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

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

CONSIDERATION OF PROPOSALS FOR AMENDMENT OF APPENDICES I AND II

A. Proposal

Include the genus *Kinosternon* (20 species) in Appendix II (with the exception of the species listed in the following paragraph, to be included in Appendix I), in accordance with the criteria set out in Resolution Conf. 9.24 (Rev. CoP17):

- Criterion of Annex 2a, paragraph A: *Kinosternon abaxillare, K. alamosae, K. chimalhuaca, K. hirtipes, K. oaxacae*.

- Criterion of Annex 2a, paragraph B: *Kinosternon acutum, K. baurii, K. flavescens, K. integrum, K. leucostomum, K. scorpioides, K. subrubrum*.

- Criterion of Annex 2b, paragraph A: *Kinosternon angustipons, K. creaseri, K. dunni, K. durangoense, K. herrerai, K. sonoriense, K. steindachneri* and *K. stejnegeri*.

Include the species *K. cora* and *K. vogti* in Appendix I, in accordance with criteria A (i, ii, iii, v) and B (i, iii, iv) of Annex 1 of Resolution Conf. 9.24 (Rev. CoP17).

B. Proponent

Brazil, Colombia, Costa Rica, El Salvador, Mexico, Panama, United States of America*

C. Supporting statement

1. Taxonomy

The nomenclature of the species proposed for inclusion follows, to the extent possible, the standard reference adopted for turtles included in the Annex of Resolution Conf. 12.11 (Rev. CoP18), that is, Fritz & Havas (2007). However, due to the recent taxonomic changes in the genus *Kinosternon* and the description of new species in the last four years, the updated publication Turtles of the World Checklist (TTWG - Rhodin et al. 2021) has been used as a basis.

1.1 Class: Reptilia

1.2 Order: Testudines

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

1.3 Family: Kinosternidae

1.4 Genus, species or subspecies, including author and year: *Kinosternon* Spix 1824

a) Species proposed for inclusion in Appendix II: *Kinosternon abaxillare* (Baur *in* Stejneger 1925) *Kinosternon acutum* (Gray 1831), *K. alamosae* (Berry & Legler 1980), *K. angustipons* (Legler 1965), *K. baurii* (Garman 1891), *K. chimalhuaca* (Berry, Seidel & Iverson 1997), *K. creaseri* (Hartweg 1934), *K. dunni* (Schmidt 1947), *K. durangoense* (Iverson 1979), *K. flavescens* (Agassiz 1857), *K. herrerai* (Stejneger 1925), *K. hirtipes* (Wagler 1830), *K. integrum* (Le Conte 1854), *K. leucostomum* (Duméril & Bibron in Duméril & Duméril 1851), *K. oaxacae* (Berry & Iverson 1980), *K. scorpioides* (Linnaeus 1766), *K. sonoriense* (Le Conte 1854), *K. steindachneri* (Siebenrock 1906), *K. stejnegeri* (Hartweg 1938), *K. subrubrum* (Bonnaterre 1789).

b) Species proposed for inclusion in Appendix I: *K. cora* (Loc-Barragán et al. 2020), *K. vogti* (López-Luna et al., 2018).

1.5 Scientific synonyms: (see Annex I: Table 1)

1.6 Common names: English: Mud Turtles, kinosternids (see Annex I: Table 1).
French:
Spanish: tortugas de pantano, de las Ciénegas, de barro, casquito, pochitoque, cimarronas, apestosa, tapaculo y de bisagra

1.7 Code numbers: n/a

2. Overview

The genus *Kinosternon* (family Kinosternidae) is endemic to the Americas. It includes 22 extant species that are distributed from the United States of America to Argentina (TTWG, 2021). No species are currently included in the CITES Appendices. Their main threats are habitat loss (i.e., fragmentation, loss of vegetation cover, desiccation and/or pollution of water bodies) and overexploitation for local consumption or illegal international trade (as pets) (Bonin et al., 2006; Ernst & Lovich, 2009; Páez et al. 2012; Legler & Vogt, 2013).

IUCN has classified 17 of the 22 species of *Kinosternon* in its Red List (**see Section 7.2**; TTWG, 2021). Some species of *Kinosternon* are exported legally, mainly to the USA and Europe. For several species of the genus found in trade in the USA and Europe, there are no records of export permits issued by the countries of origin. It is presumed that the following species are the subject of illegal international trade for the pet trade: *K. alamosae, K. chimalhuaca, K. cora, K. creaseri, K. dunni, K. flavescens, K. hirtipes, K. integrum, K. leucostomum, K. oaxacae, K. scorpioides, K. sonoriense, K. steindachneri, K. stejnegeri, K. subrubrum* and *K. vogti* (**see Section 6***).*

Mexico has reported an increase in legal trade and in illegal trade detected for export purposes (**see Section 6**); the presence of very sensitive and endemic species such as *K. vogti* and *K. cora*, for which no export permits have been issued, has been reported in Asian markets (IUCN Tortoise and Freshwater Turtle Specialist Group, pers. comm.). In early 2010, in meetings organized by the Turtle Survival Alliance, experts discussed the possibility of listing some species of the genus *Kinosternon* in CITES Appendix II and thereby regulate their harvest on a domestic and international level. Listing the species of the genus in the CITES Appendices will make it possible to regulate their international trade and will facilitate the implementation of controls and monitoring by the enforcement authorities, information exchange and the inclusion in international databases (e.g., UNEP-WCMC/CITES).

3. Species characteristics

3.1 Distribution

The 22 species of the genus *Kinosternon* are distributed in 21 countries, from the United States of America to Argentina and Paraguay (see details and maps of the distribution of the genus in **Annex II (Table 2, figures 1 to 3)**:

Country	Species
United States of America	*K. baurii*, K. flavescens, K. hirtipes, K. sonoriense, K. steindachneri*, K. stejnegeri, K. subrubrum**
Mexico	*K. abaxillare*, *K. acutum, K. alamosae*, K. chimalhuaca*, K. cora*, K. creaseri, K. durangoense*, K. flavescens, K. herrerai*, K. hirtipes, K. integrum*, K. leucostomum, K. oaxacae*, K. scorpioides, K. sonoriense, K. stejnegeri, K. vogti**
Guatemala	*K. abaxillare*, *K. acutum, K. leucostomum, K. scorpioides*
Belize	*K. acutum, K. creaseri*, *K. leucostomum, K. scorpioides*
Nicaragua	*K. angustipons, K. leucostomum, K. scorpioides*
Costa Rica	*K. angustipons, K. leucostomum, K. scorpioides*
Panama	*K. angustipons, K. leucostomum, K. scorpioides*
Colombia	*K. dunni*, K. leucostomum, K. scorpioides*
Ecuador, Honduras, Peru	*K. leucostomum, K. scorpioides*
Argentina, Bolivarian Republic of Venezuela, Bolivia, Brazil, El Salvador, Guyana, French Guiana, Suriname, Trinidad and Tobago	*K. scorpioides*

***** Endemic species to each country. Taxonomy according to the TTWG (2021).

3.2 Habitat

These species occur in temporary ponds that are shallow (0.20 to 1.50 m approx.), in slow-flowing streams and manmade reservoirs (Iverson, 1989; Iverson, 1998; Bagatto et al., 1997; Cogălniceanu et al., 2015; Hernández-Guzmán et al., 2015; Serb et al., 2001; Legler & Vogt, 2013; Duellman, 1965; Macip-Rios et al., 2018; Loc-Barragán et al., 2020; Reyes-Grajales & Iverson, 2020). They are also found in permanent ponds, wetlands, swamps and rivers (Carr & Mast, 1988, Mata-Silva et al., 2002, Aguirre-Leon & Aquino-Cruz, 2004; Iverson & Vogt, 2011; Bedoya-Cañon et al., 2018). Some species are associated with low desert areas and arid grasslands (Iverson, 1989; Legler & Vogt, 2013), while others are found in habitats with emergent vegetation and undisturbed or seasonal forests (Pritchard & Trebbau, 1984; Berry et al., 1997; Rueda-Almonacid et al., 2007; Giraldo et al., 2012; Legler & Vogt, 2013; Paez, et al., 2013). They occur at elevations ranging from sea level to 1,700 MASL (Rueda-Almonacid et al., 2007; Paez et al., 2013; Legler & Vogt, 2013; Loc-Barragán et al., 2020). Some populations of *K. sonoriense*, *K. integrum* and *K. hirtipes* can be found at elevations greater than 2,000 MASL (Legler & Vogt, 2013).

3.3 Biological characteristics

Feeding habits: Turtles of the genus *Kinosternon* are generally omnivorous (Legler & Vogt, 2013). They can eat insects, gastropods, arachnids, crustaceans, amphibians, reptiles or fish in aquatic or terrestrial environments; some may even eat carrion; they also eat algae and plants in general (e.g., seeds, leaves, stems, fruits, flowers, roots), whether emerged, floating, riparian or terrestrial (Bonin et al., 2006; Ernst & Lovich, 2009; Páez et al. 2012; Legler & Vogt, 2013).

Life history: *Kinosternon* species exhibit a Type III survivorship curve (Iverson, 1990), that is, the highest mortality occurs in the first stages of life and adult individuals have the highest chances of survival (Iverson, 1989; Odum & Barrett, 2004; Forero-Medina et al., 2007; Barreto et al., 2009; Legler & Vogt, 2013). They mainly depend on spatial resources (i.e., climate changes, habitat structure and availability, refuge and nesting sites) and nutritional resources (i.e., food and water) (Iverson, 1990; Legler & Vogt, 2013). They can go into aestivation for weeks or months in areas where the water bodies dry out; in permanent water bodies, they remain active all year (Iverson, 1990; Bonin et al., 2006; Ernst & Lovich, 2009; Páez et al. 2012; Legler & Vogt, 2013).

Behaviour: They are semi-terrestrial/semi-aquatic, with particular adaptations to live in both environments (Bonin et al., 2006; Ernst & Lovich, 2009; Páez et al. 2012; Legler & Vogt, 2013). Populations that live in temporary water bodies exhibit their main period of activity during the rainy season (Berry & Legler, 1980; Castaño-M. et al. 2005; Legler & Vogt, 2013; Paez et al., 2013). They aestivate in the buttresses and roots of trees in the dirt (at 10 to 35 cm depth), near stinging plants or plants with large thorns and in burrows dug by other animals (e.g., iguanas or mammals; Bonin et al.,

2006; Ernst & Lovich, 2009; Páez et al. 2012; Legler & Vogt, 2013). Some species are mainly diurnal (only *K. leucostomum* and *K. integrum* are nocturnal) and can travel a lot on land (Iverson, 1989; Iverson, 1999; Forero-Medina et al., 2007; Barreto et al., 2009; Legler & Vogt, 2013; Vázquez-Gómez et al., 2016; Barreto et al., 2020; Reyes-Grajales et al., 2021). In small areas, males exhibit territorial behaviour (Bonin et al., 2006; Ernst & Lovich, 2009; Legler & Vogt, 2013). When threatened by predators, they completely close their plastron and release musk, a foul-smelling substance that helps fend off predators; Bonin et al., 2006; Ernst & Lovich, 2009; Legler & Vogt, 2013).

