



A new population record and conservation assessment of the Santa Marta Poison Arrow Frog *Colostethus ruthveni* Kaplan, 1997 (Anura: Dendrobatidae) from Sierra Nevada de Santa Marta, Colombia

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Colombia is considered among the countries with the highest levels of amphibian species richness (Rueda-Almonacid et al. 2004), but it is also one of the countries with the greatest risks to its biodiversity in general (Sisk et al. 1994; Brooks et al. 2002). Poison arrow or poison dart frogs (Anura: Dendrobatidae), are tropical species restricted to the New World and

are represented globally by 12 genera with 174 species (Frost 2010), 66 of which (9 genera) are recorded in Colombia (IUCN 2010). The genus *Colostethus* (dart frogs) is one of the largest genera in the family, represented by 21 species globally, 17 of them occurring in the country (IUCN 2010).

Thirty percent of all amphibian species of the country (213 species) are considered to be in a threat category as defined by the IUCN Red List of Threatened Species (IUCN 2010), 17 of them within the Dendrobatidae family and two in the genus *Colostethus*, with a major concentration of threatened species in the Andean region (IUCN 2010).

Sierra Nevada de Santa Marta (SNSM) is an isolated mountain range located north of the Andes in the Caribbean region of Colombia. It has a high concentration of endemic species, consistent with the Pleistocene refuges theory which invokes fragmentation of ranges and temporal isolation allowing speciation to occur (Hernández-Camacho et al. 1992). SNSM, with its unique geographic location as the highest coastal mountain range in the world, represents a critical ecoregion in terms of high endemic values (Carbonó 2001).

The SNSM was established as a Biosphere Reserve by UNESCO in 1979 (López-Londoño et al. 2008), and classified as an Endemic Bird Area (EBA 36; BirdLife International 2003). It also includes several Important Bird Areas (Franco et al. 2009), and possesses one Alliance for Zero Extinction (AZE) site, since there are nine threatened species (six amphibians and three birds) with ranges restricted to the area (*Atelopus arsyecue*, *Atelopus laetissimus*, *Atelopus nahumae*, *Colostethus ruthveni*, *Eleutherodactylus insignitus*, *Eleutherodactylus ruthveni*, *Campylopterus phainopeplus*, *Myiotheretes pernix* and *Pyrrhura viridicata*; Ricketts et al. 2005).

Here we report a new population of the Santa Marta Poison Arrow Frog *Colostethus ruthveni*, from Námaku private reserve in SNSM, 14km away from the actual extent of occurrence of the species, increasing the number of known records and its current known distribution (Lynch et al. 2004). The species is considered to be Endangered under criteria B1ab(iii) because it is known from less than five locations and

