

**Figure 1:**  
Western Green Toad  
(*Bufo debilis*)  
Photo by:  
Erik F. Enderson



## Status of Three Species of Toads in North-western Mexico

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courtesy the Declining Amphibian Population Task Force newsletter-  
Froglog

Since 1992, the Instituto de Ecología of the University of Mexico (UNAM) has been conducting ecological studies in the most important prairie dog (*Cynomys ludovicianus*) colonies in North America, these are located in the Municipality of Janos, Chihuahua, Mexico. With the intent of demonstrating the ecological role of the prairie dogs as a key species for the maintenance of vertebrate diversity in the region, we initiated a study of the amphibians and reptiles occurring in the area; these organisms consistently use the prairie dogs' burrows as refugia. Unfortunately, there was no opportunity to evaluate the status of the 7 species of amphibian inhabiting the grasslands over almost 8 years of study. This was mainly because of the severe drought that affected all north-western Mexico for almost 15 years. In recent times, rainfall has increased and populations of some species of amphibian have clearly recuperated whilst others have completely disappeared from the area.

We surveyed three species of toads of the genus *Bufo*: *B. debilis* from the grasslands at Janos municipality, located 50 km south of the U.S. border (UTM's 0749533 N; 3417384 W); *B. mexicanus*, a Mexican endemic occurring in the mountains in north-western Chihuahua (UTM's 0769036 N; 0333659 W) with a few disjunct populations in Durango, (Gergus, 1998); and *B. retiformis* from central Sonora, (UTM's 0474196 N; 32011572 W). Our

first main goal was to determine the conservation status of these three species in Mexico and to identify the main ecological factors affecting their survivorship in the arid lands where they live.

We focused our study on the populations of *B. debilis* and *B. mexicanus* in north western Chihuahua because of the lack of population data concerning the reproductive biology and conservation of these species in Mexico. The Janos area can be considered as a well-preserved region of grasslands and microphyllous shrubland. The study of *B. debilis* population status is part of a larger project developed by the University of Mexico (UNAM) in which the whole herpetological community is being monitoring. *B. debilis* dwells in burrows beneath the soil for about 10 months a year in this region. *B. mexicanus* inhabits banks along the Rio Piedras Verdes in the Sierra Madre Occidental. Finally, populations of *B. retiformis* in Mexico have been previously found in the surroundings of Hermosillo, Sonora, mainly along the road from Hermosillo to Bahía Kino west of the city, and in western Altar (UTM's 0416612 N; 3397717 W). Vegetation in the area is mainly composed of mesquites and sahuaro forests, including a few patches of desert grasslands.

A series of field surveys were conducted in several selected localities during the rainy and dry seasons from June through August of 2002 and August of 2003. Six

temporary breeding ponds for *B. debilis* were identified in an area of about 50 km<sup>2</sup>. During the breeding season, occurring only after heavy rainfall, each pond was inspected during daytime and then visited during the night to assess breeding aggregations. Populations of *B. mexicanus* were assessed by visual encounter transects using flash-lights along the banks of the Río Piedras Verdes, searching under rocks, logs and low vegetation and into the soil at a 20-30 cm depth.

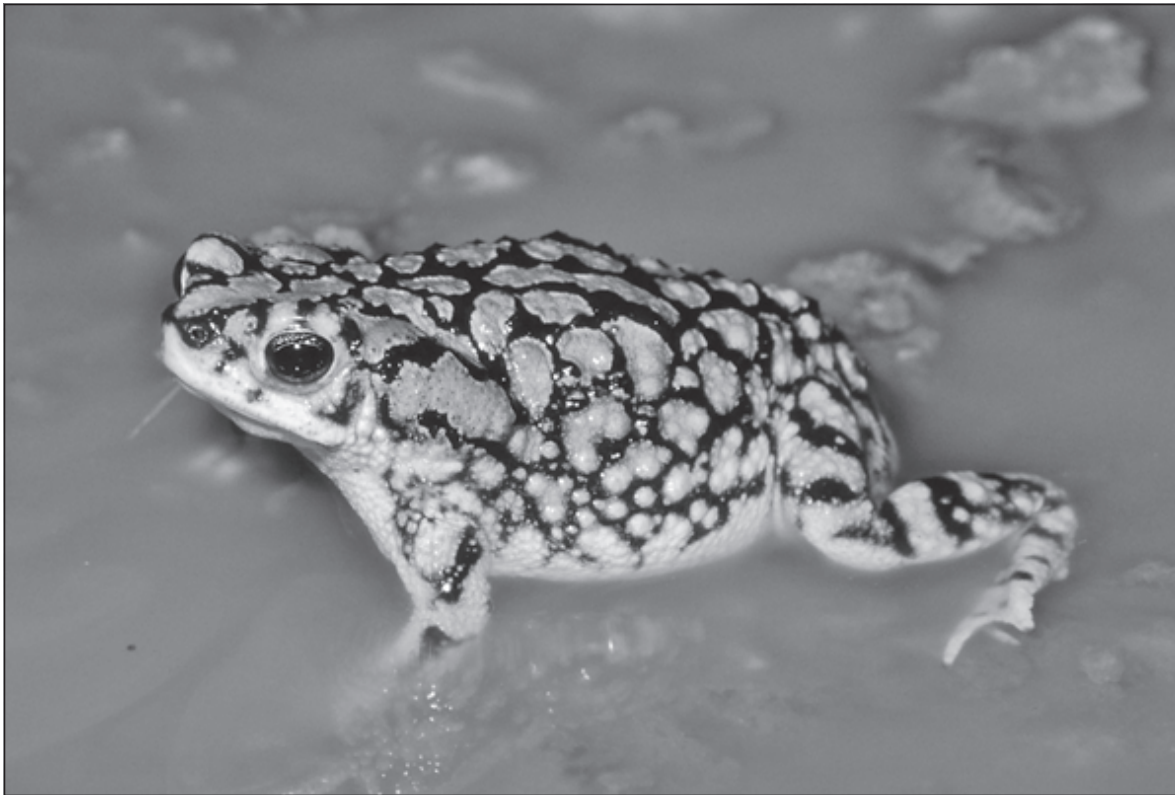
Individuals were identified in the field and we collected only egg masses and/or larvae to identify species after metamorphosis in the laboratory. In the summer of 2002, we recorded the total number of calling males, surrounding females, amplexant pairs, clutch size, presence of larvae and number of transformed individuals in the ponds. The presence of other species of amphibians and reptiles (as potential predators) was also recorded and identified. We surveyed all sites in two consecutive summer seasons; 2002 was notoriously better for amphibians than 2003.

