Jurnal Biolokus: Jurnal Penelitian Pendidikan Biologi dan Biologi
Vol. 8, Issue 2, December 2025
Pages: 192 – 200

p-ISSN: 2621-3702
e-ISSN: 2621-7538

Morphology and habitat suitability of *Rhacophorus barisani* (Harvey, Pemberton & Smith, 2002) in Karo Regency, North Sumatra

Muhammad Iqbal H. Tambunan[1,2], Yusran E. Ritonga[2]*

[1]Department of Biology Education, Universitas Royal
Jl. Prof. H. M. Yamin No.173, East Kisaran, Kabupaten Asahan, North Sumatra, 21222, Indonesia
[2]Biologi Pencinta Alam Sumatera Utara
Jl. Prof. H. M. Yamin Gg. Obat II No.14 Sei Kera Hilir II, Medan Perjuangan, Medan, North Sumatra, 20233, Indonesia
*corresponding author: yusranefendiritonga@gmail.com

ABSTRACT

Research on *Rhacophorus barisani* (Harvey, Pemberton & Smith, 2002) has been limited since its formal description in 2002. Since 2017, the IUCN has classified the Barisan Tree Frog as Least Concern, and this species is endemic to the mountain forests of the Bukit Barisan Mountains in Sumatra. Published records are limited to distribution notes and photographs, with no previous reports from Karo Regency, North Sumatra. This study was conducted between September and November 2023 in the Bukit Barisan Grand Forest Park (Tahura) and Gunung Sibuatan Protected Forest. The methods used were Visual Encounter Survey-Night Stream (VES-NS) and purposive sampling. This species was described morphologically and morphometrically, and habitat suitability data were recorded based on abiotic parameters. *R. barisani* was found in flowing water habitats and still water pools within the forest. *R. barisani* has three distinct dorsal color patterns: a light brown base color with a yellowish-brown color on the back that does not reach the sides of the body; a uniform yellowish-brown base color with yellow edges and a distinct dorsal pattern and black bands on the limbs; a green base color with scattered brown or black protuberances on the back, and a snout-vent length ranging from 41.9 to 65.7 mm. The habitat suitability of this species occupies riparian and lotic areas. Critically, we confirm that this species is the first record in Karo Regency, representing a new local discovery.

Keywords: Habitat, Karo Regency, morphology, *Rhacophorus barisani*

INTRODUCTION

Rhacophorus barisani (Harvey, Pemberton & Smith, 2002) belongs to the family Rhacophoridae, commonly known as tree frogs. This family is highly diverse, comprising approximately 6% of the world's anuran species (Ellepola & Meegaskumbura, 2023). Kurniawan et al. (2023) report that over 400 species are included in Rhacophoridae, distributed across sub-Saharan Africa, tropical Asia (including Sri Lanka, Nepal, and India), and mainland Indochina. Jiang et al. (2019) further investigate that the family comprises 416 species in 18 genera: 78 species occur in southern and southwestern China, 92 range from India and Japan to the Philippines and Sulawesi, 40 inhabit Borneo, and six are recorded from Maharashtra, India (Haas et al., 2022; Sayyed, 2015).

In the Sundaland biogeographical region, Kamsi et al. (2017) documented nine Rhacophoridae genera, namely *Chiromantis, Feihyla, Kurixalus, Leptomantis, Nyctixalus, Philautus, Polypedates, Rhacophorus* and *Theloderma*. On Sumatra, four of these genera have been reported: *Nyctixallus. Philautus, Polypedates* and *Rhacophorus* (Kamsi, 2003; Tambunan et al., 2025), with *Theloderma* also recorded (Iskandar, 1998). These genera are distinguished by both morphological traits and reproductive strategies.

The genus *Rhacophorus* reproduces in a distinctive way, creating foam nests for its eggs

on branches or leaves above standing water. Diagnostic characters include a horizontal pupil, a deeply notched but free tongue, a patterned omosternum and sternum, a short snout, large protruding eyes, webbed digits with expanded tips, and bright dorsal coloration. These frogs live in trees and are therefore referred to as arboreal (Iskandar, 1998; Kampen, 1923). Despite their arboreal habits, several species also inhabit stream channels and freshwater swamps within tropical rainforests (Harvey et al., 2002). Globally, 86 species are recognized in the genus *Rhacophorus* (Hamidy & Kurniati, 2015). Their distribution ranges from Madagascar through East and Southeast Asia and the Indo-Australian Archipelago (Kampen, 1923), including Sulawesi, the Philippines, India, China, Japan, Indochina, to Sundaland (Sumatra, Java, Borneo, Sulawesi, and adjacent islets) (Iskandar, 1998). On Sumatra alone, Kamsi et al. (2017) recorded 17 *Rhacophorus* species, 10 of them are endemic including *R. barisani*.