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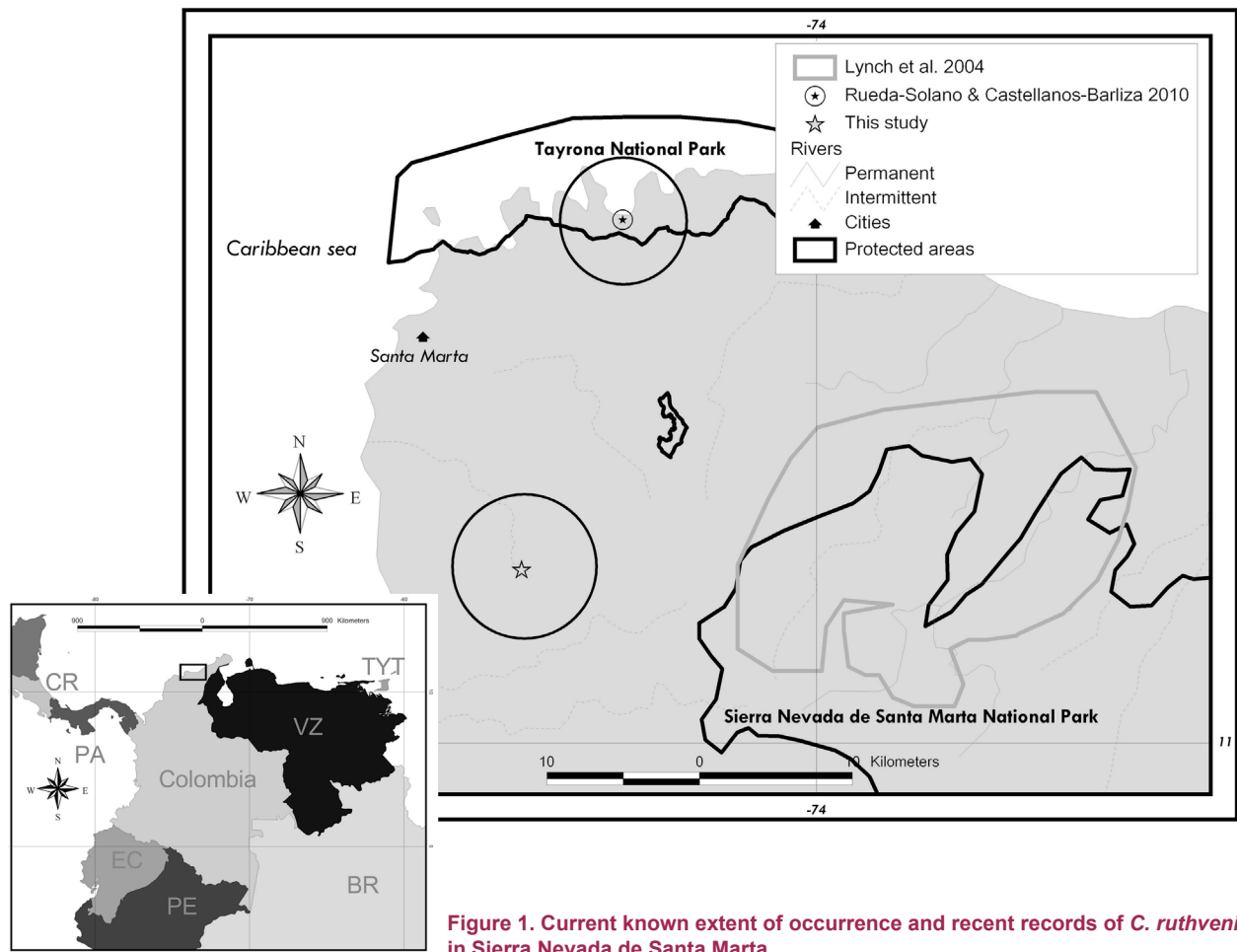


Figure 1. Current known extent of occurrence and recent records of *C. ruthveni* in Sierra Nevada de Santa Marta.

its extent of occurrence is less than 5,000km² (Lynch et al. 2004; Rueda-Solano & Castellanos-Barliza 2010); however, even when it is not included in the national threatened species list (Rueda-Almonacid et al. 2004), it has been prioritized at national level during the Amphibian Ark Conservation Needs Assessment workshop for Colombia held during November 2007 (Amphibian Ark 2007). *C. ruthveni* is known to occur in cloud and dry forests from 680 to 1,540m above sea level between San Miguel and Don Diego rivers (Lynch et al. 2004; Stuart et al. 2008), and more recently it has been also found in dense forests near sea level in Tayrona National Natural Park (TNNP; Rueda-Solano & Castellanos-Barliza 2010).

Námaku Reserve (11°6'44.47"N & 74°8'43.27"W, Fig. 1) is located on the southern slopes of the SNSM within Santa Marta municipality, approximately 15km southeast from Santa Marta City, 4km southwest from downtown Minca and 9km east from Simon Bolivar International Airport. The area is a private reserve

located between 737 and 923m above sea level with a mean annual precipitation of 2,000mm and a mean temperature ranging from 22.7 to 28.7°C (Pérez-Preciado 1984; Tribin et al. 1999).

During intensive wildlife surveys across the reserve between January and March 2010, 22 sightings of *Colostethus ruthveni* were obtained, always around creeks and river beds and during daytime hours (0900 to 1600 hr; Image 1). The individuals were identified based on the species description (Kaplan 1997) and expert consultation. The transect covered approximately 5.73km, with a total estimated abundance of 3.83 ind/km and mean survey abundance of 0.28 ± 0.09 ind/km. The substrate where all individuals were found was rocky-sandy shores within the river beds, usually near the margins of the river.

