



***Schizachyrium bolivianum*, a new grass species from the Chiquitania region of eastern Bolivia**

***Schizachyrium bolivianum*, una nueva especie de gramínea de la región de la Chiquitania en el este de Bolivia**

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ABSTRACT

The Poaceae constitutes one of the richest angiosperm families in the Chiquitania region of Bolivia, but are relatively poorly studied despite their socioeconomic and ecological importance. A new species of Poaceae endemic to the Chiquitania, *Schizachyrium bolivianum*, is described and illustrated.

Palabras clave: Endemism, risk assessment, rock outcrops.

RESUMEN

Las gramíneas son una de las familias de angiospermas con mayor riqueza de la región de la Chiquitania y, a su vez, un grupo poco estudiado a pesar de su importancia socioeconómica y ecológica. Se describe e ilustra una nueva especie de Poaceae endémica de la Chiquitania, *Schizachyrium bolivianum*.

Key words: Endemismo, riesgo de extinción, afloramientos rocosos.

INTRODUCTION

Poaceae, the grasses, constitute one of the largest plant families in Bolivia and are distributed in all ecoregions from the Andean glaciers to the Amazonian lowland forests (Beck, 1998, Jørgensen *et al.*, 2015 onwards). Bolivian grasses have been studied by Hitchcock (1927), Killeen (1990) and Renvoize (1998), the latter being the most complete work as it treated all Bolivian grasses then known. Renvoize (1998) recognised 740 species in 152 genera, with more than 20 species described as new for Bolivia. Since then, the number of recognised species has increased by more than a hundred to a total of 851, of which eighty (almost 10%) are considered endemic to Bolivia (Jørgensen *et al.*, 2015 onwards). However, it is likely that this number does not represent the total grass diversity in Bolivia, and it may increase following further investigation of taxonomically complex genera as well as by the exploration of poorly known regions (Renvoize, 1998, Meneses *et al.*, 2014). Among recent taxonomic works that include species of grasses from Bolivia are Denham (2005), who revised the *Paspalum* L. subg. *Harpostachys*, and Peichoto (2010), who revised *Schizachyrium* Nees in South America, and recognized 22 taxa, of which 11 occur in Bolivia.

Other works focusing on grasses, such as Meneses *et al.*, (2014), seek to locate the centres of grass diversity in Bolivia. Two regions identified were the Brasileño-Paranense region, which includes the Chiquitania and the Benian-Amazonian plain. The Chiquitania is a lowland region located on the Precambrian shield with a variable topography (Killeen & Hinz 1998), which includes undulating plains at altitudes from 150–500 m. In this region, there are frequent rock outcrops and a chain of mountains and plateaus with steep slopes varying

from 600–1200 m in altitude, but also areas of scrub-covered sandy plains known as Abayoy, where the Chiquitania connects with the Chaco (Navarro 2011; Beck, 2015; Villarroel *et al.*, 2016). Consequently, the Chiquitania region has developed a range of heterogeneous habitats, including forest, savanna, wetland and rocky outcrops with a rich diversity of species, including some specialized flora and species endemic to the region (Killeen 1989, Mamani *et al.*, 2011, Pozo *et al.*, 2013), including amongst the grasses *Digitaria killeenii* A.S. Vega & Rúgolo, *Eragrostis chiquitaniensis* Killeen, *E. woodii* Gir.-Cañas, *Schizachyrium beckii* Killeen, *Sporobolus crucensis* Renvoize, and *Paspalum crucense* (Killeen) S. Denham. Most of these endemic species recorded from the Chiquitania are restricted to specific habitats: *Paspalum crucense*, for example, to cracks on granite domes, and *Sporobolus crucensis* to sandy, seasonally moist hollows on and around granite domes (Killeen, 1990, Renvoize, 1998).

