CONSERVATION BIOLOGY OF FRESHWATER TURTLES AND TORTOISES

A Compilation Project of the IUCN SSC Tortoise and Freshwater Turtle Specialist Group

Edited by

Anders G.J. Rhodin, John B. Iverson, Peter Paul van Dijk,
Craig B. Stanford, Eric V. Goode, Kurt A. Buhlmann, and Russell A. Mittermeier

Kinosternon angustipons **Legler 1965 –**
Narrow-Bridged Mud Turtle, Tortuga Pequeña,
Tortuga Fantasma, Pecho Quebrado, Pecho en Cruz

Eric C. Munscher, Rafael Acuña-Mesén, Andriws E. Bello-Suazo,
Nicol Azcona-Orellana, Rafael Acuña-Castillo,
Russell A. Mittermeier, Andrew D. Walde, and Anders G.J. Rhodin

Chelonian Research Monographs
Number 5 (Installment 20) 2026: Account 137

Published by
Chelonian Research Foundation and Turtle Conservancy

in association with
IUCN SSC Tortoise and Freshwater Turtle Specialist Group, Re:wild,
Turtle Conservation Fund, and International Union for Conservation of Nature / Species Survival Commission

Chelonian Research Monographs
Contributions in Turtle and Tortoise Research

CHELONIAN RESEARCH MONOGRAPHS (CRM) (ISSN 1088-7105) is an international peer-reviewed scientific publication series for monograph-length manuscripts, collected proceedings of symposia, edited compilations, and other longer research documents focused on turtles and tortoises. The series accepts contributions dealing with any aspects of chelonian research, with a preference for conservation or biology of freshwater and terrestrial turtles and tortoises. Bibliographic and other reference materials are also of potential interest. Submit manuscripts directly to Anders Rhodin at the e-mail address above. The series is published on an occasional basis, from 1996–2016 by Chelonian Research Foundation, and from 2017 and on by Chelonian Research Foundation and Turtle Conservancy.

Published CRM Issues

CRM 1. The Galápagos Tortoises: Nomenclatural and Survival Status. 1996. By Peter C.H. Pritchard. 85 pp. Open-access pdf available here.

CRM 2. Asian Turtle Trade: Proceedings of a Workshop on Conservation and Trade of Freshwater Turtles and Tortoises in Asia. 2000. Edited by Peter Paul van Dijk, Bryan L. Stuart, and Anders G.J. Rhodin. 164 pp. Open-access pdf available here.

CRM 3. Biology and Conservation of Florida Turtles. 2006. Edited by Peter A. Meylan. 376 pp. Open-access pdf available here.

CRM 4. Defining Turtle Diversity: Proceedings of a Workshop on Genetics, Ethics, and Taxonomy of Freshwater Turtles and Tortoises. 2007. Edited by H. Bradley Shaffer, Nancy N. FitzSimmons, Arthur Georges, and Anders G.J. Rhodin. 200 pp. Open-access pdf available here.

CRM 5 (Installments 1–20, 137 species accounts to date). Conservation Biology of Freshwater Turtles and Tortoises: A Compilation Project of the IUCN SSC Tortoise and Freshwater Turtle Specialist Group. 2008–2026. Edited variously by Anders G.J. Rhodin, John B. Iverson, Peter Paul van Dijk, Kurt A. Buhlmann, Peter C.H. Pritchard, Craig B. Stanford, Eric V. Goode, Raymond A. Saumure, and Russell A. Mittermeier. 1,528 pp. to date. All accounts available as open-access pdf downloads: follow links here.

CRM 6. Turtles on the Brink in Madagascar: Proceedings of Two Workshops on the Status, Conservation, and Biology of Malagasy Tortoises and Freshwater Turtles. 2013. Edited by Christina M. Castellano, Anders G.J. Rhodin, Michael Ogle, Russell A. Mittermeier, Herilala Randriamahazo, Rick Hudson, and Richard E. Lewis. 184 pp. Open-access pdf available here.

