Herpetology Notes, Volume 18: 573–576 (published online on 09 July 2025)

The wonder of rain: records of Plateau Tiger Salamander, *Ambystoma velasci* Dugès, 1888, in Salinas, San Luis Potosí, Mexico

Jesús L. Lara-Galván[1,2], Jesús Lara-Rayos[1], Xabier Herrero-Otero[1], Juan F. Martínez-Montoya[1,*], and José J. Sigala-Rodríguez[2]

The genus *Ambystoma* is composed of 32 species (Romero-Amador, 2021; AmphibiaWeb, 2024), with a wide range in North America, as well as a high level of endemism (Parra-Olea et al., 2014). One of these species is the Plateau Tiger Salamander, *Ambystoma velasci* (Fig. 1), an amphibian with adult snout-to-vent length around 10 cm and tail length of about 8.5 cm (Ramírez-Bautista et al., 2009). Colouring of the body of post-metamorphic animals is dark brown with yellow or beige spots and a bright ventral area (SEMARNAT, 2018). The species is endangered in Mexico, where it is listed as Special Protection (or Pr) according to SEMARNAT (2010), and it is catalogued as a species of Least Concern (LC) by the IUCN (IUCN SSC Amphibian Specialist Group, 2020). The population of *A. velasci* is declining and threatened with extinction in Mexico (Parra-Olea et al., 2014). The main reasons include the introduction of exotic species, such as carp (*Cyprinus carpio*) and bullfrog (*Aquarana catesbeiana*), human collection, capture, and exploitation of the species (Huacuz-Elías, 2002), habitat destruction, chytridiomycosis (Castro-Monzon et al., 2022), or climate change (Parra-Olea et al., 2005).

Ambystoma velasci is endemic to Mexico, with a wide range that includes the eastern part of Sonora and the states of Chihuahua, Coahuila, Nuevo León, Tamaulipas, Durango, Jalisco, and Aguascalientes. It is also present in the high plateau lagoons of the Trans-Mexican Volcanic Belt (Smith and Smith, 1976), in the Valley of Mexico (Ramírez-Bautista et al., 2009), as well as in the states within the Potosino-Zacatecano Plateau (SEMARNAT, 2018). It is noteworthy that the species is absent from the Pacific and the Gulf of Mexico coasts. In San Luis Potosí State, *A. velasci* has only been reported in the municipalities of Charcas, Villa de Arriaga, and Zaragoza, but not in Salinas (Lemos-Espinal and Dixon, 2013). We here present the first formal records of this species in Salinas Municipality.

The study area is in La Reforma, Salinas Municipality, San Luis Potosí, Mexico (Fig. 2), located at an average elevation of 2036 m on the Potosino-Zacatecano Plateau (centred on 22.6322°N and a longitude of 101.7123° W). Its climate is mostly warm-temperate, with a mean annual temperature of 17°C (SMN, 2024) but with great daily temperature fluctuations. The climate is very dry, with eight arid months from October–May, which produces mostly intermittent water bodies across the municipality. The vegetation is adapted to water scarcity, with shrubland occupying 71% of the municipality, followed by grassland and small oak forest islands (INEGI, 2010). However, during the summer of 2023, precipitation was particularly scarce, registering only 19% of the mean precipitation values for normal summer seasons (SMN, 2024). This causes great water stress and the desiccation of almost all water bodies in Salinas and puts the survival of water-dependent species, such as amphibians, at risk.

Records of *Ambystoma velasci* were obtained in the context of a series of field trips conducted in Salinas Municipality from February 2023–January 2024 during the daytime. Two field trips were made every month to various sites in the municipality, covering a wide range of habitats. An average of three observers performed these surveys, on foot and with the support of amphibian nets, traps, and cameras. On account of the summer drought in 2023, additional field trips were carried out during the summer of 2024 (July, August, and September).

[1] Colegio de Postgraduados, Campus San Luis Potosí, Calle Iturbide 73, Colonia Centro, 78620 Salinas de Hidalgo, San Luis Potosí, México.

[2] Colección Zoológica, Departamento de Biología, Universidad Autónoma de Aguascalientes, 20131 Aguascalientes, México.

[*] Corresponding author. E-mail: altiplanooeste@gmail.com

Figure 1. Plateau Tiger Salamander (*Ambystoma velasci*) from Salinas Municipality, San Luis Potosí State, Mexico, showing an individual with yellow and beige spots (A) and another with a dark background colour (B). Photos by Jesús L. Lara-Galván.