As a result of recent plant diversity studies in the Chiquitanian region, notably the Darwin Initiative Project 16-004 “Conservation of the Cerrados of Eastern Bolivia”, many new endemic taxa have been found and described, including *Hyptis tuberosa* Harley (2012) in Lamiaceae, *Ipomoea psammophila* J.R.I. Wood & Scotland (2015) in Convolvulaceae, *Microlicia woodii* R.B. Pacifico, Almeda & Fidanza (2020) in Melastomataceae, *Mimosa rastrera* Atahuachi & Hughes (2016) in Fabaceae. Here we describe one further range restricted and threatened new species found in the Chiquitania.

MATERIALS AND METHODS

The new species is described from herbarium specimens deposited in K, LPB and USZ, together with field observations and consultation of relevant literature, especially Renvoize (1998) and Peichoto (2010). Terminology follows these two authors.

For evaluating the conservation status of the new species, we used the categories and criteria of the IUCN Red List (IUCN 2024), The GeoCAT tool (Bachman *et al.*, 2011) was used to calculate both the area of occupancy (AOO) and extent of occurrence (EOO) of the new species.

TAXONOMIC TREATMENT

Schizachyrium bolivianum M.T.Martinez & Renvoize, *sp. nov.* (Fig. 1 y 2).

Type: BOLIVIA. **La Paz:** Prov. Chiquitos, Arriba del Portón, detrás del Cerro Chochís, 18.115° S, 60.0603° W, 615 m, 19 Nov. 2008, J.R.I. Wood & D. Soto 25443 (holotype: USZ-96024!; isotypes: K-1382506, LPB-3522!).

Schizachyrium bolivianum similar to *Schizachyrium tenerum* Nees (1829: 336), from which it differs in the culms 12–35 cm high (vs. 30–110 cm in *S. tenerum*), leaves all cauline (vs. basal and cauline), racemes tinged yellow or green (vs. grey), and leaf blades 4–8 cm long (vs. 7–20 cm long).

Tufted perennial herb with erect or ascending culms from a knotty base. Culms terete, slender, flexuous, 12–35 cm high, unbranched. Leaves cauline, green, becoming reddish with age; sheaths imbricate throughout the length of the culm or in the upper part only, striate, glabrous; ligule membranous, 0.5–1 mm long, with a ciliolate fringe; leaf blades appressed, ascending or spreading, linear, 4–8 cm long, 0.5–1.5 mm wide, straight, arcuate or flexuous, glabrous, smooth, flat or folded and keeled, tapering to a fine point. Peduncles solitary, rarely paired. Racemes terminal, solitary, erect, straight, yellow or green tinged, 2.5–6 cm long, subtended by a narrow spathe 10–25 mm long. Rachis internodes yellow, narrowly wedge-shaped, 3–5 mm long, tip obliquely crateriform with a scarious rim, a tuft of short hairs present or absent on the lower side. Pedicels slender, straight – sided, 3–4 mm long, yellow, pilose on the margins of the upper half, tip obliquely crateriform with a scarious rim and tuft of short hairs. Pedicelled spikelet narrowly ovate, 4–8 mm long, muticous, sterile. The lower glume herbaceous, green on the dorsal surface, scaberulous, sometimes almost smooth, 5-nerved, keel distinct, scaberulous, tapering to a fine apex. Upper glume narrowly ovate, shorter than the lower glume, membranous, scaberulous on the dorsal surface, 1-nerved. Lemma absent. Sessile spikelet narrowly ovate, 6–10 mm long. The lower glume herbaceous, rounded on the back, pale green or straw coloured on the dorsal surface, scaberulous to almost smooth or scaberulous only on the keels, glabrous, 7–9-nerved, tapering to a fine apex or minutely bifurcate. Upper glume narrowly ovate, tapering to a fine point, membranous, 2/3 the length of the lower glume, scaberulous or ciliolate on the dorsal surface, 3-nerved. Lemma membranous, ciliolate. Awn geniculate, basal part twisted, distal part straight, 13–17 mm long. Anthers 1–2 mm long, ovary 1 mm long, 0.5 wide, stigma 2 mm long, feathery. Callus pilose with tufts of short or long hairs up to the

length of the internode. Caryopsis, 1–3 mm long, 0.5 mm wide, glabrous and colour brownish purple with ivory.