CRM 5 (Installment 8). Turtles and Tortoises of the World During the Rise and Global Spread of Humanity: First Checklist and Review of Extinct Pleistocene and Holocene Chelonians. 2015. TEWG [Turtle Extinctions Working Group: Anders G.J. Rhodin, Scott Thomson, Georgios L. Georgalis, Hans-Volker Karl, Igor G. Danilov, Akio Takahashi, Marcelo S. de la Fuente, Jason R. Bourque, Massimo Delfino, Roger Bour, John B. Iverson, H. Bradley Shaffer, and Peter Paul van Dijk]. 66 pp. Open-access pdf available here.

CRM 7. Turtles of the World: Annotated Checklist and Atlas of Taxonomy, Synonymy, Distribution, and Conservation Status (8th Ed.). 2017. TTWG [Turtle Taxonomy Working Group: Anders G.J. Rhodin, John B. Iverson, Roger Bour, Uwe Fritz, Arthur Georges, H. Bradley Shaffer, and Peter Paul van Dijk]. 292 pp. Open-access pdf available here.

CRM 8. Turtles of the World: Annotated Checklist and Atlas of Taxonomy, Synonymy, Distribution, and Conservation Status (9th Ed.). 2021. TTWG [Turtle Taxonomy Working Group: Anders G.J. Rhodin, John B. Iverson, Roger Bour, Uwe Fritz, Arthur Georges, H. Bradley Shaffer, and Peter Paul van Dijk]. 472 pp. Open-access pdf available here.

CRM 9. Range-Wide Demographic Collapse and Extinction Dynamics of the Endemic Burmese Roofed Turtle, *Batagur trivittata*, in Myanmar. 2024. Steven G. Platt, Win Ko Ko, Kalyar Platt, Tint Lwin, Swann Htet Naing Aung, Khin Myo Myo, Me Me Soe, Myo Min Win, Kyaw Thu Zaw Wint, Htun Thu, Shine Hsu Hsu Naing, Brian D. Horne, and Thomas R. Rainwater. 26 pp. Open-access pdf available here.

CRM 10. Turtles of the World: Annotated Checklist and Atlas of Taxonomy, Synonymy, Distribution, and Conservation Status (10th Ed.). 2025. TTWG [Turtle Taxonomy Working Group: Anders G.J. Rhodin, John B. Iverson, Uwe Fritz, Natalia Gallego-García, Arthur Georges, H. Bradley Shaffer, and Peter Paul van Dijk]. 575 pp. Open-access pdf available here.

Other Chelonian Research Foundation & Turtle Conservancy Publications

Turtles in Trouble: The World's Most Endangered Tortoises and Freshwater Turtles – 2025. TCC [Turtle Conservation Coalition: Craig B. Stanford, Anders G.J. Rhodin, Peter Paul van Dijk, Torsten Blanck, Eric V. Goode, Rick Hudson, Andrew D. Walde, Jordan Gray, Russell A. Mittermeier, and Vivian P. Páez. (Eds.)]. 2025. 77 pp. Open-access pdf available here.

Tortoises in the Mist: Turtle Poetry for Conservationists. Anders G.J. Rhodin and Eric V. Goode (Eds.)]. 2021. 106 pp. Open-access pdf available here.

CHELONIAN RESEARCH MONOGRAPHS (CRM) issues are variously available for purchase from Chelonian Research Foundation and Turtle Conservancy. Contact either Turtle Conservancy (www.turtleconservancy.org) or Chelonian Research Foundation (www.chelonian.org/crm; 564 Chittenden Dr., Arlington, VT 05250 USA; 978-807-2902; RhodinCRF@aol.com) for prices, titles, and to place orders for available print copies. Chelonian Research Foundation (founded in 1992) and Turtle Conservancy (founded in 2005 as Chelonian Conservation Center, renamed in 2010) are nonprofit tax-exempt organizations under section 501(c)(3) of the Internal Revenue Code.

