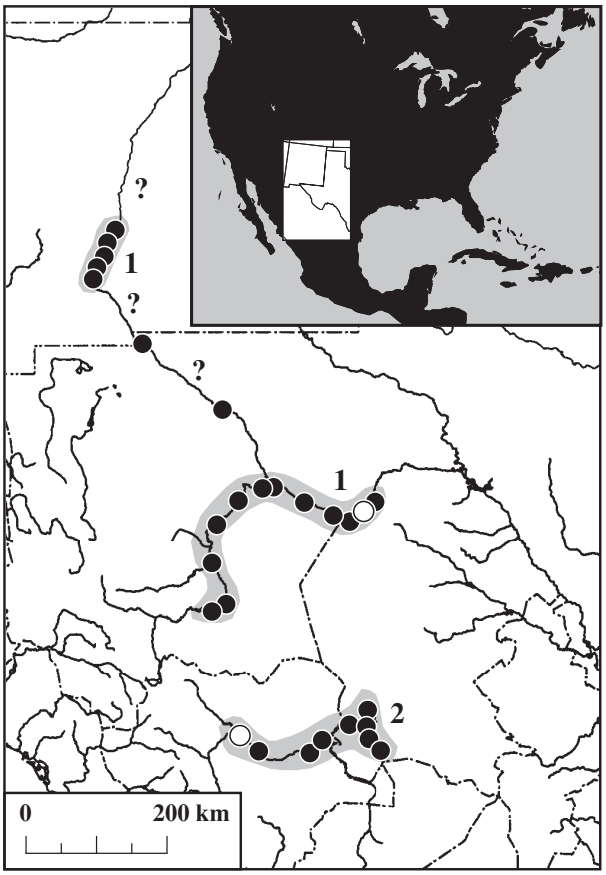
Catalogue of American Amphibians and Reptiles.

Stuart, J.N. and C.H. Ernst. 2004. *Trachemys gaigeae*.

Trachemys gaigeae (Hartweg)
Mexican Plateau Slider

Pseudemys scripta gaigeae Hartweg 1939a:1. Type locality, "Boquillas, Rio Grande River, Brewster County, Texas." Holotype, University of Michigan Museum of Zoology (UMMZ) 66472, an adult female (preserved) collected by H.T. Gaige on 15–17 July 1928 (examined by authors).
Pseudemys gaigeae: Stejneger and Barbour 1939:165.
Pseudemys scripta gagei: Zweig and Crenshaw 1957:1065. *Lapsus calami*.
Chrysemys scripta gaigeae: Smith and Taylor 1966:11.
Chrysemys gaigeae: Weaver and Rose 1967:63.
Chrysemys gaigeae gaigeae: Weaver and Rose 1967:70.
Pseudemys scripta gaigea: Degenhardt and Christiansen 1974: 38. *Ex error.*
Chrysemys gaigae: Ashton et al. 1976:51. *Ex error.*
Chrysemys gaigea: Morafka 1977:70. *Ex error.*
Chrysemys scripta gaigae: Morafka 1977:71. *Ex error.*
Chrysemys (*Trachemys*) *scripta gaigeae*: Fritz 1981:27.
Trachemys n. [= *nebulosa*] *gaigeae*: Ward 1984:45.
Tigaigene: Ward 1984:47. *Ex error.*
P. s. [*Pseudemys scripta*] *gaigae*: Stebbins 1985:102. *Ex error.*
Trachemys scripta gaigeae: Iverson 1985:4.



MAP. Distribution of *Trachemys gaigeae*: circles mark type localities, dots indicate other records, and question marks indicate localities of uncertain validity.

FIGURE 1. Dorsolateral view of an adult female *Trachemys gaigeae gaigeae* from Socorro County, New Mexico (photograph by C.W. Painter).

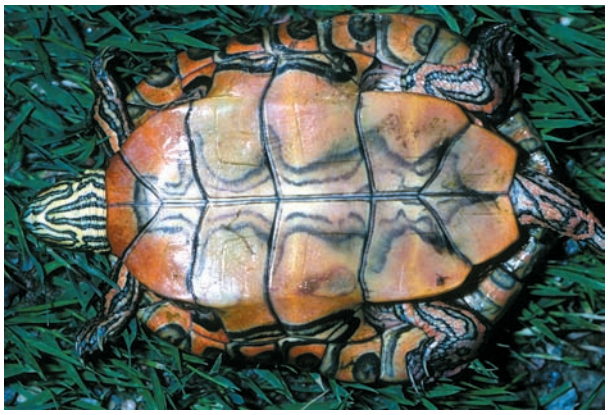


FIGURE 2. Ventral view of adult male *Trachemys gaigeae gaigeae* from Sierra County, New Mexico (photograph by C.W. Painter).

FIGURE 3. Dorsal and ventral views of hatchling *Trachemys gaigeae gaigeae* from Socorro County, New Mexico (photograph by C.W. Painter).

Trachemys gaigeae: Dixon 1987:85. First use of present combination.
Trachemys gaigae: Williamson et al. 1994:7. *Ex error.*
Trachemys nebulosa gaigeae: Bringsøe 2001:520.

• **CONTENT.** Two subspecies are recognized: *Trachemys gaigeae gaigeae* and *T. g. hartwegi*. See **Comment**.

• **DEFINITION.** *Trachemys gaigeae* is a medium-sized emydid, with a maximum carapace length of 298 mm in females and 222 mm in males. The large, supratemporal (postorbital) spot is much wider than (and usually separate from) nearby head stripes, orange to yellow-orange, ovoid or tear-drop shaped, and does not contact the orbit of the eye. A much smaller spot that contacts the posterior edge of the orbit also may be present. The carapacial pattern ranges from nearly patternless to a reticulate arrangement of ocellate yellow-orange lines with dark borders against an olive or olive-brown background. The plastral pat-

tern, most distinct in juveniles, consists of a mostly symmetrical dendritic arrangement of two or more concentric dark lines centered on the shell midline and extending laterally along the inter-scute seams.

