

AN INTRODUCTION TO THE HERPETOFAUNA OF MAINLAND SONORA, MÉXICO, WITH COMMENTS ON CONSERVATION AND MANAGEMENT

JAMES C. RORABAUGH, U.S. Fish and Wildlife Service, 201 N. Bonita Ave, Suite 141, Tucson, AZ 85745

ABSTRACT

Based on collections and published reports, the herpetofauna of mainland Sonora, México, includes 37 amphibian and 139 reptile species. An additional two amphibian and five reptile species have been taken very near the Sonoran border in contiguous habitats in Arizona, Chihuahua, or New Mexico, and almost certainly occur in Sonora, as well. This compares to 15 amphibian and 95 reptile species documented in the last summary of Sonora's herpetofauna, published in 1945. Five taxa have been introduced, and one species is known to have been extirpated from Sonora. Seventy-three (40%) of Sonora's amphibian and reptile species are given special status under México's *Lista de Especies en Riesgo* or the IUCN's Red List. Although some of the species probably do not warrant special status in Sonora, substantial threats to amphibians and reptiles in general are widespread. Sonora's sea turtles and ranid frogs are particularly imperiled. Despite these threats, there are significant opportunities for conservation, and agencies and non-governmental organizations are making good progress on several fronts to protect amphibians and reptiles, and their habitats.

INTRODUCTION

In 1945, Charles Bogert and James Oliver published *A Preliminary Analysis of the Herpetofauna of Sonora* in which they described collections of 15 species of amphibians, 9 turtle and tortoise species, 38 species of lizards, and 48 species of snakes from Sonora, México. This important, seminal work was based on collections in 1941-1942 made in the Alamos and Güirocoba areas of southeastern Sonora, as well as analysis of collections made elsewhere in the state, including specimens obtained by Edward H. Taylor (see Taylor 1938) and other pioneering herpetologists of the early 20th and late 19th centuries. Bogert and Oliver (1945) noted a general paucity of herpetological knowledge in Sonora and surmised that their checklist included no more than two-thirds of the species present. Others subsequently made additional, significant contributions to our knowledge of Sonora's herpetofauna. Most notably, Charles H. Lowe, Jr., former professor at the University of Arizona, assisted Bogert and Oliver in the field in the early 1940s and inspired two generations of students to explore and advance the field of herpetology in Sonora. In recent years, Julio Lemos Espinal, Hobart Smith, and their colleagues have made important discoveries in eastern Sonora, while Erik Enderson and Robert Bezy's work on the Highway 16 "transect" east of Hermosillo have extended the ranges of several tropical species. Although much collecting and study have occurred since 1945, no comprehensive works, field guides, or checklists describing Sonora's herpetofauna have been published, and in that regard, Sonora lags behind its neighboring states of Baja California (Grismer 2002), Chihuahua

(Lemos-Espinal et al. 2004, Lemos-Espinal and Smith in press), and Sinaloa (Hardy and McDiarmid 1969).

Much has changed since Bogert and Oliver (1945) described Alamos as a town of 3,000 inhabitants, accessible only by "a route that is all but impassable during the rainy season." They would likely be surprised by present-day Alamos, which has evolved into a cultural center and ecotourism destination for bird watchers, botanists, and amateur herpetologists that come to the area to experience the New World tropics within a day's drive of Tucson and Phoenix. Bogert and Oliver probably would not recognize the bustling, urban centers of Hermosillo, Ciudad Obregon, and Nogales, as well as the extensive agriculture on the southwestern coastal plain, and the tourist towns of Puerto Peñasco, Bahía Kino, and San Carlos. With these and other changes has come a growing recognition that elements of the natural world, including many amphibians and reptiles, are imperiled. This paper provides an introduction to the amphibians and reptiles of mainland Sonora for those interested in species' identification, distributions, and ecology, but it also attempts to build a conservation context and information base for land managers and conservationists in the hopes of facilitating the protection and maintenance of Sonora's amphibians and reptiles and their habitats.

METHODS

The checklist of amphibians and reptiles of mainland Sonora (Table 1) and discussions of conservation and management herein were compiled from personal knowledge, published and unpub-

lished studies, books, museum collections, and communications with others working in Sonora. Supporting literature for the checklist included major works on the herpetofauna of México (e.g., Smith and Taylor 1966, Flores-Villela 1993, Ochoa-Ochoa and Flores-Villela 2006), regional works (e.g., Heringhi 1969, González-Romero and Alvarez-Cárdenas 1989, Schwalbe and Lowe 2000, O'Brien et al. 2006, Rosen 2007, Rorabaugh in press), treatments of species groups (e.g., Rossman et al. 1996, Duellman 2001, Sherbrooke 2003, Campbell and Lamar 2004, IUCN et al. 2004), and many species- or locality-specific accounts and studies. However, the literature cited herein is not intended to be a comprehensive listing of herpetological studies or publications relevant to Sonora. Table 1 reflects all pertinent species accounts in the *Catalogue of American Amphibians and Reptiles*, and geographical notes and articles in *Herpetological Review* (all issues reviewed through June 2007).

Examination of collection data for the 9,150+ specimens from Sonora in the University of Arizona herpetology collection (UAZ) was invaluable in clarifying species' distributions and presence. Information in Table 1 also reflects collection data and specimens at the American Museum of Natural History (AMNH); Arizona State University herpetology collection (ASU); Bishop Museum of Natural History (BMNH); California Academy of Science (CAS), including Stanford University collections (SU); Cornell University Museum of Vertebrates (CUMV); the Field Museum of Natural History (FMNH); Harvard University Museum of Comparative Zoology (MVZ); Los Angeles County Museum (LACM); Louisiana State University Museum of Natural History (LSUMZ); Michigan State University Museum (MSUM); Museo de Zoología, Universidad Nacional Autónoma de México (UNAM); Museum of Vertebrate Zoology (MVZ); National Museum of Natural History (USNM); Royal Ontario Museum (ROM); San Diego Natural History Museum (SDNHM); Slater Museum of Natural History (PSM); University of Colorado Museum at Boulder (UCM); University of Kansas Natural History Museum (KU); University of Michigan Museum of Zoology (UMMZ); University of Texas at Arlington (UTA); University of Texas at Austin (TNHC), and University of Texas at El Paso (UTEP). Databases available on HerpNet <www.herpNet.org> also provided lists of specimens but not specific locality data for the following museums: Brigham Young University (BYU), Monty L. Bean Life Science Museum (BYUH), Florida Museum of Natural History (FLMNH), Illinois Natural History Survey (INHS), and University of Illinois Museum of Natural History (UIMNH).

The following persons provided information about species' distributions, habitat use, or other information: Randy Babb, Peggy Turk Boyer, George Bradley, Charles Conner, David Dickey, Eric Dugan, Erik Enderson, José Rafael Campoy Favela, Richard Feeney, Aaron Flesch, Carl Franklin, Anny Peralta García, Stephen Hale, Wendy Hodges, Andy Holycross, Randy Jennings, Thomas Jones, Mariko Kageyama, Howard Lawler, Julio Lemos Espinal, Brent Martin, Stephanie Meyer, Charles Painter, Ami Pate, Bill Radke, Ian Recchio, Ramses Rodriguez, Georgina Santos Barrera, Martha M. Gómez Sapiens, Cecil Schwalbe, Jeffrey Seminoff, Hobart Smith, Ángel Soto Centeno, Sally Stefferud, Kenneth Tighe, Tom Van Devender, and Robert G. Webb. Julio Lemos Espinal provided in depth review and comment on Table 1, unpublished data and manuscripts, and many common names used in Sonora. Sherry Barrett, Erik Enderson, George Ferguson, Stephen Hale, Georgina Santos Barrera, and Tom Van Devender reviewed drafts of this paper, provided valuable comments and suggestions, and shared unpublished data and observations.

RESULTS AND DISCUSSION

The Checklist

Table 1 lists 39 amphibian and 144 reptile species for mainland Sonora, their scientific and common names, habitats in which species are found, and notes on descriptions, distribution, habits, conservation status, and other topics. Marine species that can be observed on or from the Sonoran coast are included, but island species of the Gulf of California are not (see Grismer 2002 for descriptions of these species). Scientific names for species occurring in the United States mostly follow Crother et al. (2000, 2003). Common names for Arizona species follow Brennan and Holycross (2006), which are largely taken from Crother et al. (2000, 2003). Common names of other species occurring in the U.S. follow Crother et al. (2000, 2003). Names of species occurring entirely outside of the U.S. generally follow Liner (1994) as updated by Liner (1996) and Flores-Villela and Canseco-Márquez (2004). However, many of Liner's (1994, 1996) common names are not widely used in Sonora, where amphibians and reptiles are often known by local names that vary regionally, and the same name may be used for a group of similar species. Where I knew of common names used in Sonora, they are included in Table 1 (see Bogert and Oliver 1945, Zweifel and Norris 1955, Schwalbe and Lowe 2000, Grismer 2002, Secretaría de Medio Ambiente y Recursos Naturales 2002, Nabhan 2003, and Camp-

bell and Lamar 2004 for additional Spanish common names). Scientific names vary from the above authors for newly described species, cases in which subspecies have recently been elevated to species status, and other recent taxonomic revisions. For example, the checklist uses the genus name “*Plestiodon*” for skinks (Brandley et al. 2005) and “*Craugastor*” for Sonoran barking frogs (Crawford and Smith 2005), and follows Mulcahey et al. (2006) regarding the taxonomy of the Sonoran horned lizard (*Phrynosoma goodei*), Faivovich et al. (2005) for the lowland burrowing treefrog (*Smilisca fodiens*) and dwarf Mexican treefrog (*Tlalocohyla smithii*), Smith et al. (2005a) for the file-tail ground snake (*Procinura aemula*), and Peters and Orejas-Miranda (1970) for Clifton's lizard eater (*Mastigodryas cliftoni*). Nomenclature changes for amphibians as proposed by Frost et al. (2006) are not reflected in the checklist, as the scientific community has not yet had time to evaluate those proposals. For this same reason, Collins' (2006) reclassification of snake families was also not adopted. Unresolved taxonomic issues are noted in the third column of Table 1.

Included in Table 1 are seven species that likely occur or occurred historically in Sonora, but for which no museum specimens or published accounts are known. All occur just outside of Sonora in contiguous habitats (Plains spadefoot, *Spea bombifrons*; Plains leopard frog, *Rana blairi*; shortnose skink, *Plestiodon brevirostris*; red-backed whiptail, *Aspidoscelis xanthonota*; New Mexico threadsnake, *Leptotyphlops dissectus*; Plains black-headed snake, *Tantilla nigriceps*; and massasauga, *Sistrurus catenatus* [see Degenhardt et al. 1996, Campbell and Lamar 2004, Lemos-Espinal et al. 2004, Brennan and Holycross 2006]). Stephanie Meyer (pers. comm. 2005) reported loud, chirping geckos from a hotel in Navojoa that may be the common house gecko (*Hemidactylus frenatus*), a widely introduced species in the tropics; however, that report has not been investigated and the species was not included in the checklist. The status of the marbled toad (*Bufo marmoratus*) in Sonora is unresolved, as well. UNAM contains six Sonoran specimens labeled as marbled toads – three from 43 km southeast of Alamos, and three from near San Nicolás on Highway 16. In 2006, George Ferguson (pers. comm.) reported three toads that may have been this species in Arroyo Santa Bárbara, approximately 24 km east of Alamos. However, the marbled toad can be easily confused with juvenile cane toads (*Bufo marinus*) and Sinaloa toads (*B. mazatlanensis*), and thus is not included in Table 1. Specimen LACM 65154, which was until recently labeled as a marbled toad from southeastern Sonora,

was actually a misidentified juvenile cane toad (R Feeney, pers. comm. 2006).

Habitats in the second column of Table 1 correspond to biotic communities. “Highlands” refers to Chihuahuan Desertscrub/grasslands and/or oak-pine forests and woodlands depicted in Figure 1. Conservation status of species according to the World Conservation Union (IUCN) Red list and the “Lista de Especies en Riesgo” (Secretaría de Medio Ambiente y Recursos Naturales 2002) is provided in the third column.

It is beyond the scope of this paper to provide keys, descriptions, or photographs of all 183 amphibian and reptile species in Table 1. However, photographs of 144 Sonoran species shared with Chihuahua and/or Arizona can be found in Lemos-Espinal et al. (2004) and Brennan and Holycross (2006), respectively. Additionally, keys to all species present in Chihuahua are presented in Lemos-Espinal et al. (2004), and Brennan and Holycross (2006) include brief descriptions of each Arizona species. Photographs, descriptions, keys, and species accounts for all five marine turtles and the yellow-bellied sea snake (*Pelamis platurus*), as well as other species found in Baja California and islands of the Gulf of California can be found in Grismer (2002). Together, these three readily available documents contain photographs and descriptions of 154 of the 183 species in Table 1. Appendix 1 contains photographs of nine more species not found in these references, as well as images of other representative Sonoran amphibians and reptiles. In the first column of Table 1 the reader is referred to recent and available literature that contain photographs, descriptions, or keys for most species; and also indicate if a photo is included in Appendix 1. For the remaining species, the third column of Table 1 provides comparisons to similar taxa and brief descriptions that should be useful for preliminary field identifications. More comprehensive descriptions, keys, and photographs can be found in Smith and Taylor (1966), Hardy and McDiarmid (1969), Iverson (1992), Degenhardt et al. (1996), Rossman et al. (1996), Duellman (2001), Sherbrooke (2003), Stebbins (2003), Van Devender and Ferguson (2003), Campbell and Lamar (2004), images at <<http://www.desertmuseum.org/center/research.php>>, and other references listed in the Literature Cited herein.

Consistent with the predictions of Bogert and Oliver (1945) that their list of 110 species was likely no more than two-thirds of the actual herpetofauna, the checklist in Table 1 contains 183 species, 176 of which have been confirmed with specimens and/or published accounts. Although access to remote locations is now far better, and much work has occurred since Bogert and Oliver's (1945) classic

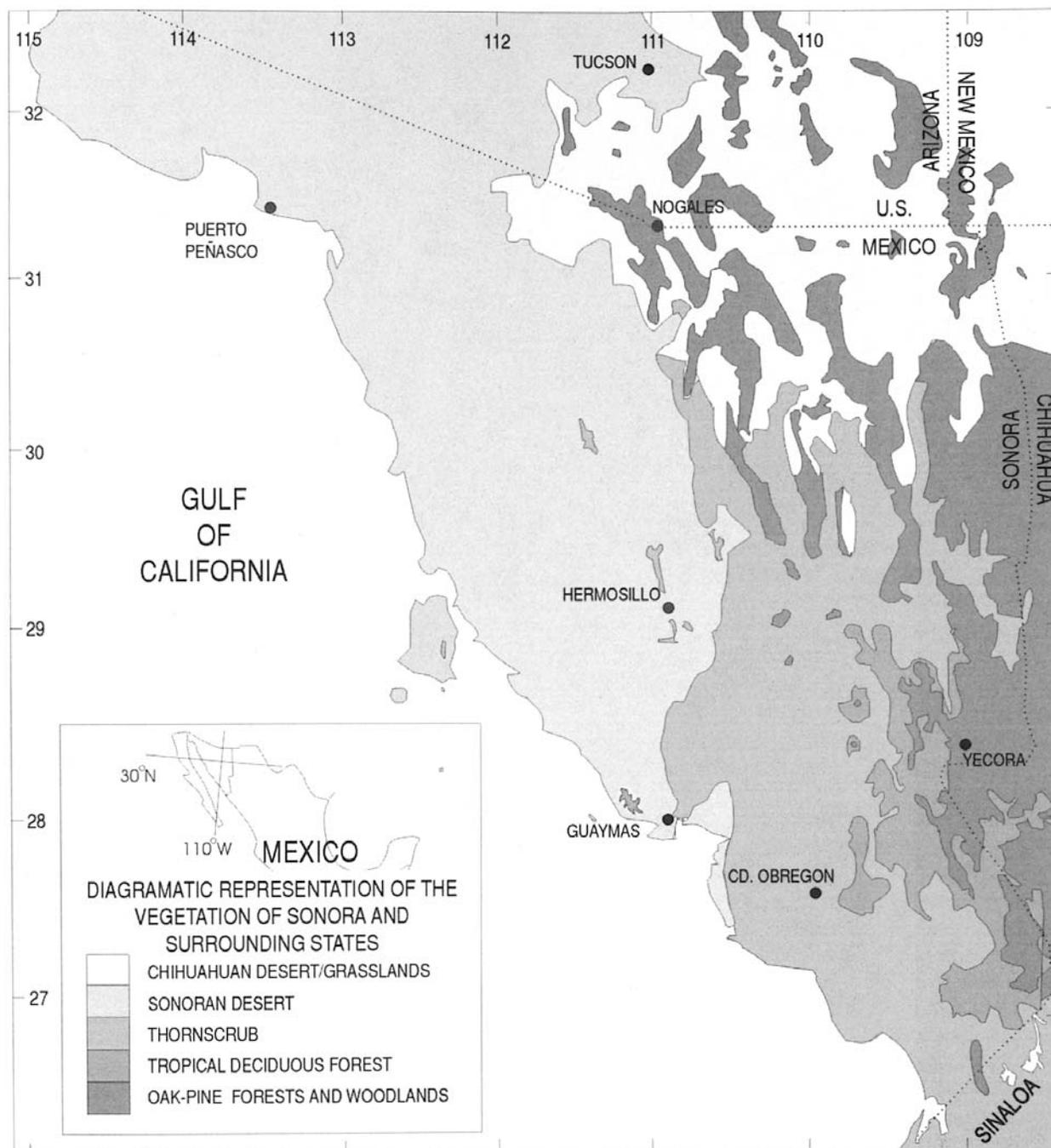


Figure 1. Vegetation communities of Sonora and adjacent areas. Drawn by Alberto Búrquez Montijo.

preliminary herpetofauna was published, many areas of Sonora are still poorly explored herpetologically. As more field and taxonomic work is conducted, numbers of species will no doubt continue to grow and distributions will change from those portrayed in Table 1. In addition, there are likely museum collections not examined herein that would improve information in Table 1. As a result, this paper is no more than an introduction to the herpetofauna of Sonora. A comprehensive description of

Sonora's amphibians and reptiles will have to wait until further work can be conducted.