Conservation Biology of Freshwater Turtles and Tortoises:
A Compilation Project of the IUCN SSC Tortoise and Freshwater Turtle Specialist Group
Rhodin, Iverson, van Dijk, Stanford, Goode, Buhlmann, and Mittermeier (Eds.)
Chelonian Research Monographs (ISSN 1088-7105) No. 5 (Installment 20), doi:10.3854/crm.5.137.angustipons.v1.2026

Kinosternon angustipons Legler 1965 – Narrow-Bridged Mud Turtle, Tortuga Pequeña, Tortuga Fantasma, Pecho Quebrado, Pecho en Cruz

Eric C. Munscher[1,2], Rafael Acuña-Mesén[3], Andriws E. Bello-Suazo[2,4,5], Nicol Azcona-Orellana[4], Rafael Acuña-Castillo[3,6,7], Russell A. Mittermeier[8], Andrew D. Walde[2], and Anders G.J. Rhodin[9,10]

[1]*SWCA Environmental Consultants, 10245 West Little York Road, Suite 600, Houston, Texas 77040, USA [emunscher@swca.com];*
[2]*Turtle Survival Alliance, 5900 Core Road, Suite 504, North Charleston, South Carolina 29406, USA [awalde@turtlesurvival.org];*
[3]*School of Biology, University of Costa Rica, Ciudad Universitaria Rodrigo Facio, San Pedro de Montes de Oca, San José, Costa Rica.[ramesen987@gmail.com];*
[4]*Turtle Love Costa Rica, Parismina, Limon, Costa Rica [andriwsbello162@gmail.com];*
[5]*Universidad Técnica Nacional, Sede Atenas, Alajuela, Costa Rica;*
[6]*Herbario Luis A. Fournier Origgi (USJ), Centro de Investigación en Biodiversidad y Ecología Tropical (CIBET), Universidad de Costa Rica, San Pedro de Montes de Oca, 11501-2060, San José, Costa Rica [rafael.acuna_cast@ucr.ac.cr];*
[7]*Centro de Investigación Jardín Botánico Lankester, Universidad de Costa Rica, 302-7050 Cartago, Costa Rica;*
[8]*Re:wild, P.O. Box 129, Austin, Texas 78767, USA [rmittermeier@rewild.org];*
[9]*Chelonian Research Foundation, 564 Chittenden Drive, Arlington, Vermont 05250, USA [rhodincrf@aol.com];*
[10]*Turtle Conservancy, PO Box 1289, Ojai, California 93024, USA*

Summary. – The Narrow-bridged Mud Turtle, *Kinosternon (Cryptochelys) angustipons* (family Kinosternidae), is a small, poorly known freshwater turtle endemic to the Caribbean lowlands of southeastern Nicaragua, northeastern and southeastern Costa Rica, and northwestern Panama. It is distinguished morphologically by its extremely narrow plastral bridge, reduced plastral kinesis, and cranial and shell characters that separate it from other Central American *Kinosternon*. Females are only slightly larger than males,with maximum straight-line carapace length (SCL) in females reaching 13.3 cm, and 13.0 cm in males. The species is known from remarkably few localities, occurs at low densities, and exhibits a highly fragmented distribution. Recent field studies have expanded knowledge of the species' ecological breadth, documenting its presence across a range of natural and anthropogenically altered wetland habitats, including lagoon systems, stagnant streams, and wetlands in degraded cattle pastures and agricultural monocultures. Despite this apparent ecological flexibility, encounter rates remain consistently low, and available evidence indicates a declining population trend driven primarily by habitat loss, hydrological alteration, pollution, and limited collection for the international pet trade. Little is known about the reproductive ecology, survivorship, or population dynamics of wild populations, and available data suggest low fecundity and slow life history typical of kinosternid turtles. As a result, *K. angustipons* requires conservation planning that relies heavily on newly acquired ecological data rather than historical baselines. The species was previously assessed as Vulnerable on the IUCN Red List in 1996 and was re-assessed as Vulnerable in 2023, although considered possibly Endangered; it has also recently been included in CITES Appendix II. The species needs focused research, and may well need habitat protection and other measures to prevent further declines, as well as a long-term monitoring program.

Distribution. – Costa Rica, Nicaragua, Panama. Native to the low elevation plains of the Caribbean versant of southern Central America from southeastern Nicaragua to northwestern Panama.

Synonymy. – *Kinosternon angustipons* Legler 1965, *Cryptochelys angustipons*, *Kinosternon (Cryptochelys) angustipons*.

Subspecies. – None recognized.

Status. – IUCN 2026 Red List: Vulnerable (VU B2ab(ii,iii,iv)), assessed 2026); CITES: Appendix II, as part of *Kinosternon* spp. (2023).