The carapace is typically smooth (not rugose), although radial corrugations may be present and distinct on vertebral scutes in adults. The vertebral keel is blunt or absent in adults, and the posterior marginals are moderately serrate. Plastron length is greater than 89% of the carapace length. The underlap of the cervical scute is relatively short (< 3.5% of carapace length). The squamosal bone is tapered posterodorsally rather than blunt. The pygal bone is elongate and extends beyond the marginal-vertebral seam. The mandibular tomium is not serrate, and the ventral surface of the mandible is rounded.

Males are smaller than females and have long, thick tails with the vent beyond the carapacial rim; the carapace is less domed than in females and the plastron is slightly concave. Females tend to retain the juvenile color pattern into adulthood, although secondary deposition of melanin may partially obscure the plastral pattern (Seidel et al. 1999). Mature males may exhibit ontogenetic melanism, which obscures the juvenile pattern on the skin and shell. No sexual dimorphism in length of the foreclaws is evident.

• **DESCRIPTIONS.** Descriptions of adults are in Hartweg (1939a-b), Pope (1939), Carr (1952), Chrapliwy and Fugler (1955), Legler (1960a, 1990), Williams et al. (1960), Weaver and Rose (1967), Pritchard (1967, 1979), Legler and Webb (1970), Cochran and Goin (1970), Ernst and Barbour (1972, 1989), Behler and King (1979), Smith and Smith (1980), Ward (1980), Fritz (1981), Smith and Brodie (1982), Obst (1983), Stebbins (1985, 2003), Garrett and Barker (1987), Ernst (1990, 1992), Ernst et al. (1994, 2000), Rogner (1995), Degenhardt et al. (1996), and Conant and Collins (1998). Garman (1887) described juvenile specimens of *T. g. hartwegi* (as "*Emys ornata* Gray, 1831" from "San Pedro, Chihuahua" [= San Pedro, Coahuila]). Juveniles were described by Carr (1952) and hatchlings by Morjan and Stuart (2001). Parsons (1968) described the choanae.

• **ILLUSTRATIONS.** All illustrations are of adult *T. g. gaigeae* unless otherwise indicated. **Color photographs** (dorsal or dorsolateral view) are in Garrett and Barker (1987), Ernst et al. (1994, juvenile), Degenhardt et al. (1996), Ernst et al. (2000, adults and juveniles of both subspecies), and Bartlett (2000, adult and hatchling). **Black and white photographs** (dorsal or dorsolateral view) are in Carr (1952, juvenile), Casas-Andreu (1967), Ernst and Barbour (1972, juvenile), Smith and Smith (1980, juvenile *T. g. gaigeae* and adult *T. g. hartwegi*), Legler (1990, *T. g. hartwegi*), Ernst (1990, 1992, juvenile in both), Ernst et al. (1994, juvenile and adult), and Seidel et al. (1999). **Color drawings** are in Smith and Brodie (1980), Obst (1983, carapacial and plastral patterns), Bour (2003, hatchlings), and Stebbins (2003). **Head and neck patterns** are illustrated in color photographs by Ernst et al. (2000) and Bour (2003), and in black and white photographs or drawings by Carr (1952, juvenile), Pritchard (1979), Smith and Smith (1980), Ward (1980), Fritz (1981), Obst (1983), Legler (1990, both subspecies), Degenhardt et al. (1996), Conant and Collins (1998), Powell et al. (1998), and Ernst et al (1994). **Photographs of the plastral pattern** are in color in Ernst et al. (2000, both subspecies) and in black and white in Carr (1952, juvenile), Williams (1956, a juvenile *T. g. gaigeae* that is actually a *T. g. hartwegi*), Legler (1960a; 1990, *T. g. hartwegi*), Smith and Smith (1980, both subspecies), Ernst (1992, juvenile), and Seidel et al. (1999). **A line drawing of the plastral pattern** of *T. g. gaigeae* is in Ward (1980) and of *T. g. hartwegi* in Legler (1990). **A nesting female and her nest and clutch** are illustrated in black and white in Morjan and Stuart (2001). **A probable hybrid** of *T. scripta elegans* x *T. gaigeae* is illustrated in black and white by Seidel et al. (1999).

Fritz (1981) illustrated a putative hybrid of *T. gaigeae* x *T. scripta elegans* x *T. venusta cataspila* that is probably an example of the lower Rio Grande form of *T. s. elegans* (U. Fritz, pers. comm.). Similarly, a color photograph in Williamson et al. (1994), supposedly of a *T. gaigeae*, also appears to be a *T. s. elegans* from the Pecos River or lower Rio Grande.

• **DISTRIBUTION.** *Trachemys gaigeae* occurs in the Rio Grande and Río Nazas drainage systems of the southwestern United States (Texas, New Mexico) and northeastern México (Chihuahua, Coahuila, Durango). The subspecies *T. g. gaigeae* occurs in the Rio Grande from Bosque del Apache National Wildlife Refuge, New Mexico downstream at least to the Brewster-Terrell county line, Texas; and in the Río Conchos from near La Cruz (Presa La Boquilla), Chihuahua downstream to the confluence with the Rio Grande. In the Rio Grande, a possible hiatus in the range occurs from Caballo Dam, Sierra Co., New Mexico downstream to Hudspeth Co., Texas (pers. observ.; M.R.J. Forstner, pers. comm.), although recent records are available from Doña Ana Co., New Mexico (Starkey 1997, Larisch and Larisch 2003). Most records in the Rio Grande along the border of the United States and México are downstream of the Río Conchos confluence. Starkey (1997) reported specimens from Sanderson Co. (*sic*; presumably south of Sanderson, Terrell Co.), Texas. An unverified observation exists for La Joya, Socorro Co., New Mexico (Stuart 1995b, Degenhardt et al. 1996). Single specimens from Albuquerque, Bernalillo Co., New Mexico (Stuart 2000) and El Paso Co., Texas (J. Iverson, pers. comm.) are likely introductions. *Trachemys g. hartwegi* has a disjunct range in the Río Nazas internal drainage system of Durango and Coahuila; it potentially enters Zacatecas via the Río Aguanaval, a Río Nazas tributary (Velasco 1894; Smith and Smith 1980; but see Conant 1977).

