

CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES
OF WILD FAUNA AND FLORA



Nineteenth meeting of the Conference of the Parties
Panama City (Panama), 14 – 25 November 2022

CONSIDERATION OF PROPOSALS FOR AMENDMENT OF APPENDICES I AND II

A. Proposal

Include the genus *Phrynosoma* in CITES Appendix II in accordance with Article II, paragraph 2a of the Convention text, as well as Criterion A of Annexes 2a and 2b of Resolution Conf. 9.24 (Rev. CoP17) as follows:

- a) *P. platyrhinos*, *P. asio*, *P. taurus*, *P. orbiculare*, *P. braconnieri*, *P. modestum* and *P. solare* in accordance with Criterion A of Annex 2a of Res. 9.24 (Rev. CoP17).
- b) All the other species of *Phrynosoma* in accordance with Criterion A of Annex 2b of Resolution Conf. 9.24 (Rev. CoP17).

B. Proponent

Mexico*

C. Supporting statement

1. Taxonomy

- 1.1 Class: Reptilia
- 1.2 Order: Squamata
- 1.3 Family: Phrynosomatidae
- 1.4 Genus, species or subspecies, including author and year:

Phrynosoma asio COPE, 1864
Phrynosoma bauri MONTANUCCI, 2015
Phrynosoma blainvillii GRAY, 1839
Phrynosoma braconnieri DUMÉRIL & BOCOURT, 1870
Phrynosoma brevirostris (GIRARD, 1858)
Phrynosoma cerroense STEJNEGER, 1893
Phrynosoma cornutum (HARLAN, 1825)
Phrynosoma coronatum (BLAINVILLE, 1835)
Phrynosoma diminutum MONTANUCCI, 2015

* *The geographical designations employed in this document do not imply the expression of any opinion whatsoever on the part of the CITES Secretariat (or the United Nations Environment Programme) concerning the legal status of any country, territory, or area, or concerning the delimitation of its frontiers or boundaries. The responsibility for the contents of the document rests exclusively with its author.*

Phrynosoma ditmarsii STEJNEGER, 1906
Phrynosoma douglasii (BELL, 1829)
Phrynosoma goodei STEJNEGER, 1893
Phrynosoma hernandesi GIRARD, 1858
Phrynosoma mcallii (HALLOWELL, 1852)
Phrynosoma modestum GIRARD, 1852
Phrynosoma orbiculare (LINNAEUS, 1758)
Phrynosoma ornatissimum (GIRARD, 1858)
Phrynosoma platyrhinos GIRARD, 1852
Phrynosoma sherbrookei NIETO-MONTES DE OCA, ARENAS-MORENO, BELTRÁN-SÁNCHEZ & LEACHÉ, 2014
Phrynosoma solare GRAY, 1845
Phrynosoma taurus BOCOURT, 1870

1.5 Scientific synonyms:

1.6 Common names:

English:	Horned lizards
French:	Lézard cornu
Spanish:	Lagarto cornudo, camaleón, tapayaxin

1.7 Code numbers:

2. Overview

The genus *Phrynosoma* is limited to North America, from the south of Canada to Mexico, with the exception of one species, *Phrynosoma asio*, which has been reported from Guatemala based on anecdotal data but has never been seen or collected (MSc Daniel Ariano, pers. comm. 2021). It includes 21 species, several of which have been recently discovered, such as *P. sherbrookei* in 2014 (Uetz et al 2020; Nieto et al 2014), or have been upgraded to species level, such as *P. bauri* and *P. diminutum* in 2015 (Montanucci 2015). However, the taxonomy is still under debate, as some authors recognize 17 species (Sherbrooke 2020) while others consider there are only 12 (Kohler 2021). IUCN has classified *P. mcallii* as Near Threatened, 12 species as Least Concern (*P. blainvillii*, *P. braconnieri*, *P. cornutum*, *P. coronatum*, *P. douglasii*, *P. goodei*, *P. hernandesi*, *P. modestum*, *P. orbiculare*, *P. platyrhinos*, *P. solare*, *P. taurus*) and *P. ditmarsii* as Data Deficient (IUCN, 2021). In 1992, four species were included in CITES Appendix II: *P. coronatum*, *P. blainvillii*, *P. cerroense* and *P. wigginsi*, but *P. wigginsi* is currently considered a synonym of *P. cerroense* (Leache & Linkem 2015).

Phrynosoma species have a highly specialized diet consisting mainly of ants (myrmecophagy), which make up 90% of the diet of some species such as *P. orbiculare*, *P. solare* and *P. platyrhinos* (Rojas et al 2016; Sherbrooke, 2003). Horned lizards face threats such as habitat destruction, livestock farming, the impact of invasive species, climate change, and legal and illegal overharvest for the domestic and international pet trade. Every year, thousands of individuals of *Phrynosoma* are internationally traded, most of them wild collected, and there is illegal domestic and international trade of these lizards. Most wild caught horned lizards die within a year of captivity due to the difficulty of providing their specialized diet (Alsup, 2013).

Thousands of individuals of *Phrynosoma* are internationally traded each year. The vast majority are wild harvested and there is illegal domestic and international trade of these taxa. Most horned lizards taken from the wild die before they have been held in captivity for a year due to a poor diet (Alsup, 2013). From 2006 to 2015, the United States exported 21,393 specimens of at least nine species of *Phrynosoma* to European and Asian countries. Mexico started to export individuals of *Phrynosoma* for commercial purposes in 2019 and the number of exports is growing. *Phrynosoma* species are becoming consolidated in the reptile pet trade and collectors seek different and unusual species. There is illegal trade of several species endemic to Mexico that are offered for sale in European countries although there are no records of any legal commercial exports.

Identification at the species level is difficult for non-experts because there is ongoing debate about the taxonomy of the genus, and authors recognize 12 to 21 species (Uetz et al 2020; Sherbrooke 2020; Kohler 2021). Correct species identification requires assessing a series of characteristics such as the number of rows of dorsal scales, the notch between the horns, the number of horns, the length of the tail, the dorsal stripes, etc. (Sherbrooke, 2003). Identification is more difficult in juvenile specimens, which only develop some characteristics such as the large horns once they reach maturity (Pianka & Parker 1975).

The inclusion of the whole genus in Appendix II would facilitate the task of customs inspectors and deter illegal international trade of rare, threatened and endemic species.

3. Species characteristics

3.1 Distribution

P. asio is endemic to Mexico (states of Oaxaca, Guerrero, Michoacán, Colima, Chiapas, Morelos, Jalisco), with anecdotal reports of its occurrence in Guatemala; *P. bauri* is endemic to the United States (Colorado, Nebraska, SE Wyoming, NE New Mexico); *P. blainvillii* occurs in the USA (California) and Mexico (Baja California); *P. braconnieri* is endemic to Mexico (southern end of the Central Mexican Plateau; semiarid parts of the states of Puebla and Oaxaca); *P. brevirostris* occurs in Canada (S Alberta, S Saskatchewan) and the USA (Wyoming, W North Dakota, W South Dakota, W Nebraska, Utah, Colorado); *P. cerroense* is endemic to Mexico (Isla Cerros, Cuesta Coyote, Bahía Concepción, Baja California Sur); *P. cornutum* occurs in the USA (from Colorado and Kansas south to Texas and west to Arizona) and Mexico (throughout the Mexican Plateau as far south as Aguascalientes, San Luis Potosí and Zacatecas); *P. coronatum* is found in the USA (California) and Mexico (Baja California); *P. diminutum* is endemic to the USA (Colorado, probably N New Mexico); *P. ditmarsii* is endemic to Mexico (Sonora); *P. douglasii* is found in Canada (SC British Columbia), the USA (Washington, Oregon, N California, Idaho, Montana, Wyoming, W North Dakota, W South Dakota, W Nebraska, N California, N Nevada, Utah, Colorado, Arizona, New Mexico, W Texas) and Mexico (Chihuahua); *P. goodei* occurs in Mexico (coast of the Gulf of California in Sonora) and the USA (Gila River and Tucson in Arizona); *P. hernandezii* occurs in Canada (Alberta, Saskatchewan), the USA (New Mexico, W Texas, Utah, Colorado, Arizona, South Dakota, Idaho, Nevada, Oregon) and Mexico (NE Sonora, Chihuahua); *P. mcallii* occurs in Mexico (NW Sonora, NE Baja California) and the USA (SE Arizona and SE California); *P. modestum* is distributed in Mexico (on the Mexican Plateau from Chihuahua and Coahuila south to Aguascalientes, San Luis Potosí and Zacatecas) and the USA (SE Colorado, W Texas, S New Mexico, SE Arizona); *P. orbiculare* is endemic to Mexico (from the Sierra Madres Occidental and Oriental and the Mexican Plateau south to Puebla and Veracruz, and to W Chihuahua and the eastern end of Sonora); *P. ornatissimum* occurs in the USA (New Mexico, Texas) and Mexico (Durango, Chihuahua, Zacatecas); *P. platyrhinus* is found in the USA (E Oregon, S Idaho, Nevada, E Utah, SW California, W Arizona) and Mexico (Baja California Norte); *P. sherbrookei* is endemic to Mexico (central Guerrero); *P. solare* occurs in Mexico (Sonora, N Sinaloa) and the USA (SE New Mexico and Arizona); *P. taurus* is endemic to Mexico (Morelos, Puebla, Oaxaca, Guerrero) (Uetz et al 2020; Aguilar & Devender, 2018; Nieto et al 2014).