Currently the species is known to occur inside two national protected areas (Tayrona NNP and SNSM NNP; Rueda-Solano & Castellanos-Barliza 2010), and a private reserve (El Dorado; ProAves 2006),



Image 1. Individual of *C. ruthveni* observed at Námaku reserve in Sierra Nevada de Santa Marta. Credit: ProCAT Colombia 2010.

so this new record represents another area with full protection for the species and a refuge from the main threats affecting its populations, such as habitat loss and degradation from agricultural activities, logging, pollution and infrastructure development (Cavelier et al. 1998; Lynch et al. 2004). However, the conservation of public protected areas requires additional reinforcement, mainly the SNSM NNP, where several factors still affect the area, including sociopolitical conflicts and jurisdictional problems, representing a potential threat to habitats and to animal populations in general (Zárrate-Charry et al. 2009). This report is a significant contribution to the current knowledge of this important but threatened species in Colombia, mainly about its distribution and habitat. The new findings and the recent sightings by Rueda-Solano & Castellanos-Barliza (2010) in Tayrona National Natural Park, provide new information about the ecology, habitat and ecosystems where the species occurs, and extends the current extent of occurrence by nearly 550km² and increasing the presence of the species to a new slope of the Sierra Nevada, suggesting the potential presence of other populations across the region, and the possible resilience to human impacts and in general a more widespread distribution. It also provides new insights for the assessment of the species and helps set new goals for research in terms of intensive and extensive surveys across the area to discover new populations and provide new information regarding biology and natural history, and mainly distribution.

Based on the new records described herein, we propose that the assessment should include a new

number of locations, increasing from four to six known. According to this recent information, we suggest the species to be downlisted into Vulnerable VU category criteria, with a known extent of occurrence of approximately 920km² (estimated from a new extent of occurrence polygon including Lynch et al. 2004 and current records). Based on the available information, the species should be listed as VU B1ab(iii), due to (B1) geographic range in the form of extent of occurrence estimated to be less than 20,000km², with (a) severely fragmented or known to exist at no more than 10 locations and (b) continuing inferred decline in (iii) area, extent and/or quality of habitat (IUCN 2001). If future information becomes available and the extent of occurrence is significantly increased, the species can be downlisted as previously stated.

Colostethus ruthveni may potentially become a conservation tool for the reserve and surroundings, since currently the entire planning of the area is conducted by a local organization where threatened and surrogate species are given significant importance. Research will be needed to better understand this species' biology and ecology in the area, in order to plan strategic conservation actions to protect the species and its habitat in this private protected area and several other parts of the region.

REFERENCES

- Amphibian Ark (2007).** *Conservation Needs Assessment Workshops*. <<https://aark.portal.isis.org/Lists/Prioritization%20workshop%20results/AllItems.aspx>>. On-line version dated 08 January 2011.
- BirdLife International (2003).** *BirdLife's online World Bird Database: The Site for Bird Conservation*. Version 2.0. <<http://www.birdlife.org>>. Downloaded on 12 July 2010.
- Brooks, T., R. Mittermeier, C. Mittermeier, G.A.B. da Fonseca, A. Rylands, W. Konstant, P. Flick, J. Pilgrim, S. Oldfield, G. Magin & C. Hilton-Taylor (2002).** Habitat loss and extinction in the hotspots of biodiversity. *Conservation Biology* 16(4): 909–923.
- Carbonó, E. (2001).** Santa Marta montane forests (NT0159). <http://www.worldwildlife.org/wildworld/profiles/terrestrial/nt/nt0159_full.html>. Downloaded on 12 October 2010.
- Cavelier, J., T.M. Aide, C. Santos, A.M. Eusse & J.M. Dupuy (1998).** The savannization of the moist forest in the Sierra Nevada de Santa Marta, Colombia. *Journal of Biogeography* 25: 901–912.
- Franco, A.M., C. Devenish, M.C. Barrero & M.H. Romero**