Reproduction: the mating season usually takes place from May to October in most species, but the nesting season can range from January to April or from September to November (Ernst & Lovich, 2009; Páez et al. 2012; Legler & Vogt, 2013). Courtship and copulation can take place in the water or on land. In some species, males have a claw on their tail that allows them to hold on to females during copulation (Iverson, 1986; Morales-Verdeja & Vogt,1997; Iverson, 2010; Paez et. al., 2013; Giraldo et. al., 2013; Costa et. al., 2017). In general, males reach sexual maturity between 5 and 7 years of age, while females mature at the age of 4 to 8 years. In most cases, females lay their eggs at night. They dig a cavity (i.e., nest) 10-25 cm deep with their hind legs (Márquez, 1995; Morales-Verdeja & Vogt, 1997; Iverson, 2010; Costa et al., 2015; Pereira et al., 2015; Da Costa et al., 2015; Costa et al., 2017; Reyes-Grajales & Iverson, 2020; Reyes-Grajales et al., 2021). Typically, the substrate of the nest is covered with sand and friable clay (Iverson, 2018); yet, when nests are built in low hollow parts of trees and among roots, they are lined with leaf litter of the trees themselves (Reyes-Grajales, 2019). In these species, clutch size typically ranges from 2 to 9 eggs (Bonin et al., 2006; Ernst & Lovich, 2009; Páez et al. 2012; Legler & Vogt, 2013). Sex is determined by temperature: males are produced at temperatures below 27° C and females are produced at temperatures above 28° C (Hulse, 1982; Rudloff, 1986; Vogt & Flores-Villela, 1992; Berry et al. 1997; Morales-Verdeja & Vogt,1997; Schilde, 2001; Berry-Iverson, 2011). Incubation time ranges from 150 to 300 days (Bonin et al., 2006; Ernst & Lovich, 2009; Legler & Vogt, 2013). Maturity: Species of the genus are late to mature.

3.4 Morphological characteristics

The genus includes turtles of various sizes: small species like *K. vogti* have a mean carapace length (CL) of 102 mm for males and 89 mm for females (López-Luna et al., 2018); by contrast, in large species such as *K. scorpioides*, CL can reach about 205 mm in males and 195 mm in females (TTWG, 2021). Distinctive characteristics for each species are based on the number, the presence/absence and the proportion of the scutes of the carapace (Bonin et al., 2006; Ernst & Lovich, 2009; Legler & Vogt, 2013). Colour is extremely variable, even in individuals of the same population. Hence, in most cases its use as a diagnostic characteristic as in other groups of reptiles (e.g., lizards or reptiles) leads to erroneous or ambiguous conclusions (Berry & Iverson, 1980; Cabrera & Colantonio, 1997; Iverson, 2010; Paez, et. al, 2013; Viana, et. al, 2013; Vogt & Souza, 2018; Mesén & Márquez, 1993).

Kinosternon turtles usually have one nuchal scute, 22 marginal scutes, four pairs of costal scutes, five pairs of vertebral scutes and six pairs of plastral scutes. With the exception of *K. herrerai*, *Kinosternon* species have two hinges in the plastral lobes that help them hide in their shell. The plastral lobes may or may not completely cover the ventral region (this is important trait to distinguish between the species). The size and presence/absence of axillary and inguinal scutes also varies between species (Iverson, 1989; Bonin et al., 2006; Forero-Medina et al., 2007; Barreto et al., 2009; Ernst & Lovich, 2009; Patiño-Siro et al., 2012; Legler & Vogt, 2013; Vázquez-Gómez et al., 2016; Reyes-Grajales & Iverson; 2020; Reyes-Grajales et al., 2021). Sexual dimorphism: it is shown in the shape of the shell (longer and flatter in males; shorter and more domed in females), the size of the tail (thicker and longer in males), the concavity of the plastron (greater in males, almost straight in females) and the size of the tip of the upper middle ramphoteca or beak (more marked in males than in females) (Berry et al. 1997; Iverson, 1998; Duellman, 1965; Macip-Rios et. al, 2018; Iverson, 1979; Williams, 1961; Schmidt & Owens, 1944; Legler & Vogt, 2013; Reyes & Iverson, 2021).

3.5 Role of the species in its ecosystem

Kinosternon turtles help regulate populations of invertebrates (e.g., molluscs, insects, arachnids), fish, amphibians and plants (terrestrial, aquatic or riparian) (Giraldo et al., 2012); they contribute to seed dispersal by eating the fruits of plants (Bonin et al., 2006; Ernst & Lovich, 2009; Rodríguez-Murcia, 2014). They are preyed upon by species of the families Felidae and Canidae, caimans, crocodiles and birds such as herons, eagles or kestrels (Iverson, 1982; Castaño-Mora et al., 2005; Giraldo et al., 2012). In aquatic systems, they may feed on dead animals such as fish, reptiles or mammals (Páez

et al. 2012; Legler & Vogt, 2013; Montalvo-Guadamuz et al., 2015). Because of their ability to bury themselves in aquatic or terrestrial areas, they improve the flow of nutrients like nitrogen, sulphur and carbon in the ecosystems in which they occur (Lovich et al., 2018).

4. Status and trends

4.1 Habitat trends

The regions where *Kinosternon* species occur are subject to high rates of habitat change for housing development and agricultural and livestock production (Ennen et al. 2020). Given that these turtles occur in areas with different types of vegetation, the expansion of the frontier of human activities varies considerably, even between regions of the same country (Páez et al., 2012). However, the quality of these habitats – and the water – and their size is decreasing (Acuña, 1990; Janzen, 1994; Morales-Verdeja & Vogt, 1997).

4.2 Population size

Although population size is unknown for most species, there are historical estimates for some of them. For example, species with a high harvest rate for a low harvest effort and a broad distribution include *K. scorpioides* and *K. leucostomum* (Páez et al., 2012; Legler & Vogt, 2013); species with a high harvest rate for a low harvest effort but whose distribution is not broad include *K. abaxillare*, K*. chimalhuaca, K. flavescens, K. integrum* and *K. oaxacae* (TTWG, 2021); species whose populations are estimated to include about 500 individuals (or fewer) include *K. angustipons, K. baurii, K. creaseri, K. dunni, K. herrerai, K. hirtipes, K. sonoriense. K. stejnegeri* and *K. subrubrum* (TTWG, 2021); species whose populations are estimated to be rare or extremely rare include *K. acutum, K. alamosae, K. cora* (Loc-Barragán et al., 2020)*, K. durangoense, K. steindachneri* and *K. vogti* (López-Luna et al., 2018).

It is important to mention that, although some populations are considered to be very common, there is information from personal observations of the disappearance of local wild populations; this is the case of *K. abaxillare, K. leucostomum*, *K. oaxacae* and *K. scorpioides* (López-León, Guichard-Romero, Reyes-Grajales, Vogt, pers. comm.). For *K. vogti*, populations are estimated to be very low, with low probability of capture (20 specimens captured or sampled by roadkill events in the last 5 years; López-Luna et al., 2018;).

In its Red List, the International Union for the Conservation of Nature (IUCN) has classified three species as Vulnerable (VU; K*. abaxillare, K. angustipons, K. dunni*), eight as Least Concern (LC; *K. baurii, K. chimalhuaca, K. creaseri, K. flavescens, K. hirtipes, K. integrum, K. stejnegeri, K. subrubrum*) and three as Data Deficient (DD; K*. alamosae, K. durangoense, K. oaxacae*) (TTWG, 2021).

4.3 Population structure

Most healthy populations of *Kinosternon* are characterized by having mostly large individuals – individuals just below sexual maturity and adults – and fewer smaller juvenile individuals (Márquez, 1995; Forero-Medina et al., 2007; Vázquez-Gómez et al., 2016; Rodrigues et al., 2017; Bedoya-Cañón et al., 2018; Patiño-Siro et al., 2018; Reyes-Grajales et al., 2021); some species in which there are records of a greater presence of large individuals (i.e., sexually mature individuals or individuals just below maturity) are *K. abaxillare* (Reyes-Grajales et al., 2021), *K. oaxacae* (Vázquez-Gómez et al., 2016), *K. scorpioides* (Acuña-Mesén, 1990; Forero-Medina et al., 2007; Barreto et al., 2009; Vogt et al., 2009) and *K. sonoriense* (Douglas, 2009). Yet, some healthy populations may be composed of more juvenile individuals (*K. creaseri*, Taggert Butterfield, pers. comm. with the CITES SA of Mexico).

A greater proportion of females than males has been reported (Márquez, 1995; Forero-Medina et al., 2007; Iverson, 2010; Bedoya-Cañón et al., 2018; Costa et al., 2017; official information provided by El Salvador for *K scorpioides*); some species for which more females than males have been reported are *K. abaxillare* (Reyes-Grajales et al., 2021), *K. oaxacae* (Vázquez-Gómez et al., 2016), *K. scorpioides* (Acuña-Mesén, 1990; Forero-Medina et al., 2007; Barreto et al., 2009; Vogt et al., 2009) and *K. sonoriense* (Douglas, 2009). It should be noted that, in some cases, the size structures reported should be taken with caution because the mesh size of various harvest (i.e., fishing) methods has changed and large mesh sizes imply a lower probability of catching small specimens

(Macip-Ríos et al., 2009; Legler & Vogt, 2013; Vázquez-Gómez et al., 2016; Reyes-Grajales et al., 2021). In general terms, the ratio between carapace size and sexual maturity of the specimens is unknown for most species.

4.4 Population trends

The population trends of all the species of *Kinosternon* are unknown, as few long-term studies have been conducted with these species. However, of the 17 species of kinosternids included in the IUCN Red List (see **Section 4.3**), three show declining trends (*K. abaxillare, K. herrerai, K. hirtipes*), three have stable trends (*K. creaseri, K. integrum, K. stejnegeri*), and 11 have unknown population trends (*K. acutum, K. alamosae, K. angustipons, K. baurii, K. chimalhuaca, K. dunni, K. durangoense, K. flavescens, K. oaxacae, K. sonoriense, K. subrubrum*). In the particular case of *K. vogti*, a very fast population decline was estimated because it is a microendemic species with a very restricted distribution in urban and suburban areas and because of the quick disappearance of the few sites in which it has been recorded (desiccation of water bodies; unpublished data, Taggert Butterfield).

For *K. cora*, the potential area of distribution is slightly larger than that of *K. vogti*, but the impact of only two traffickers can be very high (observation of the poaching of at least 90 individuals from a single harvest site; unpublished data, Taggert Butterfield). The plundering of populations by targeting adult individuals is increasing and population collapses are expected: as there are no individuals breeding, population size, density and structure and sex ratio are negatively affected (Iverson, 1989; Forero-Medina et al., 2007; Barreto et al., 2009; Vázquez-Gómez et al., 2016; Barreto et al., 2020; Reyes-Grajales et al., 2021). This is particularly serious in endemic populations with a restricted distribution such as *K. vogti* and *K. cora*.

4.5 Geographic trends

Most of the different regions in which turtles of the genus *Kinosternon* occur have historical and current high rates of changes in land use, mainly for agriculture – including livestock farming – and housing development (Ennen et al., 2020). The continuous creation of transport routes such as roads and countryside tracks and residential areas that imply changing forest cover, reclaiming water bodies and/or lining them with concrete and regularly burning croplands once or twice a year has a considerable impact on the stability and/or development of natural populations (Iverson, 1989; Janzen, 1994; Forero-Medina et al., 2007; Barreto et al., 2009; Vázquez-Gómez et al., 2016; Barreto et al., 2020; Reyes-Grajales et al., 2021).