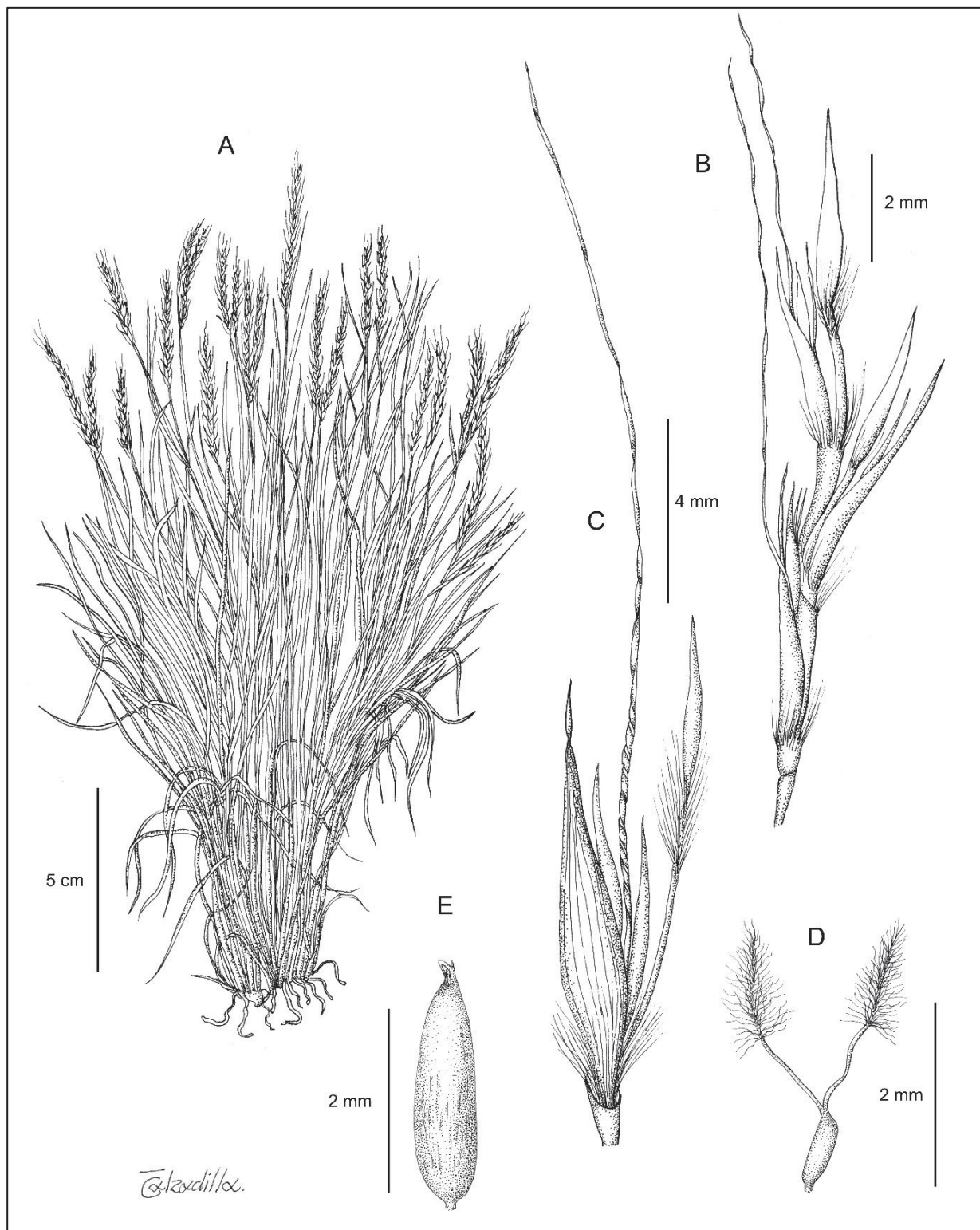


FIGURE 1. *Schizachyrium bolivianum*. A. Habit. B. Section of raceme. C. Spikelet. D. Ovary. E. Caryopsis. A, D: Wood et al. 29103 (USZ), B, C: Wood et al. 25849 (USZ), E: Wood 17564 (USZ). Drawn by Eliana Calzadilla.