R. barisani was first found around slow-flowing mountain streams in the Bukit Barisan range of Sumatra. The specific epithet reflects its endemic distribution. Commonly known as the Barisan Tree Frog, it emits a brief laughing call and inhabits tropical montane stream habitats (Harvey et al., 2002; Kurniati & Mujiono, 2020; Umilaela et al., 2008). According to Umilaela et al. (2008), the species is rare in the field, likely due to its sensitivity to climatic fluctuations and anthropogenic disturbance. Harvey et al. (2002) further found that it occurs in primary montane rainforest at high elevations, with ideal detection periods following rainfall, corresponding to its breeding activity. Kamsi et al. (2017) also reported its presence in low-elevation primary montane forest.

According to Harvey et al. (2002), *R. barisani* is poorly known due to limited data. This species was first reported from Bukit Kaba in Rejang Lebong, Bengkulu. Subsequent records include Bener, Gayo Lues, and Blang Pidie in Southwest Aceh, as well as Ulu Masen in Aceh. Additional populations have been documented in the Batang Toru Forest and Batang Gadis National Park in North Sumatra; at Sungai Durian in Kerinci, Jambi; and on Mount Marapi in Agam, West Sumatra (Cahyadi, 2021; Handayani, 2015; Harvey et al., 2002; Kamsi et al., 2017; Kirillov, 2016; Kurniati, 2009; McGuire et al., 2023; Naufal, 2019; Umilaela et al., 2008).

Based on morphology, *R. barisani* is characterized by an obliquely sloping, pointed snout, with the distance from eye to nostril nearly equals to that from nostril to snout tip. Small dermal tubercles occur on the ulna and tarsus, and the webbing between the first and second toes does not reach the distal subarticular tubercle. Dorsal skin bears rounded, flattened tubercles, and a thick, prominent supratympanic fold is evident. Dorsal coloration is primarily brown with faint transverse bands, while the groin, concealed surfaces of the thighs, and hidden thigh skin are black with white spots exhibiting a bluish tinge. Males are smaller than females (Harvey et al., 2002; Kamsi et al., 2017).

Geographically, Karo Regency lies along the Bukit Barisan mountain chain and is predominantly highland, featuring two active volcanoes, Mount Sinabung and Mount Sibayak. Ritonga (2019) reported that Karo Regency lies at elevations ranging from 200 to 2,400 meters above sea level and is dominated by highland and mountainous terrain. According to Harvey et al. (2002) and Umilaela et al. (2008), these geographic features of Karo Regency provide suitable habitat for the Barisan Tree Frog.

R. barisani was reported by Handayani (2015) in Herpetologer Mania magazine as inhabiting riparian zones, where individuals perch on branches and leaves up to four meters above the water surface. This species displays pronounced color polymorphism, which can mislead observers and contribute to taxonomic ambiguity. Comparable polymorphic traits have been observed in specimens from Karo Regency, although their precise microhabitat preferences differ.

Frogs play a crucial role in the ecosystem as a vital component of the food chain. Most

amphibians are predators, consuming various types of insects or their larvae, and also act as prey (Kusrini, 2013). This endemic frog plays a crucial role as an indicator of environmental change, as its survival is highly susceptible to environmental conditions. This research is expected to significantly impact reports on its new distribution in Sumatra and serve as baseline data for future conservation efforts.

METHOD

This study was conducted during the rainy season from September to November 2023 in the Bukit Barisan Grand Forest Park (Tahura Bukit Barisan) and the Mount Sibuatan Protected Forest, Karo Regency, North Sumatra. Data were collected using purposive sampling and the Visual Encounter Survey–Night Stream (VES–NS) method at four observation sites. Observations were carried out by 4 observers and started from 07.00 to 11.59 pm. The activities were carried out in stages and lasted for 2 nights at each location. At Mount Sibuatan, surveys extended 200 meters along the Aek Bolon stream and adjacent irrigation channels near the mountain's trailhead. In Tahura Bukit Barisan, surveys included both small stream reaches and standing pools in the Lau Pantar area (Das et al., 2016; Siregar, 2010). Nocturnal fieldwork focused on small stream habitats at two points around Mount Sibuatan and on two points, comprising both stream reaches and water-filled depressions within Tahura Bukit Barisan. At each site, calling frogs were located by their vocalizations, and habitat characteristics were documented. Samples were captured using hand nets or plastic bags, then the main abiotic parameters (air temperature, relative humidity, GPS coordinates, and elevation) were measured using a thermohygrometer and GPS *(Global Positioning System)*. Morphological characteristics (snout–vent length, head length, head width, snout length, nostril–snout distance, eye–snout distance, eye diameter, hind-limb length, femur length, tibia length and metatarsus to fourth toe tip) were described, and standard morphometric measurements were performed using digital calipers with an accuracy of 0.02–0.05 mm according to the protocol (Addaha et al., 2015; Djong et al., 2007; Harvey et al., 2002).

Study area

Tahura Bukit Barisan is a tropical montane rainforest spanning four regencies (Karo, Deli Serdang, Langkat, and Simalungun) and covering approximately 51,600 hectares, as designated by Presidential Decree No. 48 of 1988. This protected area harbors numerous legally protected flora and fauna species and serves as the headwater catchment for major North Sumatran rivers, including the Deli, Wampu, and Seruai (Ritonga, 2019).