Detailed range maps or locality data for *T. g. gaigeae* in the United States are in Pope (1939), Hamilton (1947), Brown (1950), Axtell (1959), Minton (1959), Raun and Gehlbach (1972), Degenhardt and Christiansen (1974), Conant (1977), Morafka (1977), Iverson (1986, 1992), Dixon (1987, 2000), Ernst (1992), Stuart (1995b, 2000), Degenhardt et al. (1996), Seidel et al. (1997, 1999), and Ernst et al. (2000). Detailed range maps or locality data for both subspecies in México are in Hamilton (1947), Chrapliwy and Fugler (1955), Legler (1960c), Williams et al. (1960), Smith et al. (1963), Conant (1977), Smith and Smith (1980), Iverson (1986, 1992), Legler (1990), Ernst (1992), and Ernst et al. (2000). Localities in Coahuila listed by Schmidt and Owens (1944) were based on misidentified specimens of *Pseudemys gorzugi* (see Legler 1960a). Generalized range maps are in Stebbins (1985, 2003), Garrett and Barker (1987), Ernst (1990), Legler (1990), Ernst et al. (1994), Conant and Collins (1998), and Seidel (2002).

• **FOSSIL RECORD.** No fossil remains have been described.

• **PERTINENT LITERATURE. General accounts** are in Raun and Gehlbach (1972), Garrett and Barker (1987), Dixon (1987, 2000), Alderton (1988), Ernst et al. (1994, 2000), Degenhardt et al. (1996), and Wauer and Fleming (2002). Specific topics and pertinent references include: **systematics, taxonomy, and evolution** (Hartweg 1939a,b; Carr 1942; Smith and Taylor 1950; Schmidt 1953; Williams 1956; Zweig and Crenshaw 1957; Legler 1960a,1990; Ernst 1967, 1990, 1992; Weaver and Rose 1967; Legler and Webb 1970; Brown 1971; Moll and Legler 1971; Smith and Smith 1975, 1980; Holman 1977; Wermuth and Mertens 1977; Ward, 1980, 1984; Fritz 1981, 1990b, 1995,

1998; Obst 1983; Kluge 1984; Iverson 1986, 1992; Price and Hillis 1989; David 1994; Starkey 1997; Seidel et al. 1999; Bringsøe 2001; Seidel 2002; Bour 2003; Stephens and Wiens 2003a,b), **zoogeography** (Smith and Buechner 1947; Conant 1963, 1977; Morafka 1977; Legler 1990; Starkey 1997), **habitat** (Carr 1952; Minton 1959; Legler 1960c, 1990; Williams et al. 1960; Conant 1963; Degenhardt and Christiansen 1974; Garrett and Barker 1987; Stuart 1995b, 2000; Degenhardt et al. 1996), **diet and foraging** (Legler 1960b,c; Price and Hillis 1989; Parmenter and Avery 1990; Degenhardt et al. 1996; Wilson et al. 1999; Morjan and Stuart 2001; Stuart and Painter 2002), **general behavior** (Legler 1960b, Garrett and Barker 1987, Degenhardt et al. 1996), **reproduction and courtship** (Legler 1960c, 1990; Moll and Legler 1971; Garrett and Barker 1987; Fritz 1990a,b, 1998; Ernst 1992; Degenhardt et al. 1996; Stuart and Painter 1997; Stuart and Miyashiro 1998; Morjan and Stuart 2001; Morjan and Valenzuela 2001), **association with other turtle species** (Legler 1960c, Smith et al. 1963, Degenhardt and Christiansen 1974, Stuart 1995b; Degenhardt et al. 1996), **co-occurrence and hybridization with *T. scripta*** (Ernst 1992; Stuart 1995a,b; Seidel et al. 1999; Bartlett 2000; Stuart 2000), **morphology and morphometrics** (Parsons 1968, Legler 1990, Stuart et al. 1993, Seidel et al. 1999, Seidel 2002), **melanism** (Lovich et al. 1990, Seidel et al. 1999), **longevity** (Slavens 1988, 1989), **parasites** (McAllister et al. 1995, Wilson et al. 1999), **mercury in body tissues** (Garcia 1973), **collection methodology** (Legler 1960b,c; Stuart and Painter 2002), **conservation status** (Gehlbach et al. 1975, Ashton et al. 1976, Smith and Smith 1980, Legler 1990, McCrystal 1991, Ernst 1995, Baillie and Groombridge 1996, Stuart 2000), **vernacular names** (Conant et al. 1956, Iverson 1985, Liner 1994, Crother 2000, Collins and Taggart 2002, Crother et al. 2003).

Other articles and checklists that briefly reference this species are Stejneger and Barbour (1939, 1943), Schmidt and Smith (1944), Brown (1950), Peters (1952), Schmidt (1953), Mertens and Wermuth (1955), Cochran (1961), Wermuth and Mertens (1961), Smith and Taylor (1966), Liner et al. (1977), Kluge (1984), Alderton (1988), David (1994), and Beltz (1995). Collins (1990, 1997) and Collins and Taggart (2002) incorrectly cited the year of the original description as 1938.

• **ETYMOLOGY.** The feminine name *gaigeae* is a genitive matronym honoring Dr. Helen Thompson Gaige (1890–1976), the collector of the holotype. The masculine name *hartwegi* is a genitive patronym honoring Dr. Norman Edouard Hartweg (1904–1964) for his pioneering taxonomic studies of Mesoamerican turtles. Gaige and Hartweg were colleagues at the University of Michigan Museum of Zoology.