5. Threats

The main threats to turtles of the genus *Kinosternon* are habitat destruction, consumption by humans and illegal trade for use as pets domestically and internationally. As a result, these turtles are historically and currently among the most heavily exploited ones (Brito & Ferreira, 1978; Palha et al., 1999, Vogt, 2008; L. Barreto, pers. comm., 2016; Fernandes Ferreira et al., 2013, Paez, et al., 2013; Legler & Vogt, 2013). To a different extent and with different sources, all the species are traded legally and illegally for use as pets and as raw material to make decorative objects, musical instruments and homeopathic medicines (Acuña-M. 1993; Castaño-Mora. et al. 2005; Corredor-L. et al. 2007; Legler & Vogt, 2013). Particularly, the increase in illegal harvest for international trade is a very serious threat to *K. vogti* and a serious threat to species about which very little is known such as *K. cora*, which is very similar to *K. vogti* (Standford, pers. comm.); moreover, very high harvest efforts in turtles can lead to the extirpation of entire local populations (Legler & Vogt, 2013), for example, *K. scorpioides* is harvested in large numbers in Mexico and Guatemala for food, mainly during religious festivities such as lent (Legler & Vogt, 2013).

Other significant threats are the introduction of invasive species that compete for space and food (e.g., the American bullfrog [*Lithobates catesbeianus*] and the suckermouth catfish [*Hypostomus plecostomus*], the common carp [*Cyprinus carpio*]) or aggressively displace these turtles (e.g., the red-eared slider [*Trachemys scripta elegans*] and the spiny softshell turtle [*Apalone spinifera*], which affect *K. sonoriense* in the Colorado River Delta (Aguirre & Gática 2010, Reyes-Grajales, 2021); and *K. integrum*, affecting the populations of *K. vogti* in Vallarta, Jalisco (Taggert Butterfield, pers. comm.); fires, whether natural or intentional for agricultural management, the search for turtles or other purposes, have effects on the entire population (Acuña, 1990; Janzen, 1994; Morales-Verdeja & Vogt, 1997; Páez et al., 2012); habitat pollution and degradation (with direct impacts on the species or their food), deforestation, drainage of marshes and toxic pollutants in aquatic ecosystems, groundwater extraction, river diversion, urban development and fragmentation by roads (many species of *Kinosternon* move between water bodies, so they are frequently killed by cars) (Morales-Verdeja & Vogt, 1997; Páez et al., 2012; Pereira, et. al, 2003; Iverson & Vogt,

2011; Paez, et. al, 2013; Hernández-Guzmán et. al., 2015; Acuña, 1990; Janzen, 1994; Morales-Verdeja & Vogt, 1997; Páez et al., 2012; Velázquez-Nucamendi et al., 2021). Droughts are also an important factor: in Sonora, one single drought event in 2019-2021 killed 48% of a population of *K. alamosae* (Taggert Butterfield, pers. comm.).

6. Utilization and trade

6.1 National utilization

Kinosternon turtles are widely harvested to be traded and consumed (Asprilla-Perea & Díaz-Puente, 2020) in some regions, as happens with *K. scorpioides* (Iverson, 2010) and *K. leucostomum* (Pereira, et. al, 2003). Turtles of this genus also have economic, social and cultural importance (Legler & Vogt, 2013); for example, throughout their range there are farms where they are bred for legal trade, they are a source of protein for many neighbouring communities and they are kept as a symbol of fertility, abundance of water resources and longevity in many cultures of the Americas where they occur (Bonin et al., 2006; Ernst & Lovich, 2009; Páez et al. 2012; Legler & Vogt, 2013; Asprilla-Perea & Díaz-Puente, 2020; Velázquez-Nucamendi et al., 2021). They are also used as ornaments in musical instruments and as pets (Acuña-M. 1993, Corredor-L. et al. 2007; Iverson & Vogt 2011).

Some of the most highly traded species – although they are not necessarily offered for sale under the correct name – are *K. chimalhuaca, K. creaseri, K. flavescens, K. hirtipes, K. integrum, K. leucostomum and K. scorpioides* (Iverson 1991; Legler & Vogt, 2013). Mexico: Between 2010-2020, DGVS-SEMARNAT, the General Directorate for Wildlife of the Mexican Department of the Environment and Natural Resources, reported authorizing the harvest of 30,333 individuals bred in captivity in Wildlife Management and Conservation Units known as UMAs for their Spanish acronym. These included 28,344 *K. leucostomum,* 600 *K. integrum*, two *K. abaxiallare*, 16 *K. scorpioides*, 10 *K. hirtipes* and 1,361 *K. integrum* (in most cases, the harvest was for export purposes, **see next section**); the authority reported not having authorized the harvest of any wild specimens. Brazil: Trade of *K. scorpioides* bred in captivity in intensive systems is authorized in its natural range and regulated by IBAMA, the Brazilian Institute for the Environment and Renewable Resources (Portaria 142/1992; Portaria 070/1996, Instrução Normativa 169/2008 and Instrução Normativa 07/2015). The animals obtained in captivity for trade are produced by wild parental stock managed by IBAMA; in 2016 there was only one legal commercial operation in Guaramiranga (state of Ceará) (Brazil, Informação Técnica n°4/2021-RAN/DIBIO/ICMBio). Costa Rica: There are 33 establishments that are mainly devoted to keeping populations of *K. angustipons, K. leucostomum* and *K. scorpioides* in captivity for the purposes of environmental education (26%) and exhibition (24%); few operations (10%) breed and trade in these species (Arias-Ortega et al., 2016). Venezuela: There are no programs for commercial use of these species. Few data are available on trade and use of *K. scorpioides*, which is of little interest for consumption and in low demand for the pet trade.

6.2 Legal trade

Mexico: DGVS-SEMARNAT reported authorizing the harvest of 688 *Kinosternon* from the wild between 2010-2022 (468 *K. integrum*, 85 *K. acutum*, 68 *K. leucostomum* and 67 *K. scorpioides*). In the same period, it also authorized the export of 32,883 specimens – all captive bred – for commercial purposes (30,843 *K. leucostomum*, 445 *K. integrum*, 170 *K. acutum* and 1,425 *Kinosternon* sp.). The main destinations of the specimens authorized for export were: for *K. leucostomum*, China (25,743 specimens), the USA (1,295), Hong Kong SAR (1,380), Japan (1,100), Taiwan Province of China (390), France (100), Spain (45), Germany (20) and Malaysia (20). For *K. integrum* (445 specimens), China (298), Hong Kong SAR (130), the Republic of Korea (15) and Germany (2); for *K. acutum*, the only importer was China (170); for unidentified species, the destinations were the Republic of Korea (497), Taiwan Province of China (425), Hong Kong SAR (375) and Hungary (128). PROFEPA, the Mexican CITES law enforcement authority, reported actual exports of 20,597 individuals of *K. leucostomum* between 2009 and 2020 for commercial purposes; the main importers were China (17,728 individuals), Hong Kong SAR (1,687), the USA (619), Malaysia (20), Spain (33) and Japan (510); for *K. integrum*, 31 individuals were reportedly exported to Korea (15), China (14) and Germany (2); for *K. scorpioides*, exports were limited to 4 individuals to Benin; for specimens identified only at genus level, 1,701 individuals were reported to be exported to China, Hong Kong SAR and Korea. Regarding imports, PROFEPA reported inspecting 30 specimens between 2009-2020: 26 *K. leucostomum* and 4 *K. scorpioides*.

United States: according to the information provided by the USFWS to the CITES Scientific Authority of Mexico, imports from Mexico between 2000-2019 involved 1,393 *Kinosternon* specimens (1,168

K. leucostomum, 1 *K. flavescens*, 1 *K. sonoriense*, 3 *K integrum*, 23 *K. oaxacae*, 12 *K. scorpioides*, 2 *K. subrubrum* and 184 of undetermined species. Of these imports, 84% were for commercial purposes (240 specimens of wild source and 932 with source codes C or F; *K. leucostomum* was the most abundant species with 1,162 individuals); the remaining imports were for personal or scientific purposes. Regarding exports, between 2013-2019 there were records of exports of 197,930 individuals of *Kinosternon*, practically all of them for commercial purposes (72.36% of individuals were wild (W) or ranched (R)). The most exported species were *K. subrubrum* (118,987 individuals; 82% W or R), *K. baurii* (66,532 individuals, 56% W or R), *K. flavescens* (12,378 individuals, 67.7% W or R), and only 32 individuals of *K. sonoriense* and one of *K. hirtipes* (only 3 *K. sonoriense* with source code W). The main destinations were China (49.9%), Hong Kong SAR (26%), Macao SAR (10.04%), South Korea (3.97%), Japan (3.23%) and Taiwan Province of China (2.5%); the remaining 4% was distributed between 21 countries.

Argentina: from 2000 to 2008, 306 turtles were imported from the United States (*K. subrubrum, K. baurii, K. flavescens* and *K. leucostomum*), with no imports authorized since 2008.

Peru: it reported the export of 239 live individuals of *K. scorpioides* between 2019-2020 from breeding farms in the region of Loreto.

El Salvador: 46 exports of *K. scorpioides* between 2013-2021, 76% to the USA and the rest to Hong Kong SAR, Taiwan Province of China and Macao SAR.

6.3 Parts and derivatives in trade

The most highly traded resource on a global level is live specimens for various purposes, such as the pet trade, food and medicinal purposes (Bonin et al., 2006; Ernst & Lovich, 2009; Páez et al. 2012; Legler & Vogt, 2013; Asprilla-Perea & Díaz-Puente, 2020; Velázquez-Nucamendi et al., 2021). The derivatives of *Kinosternon* turtles in trade are their meat, organs and bones (Legler & Vogt, 2013). Of these, the shell is the part most widely used to make crafts, and can be painted or inlaid with jewellery (Legler & Vogt, 2013).

6.4 Illegal trade

Mexico: as regards seizures and confiscations of *Kinosternon* turtles recorded in Mexico, between 2010-2022 PROFEPA recorded a total of 19,597 individuals, mostly of the species *K. leucostomum* (14,035 individuals), *K. integrum* (4,005) and *K. scorpioides* (470). The main confiscations took place in Mexico City Airport in 2020. They concerned 10,132 individuals of the genus that were intended for export (4,887 *K. leucostomum*, 4,931 *K. integrum*, and 314 *K. scorpioides*). Most of them showed evidence of being wild caught (e.g., hooks in the mouth, typical wounds and scars of wild specimens on the carapace, visible external parasites; according to the CITES Scientific Authority, pers. comm. with the Wildlife Management and Conservation Units where the animals were placed. As reported in Section 6.2, no authorizations have been granted for collecting wild specimens for export, so it is presumed that the specimens mentioned were of illegal origin. Considering the demographic information available on populations of kinosternids (see sections 3, 5 and 11), such a high level of harvest may have a strong impact on local populations. Particularly for *K. vogti*, after it was described in 2018 (López-Luna et al., 2018), its demand increased on a domestic and international level (Stanford, pers. comm.). The population was already very small before its description in 2018. In 2021, the presence of the species was detected in Internet forums of private collectors in Hong Kong (Craig Standford, pers. comm.), and the CITES Scientific Authority of Mexico has found evidence (i.e., publications in social media) that the species is held by private individuals; given that no authorizations have been granted, these individuals are presumed to be of illegal origin. According to Marco López-Luna (pers. comm.), several specimens of *K. vogti* and *K. cora* (the latter in 2022) have been observed in Asian markets. According to the records of DGVS-SEMARNAT, until 2021 there were no authorizations for the harvest of wild individuals of either species, and, according to PROFEPA, there were no records at ports of exit either.

United States: according to a note shared by the USFWS with Mexico, illegal trade of *Kinosternon* specimens appears to be common; the note states that, between 2017-2019, a company laundered close to 3,500 *K. baurii* obtained from the wild as captive bred specimens for the purposes of domestic and international trade (UDJ 2022). Peru: between 2015-2020, there were only five reports of illegal trade of *K. scorpioides*.

According to information from social media, the price of some specimens of *Kinosternon* in China ranges from USD 150 (e.g., *K. integrum, K. leucostomum* and *K. scorpioides*) to USD 10,000 for *K. vogti* (Eduardo Reyes Grajales, pers. comm. 2022).