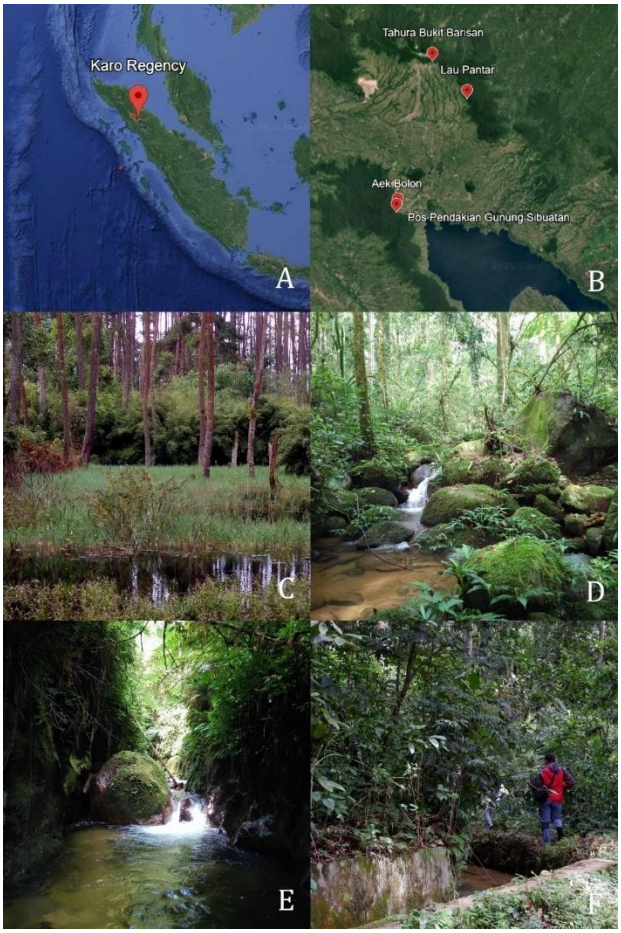

Figure 1. A) Map of Sumatra Island; B) Sample collection habitat; C) Standing pool in Tahura Bukit Barisan; D) Lau Pantar river; E) Aek Bolon river; F) Irrigation channels near the mountain's trailhead in Mount Sibuatan;. Source (a & b): Google Earth 11 October 2025.

Study by Nadhifah et al. (2018) report that the Mount Sibuatan Protected Forest, which spans Karo and Dairi regencies, also consists of tropical montane rainforest. Although detailed biodiversity surveys are limited, the forest remains in excellent condition and supports high species diversities. Both areas lie between 1,000 and 2,400 meters above sea level and include primary and secondary rainforest, pine stands, and shrubland. For this study, sampling sites were located along the Aek Bolon stream and adjacent irrigation channels in Mount Sibuatan, as well as in the pools and stream reaches of the Lau Pantar area in Tahura Bukit Barisan.

RESULTS AND DISCUSSION

Morphology of *Rhacophorus barisani* (Harvey, Pemberton & Smith, 2002)

Morphological characterization of *Rhacophorus barisani* (Harvey, Pemberton & Smith, 2002) specimens was based on variation in dorsal coloration and patterning, which correlated with body size. Three principal color morphs were observed across the four survey sites: (1) A light brown ground color with yellowish-brown on the dorsum that does not extend to the flanks. Dorsal markings are faint, limbs bear complete encircling bands, and the thigh exhibits red pigmentation; (2) A uniform yellowish-brown ground color edged in yellow, with distinct dorsal patterning and black limb bands. Samples of this morph were generally larger; and (3) A green ground color with scattered brown or black dorsal tubercles, a slender body form, bluish ventral and proximal limb coloration, and red membranes on both fore- and hind-foot webbing.

The number of *R. barisani* found in each location is as follows: Tahura Bukit Barisan 12 individuals and found with the second and third variations, Lau Pantar 3 individuals with the third variation, Aek Bolon 3 individuals with the first and third variations, and the irrigation channel near the Sibuatan mountain hiking post totaled 7 individuals with the first and third variations. The total of all individuals found in all research locations was 25 individuals. This number is relatively small considering that there are quite a lot of research points.

Overall, *R. barisani* exhibits a moderate body size and an obliquely sloping, pointed snout visible in dorsal view, with the snout tip extending beyond the lower jaw. A thick, conspicuous supratympanic fold overlies a tympanic membrane that is half the diameter of the eye and confluent with the orbital rim. Both structures generally match the surrounding skin color. The dorsal skin bears flattened, rounded tubercles and additional small tubercles on the ventral surface. Limbs are relatively short, with the forelimb length is approximately half the hind-limb length, and forelimb breadth measures three-quarters that of the hind limb. Fingers and toes are extensively webbed, with small subarticular tubercles. Webbing between toes I and II does not reach the distal tubercle. Digit tips are ovoid.