1. *Trachemys gaigeae gaigeae* (Hartweg)
Big Bend Slider

Pseudemys scripta gaigeae: Hartweg 1939a:1. See species synonymy.
Pseudemys gaigeae: Stejneger and Barbour 1939:165.
Pseudemys scripta gagei: Zweig and Crenshaw 1957:1065. See species synonymy.
Chrysemys scripta gaigeae: Smith and Taylor 1966:11.
Chrysemys gaigeae: Weaver and Rose 1967:63.
Chrysemys gaigeae gaigeae: Weaver and Rose 1967:70.
Pseudemys scripta gaigea: Degenhardt and Christiansen 1974:38. See species synonymy.
Chrysemys gaigae: Ashton et al. 1976:51. See species synonymy.
Chrysemys gaigea: Morafka 1977:70. See species synonymy.
Chrysemys scripta gaigae: Morafka 1977:71. See species synonymy.
Chrysemys (*Trachemys*) *scripta gaigeae*: Fritz 1981:27.
Trachemys n. [=*nebulosa*] *gaigeae*: Ward 1984:45.
Tigaigene: Ward 1984:47. See species synonymy.
Pseudemys scripta gaigae: Stebbins 1985:102. See species synonymy.
Trachemys scripta gaigeae: Iverson 1985:4.
Trachemys gaigeae: Dixon 1987:85. See species synonymy.
Trachemys gaigae: Williamson et al. 1994:7. See species synonymy.
Trachemys nebulosa gaigeae: Bringsøe 2001:520.
Trachemys gaigeae gaigeae: Seidel 2002:289. First use of present combination.

• **DEFINITION.** Carapace length is to at least 274 mm in females and 222 mm in males. The supratemporal spot is black-bordered and tends to be tear-drop shaped. The carapace is smooth, and radial corrugations on the vertebral scutes are usually indistinct or absent in adults. The carapacial pattern is olive to light olive-brown with a reticulate pattern of curved orange lines, often surrounding small ocelli, on the pleural and vertebral scutes. Seven to nine distinct, dark-edged stripes occur on the throat, and the symphyseal (mandibular) stripe is usually Y-shaped. The background color of the plastron is yellow to orange. The plastral pattern of usually two concentric dark lines extends onto all the plastral scutes, is about equally prominent on both anterior and posterior halves of the plastron, and is most distinct in juveniles; it may fade or disappear in mature males or be obscured by secondary melanization in adult females. Old males exhibit ontogenetic melanization of both the shell and skin patterns, characterized by irregular blotching of black and brown on the carapace, a yellow plastron on which melanin is concentrated along the inter-scute seams, and disruption and fading of the stripes on head, neck, and limbs. The vertebral keel is blunt or absent in adults, but occasionally distinct in juveniles. Of the plastral scutes, the abdominal is longest and the anal is second longest. The gular and pectoral scutes are relatively short, 12% and 16% of carapace length, respectively.

2. *Trachemys gaigeae hartwegi* (Legler)
Nazas Slider

Pseudemys scripta hartwegi: Smith and Smith 1980:469. *Nomen nudum.*
Trachemys scripta hartwegi: Iverson 1985:4. *Nomen nudum.*
Pseudemys scripta hartwegi Legler 1990:89. Type locality, "Río Nazas, 1.2 km east of Presa Lázaro Cardenas, Durango, Mexico." Holotype, University of Utah (UU) 3802, juvenile wet specimen, collected by R. Conant on 2 October 1961 (not examined by authors).
Trachemys scripta hartwegi: Iverson 1992:208.
Trachemys nebulosa hartwegi: Bringsøe 2001:520.
Trachemys gaigeae hartwegi: Seidel 2002:289. First use of present combination.

• **DEFINITION.** Carapace length is to at least 298 mm in females and 149 mm in males. The supratemporal spot tends to be ovoid and not pointed posteriorly. The adult carapace typically has radial corrugations on the vertebral scutes. The carapacial pattern is typically indistinct in adults, but includes wavy, radial lines on the vertebral scutes, and obscure or no marks on the pleural scutes. Each upper marginal scute bears a bold, dark-centered ocellus that contrasts with the ground color. The juvenile plastral pattern consists of distinct, dark, concentric lines; in adults, this pattern is largely confined to the area posterior to the pectoro-abdominal seam and is reduced to small dark marks on the gular, humeral, and pectoral scutes. The stripe on the mandibular ramus is a short, oval spot, less than or equal to the length of the supratemporal spot. The vertebral keel is

distinct and black on the posterior halves of the first four vertebral scutes, even in adults. Of the plastral scutes, the anal is the longest or is about equal in length to the abdominal. The gular and pectoral scutes are relatively long, about 14% and 19% of the carapace length, respectively.

• **COMMENT.** The taxonomy of *Trachemys gaigeae* has undergone considerable revision at the generic, specific, and subspecific levels. Specimens of both subspecies of *T. gaigeae* were classified as "*Pseudemys scripta cataspila*" by Carr (1938). The nominotypical form was described by Hartweg (1939a) as *Pseudemys scripta gaigeae* based on specimens from the Rio Grande and Río Nazas drainages. Stejneger and Barbour (1939) first elevated *gaigeae* to full species status, but this arrangement was used only intermittently for the next fifty years. Ward, in his dissertation, reassigned this form to the species *T. nebulosa* (as *T. nebulosa gaigeae*; Ward 1980); this designation was obscured in his later publication (Ward 1984), but was followed by Fritz (1995) and explicitly used by Bringsøe (2001). In addition, *gaigeae* has been variously assigned to the genera *Pseudemys* and *Chrysemys*. Ernst (1992) and Seidel et al. (1999) provided evidence for recognition of *T. gaigeae* as a full species and reviewed the taxonomic history.

The taxon *hartwegi* was described by Legler (1990) as a subspecies of *Pseudemys scripta*. Prior to this description, specimens from San Pedro, Coahuila were described by Garman (1887) as "*Emys ornata*" and illustrated by Williams (1956) as *P. s. gaigeae*. The name also has appeared as a *nomen nudum* for the Río Nazas form (Smith and Smith 1980; Iverson 1985). Bringsøe (2001) considered *hartwegi* a subspecies of *T. nebulosa*.

Several publications have noted that *T. g. gaigeae* and *T. g. hartwegi* are closely related taxa (e.g., Legler and Webb 1970; Legler 1990; Ernst 1992; and Ernst et al. 1994, 2000); indeed, specimens from the Río Nazas were used as paratypes in the original descriptions of both subspecies. Seidel (2002) first recognized the two forms as conspecific and distinct from other *Trachemys*. As allopatric and diagnosable taxa, *T. g. gaigeae* and *T. g. hartwegi* may warrant recognition as full monotypic species in accord with current phylogenetic approaches to taxonomy (e.g., Frost et al. 1992). However, additional study of the historical relatedness and differentiation of these forms is needed, as are studies of the life history and status of the Río Nazas populations.

