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CONSERVATION STATUS OF THE HERPETOFAUNA OF BAJA CALIFORNIA, MÉXICO AND ASSOCIATED ISLANDS IN THE SEA OF CORTEZ AND PACIFIC OCEAN

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***Abstract.*—The herpetofauna of the Baja California Peninsula represent a unique assemblage of the biodiversity and heritage of México. Pressure from increasing development and land conversion of the second longest peninsula in the world, and its islands, requires a modern synthesis of the conservation status of the herpetofauna. Herein, we evaluate the herpetofauna by assessing regulatory protections, natural protected land areas, and maintenance of *ex situ* species in accredited zoos. We also summarize recent changes to the taxonomy and nomenclature for this herpetofauna, as well as range extensions that further our understanding of species distributions, many of which are poorly understood. Recommendations are given to enhance and further strengthen conservation actions in Baja California, México.**

Key Words.—amphibians, Baja California, conservation, México, reptiles, Sea of Cortez

INTRODUCTION

The Baja California Peninsula, in northwestern México, consists of the states of Baja California and Baja California Sur (Fig. 1). Often referred to as "Baja," this area contains a rich and diverse herpetofauna in an equally diverse landscape. The peninsula is over 1,500 km long, covers over 10 degrees of latitude, and ranges in elevation from below sea level to over 3,000 m. It is only 230 km across at its widest point (Baja California Almanac 2003). The coastal habitats include over 3,300 km of coastline (Grismer 2002). There are over 45 major islands located in the Sea of Cortés and the Pacific Ocean (Baja California Almanac 2003). Rainfall averages less than 5 cm to over 763 cm, with some desert regions devoid of precipitation except for the wettest years (Hastings 1964). Forming the length of the peninsula are the Peninsular Ranges, which run almost unbroken from the State of California, USA southward to the cape of Baja California. A complex tectonic history and interactions between the Pacific and North American Plates resulted in Baja separating from mainland México within the last 7 million years (Stock and Hodges 1989; Winker and Kidwell 1986).

The major ecoregions have distinctive vegetation communities including coastal scrub, desert scrub, montane woodlands and forests, and subtropical thornscrub (Shreve and Wiggins 1964; Wiggins 1980). Each of these plant communities has a distinctive assemblage of herpetofauna. Coastal scrub, plant communities which have a mild climate, are found along the northwest Pacific Coast. Inland from the northern peninsula are the highest elevations comprising chaparral, oak woodland, and coniferous forest communities (Wiggins 1980). The northeast part of the peninsula contains Sonoran desert habitats, some below sea level (Wiggins 1980). Southward, the central deserts of Baja California are comprised of a varied Sonoran Desert terrain, interrupted at the midriff of the peninsula by the Vizcaino Desert, one of only three fog deserts in the world (Shreve and Wiggins 1980; Wiggins 1980). Farther south lays the Central Gulf Coast and the Magdalena Plain. Arid subtropical habitats are found ranging along the mountains from Loreto southward to the Cape region (Wiggins 1980). The montane habitat of the Sierra La Laguna in the southern portion of the peninsula has oak woodlands comprised of several endemic species at the upper elevations (Grismer 2002; Wiggins 1980).

Currently one fifth of the world's amphibians face extinction (Stuart et al. 2004; McCallum 2007; Wake and Vrendenburg 2008; IUCN, Conservation International, and NatureServe, 2008. Global Amphibian Assessment. Available from http://www.iucnredlist.org/initiatives/amphibians [Accessed 12 November, 2009]), their habitats are being converted, global temperatures have reached historic highs, and development of Baja California is proceeding at a rapid pace. For the reptiles and amphibians of Baja California to endure, an assessment of their status and distribution is needed. Herein, we provide the first comprehensive assessment

FIGURE 1. The Baja California Peninsula in M**é**xico with the natural protected areas shaded in red.

of the diverse herpetofauna of Baja California and its islands with respect to conservation needs, status, and distribution.

Taxonomic revisions.—We follow the taxonomy proposed by Grismer (2002), except for where it has been modified in subsequent published revisions including petitions to the ICZN. In their treatment of the amphibian tree of life, Frost et al. (2006) introduced name changes for amphibians of Baja California including members of the former genus *Bufo* now belong to *Anaxyrus* (= *boreas*, *californicus*, *cognatus*, *punctatus*, and *woodhouseii*), and *Ollotis* (= *alvaria*). Some former members of the genus *Rana* are currently *Lithobates* (= *berlandieri*, *catesbianus*, *forreri*, and *yavapaiensis*). Reeder (2002) resurrected *Aspidoscelis* to replace *Cnemidophorus* for former members of the genus in Baja California. *Clemmys* is now *Actinemys* (See full explanation in Iverson et al. 2008). *Sauromalus ater* takes precedence over *Sauromalus obesus* (Bulletin of Zoolological Nomenclature, 2004), and *Crotalus ruber* over *Crotalus exsul* (Bulletin of Zoolological Nomenclature, 2000). Additional recent changes in the in the taxonomy of the herpetofauna of Baja California include: (1) designation of *Pseudacris hypochondriaca* as a distinct species (Recuero et al. 2006); (2) elevation of *Rana draytonii* to full species (Shaffer et al. 2004); (3) change of the name *Xantusia vigilis* to *X. wigginsi* (Leavitt et al. 2007), (4) addition of three species extracted from *Phrynosoma coronatum* (Montanucci 2004); (5) elevation of *Crotalus oreganus* to species level from within *C. viridis* (Crother et al. 2008) based on the work of Pook et al. (2000), Ashton and DeQuieroz (2001), and Douglas et al. (2002); (6) elevation of *Trimorphodon lyrophanes* to species from subspecies level within *T. biscutatus* (Devitt et al. 2008); (7) provision of precedence of *Lichanura* over *Charina* (Burbrink 2005); and (8) movement of *Eridiphas slevini* into *Hypsiglena*, with the recognition of *H. chlorophaea* and *H. ochrorhynca* (Mulcahy 2008) occurring in Baja California.

Other systematic studies were published but did not result in nomenclatural changes. Among these, the relationships of *Rhinocheilus lecontei* were resolved (Manier 2004), Wood et al. (2008) retained the genus *Lichanura*, and Fontanella et al. (2008) determined that *Diadophis punctatus* in southern California and northern Baja California may warrant designation as a distinct species.

Range extensions.—Since Grismer (2002), range extensions for several species in Baja California have been reported and distributions more accurately defined. *Smilisca baudinii* was discovered for the first time in this region (Recuero et al. 2004). Mahrdt et al. (2002, 2003) and Mahrdt and Lovich (2004) reported several new river localities for *Anaxyrus californicus*. Redefining the precise range of this species is a work in progress (Lovich et al., in press). Similarly, Lovich et al. (2005, 2007) provided distributional information, including new localities and rivers inhabited by *Actinemys marmorata*. Sanchez-Pacheco and Mellink (2001) reported *Anniella geronimensis* from Isla San Martin. *Ensatina klauberi* was reported from Sierra Juarez (Heim et al. 2005). The range of *Ensatina escholtzii* was extended southward to 22 km south of Ensenada (Peralta-Garcia and Valdez-Villavicencio 2004) and *Sauromalus hispidus* was recently described from Isla Rasa near Bahia de los Angeles (Velarde et al. 2008). This summary of range extensions exemplifies the relatively fuzzy boundaries that define many species distributions for Baja California's herpetofauna.

