



New Record of the American Bullfrog, *Lithobates catesbeianus* (Shaw 1802), in Loja, Ecuador

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Biological invasions have been the focus of attention of the international scientific community because of their negative impacts on native biodiversity (Kraus 2009, 2011) and natural and anthropogenic ecosystems (Simberloff and Rejmánek 2011). The introduction of invasive species has been described as the second most severe contributor to biodiversity loss after the habitat lost by human activities (McGeoch et al. 2010; Simberloff and Rejmánek 2011). Among invasive species, the American Bullfrog (*Lithobates catesbeianus*) (Fig. 1) was listed as one of the world’s worst invasive species (Lowe et al. 2004). This amphibian is native to eastern and central North America, but has been introduced throughout the United States and to more than 50 countries worldwide (Lannoo 1995; Lowe et al. 2004; Ficetola et al. 2007; Kraus 2009; Frost 2024) including Colombia, Ecuador, Paraguay, Chile (Lannoo 1995), Venezuela (Hanselmann et al. 2004), Uruguay (Mazzoni et al. 2003), Argentina (Sanabria et al. 2005), and Brazil (Batista 2002).

Despite the potential threat that this invasive species represents, new records continue to be documented in South American countries (Sanabria et al. 2011; Valarezo-Aguilar

et al. 2016). For instance, in Ecuador apparently established populations of this alien species have been reported in the provinces of Napo and Manabí (Cisneros-Heredia 2004), Loja (Cobos et al. 2015), Zamora Chinchipe (Valarezo-Aguilar et al. 2016), and Santa Elena (Cruz Cordovez et al. 2020) (Fig. 2A). We herein report a new established population of the American Bullfrog in Loja, Andean Province, Ecuador (-3.9529, -79.2430; elev. 2,226 m asl) (Fig. 2), which is 13.6 km from the nearest previously known locality. We found this population in a natural lagoon of 21,843 m² located next to the property of the Loja Chamber of Commerce, in Carigan, 5 km from the bus station northwest of Loja, close to the Pan-American Highway that leads to Cuenca.

Located in the southern Andean region of Ecuador, the climate is temperate (mean temperature = 15.8 °C ± 1.9 °C, annual precipitation = 962.1 mm) (La Argelia Meteorological station INAMHI; mean data from 1950 to 2014). The site is in a productive landscape comprising small properties dedicated to agriculture and livestock in the peri-urban area of northwestern Loja. This site contains a forested area



Figure 1. Juvenile (ZSFQ H00119; left) and adult (ZSFQ H00120; right) American Bullfrogs (*Lithobates catesbeianus*) collected from the lagoon in Carigán, Loja City. Photographs by C. Mendoza-León (left) and M.E. Cobos (right).