Trachemys scripta elegans has been introduced within the range of *T. gaigeae* in the Rio Grande basin, including south-central New Mexico (Seidel et al. 1999, Stuart 2000) and at least one location in the Big Bend region of Texas where it appears to be established (Bartlett 2000; M.R.J. Forstner and J. Dixon, pers. comm.). Limited hydridization with non-native *T. s. elegans* has been reported from New Mexico (Stuart 1995b, Seidel et al. 1999). Early reports of *T. gaigeae* x *T. s. elegans* hybrids (e.g., Pope 1939, Shannon and Smith 1949, Cagle 1950, Carr 1952, Pritchard 1967) apparently were based on specimens of *T. s. elegans* possessing a discontinuous, spot-like supratemporal stripe, a characteristic common in *T. s. elegans* from the Pecos River and lower Rio Grande (Legler 1960a, Seidel et al. 1999).

Trachemys g. gaigeae is classified as "Vulnerable" by the International Union for the Conservation of Nature and Natural Resources (IUCN; Baillie and Groombridge 1996). Populations appear to be stable at three general locations in New Mexico (Bosque del Apache National Wildlife Refuge, and Elephant Butte and Caballo reservoirs). In Texas, populations are primarily located in the Rio Grande within Big Bend National Park and adjacent public lands; anthropogenic changes in hydrology may have impacted this species elsewhere along this river (pers. observ.; M.R.J. Forstner, pers. comm.). Its status in México is poorly known, although Legler (1990) observed that *T. g. hartwegi* was in danger of extirpation at one site in Coahuila. The species is protected by state regulation from commercial collecting in New Mexico, but is not formally protected anywhere else in its range.

LITERATURE CITED

Alderton, D. 1988. Turtles & Tortoises of the World. Facts on File Publ., New York.

Ashton, R.E., Jr., S.E. Edwards, and G.R. Pisani. 1976. Endangered and threatened amphibians and reptiles in the United States. SSAR Herpetol. Circ. (5):1–65.

Axtell, R.W. 1959. Amphibians and reptiles of the Black Gap Wildlife Management Area, Brewster County, Texas. Southw. Nat. 4:88–109.

Baillie, J. and B. Groombridge (eds.). 1996. IUCN Red List of Threatened Animals. IUCN, Species Survival Commission, Gland, Switzerland.

Bartlett, D. 2000. Notes from the field. The geckos and sliders: surprising discoveries in Texas' Big Bend. Reptiles Magazine 8(3):30, 32–35.

Behler, J.L. and F.W. King. 1979. The Audubon Society Field Guide to North American Reptiles and Amphibians. Alfred A. Knopf, New York.

Beltz, E. 1995. Citations for the original descriptions of North American amphibians and reptiles. SSAR Herpetol. Circ. (24):1–44.

Bour, R. 2003. Le genre *Trachemys*: systématiques et répartition. Manouria 6(18):2–9.

Bringsøe, H. 2001. *Trachemys* Agassiz, 1857 — Schmuckschildkröten, p. 517–523. *In* U. Fritz (ed.), Handbuch der Reptilien und Amphibien Europas. Band 3/IIIA: Schildkröten (Testudines) I (Bataguridae, Testudinidae, Emydidae). AULA-Verlag, Wiesbaden/Wiebelsheim, Germany.

Brown, B.C. 1950. Annotated Check-list of the Reptiles and Amphibians of Texas. Baylor Univ. Stud., Baylor Univ. Press, Waco, Texas.

Brown, P.R. 1971. A quick survey of the present status of the United States chelonians — or — the mysterious ways of the turtle taxonomists. Herpetology 5:35–38.

Cagle, F.R. 1950. The life history of the Slider Turtle, *Pseudemys scripta troostii* (Holbrook). Ecol. Monogr. 20:31–54.

Carr, A.F. 1938. Notes on the *Pseudemys scripta* complex. Herpetologica 1:131–135.

—. 1942. A new *Pseudemys* from Sonora, Mexico. Amer. Mus. Nat. Hist. Novitates (1181):1–4.

—. 1952. Handbook of Turtles. The Turtles of the United States, Canada, and Baja California. Comstock Publ. Assoc., Cornell Univ. Press, Ithaca, New York.

Casas-Andreu, G. 1967. Contribución al Conocimiento de las Tortugas Dulceacuicolas de México. Univ. Auton. México, Fac. Ciencias, Dept. Biol., México, D.F.

Chrapliwy, P.S. and C.M. Fugler. 1955. Amphibians and reptiles collected in Mexico in the summer of 1953. Herpetologica 11:121–128.

Cochran, D.M. 1961. Type specimens of reptiles and amphibians in the United States National Museum. Bull. U.S. Natl. Mus. (220):1–291.

— and C.J. Goin. 1970. The New Field Book of Reptiles and Amphibians. G.P. Putnam's Sons, New York.

Collins, J.T. 1990. Standard common and current scientific names for North American amphibians and reptiles. 3rd ed. SSAR Herpetol. Circ. (19):1–41.

—. 1997. Standard common and current scientific names for North American amphibians and reptiles. 4th ed. SSAR Herpetol. Circ. (25):1–40.

— and T.W. Taggart. 2002. Standard Common and Current Scientific Names for North American Amphibians, Turtles, Reptiles & Crocodilians. Ctr. N. Amer. Herpetol., Lawrence, Kansas.

Conant, R. 1963. Semiaquatic snakes of the genus *Thamnophis* from the isolated drainage system of the Río Nazas and adjacent areas in Mexico. Copeia 1963:473–499.