3.2 Habitat

P. orbiculare is associated with pine-oak forests at elevations of 1,500-3,400 m (Suarez et al 2018; Bryson et al 2012). *P. asio* is found in savanna, dry forest, secondary forest and agricultural areas (Canseco et al 2013). *P. sherbrookei* inhabits oak forests with patches of grassland and scrub with *Agave* spp. and other herbaceous plants (Nieto et al 2014). *P. cerroense* lives in arid and semiarid rocky and sandy areas with scrub (Ramírez et al 2004). *P. taurus* is found in high desert, arid scrub and even tropical dry forest but can also persist in traditional pastures (Canseco et al 2007). *P. ditmarsii* lives in rocky sites in evergreen oak and pine forests, deciduous forests and thorny scrub (Frost et al 2007). *P. hernandezii* is found in forest, shrubland, grassland, rocky areas, inland cliffs, mountain peaks and desert habitats (Hammerson, 2007). *P. braconnieri* inhabits primary and secondary tropical deciduous forest, scrubland and primary oak forest. It can be found in traditional agricultural areas such as corn fields (Canseco et al 2007). *P. coronatum* occurs in scrubland, grassland, coniferous woods and broadleaf woodlands; it is typically found in areas with sandy soil, scattered shrubs and ant colonies, such as along the edges of arroyo bottoms or dirt roads (Grismer 2002). *P. platyrhinus* inhabits desert shrublands, such as those dominated by sagebrush or shadscale, on sandy flats, alluvial fans, brushy dunes or dune edges (Grismer 2002, St. John 2002). *P. cornutum* is found in open arid and semiarid regions with sparse vegetation (deserts, prairies, playa edges, bajadas, dunes, foothills) with grass, cacti or scattered brush or scrubby trees (Degenhardt et al. 1996, Bartlett & Bartlett 1999). *P. mcallii* occurs in sandy desert flats with sparse vegetation; in low hills and mud hills, it is most common where superficial soils have loose or windblown sand but is rarely found in dunes (Hammerson et al 2007).

3.3 Biological characteristics

The genus *Phrynosoma* includes 11 viviparous species: *P. bauri*, *P. brevirostris*, *P. douglasii*, *P. diminutum*, *P. ditmarsii*, *P. braconnieri*, *P. hernandezii*, *P. ornatissimum*, *P. orbiculare*, *P. sherbrookei* and *P. taurus*, and 10 oviparous species: *P. asio*, *P. blainvillii*, *P. cerroense*, *P. cornutum*, *P. coronatum*,

P. goodei, *p. mcallii*, *P. modestum*, *P. platyrhinus* and *P. solare* (Nieto et al 2014; Sherbrooke 2003; Uetz et al 2020, Hammerson 2019). Viviparity is an adaptation to cold climates, very northern latitudes and high elevations that do not allow egg laying in the soil because of low temperatures or short warm seasons (Sherbrooke, 2003). *P. orbiculare* breeds in autumn and winter (Suarez et al 2018). In Texas, the breeding season for *P. cornutum* begins shortly after the spring and continues until mid-July (Milne & Milne 1950). Eggs are deposited in 2 to 3 layers and each layer is covered with soil (Reeve 1952, Sherbrooke 1981). Once laying is completed, the female refills the hole with excavated soil, rakes the surrounding surface to disguise the nest (Ramsey 1956) and leaves the site (Sherbrooke 1981). Clutch sizes for horned lizards range from 13 to 45 eggs (Milne & Milne 1950, Ballinger 1974, Pianka & Parker 1975, Sherbrooke 1981). Females of *Phrynosoma platyrhinus* produce one or two clutches between April and July and bury their eggs in the soil. Clutch size averages about 7. Incubation lasts about 50-60 days. Hatchlings appear from mid-July to mid-September; time of birth slightly differs throughout the range of the species (NatureServe 2021). Clutch size is 8.3-9.4 in *P. orbiculare*, 5.5 in *P. sherbrookei*, 7-8.4 in *P. braconneri*, 12.3 in *P. taurus*, 8.5-16 in *P. douglasii* and 11.3 in *P. ditmarsii* (Suarez et al 2018; Nieto et al 2014; Beltrán et al 2005; Zamudio et al 2000; Pianka & Parker, 1975; Montanucci, 1989; Powell et al 1991). *P. platyrhinus* has a lifespan of 7 to 8 years (Medica et al. 1973; Tanner & Krogh 1973) and reaches sexual maturity at about 22 months (Tanner and Krogh 1973; Nussbaum et al. 1983). *Phrynosoma* species have a highly specialized diet consisting mainly of ants (myrmecophagy), which make up 90% of the diet of some species such as *P. orbiculare*, *P. solare* and *P. platyrhinus* (Rojas et al 2016; Sherbrooke, 2003). In Canada, 76.9% of the diet of *P. brevirostris* is composed of ants (Powell et al 1984). *P. douglasii* consumes 71% of ants (Lahti et al 2008). *P. asio* has a lifespan of 12 to 13 years (Uetz et al 2020). *P. platyrhinus* has a lifespan of 7 to 8 years (Medica et al. 1973; Tanner & Krogh 1973) and reaches sexual maturity at about 22 months (Tanner and Krogh 1973; Nussbaum et al. 1983). Some species squirt blood from the ocular area as a defensive strategy against predators, mainly canids (Sherbrooke, 2003). *Phrynosoma* are mainly diurnal lizards, but some species have crepuscular and nocturnal activities on moonlit nights, including foraging for food, as happens with *P. asio* in Michoacán, Mexico (Raya, 2014).

3.4 Morphological characteristics

Horned lizards have dorsoventrally compressed bodies, with sharp occipital spines; they have relatively short legs, a lateral fringe of enlarged spiny scales, cryptic colours, and a specialized dentition that facilitates ant-eating (Barras, 2018; Sheerbrooke, 2003; Pianka & Parker 1975). The spines or horns in the occipital region serve as a protection from predators (Young et al 2004). Species such as *P. ditmarsii*, *P. braconneri*, *P. taurus* and *P. sherbrookei* have a very short tail (Sherbrooke, 2003; Nieto et al 2014). The genus *Phrynosoma* is unusual in that females are much larger than males (Zamudio, 1998; Pianka & Parker 1975). *P. diminutum* is the smallest, with an average snout-vent length of 43 mm in males and 54 mm in females, while *P. asio* is the largest, with an average snout-vent length that can exceed 120 mm (Sherbrooke, 2003; Hammerson, 1999).

3.5 Role of the species in its ecosystem

Horned lizards play a unique and important role in the ecosystem as regulators of populations of ants and other insects and as part of the food chain (Raya, 2013, Sherbrooke, 2003). They can eat up to 70-100 ants per day (Sherbrooke 2003). Their predators include bobcats, skunks, raccoons, hawks, owls, roadrunners, shrikes, crows, snakes, large lizards, etc. (Henke et al 1998, Young et al, 2004, Sherbrooke, 2003).