RESULTS

The Baja California Peninsula contains 167 native and 10 non-native species distributed among 25 families of amphibians and reptiles (Table 1; Appendix 1). Native amphibians consist of 12 genera and 18 species (4 salamanders, 14 anurans). Native reptiles comprise 50 genera and 149 species (8 turtles, 86 lizards, 1 amphisbaenid, and 54 snakes). Among these are five species of sea turtles and the sea snake *Pelamis platurus*. The Baja California Pacific and Gulf Coast ecoregion contains five of the eight species of sea turtles, an indicator of the diversity of marine habitats found in the Sea of Cortés and the Pacific Ocean.

Ten non-native species have been recorded in Baja California (four amphibians, six reptiles), representing five families and six genera (Table 2). These species range widely across the peninsula, and occur from the Tijuana River south to the Cape Region. These species generally occur in close proximity to cities and inhabited

TABLE 1. Composition of the herpetofauna of Baja California M**é**xico. Non-native taxa are excluded.

Orders	Families	Genera	Species
Anura	4	9	14
Caudata	1	3	4
Subtotals	6	12	18
Squamata	15	42	141
Testudines	4	8	8
Subtotals	19	50	149
Totals	25	62	167

TABLE 2. Non-native Herpetofauna of Baja California, México.

AMPHIBIA	
Anura	
Pipidae	*Xenopus laevis*
Ranidae	*Lithobates berlandieri*
	Lithobates catesbeianus
	Lithobates forreri
REPTILIA	
Testudines	
Trionychdae	*Apalone spinifera*
SQUAMATA (Sauria)	
Gekkonidae	*Gehyra mutilata*
	Hemidactylus turcicus
	Hemidactylus frenatus
Iguanidae	*Sauromalus varius*
Leptotyphlopidae	*Rhamphotyphlops braminus*

areas, with a few species (e.g., *Lithobates catesbeianus*) ranging beyond urban centers in rivers and streams. *Xenopus laevis* also has an aquatic distribution, but only in extreme northern Baja California (Tinsley and McCoid 1996; Mahrdt et al. 2003). Martínez-Isac and Valdés-Villavicencio (2000) reported *Hemidactylus turcicus* from Baja California. Whereas no non-native herpetofauna have been recorded from islands in the Baja California region, translocated *Sauromalus varius* occur on Isla Roca Lobos where individuals were released as a perceived assurance colony for declining native populations (Hollingsworth et al. 1997).

Status and protections.—The herpetofauna of the Baja California Peninsula receive protection under three primary criteria: (1) existing protections via regulations (Appendix 2); (2) occurrence in protected land areas (Appendix 3); and (3) maintenance of *ex situ* individuals in American Zoological Association (AZA) accredited zoos (Appendix 3).

Regulatory listings.—The herpetofauna of the Baja California Peninsula are subject to Mexican and international protection of endangered and threatened species under the Norma Oficial Mexicana (NOM-059-ECOL-2008), the United States Endangered Species Act, and the IUCN Red List.

The NOM-059-ECOL-2008 (Poder Ejecutivo Federal, 2008) includes 82 of the 167 species of amphibians and reptiles inhabiting Baja California and its islands. It classifies the species according to its distributional range, rarity, population status, and threats, providing in each case a general guideline for the regulation of human activities that could affect the remaining populations. Five of the listed species are amphibians and one of those (*Lithobates forreri*) is a native to other parts of Mexico and Central America but is introduced to the Baja California region (Grismer 2002). Similarly, of the 77 reptiles listed from Baja California, one species (*Gehyra mutilata*) is not native to any part of México. As an executive order, the publication of NOM-059 does not require congressional approval, having the potential to be revised according to the availability of new data. Although the NOM-059 was published previously in 2002, it was not updated until 2008, despite receiving several new petitions and information on species that deserved inclusion in the NOM-059. In the interval between updates to the NOM-059, increasing development pressure typically outpaces the implementation of protections to herpetofauna in many habitats.

Ten species are listed under the Endangered Species Act (ESA), including three amphibians and seven turtles; one turtle (*Apalone spinifera*) is not native to Baja California but occurs there. Seventeen species of amphibians are listed under the IUCN, including all species of amphibians found in Baja California, except for *Ensatina klauberi*, in addition to 127 of the total 155 (native and introduced) species of reptiles. The IUCN Red List does not cover non-native reptiles. *Ensatina klauberi* is not listed because it was only recently reported from Baja California (Mahrdt et al. 1998, Heim et al. 2005).

While the NOM-059-ECOL-2001 is a Mexican mandate regulating all activities in the national territory, the ESA covers only the trade or take of species in, or subsidized by, the United States or its citizens. The IUCN provides current and scientifically accurate information to protect species, but has limited legal jurisdiction within Mexico's borders.

Natural protected areas.—Federal biosphere national parks and flora and fauna protection areas have been established in both states of the peninsula "to preserve the natural habitat representative of the diverse biogeographic and ecologic regions and fragile ecosystems." The primary goal is to preserve biodiversity and particularly "endangered, threatened, endemic, rare and protected species" (Congreso de los Estados Unidos Mexicanos 1988). For a list of the location and size of these areas, see http://www.conanp.gob.mx/sig (Fig. 1). Some outlying islands in the Sea of Cortés and Pacific Ocean are managed independently or jointly with the Mexican states of Sonora, Sinaloa, and/or Colima. All the biotic reserves collectively encompass 5,870,261 ha (Table 3). Considering that the land area of Baja California is 14,339,600 ha, approximately 40% of the land is legally protected as biotic reserves. In recent years, the number and size of protected areas in the region has grown steadily. Of the 15 presently declared protected areas, only five existed prior to the 1990s, of which the earliest was declared in 1947 (Parque Nacional Sierra San Pedro Mártir). The most recent reserve added, declared in 2007, is the Reserva de la Biósfera Bahía de Los Ángeles, Canales de Ballenas y de Salsipuedes. Almost all of the major habitat types in Baja California are found within the protected areas, and 10 of the 15 reserves are on islands in the Sea of Cortés and Pacific Ocean (Table 3).

Of the 177 native and non-native herpetofaunal species that inhabit the Baja California peninsula, 159 (17 amphibians and 142 reptiles; Appendix 1) occur in protected areas (Appendix 3). Native species that do not occur in protected areas include *Crotaphytus grismeri*, *Elgaria cedrosensis*, *E. nana*, *Crotalus caliginis*, *Lampropeltis herrarae*, and *Thamnophis marcianus*, and non-native species include *Gehyra mutilata*, *Hemidactylus frenatus*, *H. turcicus*, and *Ramphotyphlops braminus*.