—. 1977. Semiaquatic reptiles and amphibians of the Chihuahuan Desert and their relationships to drainage patterns of the region, p. 455–491. *In* R.H. Wauer and D.H. Riskind (eds.), Transactions of the Symposium on the Biological Resources of the Chihuahuan Desert Region, United States and Mexico. Sul Ross State Univ., Alpine, Texas,

17–18 October 1974. Natl. Park Serv. Proc. and Trans. Series (3): xxii + 658 pp.
Conant, R. and J.T. Collins. 1998. A Field Guide to Reptiles and Amphibians: Eastern and Central North America. 3rd ed., expanded. Houghton Mifflin Co., Boston.
Conant, R., et al. 1956. Common names for North American amphibians and reptiles. Copeia 1956:172–185.
Crother, B.I. (chair). 2000. Scientific and standard English names of amphibians and reptiles of North America north of Mexico, with comments regarding confidence in our understanding. SSAR Herpetol. Circ. (29):1–82.
—, J. Boundy, J.A. Campbell, K. de Queiroz, D. Frost, D.M. Green, R. Highton, J.B. Iverson, R.W. McDiarmid, P.A. Meylan, T.W. Reeder, M.E. Seidel, J.W. Sites, Jr., S.G. Tilley, and D.B. Wake. 2003. Scientific and standard English names of amphibians and reptiles of North America north of Mexico: update. Herpetol. Rev. 34:196–203.
David, P. 1994. Liste des reptiles actuels du monde I. Chelonii. Dumerilia 1:7–127.
Degenhardt, W.G. and J.L. Christiansen. 1974. Distribution and habitat of turtles in New Mexico. Southw. Nat. 19:21–46.
Degenhardt, W.G., C.W. Painter, and A.H. Price. 1996. Amphibians and Reptiles of New Mexico. Univ. New Mexico Press, Albuquerque.
Dixon, J.R. 1987. Amphibians and Reptiles of Texas, with Keys, Taxonomic Synopses, Bibliography, and Distribution Maps. Texas A&M Univ. Press, College Station.
—. 2000. Amphibians and Reptiles of Texas, with Keys, Taxonomic Synopses, Bibliography, and Distribution Maps. 2nd ed. Texas A&M Univ. Press, College Station.
Ernst, C.H. 1967. Serum protein analysis: a taxonomic tool. Intl. Turtle Tort. Soc. J. 1(3):34–36.
—. 1990. Systematics, taxonomy, variation, and geographic distribution of the slider turtle, p. 57–67. *In* J.W. Gibbons (ed.), Life History and Ecology of the Slider Turtle. Smithsonian Inst. Press, Washington, D.C.
—. 1992. *Trachemys gaigeae*. Cat. Amer. Amphib. Rept. (538):1–4.
—. 1995. Freshwater and terrestrial turtles of the United States: status and prognosis. Bull. Chicago Herpetol. Soc. 30:225–230.
—, R.G.M. Altenburg, and R.W. Barbour. 2000. Turtles of the World. Multimedia interactive CD-ROM. Biodiv. Ctr., Exp. Ctr. Taxon. Ident., Amsterdam. Springer-Verlag, UNESCO, Heidelberg.
— and R.W. Barbour. 1972. Turtles of the United States. Univ. Press Kentucky, Lexington.
— and —. 1989. Turtles of the World. Smithsonian Inst. Press, Washington, D.C.
—, J. Lovich, and R.W. Barbour. 1994. Turtles of the United States and Canada. Smithsonian Inst. Press, Washington, D.C.
Fritz, U. 1981. Zwei interessante mexikanische Schmuckshildkröten der Gattung *Chrysemys* Gray, 1844. Herpetofauna (Germany) 1(3):25–32.
—. 1990a. Haltung und Nachzucht der Jamaika-Schmuckschildkröte *Trachemys terrapen* (Lacépède, 1788) und Bemerkungen zur Fortpflanzungsstrategie von neotropischen Schmuckschildkröten der Gattung *Trachemys*. Salamandra 26:1–18.
—. 1990b. Balzverhalten und Systematik in der Subtribus Nectemydina, 1: Die Gattung *Trachemys*, besonders *Trachemys scripta callirostris* (Gray, 1855). Salamandra 26:221–245.
—. 1995. Schildkröten-Hybriden 2. Halsberger-Schildkröten (Cryptodira). Herpetofauna (Germany) 17(95):19–34.
—. 1998. Courtship behavior and systematics in the subtribe Nectemydina 1. The genus *Trachemys*, especially *Trachemys scripta callirostris* (Gray, 1855). Bull. Chicago Herpetol. Soc. 33:225–236 (English translation of Fritz 1990b).
Frost, D.R., A.G. Kluge, and D.M. Hillis. 1992. Species in contemporary herpetology: comments on phylogenetic inference and taxonomy. Herpetol. Rev. 23:46–54.
Garcia, J.D. 1973. A study of mercurials in the Elephant Butte Reservoir ecosystem. Unpubl. Ph.D. Diss., Univ. New Mexico, Albuquerque.
Garman, S. 1887. Reptiles and batrachians from Texas and Mexico. Bull. Essex Inst. 19:119–138.
Garrett, J.M. and D.G. Barker. 1987. A Field Guide to Reptiles and Amphibians of Texas. Texas Monthly Press, Austin.