Conservation and Management

Table 1 reveals that 73 (40%) of Sonora's 183 amphibian and reptile species are ascribed special status on either México's "Lista de Especies en Riesgo" or the IUCN's Red List. Some are included on these lists because of threats elsewhere within

their ranges, and although from that broader perspective they may warrant special status, in Sonora these species may be fairly secure. Examples include the zebra-tailed lizard (*Callisaurus draconoides*), common kingsnake (*Lampropeltis getula*), coach-whip (*Masticophis flagellum*), and the larger rattlesnakes as well as the sidewinder (*Crotalus cerastes*). In Sonora, these species are well-represented within their ranges and their populations are fairly robust to various kinds of human disturbance. Many of these are “Pr” species, which is a category on México's list indicating possible threat, but not enough information is available to categorize the species as threatened or endangered. Two Pr species, the Río Grande leopard frog (*Rana berlandieri*) and spiny softshell turtle (*Apalone spinifera*), are only represented as introduced species, and in Sonora do not warrant protection. The tiger salamander, listed as Pr, occurs as both a native subspecies (*Ambystoma tigrinum stebbinsi*) only known in Sonora from Rancho Los Fresnos northwest of Cananea, and an introduced subspecies (*A. t. mavortium*) in the Arizona/Sonora borderlands. Protection of the introduced form is also not warranted.

Other species not provided special status may deserve such status in Sonora. The narrow-headed and West Coast gartersnakes (*Thamnophis rufipunctatus* and *T. valida*, respectively) are both aquatic habitat specialists that could be affected by introduction of non-native fishes or other potential predators. The montane streams where the narrow-headed gartersnake occurs have been impacted by logging, while the coastal habitats of the West Coast gartersnake have been largely converted to agriculture. Another sensitive species, the sheep frog (*Hypopachus variolosus*), was eliminated from one of very few sites known in Sonora when its breeding pond west of Alamos was altered by chicken farming operations (Schwalbe and Lowe 2000). Sheep frogs have only been observed at a single locality in recent years. The Sonoran green toad (*Bufo retiformis*) has likely declined due to drought and conversion of desert lands to agriculture (Santos-Barrera and Pacheco-Rodríguez 2004). If the Plains leopard frog exists in northeastern Sonora, then based on its declining status in Arizona, it should probably be considered a special status species in Sonora, as well.

Five taxa in Table 1 are intentional or accidental introductions and additions to Sonora's herpetofauna (barred tiger salamander, *Ambystoma tigrinum mavortium*; Río Grande leopard frog; American bullfrog, *Rana catesbeiana*; spiny softshell turtle; and Mediterranean gecko). Only one species has likely been extirpated from the state in recent times – the American crocodile (*Crocodylus acutus*)

occurred on the coast as far north as the mangrove lagoon at Punta Sargento, and possibly on occasion to the Río Colorado delta (Mead and Baez 2003). It was last observed in January 1973 in El Ciego estuary near Guaymas (Navarro 2003). American crocodiles were presumably extirpated due to habitat destruction (Mead et al. 2006) and probably hunting.

Sea turtles stand out as a particularly threatened group. All five of Sonora's sea turtles are listed as in danger of extinction by the Mexican government and as endangered or critically endangered on the IUCN's Red List. All have declined substantially off the coast of Sonora. A long history of harvesting turtles as well as incidental catch in fish and shrimp nets and longlines in the Gulf of California have contributed to that decline (Seminoff and Nichols 2007). But threats to sea turtles in the Gulf are only part of the conservation context of these populations, because all five species breed exclusively or largely on beaches as far away as southern México and Japan (Resendiz et al. 1998, Seminoff and Nichols 2007). When they leave the Gulf, Sonora's sea turtles die from pollution-related disease; intentional harvest for food, aphrodisiacs, and the jewelry and souvenir industry; incidental capture in nets; boat strikes; destruction or disturbance of beaches where sea turtles nest; ingestion of trash and debris; and predation of nests by people and dogs. Nets of shrimp trawlers can be particularly efficient at catching and drowning sea turtles in the Gulf, but turtle excluder devices are now required on all trawlers. Shrimp aquaculture on the coast is an increasingly popular alternative to catching wild shrimp; over 100 shrimp farms exist on about 24,000 ha of the Sonoran coast. Although not yet documented in Sonora, pollution from shrimp farms is thought to kill sea turtles in the Mediterranean Sea.

In 1991 all sea turtles in México and its waters were protected by presidential decree; however, the law is difficult to enforce. Some intentional harvest of turtles still occurs despite the law, and some trawlers are probably still operating without turtle excluder devices (Grismer 2002, Nabhan 2003, Seminoff and Nichols 2007). For such prohibitions to be effective, an understanding of the need for conservation must be promoted at the community level. Several organizations and groups are working to develop community-based conservation programs targeting sea turtles and other imperiled species of the Gulf of California. An example can be found on the north-central Sonoran coast, where sea turtles have played an important role in the diet, legends, songs, and cultural identity of the native Seri (Coomcáac) people. The Seri recognize sea turtles are declining and that their extinction would represent a great cultural loss. With the help of Drs. Gary

Nabhan and Jeffrey Seminoff, and staff from the Arizona-Sonora Desert Museum, the Seri have recruited local fisherman and villagers into sea turtle conservation (see Nabhan 2003). A training session co-taught by biologists and Seri elders for Seri youth “para-ecologists” introduced conservation techniques and simple monitoring protocols to promote conservation of Sonora’s sea turtles. On the Baja peninsula, Grupo Tortuguero de las Californias – an alliance of communities, fishing cooperatives, NGOs, tourism outfitters, scientists, government agencies, and others – is also working to promote the ecological, economic, and cultural role of sea turtles in the Gulf of California. In the upper Gulf, CEDO (El Centro Intercultural de Estudios de Desiertos y Océanos), located in Puerto Peñasco, and staff at the Reserva de la Biósfera Alto Golfo de California y Delta del Río Colorado, conduct public and community outreach to promote conservation of sea turtles and other sensitive resources. Efforts such as these can contribute significantly to a global sea turtle conservation program, which is needed to ensure the continued existence of these species in the Gulf of California and elsewhere. Seminoff and Nichols (2007) are cautiously optimistic that sea turtles can be successfully conserved in the Gulf of California, and believe that populations off the coast of Sonora may be slowly recovering.

Another particularly threatened group is the native ranid frogs, including most leopard frogs, the Tarahumara frog (*Rana tarahumarae*), and cascade frog (*R. pustulosa*). The endangerment of the group is due largely to their dependence on permanent or nearly permanent water, which in an arid land such as Sonora is invariably used or altered by human activities. Native ranid frogs are particularly vulnerable to predation by introduced species, such as the American bullfrog, sport fishes, and crayfish (*Orconectes virilis* and *Procambarus clarkii*). The apparent disappearances of lowland leopard frogs (*R. yavapaiensis*) from the Río Colorado and lowland and Chiricahua (*R. chiricahuensis*) leopard frogs from the Río San Pedro are probably largely due to these introduced predators. Ranid frogs have also been affected by a fungal skin disease – chytridiomycosis or “Bd” – which may have been spread around the globe by introductions of infected African clawed frogs (*Xenopus laevis*; Weldon et al. 2004). In Sonora, the disease has been documented in several populations of Tarahumara frogs, as well as lowland and northwest México (*R. magnaocularis*) leopard frogs, and the cascade frog (Hale et al. 2005), and it has likely been a primary cause in some declines and disappearances of these and other ranid frog populations. Wetlands are often the ultimate sinks for a variety of environmental contaminants,

and amphibians in general are sensitive to pollution. Until recently, airborne pollution from copper smelters in southeastern Arizona and northeastern Sonora resulted in acidic rainfall and high levels of cadmium that may have been toxic to Tarahumara frogs and other ranid frogs, and may have made frogs more susceptible to disease (Hale et al. 1995, 2005). These smelters are now closed or are equipped with pollution control scrubbers, so this threat should be waning. Toxins in agricultural chemicals used in the Río Colorado valley, in the extensive agricultural fields in southwestern Sonora, and elsewhere, likely affect some species, as well. Declines of ranid frogs are occurring within the context of a global loss of amphibian biodiversity that has become very apparent over the last 15 years (Stuart et al. 2004). The status of amphibians in general, but particularly highly aquatic forms, should be monitored closely in Sonora. Declines of amphibians may serve as an indicator of environmental degradation that could affect a variety of species, including Sonora’s human inhabitants.

Livestock grazing is probably the most widespread human use of Sonora’s landscapes. Grazing by cattle, goats, and other livestock has reduced vegetation cover and helped change grasslands to shrublands. Rangelands are often heavily grazed, with effects particularly apparent during drought. In some areas of northeastern Sonora, it is estimated ranchers run as many as two to five times as many cattle as their ranges can support in the long term (Walker and Pavlakovich-Kochi 2003). The effects of overgrazing are many, but precisely how amphibians and reptiles are affected is poorly studied. A study in Arizona showed that the number of lizard species and abundance of lizards declined significantly in heavily grazed areas (Jones 1981). Species dependant upon wetlands, streams, rivers, and ponds can be especially affected because cattle often congregate near water, trampling and eating streamside vegetation, and fouling water quality. In recent decades, ranchers have embarked on a campaign to improve rangelands by planting buffelgrass (*Pennisetum ciliare*), which was imported from Africa or the Middle East. These habitat conversions, coupled with subsequent fires that buffelgrass fuels, destroy native plant communities and are changing vast areas of Sonoran Desert, thornscrub, and to a lesser extent, tropical deciduous forest, into open African-like savannas. Buffelgrass has invaded more than two-thirds of Sonora, and 1.6 million ha may have been deliberately cleared and seeded with the species (Búrquez-Montijo et al. 2002). Again, although the effects on Sonora’s herpetofauna have not been well-studied; many species are probably adversely affected; especially arboreal lizards and

snakes, but also those not adapted to fire such as the desert tortoise (*Gopherus agassizii*). In addition, dense stands of buffelgrass may impede the movement of some species, such as horned lizards (*Phrynosoma*).

A variety of other human activities affect Sonora's herpetofauna. Conversion of much of the southwestern coastal plain, an area southeast of Bahía Kino, and the Río Colorado Valley to agriculture has benefitted a few species, including some amphibians, but much of the reptile fauna and several amphibian species have been eliminated from these areas. A few, mostly habitat generalists such as common kingsnakes and gophersnakes (*Pituophis catenifer*), persist in good numbers in agriculture. Mining has caused localized severe impacts to habitats in some areas, such as the copper mines at Cananea, and revisions to Mexican mining laws in 1992 made it simpler and less expensive for mining companies, including foreign firms, to operate in Sonora. Logging in the Municipio de Yécora increased dramatically after the completion of México 16, and by 2003, most of the commercial timber had been cut in the Yécora area (Van Devender and Ferguson 2003). Most of the wooded, higher montane areas of Sonora are too difficult to access for commercial logging, but that could change in the future if new roads are constructed. Finally, many people in Sonora are superstitious or have unfounded fears of amphibians and reptiles, and many animals are killed indiscriminately.

Although human activities are affecting Sonora's herpetofauna, in many ways habitats are less altered than in neighboring Arizona, where non-native predators are comparatively numerous, diverse, and widespread; most major rivers are dammed or dried up; and forests are subject to catastrophic fire due to climate change coupled with a long history of fire suppression that has led to a build up of woody fuels. Significant opportunities exist in Sonora for working with landowners, ejidatarios, communities, conservation organizations, government agencies, and others to build

support for amphibian and reptile conservation before problems such as those in Arizona fully manifest. Protected areas, such as the El Bosque Nacional y Refugio de Vida Silvestre Los Ajos-Bavispe, which covers eight mountain ranges in northeastern Sonora, the Reserva de la Biósfera Alto Golfo de California y Delta del Río Colorado, Reserva de la Biósfera Pinacate y Gran Desierto de Altar, El Área de Protección de Flora y Fauna Sierra de Alamos- Río Cuchujaqui, and others can be key to protecting Sonora's herpetofauna and other flora and fauna (Solís-Herrera 2000, Búrquez and Martínez-Yrizar 2007). However, designation of such areas needs to be followed up with development and implementation of management plans, working with landowners and ejidatarios within and near the reserves, and staffing the reserves adequately to implement plans, monitor species and habitats, and provide enforcement. In most protected areas much work is yet to be done.

There is a growing awareness of the special nature of Sonora's remarkable herpetofauna and the need to protect this legacy. The conservation work of state (CEDES - La Comisión de Ecología y Desarrollo Sustentable del Estado de Sonora) and federal (e.g. CONANP - La Comisión Nacional de Áreas Naturales Protegidas) agencies, and non-governmental organizations such as BIDA (Biodiversidad y Desarrollo Armónico), Naturalia, Pronatura, The Nature Conservancy, and others, is gaining momentum, and there is reason to be optimistic about maintaining Sonora's herpetofaunal biodiversity. As with the successful initial work with sea turtle conservation, a critical need is to work with local communities, ejidatarios, and landowners to foster conservation values for amphibians and reptiles, whether those values be economic or cultural. If the people of Sonora see value in conserving amphibians and reptiles, then maintaining herpetofaunal biodiversity into the future will become a much easier goal to achieve.

Table 1. Checklist of the amphibians and reptiles of mainland Sonora, México. Status is given according to México's "Lista de Especies en Riesgo" (Norma Oficial Mexicana NOM-059-ECOL-2001), including *P* = in danger of extinction, *A* = threatened, and *Pr* = species of special protection; but also according to the IUCN's Red List, including *CR* = critically endangered, *EN* = endangered, *VU* = vulnerable, *NT* = near threatened, and *LR/nt* = low risk, near threatened.

Scientific (Common) Names References	Habitat	Descriptions, Distribution, Status, and Other Notes
AMPHIBIANS		
AMBYSTOMATIDAE		
<i>Ambystoma rosaceum</i> (Tarahumara salamander, Salamandra Tarahumara, Ajolote) Photos and keys in Lemos-Espinal et al. (2004).	Highlands; thornscrub (marginal)	Montane streams, pools, and impounded springs in the Sierra el Pinito east to the Sierras de los Ajos, el Tigre, and San Luis; and south at least to the Sierra Sahuaribo E of San Bernardo (G. Ferguson, pers. comm. 2006). Larvae mottled with black on a cream or yellow background. Status = Pr
<i>Ambystoma tigrinum</i> (Tiger salamander, Salamandra tigre, Ajolote) Photo, descriptions and keys in Degenhardt et al. (1996). Photos and descriptions in Brennan and Holycross (2006).	Sonoran Desert; highlands	Known from the Los Fresnos Ciénega NW of Cananea (S. Stefferud, pers. comm. 2006), where it is presumably native. An introduced subspecies occurs elsewhere in the Northeast near the Arizona border and has also been collected at the Pozo Municipal, Puerto Peñasco. Larvae olive or tan colored with no dark markings. Status = Pr
PLETHODONTIDAE		
<i>Pseudoeurycea bellii</i> (Bell's false brook salamander, Tlaconete pinto) Keys in Lemos-Espinal et al. (2004).	Highlands	In Sonora, known only from moist coniferous forest near Rancho El Puerto WSW of Yécora. May occur elsewhere in eastern mountains. Status = A, VU
BUFONIDAE		
<i>Bufo alvarius</i> (Sonoran Desert toad, Sapo grande, Sapo verde) Photo in Appendix A. Photos, descriptions and keys in Degenhardt et al. (1996) and Grismer (2002). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; uncommon in tropical deciduous forest and highlands	This large toad is found throughout most of Sonora except for the arid western Gran Desierto and higher eastern mountains. May be extirpated from Río Colorado. Breeds in permanent water as well as ephemeral rain pools and cattle tanks in summer.
<i>Bufo cognatus</i> (Great Plains toad, Sapo, Sapo de las Grandes Planicies) Photos, descriptions and keys in Degenhardt et al. (1996) and Grismer (2002). Photo and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; highlands	Widespread, except for the arid western Gran Desierto, higher eastern mountains, and tropical deciduous forest. Breeds in backwater pools along streams, rain pools, agricultural ditches, and cattle tanks.