6.5 Actual or potential trade impacts

For all turtles of the genus *Kinosternon*, harvest for unregulated and/or excessive trade (i.e., for consumption and for the pet trade on a domestic and international level) is one of the main threats (TTWG, 2021). Illegal trade is targeted at adult individuals with a larger size and more striking colours, which has significant demographic consequences for population dynamics (Iverson, 1982; Forero-Medina et al., 2007; Douglas, 2009; Macip-Ríos et al., 2009; Iverson, 2010; Costa et al., 2017; Bedoya-Cañón et al., 2018). The ongoing harvest of large breeding individuals prevents the generation of new individuals, leading to the partial or total decline of the population; this is particularly serious for species with a restricted distribution or species in greater demand (Reyes-Grajales, et al., 2021; Standford et al. 2020). Illegal trade of wild specimens and little or no monitoring have led to the extirpation of entire populations that used to be abundant (Guichard-Romero com. pers; López-León, 2008; Legler & Vogt et al., 2013).

7. Legal instruments

7.1 National

Argentina: in Resolution No. 1055/2013 of the Ministry of the Environment and Sustainable Development, *K. scorpioides* is classified as an “insufficiently known taxon”. Colombia: In the national IUCN category, established in Resolution 1912-2017, *K. dunni* and *K. scorpioides* are classified as Vulnerable (VU and VU D2, respectively). Costa Rica: these species are regulated by the Wildlife Conservation Act. El Salvador: the General Environment Act regulates the hunting, harvest and trade of wildlife. Guatemala: the List of Endangered Wildlife Species of the National Council for Protected Areas includes *K. acutum, K. leucostomum* and *K. scorpioides* in Category 3 (VU) (2021). Honduras: the General Environment Act regulates the use and conservation of wildlife. Mexico: the Official Mexican Standard NOM-059-SEMARNAT-2010 (DOF, 2019) includes 10 species of *Kinosternon*, two in the category “Endangered” (P; *K. sonoriense* and *K. vogti*) and eight in the category “Subject to Special Protection” (Pr; *K. acuatum, K. alamosae, K. herrerai, K. hirtipes, K. integrum, K. leucostomum, K. oaxacae* and *K. scorpioides*). Their management and harvest are regulated through the General Wildlife Act. USA: The subspecies *K. sonoriense longifemorale* (Arizona) is listed in the Endangered Species Act (ESA) as Endangered. Peru: neither of the species that occur in the country (*K. scorpioides* and *K. leucostomum*) are considered threatened. French Guiana: protection has been granted since 1986.

7.2 International

No species of the genus *Kinosternon* are included in the CITES Appendices.

8. Species management

8.1 Management measures

Costa Rica: hunting and harvesting threatened wild fauna is prohibited, except for specimens originating from registered sustainable breeding operations; exports and imports of any species are prohibited. Guatemala: the country authorizes their use for scientific purposes and conservation breeding, the use of specimens bred *ex situ*, the harvest and trade of wild individuals through management plans that ensure the survival of the species, and sport and subsistence hunting and fishing. Mexico: the use of wild and captive bred specimens is allowed under the General Wildlife Act by Wildlife Management and Conservation Units or UMAs (the only legal entities that can harvest wild species, which must be done according to a management plan and population assessments). There are 28 wildlife UMAs registered for species of *Kinosternon* (for *K. integrum, K. scorpioides, K. acutum, K. leucostomum; K. sonoriense, K. alamosae, K. creaseri* and *K. herrerai*), and 31 UMAs for captive breeding purposes (**see Section 8.4**). USA: Regulations differ between states; for example, wild harvest for commercial purposes is prohibited for *K. flavescens* in Arizona, Texas, Colorado, Iowa, Kansas and Missouri; for *K. subrubrum*, it is prohibited in South Carolina, Indiana, Kentucky, Missouri, Mississippi, Texas and Virginia; it is prohibited for *K. baurii* in South Carolina and Virginia, for *K. hirtipes* in Texas and for *K. sonoriense* in Arizona. Other state-level measures may

include the requirement for a permit to possess or transport live or dead individuals, daily or seasonal harvest limits, limits in the number of individuals that can be possessed, authorizations for possession only for specific purposes (e.g., education) and the prohibition of artificial propagation, among others. French Guiana: any wild harvest of the species is prohibited. El Salvador: wildlife use is regulated by the Wildlife Conservation Act through the Ministry of the Environment and Natural Resources.

8.2 Population monitoring

Academic research by universities and NGOs (Students Conserving Nature - SCN) is known to be under way on at least three species in Mexico for the states of Sonora and Yucatan (Mexico): *K. integrum*, *K. alamosae* and *K. creaseri*. In addition, UMAs that wish to apply for authorizations to harvest wildlife must submit population assessments justifying a given harvest rate to SEMARNAT, the CITES Management Authority of Mexico.

8.3 Control measures

8.3.1 International

8.3.2 Domestic

In Mexico, control of cross-border movements is based on the recognition of the permits and authorizations granted by DGVS-SEMARNAT as the authority that sets regulations and non-tariff restrictions to cross-border movements of wild species (along with the Ministry of the Economy). It is also based on the verification of these permits and authorizations by the law enforcement authority (PROFEPA) at the authorized points for the entry and exit of people and goods into or from the country for commercial or non-commercial purposes. Once PROFEPA has verified that regulations and non-tariff restrictions are met and validated the permits or authorizations issued by DGVS-SEMARNAT, customs gives clearance to the formal import or export of the goods (*Ley Aduanera*, Customs Act, Article 36 A). Health measures are set by the foreign trade authorities and, according to the requirements of the country of destination, before the specimens are shipped they are verified by the health authorities at the time of import.

8.4 Captive breeding and artificial propagation

Mexico: there are 31 UMAs registered with DGVS-SEMARNAT as breeding operations; 21 for *K. leucostomum*, six for *K. integrum*, three for *K. acutum*, three for *K. scorpioides* and only one for the following species: *K. abaxillare, K. creaseri, K. flavescens, K. herrerai, K. hirtipes*. In addition, there are 20 Properties or Facilities that Manage Wildlife in Confined Form, Outside its Natural Habitat (PIMVS), eight for *K. leucostomum*, seven for *K. integrum*, four for *K. scorpioides*, two for *K. acutum* and only one for *K. alamosae, K. chimalhuaca, K. flavescens* and *K. hirtipes*. There is no record of any UMAs for *K. vogti* and *K. cora*. Argentina: according to the information provided, there are no formal breeding operations for legal trade in the species. Peru: the management of *K. scorpioides* for export purposes is from populations managed in captivity. United States: there are reports of exports of specimens with source codes F and C, so there are commercial breeding operations in the country. El Salvador: there are three captive breeding operations authorized for breeding *K. scorpioides*.

8.5 Habitat conservation

Habitat conservation takes place mainly indirectly through the existence and protection of protected areas (protection is not only targeted to *Kinosternon* turtles). **Annex III** lists some of the protected areas of Mexico, Brazil, Argentina and Colombia where species of *Kinosternon* occur.

8.6 Safeguards

9. Information on similar species

Species of *Kinosternon* have a similar appearance and are difficult to distinguish by people with little experience with the taxonomy of the genus. Iverson (1991) reported that over half of the specimens of *Kinosternon* deposited in museums are misidentified, which affects knowledge on the systematics of this group and makes information on this group scarce compared to that of other reptiles distributed in the Americas. This problem is so serious that it has been necessary to verify each literature record (Iverson,

1979). There are still identification practices based on general colour patterns (e.g., for *K. integrum, K. scorpioides* and *K. leucostomum*), which are incorrect. Identification becomes even more complicated with individuals at immature stages, since most of the diagnostic characteristics have been documented from adults. *K. vogti* is easy to confuse with *K. cora* (Marco López-Luna, pers. comm.); moreover, according to PROFEPA, both species can easily be confused with *K. leucostomum*, a species that is much more common in (legal and illegal) trade.

With other genera: due to the colour patterns on the skin and the carapace, adults and juveniles of *Kinosternon* are often confused with *Claudius angustatus*, *Staurotypus* spp. and *Sternotherus* spp., species of the same family Kinosternidae. Yet, a more detailed inspection of the plastron and other characters on the head and marginal scutes make it possible to clearly distinguish between immature individuals of both genera. To distinguish between the genus *Sternotherus* and *Kinosternon*, it is enough to look at the plastron: *Sternotherus* has a small and fixed plastron (similar to *Claudius* and *Staurotypus*), whereas the plastron of *Kinosternon* is longer and has two mobile lobes (Peter Paul van Dijk, pers. comm. with the CITES SA of Mexico).

To support species identification, the CITES Scientific Authority of Mexico coordinated the production of a dichotomous identification key to distinguish between species of *Kinosternon* (**Annex IV**). It should be highlighted that there are also identification keys for the genus *Kinosternon* that can be used (Ernst & Barbour 1992; Legler & Vogt 2013).

10. Consultations

In March 2021, Mexico consulted all the range countries about the potential listing of the genus in Appendix III (Mexico) and responses and information were received from Argentina, Brazil, Colombia, Ecuador, French Guiana, Honduras, Peru, the United States of America and Venezuela (Bolivarian Republic of).

For the preparation of the current proposal, the range States were consulted in May 2022. Information was received from the USA (24 May) and El Salvador (8 June). Responses supporting the proposal were received from Argentina (17 May), Colombia (7 June), El Salvador (8 June), Honduras (8 June) and the USA (15 June); of these, El Salvador (8 June), Colombia (10 June) and the USA (15 June) expressed their interest in being co-proponents.

Moreover, the IUCN Tortoise and Freshwater Turtle Specialist Group provided essential advice and information for the preparation of the proposal.

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11. Additional remarks

12. References

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Annex I

Table 1. Detalle de las sinonimias taxonómicas referidas a las especies del género acorde al TTWG 2021. Se incluyen nombres comunes.

Table 1. Detail of the taxonomic synonyms referring to the species of the genus according to the TTWG 2021. Common names are included.