Snout–vent length of collected samples ranged from 41.9 to 65.7 mm, with no clear sexual dimorphism in size. Head length measured 18.9–24 mm, and head width 17.4–22.3 mm. Snout length (from eye to tip) was 10.3–15.4 mm. The distance from the nostril to the eye measured 4.2–4.6 mm, while the distance from the eye to the snout tip was 11.2–15.8 mm. Total hind-limb length ranged from 54.7 to 84 mm. Femur length ranges from 17.8-27.3 mm. The length of the tibia at the time of measurement ranged from 19.3-35 mm. And the last is Metatarsus to fourth toe tip ranging between 23.2-34.2 mm. From the measurement results, the second variation originating from the standing pool in the Bukit Barisan Grand Forest Park (Tahura) has the largest morphometrics when compared with other variations. Each captured *R. barisani* individual was released after documentation and measurements were completed. Collection of this species was not carried out because it was only found in small numbers in its habitat, so conservation is necessary, and for further research, if it is needed, it is very likely that it can still be found at the location because its habitat is still preserved.

Table 1. Morphometric Measurements of *Rhacophorus barisani* (Harvey, Pemberton & Smith, 2002)

No	Character	Morphometric (mm)							
		TH	µ	LP	µ	AB	µ	IC	µ
1	Snout–vent length	45.2-65.7	55.4±0.05	41.9-63.4	52.6±0.04	42.7-62.2	52.4±0.03	42.2-60.1	51.1±0.04
2	Head length	21.1-24	22.5±0.03	19.2-23.3	21.2±0.05	19.1-22.7	20.9±0.02	18.9-23.2	21±0.05
3	Head width	17.8-22.3	20±0.04	17.6-21.2	19.4±0.02	18.4-21.3	19.8±0.05	17.4-21.1	19.2±0.04
4	Snout length	12.3-14.8	13.5±0.02	12-15.4	13.7±0.02	10.3-12.9	11.6±0.02	11.4-14.2	12.8±0.02
5	Nostril–snout distance	4.3-4.6	4.4±0.05	4.2-4.5	4.3±0.05	4.2-4.4	4.3±0.02	4.2-4.3	4.2±0.04
6	Eye–snout distance	11.9-15.8	13.8±0.05	11.8-14.1	12.9±0.04	11.2-14.4	12.8±0.03	11.3-14.2	12.7±0.05
7	Eye diameter	3.5-4.8	4.1±0.05	4.4-4.8	4.6±0.02	4.5-4.8	4.6±0.04	4.3-4.7	4.5±0.02
8	Hind-limb length	57.1-84	70.7±00.2	55.3-77.6	66.4±0.05	55.6-64.2	59.9±0.02	54.7-69	61.8±0.03
9	Femur length	17.8-27.3	22.5±0.05	18.8-25.1	21.9±0.04	17.8-22.4	20.1±0.02	20.4-23.1	21.7±0.05
10	Tibia length	22-35	28.5±0.02	21.2-29.4	25.3±0.02	22.1-26.3	24.2±0.02	19.3-25.2	22.2±0.04
11	Metatarsus to fourth toe tip	24-34.2	29.1±0.04	25.4-27.7	26.5±0.04	23.2-25.7	24.4±0.05	25.3-31.8	28.5±0.03

Note: TH = Tahura Bukit Barisan; LP = Lau Pantar; AB = Aek Bolon; IC = irrigation channel; µ = average

Habitat Suitability of *Rhacophorus barisani* (Harvey, Pemberton & Smith, 2002)

Habitat surveys for *Rhacophorus barisani* (Harvey, Pemberton & Smith, 2002) were conducted at four observation sites: the Aek Bolon stream with a width of between 3-4 meters and adjacent irrigation channels with a width of 1 meter in the Mount Sibuatan Protected Forest, and both standing pools area of approximately 50 m^2 and Lau Pantar stream reaches with a width of 3-4 meters in the Bukit Barisan Grand Forest Park (Tahura). At each site, nocturnal measurements of air temperature, relative humidity, elevation, and GPS coordinates were recorded. Air temperatures ranged from 16.1 to 19.2 °C, relative humidity from 96% to 99%, and elevations between 1,318 and 1,562 m above sea level. The standing pool in Tahura Bukit Barisan (N 03°12′22.8″, E 098°32′12.0″) was fed by a small ditch and dries out during the dry season. Lau Pantar (N 03°07′55.2″, E 098°36′16.1″) is a small, fast-flowing stream beneath primary-forest canopy in Serdang Village within Tahura Bukit Barisan. The Aek Bolon stream (N 02°54′24.4″, E 098°27′59.8″) originates on Mount Sibuatan and eventually drains into Lake Toba. Finally, an irrigation channel near the Mount Sibuatan trailhead (N 02°55′02.7″, E 098°28′04.1″) was also surveyed. All measurements were taken at night concurrently with visual encounter and call surveys.