4. State and trends

4.1 Habitat trends

Lizards of the *Phrynosomatidae* family cannot evolve fast enough to withstand current climate change due to their limitations resulting from their genetic architecture of thermal preferences (Sinervo et al 2010); moreover, their habitats are being eroded or fragmented. In California, USA, *P. mcallii* has experienced 92% habitat loss (Barrow et al 2009) and *P. blainvillii* is suffering from habitat destruction, degradation and fragmentation (Hult et al 2015). *P. coronatum* is experiencing population declines and local extirpations that are more marked in agricultural and urban areas. A key factor contributing to these declines is the destruction of native chaparral habitats with sandy substrates (Leaché et al 2009). In Mexico, *P. cerroense* is being affected by intensive agriculture in the Magdalena Plains which could destroy a significant part of its range (Leaché et al 2009). *P. cornutum* has declined in its entire area of distribution, especially in Oklahoma and Texas, due to habitat loss and alteration resulting from agriculture and urbanization (Endriss et al, 2007; Carpenter et al 1993; Price, 1990; Henke et al 1998).

The loss and fragmentation of the habitat of *P. platyrhinos* has been due to urbanization, agricultural development, energy development, the use of off-road vehicles, livestock grazing, drought and the impacts of non-native species (Hammerson et al. 2019; NatureServe 2021).

4.2 Population size

In the state of Guerrero, Mexico, population density is 1,012 ind/ha. for *P. asio* and 0.28 ind/ha. for *P. taurus* (Villanueva, 2016). *P. mcallii*: the population is severely fragmented, with an ongoing decline of mature individuals. In the summer of 2002, its population in the Yuha Basin (24,122 ha) was estimated at 18,494 adults and 8,685 juveniles (Hammerson et al, 2007). *P. coronatum*: its area of occupancy and population size appear to have declined significantly in California, but much less so in Baja California. Both are likely to continue to decline, but the rate of decline is unknown (Hollingsworth et al 2007). *P. blainvillii*: the total size of the adult population is unknown but presumably exceeds 10,000 and may be greater than 100,000 in its area of occupancy (Hammerson, 2019). No studies have explored the population size of *P. platyrhinos* in its entire range or at local level. The total size of the adult population is unknown but is believed to exceed 100,000 individuals (Hammerson et al. 2019; NatureServe 2021).

4.3 Population structure

In Guerrero, the population of *P. asio* was made up of 60.32% males and 39.68% females and that of *P. taurus* consisted of 33.33% males and 66.66% females (Villanueva, 2016). The sex ratio at birth of *P. orbiculare* in Toluca, Mexico, was 1:1 (Suarez et al 2018). In San Joaquin, California, the population of *P. blainvillii* was composed of 30.3% adults and the sex ratio was 1:1.2 (females-males), whereas the population of juveniles was female-biased, 1:0.57 (females-males) (Hult et al 2015). The sex ratio of *P. platyrhinos* is not significantly biased (Pianka & Parker 1975).

4.4 Population trends

In the 1970s, students of the University of Arizona collected a large number of individuals of *P. cornutum* and *P. modestum* near Agua Prieta and Naco, Sonora. By contrast, only a few individuals have been observed recently in these areas, although the species is still common in other states (Aguilar et al 2018). *P. mcallii* has declined in the last few decades, apparently due to anthropogenic habitat fragmentation (Beauchamp in Endris et al 2007). In California, from 2002 to 2005 in stabilized sand fields, populations of *P. mcallii* declined by 50% every year and experienced an overall decline of 90% (Barrows et al 2009). *P. cornutum* has declined in its entire range, particularly in Oklahoma (Carpenter et al 1993), and has declined in central and eastern Texas (Johnson, 2008; Price, 1990). In Colorado, USA, the population of *P. cornutum* seems to be relatively stable (Montgomery et al 2003). Populations of *P. blainvillii* in California have experienced serious declines in the entire range, and in some sites where populations used to be abundant there are currently very few individuals or none (Hult et al 2015; Hammerson 2019). Horned lizards are now protected in Oklahoma and Texas and their collection is illegal; however, where their harvest used to be common, some populations may not have entirely recovered yet (Oklahoma Wildlife Department, 2021).

4.5 Geographic trends

Phrynosoma asio has been reported from Guatemala based on anecdotal data, but has never been seen or collected and may be extirpated (MSc Daniel Ariano, pers. comm. 2021). *P. douglasii* is considered extirpated in Canada and, for *P. hernandezi*, it is likely that subpopulations in at least some sites were extirpated in the last two decades (COSEWIC 2018 and 2019). It is believed that the geographic range of *P. platyrhinos* is relatively stable or slowly declining (NatureServe 2021). However, habitat loss and fragmentation have locally reduced or destroyed the habitat that used to be suitable in the range of the species (NatureServe 2021).

5. Threats

The introduction of invasive ant species from Brazil and Argentina affects *Phrynosoma* lizards in California and Texas because the ants are not eaten by the lizards and displace their favourite prey (Manaster, 2002; Henke et al 1998). The use of insecticides to combat Brazilian fire ants may have been detrimental to *P. cornutum*, either directly or through elimination of its natural prey base (Henke et al 1998; Price, 1990). Other factors are the use of agricultural pesticides, collection for the pet trade, climate change, changes in land use such as urbanization, the conversion of land to agriculture, the growth of woody plants and the

invasion of the mixed-grass prairie by other plant species (Granberg et al 2015; Sinervo et al 2010; Sherbrooke 2003, Pianka & Parker 1975). In Sonora, the introduction of African grass may prevent the movement of some species including horned lizards (*Phrynosoma*) (Rorabaugh 2008). *P. platyrhinos* shows a preference for areas with sparse vegetation and may avoid areas invaded by non-native grasses (*Bromus tectorum*) (Newbold 2005). The presence of grass reduces the sprint performance of *P. platyrhinos* by 50 to 70 per cent compared to its bare-substrate speed (Newbold 2005). Grass grows widely in the range of the species and has probably reduced the distribution and abundance of *P. platyrhinos* (NatureServe 2021). Populations of the species have been locally reduced or eliminated due to habitat loss, fragmentation and direct mortality as a result of urbanization, agricultural development, energy development, recreational off-road vehicle use, livestock grazing, drought, pesticides and impacts of non-native species (Hammerson et al. 2019; NatureServe 2021). Habitat loss displaces individuals and populations, while fragmentation creates a barrier for dispersal, prevents population growth by immigration and may fragment populations into units that are not large enough for long-term viability (NatureServe 2021). Commercial exploitation and mortality resulting from road kills are additional factors causing the decline of the population in Texas (Price, 1990). From the 1890s to the 1930s, 8,000 horned lizards were collected every year in California, depleting local populations (Manaster, 2002). In Mexico, horned lizards are harvested from their habitat because they are tame and showy animals and therefore are highly appreciated for selling illegally on the black market and in pet shops (Raya, 2013). Because of their highly specialized diet, consisting mainly of ants, it is very difficult to meet their dietary requirements; as a result, they make poor pets and die of starvation (Casas, 2000). People have tried to keep them as pets only to find out they are difficult to keep alive in captivity (Sherbrooke, 2003). In Canada, *P. hernandezii* faces numerous threats associated with urbanization, tourism infrastructure and activities, agricultural activities, oil and gas drilling and climate change. These threats contribute to habitat loss, degradation or fragmentation and/or cause direct and indirect mortality (COSEWIC 2018).

6. Utilization and trade

6.1 National utilization

In Chihuahua, Mexico, horned lizards of the genus *Phrynosoma* are often harvested for the pet trade and are offered for sale in local markets and markets of Mexico City (Fitzgerald et al 2004). In Capulálpam de Méndez, Oaxaca, horned lizards (*P. braconneri*) are used for medicinal purposes (Mases, 2015). *P. orbiculare* and *P. taurus* are used for various purposes in Mexico, so they have a high score on the Cultural Importance Index (Avila et al 2018). Horned lizards such as *P. orbiculare* are popularly believed to live on air because, in captivity, they normally refuse to eat and die of starvation a few weeks later (Casas, 2000). They are believed by some to be useful to attract money if placed in a chest filled with iron filings (Fitzgerald et al 2004). *P. cornutum*, *P. orbiculare* and *P. modestum* are used for traditional medicinal purposes in the state of Chihuahua (Fitzgerald et al 2004).