Especie/Species	Sinónimo/Synonym
Kinosternon abaxillare Español: Casquito Pardo Inglés: Central Chiapas Mud Turtle	*Kinosternon scorpioides abaxillare* *Kinosternon cruentatum abaxillare* *Kinosternon abaxillare* Baur *in* Stejneger 1925 *kinosternon scorpioides abaxillare* — Ernst & Barbour 1989 *kinosternon scorpioides abaxillare* — Rhodin et al. 2010 *kinosternon abaxillare* — Iverson *et al.* 2013 *kinosternon scorpioides abaxillare* — TTWG 2014 *kinosternon abaxillare* — Reyes-Grajales *et al*. 2021 *kinosternon abaxillare* — TTWG 2021
Kinosternon acutum Español: Tortuga pecho quebrado de Tabasco, Pochitoque jaguactero o negro, Montera, chechagua de monte Inglés: Tabasco Mud Turtle	*Kinosternon scorpioides var*. acuta Gray 1831 *Cinosternum berendtianum* Cope 1865 *Cinosternon berendtianum* Troschel 1866 *Cinosternon effeldtii* Peters 1873 *Cinosternum effeldtii* Günther 1885 *Cinosternum effeldti* Gadow 1905 *Kinosternon berendtianum* Mertens, Müller & Rust 1934 *Kinosternon acutum* Stejneger 1941 *Kinosternon berentianum* Duellman 1965 *Kinosternun acutum* Alvarez del Toro 1973 *Kinosternon scorpioides var. acuta* Gray 1831: 34 *Cinosternum berendtianum* Cope 1865 *Cinosternon effeldtii* Peters 1873: 603 *Cinosternon effeldtii* — Bocourt 1876: 396 *Cinosternon berendtianum* — Bocourt 1876: 395 *Cinosternum effeldtii* — Günther 1885: 16 *Kinosternon berendtianum* — Stuart 1935: 55 *Kinosternon berendtianum* — Stuart 1937 *Kinosternon acutum* — Stejneger 1941 *Kinosternon acutum* — Liner 1994 *Kinosternon acutum* — Köhler 2000: 26 *Cryptochelys acuta* — Iverson et al. 2013 *Kinosternon acuta* — Spinks et al. 2014 *Kinosternon acutum* — TTWG 2014 *Kinosternon acuta* — González-Sánchez et al. 2017 *Kinosternon acutum* — TTWG 2021
Kinosternon alamosae Español: Casquito de Álamos, Tortuga pecho quebrado de Álamos y Tortuga de agua Inglés: Alamos Mud Turtle	*Kinosternon alamose* Pritchard 1979 *Kinosternon alamosae* Berry & Legler 1980 *Kinosternon alamosae* Berry & Legler 1980 *Kinosternon alamosa* Rogner 1996
Kinosternon angustipons Español: Tortuga de pantano Centroaméricana, tortuga de barro de puente estrecho Inglés: Narrow-bridged Mud Turtle, Central American Mud Turtle	*Cryptochelys angustipons* (Legler 1965)
Kinosternon baurii Español: Tortuga de barro rayada	*Cinosternum baurii* Garman 1891 *Kinosternon baurii* Lönnberg 1894 *Kinosternon bauri palmarum* Stejneger 1925 *Kinosternon bauri bauri* Mertens, Müller & Rust 1934

Inglés: Striped mud turtle	*Kinosternon baurii baurii* Stejneger & Barbour 1939 *Kinosternon baurii palmarum* Stejneger & Barbour 1939
Kinosternon chimalhuaca Español: Tortuga de pantano jalisciense Inglés: Jalisco Mud Turtle	
Kinosternon cora Español: Casquito cora, chacuanita cora Inglés: Cora Mud Turtle	*K. chimalhuaca* Berry, Seidel and Iverson 1997
Kinosternon creaseri Español: Tortuga de pantano yucateca Inglés: Creaser´s Mud Turtle	*Cryptochelys creaseri* Hartweg 1934
Kinosternon dunni Español: Tortuga de pantano Colombiana Inglés: Dunn´s Mud Turtle	*Cryptochelys dunni* Schmidt 1947
Kinosternon durangoense Español: Casquito de los presones Inglés: Durango Mud Turtle	*Kinosternon flavescens durangoense* Iverson, 1979
Kinosternon flavescens Español: Tortuga casquito amarilla Inglés: Yellow Mud Turtle	*Cinosternon flavescens* Agassiz 1857 *Platythyra flavescens* Agassiz 1857 *Cinosternum flavescens* Agassiz 1857 *Kinosternum flavescens* Cope 1892 *Kinosternon flavescens* Stone 1903 *Kinosternon flavescens flavescens* Hartweg 1938 *Kinosternon flavescens spooneri* Smith 1951 *Platythyra flavenscens* Raun & Gehlbach 1972 *Kinosternon spooneri* Collins 1991
Kinosternon herrerai Español: Tortuga casquito pecho quebrado, Tortuga pecho quebrado de Herrera, Casquillo de herrera, Garlapago, Pochitoque Inglés: Herrera´s mud turtle	*Cryptochelys herrerai* Stejneger 1925
Kinosternon hirtipes Español (E): Tortuga pecho quebrado pata rugosa Tortuga casquito del Valle de México, casquito del Lago Chapala, casquito de la presa San Juanico, casquito de Viesca, casquito de Pátzcuaro Inglés (I): Rough-Footed Mud Turtle, Valley of Mexico Mud Turtle, Lake Chapala Mud Turtle, San Juanico Mud Turtle, Viesca Mud Turtle, Mexican	*K. hirtipes hirtipes* Wagler 1830 *Cinosternon hirtipes* Wagler 1830 *Cinosternon hirtipes* Wagler 1833 *Clemmys (Cinosternon) hirtipes* Fitzinger 1835 *Cinostermon hirtipes* Gray 1844 *Kinosternum hirtipes* LeConte 1854 *Kinosternon hirtipes* Gray 1856 *Cinosternum hirtipes* Agassiz 1857 *Thyrosternum hirtipes* Agassiz 1857 *Ozotheca hirtipes* LeConte 1859 *Chinosternum hirtipes* Caballero & Caballero 1938 *Kinosternon [hirtipes] hirtipes* Schmidt 1953 *Kynosternon hirtipes* Lopez 1975 *Kinosternon hertipes* Semmler, Seidel & Williams 1977

Plateau Mud Turtle, Pátzcuaro Mud Turtle	
Kinosternon integrum Español: Tortuga pecho quebrado mexicana Inglés: Mexican Mud Turtle	*Kinosternum integrum* LeConte 1854 *Cinosternum integrum* Agassiz 1857 *Thyrosternum integrum* Agassiz 1857 *Thyrosternon integrum* Gray 1858 *Cinosternon integrum* Strauch 1862 *Kinosternon integrum* Müller 1865 *Swanka integra* Gray 1870 *Cinosternon rostellum* Bocourt 1876 *Cinosternon guanajuatense* Dugès 1888 *Cinosternum rostellum* Boulenger 1889 *Cinosternum scorpioides integrum* Siebenrock 1904 *Cinosternum scorpioides integrum forma mexicana* Siebenrock 1907 *Kinosternon scorpioides integrum* Ahl 1934 *Kinosternon intergrum* Dixon 1960 *Cinosetum integrum* Gillet 1995 *Kinosternon ingegrum* Rogner 1996
Kinosternon leucostomum Español: Tortuga pecho quebrado labios blancos Inglés: White-lipped Mud Turtle (Northern and Suthern Whithe-lipped Mud Turtle)	*Cryptochelys leucostoma* Duméril and Bibron 1851 *Cinosternon leucostomum* Duméril & Bibron 1851 *Kinosternum leucostomum* LeConte 1854 *Kinosternon leucostomum* Gray 1856 *Cinosternum leucostomum* Agassiz 1857 *Thyrosternum leucostomum* Agassiz 1857 *Swanka maculata* Gray 1869 *Swanka leucostoma* Gray 1870 *Cinosternum brevigulare* Günter 1885 *Cinosternum cobanum* Günter 1885 *Cinosternon cobanum* Atkinson 1907 *Kinosternon leucostomum* Stuart 1934 *Kinosternon leuconostomun* Maldonado 1953 *Kinosternon leucostomun* Alvarez del Toro 1960 *Kinosternon mopanum* Neill 1965 *Kinosternun leucostomun* Alvarez del Toro 1973 *Kinosternon leucostoma* Tryon 1975 *Cinosternum brevigulare* Cope 1885 *Kinosternon leucostomum leucostomum* Duméril & Bibron 1885 *Cinosternum postinguinale* Cope 1887 *Cinosternon brevigulare* Atkinson 1907 *Cinosternum spurrelli* Boulenger 1913 *Kinosternon postinguinale* Schmidt 1946,
Kinosternon oaxacae Español: Tortuga pecho quebrado oaxaqueña Inglés: Oaxaca Mud Turtle	
Kinosternon scorpioides Español: Tortuga pecho quebrado escorpión Inglés: Scorpion Mud Turtle, White-throated Mud Turtle, Red-cheeked Mud Turtle	*Testudo scorpioides* Linnaeus 1766 *Testudo tricarinata* Retzius 1792 *Testudo retzii* Daudin 1801 *Emys retzii* Schweigger 1812 *Emys scorpioidea* Schweigger 1812 *Emys scorpioides* Oken 1816 *Chersine scorpioides* Merrem 1820 *Terrapene tricarinata* Merrem 1820 *Kinosternon brevicaudatum* Spix 1824 *Kinosternon longicaudatum* Spix 1824 *Kinosternon shavianum* Bell 1825 *Terrapene retzii* Fitzinger 1826 *Terrapene scorpioidea* Fitzinger 1826 *Cinosternon brevicaudatum* Wagler 1830 *Cinosternon longicaudatum* Wagler 1830

	Cinosternon scorpioidea Wagler 1830 *Cinosternon shavianum* Wagler 1830 *Clemmys tricarinata* Wagler 1830 *Emys (Kinosternon) scorpoides* Gray 1831 *Monoclida retziana* Rafinesque 1832 *Uronyx scorpioides* Rafinesque 1832 *Cinosternon scorpioidei* Wagler 1833 *Cinosternon scorpioideum* Wagler 1833 *Terrapene scorpioides* Schinz 1833 *Cinosternon scorpioides* Duméril & Bibron 1835 *Kinosternon shawianum* Duméril & Bibron 1835 *Clemmys (Cinosternon) scorpioidea* Fitzinger 1835 *Kinosternum brevicaudatum* LeConte 1854 *Kinosternum longicaudatum* Le Conte 1854 *Cinosternum brevicaudatum* Agassiz 1857 *Cinosternum longicaudatum* Agassiz 1857 *Cinosternum scorpioides* Agassiz 1857 *Cinosternum shavianum* Agassiz 1857 *Thyrosternum longecaudatum* LeConte 1859 *Thyrosternum scorpioides* LeConte 1859 *Swanka scorpoides* Gray 1869 *Swanka longicaudata* Gray 1870 *Swanka scorpioides* Gray 1872 *Cinosternon shawianum* Bocourt 1876 *Ciniosternon shawianum* Sumichrast 1880 *Cinosternum shawianum* Sumichrast 1882 *Thyrosternum shavianum* Garman 1884 *Cinosternum shawanianum* Velasco 1892 *Cinosternum scorpioides integrum* forma brasiliana Siebenrock 1907 *Cinosternum scorpioides scorpioides* Siebenrock 1907 *Kinosternon scorpioides pachyurum* Müller & Hellmich 1936 *Kinosternon scorpioides seriei* Freiberg 1936 *Kinosternon panamensis* Schmidt 1946 *Kinosternon escorpioides* Zerecero y D. 1948 *Kinosternon scorpioides panamense* Mertens & Wermuth 1955 *Kinosternon scorpioides scorpioides* Mertens & Wermuth 1955 *Kinosternon scorpioides carajasensis* da Cunha 1970 *Kinosternon scorpioides pachyrum* Wermuth & Mertens 1977 *Kinosternon scorpioides serei* Iverson 1986 *Kinosternon scorpioides serieli* Gosławski & Hryniewicz 1993 *Kinosternon scorpioides carajanensis* Rogner 1996 *Kinosternon scorpioides carajasense* Joseph-Ouni 2004
Kinosternon sonoriense Español: Tortuga pecho quebrado sonorense Inglés: Sonora Mud Turlte	*Kinosternum sonoriense* LeConte 1854 *Kinosternon sonoriense* Gray 1856 *Cinosternum sonoriense* Agassiz 1857 *Thyrosternum sonoriense* Agassiz 1857 *Kinosternum henrici* LeConte 1860 *Thyrosternum henrici* Troschel 1860 *Cinosternon henrici* Strauch 1862 *Cinosternon sonoriense* Strauch 1862 *Thylosternum sonoriense* Müller 1865 *Swanka henricii* Gray 1870 *Cinosternum henrici* Cope 1875 *Swanka henrici* Boulenger 1889 *Kinosternon sonoriensis* Bogert & Oliver 1945 *Kinosternon sonorensis* Weise 1962 *Kinosternon seonoriense* Berry & Shine 1980 *Kinosternon sonoriense sonoriense* Iverson & Tulane 1981 *Kinosternon sonorense sonorense* Rogner 1996
Kinosternon steindachneri Inglés: Florida Mud Turtle	*Kinosternon steindachneri* Siebenrock 1906 *Kinosternon subrubrum* Bonnaterre 1789