Scientific (Common) Names References	Habitat	Descriptions, Distribution, Status, and Other Notes
<i>Bufo debilis</i> (Green toad, Sapo verde) Photo, descriptions and keys in Degenhardt et al. (1996). Photos and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Highlands	Known from south of Agua Prieta to Fronteras. Expected elsewhere in grasslands and valleys in the Northeast. Breeds in ephemeral rain pools and cattle tanks during summer. Status = Pr
<i>Bufo kelloggi</i> (Little Mexican toad, Sapito)	Sonoran Desert; thornscrub; tropical deciduous forest (marginal)	Primarily southern and central coastal plain, but records inland to near Hermosillo and north to near Santa Ana (ca. 85 km south of Nogales). Breeds in a variety of habitats (e.g., streams, cattle tanks, agriculture). Hybridizes with <i>B. retiformis</i> and <i>B. punctatus</i> . Small (<45 mm snout-urostyle length [SUL]), yellow-brown toad with dark blotches, elongate parotoids, and prominent cranial crests. <i>B. punctatus</i> has round, small parotoids. <i>B. retiformis</i> is green with dark reticulations and reduced cranial crests.
<i>Bufo marinus</i> (Cane toad, Sapo gigante) Photo and keys in Lemos-Espinal et al. (2004).	Thornscrub; tropical deciduous forest	Primarily Southwest, particularly in agricultural and rural areas. Also records at Guajaray, Rancho Güirocoba, and near Alamos. Breeds in a variety of habitats, often in disturbed areas. Sonora's largest toad (to 18 cm SUL). Massive, elongated parotoids.
<i>Bufo mazatlanensis</i> (Sinaloa toad, Sapo pinto, Sapo sinaloense) Photo and keys in Lemos-Espinal et al. (2004).	Sonoran Desert, thornscrub, tropical deciduous forest, highlands	Primarily foothills from Sinaloan border north to near Magdalena and Bacadehuachi. On the coast north to Guaymas area. ~Round parotoids about the size of the eye and prominent cranial crests
<i>Bufo mexicanus</i> (Mexican toad, Sapo del suroeste) Photo and keys in Lemos-Espinal et al. (2004).	Highlands	Permanent rivers and streams with sandbars in the mountains from Yécora area north to Bacerac and Rio Saracachi east-northeast of Cucurpe, and likely elsewhere in the east. Taxonomy of specimens from Mazocahui and Rancho La Brisca (NE of Cucurpe) need further study (E. Enderson, pers. comm. 2006). Heel tubercles usually blackened in adults. Cranial crests weak or absent. Light bar across eyelids. Status = NT
<i>Bufo occidentalis</i> (Pine toad, Sapo de pino) Photo and keys in Lemos-Espinal et al. (2004).	Highlands	Streams in the Yécora area to at least 1,900 m, possibly in the Sierra el Tigre, and likely elsewhere in the higher eastern mountains. Heel tubercles not blackened. Cranial crests in adults more prominent than in <i>B. mexicanus</i> .

Scientific (Common) Names References	Habitat	Descriptions, Distribution, Status, and Other Notes
<i>Bufo punctatus</i> (Red-spotted toad, Sapo pinto, Sapo manchas rojas) Photos, descriptions, and keys in Degenhardt et al. (1996) and Grismer (2002). Photo and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert, thornscrub; tropical deciduous forest; highlands	Found throughout Sonora, except at the highest elevations and in the valleys of the Gran Desierto. Breeds in permanent or ephemeral pools.
<i>Bufo retiformis</i> (Sonoran green toad, Sapo sonorensis) Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub	Breeds in summer in ephemeral rain pools and cattle tanks in valley bottoms from Imuris west to Caborca and Sonoyta, and south to Hermosillo and possibly as far as Navojoa, but apparent intergradation with <i>B. kelloggi</i> south of Hermosillo obscures southern limits. May occur on edge of croplands. Declines have occurred west of Hermosillo due to drought and habitat conversion. Status = Pr
<i>Bufo woodhousei</i> (Woodhouse's toad, Sapo de Woodhouse, Sapo) Photos, descriptions, and keys in Degenhardt et al. (1996) and Grismer (2002). Photo and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; highlands	Río Colorado Valley and river valleys in northeast south at least to vicinity of Huásabas (Río Bavispe). Common in agriculture and along slow-moving rivers and streams, backwaters, and lakes.
HYLIDAE		
<i>Hyla arenicolor</i> (Canyon treefrog, Rana, Ranita de cañon) Photo, descriptions, and keys in Degenhardt et al. (1996). Photos and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; tropical deciduous forest; highlands	Widespread, but absent from arid northwest and southwestern coastal plain. Breeds in rocky intermittent or permanent stream courses and pools. Marginal in Sonoran Desert.
<i>Hyla wrightorum</i> (Mountain treefrog, Ranita de montaña) Photo, descriptions, and keys in Degenhardt et al. (1996). Photos and keys in Lemos-Espinal et al. (2004). Photos and descriptions in Brennan and Holycross (2006).	Highlands including grasslands and montane woodland communities	Rancho Los Fresnos northwest of Cananea (Maldonado-Leal et al. in press), and near Yécora and Nácori Chico. Likely occurs elsewhere in the eastern mountains. Breeds in summer in ephemeral or permanent pools, streams, and wet meadows.
<i>Pachymedusa dacnicolor</i> (Mexican leaf frog, Ranita verduzca, Rana verde) Photo in Appendix A. Photos and keys in Lemos-Espinal et al. (2004).	Tropical deciduous forest; highlands (marginal)	Southeastern foothills north to near Sahuaripa. Breeds in ephemeral or permanent pools and streams, typically with emergent or overhanging vegetation. Active year round.

Scientific (Common) Names References	Habitat	Descriptions, Distribution, Status, and Other Notes
<i>Smilisca baudinii</i> (Mexican treefrog, <i>Rana trepadora</i> , <i>Rana</i>) Photo and keys in Lemos-Espinal et al. (2004).	Tropical deciduous forest	Southern Sonora. Breeds in rivers, creeks, and ponds primarily in the foothills north to at least Tónichi.
<i>Smilisca fodiens</i> (Lowland burrowing treefrog, <i>Ranita minera</i> , <i>Rana</i>) Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; tropical deciduous forest	In foothills and lowlands from Nácori Chico, Imuris,, and possibly as far west as Río Sonoyta south to Sinaloa. Breeds in ephemeral rain pools and cattle tanks during summer.
<i>Tlalocohyla smithii</i> (Dwarf Mexican treefrog, <i>Rana enana Mexicana</i>)	Sonoran Desert; thornscrub; tropical deciduous forest	Isolated records from Navojoa north to west of Hermosillo. Also Arroyo Santa Bárbara east-northeast of Alamos (E. Enderson, pers. comm. 2006). May occur on Río Cuchujaqui. Breeds primarily in ephemeral, sluggish streams and ponds. Small (<37 mm SUL), yellow or tan treefrog, with or without brown flecking.
LEPTODACTYLIDAE		
<i>Craugastor augusti</i> (Barking frog, <i>Rana amarilla labradora</i> , <i>Rana</i>) Photos, descriptions, and keys in Degenhardt et al. (1996). Keys in Lemos-Espinal et al. (2004). Photos and descriptions in Brennan and Holycross (2006).	Thornscrub; tropical deciduous forest; highlands	Rocky areas, caves, and mines in the eastern mountains and foothills from Arizona to Sinaloa. As with other Sonoran barking frogs, eggs are laid in moist places in summer; which hatch into frogs rather than tadpoles. Has skin fold between the tympana. To 95 mm SUL.
<i>Craugastor occidentalis</i> (Taylor's barking frog, <i>Rana costeña</i>)	Tropical deciduous forest	In Sonora, only known from Choquincahui area and Sierra de Alamos in the southeast. Very little known about the habits of this small frog. Lacks skin fold between the tympana, and compared to <i>C. tarahumarensis</i> , it is smaller (<45 mm SUL), has smooth skin, and is gray, tan, or brown.
<i>Craugastor tarahumaraensis</i> (Tarahumara barking frog, <i>Rana ladrona amarilla</i>) Photos and keys in Lemos-Espinal et al. (2004).	Highlands (montane woodland communities)	In Sonora, only known from Yécora area, may occur elsewhere in pine-oak woodlands in eastern mountains. Can be found under bark and leaves. Lacks skin fold between the tympana. Greenish frog with irregular dark spots. Status = Pr, VU.
<i>Leptodactylus melanonotus</i> (Sabinal frog, <i>Ranita del sabinal</i> , <i>Ranita</i>) Photo in Appendix A.	Thornscrub; tropical deciduous forest	Lowlands and foothills from Hermosillo area south to Sinaloa. Eggs laid in foam nests in burrows near rivers, streams, and other wet areas. Occasional in agriculture. To 41 mm SUL.

Scientific (Common) Names References	Habitat	Descriptions, Distribution, Status, and Other Notes
<p><i>Syrhophus interorbitalis</i> (Spectacled chirping frog, Ranita de lentas, Rana-chirriadora anteojudá)</p>	<p>Highlands (montane woodland communities); tropical deciduous forest</p>	<p>A single specimen from Hwy 16, 26 km east of Yécora (Enderson and Bezy 2007). A specimen from the Sierra Chinipas, Chihuahua (Lemos-Espinal, pers. comm. 2006), near the Sonoran border east of San Bernardo, suggests it likely occurs in the mountains to the south, as well. Small (<31 mm SUL), delicate, greenish frog with irregular, connected dark spots and a distinctive light bar between the eyes. Status = Pr.</p>
MICROHYLIDAE		
<p><i>Gastrophryne olivacea</i> (Great Plains narrow-mouthed toad, Ranita olivo, Sapito, Rana pajarito) Photo, descriptions, and keys in Degenhardt et al. (1996). Keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).</p>	<p>Sonoran Desert; thornscrub; tropical deciduous forest; highlands</p>	<p>Occurs throughout most of Sonora except the Gran Desierto and the highest northeastern mountains. Breeds primarily in ephemeral pools and cattle tanks during summer. To 41 mm SUL. Status = Pr.</p>
<p><i>Hypopachus variolosus</i> (Sheep frog, Rana ovejera, Sapito)</p>	<p>Tropical deciduous forest</p>	<p>Alamos area and Río Cuchujaqui. A single known extant population. Breeds in ephemeral pools in summer. Similar to <i>Gastrophryne</i> but usually larger (to 50 mm SUL) and ventral surface is mottled (white or white with small dark spots in <i>Gastrophryne</i>).</p>
SCAPHIOPODIDAE		
<p><i>Spea bombifrons</i> (Plains spadefoot, Sapo de espuela de los llanos) Photo, descriptions, and keys in Degenhardt et al. (1996). Photo and keys in Lemos-Espinal et al. (2004). Photos and descriptions in Brennan and Holycross (2006).</p>	<p>Highlands including Chihuahuan Desert and grasslands</p>	<p>Unconfirmed for Sonora. However, likely occurs in northeastern valleys. Breeds in ephemeral rain pools and cattle tanks in summer.</p>
<p><i>Scaphiopus couchii</i> (Couch's spadefoot, Sapo de espuela, Sapo) Photos, descriptions, and keys in Degenhardt et al. (1996) and Grismer (2002). Photo and keys in Lemos-Espinal et al. (2004). Photos and descriptions in Brennan and Holycross (2006).</p>	<p>Sonoran Desert, thornscrub; tropical deciduous forest; highlands</p>	<p>Widespread, but absent from mountains and valleys above about 1830 m. Breeds in ephemeral rain pools and cattle tanks in summer.</p>
<p><i>Spea multiplicata</i> (Mexican spadefoot, Sapo montícola de espuela) Photo, descriptions, and keys in Degenhardt et al. (1996). Photo and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).</p>	<p>Sonoran Desert; highlands</p>	<p>Primarily northern valleys from Sonoyta east to Sierra San Luis and south to Arizpe. Breeds in ephemeral rain pools and cattle tanks in summer.</p>

Scientific (Common) Names References	Habitat	Descriptions, Distribution, Status, and Other Notes
RANIDAE		
<i>Rana berlandieri</i> (Río Grande leopard frog, Rana leopardo) Photo, descriptions, and keys in Degenhardt et al. (1996). Photos and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert	Introduced from New Mexico or Texas in the 1960s or 1970s. Found in the Río Colorado Valley, including the Río Colorado, Ciénega de Santa Clara, and adjacent agriculture (see Rorabaugh and Servoss 2006). Status = Pr.
<i>Rana blairi</i> (Plains leopard frog, Rana de llano) Photo, descriptions, and keys in Degenhardt et al. (1996). Photo and descriptions in Brennan and Holycross (2006).	Highlands (grasslands)	Unconfirmed for Sonora, but may occur in cattle tanks and ponds near Agua Prieta in the northeast.
<i>Rana catesbeiana</i> (American bullfrog, Rana mugidora, Rana de toro) Photos, descriptions, and keys in Degenhardt et al. (1996) and Grismer (2002). Photo and keys in Lemos-Espinal et al. (2004). Photos and descriptions in Brennan and Holycross (2006).	Sonoran Desert; highlands	Introduced. Río Colorado Valley, as well as rivers, ponds, and croplands in the Northeast. Recorded at Vícam east of Ciudad Obregón; may occur elsewhere in southwestern croplands.
<i>Rana chiricahuensis</i> (Chiricahua leopard frog, Rana de Chiricahua) Photo, descriptions, and keys in Degenhardt et al. (1996). Keys in Lemos-Espinal et al. (2004). Photos and descriptions in Brennan and Holycross (2006).	Highlands	Rivers, ciénegas, cattle tanks, and other wetlands in mountains and valleys from Yécora north to Sierra San Luis complex and Nogales area. Status = A, VU.
<i>Rana forreri</i> (Forrer's grass frog, Rana del zacate) Photo and keys in Lemos-Espinal et al. (2004).	Sonoran Desert; thornscrub	Southwestern coastal plain south of Pitaya (southeast of Empalme) and Presa Alvaro Obregón. Breeds in permanent water, including agricultural areas. Large frog, posterior dorsolateral folds not medially displaced and more or less continuous. Status = Pr.
<i>Rana magnaocularis</i> (Northwest México leopard frog, Rana leopardo del noreste de México, Rana) Photo and keys in Lemos-Espinal et al. (2004).	Sonoran Desert (marginal); thornscrub; tropical deciduous forest	From Moctezuma, and vicinities of Hermosillo and Guaymas south into Sinaloa. Breeds in lower montane as well as coastal streams, rivers, and pools. Also occurs in agriculture on the southwestern coastal plain. Similar to <i>R. yavapaiensis</i> but lacks ventral yellow coloration, adult males have conspicuous vocal sacs, and pattern on rear of thigh more similar to <i>R. berlandieri</i> or <i>R. blairi</i> .

Scientific (Common) Names References	Habitat	Descriptions, Distribution, Status, and Other Notes
<i>Rana pustulosa</i> (Cascade frog, Rana de cascada) Photo in Appendix A.	Tropical deciduous forest	Extreme southeastern Sonora in montane creeks and canyons. Hybridizes with Tarahumara frog at Arroyo el Cobre near Choquinahui. Similar to <i>R.</i> <i>tarahuamarae</i> , but has bolder dorsolateral folds and light stripe on upper lip. Status = Pr.
<i>Rana tarahumarae</i> (Tarahumara frog, Rana de tara, Rana cuajo, Sibo'li de tara [tadpoles]) Photo in Appendix A. Photo and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Thornscrub; tropical deciduous forest; highlands	Rugged, lower montane canyons and plunge pools from near Magdalena and Bavispe south through the eastern mountains to Sinaloa and east into Chihuahua. Status = VU.
<i>Rana yavapaiensis</i> (Lowland leopard frog, Rana de Yavapai, Rana) Photo, descriptions, and keys in Degenhardt et al. (1996). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; highlands	Streams, rivers, ciénegas, cattle tanks, and other wetlands at lower elevations in the northeast south to Hwy 16. Extirpated from Río Colorado. Status = Pr.

REPTILES

CROCODYLIDAE

<i>Crocodylus acutus</i> (American crocodile, Cocodrilo Americano, Xepe ano heepni)	Marine environments in the Gulf of California	Occurred in coastal wetlands and river deltas perhaps as far north as the Río Colorado delta. Now extirpated. Last observed in 1973 near Guaymas. Status = Pr, VU.
---	--	--

CHELONIIDAE

<i>Caretta caretta</i> (Loggerhead turtle, Tortuga caguama, Tortuga perica, Xpeyo) Photo, descriptions, and keys in Grismer (2002).	Marine environments in the Gulf of California	Large (to 0.95 m in the Gulf) and rare turtle of the Gulf of California. Not known to nest in Sonora. Status = P, EN.
<i>Chelonia mydas</i> (Green turtle, Parlama, Tortuga negra, Tortuga prieta, Moosni) Photo, descriptions, and keys in Grismer (2002).	Marine environments in the Gulf of California	Large (to 1.1 m) marine turtle of the Gulf of California. Most commonly encountered marine turtle off the Sonoran coast. Small numbers nest on central coastal beaches. Status = P, EN.
<i>Eretmochelys imbricata</i> (Hawksbill turtle, Carey, Perico, Moosni quipáacalc) Photo, descriptions, and keys in Grismer (2002).	Marine environments in the Gulf of California	Large (to 0.9 m, but most are 0.3-0.5 m in the Gulf) marine turtle, which is more common in the southern Gulf. May enter rivers or creeks on the coast. Not known to nest in Sonora. Their shells are highly prized for illegal production of jewelry and souvenirs. Status = P, CR.

