

Additional distributional records of a recently described Mexican toad species, *Incilius mccoyi* (Anura: Bufonidae)

Jeffrey W. Streicher^{1*}, Jacobo Reyes-Velasco¹, Christian L. Cox¹, Jonathan A. Campbell¹
and Oscar Flores-Villela²

The Madrean pine-oak woodlands of Mexico are renowned for containing notable levels of biodiversity. In particular, the Sierra Madre Occidental of northwestern Mexico harbors a fauna originating from a diverse array of temperate and tropical lineages. Anurans in the family Bufonidae are one of several groups with local representatives from both sides of this ecological interchange of biomes (López, Woolrich-Piña and Lemos-Espinal, 2009). In a recent article, Santos-Barrera and Flores-Villela (2011) described a new species of toad in the genus *Incilius* from northwestern Mexico. This species, *Incilius mccoyi*, was formerly referred to the highly variable *Incilius occidentalis* group that inhabits the pine-oak forests of Western and Central Mexico (Martin, 1972). Santos-Barrera and Flores-Villela (2011) reported that *I. mccoyi* only occurs at a handful of upland localities (1200–1500 m) in central Chihuahua. During biological surveys we conducted near this region in 2008 we collected several specimens referable to *I. mccoyi*. Following comparisons with the original species description, we found that our collections expand or exceed the previously reported ranges of geographic distribution, elevational distribution, and adult body size. Below we describe this hitherto undocumented variation in detail and discuss the implications of our findings for other poorly known amphibians endemic to the region.

Our biological inventories were conducted in pine-oak forest habitats of the Sierra Madre Occidental in the states of Chihuahua and Durango from 3–13 August 2008. We also collected a single individual during a survey conducted 3 June 2008 near Durango City in Durango. Specimens were collected on roadways between 20.51 and 02.00 hrs. All individuals were found actively moving across the road with the exception of two that had sustained fatal injuries from vehicles (UTA A-61320 and 61323). Voucher specimens were preserved using protocols described by McDiarmid (1994). In

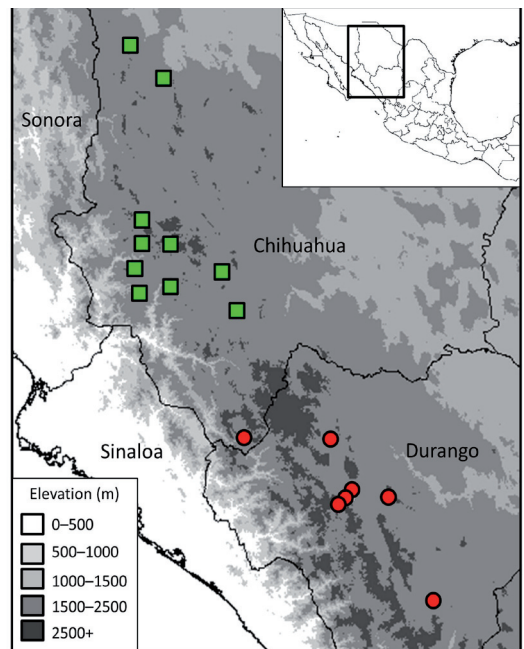


Figure 1. Geographic distribution of *Incilius mccoyi*. Red circles indicate localities reported in this study. Green squares are approximations of localities reported in Santos-Barrera and Flores-Villela (2011).

¹ Amphibian and Reptile Diversity Research Center, Department of Biology, The University of Texas at Arlington, Arlington, Texas 76010, USA.

² Museo de Zoolgía, Facultad de Ciencias, Universidad Nacional Autónoma de México, A.P. 70-399, México, D.F., 04510, México.

*Corresponding autor; e-mail: streicher@uta.edu

Table 1. Voucher specimens and associated locality data for *Incilius mccoysi* collected from Chihuahua and Durango, Mexico. Latitude and longitude are based on the latest revision of the World Geodetic System (WGS 84).