Horned lizards are often sold as pets in the United States even though they rapidly die in captivity (Aguilar & Devender, 2018). The collection of horned lizards to sell in the pet trade may have affected several populations, especially near towns and cities (Oklahoma Wildlife Department 2021). Hundreds of thousands of horned lizards were shipped out of California, Oklahoma and Texas and sold for pets in eastern United States and Europe from the early 1900s until the 1980s (Dropkin, 2015; Pianka et al 2007; Oklahoma Wildlife Department 2021; Jennings 1987). In the 1950s, a single pet dealer in Texas was selling more than 50,000 horned lizards every year (Dropkin, 2015). In 1967, the Texas legislature passed protective legislation preventing collection, exportation and sale of *P. cornutum* from the state. Before that, hundreds of thousands of horned lizards were exported (dead and alive) from Texas every summer to tourists, curiosity seekers and would be pet owners, leading only to the demise of the lizards (Pianka et al 2007). If a horned lizard has adequate fat reserves it can live for months in an inadequate captive environment, but it is certain death for almost all the collected lizards (Pianka et al 2007).

6.2 Legal trade

Species of *Phrynosoma* are internationally traded for the pet trade. In the USA, data on *Phrynosoma* exports extracted from the U.S. Fish and Wildlife's Law Enforcement Management Information System ("LEMIS") from 2006 to 2015 show that 21,393 live specimens of at least nine *Phrynosoma* species were exported, including 54 *P. asio*, *P. taurus* and *P. braconneri*, which are endemic to Mexico. Of these, 93.8% (20,080 specimens) were wild harvested, while 3.8% (822 specimens) were captive bred and 2.3% (487 specimens) were born in captivity from wild parents (LEMIS 2006-2015) between 2013 and 2017; for *P. platyrhinos*, this percentage was 96% (LEMIS 2021).

The most commonly exported species by far is *P. platyrhinos*, with 20,199 individuals exported, which amounts to 94.4% of the trade of *Phrynosoma* involving the USA. It is followed by *P. modestum*, with 496 individuals, which represents 2.3% of the trade. Specimens were exported to 32 different countries, of which Germany was the main destination with 3,371 individuals, followed by the Netherlands (2,865 specimens), the United Kingdom (2,816 specimens), Japan (2,645 specimens) and Canada (1,916 specimens). The European Union is the main market for live *Phrynosoma*, followed by Asia (Japan, Hong Kong SAR, Thailand, Korea and Taiwan, Province of China). From 2013 to 2017, 99% of transactions of *P. platyrhinos* were reported as having commercial purposes (LEMIS 2021).

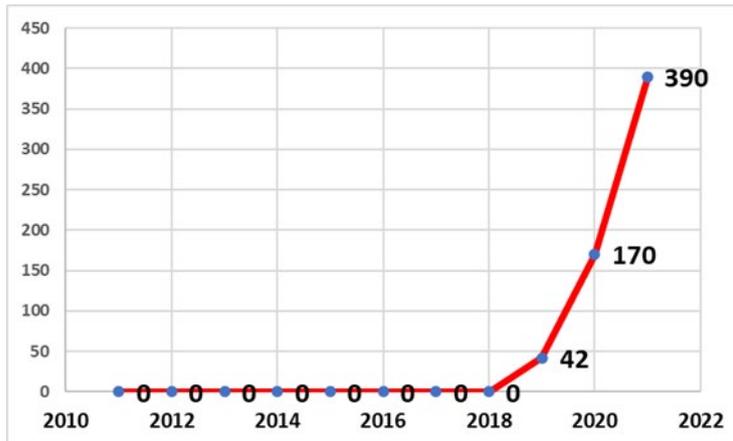
Countries of import of *Phrynosoma* exported by the USA, 2006-2015

Country	Quantity imported
Germany	3371
Netherlands	2865
United Kingdom	2816
Japan	2645
Canada	1916
Switzerland	1171
Austria	1133
Hong Kong SAR	819
Spain	715
Czech Republic	689
Thailand	608
Korea	557
Italy	554
Taiwan, Province of China	517

Source: LEMIS 2006-2015

In 2013-2017, *P. platyrhinos* was exported to the Netherlands, Japan, Hong Kong SAR, Germany, Great Britain and Canada. The Netherlands, Japan and Hong Kong SAR were the three main importers of *P. platyrhinos* from the United States. Altogether, they imported almost 50% of the individuals traded (LEMIS 2021). Mexico exported 45 live *Phrynosoma* between 2000 and 2017: 24 *P. asio*, 12 *P. orbiculare* and 8 *P. coronatum*, all for scientific and non-commercial purposes (SEMARNAT 2019). In 2019-2021, exports from Mexico of wild-collected *Phrynosoma* for commercial purposes were the following: 42 *P. asio* in 2019; 170 *P. asio* in 2020 and 366 *P. asio* and 24 *P. taurus* in 2021, amounting to 602 individuals in total (SEMARNAT 2022). The countries of destination of commercial exports of *Phrynosoma* from Mexico were Spain (250 individuals); Japan (174 individuals); Germany (162 individuals) and the United States (6 individuals) (SEMARNAT 2022).

Commercial exports of *Phrynosoma* from Mexico, 2011-2021



Source: SEMARNAT 2019, 2022

Information recorded in the CITES Trade Database on the 4 species included in the CITES Appendices (*P. coronatum*, *P. blainvillii*, *P. cerroense* and *P. wigginsii*=*P. cerroense*) shows the following: 12 individuals were exported by Mexico (*P. coronatum* 8; *P. blainvillii* 4), 5 for commercial purposes (CITES, 2021), and 84 individuals were exported by the USA (*P. coronatum* 51; *P. cerroense* 30; *P. blainvillii* 3); of these, 82 were exported for commercial purposes (CITES 2021). Interestingly, *P. cerroense* was exported from the USA in 2011 but it is endemic to Mexico and there are no records of exports of this species from Mexico or from the USA in the LEMIS database. CITES trade data do not match the data of the Ministry of the Environment and Natural Resources of Mexico (SEMARNAT), which reported that all the exports of *Phrynosoma* were for scientific purposes (SEMARNAT, 2019). The information about the exports of *P. coronatum* and *P. blainvillii* in the LEMIS database of the USA does not match the records of the CITES Trade Database either.

Phrynosoma species are sold in several European countries (Altherr & Lameter 2020; Altherr et al 2019), Taiwan (Shiau et al 2006), the Philippines (Sy 2015) and Japan and Malaysia (Annex 1). In the USA pet trade, *P. platyrhinos* is sold for USD 39,99; USD 149,99; *P. asio* is sold for USD 700 a pair.¹

6.3 Parts and products in trade

Practically all the international trade recorded concerns live animals. In the United States, 99% of the specimens of *P. platyrhinos* traded in 2013-2017 were live animals (LEMIS 2021).

6.4 Illegal trade

In Mexico, *Phrynosoma* species are highly valued for selling illegally on the black market and in pet shops (Raya, 2013). In Chihuahua they are harvested and offered for sale internationally in pet shops and reptile shows (González Porter, pers. comm. with Adrián Reuter, in Fitzgerald et al 2004). There is information about commercial harvest of reptiles from the island and it is likely that *P. cerroense* is one of the species subjected to this activity (Ramírez et al 2004).

Between 2000-2020, Mexico seized 302 *Phrynosoma*: *P. orbiculare* (46), *P. asio* (30), *P. cornutum* (12), *P. mcalli* (6) and *P. spp* (203) (PROFEPA 2019, 2021). *Phrynosoma* are the species of lizards most frequently seized in Mexico (Altherr et al 2020). Endemic species of *Phrynosoma* that were never exported to Europe for commercial purposes have been offered for sale in several countries of Europe; this includes 68 specimens of *P. orbiculare* at prices of EUR 100-200 and *P. taurus* at a price of EUR 500 (Altherr et al 2019). In addition, *Phrynosoma* have not been commercially exported from Mexico to any countries, so it can be inferred that the endemic species were illegally smuggled out of Mexico.

1 <https://www.backwaterreptiles.com/other-lizards/desert-horned-lizard-for-sale.html>
<https://www.gotreptiles.com/horned-toad-lizard-small.html>
<http://www.faunaclassifieds.com/forums/showthread.php?t=682468>.

6.5 Actual or potential trade impacts

The demand for endemic species drives illegal trade, which can ultimately lead to their overexploitation (Courchamp et al 2006). Some species such as rare and endemic species of reptiles are particularly vulnerable to overexploitation (Auliya et al 2016; Herrel et al 2014). A study found that the more widely traded or popular a species is in the United States, the more likely it is to be smuggled into other countries (Stringham et al 2021). The growing popularity of *Phrynosoma* species as pets could be promoting illegal trade.