Some protected areas of Baja California may harbor species whose occurrence remains unverified. For example, Grismer et al. (1994) listed seven species that had been reported but not confirmed for the Vizcaíno Peninsula region, and 10 species that were suspected to occur there. The numerous range extensions in recently published literature are an indication of the high potential for novel observations of the herpetofauna throughout Baja California and its islands. Also, *Hyla cadaverina* may still occur in the Bahía de Los Angeles Biosphere Reserve (Fig. 1), although it is believed extirpated.

In México, only national parks are public property, while a network of privately owned property comprises the remaining protected areas. The current situation with multiple private landowners allows private interests to avoid habitat conservation measures, potentially threatening local reptile and amphibian populations. Management plans, when developed, are designed for specific protected areas and may incorporate activity guidelines and restrictions to protect fragile populations, but the required information is not always available to land users. Despite more effort being placed on developing effective habitat conservation measures, freshwater and coastal land development also continues to threaten riparian, desert oasis, and coastal corridors, fragmenting the possibilities to assure effective and permanent protections. Much work remains to achieve effective resource conservation and management throughout the Baja region.

Ex situ conservation.—Live collections allow assurance colonies for species to be maintained.

TABLE 3. Biotic reserves and protected areas associated with Baja California and Baja California Sur, M**é**xico. Locations of reserves are: P = Peninsula of Baja California; GI = Gulf islands; PI = Pacific Ocean islands.

Site	Type	Area (ha)	Declared	Location
Alto Golfo de California y Delta del Río Colorado	Reserva de la Biosfera	936,407	1993	P, GI
Archipiélago de Revillagigedo-Colima	Reserva de la Biosfera	653,007	1994	PI
Archipiélago de San Lorenzo	Parque Nacional	58,443	2005	GI
Bahia de Loreto	Parque Nacional	205,683	2000	GI
Bahia de Los Ángeles, Canales de Ballenas y de Salsipuedes	Reserva de la Biosfera	387,956	2007	GI
Cabo Pulmo	Parque Nacional	7,099	2000	P
Cabo San Lucas	Área de Protección de Flora y Fauna	3,996	2000	P
Complejo Lagunar Ojo de Liebre	Reserva de la Biosfera	60,343	1972	P
Constitución de 1857	Parque Nacional	4,950	1962	P
El Vizcaíno	Reserva de la Biosfera	2,545,153	1988	P
Isla Guadalupe	Reserva de la Biosfera	476,977	2005	PI
Isla San Pedro Mártir-Sonora	Reserva de la Biosfera	30,165	2002	GI
Islas del Golfo de California-Baja, Baja Sur, Colima y Sinaloa	Área de Protección de Flora y Fauna	314,736	1978	GI
Sierra la Laguna	Reserva de la Biosfera	112,437	1994	P
Valle de los Cirios	Area de Protección de Flora y Fauna	2,611,000	1980	P
Sierra San Pedro Mártir	Parque Nacional	72, 909	1947	P

Ultimately they may also provide reintroduction potential for species that have become extirpated or extinct in the wild. They promote additional research as to the activity, diet, reproduction, behavior, and other aspects of a species for which we have incomplete knowledge and are difficult to study in natural conditions. However, zoological collections are finite in capacity and provide sufficient space for only a small portion of global biodiversity, including herpetofauna. Thus, a species needed for reintroduction or for research, may not be available or may not include the target population by genotype or precise distribution.

The existence of Baja California's species of amphibians and reptiles in zoological collections was evaluated on a global scale, using the holdings indicated by the International Species Information System (http://www.isis.org; Appendix 3). Seventy of 167 native species (42%) exist in live collections. Eleven of the species in zoo collections are amphibians, and 59 are reptiles. Most of the species in zoological collections are wide ranging, found in the United States or in other countries south of Mexico (e.g., *Smilisca baudinii*). Twelve species of reptiles in zoo collections are endemic to Baja California, with the sole endemic amphibian being the newly elevated *Pseudacris hypochondriaca* (Recuero et al. 2004).

Those species of amphibians and reptiles in zoological collections may or may not have originated from Baja California, as the query of live collections was made for the entire range of each species. Less than half of the herpetofauna of Baja California is represented in zoological collections worldwide, with even fewer species having originated from México than from other countries. The availability of permits, field transportation and associated costs, and the capacity for zoos to maintain these animals limit the exportation of Mexican herpetofauna to foreign zoos. In time, at least the species identified as Critically Endangered, especially those endemic to Baja California, should be housed in zoological institutions for the purpose of conservation.

DISCUSSION

Threats to the herpetofauna.—Despite the protection provided by natural protected land areas and the NOM-059, the herpetofauna of this region still faces considerable pressures. Historically, the Baja California Peninsula was an under-populated frontier with few urban areas, but its increasing popularity as a tourist destination has prompted the development of pristine natural landscapes, particularly along coastal areas (Weissert, W. 2004. México struggles to build marinas in Baja California. The Associated Press and The Seattle Times. Available from http://community.seattletimes.nwsource.com/archive/?date=20040109&slug=mexyacht11. [Accessed 12 November 2009]). The Government of México also sees this frontier as a region to exploit for resource extraction. This is causing an increasing demand for land conversion and its respective infrastructure to support growth within biodiversity hotspots (Myers et al. 2001). That is the case for the coastal corridors between Tijuana and Ensenada. The result is the accelerated growth of urban/industrial centers along the USA borders (Tijuana, Mexicali, Tecate, and Ensenada), and agricultural areas wherever freshwater is available in this arid region. In the northern region of Baja California the natural flow of species between Mexican and US habitats has been impacted by the construction of the US-México border fencing, walls, and other restrictive barriers meant to control unauthorized border crossing by humans.

Development in the Baja California region is depleting freshwater and associated native habitats (i.e., riparian, ephemeral streams, vernal pools). Residential, industrial, and agricultural needs demand an increasing volume of freshwater from a region with low rainfall and very few perennial streams, directly motivating, and in some cases commercializing, the extraction of water from aquifers, streams, and oases. Golf course construction exacerbates the demand for such a precious resource, draining already limited freshwater and riparian habitats. Poor sewage and wastewater treatment systems cause pollution of streams, where the introduction of exotic species adds additional pressure on native species.

Development of pristine areas, including large projects as shipping ports and liquefied gas terminals, triggers the construction of infrastructure for sewage, electricity, and transport. Continued development and enhancement of transportation corridors leads to increased herpetofaunal mortality due to vehicular traffic. Sand mining for local construction and exportation to the USA causes the destruction of riparian habitat, which in northwestern Baja California, threatens the remaining populations of the endangered Arroyo Toad (*Anaxyrus californicus*; Danemann, G. 2005. Proposal for the inclusion of the Southwestern Arroyo Toad (*Bufo californicus*) as a threatened species in the Mexican list of species at risk (NOM-059-SEMARNAT). Unublished technical report submitted to the Instituto Nacional de Ecología. Pronatura Noroeste (Calle Décima N° 60, Ensenada, Baja California, 22800 Mexico). 9 pp.), the Red-legged Frog (*Rana draytonii*), and the endemic salmonid *Onchoryhcus mykiss nelsoni*. In fact, sand mining has become an emerging issue because southern California supplies some of its copious demand for aggregate and sand from northern Mexico, from where it is cheaper to ship.