Catalogue No.	State	Municipality	Category	Latitude	Longitude	Elevation (m)	SVL (mm)
UTA A-61324	Chihuahua	Guadalupe y Calvo	Adult	25.77933	-106.7990	2368	83.0
UTA A-61307	Durango	Durango	Adult	23.95536	-104.6063	1895	104.0
UTA A-61308	Durango	Stgo. Papasquiario	Subadult	25.19059	-105.5594	1730	35.1
UTA A-61309	Durango	Stgo. Papasquiario	Subadult	25.19059	-105.5594	1730	40.0
UTA A-61310	Durango	Guanacevi	Adult	25.77066	-105.7994	1967	88.9
UTA A-61311	Durango	Stgo. Papasquiario	Adult	25.04524	-105.6820	2623	83.9
UTA A-61312	Durango	Stgo. Papasquiario	Adult	25.04524	-105.6820	2698	78.0
UTA A-61313	Durango	Stgo. Papasquiario	Subadult	25.04524	-105.6820	2468	39.9
UTA A-61314	Durango	Stgo. Papasquiario	Adult	25.06731	-105.6484	2726	101.9
UTA A-61315	Durango	Stgo. Papasquiario	Adult	25.07118	-105.644	2746	52.2
UTA A-61316	Durango	Stgo. Papasquiario	Adult	25.07118	-105.644	2746	60.1
UTA A-61317	Durango	Stgo. Papasquiario	Adult	25.07576	-105.6445	2706	88.2
UTA A-61318	Durango	Stgo. Papasquiario	Adult	25.07827	-105.6303	2707	95.1
UTA A-61319	Durango	Stgo. Papasquiario	Adult	25.0766	-105.6286	2723	97.2
UTA A-61320	Durango	Stgo. Papasquiario	Adult	25.11188	-105.5866	2488	N/A
UTA A-61321	Durango	Stgo. Papasquiario	Subadult	25.11188	-105.5866	2488	43.5
UTA A-61322	Durango	Stgo. Papasquiario	Subadult	25.11421	-105.5848	2468	36.6
UTA A-61323	Durango	Stgo. Papasquiario	Adult	25.11421	-105.5848	2468	N/A
JAC 29489	Durango	Stgo. Papasquiario	Adult	25.04885	-105.6763	2488	N/A

total we collected 18 individuals referable to *I. mccoysi* and deposited these specimens in the Amphibian and Reptile Diversity Research Center of the University of Texas at Arlington (UTA). A single specimen (Field ID: JAC 29489) was lost in transit to UTA; however tissue samples and photographs remain of this individual. Digital images of specimens in life were deposited in the UTA Digital Image Collection (UTADC 5259–5321 and 6983–7197). Our collection included individuals from several localities listed in Table 1. Snout–vent length (SVL) was taken to the nearest 0.1 mm using a digital caliper. We assigned specimens to *I. mccoysi* based on several morphological features including dorsal coloration, integumentary texture (dorsal surfaces covered in distinct conical tubercles) and toe webbing characteristics (Fig. 2). In our sample adult SVL ranged from 52.2–104.0 (mean 70.5±4.9 SE) mm. We found that the five subadults (SVL 35.1–43.5 [mean 39.0±1.5] mm) have undeveloped cranial crests and possess dorsal surfaces covered in conical tubercles with conspicuous red tips.

The type and referred material are known to occur at ten localities in Chihuahua (Santos-Barrera and Flores-Villela, 2011). The collections described herein expand the known range of *I. mccoysi* to include an additional

eight localities in the states of Chihuahua and Durango (Fig. 1). This represents the first report of *I. mccoysi* in the state of Durango. Because the specimens we collected came from substantially higher elevations (1730–2746 m) than previously reported (1200–1500 m; Santos-Barrera and Flores-Villela, [2011]), it appears that *I. mccoysi* has a much broader elevational distribution in the Sierra Madre Occidental. We also suspect that this species ranges further south into montane regions of the state of Jalisco (Reyes-Velasco pers. obs.). The maximum adult SVL we recorded exceeds that reported in the original description of *I. mccoysi* (86.53 mm) indicating that there may be regional variation in adult body size. While most of our samples were collected in pine-oak forest habitat, we collected a single specimen (UTA A-61307) from the outskirts of Durango City in an urbanized region of mesquite-grassland habitat. This particular locality features a complex irrigation system used to sustain crops during drought conditions. As such, we speculate that this human agricultural practice may have mediated the presence of *I. mccoysi* in this otherwise arid region of central Mexico. During our surveys in Durango we observed the syntopic occurrence of *I. mccoysi* and another toad species, *Anaxyrus mexicanus*, at several localities. The extent of breeding interactions