During observations, the lowest temperature was recorded at the irrigation channel near the base of Mount Sibuatan (16.1 °C), and the highest at Lau Pantar in Serdang Village, Tahura Bukit Barisan (19.2 °C). Kusrini (2013) reports that optimal frog habitat temperatures range from 22 to 35 °C, whereas Kurniawan et al. (2024) found that frogs tolerate 18.5 to 25.3 °C. Novia et al. (2015) recorded habitat temperatures of 17 to 19 °C in Kerinci Seblat National Park, which aligns with our findings in Karo Regency.

Table 2. Environmental parameters at *Rhacophorus barisani* (Harvey, Pemberton & Smith, 2002) habitat sites.

Parameter	Observation Sites			
	TH	LP	AB	IC
Temperature (°C)	17,8	19,2	16,4	16,1
Relative humidity (%)	99	96	99	99
Elevation (m a.s.l.)	1,436	1,318	1,562	1,528

Notes: TH = Tahura Bukit Barisan; LP = Lau Pantar; AB = Aek Bolon dan IC = irrigation flow.

Relative humidity was lowest at Lau Pantar 96% and 99% at the other three sites. Kusrini (2013) suggests that ideal humidity for frogs spans 56 to 100%, and both Kurniawan et al. (2024) and Novia et al. (2015) report habitat humidity between 82 and 100%. These conditions support frog persistence in Karo Regency. Between September and November 2018, the average humidity ranged from 86.9 to 100%, daily rainfall averaged 6.3 to 8.8 mm, and there were 15 to 18 rainy days per month (BPS Kabupaten Karo, 2018). Temperature and

humidity are critical factors for organismal survival. Handayani (2015) adds that color variation in the Barisan Tree Frog is influenced by ambient temperature, weather, and climate.

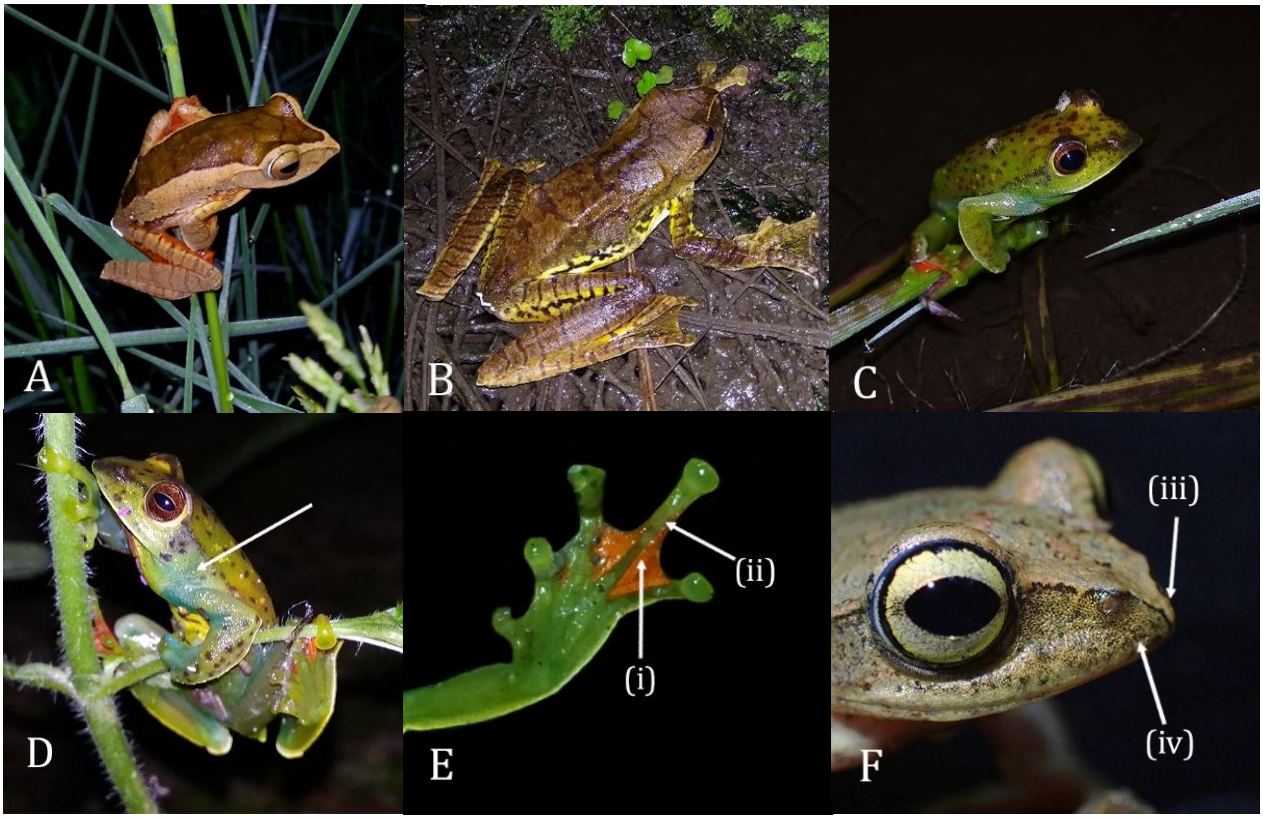

Figure 2. *Rhacophorus barisani* (Harvey, Pemberton & Smith, 2002) A. 1st pattern variation; B. 2nd pattern variation; C. 3rd variation of pattern; D. Blue-colored pattern on the abdomen and base of limbs; E. Metatarsus (i) red color of the foot membrane and (ii) red color of the foot membrane the membrane on the fingertips does not reach the fingertips and F. Head (iii) pointed muzzle tip and (iv) the tip of the muzzle over the tip of the lower jaw.

