



INTRODUCED SPECIES

A New Distribution Record for the Invasive American Bullfrog, *Lithobates catesbeianus* (Shaw 1802) (Anura: Ranidae), from Eastern Ecuador

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Amphibian diversity around the world is declining (e.g., Young et al. 2001; Collins and Storfer 2003), and the introduction of alien species is second only to habitat loss as a cause (Vitousek et al. 1997). Casas et al. (2001) identified the American Bullfrog, *Lithobates catesbeianus* (Shaw 1802), as one of the worst invasive species in many regions. It has a wide natural distribution in North America, ranging from Nova Scotia, Canada, south to central Florida and west to the Great Plains of the United States (Powell et al. 2016). Introduced populations are in other U.S. states and in many other countries, including Mexico, Argentina, Brazil, Colombia, Ecuador, Uruguay, Spain, Peru, Puerto Rico, the Canary Islands, Singapore, and Taiwan (e.g., Lever 2003; Kraus 2009). In South America, introduced populations are known from several localities in the Amazonian lowlands of Venezuela, Colombia, Ecuador, Paraguay, Chile, Uruguay, Argentina, and Brazil (Rodríguez and Linares 2001; Batista 2002; Mazzoni et al. 2003; Hanselmann et al. 2004; Sanabria et al. 2005; Ghirardi et al. 2011). In Amazonian Ecuador, Cisneros-Heredia (2004) reported an apparently established population of this alien species from Napo Province and additional observations of escaped American Bullfrogs from Manabí Province. Cobos Cobos et al. (2015) documented another apparently well-established population in Loja Province.

Expeditions conducted by the Universidad Nacional de Loja (LOUNAZ) across the southeastern Andean slopes of Ecuador detected a third established feral population of American Bullfrogs in the country. We saw and heard many individuals in artificial lagoons adjacent to cattle pastures (Fig. 1). The identity of these frogs was confirmed from photographs by R. Powell. In addition, a voucher specimen (an adult female) deposited in the herpetological collection of the Centro de Investigaciones Zoológicas, Universidad Nacional de Loja, Loja, Ecuador (LOUNAZ PAD220) was collected

at the Centro de Estudios y Desarrollo para la Amazonía (CEDAMAZ) on 1 August 2007 by K. Valarezo-Aguilar, D.F. Cisneros-Heredia, O. Ordonez-Gutierrez, and several students in a herpetology class. CEDAMAZ is a reserve managed by Universidad Nacional de Loja and is located in the region of “El Padmi,” ca. 68 km from the city of Zamora and 128 km from the city of Loja, in Zamora-Chinchipec Province, Ecuador (03°44'39"S, 78°36'55"W, 829 m asl; Fig. 2). That individual (SVL 152 mm; 175 g) was collected while active at night along a small stream bordering cattle pastures. It exhibits all diagnostic features of *Lithobates catesbeianus*. Color varied from brown to green tones, with darker dorsal spots and a yellowish throat. Hindfeet are completely webbed and the tympanum is larger than the eye.

The first introduction of the American Bullfrog to Ecuador was in 1988 (Velasco 2001) into Guayas Province, followed by additional introductions to five other provinces (Los Ríos, Napo, Pastaza, Morona Santiago, and Zamora-Chinchipec; Villacís and Zurita 2002). Sixteen legally established bullfrog-breeding farms are in Zamora-Chinchipec Province, the southernmost Amazonian province of Ecuador (Ortega 2007). The animals reported here likely escaped from one of these facilities into natural ecosystems.

American Bullfrogs have voracious appetites (e.g., Schwalbe and Rosen 1988) and a capacity to spread diseases (e.g., Schloegel et al. 2012). Their introduction often coincides with population declines of native amphibians (e.g., Kraus 2009), although other causes have been implicated (e.g., Hayes and Jennings 1986). This report emphasizes the need to conduct continuous assessments to evaluate the effects of this species on native anurans and their habitats (e.g., Daszak et al. 2004) and also speaks to the need for developing and enforcing policies regulating or prohibiting breeding facilities for this and other non-native species.



Fig. 1. American Bullfrogs (*Lithobates catesbeianus*) at the Centro de Estudios y Desarrollo para la Amazonía (CEDAMAZ). Photographs by the authors.