7. Legal instruments

7.1 National

In Mexico, *P. cerroense*, *P. mcallii*, *P. orbiculare* and *P. taurus* are classified as Threatened, while *P. asio* and *P. braconnieri* are classified as Subject to Special Protection (DOF 2019). In the USA, *P. blainvillii* is listed as Vulnerable in California; *P. cornutum* is listed as Fully Protected in New Mexico, as a Species of Special Concern in Oklahoma and Colorado, and as Threatened in Texas; *P. hernandezi* is classified as Fully Protected in New Mexico, Threatened in Texas and potentially at risk in Montana; *P. mcallii* is considered Threatened in California and Arizona (New Mexico Game and Fish 2021, 2018, Montgomery 2003; Oklahoma Wildlife Department 2021). *P. platyrhinos* is not protected under the US Endangered Species Act. The states of the USA in which this species occurs have individual regulations that grant some protection to the species, but the level of protection varies between states and no federal regulations currently protect the species on a national level. In Canada, *P. douglasii* is Extirpated and *P. hernandezi* is classified as Special Concern (COSEWIC 2018, 2019).

7.2 International

In 1992, four species were included in CITES Appendix II: *P. coronatum*, *P. blainvillii*, *P. cerroense* and *P. wigginsi* (CITES Checklist 2021). However, *P. wigginsi* is now considered a synonym of *P. cerroense* (Leache & Linkem 2015).

8. Species management

8.1 Management measures

In the United States, researchers and ranch managers in central Texas are currently exploring options to reintroduce *P. cornutum* in plots where it used to occur (Granber et al 2015). In Canada, *P. douglasii* is extirpated and it is considered that, if it were reintroduced, its current potential threats would include widespread habitat loss, road mortality and predation by native and exotic animals (COSEWIC 2019).

8.2 Population monitoring

In Mexico, the Autonomous University of Guerrero and the National Autonomous University of Mexico are conducting studies and working on the conservation of some species of horned lizards, including *P. orbiculare*, *P. asio*, *P. taurus* and *P. braconnieri*. In Michoacán, the *Centro Michoacano para la Conservación del Camaleón* conducts activities aimed at protecting horned lizards and raising awareness about them (Raya 2013).

8.3 Control measures

8.3.1 International

In the USA, the states regulate the harvest and conservation of the species, and individual states have set limits to the collection and possession in the state of *P. platyrhinos* or more broadly of reptiles and species included in the state list.

8.3.2 Domestic

In Mexico, the harvest and conservation of all species of *Phrynosoma* are regulated by the General Wildlife Act (*Ley General de Vida Silvestre*) and the General Ecological Balance and Environmental Protection Act (*Ley General del Equilibrio Ecológico y la Protección al Ambiente*).

8.4 Captive breeding and artificial propagation

In 2008, Los Angeles Zoo launched a captive breeding project for *P. asio* that required a very high level of care of the species in captivity because of its specific food and humidity requirements (Recchio et al 2014). Most of these lizards die within weeks due to poor husbandry, and no self-sustaining captive-bred populations have ever been obtained (Oklahoma Wildlife Department 2021). In Mexico, four Wildlife Management and Conservation Units or UMAs and two Properties or Facilities that Manage Wildlife in Confined Form, Outside its Natural Habitat (PIMVS) conduct intensive management of specimens of *Phrynosoma* but there are no records of authorizations for the collection of *Phrynosoma* in intensive management UMAs or PIMVS.

8.5 Habitat conservation

Phrynosoma species are present in several protected areas in Mexico, the United States and Canada. (Aguilar & Devender, 2018; Fitzgerald et al 2014; Rojas et al 2016; Leache et al 2009, COSEWIC 2019)

8.6 Safeguards

9. Information on similar species

All *Phrynosoma* species are similar in appearance to non-experts. Correct species identification requires assessing a series of characteristics such as the number of rows of dorsal scales, the notch between the horns, the number of horns, the length of the tail, the dorsal stripes, etc. (Sherbrooke, 2003). Identification is more difficult in juvenile specimens, which only develop some characteristics such as the large horns once they reach maturity (Pianka & Parker 1975).

10. Consultations

The USA and Canada were consulted.

11. Additional remarks

12. References

- Aguilar-Morales, C., & Van Devender, T. R. (2018). Horned Lizards (*Phrynosoma*) of Sonora, Mexico: Distribution and Ecology. *Sonoran Herpetologist*, 31(3), 40-50.
- Alsop, V. 2013. Desert Horned Lizard Care. Beasties Publishing; Edición 2nd electronic (8 abril 2013).
- Altherr, S., Lameter, K & Cantú, J.C, (2019). The trade in nationally protected lizards from Australia, Cuba, and Mexico And the EU's role as a main destination. *TRAFFIC Bulletin*, 31(2), 59.
- Altherr, S. & K. Lameter (2020): Stolen Wildlife III – The EU is a main hub and destination for illegally caught exotic pets. Report by Pro Wildlife (ed.), Munich, Germany, 40 pp.
- Auliya, M., et al., Trade in live reptiles, its impact on wild populations, and the role of the European market, *Biological Conservation* (2016), <http://dx.doi.org/10.1016/j.biocon.2016.05.017>
- Avila-Nájera, D. M., Mendoza, G. D., Villarreal, O., & Serna-Lagunes, R. (2018). Uso y valor cultural de la herpetofauna en México: una revisión de las últimas dos décadas (1997-2017). *Acta zoológica mexicana*, 34.
- Ballinger, R. E. 1974. Reproduction of the Texas horned lizard, *Phrynosoma cornutum*. *Herpetologica* 30:321-327.
- Barrows, C. W., & Allen, M. F. (2009). Conserving species in fragmented habitats: population dynamics of the flat-tailed horned lizard, *Phrynosoma mcallii*. *The Southwestern Naturalist*, 54(3), 307-316.
- Bartlett, R D. and Bartlett, P.P. 1999. A Field Guide to Texas Reptiles and Amphibians. Gulf Publishing Company, Houston, Texas. xviii + 331 pp.
- Beltrán-Sánchez, E., Mendoza-Quijano, F. & Sherbrooke, W. C. (2005). Aspectos reproductivos del camaleón vivíparo *Phrynosoma taurus* (Sauria: Phrynosomatidae) de Zumpango del Río, Guerrero. *Boletín de la Sociedad Herpetológica*, 13, 37-41.
- Borras Guevara, M. L. (2008). Estrategia antipredatoria del color del cuerpo y línea blanca dorsal de *Phrynosoma cornutum* en tres microhábitats diferentes (Bachelor's thesis, Bogotá-Uniandes).