Kinosternon stejnegeri Inglés: Arizona Mud Turtle	*Kinosternon arizonense* Gilmore 1922 *Kinosternon flavescens stejnegeri* Hartweg 1938 *Kinosternon arizonenese* Iverson 1978 *Kinosternon flavescens arizonense* Iverson 1979 *Kinosternon arizonense* Gilmoe, 1923
Kinosternon subrubrum Español: Tortuga de lodo oriental Inglés: Eastern Mud Turtle, Common Mud Turtle. Florida Mud Turtle, Mississippi Mud Turtle	*Testudo subrubra* Lacépède 1788 *Testudo pensylvanica* Gmelin 1789, *Emydes pensilvancia* Brongniart 1805 *Emys pensylvanica* Schweigger 1812 *Terrapene boscii* Merrem Tentam 1820 *Terrapene pensylvanica* Merrem Tentam 1820 *Cistuda pensylvanica* Say J. 1825 *Sternotherus pensylvanica* Gray Ann. 1825 *Kinosternon pennsylvanicum* Bell 1825 *Sternothaerus boscii* Bell 1825 *Kinosternum pensylvanicum* Bonaparte 1830 *Cinosternon pensylvanicum* Wagler 1830 *Emys (Kinosternon) pennsylvanica* Gray 1831 *Clemmys (Cinosternon) pensylvanica* Fitzinger 1835 *Kinosternon pensylvanicum* DeKay 1842 *Kinosternon (Kinosternon) doubledayii* Gray 1844 *Kinosternon (Kinosternon) oblongum* Gray 1844 *Kinosternum doubledayii* LeConte 1854 *Kinosternum pennsylvanicum* LeConte 1854 *Kinosternon punctatum* Gray 1856 *Cinosternon pennsylvanicum* Agassiz 1857 *Cinosternum doubledayii* Agassiz 1857 *Cinosternum oblongum* Agassiz 1857 *Cinosternum pennsylvanicum* Agassiz 1857 *Cistudo pennsylvanica* Agassiz 1857 *Terrapene pennsylvanica* Agassiz 1857 *Thyrosternum pennsylvanicum* Agassiz 1857 *Cinosternum doubledayi* Agassiz 1857 *Cinosternum punctatum* Agassiz 1857 *Cinosternon doubledayii* Strauch 1865 *Swanka fasciata* Gray 1869 *Cinosternum pensylvanicum* Boulenger 1889 *Kinosternon pensilvanicum* Lönnberg 1894 *Cinosternonus pensylvanicum* Herrera 1899 *Cinosternum pensilvanicum* Siebenrock 1907 *Cinosternum pensilvanium* Siebenrock 1909 *Testudo pensilvanica* Siebenrock 1909 *Kinosternon subrubrum subrubrum* Stejneger & Barbour 1917 *Kinonsternon subrubrum* Liner 1954 *Kinosternum subrubrum* Schwartz 1961 *Kinosternon subrum* Richard 1999 *Kinosternon hippocrepis* Gray 1856 *Cinosternum hippocrepis* Agassiz 1857 *Cinosternon hippocrepis* Strauch 1865 *Kinosternon louisianae* Baur 1893 *Cinosternum louisianae* Ditmars 1907 *Kinosternon subrubrum hippocrepis* Stejneger 1917 *Cinosternum steindachneri* Siebenrock 1906 *Kinosternon steindachneri* Stejneger & Barbour 1917 *Kinosternon subrubrum steindachneri* Carr 1940 *Kinosternon subrubrumsteindachnerii* Nöllert 1992
Kinosternon vogti Español: Chacuanita de Puerto Vallarta, Casquito de Vallarta Inglés: Vallarta Mud Turtle	

(*Spanish only / en español únicamente / Seulement en espagnol)*

Annex II

Table 2. Distribución de las especies del género *Kinosternon*. Se utilizó TTWG (2021) para definir a *K. abaxillare* y *K. stejnegeri* (esta última, considerada previamente como *K. arizonense*). Para describir las áreas de distribución de *K. vogti* se utilizó la descripción de López-Luna et al. (2018), mientras que para *K. cora* se usó la descripción hecha por Loc-Barragán et al. (2020).

Table 2. Distribution of the species of the genus *Kinosternon*. TTWG (2021) was used to define *K. abaxillare* and *K. stejnegeri* (formely named as *K. arizonense*), López-Luna et al. (2018) for *K. vogti,* and Loc-Barragán et al. (2020) for *K. cora*.

Especies/Species	**Distribución/Distribution**
Kinosternon abaxillare	Depresión Central del estado de Chiapas, México y al oeste de Guatemala
Kinosternon acutum	Desde el centro de Veracruz (México) hacia norte de Belice y Guatemala (excluyendo la mayor parte de la península de Yucatán)
Kinosternon alamosae	**Endémica a México**: norte de Sinaloa y suroeste de Sonora
Kinosternon angustipons	Desde el sureste de Nicaragua, Costa Rica hasta el norte de Panamá
Kinosternon baurii	**Endémica a los EUA**: por toda la zona de océano atlántico y el mar de caribe, se encuentra en Florida, Georgia, Carolina del norte y sur, y Virginia
Kinosternon chimalhuaca	**Endémica a México**: desde el oeste de Jalisco (región costa) a Colima (costa)
Kinosternon cora	**Endémica a México**: oeste de Nayarit y sur de Sinaloa
Kinosternon creaseri	**Endémica a México**: centro y este de la península de Yucatán
Kinosternon dunni	**Endémica a Colombia**: río San Juan hacia cuencas del Río Baudo (oeste de Colombia)
Kinosternon durangoense	**Endémica a México**: sur de Chihuahua, oeste de Coahuila y este de Durango
Kinosternon flavescens	En EUA se distribuye desde el noroeste de Nebraska hacia el sur de Texas, pasando por Arizona Colorado, Illinois, Iowa, Kansas, Missouri, New Mexico, Oklahoma. En México se distribuye desde el norte de Chihuahua hasta el norte de Veracruz
Kinosternon herrerai	**Endémica a México**: sur de Tamaulipas al centro de Veracruz, este de San Luis Potosí, de Hidalgo y de Puebla
Kinosternon hirtipes	En EUA, se distribuye en una pequeña fracción al sur oeste de Texas (Big Bend). En México, se distribuye de forma disyunta en el desde el Desierto Chihuahuense hasta el altipalono mexicano, llegando a la Faja Volcánica Transmexicana, ocupando los estados de Aguascalientes, Chihuahua, Coahuila, la Ciudad de México, Durango, Guanajuato, Jalisco, México, Michoacán y Zacatecas
Kinosternon integrum	**Endémica a México**: se distribuye en los estados de Colima, Durango, Guanajuato, Guerrero, Hidalgo, Jalisco, Michoacán, Morelos, Nayarit, Oaxaca, Puebla, San Luis Potosí, Sinaloa, Sonora, Tamaulipas, Zacatecas
Kinosternon leucostomum	Se distribuye en la costa Atlantica y Pacífica, ampliamente en Belize, Costa Rica, Ecuador, Guatemala, Honduras, Nicaragua y Panamá. En Colombia se distribuye en la fracción noroeste colindante a Panamá. En México se distribuye por toda la región sureste abarcando los estados de Campeche, Chiapa, Oaxaca, Quintana Roo, Tabasco y Veracruz.
Kinosternon oaxacae	**Endémica a México**: Se distribuye desde la costa de Guerrero hasta la mitada de la costa de de Oaxaca.
Kinosternon scorpioides	En la costa Atlantica se distribuye desde el sur de Tamaulipas (México), hasta Guayana, en la costa Pacífica desde el Itzmo de Tehuantepec en Oaxaca, hasta tierra Adentro en el norte de Argentina, Bolivia y norte de Perú

Kinosternon sonoriense	En México se distribuye al norte y este de Sonora, oeste de Chihuahua, y una pequeña fracción de Baja California Norte. En EUA se distribuye al sur de Arizona, California y Nuevo México
K. steindachneri	**Endémica a los EUA**: se encuentra en la península de Florida
K. stejnegeri	Suroeste de Arizona (EUA) hacia el centro de Sonora (México)
Kinosternon subrubrum	**Endémica a los EUA**: se distribuye ampliamente al este de los EUA
Kinosternon vogti	**Endémica a México**: distribuida en los alrededores de Puerto Vallarta, Jalisco, México.

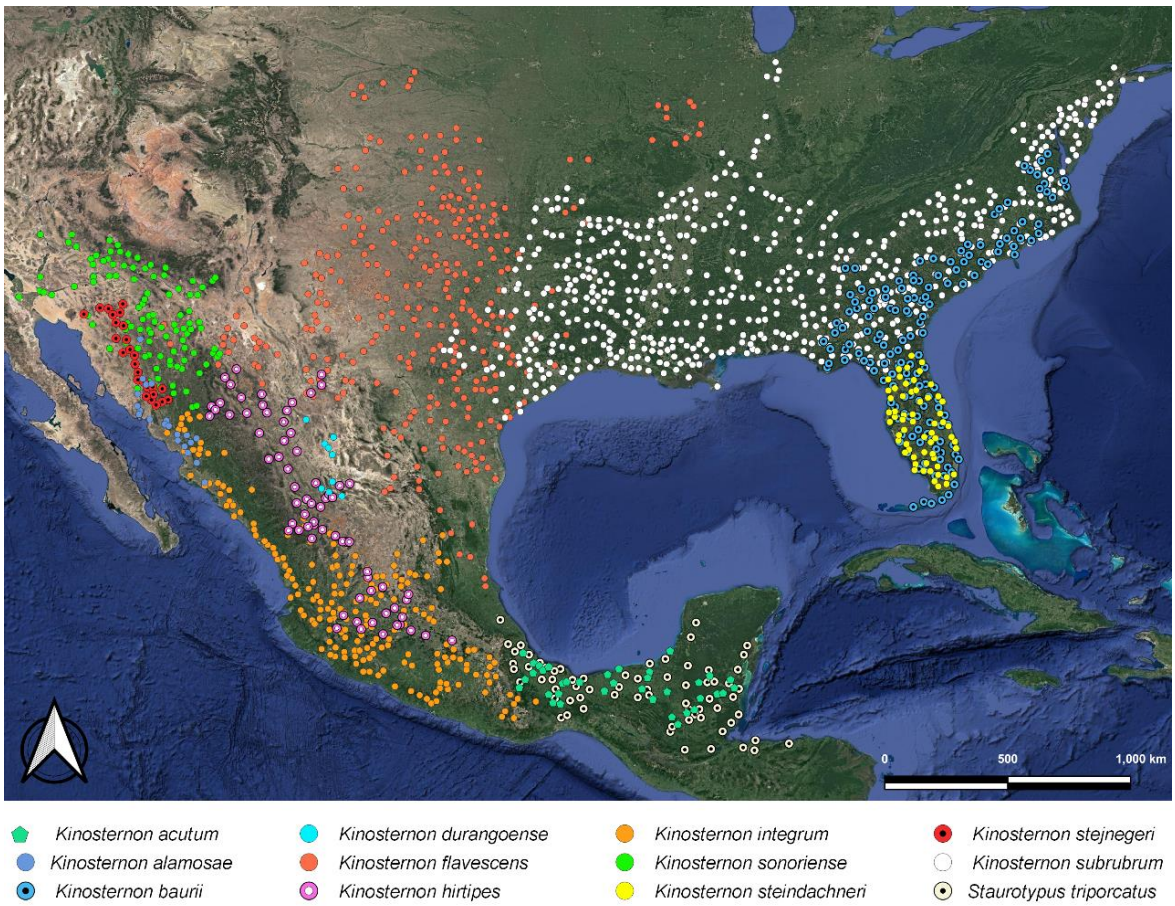

Figure 1 // Figure 1. Distribución del género *Kinosternon* y *Staurotypus triporcatus*. Información recuperada del TTWG (2021), utilizada con el permiso de Anders Rhodin. Mapas elaborados por Laura M. Florez-Franco y Eduardo Reyes Grajales. **//** Distribution of Genus *Kinosternon and Staurotypus triporcatus.* Information recovered by TTWG (2021), under authorization of Anders Rhodin. Maps elaborated by Laura M. Florez-Franco and Eduardo Reyes Grajales.