Less obvious and very poorly studied threats to the species of Baja California are habitat changes as a result of global warming. More research on this topic is needed because data to date are largely hypothetical, and

relictual mesic habitats face pressure from continued drought and warming conditions in hot environs such as the northern deserts.

Another potential threat in the northern portion of Baja California is the chytrid fungus *Batrachochytrium dendrobatidis* (BD), an emerging global threat detected in *Lithobates berlandieri* (Lovich et al. 2008) and *Anaxyrus californicus* (Mendelsohn, M.B., M.C. Madden-Smith, and R.N. Fisher. 2005. Post-Cedar Fire Arroyo Toad (*Bufo californicus*) monitoring surveys at Cuyamaca Rancho State Park, 2004. Final Report. U.S. Geological Survey, Western Ecological Research Center, Sacramento, California.) in the United States only 50 miles north of the border in continuous habitats. *Rana draytonii*, a common species in the Sierra San Pedro Martir of northern Baja California, has been confirmed as infected with BD at a site about 100 miles north of the México border (Ervin, E.L., N.J. Scott, S.A. Hathaway, and R.N. Fisher. 2001. Initial Report on the monitoring of a California Red-legged Frog (*Rana aurora draytonii*) population in San Francisquito Canyon. Angeles National Forest, California: Year 2000. Report to Department of Agriculture, Forest Service, Angeles National Forest, Arcadia, California, USA.). This infectious pathogen, however, has yet to be reported from Baja California.

Extirpations.—Although no extinctions of amphibians or reptiles are known from Baja California, much of the insular herpetofauna and peninsular endemic species are vulnerable given their limited distribution and narrow habitat requirements. Case (1982) documented extreme fluctuations in numbers of *Sauromalus hispidus* during a 15-year period on Isla Angel de la Guarda. In 1978, he counted 105 individuals on research plots; whereas, by 1991 he counted only five live individuals. Drought was hypothesized as the cause of the observed decline. Perhaps not all insular reptiles within the region experience similar declines during droughts, but the results found by Case (1982) clearly demonstrates the potential for significant fluctuations and rapid population loss. Likewise, mesic-adapted herpetofauna with restricted ranges are susceptible to localized extirpation, including *Pseudacris cadaverina* and *Actinemys marmorata* at southern localities (Grismer and McGuire 1993).

According to the available data, *Anaxyrus alvarius*, *Rana boylii*, and *R. yavapaiensis* have been extirpated from the Baja California region (Grismer 2002). Historically, *A. alvarius* and *R. yavapaiensis* occurred at the southern end of the Río Colorado, where urbanization and hydrologic alterations have severely threatened the riparian habitat used by those species. Currently, *Rana yavapaiensis* has dramatically declined throughout its entire range, and only exists in a few small populations outside Baja California.

Illegal collection and trafficking.—The herpetofauna in this region is subject to illegal collecting and trafficking (Grismer 2002), which is in violation of US and Mexican law. Mellink (1995) and an author (LLG) have reported observations of that heavy impact to habitat in search of species, such as California Mountain Kingsnakes (*Lampropeltis zonata*), Rosy Boas (*Lichanura trivirgata*), and Banded Rock Lizards (*Petrosaurus* sp.). Large numbers of specimens have been removed from some areas, including a reported 1000 San Lucan Rock Lizards (*Petrosaurus thalassinus*) from the Cape Region over a period of two years (Grismer 2002). Illegal collection and commercialization of herpetofauna threatens insular endemics such as the Isla Todos Santos Mountain Kingsnake (*Lampropeltis herrerae*). Mellink (1995) reported finding snake traps on the island bated with live mice, as well as collectors turning over rocks.

Conservation recommendations.—While some species of the herpetofauna occur in protected areas, impacts to the landscape within many protected areas are ongoing because of the multiple use nature of the reserves. Enforcement of existing protections is uncommon. Large projects are planned that could have major environmental consequences, including coastal development, industrial expansion, tourism, sand mining, and potential railway expansion along the length of the peninsula. Sand mining should be regulated and minimized because it impacts riparian and wetland areas where many threatened or endangered species, herpetofaunal or otherwise, occur.

Illegal collecting remains a threat, as the market demand for amphibians and reptiles, both for consumption and for the pet industry, remains significant. Sea turtle eggs remain a consumer delicacy, and are considered a fish by the Roman Catholic Church. Without a strong stand in the form of a papal decree to correct the taxonomic error, avoidance and consumption of this delicacy during Lent will continue to hamper conservation efforts. Such egregious errors in taxonomy and the lack of effort to stem this tide by religious authorities only highlights the need for greater public awareness and education to increase the protection of México's herpetofaunal heritage and biodiversity at large. Tijuana and northern Baja California remain one of the fastest growing regions in all of México, with an increasing demand for land conversion and its respective infrastructure to support growth within a recognized biodiversity hotspot (Myers et al. 2001). Novel ways of acquiring land as conservation easements are increasing, which recently have created opportunities for land protection within the private sector (White et al., 2006; Ocho-Ochoa et al. 2009), but far more remains to be accomplished.

CONCLUSIONS

One hundred and sixty-seven species of amphibians and reptiles occur in Baja California and associated islands in the Sea of Cortés and Pacific Ocean. This number increases with newly recorded species found to inhabit the peninsula (Recuero et al. 2004) and systematic studies that reveal cryptic species (Montanucci 2004). The future has great potential, as Baja California and U.S. have partnered on recent cross border conservation initiatives. A successful example is that of the California Condor (*Gymnogyps californianus*) reintroduction, and the natural range expansion of populations of Peninsular Bighorn Sheep (*Ovis canadensis nelsoni*), both federally protected in the United States. Non-native species inhabiting the region are being better defined in geographic range (Mahrdt et al. 2003), ultimately assisting in their management or control where they are deleterious to native species. Expeditions led by the San Diego Natural History Museum Biodiversity Research Center of the Californias, as well as other institutions and their collaborators, continue to lead productive work in systematic and evolutionary biology, ecology and the distribution of species in Baja California. It is essential that efforts be made on baseline natural history and inventory studies, public and private land conservation, education, public outreach, policy, and enforcement. Ultimately, we hope that efforts to conserve Baja California's biological heritage will outpace development of the area and the loss of the states natural resources.

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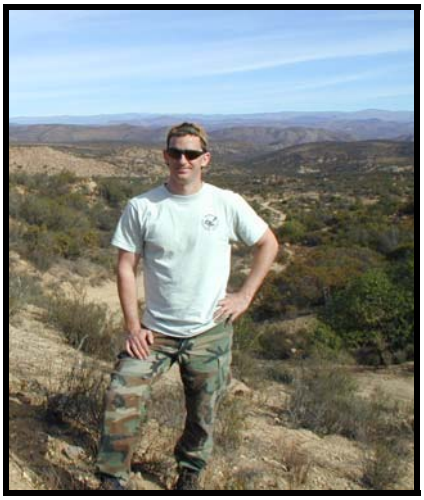
Errata fixed 23 January 2010. Some typographical errors and citation errors were found by the author and corrected.