- Bryson, R. W., García-Vázquez, U. O. & Riddle, B. R. (2012). Diversification in the Mexican horned lizard *Phrynosoma orbiculare* across a dynamic landscape. *Molecular Phylogenetics and Evolution*, 62, 87–96.
- California Natural Diversity Database (CNDDB). February 2021. Special Animals List. California Department of Fish and Wildlife. Sacramento, CA.
- Canseco-Márquez, L., Campbell, J.A., Ponce-Campos, P., Muñoz-Alonso, A. & García Aguayo, A. 2007. *Phrynosoma taurus*. The IUCN Red List of Threatened Species 2007: e.T64082A12734911. <https://dx.doi.org/10.2305/IUCN.UK.2007.RLTS.T64082A12734911.en>.
- Canseco-Márquez, L., Mendoza-Quijano, F. & Ponce-Campos, P. 2007. *Phrynosoma braconnieri*. The IUCN Red List of Threatened Species 2007: e.T64071A12741450. <https://dx.doi.org/10.2305/IUCN.UK.2007.RLTS.T64071A12741450.en>
- Canseco-Marquez, Antonio Muñoz, André García, Paulino Ponce. 2013. *Phrynosoma asio*. The IUCN Red List of Threatened Species 2013: e.T198393A2524363. <https://dx.doi.org/10.2305/IUCN.UK.2013-2.RLTS.T198393A2524363.en>.
- Carpenter, C. C., R., St. Clair, and P. Gier. 1993. Determination of the distribution and abundance of the Texas horned lizard (*Phrynosoma cornutum*) in Oklahoma. Final report, Federal Aid Project E-18, Oklahoma Department of Wildlife Conservation, Oklahoma City, Oklahoma, U.S.A.
- Casas Andreu, G. 2000. Mitos, leyendas y realidades de los reptiles en México. *CIENCIA ergo-sum, Revista Científica Multidisciplinaria de Prospectiva* 7(3), [fecha de Consulta 6 de Abril de 2021]. ISSN: 1405-0269. Available in: <https://www.redalyc.org/articulo.oa?id=10401912>
- CITES 2021 Trade Data Base *Phrynosoma* downloaded 3 March 2021
- CITES Check list 2021 <https://checklist.cites.org> *Phrynosoma*
- Courchamp F, Angulo E, Rivalan P, Hall RJ, Signoret L, Bull L, et al. (2006) Rarity Value and Species Extinction: The Anthropogenic Allee Effect. *PLoS Biol* 4(12): e415. <https://doi.org/10.1371/journal.pbio.0040415>CITES 2021 Trade Data Base *Phrynosoma* downloaded 3 March 2021
- COSEWIC. 2018. COSEWIC assessment and status report on the Greater Short-horned Lizard *Phrynosoma hernandesi* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xi + 64 pp. (<http://www.registrelep-sararegistry.gc.ca/default.asp?lang=en&n=24F7211B-1>).
- COSEWIC Annual Report 2018-2019 https://wildlife-species.canada.ca/species-risk-registry/virtual_sara/files/cosewic/Rapport-Cescc-Report-v00-2019Oct-En.pdf
- Degenhardt, W.G., Painter, C.W. and Price, A.H. 1996. *Amphibians and Reptiles of New Mexico*. University of New Mexico Press, Albuquerque, New Mexico. Xix + 431 pp.
- Diario Oficial Federal DOF 14/11/2019 MODIFICACIÓN del Anexo Normativo III, Lista de especies en riesgo de la Norma Oficial Mexicana NOM-059-SEMARNAT-2010, Protección ambiental-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, publicada el 30 de diciembre de 2010
- Endriss, D. A., Hellgren, E. C., Fox, S. F., & Moody, R. W. (2007). Demography of an urban population of the Texas horned lizard (*Phrynosoma cornutum*) in central Oklahoma. *Herpetologica*, 63(3), 320-331.
- Fitzgerald, L.A., et al. 2004. Collection, Trade, and Regulation of Reptiles and Amphibians of the Chihuahuan Desert Ecoregion. *TRAFFIC North America*. Washington D.C.: World Wildlife Fund.
- Frost, D.R., Hammerson, G.A., Gadsden, H. & Sherbrooke, W. 2007. *Phrynosoma ditmarsii*. The IUCN Red List of Threatened Species 2007: e.T64074A12741807. <https://dx.doi.org/10.2305/IUCN.UK.2007.RLTS.T64074A12741807.en>. Downloaded on 08 April 2021.
- Granberg, R., Perry, G., & Verble, R. M. (2015). Using Historic Evidence to Inform Conservation Decisions for the Texas Horned Lizard (*Phrynosoma cornutum*). *Post Oak & Prairie Journal*, 25.
- Grismer, L.L. 2002. *Amphibians and Reptiles of Baja California, Including its Pacific Islands and the Islands in the Sea of Cortés*. University of California Press, Berkeley and Los Angeles, California.
- Hammerson, G.A. (1999) *Amphibians and Reptiles in Colorado*. 2nd Edition. University Press of Colorado, Niwot, CO., xxii +484 pp.
- Hammerson, G.A., Frost, D.R. & Gadsden, H. 2007. *Phrynosoma mcallii*. The IUCN Red List of Threatened Species 2007: e.T64077A12733969. <https://dx.doi.org/10.2305/IUCN.UK.2007.RLTS.T64077A12733969.en>.

- Hammerson, G.A. 2007. *Phrynosoma hernandesi*. The IUCN Red List of Threatened Species 2007: e.T64076A12741970. <https://dx.doi.org/10.2305/IUCN.UK.2007.RLTS.T64076A12741970.en>.
- Hammerson, G.A. 2019. *Phrynosoma blainvillii*. The IUCN Red List of Threatened Species 2019: e.T17087A89972321. <https://dx.doi.org/10.2305/IUCN.UK.2019-2.RLTS.T17087A89972321.en>.
- Hammerson, G.A. 2019. *Phrynosoma goodei*. The IUCN Red List of Threatened Species 2019: e.T89974730A89974758. <https://dx.doi.org/10.2305/IUCN.UK.2019-2.RLTS.T89974730A89974758.en>
- Henke, S. E., & Fair, W. S. (1998). Management of Texas horned lizards. Wildlife Management Bulletin of the Caesar Kleberg Wildlife Research Institute, Texas A&M University-Kingsville.
- Herrel, A., & van der Meijden, A. (2014). An analysis of the live reptile and amphibian trade in the USA compared to the global trade in endangered species. *The Herpetological Journal*, 24(2), 103-110.
- Hollingsworth, B. & Hammerson, G.A. 2007. *Phrynosoma coronatum*. The IUCN Red List of Threatened Species 2007: e.T64073A12741647. <https://dx.doi.org/10.2305/IUCN.UK.2007.RLTS.T64073A12741647.en>.
- Hult, S. M., & Germano, D. J. (2015). Population structure, size, and activity patterns of *Phrynosoma blainvillii* in the San Joaquin Desert of California. *Herpetological Conservation and Biology*, 10(3), 839-849.
- IUCN REDLIST 2021 <https://www.iucnredlist.org/search?query=phrynosoma&searchType=species>.
- Jennings, M. R. (1987). Impact of the curio trade for San Diego horned lizards (*Phrynosoma coronatum blainvillii*) in the Los Angeles Basin, California: 1885-1930. *Journal of Herpetology*, 21(4), 356-358.
- Johnson-Linam, L. A. 2008. Texas horned lizard watch 10-year summary report. Texas Parks and Wildlife Department, Report W7000-1442.
- Köhler, G. Taxonomy of Horned Lizards, Genus *Phrynosoma* (Squamata, Phrynosomatidae). *Taxonomy* 2021, 1, 83–115. <https://doi.org/10.3390/taxonomy1020009>
- Lahti, M. E., & Beck, D. D. (2008). Ecology and ontogenetic variation of diet in the pigmy short-horned lizard (*Phrynosoma douglasii*). *The American Midland Naturalist*, 159(2), 327-339.
- Leaché, A. D., Koo, M. S., Spencer, C. L., Papenfuss, T. J., Fisher, R. N., & McGuire, J. A. (2009). Quantifying ecological, morphological, and genetic variation to delimit species in the coast horned lizard species complex (*Phrynosoma*). *Proceedings of the National Academy of Sciences*, 106(30), 12418-12423.
- Leaché, Adam D. and Charles W. Linkem 2015. Phylogenomics of Horned Lizards (Genus: *Phrynosoma*) Using Targeted Sequence Capture Data. *Copeia* 2015 (3): 586-594
- LEMIS 2006-2015 U.S. Fish and Wildlife Service's Law Enforcement Management Information System ("LEMIS")
- LEMIS 2013-2017; 2021 U.S. Fish and Wildlife Service's Law Enforcement Management Information System ("LEMIS")
- Manaster, J. (2002). Horned lizards. Texas Tech University Press.
- Masés García, C. A. (2015). Evaluación del manejo, protección y aprovechamiento legal e ilegal de vertebrados silvestres de Oaxaca, México. Tesis que para obtener el grado de Maestro En Ciencias. Instituto Politécnico Nacional.
- MEDICA PA, TURNER FB, SMITH DD. 1973. Effects of radiation on a fenced population of horned lizards in southern Nevada. *Journal of Herpetology* 7:79–85.
- Milne, L. J., and M. J. Milne. 1950. Notes on the behavior of horned toads. *American Midland Naturalist* 44:720-741.
- Montana Field Guide Greater Short-horned Lizard, *Phrynosoma hernandesi* Montana Natural Heritage Program and Montana Fish, Wildlife and Parks. Retrieved on March 23, 2021, from <http://FieldGuide.mt.gov/speciesDetail.aspx?elcode=aracf12080&sort=3>
- Montanucci, R. (1989). Maintenance and propagation of horned lizards (*Phrynosoma*) in captivity. *Bulletin Chicago Herpetological Society*, 24, 229-238
- Montanucci, R. R. (2015). A taxonomic revision of the *Phrynosoma douglasii* species complex (Squamata: Phrynosomatidae). *Zootaxa*, 4015, 1-177.
- Montgomery, C. E., & Mackessy, S. P. (2003). Natural history of the Texas horned lizard, *Phrynosoma cornutum* (Phrynosomatidae), in southeastern Colorado. *The Southwestern Naturalist*, 48(1), 111-118.