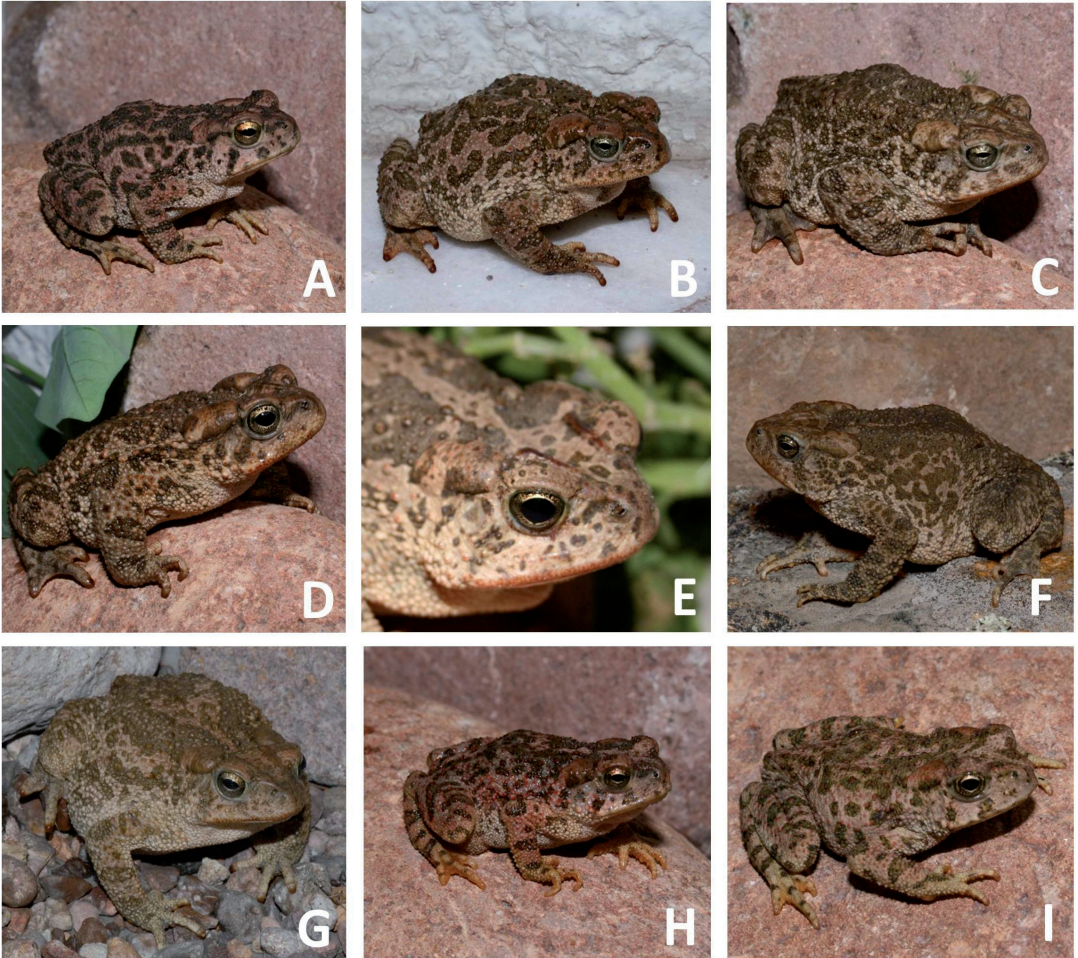


Figure 2. *Incilius mccoyi* in life. Adult individuals, (A) UTA A-61315, (B) JAC 29489, (C) UTA A-61319, (D) UTA A-61311, (E) UTA A-61307, (F) UTA A-61324, (G) UTA A-61314, and subadult individuals, (H) UTA A-61322, (I) UTA A-61308.

between these highland species may be important to investigate, particularly because (1) we collected several subadult individuals that we were unable to confidently assign to species and (2) elsewhere these two divergent toad genera are known to hybridize (Vogel and Johnson, 2008).

The current human mediated threats to biodiversity in Mexico (particularly those posed by urban encroachment [see Ochoa-Ochoa et al., 2009]) are well known and present notable challenges for conservation management. Our report of a widespread *I. mccoyi* highlights the ongoing need for better distributional data in other endemic Mexican amphibians.

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