R. barisani has been reported from foothill to montane zones at elevations of 1,000–1,700 m above sea level (m a.s.l.). In the present study, samples were recorded between 1,318 and 1,562 m. Previous records include Sungai Durian in Kerinci, Jambi at 1,000 m a.s.l. (Kurniati, 2009). Sumber Urip Village in Rejang Lebong at 1,300–1,700 m in disturbed primary forest (Umilaela et al., 2008). Bukit Kaba at 1,440 m a.s.l. (Harvey et al., 2002), and the Batang Toru Forest and Sopotinjak area in Batang Gadis National Park (Kamsi et al., 2017). All known localities are montane forest sites on Sumatra, corroborating the habitat suitability for the Barisan Tree Frog in Karo Regency, North Sumatra.

Novia et al. (2015) reported that as elevation increases, ambient temperature decreases and humidity increases, leading to reduced amphibian abundance and diversity.

Under these conditions, only species with the best physiological and ecological tolerance persist, including *R. barisani*. Kurniati (2009) described *R. barisani*'s habitat as slow- to fast-flowing streams with fallen logs and adjacent animal wallows. Harvey et al. (2002) further noted its preference for primary montane rainforest near gently flowing streams. In this study, *R. barisani* was found in fast-flowing reaches of the Aek Bolon stream and associated irrigation channels in the Mount Sibuatan Protected Forest, as well as in both fast-flowing sections of the Lau Pantar stream and ephemeral pools under pine canopy in Tahura Bukit Barisan. These observations confirm that the Barisan Tree

Frog occupies both lotic and seasonal lentic microhabitats beneath continuous forest canopy.

Handayani (2015) found that *R. barisani* closely resembles *R. baluensis* Inger, but differs in coloration, digital morphology, and habitat preferences. According to Harvey et al. (2002), *R. baluensis* is brown, while *R. barisani* exhibits distinct color polymorphism, which can complicate accurate identification. Our study revealed three distinct color morphs on the backs of specimens from the Bukit Barisan Forest Reserve and the Gunung Sibuatan Protection Forest, as described above. *R. baluensis* has a pointed calcar on its heel, while *R. barisani* has only a small protrusion and they have a similar head shape with a pointed snout. *R. baluensis* is larger than the species we studied.

Based on data collected from Tahura Bukit Barisan and the protected forest of Mount Sibuatan, the body size of *R. barisani* is generally medium, ranging from 41.9 to 65.7 mm, with no distinction observed between male and female. Although they have the same medium size as *R. dulitensis* Boulenger, *R. nigropalmatus* Boulenger, *R. prominanus* Smith and R. *reinwardtii* (Schlegel) (Harvey et al., 2002), these four species have a brown body color, there are triangular calcars on the legs and *R. barisani* more extensive webbing. Kamsi et al. (2017) reported a narrower range of 43–53 mm, while Harvey et al. (2002) measured a mean of 53.16 mm exclusively in males. Head length varies from 18.9 to 24 mm and head width from 17.4 to 22.3 mm. The snout is characteristically sloping and pointed in dorsal view, extending beyond the lower jaw margin, and measures 10.3–15.4 mm. In comparison to congeners, *R. barisani* has a more acutely pointed head and a mouth width that extends to the orbital rim (Hamidy & Kurniati, 2015; Harvey et al., 2002; Kamsi et al., 2017; Umilaela et al., 2008).

The eyes are large and round, with a diameter of 4.3–5.0 mm. Harvey et al. (2002) reported that the average eye diameter of *R. barisani* is approximately 0.5 mm. The tympanic membrane is confluent with the orbital rim and measures only half the diameter of the eye. The annulus and tympanum generally match the surrounding skin coloration. The supratympanic fold is thick and conspicuous (Kurniati, 2009). The distance from the nostril to the eye measures 4.2–4.6 mm, while the distance from the eye to the tip of the snout is approximately 11.2–15.8 mm. Total hind-limb length ranges from 54.7 to 84 mm. Harvey et al. (2002) noted that, in this species, the eye–nostril distance is nearly equal to the nostril–snout tip distance.

The dorsal skin bears flattened, rounded tubercles. This characteristic is similar to that of *R. cyanopunctatus* Manthey and Steiof, but the two species differ in their legs. *R. cyanopunctatus* has a long triangular calcar and prominent cream-colored spots in the subocular area (Harvey et al. 2002). The ventral surface is white with brown or black spotting, and small tubercles are also present on the belly. According to Hamidy & Kurniati (2015), the overall body coloration of *R. barisani* is brown, with the ventral surface speckled in black and a lined pattern on the dorsum. Kamsi et al. (2017) further describe the dorsal skin texture as flattened yet protruding like small spines.