- Natureserve 2021 Phrynosoma platyrhinos
[https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.817747/Phrynosoma platyrhinos](https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.817747/Phrynosoma_platyrhinos)
- New Mexico Game and Fish 2021 Hernandez's Short-horned Lizard <https://www.bison-m.org/booklet.aspx?SpeciesID=030090>
- New Mexico Game and Fish 2018 Texas Horned Lizard <https://www.bison-m.org/booklet.aspx?SpeciesID=030070>
- Newbold, T.A.S. 2005. Desert horned lizard (*Phrynosoma platyrhinos*) locomotor performance: the influence of cheatgrass (*Bromus tectorum*). *Southwestern Naturalist* 50:17-23.
- Nieto-Montes de Oca, A., Arenas-Moreno, D., Beltrán-Sánchez, E., & Leaché, A. D. (2014). A new species of horned lizard (genus *Phrynosoma*) from Guerrero, México, with an updated multilocus phylogeny. *Herpetologica*, 70(2), 241-257.
- NUSSBAUM RA, BRODIE ED JR., STORM RM. 1983. Reptiles and amphibians of the Pacific Northwest. Moscow, ID: University of Idaho Press. 336 p
- Oklahoma Wildlife Department 2021
<https://www.wildlifedepartment.com/wildlife/nongamespecies/reptiles/texas-horned-lizard>
- Pianka, E. R., & Parker, W. S. (1975). Ecology of horned lizards: a review with special reference to *Phrynosoma platyrhinos*. *Copeia*, 141-162.
- Pianka Eric R. and Wendy L. Hodges. 2007 Horned Lizards, and
<http://www.zo.utexas.edu/faculty/pianka/phryno.html>
<http://www.zo.utexas.edu/faculty/pianka/phryno2.html>
- Powell, G. L., & Russell, A. P. (1984). The diet of the eastern short-horned lizard (*Phrynosoma douglassi brevirostre*) in Alberta and its relationship to sexual size dimorphism. *Canadian Journal of Zoology*, 62(3), 428-440.
- Powell, L. & Russell, A. P. (1991). Parturition and clutch characteristics of short-horned lizards (*Phrynosoma douglasii brevirostre*) from Alberta. *Canadian Journal of Zoology*, 69, 2759-2764
- Price, A. H. 1990. *Phrynosoma cornutum*. *Catalogue of American Amphibians and Reptiles* 469:1
- PROFEPA 2019 Oficio PFFA/1.7/12C.6/02176/19, 29 NOV. 2019
- PROFEPA 2021 Oficio PFFA/1.7/12C.6/00061-21, 10 Feb 2021
- PROFEPA 2022 Oficio PFFA/1.7/12C.6/0425/2022 Expediente. PFFA/1.7/12C.6/00220-22. 9 marzo 2022
- Ramírez Bautista, A., F. Mendoza Quijano & M. C. Arizmendi. 2004. *Phrynosoma cerroense*. Estatus y conservación de algunos anfibios y reptiles de México. Facultad de Estudios Superiores Iztacala, Unidad de Biología, Tecnología y Prototipos (UBIPRO), Universidad Nacional Autónoma de México. Bases de datos SNIB-CONABIO. Proyecto W043. México. D.F
- Ramsey, L. W. 1956. Nesting of Texas horned lizards. *Herpetologica* 12:239-240.
- Raya García, E. 2013. Los camaleones de México para el mundo. *CONABIO. Biodiversitas*, 107:1-6
- Raya-García, E. (2014). *Phrynosoma asio* (Giant Horned Lizard) crepuscular and nocturnal activity. *Herpetological Review*, 45(2).
- Recchio, I, Robertson-Billet, M, Rodriguez, C and Haigwood J. 2014 Captive Husbandry and Reproduction of *Phrynosoma asio* (Squamata: Phrynosomatidae) at the Los Angeles Zoo and Botanical Gardens *Herpetological Review*, 2014, 45(3), 450–454. Society for the Study of Amphibians and Reptiles
- Reeve, W. L. 1952. Taxonomy and distribution of the horned lizard genus *Phrynosoma*. *University of Kansas Science Bulletin* 34:817-960
- Rojas-Hernández, U., Salas-Mercado, G. & Hernández-Gallegos, O. (2016). Dieta de *Phrynosoma orbiculare* (Squamata: Phrynosomatidae). *Memorias de la XIV Reunión Nacional de Herpetología*, Nayarit, México. Tepic: Sociedad Herpetológica Mexicana A.C.
- Rorabaugh, J.C. 2008. An introduction to the herpetofauna of mainland Sonora, México, with comments on conservation and management. *Journal of the Arizona-Nevada Academy of Science* 40(1):20-65.
- SEMARNAT 2019 Dirección General de Vida Silvestre Oficio Núm SEMARNAT/UCPAST/UT/392319;
- SEMARNAT 2018-2019 Oficio Núm. SEMARNAT/UCPAST/UT/304/18. 29 enero 2018 y Oficio Núm. SEMARNAT/UCPAST/UT/2725/19. 20 Agosto 2019

SEMARNAT 2022 Oficio Núm. SEMARNAT/UCPAST/UT/676/2022 número de folio 330026722000581 16 de Marzo 2022

Sherbrooke, W. C. (1981). Horned Lizards. Unique Reptiles of Western North America. Southwest Park and Monuments Association, Arizona.

Sherbrooke, W. C. (2003). Introduction to horned lizards of North America (No. 64). Univ of California Press.

Sherbrooke, W. C. (2020). Current names: a guide to recent name changes of horned lizard species. *Sonoran Herpetologist*, 33, 4-10

Shiau, T.-W., Hou, P.-C., Wu, S.-H., & Tu, M.-C. (2006). A survey on alien pet reptiles in Taiwan. *Taiwania*, 51(2), 71–80.

Sinervo, B., Mendez-De-La-Cruz, F., Miles, D. B., Heulin, B., Bastiaans, E., Villagrán-Santa Cruz, M., ... & Sites, J. W. (2010). Erosion of lizard diversity by climate change and altered thermal niches. *Science*, 328(5980), 894-899.

Stringham, O. C., García-Díaz, P., Toomes, A., Mitchell, L., Ross, J. V., & Cassey, P. (2021). Reptile smuggling is predicted by trends in the legal exotic pet trade. *EcoEvoRxiv*. January 28. <https://doi.org/doi:10.32942/osf.io/t42fd>

St. John, A. 2002. Reptiles of the Northwest. Lone Pine Publishing, Renton, Washington.

Suárez-Rodríguez, O., Suárez-Varón, G., Chávez-Siles, F., Pérez-Arriaga, F., Andrade-Soto, G., Aguilar-Isaac, L. & Hernández-Gallegos, O. (2018). Masa relativa de la camada en *Phrynosoma orbiculare* (Squamata: Phrynosomatidae) en el Parque Estatal Sierra Morelos, Toluca, Estado de México. *Revista mexicana de biodiversidad*, 89(1), 282-289.

Sy, E. Y. (2015). Checklist of exotic species in the Philippine pet trade, ii. Reptiles. *Journal of Nature Studies*, 14(1), 66–93.

Tanner, W. W., & Krogh, J. E. (1973). Ecology of *Phrynosoma platyrhinos* at the Nevada test site, Nye County, Nevada. *Herpetologica*, 327-342.

Uetz, P., Freed, P. & Hošek, J. (eds.) (2020) The Reptile Database, <http://www.reptile-database.org>, accessed (Feb 10, 2020)

USCBP 2022 CBP Officers Find 43 Horned Lizards and 9 Snakes in and Under Man's Clothes. March 8, 2022. <https://www.cbp.gov/newsroom/local-media-release/cbp-officers-find-43-horned-lizards-and-9-snakes-and-under-man-s>

Young, K. V., Brodie Jr, E. D., & Brodie III, E. D. (2004). How the horned lizard got its horns. *Science*, 304(5667), 65-65.

Zamudio, K. R. (1998). The evolution of female-biased sexual size dimorphism: a population-level comparative study in horned lizards (*Phrynosoma*). *Evolution*, 52(6), 1821-1833.