Gehlbach, F.R., K.A. Arnold, K. Culbertson, D.J. Schmidly, C. Hubbs, and R.A. Thomas. 1975. TOES watch-list of endangered, threatened, and peripheral vertebrates of Texas. Texas Org. Endang. Spec. Publ. 1:1–12.
Hamilton, R.D. 1947. The range of *Pseudemys scripta gaigeae*. Copeia 1947:65–66.
Hartweg, N. 1939a. A new American *Pseudemys*. Occ. Pap. Mus. Zool. Univ. Michigan (397):1–4.
—. 1939b. Further notes on the *Pseudemys scripta* complex. Copeia 1939:55.
Holman, J.A. 1977. Comments on turtles of the genus *Chrysemys* Gray. Herpetologica 33:274–276.
Iverson, J.B. 1985. Checklist of the turtles of the world, with English common names. SSAR Herpetol. Circ. (14):1–14.
—. 1986. A Checklist with Distribution Maps of the Turtles of the World. Priv. printed, Richmond, Indiana.
—. 1992. A Revised Checklist with Distribution Maps of the Turtles of the World. Priv. printed, Richmond, Indiana.
Kluge, A.G. 1984. Type-specimens of reptiles in the University of Michigan Museum of Zoology. Misc. Publ. Univ. Michigan Mus. Zool. (167):1–85.
Larisch, M. and L.J. Larisch. 2003. Geographic distribution: *Trachemys gaigeae* (Big Bend Slider). Herpetol. Rev. 34:382–383.
Legler, J.M. 1960a. A new subspecies of Slider Turtle (*Pseudemys scripta*) from Coahuila, México. Univ. Kansas Publ. Mus. Nat. Hist. 13:73–84.
—. 1960b. A simple and inexpensive device for trapping aquatic turtles. Utah Acad. Sci. Proc. 37:63–66.
—. 1960c. Remarks on the natural history of the Big Bend Slider, *Pseudemys scripta gaigeae*, Hartweg. Herpetologica 16:139–140.
—. 1990. The genus *Pseudemys* in Mesoamerica: taxonomy, distribution, and origins, p. 82–105. *In* J.W. Gibbons (ed.), Life History and Ecology of the Slider Turtle. Smithsonian Inst. Press, Washington, D.C.
— and R.G. Webb. 1970. A new Slider (*Pseudemys scripta*) from Sonora, México. Herpetologica 26:157–168.
Liner, E.A. 1994. Scientific and common names for the amphibians and reptiles of Mexico in Spanish and English. SSAR Herpetol. Circ. (23):1–113.
—, R.M. Johnson, and A.H. Chaney. 1977. A contribution to the herpetology of northern Coahuila, Mexico. Trans. Kans. Acad. Sci. 80(1/2):47–53.
Lovich, J.E., W.R. Garstka, and C.J. McCoy. 1990. The development and significance of melanism in the slider turtle, p. 233–254. *In* J.W. Gibbons (ed.), Life History and Ecology of the Slider Turtle. Smithsonian Inst. Press, Washington, D.C.
McAllister, C.T., J.N. Stuart, and S.J. Upton. 1995. Coccidia (Apicomplexa: Eimeriidae) from the Big Bend Slider, *Trachemys gaigeae* (Testudines: Emydidae), in New Mexico. J. Parasitol. 81:804–805.
McCrystal, H.K. 1991. The herpetofauna of the Big Bend region. Sonoran Herpetologist 4:137–141.
Mertens, R. and H. Wermuth. 1955. Die rezenten Schildkröten, Krokodile und Brückenechsen. Eine kritische Liste der heute lebenden Arten und Rassen. Zool. Jahrb. Abt. Allg. Zool. 83:323–440.
Minton, S.A. 1958 (1959). Observations on amphibians and reptiles of the Big Bend region of Texas. Southw. Nat. 3:28–54.
Moll, E.O. and J.M. Legler. 1971. The life history of a Neotropical Slider Turtle, *Pseudemys scripta* (Schoepff), in Panama. Bull. Los Angeles Co. Mus. Nat. Hist. (11):1–102.
Morafka, D.J. 1977. A biogeographical analysis of the Chihuahuan Desert through its herpetofauna. Biogeographica 9:1–313.
Morjan, C.L. and J.N. Stuart. 2001. Nesting record of a Big Bend Slider Turtle (*Trachemys gaigeae*) in New Mexico, and overwintering of hatchlings in the nest. Southw. Nat. 46:230–234.
— and N. Valenzuela. 2001. Is ground-nuzzling by female turtles associated with soil surface temperature? J. Herpetol. 35:668–672.
Obst, F.J. 1983. Schmuckschildkröten: die Gattung *Chrysemys*. A. Ziemsen Verlag, Wittenberg-Lutherstadt, Germany.
Parmenter, R.R. and H.W. Avery. 1990. The feeding ecology of the slider turtle, p. 257–266. *In* J.W. Gibbons (ed.), Life History and Ecology of the Slider Turtle. Smithsonian Inst. Press, Washington, D.C.
Parsons, T.S. 1968. Variation in the choanal structure of Recent turtles. Can. J. Zool. 46:1235–1263.
Peters, J.A. 1952. Catalogue of type specimens in the herpetological collections of the University of Michigan Museum of Zoology. Occ. Pap. Mus. Zool. Univ. Michigan (539):1–55.
Pope, C.H. 1939. Turtles of the United States and Canada. Alfred A.