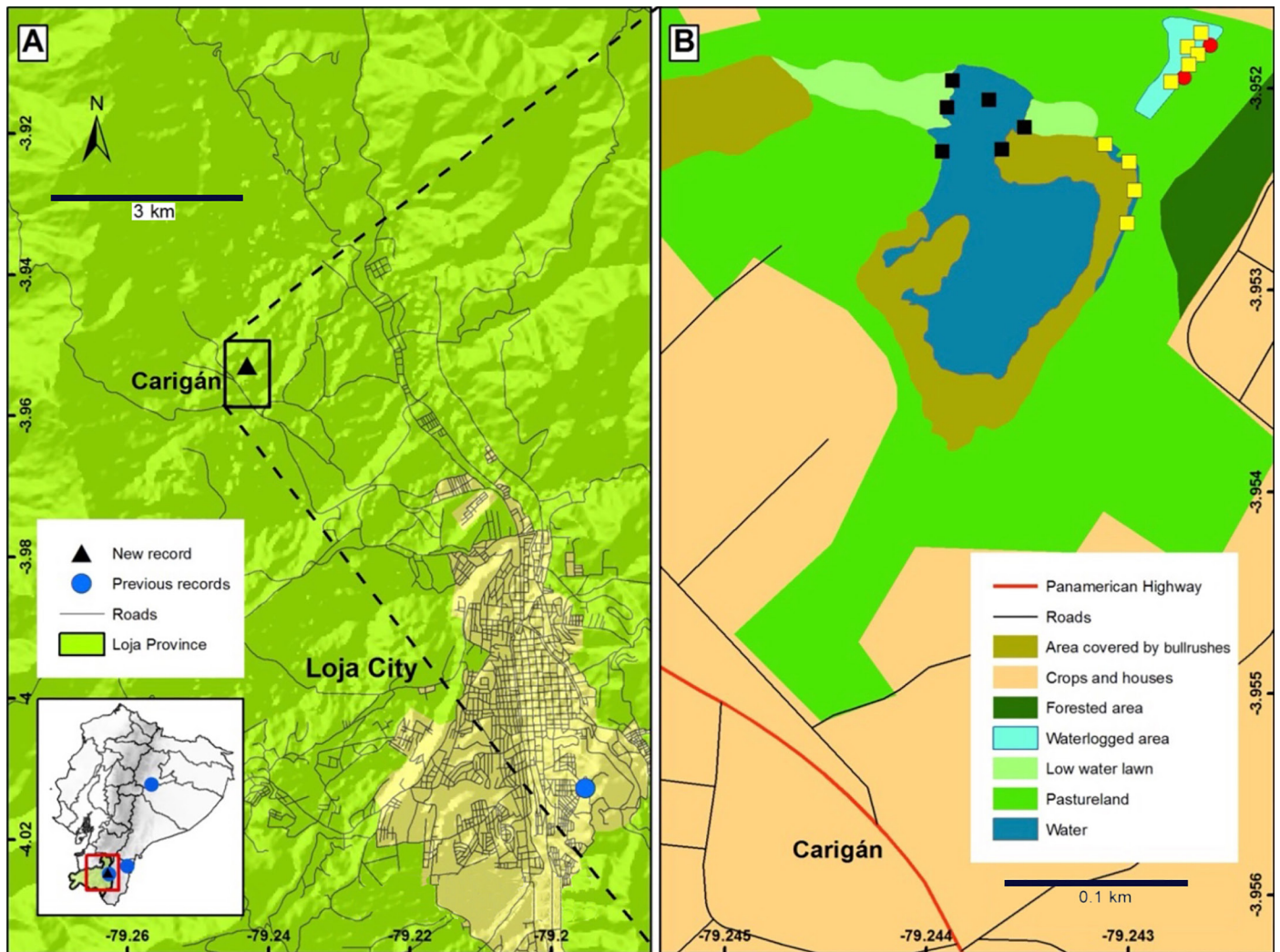


Figure 2. Records of American Bullfrogs (*Lithobates catesbeianus*) in Ecuador. (A) Location of the study area in Loja City, and (B) the study area with records of frogs: black squares = calling males, yellow squares = juveniles sighted, red circles = juveniles collected.

of medium to large (10–15 m) trees and grassland, whereas the previously recorded population is in an urban park surrounded by houses and buildings in eastern Loja.

We visited the area at 1600–2000 h on 25 June 2016 (temperature 16 °C, relative humidity 79%). During the first two hours we only saw a juvenile; at 1830 h, we detected a brief activity period when at least six males were vocalizing. We walked around the shores of the lagoon for approximately an hour, detecting four additional juveniles, which were inaccessible. However, in a nearby waterlogged area flooded by the lagoon, we found six juveniles and the only tadpoles we saw. We collected two juveniles (Fig. 1) that were deposited as voucher specimens in the amphibian collection of the Terrestrial Zoology Laboratory of the Universidad San Francisco de Quito, Ecuador (ZSFQ H00119–20). Diego Cisneros-Heredia confirmed the identity of the species.

This is the second record of American Bullfrogs in Loja. Despite the proximity, the two populations are isolated from each other. The origin of this new population, similar to that

reported by Cobos et al. (2015), was the intentional release of individuals brought from a production farm in adjacent Zamora Chinchipe Province. Although invasive bullfrogs pose a threat to native amphibians and other small animals (Valarezo-Aguilar 2012), to date, we have no information about the community structures of the lagoons in Loja and no evidence of any impact of the introduction.

This new American Bullfrog population in Loja, other records in the Andean Highlands of Venezuela (Díaz De Pascual and Chacón-Ortiz 2002), and distribution models of this species in Ecuador (Iñiguez and Morejón 2014) indicate that these frogs can successfully invade sites at elevations > 2,000 m asl with temperatures of 15–20 °C. Considering the wetter and warmer future projected for this region as a consequence of climate change (Aguirre et al. 2015), effects of these invasive bullfrog populations could get worse and are likely to include displacement of native species and alterations of their phenology (Zank et al. 2014; Cobos and Alonso 2016). In the interim, invasive bullfrogs threaten biodiversity due to

both predation and competition with corresponding impacts on food webs (Cucherousset et al. 2012; David et al. 2017; Wainright et al. 2021). Further investigations are crucial for managing such potentially catastrophic alterations of the local biotic communities.

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