Limbs are relatively short. The forelimb length is approximately half that of the hind limb, and its girth measures three-quarters the circumference of the hind limb. Harvey et al. (2002) similarly noted that the upper arm is shorter than the hind limb and that the forearm circumference is three-quarters that of the lower leg. Fingers and toes are extensively webbed, with small subarticular tubercles. Webbing between the first and second toes does not reach the distal tubercle. Digit tips are ovoid (Hamidy & Kurniati, 2015; Harvey et al., 2002; Kamsi et al., 2017). In our study, femur length from 17.8 to 27.3 mm, tibia length from 19.3 to 35 mm, and metatarsus length to the tip of the fourth toe from 23.2 to 34.2 mm.

CONCLUSION

Based on morphological and morphometric analyses, *Rhacophorus barisani* (Harvey, Pemberton & Smith, 2002) exhibits variation in

both coloration and body size. *R. barisani* has three different dorsal color patterns: a light brown ground color with yellowish-brown on the dorsum that does not extend to the flanks; a uniform yellowish-brown ground color edged in yellow with distinct dorsal patterning and black limb bands; a green ground color with scattered brown or black dorsal tubercles and range the snout-vent length from 41.9 – 65.7 mm. Habitat suitability of the species occupies riparian and lotic, including stream margins, irrigation channels, and seasonal pools within primary and pine forest at high elevations in Karo Plateau, North Sumatra. Although specific threats have not been quantified, habitat loss from small-scale agriculture, subsistence wood collection, and expanding human settlements likely impact this species. To support conservation of the Barisan Tree Frog, we recommend targeted surveys to map its full distribution, detailed study of its breeding biology and population dynamics, and the establishment of habitat protection measures in key montane forest areas.

REFERENCES

Addaha, H., Hon Tjong, D., & Wilson Novarino. (2015). Morfological Variation of Striped Tree Frog *Polypedates leucomystax* Gravenhorst, 1829 (Anura; Rhacophoridae) in West Sumatera. *Online Jurnal of Natural Science*, *4*(3), 348–354.

Cahyadi, G. (2021). *Rhacophorus barisani*. https://www.inaturalist.org/taxa/26503-Rhacophorus-barisani

Das, Indraneil and Ramlah, Zainudin and Taha, Wahab and Pui, Min, Y. and Fadzil, M., Amram and Quatrin, E., Deka and Matleen, M., Agoh, A. and Atira, N., Alaudin and Baizurah, S. N., & Malik, A. (2016). *A Manual for Amphibian Field Studies*. UNIMAS Publisher.

Djong, T. H., Matsui, M., Kuramoto, M., Belabut, D. M., Sen, Y. H., Nishioka, M., Sumida, M. (2007). Morphological divergence, reproductive isolating mechanism, and molecular phylogenetic relationships among Indonesia, Malaysia, and Japan populations of the Fejervarya limnocharis complex (Anura, Ranidae). *Zoolog Sci, 24*(12), 197-212. https://doi.org/10.2108/zsj.24.1197

Ellepola, G., & Meegaskumbura, M. (2023). Diversification and biogeography of Rhacophoridae – a model testing approach. *Frontiers in Ecology and Evolution*, *11* (September), 1–14. https://doi.org/10.3389/fevo.2023.1195689

Haas, A., Das, I., Hertwig, S., Schulz-Schaeffer, R. & Bublies, P. (2022). *A Guide to the Tadpoles of Borneo*. Tredition.

Hamidy, A., & Kurniati, H. (2015). A new species of tree frog genus Rhacophorus from Sumatra, Indonesia (Amphibia, Anura). *Zootaxa*, *3947*(1), 49–66. https://doi.org/10.11646/zootaxa.3947.1.3

Handayani, S. (2015). *Rhacophorus barisani di Hutan Batangtoru, Beda-beda tapi Sama*. https://herpetologermania.blogspot.com/2015/02/rhacoporus-barisani-di-hutan-batangtoru.html

Harvey, M. B., Pemberton, A. J., & Smith, E. N. (2002). New and poorly known parachuting frogs (Rhacophoridae: Rhacophorus) from Sumatra and Java. *Herpetological Monographs*, 16(1), 46-92.

Inger, R. F., & Stuebing, R. B. (2005). *A Field Guide to the Frogs of Borneo* (Vol. 2, Issue 1). Natural History Publications (Borneo).

Iskandar, D. T. (1998). *Amfibi Jawa dan Bali*. Puslibang Biologi-LIPI.

Jiang, D., Jiang, K., Ren, J., Wu, J., & Li, J. (2019). Resurrection of the Genus Leptomantis, with description of a new genus to the Family Rhacophoridae (Amphibia: Anura). *Asian Herpetological Research*, *10* (1), 1–12. https://doi.org/10.16373/j.cnki.ahr.180058

Kampen, P. N. van. (1923). *The Amphibia of The Indo-Australian Archipelago* (Issue 112). E.J.Brill ltd.