Scientific (Common) Names References	Habitat	Descriptions, Distribution, Status, and Other Notes
<i>Lepidochelys olivacea</i> (Olive ridley turtle, Tortuga golfina, Golfina, Moosni otác) Photo, descriptions, and keys in Grismer (2002).	Marine environments in the Gulf of California	Large (to 0.7 m) marine turtle of the Gulf of California. Nests uncommonly on beaches as far north as Puerto Peñasco and El Golfo de Santa Clara. Status = P, EN.
DERMOCHELYIDAE		
<i>Dermochelys coriacea</i> (Leatherback turtle, Laúd, Siete filos, Moosnípol) Photo, descriptions, and keys in Grismer (2002).	Marine environments in the Gulf of California	Large (to 2.4 m, but typically <1.0 m in the Gulf) and rare marine turtle. Nests rarely on central and possibly southern coastal beaches (Seminoff and Nichols 2007). Status = P, CR.
GEOEMYDIDAE		
<i>Rhinoclemmys pulcherrima</i> (Painted wood turtle, Tortuga pinta, Tortuga colorado) Photo in Appendix A.	Tropical deciduous forest	Found along streams and arroyos in the foothills of extreme Southeast (e.g., Alamos, Choquinahui, and Güirocoba). Semi-aquatic. Keeled carapace and lacks webbing between toes. Status = Pr.
EMYDIDAE		
<i>Terrapene nelsoni</i> (Spotted box turtle, Tortuga del monte, Tortuga de caja, Juanon) Photo and keys in Lemos-Espinal et al. (2004).	Thornscrub; tropical deciduous forest; highlands	A terrestrial turtle found in woodlands from the Sierra de Batuc, ~10 km east of Nácori Chico (A. Flesch, pers. comm. 2006), and possibly the Sierra Huachinera south to Alamos, Güirocoba, and Sinaloa. Carapace dark with light spots. Status = Pr.
<i>Terrapene ornata</i> (Western box turtle, Tortuga de adornos) Photo, descriptions, and keys in Degenhardt et al. (1996). Photo and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Thornscrub (marginal); highlands	A terrestrial turtle found primarily in valley grasslands and Chihuahuan Desert north of Santa Ana (ca. 85 km south of Nogales) and Arizpe to Arizona during the summer. Status = LR/nt.
<i>Trachemys nebulosa</i> (Fuerte slider, Jicotea Fuerte, Tortuga de agua, Tortuga Juan)	Tropical deciduous forest	An aquatic turtle of the Río Cuchujaqui and other permanent water in the Río Fuerte drainage. Taxonomy of Sonoran <i>Trachemys</i> follows Seidel (2002). Only <i>Trachemys</i> in its range in Sonora.
<i>Trachemys yaquia</i> (Yaqui slider, Jicotea Yaqui, Tortuga de agua) Photo in Appendix A.	Thornscrub; tropical deciduous forest; highlands	An aquatic turtle of rivers, presas, and other permanent water of the Ríos Sonora and Bavispe south to the Río Mayo. Only <i>Trachemys</i> in its range.
KINOSTERNIDAE		
<i>Kinosternon alamosae</i> (Alamos mud turtle, Casquito de Alamos, Tortuga de agua) Photo in Appendix A.	Sonoran Desert (marginal); thornscrub; tropical deciduous forest	An aquatic pond turtle found from the Río Sonora near Ures south to Guaymas and Alamos, and into Sinaloa. One pair of short chin barbels. No distinct stripes or reticulations on face. Elevated 10 th marginal scute.

Scientific (Common) Names References	Habitat	Descriptions, Distribution, Status, and Other Notes
<i>Kinosternon arizonense</i> (Arizona mud turtle, Tortuga de los charcos, Tortuga de agua, Xtamáaija) Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub	An aquatic pond turtle from near Altar and Nogales south to near Tecoripa and Pitaya SE of Guaymas. Similar to <i>K. alamosae</i> but elevated 9 th and 10 th marginal scutes.
<i>Kinosternon integrum</i> (Mexican mud turtle, Casquito de burro, Tortuga de agua) Photo and keys in Lemos-Espinal et al. (2004).	Thornscrub; tropical deciduous forest; highlands (marginal)	An aquatic turtle of foothill ponds and streams from the Sierra el Chinito E of Baviácora (Enderson et al. 2007) south into Sinaloa. Three or more pairs of short chin barbels, has stripes and reticulations on face. Status = Pr
<i>Kinosternon sonoriense</i> (Sonora mud turtle, Casquito de Sonora, Tortuga de agua, Xtamáaija) Photo in Appendix A. Photo, descriptions, and keys in Degenhardt et al. (1996). Keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; highlands including Chihuahuan Desert, grasslands, and montane woodland communities	An aquatic stream and pond turtle primarily in the northeast south to Yécora. Isolated populations on the Río Sonoyta and adjacent wetlands, and on the Río Altar. Likely extirpated from Río Colorado. Long chin barbels, stripes and reticulations on face. Adult males have “claspers” on contacting surfaces of shank and thigh (<i>K. integrum</i> does not). Status = VU
TESTUDINIDAE		
<i>Gopherus agassizii</i> (Desert tortoise, Tortuga del monte, Galápago de desierto, Xtamóosni) Photo, descriptions, and keys in Grismer (2002). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; tropical deciduous forest; highlands (marginal)	A large (to 0.4 m) terrestrial tortoise found throughout much of Sonora except for the higher mountains as well as valleys of the western Gran Desierto. Tortoises from tropical deciduous forest south into Sinaloa may represent a separate species or subspecies (Karl et al. 2006). Status = VU.
TRIONYCHIDAE		
<i>Apalone spinifera</i> (Spiny softshell, Tortuga de concha blanda) Photos, descriptions, and keys in Degenhardt et al. (1996) and Grismer (2002). Photo and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; highlands	Introduced. An aquatic turtle collected at Ciénega de Santa Clara (J. Campoy, pers. comm. 2007). Probably occurs elsewhere in the Río Colorado Valley and likely on the Río San Pedro, as well. Status = Pr.
EUBLEPHARIDAE		
<i>Coleonyx fasciatus</i> (Black banded gecko, Geco de manchas negras, Salamanquesa)	Thornscrub; tropical deciduous forest	Records from near Alamos and Tónichi, but a specimen from Arizpe suggests this species may occur elsewhere in thornscrub. Nocturnal ^a . Bold, banded pattern (3 dark bands between the limbs) with distinct separation of dorsal and ventral ground colors.

Scientific (Common) Names References	Habitat	Descriptions, Distribution, Status, and Other Notes
<i>Coleonyx variegatus</i> (Western banded gecko, Salamanquesa de franjas, Cozixol) Photos, descriptions, and keys in Degenhardt et al. (1996) and Grismer (2002). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub	Throughout western Sonora from San Luis Río Colorado east to near Cucurpe and south to Guaymas. Isolated record from near Huásabas. Nocturnal ^a
GEKKONIDAE		
<i>Hemidactylus turcicus</i> (Mediterranean house gecko, Geco pinto) Photo, descriptions, and keys in Degenhardt et al. (1996). Photo and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert	Introduced nocturnal ^a gecko of cities and towns, often in and around buildings at night. Collected in Baha Kino (A. Peralta-García, pers. comm. 2007) and El Golfo de Santa Clara, and reported from San Luis Río Colorado (R. Rodríguez, pers. comm. 2005). Likely occurs locally at Puerto Peñasco, Agua Prieta, and elsewhere. Will likely spread to other developed areas.
<i>Phyllodactylus homolepidurus</i> (Sonoran leaf-toed gecko, Salamanquesa de Sonora)	Sonoran Desert; thornscrub	From near El Oasis north of Hermosillo and on the coast at Punta Cirio south at least to Guaymas area in rocky habitats where it is often found in crevices or under rocks during the day. Also found around buildings. Nocturnal ^a . Status = Pr.
<i>Phyllodactylus tuberculatus</i> (Yellowbelly gecko, Geco tuberculoso, Salamanquesa) Photo in Appendix A. Keys in Lemos-Espinal et al. (2004).	Thornscrub; tropical deciduous forest	Rocky foothills from Sinaloa north at least to Hwy 16. Also found around buildings. Nocturnal ^a , but often observed in rock crevices by day. Very similar to <i>P. homolepidurus</i> , but dorsal tubercles at mid body are larger and more keeled, and the base of each tubercle is oval (rather than round).
HELODERMATIDAE		
<i>Heloderma horridum</i> (Mexican beaded lizard, Escorpión grande, Escorpion) Photo and keys in Lemos-Espinal et al. (2004).	Thornscrub; tropical deciduous forest; highlands (marginal)	Very large (to 0.9 m ^b) lizard of foothills from Sinaloa north at least to Sahuaripa (J. Lemos Espinal, pers. comm. 2006). Tail length >60% of snout-vent length (SVL). This and the Gila monster are the only two venomous lizards in the world. Status = A, VU.
<i>Heloderma suspectum</i> (Gila monster, Escorpion, Escorpion pintado, Escorpion pequeño, Paaza) Photo in Appendix A. Photo, descriptions, and keys in Degenhardt et al. (1996). Photos and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; highlands	Widespread, but absent from valleys of the western Gran Desierto, as well as east-central Sonora. Venomous. Smaller than Mexican beaded lizard, tail length <56% of SVL, tongue black (pink in <i>H. horridum</i>), and top of head mottled black and pink (usually all black in <i>H. horridum</i>). Status = A, VU.

Scientific (Common) Names References	Habitat	Descriptions, Distribution, Status, and Other Notes
IGUANIDAE/IGUANINAE		
<i>Ctenosaura macrolopha</i> (Sonoran spiny-tailed iguana, Iguana de tierra firme, Iguana, Heepni) Photo in Appendix A. Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert (marginal); thornscrub; tropical deciduous forest	Large lizard of foothills and valleys, inland from south of El Oasis (Hwy 15) to Sinaloa, and on the coast from Guaymas area south. May be observed in trees, on rocks or walls, or on the ground. Status = Pr.
<i>Dipsosaurus dorsalis</i> (Desert iguana, Porohui, Iguana, Meyo) Photo, descriptions, and keys in Grismer (2002). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub	Throughout western Sonora south to Río Fuerte, Sinaloa. Particularly abundant in arid Gran Desierto valleys and flats.
<i>Sauromalus ater</i> (Common chuckwalla, Iguana, Coof coopol) Photo in Appendix A. Photo, descriptions, and keys in Grismer (2002). Photos and descriptions in Brennan and Holycross (2006)	Sonoran Desert	Large-bodied lizard of rocky slopes and outcrops throughout Sonoran Desert from Empalme north to Arizona. Status = A.
IGUANIDAE/CROTAPHYTINAE		
<i>Crotaphytus collaris</i> (Eastern collared lizard, Cachorón, Lagartija de collar) Photo, descriptions, and keys in Degenhardt et al. (1996). Photo and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Highlands	Northeast from Sierra San Luis complex west to Santa Cruz (NW of Cananea) and south to Arizpe and near Huásabas. Found in sunny areas with rocks and boulders. Status = A.
<i>Crotaphytus dickersonae</i> (Dickerson's collared lizard, Lagartija de collar, Cachorón, Hast coof) Photo, descriptions, and keys in Grismer (2002).	Sonoran Desert	Restricted to rocky areas near the coastline from Bahía Kino to hills just north of Puerto Libertad (E. Enderson, pers. comm. 2006). Adult males are distinctly blue (females are brown, but with orange banding in breeding season).
<i>Crotaphytus nebrius</i> (Sonoran collared lizard, Lagartija de collar, Cachorón, Hast coof) Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; highlands (marginal)	Mountains and foothills from the Gran Desierto south to near Empalme, east to Güisamopa near Yécora, and northeast to near Villa Hidalgo.
<i>Gambelia wislizenii</i> (Long-nosed leopard lizard, Lagartija mata caballo, Cachorón, Hantpízal) Photo, descriptions, and keys in Degenhardt et al. (1996) and Grismer (2002). Photo and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; highlands	Throughout flats and valleys from Guaymas north to the Gran Desierto and northeast to Fronteras. Most commonly encountered in Sonoran Desert. Status = Pr.

Scientific (Common) Names References	Habitat	Descriptions, Distribution, Status, and Other Notes
IGUANIDAE/PHRYNOSOMATINAE		
<i>Callisaurus draconoides</i> (Zebra-tailed lizard, Cachora, Perrita, Ctamófi) Photos, descriptions, and keys in Degenhardt et al. (1996) and Grismer (2002). Photos and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; tropical deciduous forest; highlands	Throughout much of Sonora, except higher eastern mountains and valleys. Particularly common in sandy or gravelly flats and washes. Status = A.
<i>Cophosaurus texanus</i> (Greater earless lizard, Lagartijon sordo, Cachora) Photo, descriptions, and keys in Degenhardt et al. (1996). Photo and keys in Lemos-Espinal et al. (2004). Photos and descriptions in Brennan and Holycross (2006).	Thornscrub; highlands	Northeast, from Arizona border south to near Huásabas. Distribution in Sonora poorly documented. Primarily in mid-elevation valleys and bajadas with sandy or gravelly soils. Status = A.
<i>Holbrookia approximans</i> (Speckled earless lizard, Lagartija sorda manchadita, Cachorita) Keys in Lemos-Espinal et al. (2004).	Highlands (montane woodland communities)	Known from the Sierra San Luis near the Chihuahuan and U.S. borders (Smith et al. 2006). Similar to <i>H. elegans</i> but occurs at higher elevations (>1,220 m). The distribution and taxonomy of the two <i>Holbrookia</i> species needs further investigation in the Northeast. Crother et al. (2000) considers this taxon a subspecies of <i>H. maculata</i> .
<i>Holbrookia elegans</i> (Elegant earless lizard, Lagartija sorda Mexicana, Cachorita) Photo and keys in Lemos-Espinal et al. (2004). Photos and descriptions in Brennan and Holycross (2006).	Highlands including Chihuahuan Desert, grasslands, and montane woodland communities; Sonoran Desert; thornscrub; tropical deciduous forest	Widespread in western and central Sonora from the Arizona border south to Sinaloa, but absent from the Gran Desierto west of Sonoyta, the extreme Northeast, and higher mountains. Often found in sandy or gravelly areas.
<i>Phrynosoma cornutum</i> (Texas horned lizard, Camaleón Texano) Photo, descriptions, and keys in Degenhardt et al. (1996) and Sher- brooke (2003). Photo and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Highlands including Chihuahuan Desert and grasslands	Northeastern valleys from eastern Río San Pedro Valley east to the Sierra San Luis complex and south to Fronteras. Status = A.
<i>Phrynosoma ditmarsii</i> (Rock horned lizard, Camaleón de piedra) Photos, descriptions, and keys in Sherbrooke (2003).	Thornscrub; highlands	Only known from near Nácori Chico, the Sierras Manzanal and Baviacora, and at Rancho La Mula near Tónichi. Expected elsewhere in eastern Sonora. Similar to <i>P.</i> <i>hernandesi</i> , but shorter horns and keeled ventral scales. Status = A.

Scientific (Common) Names References	Habitat	Descriptions, Distribution, Status, and Other Notes
<i>Phrynosoma goodei</i> (Sonoran horned lizard, Camaleón de Sonora) Photos, descriptions, and keys in Sherbrooke (2003). Photo and descriptions in Brennan and Holycross (2006) as <i>P. platyrhinos</i> .	Sonoran Desert	Northwest – distribution similar to <i>P. mcallii</i> , but south to Río San Ignacio and often found in coarser sands or gravels closer to or within the mountains.
<i>Phrynosoma hernandesi</i> (Greater short-horned lizard, Camaleón de cuernos-pequeños de montaña) Photos, descriptions, and keys in Degenhardt et al. (1996) and Sherbrooke (2003). Keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Highlands including grasslands and montane woodland communities	Northeastern mountains and high valleys from the Sierras el Tigre and San Luis west to ranges near Cananea. Can be found in the highest mountain areas, often with sandy or gravelly soils.
<i>Phrynosoma mcallii</i> (Flat-tailed horned lizard, Camaleón de cola plana, Camaleón del Gran Desierto) Photo in Appendix A. Photo, descriptions, and keys in Grismer (2002) and Sherbrooke (2003). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert	Arid, sandy flats and low dunes of the Gran Desierto from San Luis Río Colorado southeast to and perhaps beyond Bahía San Jorge. Status = A.
<i>Phrynosoma modestum</i> (Round-tailed horned lizard, Camaleón) Photos, descriptions, and keys in Degenhardt et al. (1996) and Sherbrooke (2003). Photo and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Highlands	Gravelly or rocky foothills, bajadas, and valleys in Chihuahuan Desert and adjacent grasslands in extreme northeast.
<i>Phrynosoma orbiculare</i> (Mountain horned lizard, Camaleón de montaña) Photos, descriptions, and keys in Sherbrooke (2003). Photo and keys in Lemos-Espinal et al. (2004).	Highlands (montane woodland communities)	In Sonora, only known from montane woodlands near Yécora. May occur elsewhere in eastern mountains. Distinguished from <i>P. hernandesi</i> by longer horns and tail. Status = A.
<i>Phrynosoma solare</i> (Regal horned lizard, Camaleón real, Hant coáaxoj) Photos, descriptions, and keys in Degenhardt et al. (1996) and Sherbrooke (2003). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; tropical deciduous forest; highlands	Widespread, but absent from western Gran Desierto (west and south of the Pinacate Region) and mountains of eastern Sonora.