Zamudio, K. R. & Parra-Olea, G. (2000). Reproductive mode and female reproductive cycle of two endemic Mexican horned lizards (*Phrynosoma taurus* and *Phrynosoma braconnieri*). *Copeia*, 2000, 222-229

Advertisements of *Phrynosoma sp.* offered for sale in the USA, Europe and Asia

exotic-supply [ご利用案内](#) | [お問い合わせ](#) 生体検索:

商品カテゴリ一覧 [ホーム](#) | [トカゲ > ヨロイトカゲ・ツノトカゲ・イワトカゲ](#) | [コリーマオオツノトカゲ](#) 完売しました

▼ [トカゲ](#) 商品詳細

- ▼ [トカゲ](#)
- ▼ [ヤモリ](#)
- ▼ [蛇](#)
- ▼ [トカゲ](#)
- ▼ [壁ガメ](#)
- ▼ [水棲ガメ](#)
- ▼ [ハコガメ](#)
- ▼ [カエル](#)
- ▼ [サラマンダー・イモリ](#)
- ▼ [虫](#)
- ▼ [奇虫](#)
- ▼ [中型大型インコ・オウム](#)
- ▼ [王リフレコウ](#)
- ▼ [小動物](#)



コリーマオオツノトカゲ 完売しました
販売価格は[お問い合わせ](#)ください。

学名: *Phrynosoma asio*
分布: メキシコ南部
全長: 20cm

2019年10月入荷

ツノトカゲの最大種! コリーマオオツノトカゲです!

ツノトカゲはトゲトゲしていてカッコいいのですが、

REPTILESNERITTERS



MEXICAN PLATEAU HORNED LIZARD ADULTS
PHRYNOSOMA ORBICULARE **\$219.99**



terro

商品検索

[商品カテゴリー一覧](#) [ご利用案内](#) [特定商取引法表示](#) [お問い合わせ](#) [メールマガジン](#) [リンク](#)

[ホーム](#) > [トカゲ](#) > [Phrynosoma braconieri](#)

Phrynosoma braconieri



Phrynosoma braconieri

販売価格: 178,000円(税別)

net.co.jp/?author=8)

こんばんは、蕨地です！

冬は苦手だけど年末の雰囲気は割と好きです（笑）

お待たせしました！ここ最近のトカゲの新作生体をドーン！

と紹介したいと思います！！＼(^o^)/

【新着生体】

・チワワヤマツノトカゲ(*Phrynosoma orbiculare orinetale*)

トゲトゲしたお精進のような姿が愛らしい(≡∇≡)b

メキシコの山岳地帯に棲む中型ツノトカゲ。妙に小綺麗で背中にあるマーキングもありますが、なんと、この個体CBなんです！！！

胎生なのでこの姿のまま生まれるそうです！全く想像が付きません（笑）

野生下ではアリなどを食べているそうですが、コオロギでも飼育は可能です。

一瞬でひびッとエサを食べる姿は早速見て飼育者しか見ることが出来なそうです！<





Sponsors » Breeders | Dealers | Importers/Exporters | Caging | Feed | Supplies | Services | Events
 Inside FaunaClassifieds » Product Reviews | Classifieds! | Photo Gallery | Banner Advertising

Herpstats, Helix & Zilla Thermostats at The Bean Farm

Do you want to be able to bump and highlight your classified ads? Click here!

FaunaClassifieds > Reptile & Amphibian - Classifieds > Lizards For Sale/Wanted > Other Lizards
 Giant Horned Lizards

Welcome,
 You last visit
 Your Notice

User CP FAQ Trader Ratings Members List Calendar New Posts Search Quick Links



Post Reply

Thread Tools Search this

11-14-2020, 03:22 AM

Cjhermosillo
 Registered User

Join Date: Feb 2018
 Location: Santa Ana, CA
 Age: 25
 Posts: 4
 Name: Christopher Hermosillo

Trader Rating: (0)

Giant Horned Lizards

Phrynosoma asio are the best starter horned lizard of them all. They eat a variety of foods just like any other species of small lizard. They requirements in their diet too of all **phrynosoma**, and fare decently for long periods without them. I give mine ants every month or so if tl maintained asio for over three years with this style of diet and got eggs last year. Give them lots of water and humidity too, daily misting is species. I am letting go 1.2 for \$1500, only because they are in pristine shape. Usually any **phrynosoma** come in as imports and are ema when you see them available. I have hand fed and outdoor raised mine in an ideal enclosure in a perfect southern california climate for the these asio are WELL established. Im happy to provide any answers to questions you may have about their care. Feel free to message me o cjhermosillo@yahoo.com

Giant Horned Lizards - FaunaClassifieds





This ad space is available

[Click here for info](#)

[Sponsors](#) | [Breeders](#) | [Dealers](#) | [Importers/Exporters](#) | [Caging](#) | [Feed](#) | [Supplies](#) | [Services](#) | [Events](#)
[Inside FaunaClassifieds](#) | [Product Reviews](#) | [Classifieds](#) | [Photo Gallery](#) | [Banner Advertising](#)

[Herpstats, Helix & Zilla Thermostats at The Bean Farm](#)

[Do you want to be able to bump and highlight your classified ads? Click here!](#)

[FaunaClassifieds](#) > [Reptile & Amphibian - Classifieds](#) > [Lizards For Sale/Wanted](#) > [Other Lizards](#)
L [For Sale] **Giant horned lizard (Phrynosoma asio)**

Welcome, [atomichawaii](#)
You last visited: 04-08-20
[Your Notifications: 1](#)

[User CP](#) | [FAQ](#) | [Trader Ratings](#) | [Members List](#) | [Calendar](#) | [New Posts](#) | [Search](#) | [Quick Links](#)

UQ mobile
データがかしこく使えるUQ学割

[Post Reply](#)

[Thread Tools](#) | [Search this Thread](#)

02-15-2019,
03:33 AM

[animal-house](#)
The Reptile Man

Join Date: Nov 2014
Location: Mukwonago Wisconsin
Posts: 137
Name: Daniel Thomas
Trader Rating: (0)

Giant horned lizard (Phrynosoma asio)

We have 2.2 Giant horned lizards that are available. These are **Phrynosoma asio**, the Mexican Giant Horned, not the small Texas/Arizona/Call on have been in our care for almost 6 months now.

These guys are taking crickets & roaches dusted in calcium and formic cal plus along with occasional ants as well. Very hard to get established on other than ants, so the hard work is done for you already.

Keep hot & dry & offer food daily. Basking temps kept at 120-130F. Soaked once every other week just to ensure staying hydrated otherwise no source given.

\$700 for 1 pair
\$1200 shipped for both pairs.
No single animals.

- All animals are plus shipping unless otherwise indicated.
- Shipping is FEDEX via Reptiles2You
- Live arrival is guaranteed as long as temps are between 40-85F and received first delivery attempt.
- Must be held at HUB if above 85 or below 40 degrees.
- Any problems need to be reported within 2 hours of receiving.
- We are not responsible for delays due to conditions out of our control.
- Paypal or credit cards accepted for payment.
- Please contact via PM, phone, or email for quickest responses.





Cart: RM0.00 (<https://exoreptiles.com/my/cart/>)

<https://exoreptiles.com/my/>

GIANT HORNED LIZARD (PHRYNOSOMA ASIO)

[Return to Previous Page](#)

[Home](https://exoreptiles.com/my/) / [Live pet](https://exoreptiles.com/my/product-category/live-pet/) / [Lizards](https://exoreptiles.com/my/product-category/live-pet/lizards-live-pet/) / [Giant Horned Lizard \(Phrynosoma asio\)](#)



<https://www.got reptiles.com/horned-toad-lizard-small.html>

Horned Toad Lizard (adults)



\$149.99

Search Lizards

I'm searching for Ich suche
1.2 Phrynosoma asio
1.2 Phrynosoma

I'm searching for
Ich suche

1.2 Phrynosoma asio
1.2 Phrynosoma solare

🕒 11 months ago
📍 1234AA Holland 

Roy Achternaam 

Search Lizards

Looking for:
Phrynosoma
platyrhinos
Brachylophus fasciatus
live in
Sw

Looking for:
Phrynosoma platyrhinos
Brachylophus fasciatus
live in Sweden so hopefully transport can get fixed!

Search Lizards

Sauromalus ater carrot tail
Phrynosoma modestum

🕒 3 months ago
📍 716XX Landkreis
Ludwigsburg 

S. J. 



Sell Lizards

Phrynosoma asio NZ11 / 2020

3,0 Phrynosoma asio NZ11 / 2020

1,0 Phrynosoma asio NZ /2018

3 weeks ago

Jakub Bříza

330 17 Chotíkov 358



Search Lizards

Search for 1,0 Phrynosoma goodei

I'm looking for male phrynosoma goodei for my adult female.

3 weeks ago

Tomas Pes

30100 Plzeň