Figure 1. Adult male Narrow-bridged Mud Turtle, *Kinosternon angustipons*, from Puerto Viejo de Sarapiqui, Heredia Province, Costa Rica. Photo by Rio Dante.

Taxonomy. — *Kinosternon* (Spix 1824) is one of the most species-rich genera of turtles, with 26 recognized extant species, and is the most widespread genus of continental turtles in the Americas, extending from the northeastern USA to northwestern Argentina, with a major center of diversity in Mexico (TTWG 2025). *Kinosternon angustipons* Legler 1965 is a small turtle endemic to the Caribbean versant of southeastern Nicaragua through northeastern and southeastern Costa Rica to northwestern Panama (Iverson 1992; TTWG 2025; Bello-Suazo et al. 2025; Rhodin et al. 2026).

Kinosternon angustipons was described from specimens collected in Limón Province, Costa Rica, by Edward H. Taylor in 1952 and by John M. Legler from 1961–1963 (Legler 1965). The holotype is an adult female deposited in the herpetology collection of the Museum of Natural History of the University of Kansas (KU 43631), collected in Los Diamantes, in Pococí, Limón, near what is now the city of Guápiles.

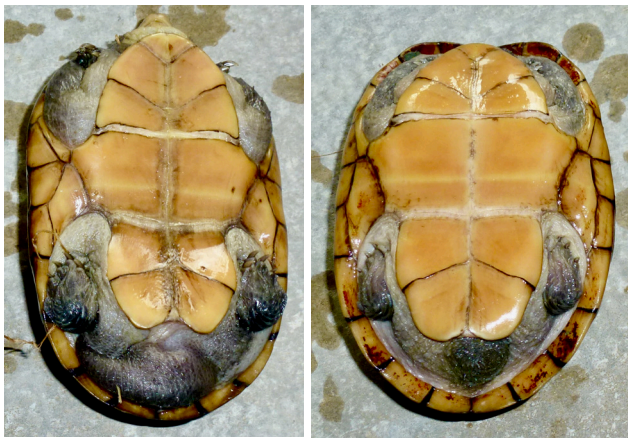

Figure 2. Adult *Kinosternon angustipons* from Barro del Colorado and Porto Viejo, Heredia Province, Costa Rica, collected in 1970 and 1974. *Left*: male, *right*: female. Photos by Walter Sachsse in 2017.

The species has since been consistently recognized as a distinct species based on its narrow plastral bridge, reduced plastral kinesis, and subtle but consistent cranial and shell characters (Legler 1966; Iverson 1980, 1982). There are no recognized synonyms nor subspecies. The epithet "*angustipons*" refers to the distinctive narrow plastral bridge of this species (Legler 1965).

Recent multilocus phylogenetic analysis by Hurtado-Gómez et al. (2024) has clarified relationships within *Kinosternon*, supporting deep divergences that warranted the recognition of three subgenera: *Kinosternon, Cryptochelys*, and *Thyrosternum*. Under this framework, *K. angustipons* was included in the subgenus *Cryptochelys* and is recovered as sister species to the Colombian endemic, *K. dunni* Schmidt 1947, with *K. leucostomum* (Duméril and Bibron *in* Duméril and Duméril 1851) forming the next closest lineage. This proposed arrangement has been adopted by the Turtle Taxonomy Working Group (TTWG 2025).

Cryptochelys was originally established as a distinct genus by Iverson et al. (2013) to include all kinosternines (6 extant species in their analyses) closer to its type species, *K. leucostomum*, than to *K. flavescens* and *Sternotherus odoratus*. However, Spinks et al. (2014) and Hurtado-

Figure 3. Adult male *Kinosternon angustipons* from Boca Tapada, Alajuela Province, Costa Rica. Photo by Renae Reed.

Figure 4. Adult male *Kinosternon angustipons* from Boca Tapada, Alajuela Province, Costa Rica. Photo by Renae Reed.

Figure 5. Adult male *Kinosternon angustipons* from Puerto Viejo de Sarapiqui, Heredia Province, Costa Rica. Photo by Rio Dante.