Scientific (Common) Names References	Habitat	Descriptions, Distribution, Status, and Other Notes
<i>Sceloporus clarkii</i> (Clark's spiny lizard, Lagartija espinosa de Clark, Cachora, Haasj) Photo, descriptions, and keys in Degenhardt et al. (1996). Photo and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; tropical deciduous forest; highlands	Lower mountains and foothills throughout most of Sonora except arid northwest. Often found in trees, sometimes on the ground or on rocks.
<i>Sceloporus cowlesi</i> (Southwestern fence lizard, Lagartija de pampa, Cachora) Photos and descriptions in Brennan and Holycross (2006).	Highlands including Chihuahuan Desert and grasslands	Northeastern valleys, bajadas, and foothills. Similar to <i>Sceloporus virgatus</i> but typically occurs at lower elevations.
<i>Sceloporus horridus</i> (Horrible spiny lizard, Torosco, Cachorón) Photo and keys in Lemos-Espinal et al. (2004).	Tropical deciduous forest; highlands	Southeastern foothills and mountains south of Hwy 16. Isolated and questionable record from La Poza south of Hermosillo. Compared to <i>S. clarkii</i> , this species has <8 femoral pores (total, both thighs; <i>S. clarkii</i> has >15), lacks prominent forearm bands, and males have widely separated, faint blue patches on the throat (<i>S. clarkii</i> has large black-bordered, blue throat patches that often converge). Found on logs, rocks, posts. More localized than <i>S. clarkii</i> .
<i>Sceloporus jarrovi</i> (Yarrow's spiny lizard, Cachorón, Lagartija espinosa de Yarrow) Photo, descriptions, and keys in Degenhardt et al. (1996). Photos and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Thornscrub; highlands (montane woodland communities)	Mostly above 1,300 m on rocks and sometimes trees in wooded areas or rocky slopes in the mountains of the northeast from the Arizona border south to Yécora area.
<i>Sceloporus lemosespinali</i> (Chihuahuan mezquite lizard, Chintete de mezquite de Chihuahua, Cachora) Photo in Appendix A. Photo and keys in Lemos-Espinal et al. (2004).	Highlands (montane woodland communities)	Montane woodlands at 1,800-2,500 m in the Sierra Madre Occidental and associated ranges (Sierras San Luis, El Tigre, and Huachinera) south to Sinaloa. Formerly considered <i>S. grammicus</i> (Lara-Góngora 2004).
<i>Sceloporus magister</i> (Desert spiny lizard, Lagartija espinosa del desierto, Cachorón, Haasj) Photos, descriptions, and keys in Degenhardt et al. (1996) and Grismer (2002). Photo and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; highlands	Lowland plains and foothills from Agiabampo north to Arizona. Also in lower elevation highlands. Absent from treeless valleys in the Gran Desierto. Often found on trees or rocks.

Scientific (Common) Names References	Habitat	Descriptions, Distribution, Status, and Other Notes
<i>Sceloporus nelsoni</i> (Nelson's spiny lizard, Lagartija espinosa de Nelson, Cachorita) Photo and keys in Lemos-Espinal et al. (2004).	Tropical deciduous forest	Foothills from near Santa Ana de Yécora south to Sinaloa. Rocks and cliffs, often in shaded arroyos near water. Small, dark spiny lizard with barred throat.
<i>Sceloporus poinsettii</i> (Crevice spiny lizard, Lagartija espinosa de barrada, Cachorón) Photo, descriptions, and keys in Degenhardt et al. (1996). Photos and keys in Lemos-Espinal et al. (2004).	Highlands	Rocky hillsides and canyons in arid scrub or woodlands. Isolated records from areas of Yécora, Mesa Tres Ríos, and east of Huachinera. Likely occurs elsewhere at moderate elevations in the northeast.
<i>Sceloporus slevini</i> (Slevin's bunchgrass lizard, Lagartija de pastizal de Slevin, Cachora) Photos and keys in Lemos-Espinal et al. (2004). Photos and descriptions in Brennan and Holycross (2006).	Highlands	Northeast, from Yécora area north to Arizona and east into Chihuahua. Grassy plains to high in the mountains.
<i>Sceloporus virgatus</i> (Striped plateau lizard, Lagartija de meseta rayada, Cachora) Photo, descriptions, and keys in Degenhardt et al. (1996). Photo and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Highlands (montane woodland communities)	Mostly above 1,500 m in wooded eastern mountains from Yécora area north to Arizona.
<i>Uma rufopunctata</i> (Yuman Desert fringe-toed lizard, Lagartija de manchas laterales, Cachora) Photo in Appendix A. Photos and descriptions in Brennan and Holycross (2006).	Sonoran Desert	Dunes and flats with fine, windblown sand in the Northwest from near San Luis Río Colorado southeast to Punta Tepoca. Status = A.
<i>Urosaurus bicarinatus</i> (Tropical tree lizard, Roñito, Lagartija, Cachorita) Photo and keys in Lemos-Espinal et al. (2004).	Thornscrub (marginal); tropical deciduous forest	Southeastern foothills south of Nuri. Often on tree trunks or branches. Similar to <i>U. ornatus</i> , but has sharply pointed ventral scales and males have yellow or mottled (rather than blue) throats. One row of paravertebral scales on each side of the spine.
<i>Urosaurus graciosus</i> (Long-tailed brush lizard, Lagartija de matorral, Cachorita) Photo, descriptions, and keys in Grismer (2002). Photos and descriptions in Brennan and Holycross (2006).	Sonoran Desert	Typically found on the branches of creosote, mesquite, and other trees or shrubs in the northwest from Arizona south to Puerto Libertad area.

Scientific (Common) Names References	Habitat	Descriptions, Distribution, Status, and Other Notes
<i>Urosaurus ornatus</i> (Ornate tree lizard, Lagartija de árbol, Lagartija, Cachorita, Hehe iti cooscl) Photos, descriptions, and keys in Degenhardt et al. (1996) and Grismer (2002). Photo and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; tropical deciduous forest; highlands including Chihuahuan Desert, grasslands, and montane woodland communities	Throughout Sonora, except for the highest mountains and treeless flats in the Gran Desierto. Typically found on trees or rocks.
<i>Uta stansburiana</i> (Common side-blotched lizard, Cachora gris, Tozípla) Photos, descriptions, and keys in Degenhardt et al. (1996) and Grismer (2002). Photo and keys in Lemos-Espinal et al. (2004). Photos and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; highlands	Widespread in Sonoran Desert flats and mountains; also in thornscrub south to near Pitaya (SE of Empalme), and enters highlands near Nogales and extreme northeast.
XANTUSIIDAE		
<i>Xantusia vigilis</i> (Desert night lizard, Cuija, Salamanquesa, Cozíxoj) Photo, descriptions, and keys in Grismer (2002). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert	Isolated localities from near Bahía Kino north into the western Gran Desierto. Can be found under dead agaves, yuccas, nolinás, and cardons, but also in rocks. Nocturnal ^a .
POLYCHRIDAE		
<i>Anolis nebulosus</i> (Clouded anole, Pañuelo, Lagartija, Cachorita) Photo and keys in Lemos-Espinal et al. (2004).	Thornscrub; tropical deciduous forest; highlands	Eastern foothills from Sinaloa north to Río Nácori NE of Nácori Chico. Record for La Poza south of Hermosillo. Often found on branches of trees and shrubs.
SCINCIDAE		
<i>Plestiodon brevirostris</i> (Shortnose skink, Salamanquesa, Ajolote ^c) Photo and keys in Lemos-Espinal et al. (2004).	Highlands	Unconfirmed for Sonora; however, a specimen from Milpillás, Chihuahua suggests it likely occurs in the Sierra Milpillás, Sonora. Found in montane woodlands. Striped with 22-24 scale rows at mid body and one postmental scale.
<i>Plestiodon callicephalus</i> (Mountain skink, Lincer de barranco, Salamanquesa, Ajolote ^c) Keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Tropical deciduous forest; highlands	Secretive species of woodlands and forests in the eastern mountains, from Arizona to Sinaloa and east into Chihuahua. Striped, usually two postmental scales, and 26-28 scale rows at mid body. Light “V” mark atop head.

Scientific (Common) Names References	Habitat	Descriptions, Distribution, Status, and Other Notes
<i>Plestiodon obsoletus</i> (Great Plains skink, Lincer llanero, Salamanquesa) Photos, descriptions, and keys in Degenhardt et al. (1996). Keys in Lemos-Espinal et al. (2004). Photos and descriptions in Brennan and Holycross (2006).	Highlands	Secretive species of grassy plains and canyons east and northeast of Hermosillo. Rarely encountered. No stripes, juveniles black.
<i>Plestiodon parviauriculatus</i> (Northern pygmy skink, Salamanquesa, Ajolote ^c) Keys in Lemos-Espinal et al. (2004).	Tropical deciduous forest; highlands	Secretive species of woodlands in southeastern mountains and foothills from Sinaloa north at least to Yécora area. Striped with 19-20 scale rows at mid body and one postmental scale. No light "V" mark atop head. Status = Pr.
TEIIDAE		
<i>Aspidoscelis burti</i> (Canyon spotted whiptail, Güico, Huico, Ctoixa) Photos, descriptions, and keys in Degenhardt et al. (1996). Photos and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; highlands	Montane canyons and foothills from northeastern and north-central Sonora south to Guaymas area and through central, lower foothills possibly to Sinaloa. Taxonomy of <i>A. burti/costata</i> complex needs further work (see Reeder et al. 2002).
<i>Aspidoscelis costata</i> (Western México whiptail, Huico llanero, Huico) Photos and keys in Lemos-Espinal et al. (2004).	Thornscrub; tropical deciduous forest; highlands	From Huásabas area in the northeast south through the mountains and foothills (east of range of <i>A. burti</i>) to Sinaloa (Wright 1994). Often found in openings and second growth forest or scrub. In the foothills, large individuals are spotted and lack stripes, similar to <i>A. burti</i> , but have much blue/black on the ventral surface (<i>A. burti</i> is white or cream), and a light blue chin. To the east, large individuals are more striped and less likely to have darkened ventral surface and blue chins. Small adults and juveniles are striped.
<i>Aspidoscelis exsanguis</i> (Chihuahuan spotted whiptail, Huico pinto de Chihuahua, Huico) Photo, descriptions, and keys in Degenhardt et al. (1996). Keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Highlands	Northeastern rocky hillsides and sandy canyon bottoms from the Sierra San Luis west to near Naco and south to near Moctezuma, the eastern slope of the Sierra Huachinera, and La Mesa Tres Ríos.

Scientific (Common) Names References	Habitat	Descriptions, Distribution, Status, and Other Notes
<i>Aspidoscelis opatae</i> (Opata whiptail, Huico opata, Huico)	Thornscrub; highlands	In the valley of the Río Bavispe from Presa Angostura south to Huásabas. Also reported from Huachinera. All female, with seven light strips and no spots between the stripes. Adults exhibit dorsal ground color of gray to blue-gray, no blue color on ventral surface of head and body, a minimum of 10 scales between the paravertebral stripes, and granular postantibrachial scales. Tail blue (at least towards the end) on adults and juveniles (Wright 1967). May be a complex of three distinct taxa (Wright 1994).
<i>Aspidoscelis sonora</i> (Sonoran spotted whiptail, Huico manchado de Sonora, Huico) Photo, descriptions, and keys in Degenhardt et al. (1996). Photo and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Thornscrub; highlands including Chihuahuan Desert, grasslands, and montane woodland communities	Northeastern bajadas, foothills, and mountains from southwest of Nogales to Nácori Chico, Cerro La Agualurca southeast of Hermosillo, and Güisamopa near Yécora.
<i>Aspidoscelis tigris</i> (Tiger whiptail, Huico occidental, Huico) Photos, descriptions, and keys in Degenhardt et al. (1996) and Grismer (2002). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; highlands	San Luis Río Colorado east to Pilares de Nacozeni, and south along the coastal plain and lower foothills to Sinaloa. Often common in Sonoran Desert.
<i>Aspidoscelis uniparens</i> (Desert grassland whiptail, Huico de la pradera del desierto, Huico) Photo, descriptions, and keys in Degenhardt et al. (1996). Keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; highlands including Chihuahuan Desert and grasslands	Grassy plains and bajadas often with shrubs and mesquite north and east from Sierra Los Locos (near San Felipe northeast of Hermosillo) to Arizona.
<i>Aspidoscelis xanthonota</i> (Red-backed whiptail, Huico de dorsorojo, Huico) Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert	Unconfirmed for Sonora; however, likely occurs in desert mountains (e.g., Sierras Cubabi, San Francisco, and/or Pinacate) near Sonoyta.
ANGUIDAE		
<i>Elgaria kingii</i> (Madrean alligator lizard, Lagartija, Lagarto de montaña) Photo, descriptions, and keys in Degenhardt et al. (1996). Photos and keys in Lemos-Espinal et al. (2004). Photos and descriptions in Brennan and Holycross (2006).	Thornscrub; tropical deciduous forest; highlands including Chihuahuan Desert, grasslands, and montane woodland communities	Secretive species typically found in rocky, wooded canyons or mountains, or along rivers from the Nogales area east to Chihuahua and south through the mountains and foothills to Sinaloa. Isolated population at Nacapule Canyon NW Guaymas. Status = Pr.

Scientific (Common) Names References	Habitat	Descriptions, Distribution, Status, and Other Notes
LEPTOTYPHLOPIDAE		
<i>Leptotyphlops dissectus</i> (New Mexico threadsnake, Culebrilla ciega de Nuevo México) Photo, descriptions, and keys in Degenhardt et al. (1996). Photo and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Highlands	Unconfirmed for Sonora, but likely occurs in valleys and mountains in the extreme northeast. Typically in fine, loose soil suitable for burrowing, often with surface rocks. Small, secretive species.
<i>Leptotyphlops humilis</i> (Western threadsnake, Culebrilla ciega de occidente, Viburíta) Photos, descriptions, and keys in Degenhardt et al. (1996) and Grismer (2002). Photo and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; tropical deciduous forest; highlands	Distributed throughout Sonora except for the high northeastern mountains. Likely absent from arid valleys of the western Gran Desierto. Small, secretive, burrowing species.
BOIIDAE		
<i>Boa constrictor</i> (Boa constrictor, Limacoa, Macoa, Corúa, Boa, Xazáacoj) Photo in Appendix A. Photo and keys in Lemos-Espinal et al. (2004).	Sonoran Desert; thornscrub; tropical deciduous forest; highlands	Throughout tropical deciduous forest and thornscrub as well as adjacent rich Sonoran Desert and lower highlands. Inland to within 80 km (Magdalena Palm Canyon northwest of Cucurpe) or less of the Arizona border. Occurs on the coast north to Bahía Kino (E. Enderson, pers. comm. 2006). Heavy bodied snake to >2 m ^b . Status = A.
<i>Lichanura trivirgata</i> (Rosy boa, Boa rosada, Maxáa) Photo, descriptions, and keys in Grismer (2002). Photos and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub	Rocky slopes and bajadas in the Gran Desierto south to mountains southeast of Empalme. Status = A.
COLUBRIDAE		
<i>Arizona elegans</i> (Glossy snake, Culebra brillante, Coimaj) Photos, descriptions, and keys in Degenhardt et al. (1996) and Grismer (2002). Photo and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; highlands; tropical deciduous forest	Primarily a species of Sonoran Desert flats and valleys, found from the Gran Desierto east to the Nogales area and south along the coast and lower foothills into Sinaloa.
<i>Chilomeniscus stramineus</i> (Variable sand snake, Culebra de los médanos, Coralillo falso, Hapéquet Camízj) Photo, descriptions, and keys in Grismer (2002). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; tropical deciduous forest	Burrowing species that occurs in the eastern Gran Desierto and near Sasabe on the Arizona border south to near the Sinaloan border. Primarily a Sonoran Desert species of sandy or gravelly arroyos with leaf litter. Records from tropical deciduous forest near Alamos.

Scientific (Common) Names References	Habitat	Descriptions, Distribution, Status, and Other Notes
<i>Chionactis occipitalis</i> (Western shovel-nosed snake, Coralillo falso, Hant quip) Photo, descriptions, and keys in Grismer (2002). Photos and descriptions in Brennan and Holycross (2006).	Sonoran Desert	Northwestern flats and valleys from Puerto Libertad north and west to San Luis Río Colorado. Abundant in sandy flats and low dunes.
<i>Chionactis palarostris</i> (Sonoran shovel-nosed snake, Culebra palanaria de Sonora) Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub	Primarily Sonoran Desert from Guaymas north to Sonoyta and near Magdalena, and to the foothills east of Hermosillo, in gravelly bajadas and sandy to rocky flats with relatively open vegetation.
<i>Diadophis punctatus</i> (Ring-necked snake, Culebra de collar) Photos, descriptions, and keys in Degenhardt et al. (1996) and Grismer (2002). Photo and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Thornscrub; highlands	Higher thornscrub canyons, lower highlands and valleys in the northeast from Arizona to the Yécora area.
<i>Drymarchon melanurus</i> (Western indigo snake, Babutua, Babatuco, Culebra azul, Culebra prieta) Photos and keys in Lemos-Espinal et al. (2004).	Thornscrub; tropical deciduous forest; highlands (marginal)	Southern Sonoran foothills and valleys from Sinaloa north at least to lower Río Aros and near San Javier north of Suaqui Grande (Río Yaqui). Often near water. Large individuals are >2 m ^b . Most active during morning and late afternoon.
<i>Drymobius margaritiferus</i> (Speckled racer, Corredora moteada, Culebra)	Tropical deciduous forest	Foothills in extreme southern Sonora, often near water. Records from near Alamos, Río Cuchujaqui, Choquincahui, and Güirocoba. Diurnal ^a and primarily terrestrial. Dorsal scales dark, each with a yellow or cream spot.
<i>Geophis dugesii</i> (Dugés's earth snake, Minadora de Dugés) Photo in Appendix A. Keys in Lemos-Espinal et al. (2004).	Highlands (montane woodland communities)	Documented in the mountains near Yécora as the subspecies <i>G. d. aquilonaris</i> . Likely occurs elsewhere in the southeastern mountains from Sinaloa north to at least Hwy 16. Rarely encountered. Black-and-white banded pattern similar to <i>Tropidodipsas repleta</i> , but with a light band on the neck, more (>172) ventral scales (<156 in <i>T. repleta</i>), and distinctive head scalation.
<i>Gyalopium canum</i> (Chihuahuan hook-nosed snake, Culebra de naricilla occidental) Photo, descriptions, and keys in Degenhardt et al. (1996). Keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Highlands including Chihuahuan Desert, grasslands, and montane woodland communities	Burrowing species typically of arid flats and grasslands from Yécora north and northwest to Arizona. Occasionally found in mountains. Rarely encountered in Sonora.

