodryas agassizii* in the Tandilia Mountain System, Argentina. Specimens from Estancia Ninonil (A), Estancia Rucahué (B), Estancia Las Mercedes (C–E), and Estancia El Bonete (F).
October 19th 2017 (13:27 h), we found one specimen of *Philodryas agassizii* (MLP, cf. 0053) in a highland grassland with bare soil patches at Estancia Ninonil, Partido de Tandil (37°37.6144’S, 59°13.9012’W; 342 masl; Fig. 1A). The habitat was dominated by native grass and a few patches of native shrubs (mainly *Colletia paradoxa* and *Baccharis tandiliensis*). This specimen was released and no morphological measures were taken.

December 7th 2017 (09:08 h), we found one specimen of *Philodryas agassizii* (MLP, cf. 0054) on a road immersed in a highland grassland at Estancia Rucahué, Partido de Tandil (37°28.6316’S, 59°3.3116’W; 205 masl; Fig. 1B). The habitat was a highland grassland dominated by native grasses (*Nessiana*, and *Piptochaetium*). This specimen was released and no morphological measures were taken.

Between November 2019 and January 2020, we found three specimens of *Philodryas agassizii* at highland grassland in Estancia Las Mercedes, Partido de Tandil. The habitat was dominated by native grass (genus *Nessiana*, *Piptochaetium*, and *Paspalum*) and large patches of native shrubs (*Baccharis tandiliensis* and *Eupatorium bunifolium*). Rocky outcrops and loose rocks were frequent in the area. Livestock was of low density and woody invasive species were scarce at the site. We found all specimens under rocks (Table 1). November 9th, 2019 (11:50 h), we collected one juvenile specimen (MLP, R. 6761, Fig. 1C; 37°22.645’S, 59°05.355’W; 252 masl). We found another two specimens, and both were measured in the field and then released. December 5th, 2019 (14:43 h) we found a second juvenile specimen (MLP, cf. 0051, Fig. 1D; 37°22.656’S, 59°05.378’W; 251 masl), and January 24th, 2020 (09:57 h) we found a male specimen (MLP, cf. 0052, Fig. 1E; 37°22.708’S, 59°05.289’W; 245 masl).

December 21st 2019 (12:50 h), we found one adult female of *Philodryas agassizii* (MLP, R. 6762, Fig. 1F, Table 1) in highland grasslands with bare soil patches at Estancia El Bonete, Partido de Lobería (37°52.264’S, 58°38.802’W; 218 masl). The habitat was a highland grassland dominated by native grasses (genus *Nessiana*, *Piptochaetium*, and *Paspalum*) and patches of native shrubs (mainly *Colletia paradoxa* and *Baccharis tandiliensis*). Rocky outcrops were frequent, and some remnants were affected by the colonization of woody invasive vegetation. Livestock density was low in this grassland remnant. This specimen was collected.

These six new records resulted in four new localities in the geographic range of *Philodryas agassizii* (Fig. 2, modification of Griffith et al. 1998). These new localities extend the range of this snake along the Tandilia mountain system, 100 km to the

| Specimen (photo) | Locality        | Length (mm) | Mass (g) |
|------------------|-----------------|-------------|----------|
|                  |                 | Snout-vent  | Head     | Tail     | Total    |          |
| MLP, R. 6761 (1C)| Ea. Las Mercedes| 161.7       | 7.89     | 52.2     | 213.9    | 3.8      |
| MLP, cf. 0051 (1D)| Ea. Las Mercedes| 190.0       | 8.85     | 45.8     | 235.8    | 5.5      |
| MLP, cf. 0052 (1E)| Ea. Las Mercedes| 289.0       | 10.48    | 108.8    | 397.8    | 7.8      |
| MLP, R. 6762 (1F)| Ea. El Bonete   | 405.0       | 13.65    | 117.5    | 522.5    | 31.6     |
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northwest from the closest previously known site (i.e., Sierra del Volcán, Balcarce; Vega and Bellagamba 1990), and help to fill one of the gaps of the geographic distribution of the species in the Pampean region of Argentina. Our records will contribute to better understand the distribution of *Philodryas agassizii* in the region, reinforcing the idea that the species is occurring in relatively well conserved grasslands.

**Acknowledgments**

We would like to thank field assistants and collaborators (Clara Fiorino Falasco, Gonzalo Adrián Reuter, Florencia Débora Dosil Hiriart, María Florencia Aranguren, Pilar Plantamura and Scarlett Mendez Herrera) for their kind assistance and support during the fieldwork activities. We also appreciate the collaboration of Tomas Pérez Marino (Estancia El Bonete), Paulo Mosca (Estancia Ninonil), and Federico Juana (Estancia Las Mercedes) for allowing entry into their properties. Jorge Williams made valuable suggestions for improving this manuscript. The Dirección de Fauna Silvestre of the Buenos Aires Province gave us authorization to perform this work.

We greatly acknowledge two anonymous reviewers whose comments improve our works.
This study was supported by the Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET PIP 11220150100598CO), the Agencia Nacional de Promoción Científica y Tecnológica (ANPCYT, PICT 2015-2281), and the Neotropical Grassland Conservancy (STUDENT GRANT PROGRAM 2019).

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