- (2009). Colombia, pp 135–148. In: C. Devenish, D.F. Díaz Fernández, R.P. Clay, I. Davidson & I. Yépez Zabala (eds.) *Important Bird Areas Americas—Priority sites for biodiversity conservation*. Quito, Ecuador: BirdLife International (BirdLife Conservation Series No. 16).
- Frost, D.R. (2010).** *Amphibian Species of the World: an Online Reference*. Version 5.4. <<http://research.amnh.org/vz/herpetology/amphibia>>. Online version dated 8 April 2010.
- IUCN (2001).** *IUCN Red List Categories and Criteria: Version 3.1*. IUCN Species Survival Commission. IUCN, Gland, Switzerland and Cambridge, UK, ii+30pp.
- IUCN (2010).** *IUCN Red List of Threatened Species*. Version 2010.3. <<http://www.iucnredlist.org>>. Downloaded on 02 September 2010.
- Kaplan, M. (1997).** A new species of *Colostethus* from the Sierra Nevada de Santa Marta (Colombia) with comments on intergeneric relationships within the Dendrobatidae. *Journal of Herpetology* 31(3): 369–375.
- López-Londoño, T., J.F. González-Maya, D. Zárrate-Charry & S. Balaguera-Reina (2008).** Biodiversity and cultural conservation in Sierra Nevada de Santa Marta Colombia. *Mountain Forum Bulletin* 8(2): 43–44.
- Lynch, J., M.P. Ramírez Pinilla, M. Osorno-Muñoz, J.V. Rueda, A. Amézquita & M.C. Ardila-Robayo (2004).** *Colostethus ruthveni*. In: IUCN 2010. IUCN Red List of Threatened Species. Version 2010.3. <www.iucnredlist.org>. Downloaded on 12 October 2010.
- Pérez-Preciado, A. (1984).** Aspectos climáticos de la Sierra Nevada de Santa Marta, pp. 33–44. In: Van Der Hammen, T. & P. Ruiz-C (eds.). *La Sierra Nevada de Santa Marta Transecto Buritaca–La Cumbre*. Estudios de Ecosistemas Tropoandinos Vol. II. J. Cramer, Vaduz - Berlín - Stuttgart, 603pp.
- ProAves (2006).** *Informe Anual 2006*. Fundación ProAves. Bogotá, Colombia, 24pp.
- Ricketts, T.H., E. Dinerstein, T. Boucher, T.M. Brooks, S.H.M. Butchart, M. Hoffmann, J.F. Lamoreux, J. Morrison, M. Parr, J.D. Pilgrim, A.S.L. Rodrigues, W. Sechrest, G.E. Wallace, K. Gerlin, J. Bielby, N.D. Burgess, D.R. Church, N. Cox, D. Knox, C. Loucks, G.W. Luck, L.L. Master, R. Moore, R. Naidoo, R. Ridgely, G.E. Schatz, G. Shire, H. Strand, W. Wettengel & E. Wikramanayake (2005).** Pinpointing and preventing imminent extinctions. *Proceedings of the National Academy of Sciences - US* 51: 18497–18501.
- Rueda-Solano, L.A. & J. Castellanos-Barliza (2010).** Herpetofauna de Neguanje, Parque Nacional Natural Tayrona, Caribe Colombiano. *Acta Biológica Colombiana* 15(1): 195–206.
- Rueda-Almonacid, J.V., J.D. Lynch & A. Amézquita (Eds.) (2004).** *Libro Rojo de los Anfibios de Colombia. Serie Libros Rojos de Especies Amenazadas de Colombia*. Conservación Internacional Colombia, Instituto de Ciencias Naturales – Universidad Nacional de Colombia, Ministerio del Medio Ambiente. Bogotá (Colombia).
- Stuart, S.N., M. Hoffmann, J.S. Chanson, N.A. Cox, R.J. Berridge, P. Ramani & B.E. Young (eds.) (2008).** *Threatened Amphibians of the World*. Lynx Edicions, Barcelona, Spain; IUCN, Gland, Switzerland; and Conservation International, Arlington, Virginia, USA, xv+758pp.
- Sisk, T.D., A.E. Launer, K.R. Switky & P.R. Ehrlich (1994).** Identifying extinction threats. *Bioscience* 44: 592–604.
- Tribin, M.C.D.G., G.E. Rodríguez-N & N. Valderrama (1999).** The biosphere reserve of the Sierra Nevada de Santa Marta: A pioneer experience of a shared and coordinated management of a bioregion. UNESCO. South Cooperation Programme Working paper No 130. Paris, 40pp.
- Zárrate-Charry, D., J.F. González-Maya, C. Jaramillo, C. Castaño-Uribe, A.M. Botero, S.A. Balaguera-Reina & A.A. Cepeda (2009).** *Monitoreo comunitario para la planificación de la conservación: un enfoque de especies bandera como herramientas culturales de conservación*. Fundación Herencia Ambiental Caribe-ProCAT Colombia. Santa Marta, 45pp.