ROBERT E. LOVICH recently completed his Ph.D. on the phylogeography and conservation of the Arroyo Toad (*Anaxyrus californicus*), at Loma Linda University. His M.S. thesis was on the phylogeography of the Granite Night Lizard (*Xantusia henshawi*), and resulted in the elevation of the Sandstone Night Lizard (*Xantusia gracilis*) to full species. This year, Robert published his first book, "Lizards of the American Southwest" by Larry Jones and Robert Lovich (Eds.). Currently, Robert is a Natural Resources Specialist for the U.S. Navy in San Diego, California. When not working on his collection of muscle cars, his work and interests include: (1) natural history and evolution of herpetofauna; (2) endangered species conservation; and (3) integrating science into natural resource management. (Photographed by Clark Mahdrt)

GUSTAVO D. DANEMANN is a marine biologist with a Ph.D. in Policy Analysis and Natural Resource Administration. His expertise includes vertebrate zoology and ecology, biodiversity conservation, and natural protected areas. He has published 12 book chapters and 15 papers dealing with diverse scientific topics in those fields. He collaborated with Rob Lovich and Clark Mahrdt in an assessment of the population status of the Arroyo Toad in Baja California (México), which resulted in a successful proposal to include it in the Mexican Protected Species Act. At present, Gustavo is the Executive Director of Pronatura Noroeste, a Mexican non-profit organization dedicated to the conservation of the flora, fauna, and ecosystems in Northwest México, in which he has been involved since 1997. He is an active diver, photographer, and communicator. (Photographed by unknown)

L. LEE GRISMER received a MS. in biology from San Diego State University in 1986 and Ph.D. in biology from Loma Linda University in 1994. He spent nearly a quarter of a century studying the systematics and evolution of the herpetofauna of Baja California, its adjacent Pacific islands and the islands in the Sea of Cortés which resulted in nearly 90 publications and culminated with an award winning book "Amphibians and Reptiles of Baja California including its Pacific Islands and Islands in the Sea of Cortés" published in 2002 by The University of California Press, Berkeley. Dr. Grismer has been working in jungles of Malaysia, Cambodia, and Vietnam since 2002 where he has discovered and described nearly sixty new species of amphibians and reptiles. He continues working there today. The picture was taken in Cambodia with a dingo puppy he nursed back to health after it was bitten by a cobra. It now resides with him in the United States. (Photographed by unknown)

APPENDIX 1. Composition and distribution of the herpetofauna of the peninsula of Baja California, Mexico, and associated islands in the Pacific Ocean and Sea of Cortés. * = taxa endemic to Baja California region. ** = taxa introduced to Baja California region. The insular endemic *Sauromalus varius* has been introduced beyond its range to additional islands within Baja California.‡ = endemic to one or more islands.

Taxa	Distributional Categories		
	Peninsular	**Pacific Ocean Islands**	**Sea of Cortés Islands**
Family Plethodontidae			
Aneides lugubris	X	X	
Batrachoseps major	X	X	
Ensatina eschscholtzii	X		
Ensatina klauberi	X		
Family Bufonidae			
Anaxyrus boreas	X		
Anaxyrus californicus	X		
Anaxyrus cognatus	X		
Anaxyrus punctatus	X	X	X
Anaxyrus woodhousii	X		
Ollotis alvarius	X		
Family Hylidae			
Hyla cadaverina	X		
Pseudacris hypochondriaca‡	X	X	
Smilisca baudinii	X		
Family Pipidae			
*Xenopus laevis***	X		
Family Ranidae			
*Lithobates berlandieri***	X		
*Lithobates catesbeianus***	X		
*Lithobates forreri***	X		
Lithobates yavapaiensis	X		
Rana draytonii	X		
Rana boylii	X		
Family Scaphiopodidae			
Scaphiopus couchii	X		X
Spea hammondii	X		
Family Emydidae			
Actinemys marmorata	X		
*Trachemys nebulosa**	X		
Family Testudinidae			
Gopherus agassizii	X		X
Family Cheloniidae			
Caretta caretta		X	X
Chelonia mydas		X	X
Eretmochelys imbricata		X	X
Lepidochelys olivacea		X	X
Family Dermochelyidae			
Dermochelys coriacea		X	X
Family Trionychidae			
*Apalone spinifera***	X		
Family Crotaphytidae			
Crotaphytus dickersonae			X
*Crotaphytus grismeri **	X		
*Crotaphytus insularis *‡*			X
Crotaphytus vestigium	X		
Gambelia copeii	X	X	
Gambelia wislizenii	X		X
Family Iguanidae			
*Ctenosaura conspicuosa * ‡*			X
Ctenosaura hemilopha ‡			X
*Ctenosaura nolascensis * ‡*			X
*Dipsosaurus catalinensis * ‡*			X
Dipsosaurus dorsalis	X	X	X
Sauromalus ater	X		X
*Sauromalus hispidus * ‡*			X

Sauromalus klauberi * ‡			X
Sauromalus slevini * ‡			X
Sauromalus varius * ‡			X
Family Phrynosomatidae			
Callisaurus draconoides	X	X	X
Petrosaurus mearnsi	X		X
Petrosaurus repens *			X
Petrosaurus slevini * ‡			X
Petrosaurus thalassinus *	X		X
Phrynosoma coronatum	X	X	
Phrynosoma m'callii	X		
Phrynosoma platyrhinos	X		
Phrynosoma solare	X		X
Sceloporus angustus * ‡			X
Sceloporus clarkii	X		X
Sceloporus grandaevus * ‡			X
Sceloporus hunsakeri ‡			X
Sceloporus licki‡			X
Sceloporus lineatulus * ‡			X
Sceloporus magister	X		X
Sceloporus occidentalis	X	X	
Sceloporus orcutti	X		X
Sceloporus graciosus‡	X		
Sceloporus zosteromus‡	X	X	X
Uma notata	X		
Urosaurus graciosus	X		
Urosaurus lahtelai *			
Urosaurus nigricaudus	X	X	X
Urosaurus ornatus	X		X
Uta encantadae‡ *			X
Uta lowei‡ *			X
Uta nolascensis‡*			X
Uta palmeri ‡*			X
Uta squamata‡*			X
Uta stansburiana	X	X	X
Uta tumidarostra‡*			X
Family Eublepharidae			
Coleonyx gypsicolus‡*			X
Coleonyx switaki	X		
Coleonyx variegatus	X	X	X
Family Gekkonidae			
*Gehyra mutilata***	X		
*Hemidactylus frenatus***	X		
*Hemidactylus turcicus***	X		
Phyllodactylus bugastrolepis‡ *			X
Phyllodactylus homolepidurus	X		X
Phyllodactylus partidus ‡*			X
Phyllodactylus unctus *	X		X
Phyllodactylus xanti	X	X	X
Family Teiidae			
Aspidoscelis bacatus ‡*			X
Aspidoscelis canus‡ *			X
Aspidoscelis carmenensis ‡*			X
Aspidoscelis catalinensis‡ *			X
Aspidoscelis celeripes ‡*			X
Aspidoscelis ceralbensis‡ *			X
Aspidoscelis danheimae‡ *			X
Aspidoscelis espiritensis‡ *			X
Aspidoscelis franciscensis‡ *			X
Aspidoscelis hyperythra	X	X	X
Aspidoscelis labialis	X		
Aspidoscelis martyris ‡*			X
Aspidoscelis pictus ‡*			X
Aspidoscelis tigris	X	X	X
Family Xantusiidae			
Xantusia henshawi	X		
Xantusia wigginsi	X		
Xantusia vigilis	X		
Family Scincidae			
Plestiodon gilberti	X		