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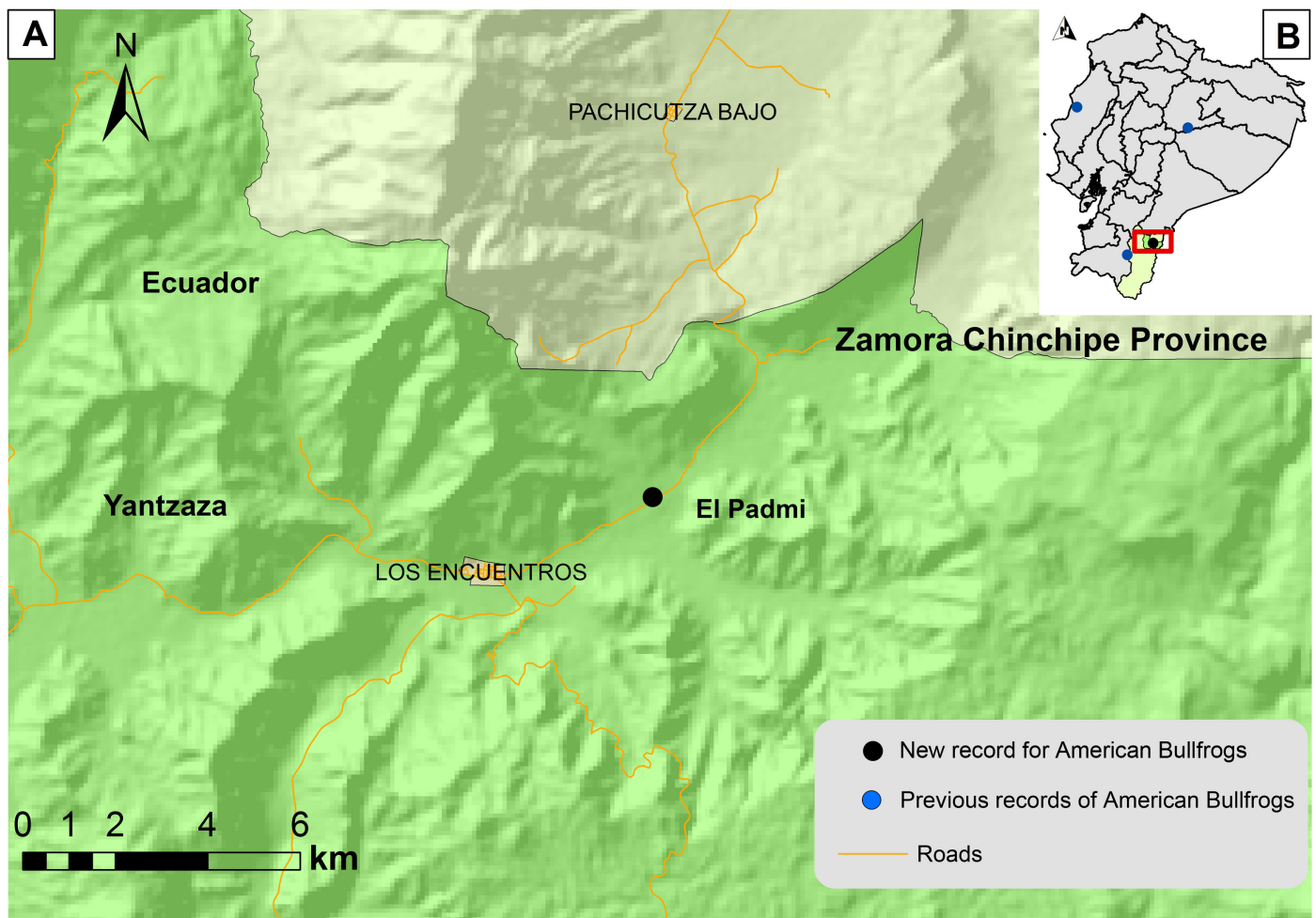


Fig. 2. The location of feral populations of American Bullfrogs (*Lithobates catesbeianus*) in Ecuador. (A) The black dot marks the site of this new record. (B) Blue dots mark the current distribution as reported by Cisneros-Heredia (2004) and Cobos Cobos et al. (2015).

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