Additional specimens examined (paratypes): BOLIVIA. Santa Cruz: Prov. Chiquitos, Cerro Chochís, 18°07' S, 60°00' W, 1200 m, 22 Feb. 2006, *J.R.I. Wood* 22237 (USZ, K, LPB); Chochis, arriba del Portón, sobre el camino por detrás del cerro, 18°06'59.4"S, 60°03'37.1"W, 615 m, 19 Nov. 2008, *J.R.I. Wood & D. Soto* 25443 (K, LPB, USZ); Serranía de Santiago, 18°20'47"S, 59°33'44"W, 803 m, 10 Apr. 2008, *J.R.I. Wood et al.* 24366 (K, LPB, USZ); Chochís, by path going around base of El Torre [La Torre], 650 m, 27 Dec. 2002, *J.R.I. Wood* 18797 (K, LPB, USZ); Meseta La Mina, zona

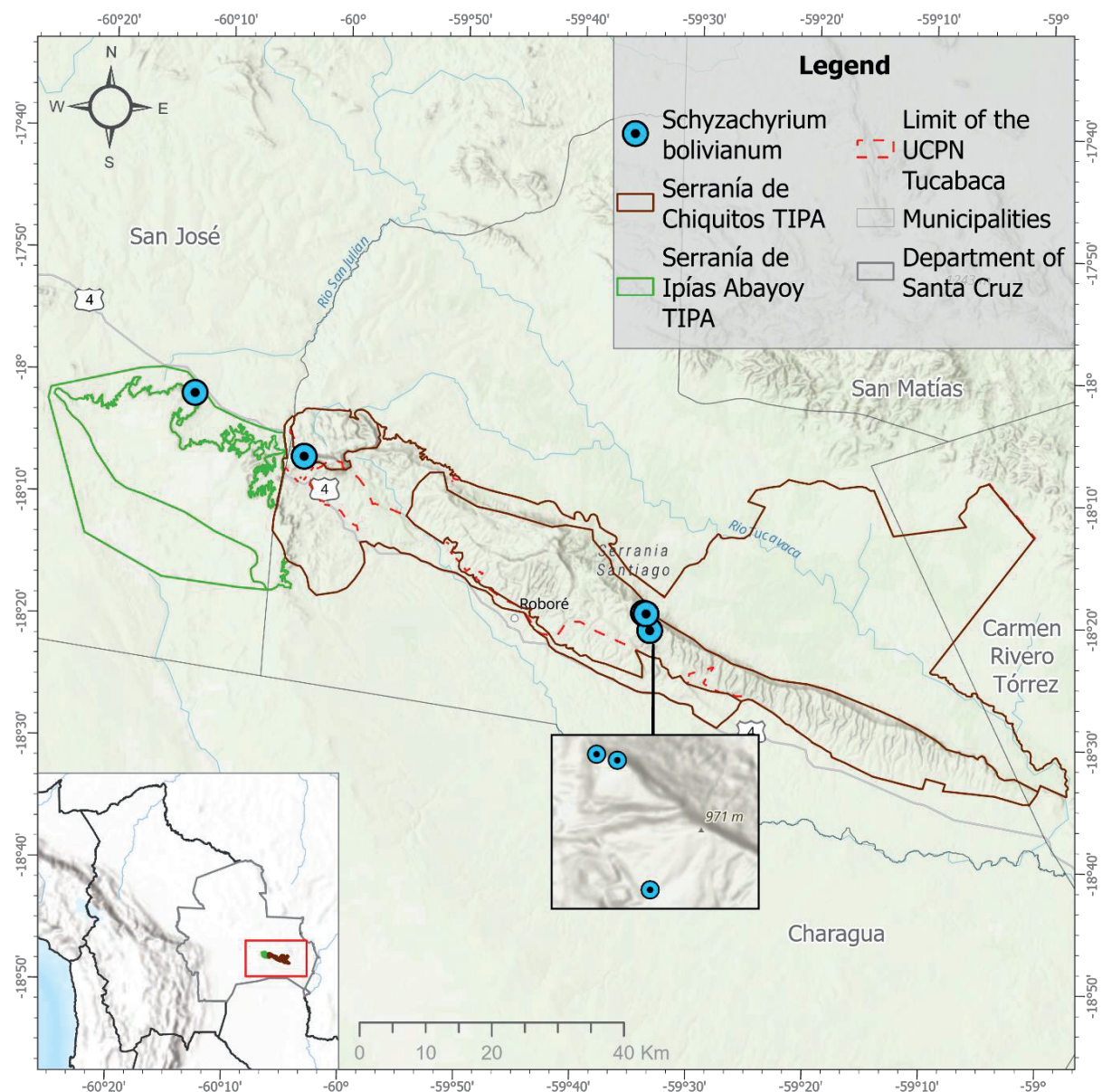


FIGURE 2. Distribution of *Schizachyrium bolivianum* in the Serranía Chiquitana, and Unidad de Conservación del Patrimonio Natural (UCPN) Santa Cruz, Bolivia.

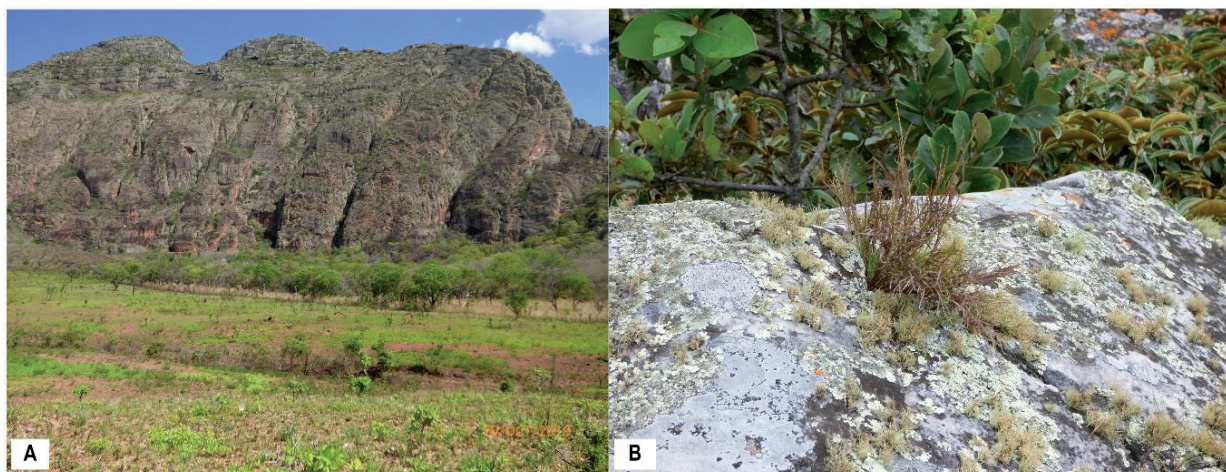


FIGURE 3. A. Rocky towers and sandstone walls where *Schizachyrium bolivianum* grows, El Portón, Chochís ©Photography Project Initiative Darwin (26-024). B. *S. bolivianum* growing in crack that contrast with the rock walls where it grows, Mirador de Santiago de Chiquitos.