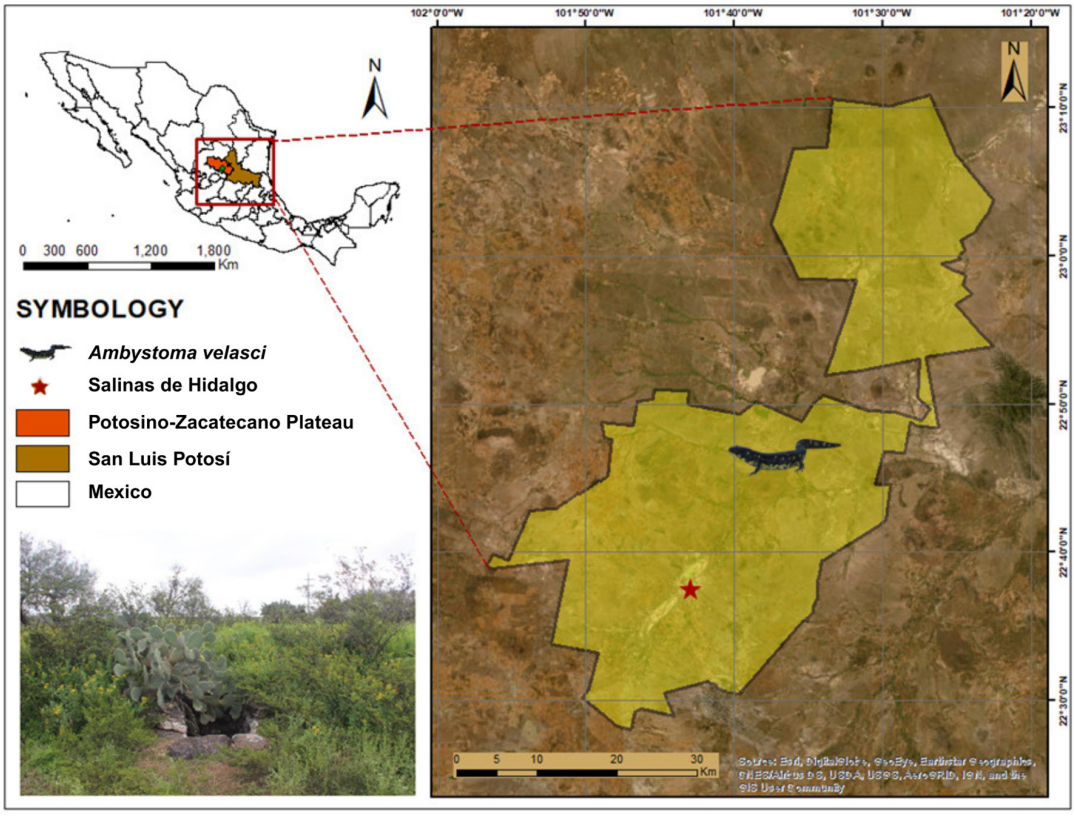

Figure 2. (Upper left) Map of Mexico, showing San Luis Potosí State (brown), the Potosino-Zacatecano Plateau (orange), and Salinas Municipality (green). The main map shows where the well (lower left) is located in the municipality. Photo by Xabier Herrero-Otero.

On 21 August 2024 at 10:35 h, an artificial well of 7 m depth with a 2 x 1 m opening (Fig. 2) was discovered at 22.7676°N, 101.6145°W (elevation 2036 m), in which *A. velasci* were observed. The well had some superficial water on one of its sides, whereas the opposite side was filled with sediments. In total, we observed 19 post-metamorphic individuals. One month later, on 9 and 14 September 2024, the well was visited again following recent heavy rainfall. This time, we only counted five post-metamorphic *A. velasci*. Other amphibian species found in the well were *Anaxyrus cognatus*, *A. debilis*, and *Spea multiplicata*, as well as some reptiles (e.g., *Tantilla wilcoxi*). The main plant species around the well were Prickly Pear Cactus (genus *Opuntia*),

Creosote (*Larrea tridentata*), and mesquites (genus *Prosopis*). It is noteworthy that an electricity tower has been installed next to the well to support a rural community of less than 30 inhabitants, who mentioned that this well had not been used for many years.

Two salamanders (Fig. 1) were collected and identified morphologically by Gabriela Parra-Olea (Universidad Nacional Autónoma de México). Specimens were deposited at the Zoological Collection of the Universidad Autónoma de Aguascalientes (UAA-ANF-378) and the National Collection of Amphibians and Reptiles of the Universidad Nacional Autónoma de México (IBH 36758).

The 2024 record of *A. velasci* in the Potosino-Zacatecano Plateau is important, because it documents the survival of the species after the 2023 summer drought. These are the first published records of the species for Salinas Municipality. Indeed, the geographically closest record for this species in San Luis Potosí is in Charcas Municipality (Lemos-Espinal and Dixon 2013), approximately 70 km northeast of our record. Another record is located 100 km to the south at Rancho Las Papas de Arriba, Ojuelos Municipality, Jalisco State (Percino-Daniel et al., 2019).

The survival of the Plateau Tiger Salamander after the 2023 summer drought highlights the importance of water bodies in arid regions such as Salinas, where high precipitation variability could have a strong impact on the populations of *A. velasci*. This raises the possibility of creating artificial permanent water bodies that emulate the suitable conditions in which this salamander thrives.