Scientific (Common) Names References	Habitat	Descriptions, Distribution, Status, and Other Notes
<i>Gyalopium quadrangulare</i> (Thornscrub hook-nosed snake, Corallilo, Viburita) Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; tropical deciduous forest; highlands	Widespread, but not found in arid northwest or higher areas of eastern Sonora. Burrowing species typically of rolling terrain and foothills, most commonly in thornscrub and tropical deciduous forest. Status = Pr.
<i>Heterodon nasicus</i> (Western hog- nosed snake, Culebra nariz de cerdo occidental) Photo, descriptions, and keys in Degenhardt et al. (1996). Photos and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Highlands	High northeastern desert or grassland valleys, often in sandy or loose soils suitable for burrowing. Smith et al. (2003) consider the subspecies in Sonora to be a separate species – <i>H. kennerlyi</i> . Status = Pr.
<i>Hypsiglena torquata</i> (Nightsnake, Culebra de la noche, Coimaj coospoj) Photo, descriptions, and keys in Degenhardt et al. (1996) and Grismer (2002). Photos and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; tropical deciduous forest; highlands including Chihuahuan Desert, grasslands, and montane woodland communities	Throughout Sonora from low desert valleys well into the mountains. Likely absent from highest eastern mountains and valleys of the western Gran Desierto.
<i>Imantodes gemmistratus</i> (Central American tree snake, Cordelilla de la escamuda, Culebra) Photo in Appendix A.	Thornscrub; tropical deciduous forest	Extremely thin-bodied, arboreal species found on roads at night or in low trees and shrubs in the southeastern foothills at least as far north as Hwy 16. Especially active after summer rains. Status = Pr.
<i>Lampropeltis getula</i> (Common kingsnake, Culebra real común) Photos, descriptions, and keys in Degenhardt et al. (1996) and Grismer (2002). Photo and keys in Lemos-Espinal et al. (2004). Photos and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; tropical deciduous forest; highlands including Chihuahuan Desert, grasslands, and montane woodland communities	Throughout Sonora except for arid valleys in the Gran Desierto and the highest mountains in the east. Status = A.
<i>Lampropeltis pyromelana</i> (Sonoran mountain kingsnake, Culebra real de montaña Sonora) Photo, descriptions, and keys in Degenhardt et al. (1996). Photos and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Highlands (montane woodland communities)	Found in wooded mountains of eastern Sonora above 1,200 m from the Sierras Mariquita and San Luis south probably into Sinaloa. Lemos-Espinal et al. (2003) consider snakes from the Yécora area south to be a separate species (<i>L.</i> <i>knoblochi</i>). Status = A.
<i>Lampropeltis triangulum</i> (Milk snake, Coralilla) Photo in Appendix A. Photos, descriptions, and keys in Degenhardt et al. (1996). Photo and keys in Lemos-Espinal et al. (2004). Photos and descriptions in Brennan and Holycross (2006).	Thornscrub; tropical deciduous forest	Foothills from Sinaloa north to at least Santa Rosa area on Hwy 16. May also occur in grasslands in northeastern highlands. Status = A.

Scientific (Common) Names References	Habitat	Descriptions, Distribution, Status, and Other Notes
<i>Leptodeira punctata</i> (Western cat-eyed snake, Escombrera del occidente México)	Thornscrub	Only known from Río Yaqui near Ciudad Obregón. Expected elsewhere in southern Sonora. Found near water. Can be found on the ground or in low shrubs or trees. Vertical pupils. Small, often paired spots on the dorsum.
<i>Leptodeira splendida</i> (Splendid cat-eyed snake, Escombrera ojo de gato) Photo and keys in Lemos-Espinal et al (2004).	Tropical deciduous forest; highlands	In the east from Sinaloa north at least to Highway 16 (near San Nicolas and Maycoba). Most records from east of Alamos to Choquincahui and Güirocoba. Often arboreal near water. Vertical pupils. Large, dark blotches on dorsum.
<i>Leptophis diplotropis</i> (Pacific coast parrot snake, Culebra verde, Güirotillera) Photo in Appendix A. Photos and keys in Lemos-Espinal et al. (2004).	Tropical deciduous forest	Primarily extreme southeastern foothills (e.g., Alamos area, Río Cuchujaqui, Choquincahui, and Güirocoba), but isolated record from near Cumpas. Alert, slender snake. Typically arboreal in trees and shrubs, but sometimes on the ground. Diurnal ^a . Status = A.
<i>Masticophis bilineatus</i> (Sonoran whipsnake, Chirrionero, Culebra de pollo, Alicante, Coimaj coopol) Photo, descriptions, and keys in Degenhardt et al. (1996) and Grismer (2002). Photo and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; tropical deciduous forest; highlands including Chihuahuan Desert, grasslands, and montane woodland communities	Throughout Sonora except for arid northwestern valleys and mountains west of the Sierra Pinacate. Diurnal ^a and often arboreal. Found to high in the mountains.
<i>Masticophis flagellum</i> (Coachwhip, Chirrionera, Chicotera, Alicante, Alicanre, Coimaj coopol) Photos, descriptions, and keys in Degenhardt et al. (1996) and Grismer (2002). Photos and keys in Lemos-Espinal et al. (2004). Photos and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; tropical deciduous forest; highlands	Throughout most of Sonora, except the highest mountains in the East. Found on the ground or in trees and shrubs. Diurnal ^a . Status = A.
<i>Masticophis mentovarius</i> (Neotropical whipsnake, Chirrionera, Alicante) Photo and keys in Lemos-Espinal et al. (2004).	Thornscrub; tropical deciduous forest	Southeastern foothills and mountains from Sinaloa north to at least Santa Ana de Yécora. Primarily terrestrial in open areas. Diurnal ^a . Similar to <i>M. flagellum</i> but heavier bodied with a broader head, adults are gray or tan with no distinct stripes, chin and throat are unspotted, and dorsal scales are usually tipped posteriorly with black.

Scientific (Common) Names References	Habitat	Descriptions, Distribution, Status, and Other Notes
<i>Mastigodryas cliftoni</i> (Clifton's lizard eater, Lagartijera, Alicantre)	Tropical deciduous forest	Extreme southeastern foothills. Rarely encountered. Records from near Alamos, Choquinahui, Anna María Mine (32 km east of Alamos), and Arroyo Verde near Rancho Santa Bárbara. Alert, fast-moving, diurnal ^a , and typically found on the ground. Large eyes, blue and/or red on the head and neck, followed by dark banding and a transition to black coloration on the posterior 1/2 to 1/3 of the body and the tail. To >1.5 m ^b .
<i>Oxybelis aeneus</i> (Brown vine snake, Bejuquilla, Güirotillera, Hamíj catójoj) Photos and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; tropical deciduous forest; highlands	Very slender, primarily arboreal snake found from the Arizona border near Nogales and Presa Augustura south to Sinaloa. At lower elevations in highlands. Marginal on eastern and southern borders of Sonoran Desert.
<i>Phyllorhynchus browni</i> (Saddled leaf-nosed snake, Culebríta) Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; tropical deciduous forest	Throughout most of the lowlands and foothills except for the Gran Desierto west of Sierra Pinacate. Often on bajadas in gravelly or sandy soils. Status = Pr.
<i>Phyllorhynchus decurtatus</i> (Spotted leaf-nosed snake, Culebríta, Cocasnáacöl) Photo, descriptions, and keys in Grismer (2002). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub	Western Sonora from the Gran Desierto and Santa Ana (ca. 85 km south of Nogales) south to at least Navojoa, and east to Ures. Typically found in sandy or gravelly soils in valleys and bajadas. May occur in tropical deciduous forest near Alamos.
<i>Pituophis catenifer</i> (Gophersnake, Cincuate, Víbora sorda, Burillo, Cocasnáacöl) Photo, descriptions, and keys in Degenhardt et al. (1996) and Grismer (2002). Photo and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; tropical deciduous forest; highlands including Chihuahuan Desert, grasslands, and montane woodland communities	Occurs throughout Sonora, but likely absent from arid valleys in the western Gran Desierto. Uncommon or absent at the highest elevations.
<i>Pituophis deppiei</i> (Mexican bullsnake, Cincuate Mexicana) Photos and keys in Lemos-Espinal et al. (2004).	Highlands (montane woodland communities)	Known from Hwy 16 at 1,829 m in the Sierra Madre Occidental (Smith et al. 2005b). Has two prefrontal scales (<i>P. catenifer</i> has four). Distribution of the two <i>Pituophis</i> needs further investigation in eastern Sonora.
<i>Procinura aemula</i> (File-tail ground snake, Coralillo) Photos and keys in Lemos-Espinal et al. (2004).	Tropical deciduous forest	Southeastern foothills and river valleys from Sinaloa north to west of Mazatan, often in rocky, open terrain below 750 m. Particularly active after summer rains. Dorsal pattern variable, but can very much resemble a small (<450 mm ^b) <i>Micrurus distans</i> , except snout is usually pale. Distinctive, strongly keeled scales on tail.

Scientific (Common) Names References	Habitat	Descriptions, Distribution, Status, and Other Notes
<i>Pseudoficimia frontalis</i> (False ficimia, Culebra)	Thornscrub; tropical deciduous forest	Southeastern foothills north to at least Hwy 16. Secretive and rarely encountered. Brown or tan snake to ~0.7 m ^b with dark mid-dorsal blotches/spots and smooth scales. Slightly upturned rostral scale similar to <i>Gyalopium</i> . Loreal scale absent.
<i>Rhinocheilus lecontei</i> (Long-nosed snake; Coralillo falso, Cofti caacoj) Photos, descriptions, and keys in Degenhardt et al. (1996) and Grismer (2002). Photo and keys in Lemos-Espinal et al. (2004). Photos and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; tropical deciduous forest; highlands including Chihuahuan Desert, grasslands, and montane woodland communities	Widespread except in eastern mountains above 1,900 m. Commonly found on roadways at dusk or after dark. Smith et al. (2004) consider the subspecies <i>antoni</i> of southern Sonora to be a separate species (but see Manier 2004).
<i>Salvadora bairdi</i> (Baird's patch-nosed snake, Culebra chata de Baird)	Highlands (montane woodland communities)	Known only from Sierra La Madera east of Cumpas and Sierra Milpillas west of Milpillas, Chihuahua. Likely occurs elsewhere in eastern mountains above 500 m. Diurnal ^a . Similar to other <i>Salvadora</i> but dark dorsal stripes relatively broad and mid-dorsal light stripe narrow. Lateral dark stripes prominent on third scale rows. Eight supralabials and posterior chin shields separated by a series of small scales. Status = Pr.
<i>Salvadora grahamiae</i> (Mountain patch-nosed snake, Culebra chata de montaña) Photo, descriptions, and keys in Degenhardt et al. (1996). Keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Highlands	Northeastern mountains near the Chihuahua and Arizona borders, particularly >1,370 m. Often in rocky canyons or slopes. Diurnal ^a . Distribution poorly known in Sonora.
<i>Salvadora hexalepis</i> (Western patch-nosed snake, Culebra chata, Maxáa) Photo, descriptions, and keys in Grismer (2002). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; tropical deciduous forest; highlands	Throughout Sonora except for higher eastern mountains where it is replaced by other <i>Salvadora</i> species. Diurnal ^a .
<i>Senticolis triaspis</i> (Green rat snake, Culebra ratonera oliva, Culebra verde) Photo, descriptions, and keys in Degenhardt et al. (1996). Photo and keys in Lemos-Espinal et al. (2004). Photos and descriptions in Brennan and Holycross (2006).	Thornscrub; tropical deciduous forest; highlands; Sonoran Desert (marginal)	Typically rocky canyons in foothills and mountains. Throughout eastern Sonora, but absent from highest mountains. Occurs in rich Sonoran Desert near Guaymas.

Scientific (Common) Names References	Habitat	Descriptions, Distribution, Status, and Other Notes
<i>Sonora semiannulata</i> (Groundsnake, Culebra de arena) Photos, descriptions, and keys in Degenhardt et al. (1996) and Grismer (2002). Photos and keys in Lemos-Espinal et al. (2004). Photos and descriptions in Brennan and Holycross (2006).	Sonoran Desert; highlands	Near San Luis Río Colorado in riverine, agricultural, and rural or urban areas, as well as in the northeast near the Arizona border.
<i>Storeria storerioides</i> (Mexican brown snake, Culebra parda Mexicana) Photo and keys in Lemos-Espinal et al. (2004).	Highlands (montane woodland communities)	Records from Sierra Huachinera, west of Yécora, and east of Alamos. Secretive montane species, rarely encountered. Small (<350 mm ^b), slender, brown snake with dark spots or narrow banding and a dark patch on top of the head that extends behind the parietal scales to form short (1-7 scale rows), lateral stripes on the neck.
<i>Sympholis lippiens</i> (Mexican short-tailed snake, Culebra de cola corta Mexicana, Culebra, Coralillo) Photo and keys in Lemos-Espinal et al. (2004).	Thornscrub; tropical deciduous forest	Foothills from Sinaloa north to at least Moradillas (southeast of Hermosillo). Most records from west of Alamos. Short-tailed, black and white or yellow banded, burrowing species, <0.6 m ^b that may be associated with leaf cutter ant mounds (Holm 2003).
<i>Tantilla hobartsmithi</i> (Smith's black-headed snake, Culebra cabeza negra del suroeste) Photo, descriptions, and keys in Degenhardt et al. (1996). Keys in Lemos-Espinal et al. (2004). Photos and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; highlands	Northeast from Arizona border south to at least Hermosillo, but also near Sonoyta and in the Guaymas area. The latter, disjunct localities, suggest the species likely occurs elsewhere in Sonoran Desert and thornscrub. Distribution poorly known in Sonora.
<i>Tantilla nigriceps</i> (Plains black-headed snake, Culebra cabeza negra de los llanos) Photo, descriptions, and keys in Degenhardt et al. (1996). Photos and descriptions in Brennan and Holycross (2006).	Highlands	Unconfirmed for Sonora, but likely occurs in northeastern valleys. Records near the Sonora border in Arizona and New Mexico.
<i>Tantilla wilcoxi</i> (Chihuahuan black-headed snake, Culebra cabeza negra de Chihuahua) Photo and keys in Lemos-Espinal et al. (2004). Photos and descriptions in Brennan and Holycross (2006).	Highlands (montane woodland communities)	Sierra San Luis and Hwy 16 between Tonichi and San Nicolas. Likely occurs elsewhere in the eastern mountains above 900 m. Can be found under rocks, logs, or dead agaves in rocky, wooded canyons.
<i>Tantilla yaquia</i> (Yaqui black-headed snake, Culebra cabeza negra Yaqui) Photo, descriptions, and keys in Degenhardt et al. (1996). Keys in Lemos-Espinal et al. (2004). Photos and descriptions in Brennan and Holycross (2006).	Thornscrub; tropical deciduous forest; highlands	Eastern Sonora from near Sasabe south and east to Sinaloa and Chihuahua. Absent from higher mountains. Can be found under rocks, logs, and other surface debris.

Scientific (Common) Names References	Habitat	Descriptions, Distribution, Status, and Other Notes
<i>Thamnophis cyrtopsis</i> (Black-necked gartersnake, Culebra lineada de bosque, Culebra de agua) Photo, descriptions, and keys in Degenhardt et al. (1996). Photo and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; tropical deciduous forest; highlands including Chihuahuan Desert, grasslands, and montane woodland communities	Widespread in Sonora except north and west of Caborca and coastal plain north of Guaymas area. Often found in or near canyon streams, but may stray into uplands. Primarily diurnal ^a . Status = A.
<i>Thamnophis eques</i> (Mexican gartersnake, Culebra de agua nómado Mexicano, Culebra de agua) Photo in Appendix A. Photo, descriptions, and keys in Degenhardt et al. (1996). Photo and keys in Lemos-Espinal et al. (2004). Photos and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; tropical deciduous forest; highlands	A highly aquatic species of ciénegas, streams, and cattle tanks from Altar, Rancho Los Fresnos, and San Bernardino south through the foothills and mountains to Río Fuerte drainage. Common east of Yécora. Likely occurred historically on Río Colorado. Diurnal ^a . Status = A.
<i>Thamnophis marcianus</i> (Checkered gartersnake, Sochuate) Photo, descriptions, and keys in Degenhardt et al. (1996) and Grismer (2002). Photos and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; highlands	Río Yaqui and other drainages east and north of Hermosillo. Also Río Colorado. Found in a variety of wetland types as well as croplands. Status = A.
<i>Thamnophis melanogaster</i> (Mexican blackbelly water snake, Culebra de agua de panza negra Mexicana) Photo and keys in Lemos-Espinal et al. (2004).	Highlands	In Sonora, only known from Yécora area and Mesa Tres Ríos. Highly aquatic species of montane streams, marshes, and ciénegas. Adults can be similar to <i>T. valida</i> , but anal scale not divided. Status = A.
<i>Thamnophis rufipunctatus</i> (Narrow-headed gartersnake, Culebra de agua de cabeza-angosta, Pichecuate) Photo, descriptions, and keys in Degenhardt et al. (1996). Keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Highlands (montane woodland communities)	Highly aquatic snake of montane rocky streams. Records from near Yécora and Baviácora, but likely occurs elsewhere in the northeastern mountains (see Rossman et al. 1996). Diurnal ^a .
<i>Thamnophis valida</i> (West Coast gartersnake, Culebra de agua) Photos, descriptions, and keys in Grismer (2002). Keys in Lemos-Espinal et al. (2004).	Thornscrub; tropical deciduous forest	From the dam at Presa Alvaro Obregón and Alamos south to Sinaloa. Aquatic snake of permanent streams, rivers, and rocky pools. Most active at night. Lacks light dorsal stripes, anal scale divided.