Motacuzal, Chochís, 800 m, 18 Nov. 2001, *J.R.I. Wood* 17564 (K, LPB, USZ); Santiago de Chiquitos, El Mirador, 18°19'21.4"S, 59°34'17.8"W, 846 m, 21 Mar. 2009, *J.R.I. Wood et al.* 25849 (K!, LPB!, USZ!); El Mirador, Santiago de Chiquitos, 18°19'25.2"S, 59°34'04.7"W, 908 m, 20 Mar. 2020, *J.R.I. Wood et al.* 29103 (K, LPB, USZ); Serranía de Ipías, sector de las antenas, 18°1'54"S, 60°13'03"W, 844 m, 26 Feb. 2021, *M.T. Martínez et al.*, 814 (K, LPB, USZ); Serranía de Ipías, lado opuesto de las antenas, sector más al este de la serranía, 18°06'01"S, 60°13'24"W, 668 m, 13 Nov. 2020 *M.T. Martínez et al.*, 531 (K, LPB, USZ).

Distribution and habitat: *Schizachyrium bolivianum* is an endemic species of the municipalities of San José de Chiquitos and Roboré in the province of Chiquitos, occurring in the territories of the communities of Ipías, Chochis and Santiago de Chiquitos (Figure 2). This perennial grass grows in cracks on rock towers and sandstone cliff walls between 615 and 1200 m a.s.l (Figure 3A). Its brown appearance contrasts with the grey rock walls where it grows (Figure 3B). It is scattered in occurrence, but not abundant.

Phenology: It flowers during and at the end of the summer rainy season, being recorded from the end of October to May.

Etymology: The specific epithet *bolivianum* refers to its distribution and endemism in Bolivia, as well as a tribute to the Bolivian bicentennial.

Discussion: *Schizachyrium bolivianum* resembles *S. tenerum* Nees in Mart. in some morphological characteristics, but is distinct in its tufted habit. Peichoto (2010) describes *S. tenerum* as a species with culms up to 80 cm, and Renvoize (1998) with culms that can reach 110 cm high; in contrast, *S. bolivianum* does not exceed 40 cm high. In addition to the size of its culms, *S. bolivianum* is differentiated by its cauline leaves, the size of its sessile spikelets (6–10 mm long), and its 7–9-nerved lower glume, while the sessile spikelets of *S. tenerum* are 4–6 mm long and the lower glume is 5–7-nerved (Peichoto, 2010, Renvoize, 1998). Another distinguishing feature is the caryopsis, which in *S. bolivianum* is 1–3 mm long and 0.5 mm wide, while in *S. tenerum* it is 2–2.5 mm long and 0.7 mm wide (Peichoto, 2010). Finally, the habitat of *S. bolivianum* is very distinctive, being restricted to crevices in rock towers in the Serranías de Chiquitos, and always being found at relatively high altitudes.

Conservation status: *Schizachyrium bolivianum* is restricted to rock towers and cliffs, a habitat it shares with species such as *Praxelis chiquitensis* (B.L.Rob.) R.M. King & H.Rob. and *Blepharodon crabronum* Goyder, both of which are considered globally Endangered (Clegg, 2020a, b). Based on GeoCAT, *Schizachyrium bolivianum* has an extent of occurrence (EOO) of 111 km² and an area of occupancy (AOO) of 11 km². Currently, it is only known from three localities, Santiago de Chiquitos and Chochis, lying within the Reserva Municipal Valle de Tucavaca (Figure 2) and a third location, Ipías, which lies outside this protected area. Currently there is no direct threat to its populations, but there is a latent threat from mining activities in the mountains of the Chiquitania region and from the fires that occur with greater frequency and intensity in the region. According to the IUCN criterion B2 (2019), with an area of occupancy of < 500 km², < 5 localities and the possible impact on habitat quality due to activities such as mining and fires, *Schizachyrium bolivianum* is classified as Endangered [EN, B2 ab (iii)].

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