Plestiodon lagunensis *	X		
Plestiodon skiltonianus	X	X	
Family Anniellidae			
Anniella pulchra	X	X	
Anniella geronimensis *	X	X	
Family Anguidae			
Elgaria cedrosensis‡		X	
Elgaria multicarinata	X	X	
Elgaria nana ‡ *		X	
Elgaria paucicarinata‡	X		
Elgaria velazquezi *	X		
Family Bipedidae			
Bipes biporus *	X	X	
Family Leptotyphlopidae			
Leptotyphlops humilis	X	X	X
Family Typhlopidae			
*Rhamphotyphlops braminus***	X		
Family Boidae			
Charina trivirgata	X	X	X
Family Colubridae			
Arizona elegans	X		
Arizona pacata	X		
Bogertophis rosaliae	X		X
Chilomeniscus stramineus *	X	X	X
Chilomeniscus savagei ‡ *	X		X
Chionactis occipitalis	X		
Diadophis punctatus	X	X	
Eridiphas slevini‡ *		X	X
Hypsiglena torquata	X	X	X
Hypsiglena gularis‡ *			X
Lampropeltis catalinensis‡ *			X
Lampropeltis getula			X
Lampropeltis herrarae‡ *		X	
Lampropeltis zonata	X		
Masticophis aurigulis *	X		
Masticophis barbouri‡ *			X
Masticophis bilineatus	X		X
Masticophis flagellum	X		X
Masticophis fuliginosus	X	X	
Masticophis lateralis	X		
Masticophis slevini‡ *			X
Phyllorhynchus decurtatus	X		X
Pituophis catenifer	X	X	X
Pituophis insulanus	X	X	
Pituophis vertebralis *	X	X	X
Rhinocheilus lecontei	X		
Rhinocheilus etheridgei‡ *			X
Salvadora hexalepis	X	X	X
Sonora semiannulata	X		X
Tantilla planiceps	X		X
Thamnophis elegans	X		
Thamnophis marcianus	X		
Thamnophis hammondii	X		
Thamnophis validus	X		
Trimorphodon biscutatus	X		X
Family Elapidae			
Micruroides euryxanthus	X		X
Family Viperidae			
Crotalus angelensis‡ *			X
Crotalus atrox	X		X
Crotalus catalinensis‡ *			X
Crotalus calaginis‡ *		X	
Crotalus cerastes	X		X
Crotalus enyo	X	X	X
Crotalus estebanensis‡ *			X
Crotalus lorenzoensis‡ *			X
Crotalus mitchelli	X	X	X
Crotalus muertensis‡ *			X
Crotalus molossus	X		X
Crotalus [exsul] ruber	X	X	X

Crotalus tigris	X		X
Crotalus tortugensis‡ *			X
Crotalus viridis	X		

APPENDIX 2. Conservation status of the native herpetofauna of Baja California, Mexico, and associated islands, as indicated by their inclusion in the Norma Oficial (NOM59 2008), IUCN Red List, United States Endagered Species Act, and also those species that are housed in zoological collections *ex situ*.

Taxa	Conservation Status Categories				
	NOM59 (ca. 2008)	IUCN Red List Category	GAA	ESA	Captive/Zoos
Aneides lugubris	X	X	X		
Batrachoseps major		X	X		
Ensatina eschscholtzii‡	X	X	X		X
Ensatina klauberi					
Anaxyrus alvarius‡		X	X		X
Anaxyrus boreas‡		X	X		X
Anaxyrus californicus	X	X	X	X	
Anaxyrus cognatus‡		X	X		X
Anaxyrus punctatus‡		X	X		X
Anaxyrus woodhousii‡		X	X		X
Hyla cadaverina		X	X		X
Pseudacris hypochondriaca		X	X		X
Smilisca baudinii		X	X		X
Lithobates yavapaiensis	X	X	X		X
Rana draytonii		X	X	X	
Rana boylii	X	X	X		
Scaphiopus couchii		X	X		X
Spea hammondii		X	X		X
Actinemys marmorata		X			X
Trachemys nebulosa					
Gopherus agassizii	X	X		X	X
Caretta caretta	X	X		X	X
Chelonia mydas	X	X		X	X
Eretmochelys imbricata	X	X		X	
Lepidochelys olivacea	X	X		X	
Dermochelys coriacea	X	X		X	
Apalone spinifera	X			X	
Crotaphytus dickersonae		X			
Crotaphytus grismeri		X			
Crotaphytus insularis		X			X
Crotaphytus vestigium		X			
Gambelia copeii		X			
Gambelia wislizenii	X	X			X
Ctenosaura conspicuosa					X
Ctenosaura hemilopha	X				X
Ctenosaura nolascensis					
Dipsosaurus catalinensis					
Dipsosaurus dorsalis		X			X
Sauromalus ater	X	X			X
Sauromalus hispidus	X				X
Sauromalus klauberi	X				
Sauromalus slevini	X				
Sauromalus varius	X				X
Callisaurus draconoides	X	X			X
Petrosaurus mearnsi	X	X			X
Petrosaurus repens		X			
Petrosaurus slevini		X			
Petrosaurus thalassinus	X	X			X
Phrynosoma coronatum					
Phrynosoma m'callii					
Phrynosoma platyrhinos		X			X
Phrynosoma solare	X	X			X