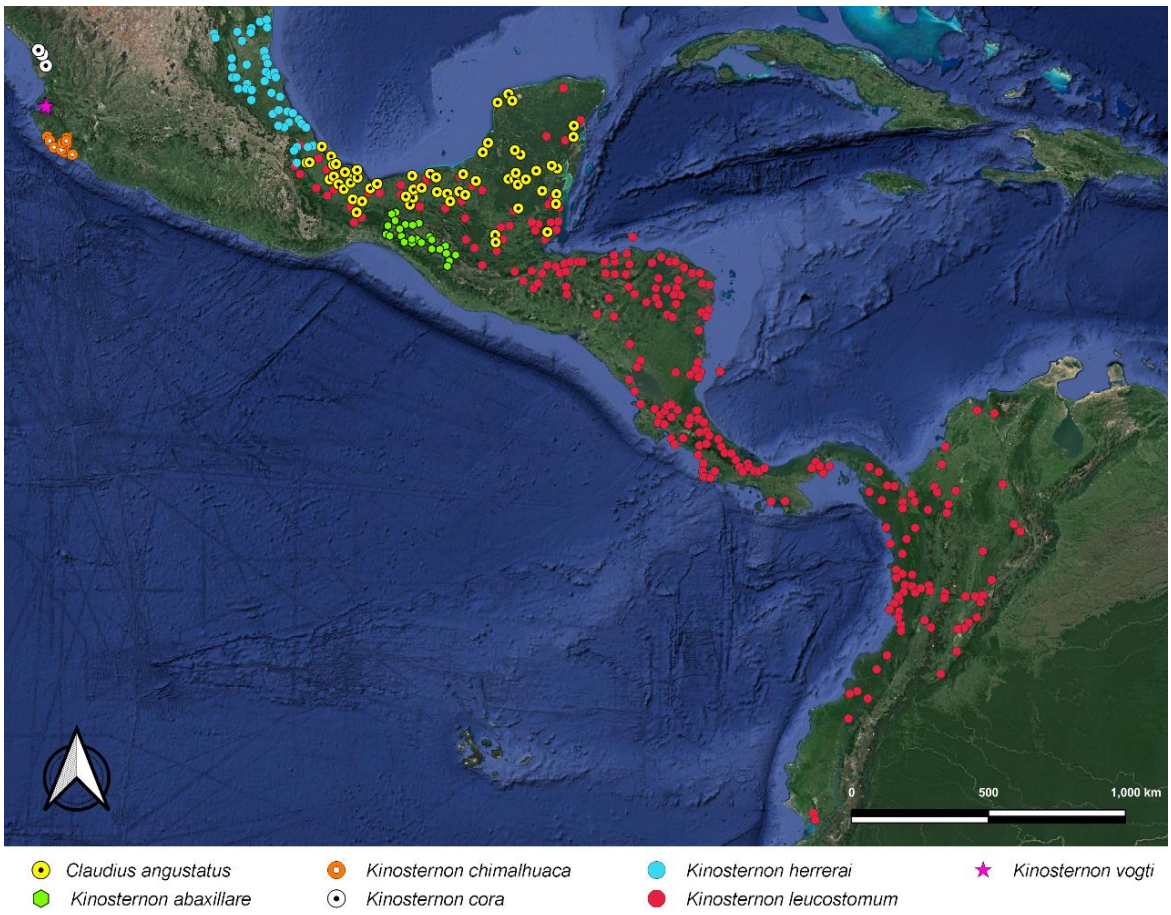

Figure 2 // Figure 2. Distribución del género *Kinosternon* y *Claudius angustatus*. Información recuperada del TTWG (2021), utilizada con el permiso de Anders Rhodin. Mapa elaborado por Laura M. Florez-Franco y Eduardo Reyes Grajales. **//** Distribution of Genus *Kinosternon* and *Claudius angustatus.* Information recovered by TTWG (2021), under authorization of Anders Rhodin. Maps elaborated by Laura M. Florez-Franco and Eduardo Reyes Grajales.

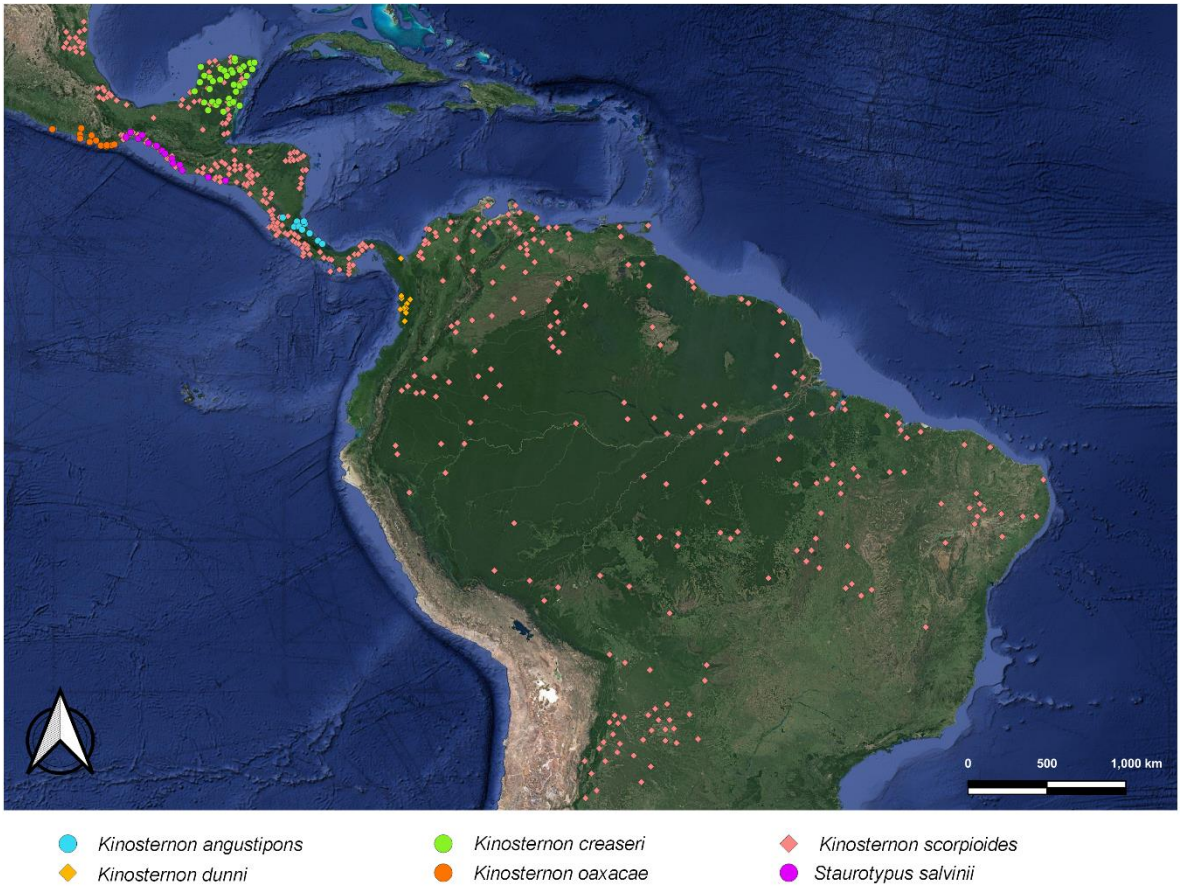

Figure 3 // Figure 3. Distribución del género *Kinosternon* y *Staurotypus salvinii*. Información recuperada del TTWG (2021), utilizada con el permiso de Anders Rhodin. Mapa elaborado por Laura M. Florez-Franco y Eduardo Reyes Grajales. ***//*** Distribution of Genus *Kinosternon* and *S. salvinii.* Information recovered by TTWG (2021), under authorization of Anders Rhodin. Maps elaborated by Laura M. Florez-Franco and Eduardo Reyes Grajales.

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Annex III

Table 3. Áreas Naturales Protegidas con presencia de alguna especie de *Kinosternon**
Table 3. Protected Natural Areas with presense of any species of *Kinosternon*.*

País/Country	Especie / Nombre del área - Species/Area name
Argentina*	*K. scorpioides* se encuentra en los Parques Nacionales Calilegua (Jujuy), El Impenetrable (Chaco) y El Rey (Salta), y en la Reserva Natural Formosa (Formosa).
Brasil*	*K. scorpioides* se encuentra en Rerva Biológica do Jaru, Floresta Nacional de Carajá, Parque Nacional da Amazônia, Parque Nacional dos Lencois Maranhenses, Reserva Biológica do Rio Trombetas, Área de Proteçao Ambientral do Pratagy, Área de Proteçao Ambiental Bonfim-Guaraira, Área de Proteçao Ambiental da ME do Rio Negro – Setor Aturiá/Apuauzinho, Área de Proteçao Ambiental do Arquipélago do Marajó, Área de Proteçao Ambiental do Arquipélaago do Marajó, Área de Proteçao Ambiental do Arquipélago do Marajó e Floresta Estadual Faro.
Colombia*	*K. dunni* se encuentra en la Reserva las Tangaras; *K. leucostomum* y *K. scorpioides* se encuentran en el VIP Isla de Salamanca, Santuario de Fauna y Flora -SFF- Ciénaga Grande de Santa Marta, SFF El Mono Hernández, PNN Katíos, PNN Paramillo, PNN Las Orquídeas, PNN Tatamá, PNN Utría, PNN Farallones, PNN Uramba-Bahía Málaga, PNN Sanquianga, RFP Serrania de Coraza y Montes de Maria, RFP Darién, RFP Río León, RFP Frontino, AMECR Alto Amurrupá, RFP Cuencas de los Ríos Riofrío, Piedras y Pescador, RN Laguna de Sonso, RFP Municipio de Jamundí-Río Guachinté, RN Nechí-Bajo Cauca, REP Bosque El Aguíl, PNR Serranía de las Quinchas, RFP Cuchilla el Minero, DMI Cuchilla de San Antonio, RFP Quebradas el Peñón y San Juan, PNR La Sierpe, RFP Río Escalerete y San Cipriano, RFP Río Guabas y DMI La Plata
México	Existen registros de las especies del género *Kinosternon* distribuidos en 40 Áreas Naturales Protegidas (ANPs) en el país, de las cuales corresponden a 20 Reservas de la Biosfera, 10 Áreas de Protección de Flora y Fauna, 6 Parques Nacionales, 3 Áreas de Protección de Recursos Naturales y un Parque Marítimo Nacional; este número de ANPs abarca un área protegida aproximada de 9,454,835.93 ha. La distribución es la siguiente: - *K. abaxillare*: La Sepultura, Cañon del Sumidero y Selva el Ocote. - *K. acuatum*: Calakmul, Laguna de Términos, Pantanos de Centla, Cañón de Usumacinta, Los Tuxtlas - *K. alamosae*: Sierra de Álamos. - *K. chimalhuaca*: Chamela-Cuixmala, cerca de sierra Manatlán. - *K. cora*: área de influencia de Marismas Nacionales. - *K. creaseri*: Los Petenes, Calakmul, Sian Ka'an, Yuamil, cerca de Río Lagartos y Yum Balam, Kaxil Kiuic en la costa occidental de Islas Mujeres. - *K. durangoense*: CADNR 043, cerca de la Michilia. - *K. flavenscens*: Sierra de Abra Tanchipa, Laguna Madre y delta del río Bravo, Janos, cerca de Sierra de Tamaulipas, Cumbres de Monterrey, NADNR Chihuahua-Sonora. - *K. herrerai*: Laguna Madre y delta del río Bravo, Sierra de Tamaulipas, Sierra del Abra Tanchipa. - *K. hirtipes*: Mariposa Monarca, cerca de corredor biológico Lagunas de Zempoala-Chichinautzin, CADNR Nayarit, APRN Valle de Bravo, Sierra Gorda, Tutuaca, Bosencheve, Xochimilco, Alguna ANP del Río Bravo y el Río Conchos. - *K. integrum*: Sierra de Alamos, CADNR Nayarit, Marismas Nacionales, Sierra de Quila, La Primavera, Chamela-Cuixmala, Zicuiran-Infiernillo, Insurgentes J. MA. Morelos, Sierra Gorda, APRN Valle de Bravo, El Tepozteco, Corredor Biológico Lagunas de Zempoala-Chichinautzin, Sierra de Huautla, Tehuacán-Cuicatlán. - *K. leucostomum*: Los Tuxtlas, Lacan-tun, Montes Azules, Cañón del Usumacinta, Pántanos de Centla, Laguna de Términos, Calakmul. - *K.oaxacae*: Bahias de Huatulco. - *K. scorpioides*: Zona de protección federal Chiapas, Selva El Ocote, Cañón del Sumidero, Laguna de Términos, Los petenes, Calakmul, Sian Ka án, Río Lagartos, Costa Occidental de Isla Mujeres. - *K. sonoriense*: Janos, cerca de Sierra Alamos, Tutuaca. - *K. stejnegeri*: cerca de Janos y Tutuaca. - *K. vogti no cuenta con representación en ninguna Área Natural o dentro de áreas de influencia.*