In Janos Municipality, the rainy season in 2003 was extremely erratic with important thunderstorms delayed until the beginning of August. As a consequence, we detected the presence of only three of the six temporary pools recorded in 2002; two of them still contained water but no individuals of *B. debilis*. The largest single pool for *B. debilis* contained several anuran species such as *B. cognatus*, *B. woodhousei*, *Scaphiopus couchii* and *S. hammondi*. On July 29th 2002 at our breeding site 1,

56 males calling in the pool. Partitioning of the breeding pond is quite interesting: *S. hammondi* calls at the pool border, *B. debilis* calls from just 1 - 1.5 m into the pool and *B. cognatus* and *B. woodhousei* call from completely within the pool. The presence of colubrid snakes was confirmed; an adult *Thamnophis marcianus* swallowed three adult *S. hammondi* and one *B. debilis* in 80 minutes. A juvenile *Hererodon nasicus* was found at the pool border the morning after.

Clutch size in *Bufo debilis* is small with an average of 25 eggs/clutch. No other rainfall refilled the pools and, in the main site, depth changed from 19 cm to 12 cm within three days; after that no other breeding explosion occurred. Finally, at site 5 (sized 10 X 5 m) which was already dried, we observed only recently transformed individuals of *B. debilis*; a concentration of about 5000 metamorphs were found under ground plates with thousands migrating from the pool border into small holes in the soil. As far as we know, this is one of the most important habitats for *Bufo debilis*. Populations in San Luis Potosi and Zacatecas are apparently smaller, as was demonstrated by Torres Cervantes (2003) who recorded only 16 individuals in 5 years of study.

*Bufo mexicanus* breeds in permanent, moderate rivers and streams with small to medium beaches where they remain under soft sand at depths of 20-30 cm. Three different localities were sampled along the Río Piedras Verdes. We observed important populations mainly at Ignacio Zaragoza town. Transects along the



**Figure 2:**  
Sonoran Green Toad  
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we counted 28 *B. debilis* adult males and 8 females along the pool perimeter (about 110 m X 100 m). At this site, the dominant species was *Scaphiopus hammondi* with

river accounted for an average density of 15 individuals per 1 km in this locality. We consider that this is a healthy population since individuals of different ages

were recorded, although we were unable to see tadpoles. This probably means that the reproductive season occurred several weeks before. At the southern locality (Colonia Pacheco) we recorded an average of eight calling males/1 km along the river.

Concerning *Bufo retiformis* (Sonoran Green Toad), we visited fourteen localities in two summer seasons with no success. Like many other desert amphibians, *Bufo retiformis* has explosive breeding activity coinciding with the first thunderstorms of the season; such ecological requirements restrict its activity to a few days per year (Sullivan et al., 1996). Supposedly, it is possible to find individuals after thunderstorms that form pools and fill small dams and cattle tanks (Savage, 1954; Sullivan et al.,



**Figure 3:**  
Historical distribution of (*Bufo retiformis*) in Mexico courtesy the Centro de Investigacion Cientifica y de Educacion Superior de Ensenada

1996). The drought is probably responsible for the lower abundance of amphibians and reptiles in the field. Sullivan et al. (2000) stressed the importance of climatic conditions for the activity of the Sonoran Green Toad in Arizona.

We consider that the intent to remove *Bufo retiformis* from CITES Appendix II is premature. The main argument is the presence of apparently healthy and stable populations in Arizona, but precise data on Mexican populations does not exist and this represents the main range of the species. The most common localities for this species are located around Hermosillo City. The last record of a Mexican individual of *Bufo retiformis* is from 1985. At present, these localities are seriously transformed and disturbed. At the irrigation systems we corroborated the presence of other anuran species such as *Bufo alvarius*, *Bufo mazatlanensis*, *Spea multiplicata* and *Rana* sp. Contrary to Hulse's (1978), assumption that agricultural lands may constitute a more suitable habitat for *Bufo retiformis*, we observed that this is not the case for Mexican populations in Sonora. The cause could be in part because dams and wells have dried and getting water in these areas is extremely difficult. Local people commented about the changes in rainfall regimes in the last

decades but there are no studies relating these changes to the absence of *B. retiformis* in its historical range.

The results presented here can be considered as preliminary. We plan to continue with the monitoring of populations of these three species (and other amphibians in north-western Mexico) in order to evaluate the role of climate warming and its effects on the distribution and abundance of amphibians in the grasslands and temperate forests. In addition, we want to know if other factors such as disease are of any importance in the disappearance of *B. retiformis* in Mexico. It is possible that other factors like climate and/or habitat alteration can act in synergism with diseases and pollution to reduce the populations of some species of amphibians.

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