Sceloporus angustus		X	X
Sceloporus clarkii		X	X
Sceloporus grandaevus			
Sceloporus hunsakeri	X	X	
Sceloporus licki		X	X
Sceloporus lineatulus	X	X	
Sceloporus magister	X	X	
Sceloporus occidentalis	X	X	
Sceloporus orcutti	X	X	
Sceloporus graciosus		X	X
Sceloporus zosteromus		X	X
Uma notata		X	X
Urosaurus graciosus	X	X	
Urosaurus lahtelai	X	X	
Urosaurus nigricaudus	X	X	X
Urosaurus ornatus		X	
Uta encantadae	X	X	
Uta lowei	X	X	
Uta nolascensis	X	X	
Uta palmeri	X	X	X
Uta squamata	X	X	
Uta stansburiana	X	X	X
Uta tumidarostra		X	
Coleonyx gypsicolus			
Coleonyx switaki		X	
Coleonyx variegatus	X	X	X
Phyllodactylus bugastrolepis	X	X	
Phyllodactylus homolepidurus	X	X	
Phyllodactylus partitus	X	X	
Phyllodactylus unctus	X	X	
Phyllodactylus xanti	X		
Aspidosceles bacatus	X	X	
Aspidosceles canus	X	X	
Aspidosceles carmenensis		X	
Aspidosceles catalinensis	X	X	
Aspidosceles celeripes	X	X	
Aspidosceles ceralbensis	X	X	
Aspidosceles danheimae		X	
Aspidosceles espiritensis		X	
Aspidosceles franciscensis		X	
Aspidosceles hyperythra	X	X	
Aspidosceles labialis	X	X	
Aspidosceles martyris	X	X	
Aspidosceles pictus		X	
Aspidosceles tigris		X	X
Xantusia henshawi		X	X
Xantusia wigginsi			
Xantusia vigilis		X	X
Plestiodon gilberti	X	X	
Plestiodon lagunensis	X	X	
Plestiodon skiltonianus		X	
Anniella pulchra		X	X
Anniella geronimensis		X	
Elgaria cedrosensis		X	
Elgaria multicarinata	X	X	X
Elgaria nana		X	
Elgaria paucicarinata	X	X	
Elgaria velazquezi		X	
Bipes biporus	X	X	
Leptotyphlops humilis		X	
Charina trivirgata	X	X	X
Arizona elegans		X	X
Arizona pacata		X	
Bogertophis rosaliae		X	X
Chilomeniscus stramineus	X	X	
Chilomeniscus savagei	X	X	
Chionactis occipitalis		X	
Diadophis punctatus		X	X
Eridiphas slevini	X		
Hypsiglena torquata	X	X	X

Hypsiglena gularis			
Lampropeltis catalinensis		X	
Lampropeltis getula	X	X	X
Lampropeltis herrarae		X	X
Lampropeltis zonata	X	X	X
Masticophis aurigulis	X	X	
Masticophis barbouri		X	
Masticophis bilineatus		X	X
Masticophis flagellum	X	X	X
Masticophis fuliginosus			
Masticophis lateralis	X	X	
Masticophis slevini		X	
Phyllorhynchus decurtatus		X	
Pituophis catenifer		X	X
Pituophis insulanus			
Pituophis vertebralis		X	
Rhinocheilus lecontei		X	X
Rhinocheilus etheridgei		X	
Salvadora hexalepis		X	X
Sonora semiannulata		X	
Tantilla planiceps		X	
Thamnophis elegans	X	X	X
Thamnophis marcianus	X		X
Thamnophis hammondii	X	X	
Thamnophis validus		X	
Trimorphodon lyrophanes	X		X
Micruroides euryxanthus	X	X	
Crotalus angelensis		X	
Crotalus atrox	X	X	X
Crotalus catalinensis	X	X	X
Crotalus calaginis		X	
Crotalus cerastes	X	X	X
Crotalus enyo	X	X	X
Crotalus estebanensis		X	
Crotalus lorenzoensis		X	
Crotalus mitchelli	X	X	X
Crotalus muertensis		X	X
Crotalus molossus	X	X	X
Crotalus [exsul] ruber	X	X	X
Crotalus tigris	X	X	X
Crotalus tortugensis	X	X	
Crotalus oreganus	X	X	X

APPENDIX 3. Herpetofauna located in respective biotic reserves of Baja California and islands in the Sea of Cortés and the Pacific Ocean.

			Total	Alto Golfo de California y Delta del Río Colorado	Archipiélago de Revillagigedo-Colima	Archipiélago de San Lorenzo	Bahia de Loreto	Bahia de Los Ángeles, Canales de Ballenas y de Salsipuedes	Cabo Pulmo	Cabo San Lucas	Complejo Lagunar Ojo de Liebre	Parque Nacional Ciudad Constitucion de 1857	El Vizcaíno	Isla Guadalupe	Isla San Pedro Mártir-Sonora	Islas del Golfo de California-Baja, Baja Sur, Colima y Sinaloa	Sierra la Laguna	Sierra San Pedro Mártir	Valle de los Cirrios
				43	0	9	37	53	6	7	1	17	20	0	4	102	40	54	54
		Species	# of Areas																
Plethodontidae		*Aneides lugubris*	0																
		Batrachoseps major	1															X	
		Ensatina eschscholtzii	0																
		Ensatina klauberi	2									X						X	
Bufonidae		*Anaxyrus alvarius*	1	X															
		Anaxyrus boreas	4					X				X						X	X
		Anaxyrus californicus	1															X	
		Anaxyrus cognatus	1	X															
		Anaxyrus punctatus	7	X				X					X			X	X	X	X
		Anaxyrus woodhousii	1	X															
Hylidae		*Hyla cadaverina*	3									X						X	X
		Pseudacris hypochondriaca‡	5									X	X				X	X	X
		Smilisca baudinii	0																
Ranidae		*Lithobates berlandieri***	1	X															
		*Lithobates catesbeianus***	3	X								?					X		
		*Lithobates forreri***	0																
		Lithobates yavapaiensis	1	X															
		Rana draytonii	2									?						X	
		Rana boylii	1															X	
Pelobatidae		*Scaphiopus couchii*	6	X				X								X	X	X	X
		Spea hammondii	2															X	X
Emydidae		*Actinemys marmorata*	2															X	X
		Trachemys nebulosa‡	0																
Testudinidae		*Gopherus agassizii*	1													X			
Cheloniidae		*Caretta caretta*	4					X	X	X						X			
		Chelonia mydas	5	X				X	X	X						X			
		Eretmochelys imbricata	4					X	X	X						X			
		Lepidochelys olivacea	5	X				X	X	X						X			
Dermochylidae		*Dermochelys coriacea*	5	X				X	X	X						X			
Trionychdae		*Apalone spinifera***	1	X															
Crotaphytidae		*Crotaphytus dickersonae*	1													X			
		Crotaphytus grismeri‡	0																
		Crotaphytus insularis *‡	2					X								X			
		Crotaphytus vestigium	3					X										X	X
	1	*Gambelia copeii*	4					X					X					X	X
		Gambelia wislizenii	3	X												X			X
Iguanidae		*Ctenosaura conspicuosa* * ‡	1													X			