Knopf, New York.
Powell, R., J.T. Collins, and E.D. Hooper, Jr. 1998. A Key to the Amphibians & Reptiles of the Continental United States and Canada. Univ. Press Kansas, Lawrence.
Price, A.H. and D.M. Hillis. 1989. Biochemical genetics and taxonomic status of *Trachemys gaigeae* and of the *Trachemys scripta* complex in Texas. Abstr. First World Congr. Herpetol., Canterbury, United Kingdom.
Pritchard, P.C.H. 1967. Living Turtles of the World. T.F.H. Publ., Inc., Jersey City, New Jersey.
—. 1979. Encyclopedia of Turtles. T.F.H. Publ., Inc., Neptune, New Jersey.
Raun, G.G. and F.R. Gehlbach. 1972. Amphibians and reptiles in Texas. Taxonomic synopsis, bibliography, and county distribution maps. Dallas Mus. Nat. Hist. Bull. (2):1–61.
Rogner, M. 1995. Schildkröten 1. Heidi-Rogner-Verlag, Hürtgenwald, Germany.
Schmidt, K.P. 1953. A Checklist of North American Amphibians and Reptiles. Univ. Chicago Press, Chicago, Illinois.
— and D.W. Owens. 1944. Amphibians and reptiles of northern Coahuila, Mexico. Zool. Ser., Field Mus. Nat. Hist. 29:97–115.
— and T.F. Smith. 1944. Amphibians and reptiles of the Big Bend region of Texas. Zool. Ser. Field Mus. Nat. Hist. 29:75–96.
Seidel, M.E. 2002. Taxonomic observations on extant species and subspecies of Slider Turtles, genus *Trachemys*. J. Herpetol. 36:285–292.
—, W.G. Degenhardt, and J.R. Dixon. 1997. Geographic distribution. *Trachemys gaigeae*. Herpetol. Rev. 28:157.
—, J.N. Stuart, and W.G. Degenhardt. 1999. Variation and species status of Slider Turtles (genus *Trachemys*) in the southwestern United States and adjacent Mexico. Herpetologica 55:470–487.
Shannon, F.A. and H.M. Smith. 1949. Herpetological results of the University of Illinois field expedition, spring 1949. Trans. Kansas Acad. Sci. 52:494–509.
Slavens, F.L. 1988. Inventory, Longevity and Breeding Notes — Reptiles and Amphibians in Captivity current January 1, 1988. Priv. printed. Seattle, Washington.
—. 1989. Reptiles and Amphibians in Captivity: Breeding, Longevity and Inventory. Priv. printed. Seattle, Washington.
Smith, H.M. and E.D. Brodie, Jr. 1982. A Guide to Field Identification. Reptiles of North America. Golden Press, New York.
— and H.K. Buechner. 1947. The influence of the Balcones Escarpment on the distribution of amphibians and reptiles in Texas. Bull. Chicago Acad. Sci. 8:1–16.
— and R.B. Smith. 1975. An analysis of the knowledge of the turtle fauna of Mexico. Chelonia 2(3):3–8.
— and —. 1980. Synopsis of the Herpetofauna of Mexico. Vol. VI. Guide to Mexican Turtles. Bibliographic Addendum III. John Johnson, North Bennington, Vermont.
— and E.H. Taylor. 1950. Type localities of Mexican reptiles and amphibians. Univ. Kansas Sci. Bull. 33:313–379.
— and —. 1966. Herpetology of Mexico. Annotated Checklist and Keys to the Amphibians and Reptiles. A Reprint of Bulletins 187, 194, and 199 of the U.S. National Museum with a List of Subsequent Taxonomic Innovations. Eric Lundberg, Ashton, Maryland.
—, K.L. Williams, and E.O. Moll. 1963. Herpetological explorations on the Rio Conchos, Chihuahua, Mexico. Herpetologica 19:205–215.
Starkey, D.E. 1997. Molecular systematics and biogeography of the New World turtle genera *Trachemys* and *Kinosternon*. Unpubl. Ph.D. Diss., Texas A&M Univ., College Station.
Stebbins, R. 1985. A Field Guide to Western Reptiles and Amphibians. 2nd ed. Houghton Mifflin Co., Boston.
—. 2003. A Field Guide to Western Reptiles and Amphibians. 3rd ed. Houghton Mifflin Co., Boston.
Stejneger, L. and T. Barbour. 1939. A Check List of North American Amphibians and Reptiles. 4th ed. Harvard Univ. Press, Cambridge, Massachusetts.
— and —. 1943. A check list of North American amphibians and reptiles. 5th ed. Bull. Mus. Comp. Zool. Harvard 93:1–260.
Stephens, P.R. and J.J. Wiens. 2003a. Explaining species richness from continents to communities: the time-for-speciation effect in emydid turtles. Amer. Nat. 161:112–128.
— and —. 2003b. Ecological diversification and phylogeny of emydid turtles. Biol. J. Linnean Soc. 79:577–610.
Stuart, J.N. 1995a. Geographic distribution. *Trachemys scripta scripta*. Herpetol. Rev. 26:107.
—. 1995b. Notes on aquatic turtles of the Rio Grande drainage, New Mexico. Bull. Maryland Herpetol. Soc. 31:147–157.
—. 2000. Additional notes on native and non-native turtles of the Rio Grande drainage basin, New Mexico. Bull. Chicago Herpetol. Soc. 35:229–235.
— and J.B.M. Miyashiro. 1998. *Trachemys gaigeae*. Courtship behavior. Herpetol. Rev. 29:235–236.
— and C.W. Painter. 1997. *Trachemys gaigeae*. Reproduction. Herpetol. Rev. 28:149–150.
— and —. 2002. Observations on the diet of *Trachemys gaigeae* (Testudines: Emydidae). Bull. Maryland Herpetol. Soc. 38:15–22.
—, —, and B.C. Stearns. 1993. *Trachemys gaigeae*. Maximum size. Herpetol. Rev. 24:32–33.
Velasco, A.L. 1894. Geografía y estadística del estado de Zacatecas. Geografía y estadística de la República Mexicana. Vol. 16. Secr. Fomento, México, D.F.
Ward, J.P. 1980. Comparative cranial morphology of the freshwater turtle subfamily Emydinae: an analysis of the feeding mechanisms and systematics. Unpubl. Ph.D. Diss., N. Carolina St. Univ., Raleigh.
—. 1984. Relationships of chrysemyd turtles of North America (Testudines: Emydidae). Spec. Publ. Mus. Texas Tech Univ. (21):1–50.
Wauer, R.H. and C.M. Fleming. 2002. Naturalist's Big Bend. An Introduction to the Trees and Shrubs, Wildflowers, Cacti, Mammals, Birds, Reptiles and Amphibians, Fish, and Insects. Texas A&M Univ. Press, College Station.
Weaver, W.G. Jr. and F.L. Rose. 1967. Systematics, fossil history, and evolution of the genus *Chrysemys*. Tulane Stud. Zool. 14:63–73.
Wermuth, H. and R. Mertens. 1961. Schildkröten, Krokodile, Brückenechsen. Gustav Fischer, Jena.
— and —. 1977. Liste der rezenten Amphibien und Reptilien. Testudines, Crocodylia, Rhynchocephalia. Das Tierreich 100:1–174.
Williams, E.1956. *Pseudemys scripta callirostris* from Venezuela with a general survey of the *scripta* series. Bull. Mus. Comp. Zool. 115:145–160.
Williams, K.L., H.M. Smith, and P.S. Chrapliwy. 1960. Turtles and lizards from northern Mexico. Trans. Illinois St. Acad. Sci. 53:36–45.
Williamson, M.A., P.W. Hyder, and J.S. Applegarth. 1994. Snakes, Lizards, Turtles, Frogs, Toads, and Salamanders of New Mexico. Sunstone Press, Santa Fe, New Mexico.
Wilson, W.D., J.A. Hnida, and J.N. Stuart. 1999. *Trachemys gaigeae*. Endoparasites. Herpetol. Rev. 30:226.
Zweig, G. and J.W. Crenshaw. 1957. Differentiation of species by paper electrophoresis of serum proteins of *Pseudemys* turtles. Science (New York) 126:1065–1067.

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