***Información obtenida por consultas de México sobre potenciales inclusiones del género en Appendix III para Mx en 2021.**

Annex IV

Clave de identificación de las especies del género *Kinosternon, Claudius* y *Staurotypus* (solamente para individuals adultos)*[1]
Identification Key for *Kinosternon*, *Claudius* and *Starotypus* species (only for adult specimens)

1A. Plastron cruciform …….. 2
1B. Plastron extensive, not cruciform ,,…..…….. 4

2A. Three prominent pointed extensions (cuspids) on the upper tomium; distributed on the Gulf of Mexico versant in the states of Campeche, Chiapas, Oaxaca, Veracruz, and Yucatan; on the Caribbean versant found in the central and southern region of Quintana Roo …….. ***Claudius angustatus***
2B. No tomial extensions present; three carapace keels (one medial, two lateral) evident ……. 3

3A. Dark and pale reticulations predominate on the extremities; present in the Atlantic Ocean drainages, specifically in Mexico (from Veracruz to the Yucatan Peninsula), Guatemala (north region), Belize and Honduras (northwest region) ……... ***Staurotypus triporcatus***
3B. Light tones on the extremities (yellow, light brown, cream-colored); present along the Pacific coasts in Mexico (Oaxaca and Chiapas), Guatemala and El Salvador ……. ***S. salvinii***

4A. Posterior plastral lobe not movable; distributed in Gulf of Mexico drainages in the states of Hidalgo, Puebla, San Luis Potosi, Tamaulipas, and Veracruz …….. ***Kinosternon herrerai***
4B. Both anterior and posterior plastral lobes are movable……. 5

5A. Axillary scutes are usually absent; distributed in the Central Depression of the State of Chiapas (Mexico), and a small region in northwestern Guatemala (Department of Huehuetenango) ……..…… …….. ***K. abaxillare***
5B. Axillary scutes always present……..…… 6

6A. Rostral shield large, rounded (not furcate or bell-shaped), and light; distributed in Puerto Vallarta, Jalisco ..…… ……..…….. ***K. vogti***
6B. Rostral shield present in different sizes and shapes (v-shaped or bell-shaped) …… ……..…… 7

7A. Nose bulbous dorsally ..……..…….... 8
7B. Nose not bulbous ..……..…….. .. 9

8A. The suture of plastral scutes 3 is long, about the same length as plastral scute 1; present in Costa Rica, Nicaragua, and Panama ……..….. ***K. angustipons***

1 *This key was prepared by M. Sc. Eduardo Reyer Grajales – Departamento de Conservación de la Biodiversidad, El Colegio de la Frontera Sur, San Cristóbal de las Casas, Chiapas, Mexico. It was made reviewing Ernst and Barbour (1989), Legler and Vogt (2013), López-Luna et al. (2018), Loc-Barragán et al. (2020), and TTWG (2021) (see References section); it also incorporates personal data from Eduardo Reyes-Grajales. The key was reviewed by Dr. John B. Iverson.*

8B. The suture of plastral scutes 3 is short; endemic to Colombia, present in Choco and Valle del Cauca ……..... .....…... ***K. dunni***

9A. Carapace wiouth keels; endemic to Mexico, present in the states of Sinaloa and Sonora ……..… …….. ***K. alamosae***
9B. Carapace presents one or three keels ……..…..…..……..…… 10

10A. Unicarinate carapace ……..……..…….. 11
10B. Tricarinate carapace ……...……. 15

11A. Posterior margin of plastral scutes 6 is rectilineal; endemic to the USA, and is present in Florida ……..…… …… ***K. steindachneri***
11B. Posterior margin of plastral scutes 6 is curved ……..…..……..……..…… 12

12A. Presents a single, broad, light postorbital stripe on each side of the head, sometimes suffused with dearker pigment; present in Belize, Colombia (Antioquia, Atlántico, Bolívar, Boyacá, Caldas, Cauca, Cesar, Chocó, Córdoba, Cundinamarca, Huila, Magdalena, Nariño, Santander, Sucre, Tolima, Valle del Cauca), Costa Rica, Ecuador, Guatemala, Honduras, Mexico Campeche, Chiapas, Oaxaca, Quintana Roo, Tabasco, Veracruz, Yucatán), Nicaragua and Panama ……..……..…….. ***K. leucostomum***
12B. Not presenting a single, broad, light postorbital stripe on each side of the head ……..…… ……..……...……..… 13

13A. Eyes present red pigment; present in Belize, Guatemala, Mexico (Campeche, Chiapas, Quintana Roo, Tabasco, Veracruz) ……..……. ***K. acutum***
13B. Eyes present brown pigment ……..……..……..… 14

14A. Plastral scute 6 suture longer than that of scute 4; present in Belize, and Mexico (Campeche, Quintana Roo, Yucatán) ……..……..……. ***K. creaseri***
14B. Plastral scute 4 suture longer than that of scute 6; present in Mexico (Aguascalientes, Chihuahua, Coahuila, Mexico City, Durango, Guanajuato, Jalisco, Michoacán, Zacatecas) and USA (Texas) ……..……..…… ……..…….. ***K. hirtipes***

15A. Carapace presents three longitudinal light stripes along the length of the Shell …… ……..……. ***K. baurii***
15B. Carapace does not present three longitudinal light stripes on the carapace ……..……... 16

16A. Plastral lobes close the shell opening completely ……..……..…… 17
16B. Plastral lobes do not close the shell opening completely ……..……..……..…… 18

17A. Plastral scute 6 suture longer than that of scute 4; (Plastral scute 4 suture longer than that of scute 6) present in Argentina (Chaco, Formosa, Jujuy, Salta, Tucumán), Belize, Bolivia, Brazil (Acre, Algoas, Amapá, Amazonas, Bahia, Ceará, Goaiás, Maranhão, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Pará, Paraiba, Pernambuco, Piauí, Rio Grande do Norte, Rondônia, Sergipe, and Tocantins), Colombia (Amazonas, Antioquia, Arauca, Atlántico, Bolívar, Caldas, Caquetá, Casanare, Cesar, Chocó, Córdoba, Guainía, Magdalena, Meta,

Norte de Santander, Putumayo, San Andrés, Sucre, Vaupés, and Vichada), Costa Rica, Ecuador, El Salvador, French Guiana, Guatemala, Guyana, Honduras, Mexico (Campeche, Chiapas, Oaxaca, Quintana Roo, Tabasco, Tamaulipas, Veracruz, Yucatán), Nicaragua, Panama, Paraguay, Peru (Amazonas, Huánuco, Loreto, Madre de Dios, Ucayali), Suriname, Trinidad, and Venezuela (Amazonas, Apure, Aragua, Bolívar, Cojedes, Falcón, Guárico, Lara, Monagas, Portuguesa, Sucre, Táchira, Trujillo, Yaracuy, and Zulia) ……..……... ***K. scorpioides***

17B. Plastral scute 4 suture longer than that of scute 6; endemic to Mexico, present in the states of Colima, Durango, Guanajuato, Guerrero, Hidalgo, Jalisco, Michoacán, Morelos, Nayarit, Oaxaca, Puebla, San Luis Potosi, Sinaloa, Sonora, Tamaulipas, and Zacatecas ……..……...……..… ***K. integrum***

18A. Anterior pair of chin barbels very long, subequal to orbital diameter; present in Mexico (Baja California, Chihuahua, Sonora), and USA (Arizona and New Mexico) …….. ***K. sonoriense***

18B. Pair of short anterior chin barbels never approaching orbital diameter ……..……...…….. 19

19A. The suture of the plastral scutes 6 is the longest ……..……... 20

19B. The suture of the plastral scutes 4 is the longest ……..……..……... 21

20A. Ninth marginal scute elevated to the height of the tenth; present in Mexico (Chihuahua, Coahuila, Nuevo León, Tamaulipas and Veracruz), and USA (Arizona, Colorado, Illinois, Iowa, Kansas, Missouri, Nebraska, New Mexico, Oklahoma, and Texas) ……..……... ***K. flavescens***

20B. Ninth marginal scute not elevated to the height of the tenth; endemic to USA, present in the states of Alabama, Arkansas, Delaware, Florida, Georgia, Illinois, Indiana, Kentucky, Louisiana, Maryland, Mississippi, Missouri, New Jersey, New York, North Carolina, Oklahoma, Pennsylvania, South Carolina, Tennessee, Texas and Virginia ……... ***K. subrubrum***

21A. Suture of plastral scutes 2 is the third longest of plastron; endemic to Mexico, present in the states of Nayarit and Sinaloa …… …….. ***K. cora***

21B. Plastral scute 1 is the third longest of plastral scute mid-line length ……... 22

22A. Suture of plastral scutes 2 is the fourth longest on plastron; present in Mexico (Sonora), and USA (Arizona) …….. ***K. stejnegeri***

22B. Suture of plastral scutes 5 is the fourth longest on plastron …….. 23

23A. Midline length of plastral scute 1 is equal or greater than 30% of maximum carapace length; endemic to Mexico, present in the states of Chihuahua, Coahuila, and Durango ……..……. ***K. durangoense***

23B. Midline length of plastral scute 1 is less than 30% of maximum carapace length ……..… 24

24A. The suture between plastral scute 6 is equal or greater than 22% of maximum carapace length; endemic to Mexico, present in the states of Guerrero and Oaxaca ……..…. ***K. oaxacae***

24B. The suture between plastral scute 6 is equal to or less than 21.6% of maximum carapace length; endemic to Mexico, present in the states of Colima and Jalisco ……..... ***K. chimalhuaca***