	Ctenosaura hemilopha ‡	2									X	X			
	Ctenosaura nolascensis *‡	1									X				
	Dipsosaurus catalinensis * ‡	2			X						X				
	Dipsosaurus dorsalis	8	X		X	X			X		X	X	X	X	
	Sauromalus obesus	7	X		X	X			X		X		X	X	
	Sauromalus hispidus *‡	3		X		X					X				
	Sauromalus klauberi *‡	2			X						X				
	Sauromalus slevini *‡	2			X						X				
	Sauromalus varius *‡	3		X		X					X				
Phrynosomatidae	*Callisaurus draconoides*	8	X		X	X			X		X	X	X	X	
	Petrosaurus mearnsi	4				X					X		X	X	
	Petrosaurus repens ‡	3			X						X			X	
	Petrosaurus slevini *‡	2				X					X				
	Petrosaurus thalassinus ‡	2									X	X			
	Phrynosoma blainvillii	3						X					X	X	
	Phrynosoma cerroense	2							X					X	
	Phrynosoma coronatum	4				X	X					X	X		
	Phrynosoma m'callii	1	X												
	Phrynosoma platyrhinos	1	X												
	Phrynosoma wigginsi	1							X						
	Phrynosoma solare	1									X				
	Sceloporus angustus *‡	1									X				
	Sceloporus clarkii	2	X								X				
	Sceloporus grandaevus *‡	1									X				
	Sceloporus hunsakeri ‡	2									X	X			
	Sceloporus licki‡	1										X			
	Sceloporus lineatulus *‡	2			X						X				
	Sceloporus magister	5	X						X		X		X	X	
	Sceloporus occidentalis	2						X					X		
	Sceloporus orcutti	4			X	X					X		X		
	Sceloporus graciosus‡	2						X					X		
	Sceloporus zosteromus‡	5			X	X					X	X		X	
	Uma notata	1	X												
	Urosaurus graciosus	0													
	Urosaurus lahtelai‡	0													
	Urosaurus nigricaudus	6			X	X					X	X	X	X	
	Urosaurus ornatus	2	X								X				
	Uta encantadae‡ *	1									X				
	Uta lowei‡ *	1									X				
	Uta nolascensis‡*	1									X				
	Uta palmeri ‡*	2								X	X				
	Uta squamata‡*	2			X						X				
	Uta stansburiana	10	X	X	X	X		X	X		X	X	X	X	
	Uta tumidarostra‡*	1									X				
Eublepharidae	*Coleonyx gypsicolus*‡*	1									X				
	Coleonyx switaki	2				X								X	
	Coleonyx variegatus	7	X		X	X			X		X		X	X	
Gekkonidae	*Phyllodactylus bugastrolepis*‡ *	2			X						X				
	Phyllodactylus homolepidurus	1									X				
	Phyllodactylus partidus ‡*	2				X					X				
	Phyllodactylus unctus‡	2									X	X			
	Phyllodactylus xanti	7		X	X	X					X	X	X	X	
	*Gehyra mutilata***	0													
	*Hemidactylus frenatus***	0													
	*Hemidactylus turcicus***	0													
Teiidae	*Aspidosceles bacatus* ‡*	1									X				
	Aspidosceles canus‡ *	3		X		X					X				
	Aspidosceles carmenensis ‡*	2			X						X				
	Aspidosceles catalinensis‡ *	2			X						X				
	Aspidosceles celeripes ‡*	1									X				
	Aspidosceles ceralbensis‡ *	1									X				
	Aspidosceles danheimae‡ *	1									X				
	Aspidosceles espiritensis‡ *	1									X				
	Aspidosceles franciscensis‡ *	1									X				
	Aspidosceles hyperythra	6			X	X			X		X		X	X	
	Aspidosceles labialis	2										X		X	
	Aspidosceles martyris ‡*	2								X	X				
	Aspidosceles pictus ‡*	2			X						X				

	Aspidosceles tigris	7	X		X	X				X		X		X	X
Xantusiidae	*Xantusia henshawi*	2							X					X	
	Xantusia wigginsi	2											X		X
	Xantusia vigilis	4				X							X	X	X
Scincidae	*Plestiodon gilberti*	1												X	
	Plestiodon lagunensis‡	1											X		
	Plestiodon skiltonianus	2							X					X	
Anguidae	*Anniella pulchra*	1												X	
	Anniella geronimensis‡	1													X
	Elgaria cedrosensis‡	0													
	Elgaria multicarinata	3							X					X	X
	Elgaria nana ‡ *	1										X			
	Elgaria paucicarinata‡	2											X		X
	Elgaria velazquezi‡	1								X					
Bipedidae	*Bipes biporus*‡	1											X		
Leptotyphlopidae	*Leptotyphlops humilis*	5			X	X						X	X	X	
	*Rhamphotyphlops braminus***	0													
Boidae	*Charina trivirgata*	5				X						X	X	X	X
Colubridae	*Arizona elegans*	3	X											X	X
	Arizona pacata	0													
	Bogertophis rosaliae	4			X	X						X	X		
	Chilomeniscus stramineus	5	X		X	X						X	X		
	Chilomeniscus savagei	1										X			
	Chionactis occipitalis	2	X												X
	Diadophis punctatus	1												X	
	Hypsiglena slevini‡ *	5			X	X						X	X		X
	Hypsiglena ochrorhyncha	9		X	X	X			X	X		X	X	X	X
	Hypsiglena chlorophaea	5	X		X	X						X			X
	Lampropeltis catalinensis‡ *	2			X							X			
	Lampropeltis getula	10	X	X	X	X				X	X	X	X	X	X
	Lampropeltis herrarae‡ *	0													
	Lampropeltis zonata	2							X					X	
	Masticophis aurigulis‡	1											X		
	Masticophis barbouri‡ *	1										X			
	Masticophis bilineatus	3	X									X			X
	Masticophis flagellum	4			X							X	X		X
	Masticophis fuliginosus	4	X			X								X	X
	Masticophis lateralis	2							X					X	
	Masticophis slevini‡ *	1										X			
	Phyllorhynchus decurtatus	5	X		X	X						X			X
	Pituophis catenifer	5	X									X	X	X	X
	Pituophis insulanus	0													
	Pituophis vertebralis‡	2				X						X			
	Rhinocheilus lecontei	4	X			X								X	X
	Rhinocheilus etheridgei‡ *	1										X			
	Salvadora hexalepis	7	X			X				X		X	X	X	X
	Sonora semiannulata	4	X			X						X	X		
	Tantilla planiceps	5			X	X						X	X		X
	Thamnophis elegans	1												X	
	Thamnophis marcianus	0													
	Thamnophis hammondii	2												X	X
	Thamnophis validus	1											X		
	Trimorphodon lyrophanes	8	X		X	X				X		X	X	X	X
Elapidae	*Micruroides euryxanthus*	2	X									X			
	Pelamis platurus	4					X	X	X			X			
Viperidae	*Crotalus angelensis*‡ *	2				X						X			
	Crotalus atrox	3	X								X	X			
	Crotalus catalinensis‡ *	2			X							X			
	Crotalus calaginis‡ *	0													
	Crotalus cerastes	3	X									X			X
	Crotalus enyo	6			X	X				X		X	X		X
	Crotalus estebanensis‡ *	1										X			
	Crotalus lorenzoensis‡ *	3		X		X						X			
	Crotalus mitchelli	8	X	X	X	X						X	X	X	X
	Crotalus muertensis‡ *	1										X			
	Crotalus molossus	1										X			
	Crotalus ruber	7			X	X				X		X	X	X	X
	Crotalus tigris	2	X									X			
	Crotalus tortugensis‡ *	1										X			

Crotalus oreganus	4	X	X	X	X