Scientific (Common) Names References	Habitat	Descriptions, Distribution, Status, and Other Notes
<i>Trimorphodon biscutatus</i> (Western lyresnake, <i>Víbora sorda</i>) Photo, descriptions, and keys in Degenhardt et al. (1996) and Grismer (2002). Photos and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; tropical deciduous forest; highlands	Throughout most of Sonora in rocky hillsides and canyons. Absent from higher mountains in the east.
<i>Trimorphodon tau</i> (Mexican lyresnake, <i>Culebra</i>) Keys in Lemos-Espinal et al. (2004).	Thornscrub; tropical deciduous forest	Rocky canyons and foothills south of Nuri. Hybridizes with <i>T. biscutatus</i> . A specimen from 32 km east of Caborca (Ottley 1982) is questionable. Distinguished from <i>T. biscutatus</i> by a light transverse band across nape of neck.
<i>Tropidodipsas repleta</i> (Snail-eating snake, <i>Caracolera occidental</i>)	Highlands (montane woodland communities)	Known only from km 236 on Hwy 16 in the Sierra Madre Occidental at 1,643 m (see Smith et al. 2005c). A specimen of <i>Tropidodipsas "philippi"</i> from km 258, Hwy 16 (UNAM 12057) may be this species. Expected elsewhere in southeastern mountains. Similar to <i>T. annulifera</i> from Sinaloa but has 15-29 complete, narrow (1 scale row dorsally, 2 scale rows ventrally) white bands on a black background and lacks a white band on the neck. Probably grows to ~0.5 m ^b .

ELAPIDAE

<i>Micruroides euryxanthus</i> (Sonoran coralsnake, Coralillo occidental, Coralillo, Coftj) Photos, descriptions, and keys in Degenhardt et al. (1996) and Grismer (2002). Keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; tropical deciduous forest; highlands	Widespread in lowland Sonora, except for western Gran Desierto, coastal plain north of Punta Tepoca, and the higher mountains of eastern Sonora. Occasional in pine-oak woodland near Yécora. Most are < 0.5 m ^b . Third band from snout is red (it is black in <i>Micrurus distans</i>). Highly venomous. Status = A.
<i>Micrurus distans</i> (West Mexican coralsnake, Coralillo) Photo and keys in Lemos-Espinal et al. (2004).	Thornscrub; tropical deciduous forest; highlands	From Sinaloa north to at least the foothills of the Río Yaqui area near Tónichi and the mountains at Maycoba. In grassland-oak woodland at Maycoba and Santa Bárbara. To more than 1 m ^b . Active at cooler temperatures than many snakes. Often active after summer rains. Highly venomous. Status = Pr.
<i>Pelamis platurus</i> (Yellow-bellied sea snake, Alicante del mar, Xepe ano cocázní) Photo, descriptions, and keys in Grismer (2002).	Marine environments in the Gulf of California	Ranges throughout the Gulf of California, but does not breed in our area. Highly venomous, although it rarely bites.

Scientific (Common) Names References	Habitat	Descriptions, Distribution, Status, and Other Notes
VIPERIDAE		
<i>Agkistrodon bilineatus</i> (Cantil, Pichecuate, Pichicuata) Photo in Appendix A.	Thornscrub; tropical deciduous forest	Foothills from Sinaloa north to near Nuri (R. Babb, pers. comm. 2007), often near streams. Uncommonly encountered and highly venomous. Status = Pr.
<i>Crotalus atrox</i> (Western diamond-backed rattlesnake, Víbora serrana, Cocázni) Photo, descriptions, and keys in Degenhardt et al. (1996) and Grismer (2002). Photo and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; tropical deciduous forest; highlands	Widespread in Sonora except arid valleys of the western Gran Desierto and higher eastern mountains. Highly venomous. Status = Pr.
<i>Crotalus basiliscus</i> (Mexican west coast rattlesnake, Sayahuqui, Cola prieta) Photo and keys in Lemos-Espinal et al. (2004).	Thornscrub; tropical deciduous forest	Mostly below 600 m from Sinaloa north to near Vicam on the coast and inland to just south of Hwy 16. Apparently hybridizes with <i>C. molossus</i> at 600-1,500 m (Campbell and Lamar 2004). Very similar to <i>C. molossus</i> , but tail gray with dim, light rings (tail black in <i>C. molossus</i>), and dorsal blotches less likely to form crossbars on the body. Highly venomous. Status = Pr.
<i>Crotalus cerastes</i> (Sidewinder, Cuernitos, Ctaamjij) Photo, descriptions, and keys in Grismer (2002). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert	Small (<0.8 m ^b) horned rattlesnake of sandy flats and bajadas from southwestern Arizona south to at least Estero Tastiota. Highly venomous. Status = Pr.
<i>Crotalus lepidus</i> (Rock rattlesnake, Chachamuri verde, Chichámora) Photo, descriptions, and keys in Degenhardt et al. (1996). Photos and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Highlands	Small (mostly <0.8 m ^b) rattlesnake of rocky montane canyons and talus slopes from southeastern Arizona south to at least Yécora. Highly venomous. Status = Pr.
<i>Crotalus mitchelli</i> (Speckled rattlesnake, Víbora blanca) Photo, descriptions, and keys in Grismer (2002). Photos and descriptions in Brennan and Holycross (2006).	Sonoran Desert	Rocky mountains and bajadas at Sierra Pinacate and adjacent ranges in the Gran Desierto. Highly venomous.
<i>Crotalus molossus</i> (Black-tailed rattlesnake, Sayahuqui, Cola prieta, Cocázni) Photos, descriptions, and keys in Degenhardt et al. (1996) and Grismer (2002). Photos and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; tropical deciduous forest (marginal); highlands	Throughout Sonora except for western Gran Desierto and coastal plain south of Guaymas. Often a montane snake. Highly venomous. Status = Pr.

Scientific (Common) Names References	Habitat	Descriptions, Distribution, Status, and Other Notes
<i>Crotalus pricei</i> (Twin-spotted rattlesnake, Chachámuri, Chichámora) Photos and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Highlands (montane woodland communities)	Small (<0.7 m ^b) rattlesnake of rocky outcrops and talus slopes above 1,900 m. Known from the Sierras el Tigre and de los Ajos. May occur in other high northeastern mountains. Highly venomous. Status = Pr.
<i>Crotalus scutulatus</i> (Mohave rattlesnake, Víbora de cascabel, Cocázni) Photo, descriptions, and keys in Degenhardt et al. (1996). Photo and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; highlands	Valleys and bajadas of northern Sonora from the Sierra del Rosario (Gran Desierto) east to at least the Naco area and probably to the Sierra San Luis, and south to Benjamin Hill and near Puerto Lobos. Absent above about 1,700 m. Highly venomous. Status = Pr.
<i>Crotalus tigris</i> (Tiger rattlesnake, Cascabel del tigre, Cocázni cahtxíma) Photo and descriptions in Brennan and Holycross (2006).	Sonoran Desert; thornscrub; tropical deciduous forest; highlands	Small (<0.9 m ^b) rattlesnake throughout much of Sonora in mountains and rocky bajadas below about 1,470 m. Absent from western Gran Desierto and higher eastern mountains and valleys. Highly venomous. Status = Pr.
<i>Crotalus viridis</i> (Prairie rattlesnake, Cascabel occidental) Photo, descriptions, and keys in Degenhardt et al. (1996). Photo and keys in Lemos-Espinal et al. (2004). Photo and descriptions in Brennan and Holycross (2006).	Highlands (grasslands)	Occurs in grasslands and perhaps the lower slopes of the Sierra San Luis in extreme Northeast (Enderson pers. comm. 2007). Highly venomous. Status = Pr.
<i>Crotalus willardi</i> (Ridge-nosed rattlesnake, Chachámuri roja, Chichámora) Photo in Appendix A. Photo, descriptions, and keys in Degenhardt et al. (1996). Photos and keys in Lemos-Espinal et al. (2004). Photos and descriptions in Brennan and Holycross (2006).	Highlands (montane woodland communities)	Small (<0.7 m ^b) rattlesnake of wooded montane canyons and slopes above about 1,500 m from the Sierra San Luis complex west to the Sierra de Pinitos (Villa et al. 2007) and south to the Sierras Aconchi and Huachinera, and near Yécora. Highly venomous. Status = Pr.

Scientific (Common) Names References	Habitat	Descriptions, Distribution, Status, and Other Notes
<i>Sistrurus catenatus</i> (Massasauga, Cascabel de massasauga, Víbora de cascabel) Photo, descriptions, and keys in Degenhardt et al. (1996). Photo and descriptions in Brennan and Holycross (2006).	Highlands	Unconfirmed for Sonora. Small (<0.6 m ^b) rattlesnake that likely occurs or occurred in grasslands near Agua Prieta and the Río San Pedro Valley. USNM 506, collected in 1851 from "Sonora" (unspecified locality), is the only massasauga collected or reported from Sonora. Some confusion surrounds this locality. The expedition during which the specimen was collected zig-zagged across the current U.S./Mexico border in 1851, so the specimen could have been collected in either Arizona or Sonora (Stejneger 1940, Bogert and Oliver 1945). Populations of this species have declined in Arizona. Highly venomous. Status = Pr.

^aMost lizards are diurnal, whereas most snakes are nocturnal or are active in favorable weather day or night. Lizards that are primarily nocturnal and snakes that are primarily diurnal are noted in the third column.

^bTotal length (body + tail)

^cAjolote typically refers to *Ambystoma* salamanders; however, in the mountains of southeastern Sonora, this term is also used to describe blue-tailed skinks.

NOTE ADDED IN PRESS

Two additional introduced species have recently been documented in mainland Sonora, including the Brahminy blindsnake (*Ramphotyphlops braminus*) from the Parque Madero in Hermosillo (Quijada-Mascareñas, A., and E. F. Enderson. 2007. *Ramphotyphlops braminus* (Brahminy blindsnake), México, Sonora. *Herpetological Review* 38(4):490) and the Common house gecko (*Hemidactylus frenatus*) from Guaymas (Valdez-Villavicencio, J., and A. Peralta-García. In review. Nuevos registros de *Hemidactylus frenatus* (Squamata: Gekkonidae) en el noroeste de México. *Acta Zoologica Mexicana*). These findings came too late in the review process to be reflected in this paper, as did information in Lemos-Espinal, J. A., and H. M. Smith. 2007. *Anfibios y Reptiles del Estado de Chihuahua, México/Amphibians and Reptiles of the State of Chihuahua, México*. Universidad Nacional Autónoma de México y CONABIO, México D.F. and recent taxonomic revisions as described in CROTHER, B. I., ed. 2008. *Scientific and Standard English Names of Amphibians and Reptiles of North America North of Mexico*. SSAR Herpetological Circular 37 and LINER, E. A. 2007. *A Checklist of Amphibians and Reptiles of México*. Occasional Papers of the Museum of Natural Science No. 80.

ACKNOWLEDGMENTS

This paper would not have been possible without access to museum collections, generous contributions of unpublished data, and the hospitality of the people of Sonora. Persons contributing information and reviews, as well as museums accessed, are listed in "The Checklist" above. I would not have attempted this work without the encouragement of Eduardo López Saavedra.

LITERATURE CITED

- BOGERT, C. M., and J. A. OLIVER. 1945. A preliminary analysis of the herpetofauna of Sonora. *Bulletin of the American Museum of Natural History* 83(6):297-426.
- BRANDLEY, M. C., A. SCHMITZ, and T. W. REEDER. 2005. Partitioned bayesian analyses, partition choice, and the phylogenetic relationships of Scincide lizards. *Systematic Biology* 54(3):373-390.
- BRENNAN, T. C., and A. T. HOLYCROSS. 2006. *Amphibians and Reptiles in Arizona*. Arizona Game and Fish Department, Phoenix, AZ.
- BÚRQUEZ, A., and A. MARTÍNEZ-YRÍZAR. 2007. Conservation and landscape transformation in northwestern México. Pp. 537-547 in R. Felger and B. Broyles, eds., *Dry Borders, Great Natural Reserves of the Sonoran Desert*. University of Utah Press, Salt Lake City.
- BÚRQUEZ-MONTIJO, A., M. E. MILLER, and A. MARTÍNEZ-YRÍZAR. 2002. Mexican grasslands,

- thornscrub, and the transformation of the Sonoran Desert by invasive exotic buffelgrass (*Pennisetum ciliare*). Pp. 126-146 in B. Tellman, ed., *Invasive Exotic Species in the Sonoran Region*. University of Arizona Press and Arizona-Sonora Desert Museum, Tucson.
- CAMPBELL, J. A., and W. W. LAMAR. 2004. *The Venomous Reptiles of the Western Hemisphere*, Vols. 1 and 2. Comstock Publishing Associates, Ithaca, NY.
- COLLINS, J. T. 2006. A re-classification of snakes native to Canada and the United States. *Journal of Kansas Herpetology* 19:18-20.
- CRAWFORD, A. J., and E. N. SMITH. 2005. Cenozoic biogeography and evolution in direct-developing frogs of Central America (Leptodactylidae: *Eleutherodactylus*) as inferred from a phylogenetic analysis of nuclear and mitochondrial genes. *Molecular Phylogenetics and Evolution* 35:536-555.
- CROTHER, B. I., J. BOUNDY, J. A. CAMPBELL, K. DE QUEIROZ, D. R. FROST, D. M. GREEN, R. HIGHTON, J. B. IVERSON, R. W. MCDIARMID, P. A. MEYLAN, T. W. REEDER, M. E. SEIDEL, J. W. SITES, JR., S. G. TILLEY, and D. B. WAKE. 2003. Scientific and common names for amphibians and reptiles of North America north of México: Update. *Herpetological Review* 34(3):196-203.
- CROTHER, B. I., J. BOUNDY, J. A. CAMPBELL, K. DE QUEIROZ, D. R. FROST, R. HIGHTON, J. B. IVERSON, P. A. MEYLAN, T. W. REEDER, M. E. SEIDEL, J. W. SITES, JR., T. W. TAGGART, S. G. TILLEY, and D. B. WAKE. 2000. *Scientific and Common Names for Amphibians and Reptiles of North America North of México, with Comments Regarding Confidence of Our Understanding*. Society for the Study of Amphibians and Reptiles, Herpetological Circular No. 29.
- DEGENHARDT, W. G., C. W. PAINTER, and A. H. PRICE. 1996. *Amphibians and Reptiles of New Mexico*. University of New Mexico Press, Albuquerque.
- DUELLMAN, W. E. 2001. *The Hylid Frogs of Middle America*. Expanded ed. Society for the Study of Amphibians and Reptiles, St. Louis, MO.
- ENDERSON, E., and R. BEZY. 2007. *Syrrophus interorbitalis* (Spectacled chirping frog). México: Sonora. *Herpetological Review* 38(2):216.
- ENDERSON, E. F., R. L. BEZY, and S. F. HALE. 2007. *Kinosternon integrum* (Mexican mud turtle). México: Sonora. *Herpetological Review* 38(2):217.
- FAIVOVICH, J., C. F. B. HADDAD, P. C. O. GARCIA, D. R. FROST, J. A. CAMPBELL, and W. C. WHEELER. 2005. Systematic review of the frog family Hylidae, with special reference to Hylinae: Phylogenetic analysis and taxonomic revision. *Bulletin of the American Museum of Natural History* 294:1-240.
- FLORES-VILLELA, O. 1993. *Herpetofauna Mexicana: Annotated List of Species of Amphibians and Reptiles of México, Recent Taxonomic Changes, and New Species*. Special Publication Number 17. Carnegie Museum of Natural History, Pittsburgh, PA.
- FLORES-VILLELA, O., and L. CANSECO-MÁRQUEZ. 2004. Nuevas especies y cambios taxonómicos para la herpetofauna de México. *Acta Zoologica Mexicana (n.s.)* 20(2):115-144.
- FROST, D. R., T. GRANT, J. FAIVOVICH, R. H. BAIN, A. HAAS, C. F. B. HADDAD, R. O. DE SÁ, A. CHANNING, M. WILKINSON, S. C. DONNELLAN, C. J. RAXWORTH, J. A. CAMPBELL, B. L. BLOTTO, P. MOLER, R. C. DREWES, R. A. NUSSBAUM, J. D. LYNCH, D. M. GREEN, and W. C. WHEELER. 2006. The amphibian tree of life. *Bulletin of the American Museum of Natural History* 297:1-370.
- GONZÁLEZ-ROMERO, A., and S. ALVAREZ-CÁRDENAS. 1989. Herpetofauna de la region del Pinacate, Sonora, México: Un inventario. *The Southwestern Naturalist* 34(4):519-526.
- GRISMER, L. L. 2002. *Amphibians and Reptiles of Baja California, including the Pacific Islands in the Sea of Cortez*. University of California Press, Berkeley.
- HALE, S. F., P. C. ROSEN, J. L. JARCHOW, and G. A. BRADLEY. 2005. Effects of the chytrid fungus on the Tarahumara frog (*Rana tarahumarae*) in Arizona and Sonora, México. Pp. 407-411 in G. J. Gottfried, B. S. Gebow, L. G. Eskew, and C. B. Edminster, comps., *Connecting Mountain Islands and Desert Seas: Biodiversity and Management of the Madrean Archipelago II*. Proceedings RMRS-P-36. USDA Forest Service, Rocky Mountain Research Station, Fort Collins, CO.
- HALE, S. F., C. R. SCHWALBE, J. L. JARCHOW, C. J. MAY, C. H. LOWE, and T. B. JOHNSON. 1995. Disappearance of the Tarahumara frog. Pp. 138-140 in E. T. LaRoe, G. S. Farris, C. E. Puckett, P. D. Doran, and M. J. Mac, eds., *Our Living Resources: A Report to the Nation on the Distribution, Abundance, and Health of U.S. Plants, Animals, and Ecosystems*. USDI National Biological Service, Washington, D.C.
- HARDY, L. M., and R. W. MCDIARMID. 1969. The amphibians and reptiles of Sinaloa, México. *University of Kansas Publications, Museum of Natural History* 18(3):39-252 + plates and figs.
- HERINGHI, H. L. 1969. *An Ecological Survey of the Herpetofauna of Alamos, Sonora, México*. M.S. Thesis, Arizona State University, Tempe.