Acknowledgements. We thank the Colegio de Postgraduados, Campus San Luis Potosí, for the resources to implement the project "Diversity of wild amphibians and reptiles in the municipality of Salinas, San Luis Potosí, Mexico" (Key SLP52711A.2024.01). We would also like to thank Gabriela Parra-Olea for helping us identify the species and depositing the specimen at the Zoological Collection in Mexico City. Additionally, we thank Rubén Carbajal-Márquez for providing literature about the distribution of this species and for his assistance with depositing the specimen at the Zoological Collection in Aguascalientes. We also thank Christine Kaiser and Yunke Wu for their valuable comments that helped improve this manuscript. Special thanks to Efrén Rodríguez Valenciano for his support with transportation to the field work sites, as well as to Ernestina Meza-Rangel, Omar Becerra-Soria, and Susana Monasterio for their participation in the sampling campaign. Finally, we thank Mireya Galván, Nigthe-há Lara, Hermila Sifuentes, and Rocío Galván for their support throughout this investigation. Specimens were collected under permit SPARN/DGVS/12680/23 to Gabriela Parra-Olea, who also collaborated in field work.

References

AmphibiaWeb (2024): *Ambystoma velasci*: Mexican Tiger Salamander. University of California, Berkeley, California, USA. Available at: https://amphibiaweb.org. Accessed on 12 September 2024.

Castro-Monzon, F., Rödel, M.-O., Ruland, F., Parra-Olea, G., Jeschke, J.M. (2022): *Batrachochytrium salamandrivorans*' amphibian host species and invasion range. EcoHealth **19**: 475–486.

Huacuz-Elías, D. (2002): Estado de conservación del género *Ambystoma* en Michoacán, México. Universidad Michoacana de San Nicolás de Hidalgo, Fondo Mexicano para la Conservación de la Naturaleza, A.C. and Secretaría de Medio Ambiente y Recursos Naturales, Morelia, Michoacán, México. 44 pp.

INEGI [Instituto Nacional de Geografía y Estadística]. Gobierno del Estado de San Luis Potosí. (2010): Compendio de información geográfica municipal 2010 "Salinas". Available at: https://www.inegi.org.mx. Accessed on 9 October 2024.

IUCN SSC [International Union for Conservation of Nature Species Survival Commission] Amphibian Specialist Group (2020): *Ambystoma velasci*. The IUCN Red List of Threatened Species **2020**: e.T62130287A53974804.

Lemos-Espinal, J.A., Dixon, J.R. (2013): Amphibians and Reptiles of San Luis Potosí. Eagle Mountain, Utah, USA, Eagle Mountain Publishing. 300 pp.

Parra-Olea, G., Martínez-Meyer, E., de León, G. (2005): Forecasting climate change effects on salamander distribution in the highlands of central Mexico. Biotropica **37**: 202–208.

Parra-Olea, G., Flores-Villela, O.A., Mendoza-Almeralla, C. (2014): Biodiversidad de anfibios en México. Revista Mexicana de Biodiversidad **85**: 460–466.

Percino-Daniel, R., Gómez-Llamas, J.C., Contreras-López, J.M. (2019): New record of *Ambystoma velasci* (Dugès, 1888) from western Mexico. Herpetology Notes **12**: 351–352.

Ramírez-Bautista, A., Hernández-Salinas, U., García-Vázquez, U.O., Leyte-Manrique, A., Canseco-Márquez, L. (2009): Herpetofauna del Valle de México: Diversidad y Conservación. Universidad Autónoma del Estado de Hidalgo y Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, México D.F., México. 213 pp.

Romero-Amador, L. (2021): Ajolotes, especies endémicas mexicanas en peligro de extinción. Biología y Sociedad **7**: 10–19.

SEMARNAT [Secretaría de Medio Ambiente y Recursos Naturales] (2010): Norma Oficial Mexicana NOM-059-SEMARNAT-2010. Protección ambiental de especies nativas de México de flora y fauna silvestres. Categorías de riesgo y especificaciones para su inclusión, exclusión o cambio. Lista de especies en riesgo. Diario Oficial de la Federación, Segunda Sección, 30 de diciembre de 2010, Ciudad de México, México. Available at: http://dof.gob.mx/nota_detalle_popup.php?codigo=5173091. Accessed on 12 September 2024.

SEMARNAT [Secretaría de Medio Ambiente y Recursos Naturales]. (2018): Programa de Acción para la Conservación de las Especies *Ambystoma* spp. SEMARNAT/CONANP, Ciudad de México, México.

Smith, H.M., Smith, R.B. (1976): Synopsis of the herpetofauna of Mexico. Volume IV. Source Analysis and Index for Mexican Amphibians. North Bennington, Utah, USA, John Johnson. 252 pp.

SMN [Servicio Meteorológico Nacional] (2024): Normales Climatológicas por Estado. Available at: https://smn.conagua.gob.mx/es/climatologia/informacion13climatologica/normales-climatologicas-por-estado?estado=slp. Accessed on 8 October 2024.

Accepted by Yunke Wu