Kamsi, M. (2003). *Panduan Lapangan Amfibi Kawasan Ekosistem Leuser*. The Gibbon

Foundation, PILI-NGO Movement.

Kamsi, M., Handayani, S., Siregar, A. J., & Fredricksson, G. (2017). *Buku Panduan Lapangan Amfibi & Reptil Kawasan Hutan Batang Toru*. Yayasan Ekosistem Leuser.

Badan Pusat Statistik Kabupaten Karo. (2018). *Rata-rata Kelembaban Udara, Curah Hujan dan Hari Hujan Tahun 2018*. https://karokab.bps.go.id/statictable/2015/11/20/38/rata-rata-kelembaban-udara-curah-hujan-dan-hari-hujan-2018.html

Kirillov, P. (2016). *Rhacophorus barisani*. https://www.inaturalist.org/taxa/26503-Rhacophorus-barisani

Kurniati, H. (2009). Biodiversity of amphibians and reptiles in Kerinci Seblat National Park, Sumatra, Indonesia. *Zoo Indonesia*, *18*(2), 44–68.

Kurniati, H., & Mujiono, N. (2020). Distrubusi Geografi Jenis-Jenis Kodok Endemik Sumatra Berdasarkan Batas Administratif Provinsi dan Nilai Penting Wilayah Konservasi. *Jurnal Biologi Indonesia*, *16*(2), 183–194. https://doi.org/10.47349/jbi/16022020/183

Kurniawan, N., Fathoni, M., Assiddiqy, M. F., Septiadi, L., & Rijalullah, M. A. (2024). Habitat Suitability Modelling of *Rhacophorus reinwardtii* (Schlegel, 1840) in Java, with Notes on Habitat Characteristics from Malang Region-East Java. *Journal of Tropical Biodiversity and Biotechnology*, *9*(2), 1-16. https://doi.org/10.22146/jtbb.84459

Kurniawan, N., Septiadi, L., Kadafi, A. M., Fathoni, M., Prabasari, K., & Thammachoti, P. (2023). A New Species of Theloderma Tschudi, 1838 (Amphibia: Rhacoporidae) from Central Java Allied to T. horridum (Boulenger, 1903). *Asian Herpetological Research*, *14*(1), 1–23. https://doi.org/10.16373/j.cnki.ahr.220033

Kusrini, M. D. (2013). *Panduan Bergambar Identifikasi Amfibi Jawa Barat*. Fakultas Kehutanan IPB dan Direktorat Konservasi Keanekaragaman Hayati.

McGuire, J. A., Guzman, D., Lawalata, S., Rasyid, A., & Arifin, U. (2023). *Rhacophorus barisani*. https://amphibiaweb.org/species/6016

Nadhifah, A., Noviady, I., Suharja, Muslim, & Suhendri, Y. (2018). Keanekaragaman lumut (Musci) berukuran besar pada zona montana Kawasan Hutan Lindung Gunung Sibuatan, Sumatra Utara. *Prosiding Seminar Nasional Masyarakat Biodiversitas Indonesia*, *4*(2), 101–106. https://doi.org/10.13057/psnmbi/m040201

Naufal, F. (2019). *Rhacophorus barisani*. https://www.inaturalist.org/taxa/26503-Rhacophorus-barisani

Novia, Sanjaya, M., & Gusman, D. (2015). Vertical Distribution of Anura in Seblat Mount Lebong Regency, Bengkulu. *Prosiding Semirata 2015 Bidang MIPA BKS-PTN Barat*, 173–178.

Ritonga, Y. E. (2019). *Pengenalan Flora Pegunungan Sumatera Utara*. Media Guru.

Sayyed, A. (2015). *Note on the Natural Crossbreeding in Family*. *2* (September 2013), 1–4.

Siregar, A. J. (2010). *Jenis dan Komposisi Komunitas Amfibi di Taman Wisata Alam/ Cagar Alam Sibolangit dan Desa Sembahe Kecamatan Sibolangit Kabupaten Deli Serdang Sumatera Utara*. Universitas Sumatera Utara.

Tambunan, M. I. H., Haq, M. D., Muammar, Hardiansyah, D., & Ritonga, Y. E. (2025). Identification of Amphibian Species in the Durin Serugun Village Forest, Sibolangit, North Sumatra. Ulin - J Hut Trop, 9 (2), 428–437. https://doi.org/http://dx.doi.org/10.32522/ujht.v9i2.22120

Umilaela, Iskandar, D. T., Bickford, D. P., Roesma, D. I., Elianur, R., Rachmansah, A., Prayoga, A., Hadisaputro, D. A., & Pialo, E. (2008). *Frog Conservation in Bengkulu , Sumatra – Indonesia Frog Conservation in Bengkulu , Sumatra – Indonesia*. *July*.