- HOLM, P. A. 2003. *Research and Conservation in Southern Sonora, México*, *Sympholis lippiens* (Mexican short-tailed snake). Arizona-Sonora Desert Museum, Tucson, AZ. <http://www.desertmuseum.org/programs/fauna_sympholis.htm>.
- IUCN-THE WORLD CONSERVATION UNION, CONSERVATION INTERNATIONAL, and NATURE-SERVE. 2004. *Global Amphibian Assessment*. <<http://www.globalamphibians.org>>.
- IVERSON, J. B. 1992. *A Revised Checklist with Distribution Maps of the Turtles of the World*. Privately Printed, Richmond, IN.
- JONES, K. B. 1981. Effects of grazing on lizard abundance and diversity in western Arizona. *The Southwestern Naturalist* 26(2):107-115.
- KARL, A. E., C. MELENDEZ-TORRES, C. R. SCHWALBE, M. VAUGHN, P. C. ROSEN, D. REIDLE, and L. A. BUCCI. 2006. The morphologically distinct Sinaloan desert tortoise. Pp. 18 in *Abstracts, Thirty-first Annual Meeting and Symposium*. The Desert Tortoise Council, Tucson, AZ.
- LARA-GÓNGORA, G. 2004. A new species of *Sceloporus* (Reptilia, Sauria: Phrynosomatidae) of the *grammicus* complex from Chihuahua and Sonora, México. *Bulletin of the Maryland Herpetological Society* 40(1):1-41.
- Lemos-Espinal, J. A., D. Chisar, and H. M. Smith. 2003. Knobloch's kingsnake (*Lampropeltis knoblochi*) of México a species. *Bulletin of the Maryland Herpetological Society* 39(3):53-58.
- LEMONS-ESPINAL, J. A., and H. M. SMITH. In press. *Anfibios y Reptiles de Chihuahua, México/Amphibians and Reptiles of Chihuahua, México*. CONABIO, México D.F.
- LEMONS-ESPINAL, J. A., H. M. SMITH, and D. CHISAR. 2004. *Introducción a Los Anfibios y Reptiles del Estado de Chihuahua/Introduction to the Amphibians and Reptiles of the State of Chihuahua, México*. Universidad Nacional Autónoma de México y CONABIO, México D.F. ASBN 970090000-21-7.
- LINER, E. A. 1994. *Scientific and Common Names for the Amphibians and Reptiles of México in English and Spanish*. Herpetological Circular No. 23. Society for the Study of Amphibians and Reptiles, Athens, OH.
- LINER, E. A. 1996. Addenda to checklist of scientific and common names of Mexican amphibians and reptiles. *Herpetological Review* 27(3):128-129.
- MALDONADO-LEAL, B. G., P. L. WARREN, T. R. JONES, V. BOYARKSI, and J. C. RORABAUGH. In press. *Hyla wrightorum* (Arizona treefrog). México: Sonora. *Herpetological Review*.
- MANIER, M. K. 2004. Geographic variation in the long-nosed snake, *Rhinocheilus lecontei* (Colubridae): Beyond the subspecies debate. *Biological Journal of the Linnean Society* 83:65-85.
- MEAD, J., and A. BAEZ. 2003. Crocodylian remains from the late Pleistocene of northeastern Sonora. *Crocodyle Specialist Group Newsletter* 22(1):19-21.
- MEAD, J. I., A. BAEZ, S. L. SWIFT, M. C. CARPENTER, M. HOLLENSHEAD, N. J. CZAPLEWSKI, D. W. STEADMAN, J. BRIGHT, and J. ARROYO-CABRALES. 2006. Tropical marsh and savanna of the late Pleistocene in northeastern Sonora, México. *The Southwestern Naturalist* 51(2):226-239.
- MULCAHY, D. G., A. W. SPAULDING, J. R. MENDELSON III, and E. D. BRODIE JR. 2006. Phylogeography of the flat-tailed horned lizard (*Phrynosoma mcallii*) and systematics of the *P. mcallii-platyrrhinus* mtDNA complex. *Molecular Ecology* 15(7):1807-1826.
- NABHAN, G. P. 2003. *Singing the Turtles to Sea: The Comcaac (Seri) Art and Science of Reptiles*. University of California Press, Berkeley.
- NAVARRO, C. J. 2003. *Crocodylus acutus* in Sonora. *Crocodyle Specialist Group Newsletter* 22(1):21.
- O'BRIEN, C., A. D. FLESCHE, E. WALLACE, M. BOGAN, S. E. CARRILLO-PERCÁSTEGUI, S. JACOBS, and C. VAN RIPER III. 2006. *Biological Inventory of the Río Aros, Sonora, México: A River Unknown*. University of Arizona and Sonoran Desert Research Station, Tucson.
- OCHOA-OCHOA, L., and O. FLORES-VILLELA. 2006. *Áreas de Diversidad y Endemismo de la Herpetofauna Mexicana*. UNAM-CONABIO-Las prensas de Ciencias, México, D. F.
- OTTLEY, J. R. 1982. *Trimorphodon upsilon* (Broad-banded lyre snake) México, Sonora. *Herpetological Review* 13(3):82.
- PETERS, J. A., and B. OREJAS-MIRANDA. 1970. Catalogue of the neotropical squamata. 1. Snakes. *Bulletin of the U.S. National Museum* 297:1-347.
- REEDER, T. W., C. J. COLE, and H. C. DESSAUER. 2002. Phylogenetic relationships of whiptail lizards of the genus *Cnemidophorus* (Squamata: Teiidae): A test of monophyly, reevaluation of karyotypic evolution, and review of hybrid origins. *American Museum Novitates* 3365:1-61.
- RESENDIZ, A., B. RESENDIZ, W. J. NICHOLS, J. A. SEMINOFF, and N. KAMEZAKI. 1998. First confirmation of a trans-Pacific migration of a tagged loggerhead sea turtle (*Caretta caretta*), released in Baja California. *Pacific Science* 52:151-153.

- RORABAUGH, J. C. In press. Conservation of amphibians and reptiles in northwestern Sonora and southwestern Arizona. In *2006 Biennial Conference of Research in the Sonoran Desert Proceedings Series*. University of Arizona Press, Tucson.
- RORABAUGH, J. C., and J. M. SERVOSS. 2006. *Rana berlandieri* (Rio Grande leopard frog). Mexico: Sonora. *Herpetological Review* 37(1):102.
- ROSEN, P. C. 2007. Reptiles and amphibians in arid southwestern Arizona and northwestern Sonora. Pp. 310-337 in R. Felger and B. Broyles, eds., *Dry Borders, Great Natural Reserves of the Sonoran Desert*. University of Utah Press, Salt Lake City.
- ROSSMAN, D. A., N. B. FORD, and R. A. SEIGEL. 1996. *The Garter Snakes, Evolution and Ecology*. University of Oklahoma Press, Norman.
- SANTOS-BARRERA, G., and J. PACHECO-RODRÍGUEZ. 2004. Status of three species of toads in northwestern México. *Sonoran Herpetologist* 17(7):74-76.
- SECRETARIA DE MEDIO AMBIENTE Y RECURSOS NATURALES. 2002. *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*. NORMA Oficial Mexicana NOM-059-ECOL-2001.
- SEIDEL, M. E. 2002. Taxonomic observations on extant species and subspecies of slider turtles, genus *Trachymes*. *Journal of Herpetology* 36(2):285-292.
- SEMINOFF, J. A., and W. J. NICHOLS. 2007. Sea turtles of the Alto Golfo: A struggle for survival. Pp. 505-518 in R. Felger and B. Broyles, eds., *Dry Borders, Great Natural Reserves of the Sonoran Desert*. University of Utah Press, Salt Lake City.
- SCHWALBE, C. R., and C. H. LOWE. 2000. Amphibians and reptiles of the Sierra de Alamos. Pp. 172-199 in R. H. Robichaux and D. A. Yetman, eds., *The Tropical Deciduous Forest of Alamos, Biodiversity of a Threatened Ecosystem in México*. University of Arizona Press, Tucson.
- SHERBROOKE, W. C. 2003. *Introduction to Horned Lizards of North America*. University of California Press, Berkeley.
- SOLÍS-HERRERA, T. 2000. Historia de la conservación in Sonora. *Entorno, Marzo de 2000* 5:1-2.
- SMITH, H. M., D. CHISZAR, C. M. ECKERMAN, and H. D. WALLEY. 2003. The taxonomic status of the Mexican hognose snake *Heterodon kennerlyi* Kennicott (1860). *Journal of Kansas Herpetology* 5:17-20.
- SMITH, H. M., D. CHISZAR, and J. A. LEMOS-ESPINAL. 2005b. *Pituophis deppei deppei* (Deppe's gophersnake). México: Sonora. *Herpetological Review* 36(1):83.
- SMITH, H. M., J. A. LEMOS-ESPINAL, and D. CHISZAR. 2004. The status of *Rhinochelius antonii* Dugès (Reptilia: Serpentes). *Bulletin of the Maryland Herpetological Society* 40(4):175-178.
- SMITH, H. M., J. A. LEMOS-ESPINAL, and D. CHISZAR. 2005a. *Procinura, P. aemula*. *Catalogue of American Amphibians and Reptiles* 820:1-4.
- SMITH, H. M., J. A. LEMOS-ESPINAL, and D. CHISZAR. 2006. *Holbrookia approximans* (Dickerson's earless lizard). México: Sonora. *Herpetological Review* 36(1):79-80.
- SMITH, H. M., J. A. LEMOS-ESPINAL, D. HARTMAN, and D. CHISZAR. 2005c. A new species of *Tropidodipsas* (Serpentes: Colubridae) from Sonora, México. *Bulletin of the Maryland Herpetological Society* 41(1):39-41.
- SMITH, H. M., and E. H. TAYLOR. 1966. *Herpetology of México. Annotated Checklists and Keys to the Amphibians and Reptiles*. A Reprint of Bulletins 187, 194, and 199 of U. S. National Museum with a list of subsequent taxonomic innovations. Eric Lundberg, Ashton, MD.
- STEBBINS, R. C. 2003. *A Field Guide to Western Reptiles and Amphibians*, Third Edition. Houghton Mifflin Company, Boston, MA.
- STEJNEGER, L. 1940. "Sonora" as the locality for the Graham-Clark reptile collections of 1851. *Copeia* 1940(3):204-205.
- STUART, S. N., J. S. CHANSON, N. A. COX, B. E. YOUNG, A. S. L. RODRIGUEZ, D. L. FISCHMAN, and R. W. WALLER. 2004. Status and trends of amphibian declines and extinctions worldwide. *Science* 306:1783-1786.
- TAYLOR, E. H. 1938. Notes on the herpetological fauna of the Mexican state of Sonora. *Bulletin of the University of Kansas* 24:475-503.
- VAN DEVENDER, T. R., and G. M. FERGUSON. 2003. *Research in the Sierra Madre Occidental of Eastern Sonora, México: Noteworthy Animals in the Yécora Area*. <[Http://www.desertmuseum.org/programs/yecora_index.html](http://www.desertmuseum.org/programs/yecora_index.html)>.
- VILLA, R. A., P. T. CONDON, T. A. HARE, S. AVILA-VILLEGAS, and D. G. BARKER. 2007. *Crotalus willardi willardi* (Arizona ridge-nosed rattlesnake). México: Sonora. *Herpetological Review* 38(2):220.
- WALKER, M. P., and V. PAVLAKOVICH-KOCHI. 2003. *The State of the Arizona-Sonora Border Region: Shared Pollution, Shared Solutions*. The Nature Conservancy, Tucson, AZ.

- WELDON, C., L. H. DU PREEZ, A. D. HYATT, R. MULLER, and R. SPEARE. 2004. Origin of the amphibian chytrid fungus. *Emerging Infectious Diseases* 10(12):3-8.
- WRIGHT, J. W. 1967. A new uniparental whiptail lizard (Genus *Cnemidophorus*) from Sonora, México. *Journal of the Arizona Academy of Science* 4:185-193.
- WRIGHT, J. W. 1994. The North American deserts and species diversity in the lizards of the genus *Cnemidophorus*. Pp. 255-271 in P. R. Brown and J. W. Wright, eds., *Herpetology of the North American Deserts*. Southwestern Herpetologists Society, Special Publication No. 5.
- ZWEIFEL, R. G., and K. S. NORRIS. 1955. Contribution to the herpetology of Sonora, Mexico; descriptions of new subspecies of snakes (*Micruroides euryxanthus* and *Lampropeltis getulus*) and miscellaneous collecting notes. *American Midland Naturalist* 54(1):230-249.

Appendix A. Photographs of representative Sonoran amphibians and reptiles. All photos by the author, except *Geophis dugesii*, taken by Ian Recchio.



Sonoran Desert toad (*Bufo alvarius*) in thornscrub



Mexican leaf frog (*Pachymedusa dacnicolor*), Río Cuchajaqui



Sabinal frog (*Leptodactylus melanonotus*), Sierra de Alamos



Tarahumara frog (*Rana tarahumarae*) from the Sierra de la Madera

Appendix A. Photographs of representative Sonoran amphibians and reptiles. All photos by the author, except *Geophis dugesii*, taken by Ian Recchio.



Cascade frog (*Rana pustulosa*), Arroyo el Cobre near Choquincahui



Juvenile Painted wood turtle (*Rhinoclemmys pulcherrima*), Minas Nuevas



Yaqui slider (*Trachemys yaquia*), Río Mayo



Alamos mud turtle (*Kinosternon alamosae*), El Caracol west of Alamos. This species and *K. arizonense* lack distinctive head stripes or reticulations.

Appendix A. Photographs of representative Sonoran amphibians and reptiles. All photos by the author, except *Geophis dugesii*, taken by Ian Recchio.



Sonora mud turtle (*Kinosternon sonoriense*), Rancho Los Fresnos. This is the most widely distributed of Sonora's four mud turtles.



Yellowbelly gecko (*Phyllodactylus tuberculatus*), Rancho Acosta, Alamos



Gila monster (*Heloderma suspectum*), Rancho el Aribabi, northeast of Imuris



Juvenile spiny-tailed iguana (*Ctenosaura macrolopha*) (green), Río Cuchajaqui. Adults are gray to gray-brown and can be 0.5 m total length.

Appendix A. Photographs of representative Sonoran amphibians and reptiles. All photos by the author, except *Geophis dugesii*, taken by Ian Recchio.



Chuckwalla (*Sauromalus ater*) at its northwestern-most locality in Sonora - El Capitan ~45 km east-southeast of San Luis Río Colorado



Flat-tailed horned lizard (*Phrynosoma mcallii*), Gran Desierto near Bahía Adair



Chihuahuan mezquite lizard (*Sceloporus lemosespinali*), Sierra San Luis



Boa constrictor (*Boa constrictor*) in tropical deciduous forest near Alamos.

Appendix A. Photographs of representative Sonoran amphibians and reptiles. All photos by the author, except *Geophis dugesii*, taken by Ian Recchio.



Yuman Desert fringe-toed lizard (*Uma rufopunctata*), Gran Desierto



One of four specimens of Dugés's earth snake (*Geophis dugesii*) known from Sonora. Photo by Ian Recchio.



Central American tree snake (*Imantodes gemmistratus*) from west of Alamos.



Sinaloan milksnake (*Lampropeltis triangulum*) near Alamos

Appendix A. Photographs of representative Sonoran amphibians and reptiles. All photos by the author, except *Geophis dugesii*, taken by Ian Recchio.



Pacific Coast parrot snake (*Leptophis diplotropis*), west of Alamos



Mexican gartersnake (*Thamnophis eques*), Rancho Los Fresnos NW of Cananea. This species has declined in northern Sonora.



Cantil (*Agkistrodon bilineatus*) from west of Alamos



Ridge-nosed rattlesnake (*Crotalus willard*), Sierra San Luis