Gómez et al. (2024) found that *Cryptochelys* is nested within the traditional concept of *Kinosternon*, hence, although retrieved as a distinct monophyletic entity in both studies, a subgenus rank for *Cryptochelys* was recommended. According to Hurtado-Gómez et al. (2024), *Cryptochelys* diverged from its sister group (subgenus *Kinosternon*) 13 million years ago, during the Miocene; however, their time-calibrated analysis did not include *K. angustipons*. Iverson et al. (2013) estimated a divergence of ca. 8 million years between *K. angustipons* and *K. dunni*.

Description. — *Kinosternon (Cryptochelys) angustipons* is a small species; adults typically reach a straight-line carapace length (SCL) of approximately 7.2–13.3 cm (Azcona et al. 2026). Sexual dimorphism is slight; males typically have longer tails and a slightly concave plastron (Iverson 1982; Acuña-Mesén and Márquez-B. 1993) and are slightly smaller than females. The maximum known SCL in males is 13.0 cm; the maximum SCL in females is 13.3 cm, and their mass ranges from 98.0–375.0 g (Azcona et al. 2026).

The carapace is smooth, low-domed, and oval, usually dark brown to olive and lacking prominent patterning. It is unkeeled in adults but may be weakly tricarinate in juveniles. The posterior margin of the shell is slightly notched, and the scutes may overlap slightly in older individuals. Vertebrals 1–3 are almost as wide as they are long, vertebrals 4 and 5 are wider than they are long, and vertebral 5 is much reduced. The first vertebral scute usually contacts the second marginal, the fourth pleural scute usually does not contact the eleventh marginal scute, and only the tenth marginal scute is elevated.

The plastron is weakly double-hinged and distinctly reduced, with a characteristically narrow bridge (21% or less of the length of the carapace) connecting the anterior and posterior lobes, a feature unique among Central American *Kinosternon* (Legler 1965, 1966). Its anterior and posterior lobes are less than 34% and 39% of the maximum carapace length, respectively, with an anal notch in the posterior lobe. The interfemoral seam length

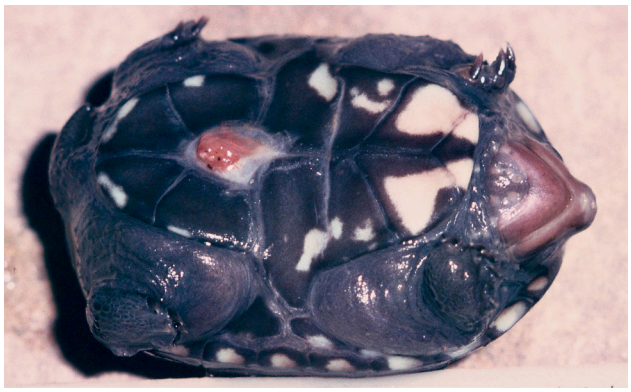

Figure 6. Hatchling *Kinosternon angustipons,* hatched in captivity. Photo by Walter Sachsse.

is greater than 14% of the maximum plastron length. In older individuals, the seams may contain much soft, pale tissue. The plastral formula is abd > an > hum > fem > gul > pect. The inguinal and axillary scutes of the bridge are in contact. The plastron and bridge are pale yellow, sometimes with dark seams. The plastron, bridge, and underside of marginals may be extensively stained in some individuals.

The head is relatively small, unstriped, typically yellowish with brown margins, lacking the bold striping common in *K. leucostomum* (Legler 1965; Ernst and Barbour 1989). The head is dark brown dorsally, paling in the canthal region to tan and cream. The sides and gular region of the head are pale cream. The iris is brown with gold flecks, and the jaws are unmarked or lightly marked with pale streaks. The jaws are unhooked and unnotched. There are three to six small yellowish barbels on the chin.

Limbs are moderately webbed, consistent with a primarily aquatic lifestyle. The skin of the limbs is pale gray to grayish brown. Adult females possess a short, stubby tail with an unmodified tip. Males have a long thickened tail with an unmodified tip, clasping organs on the thighs and crura, and a boss-like enlargement of the snout in the prefrontal region.

The species has musk glands, which were described by Waagen (1972), and rostral pores, which were described by Winokur and Legler (1974). Its choanal structure was described by Parsons (1968).

Distribution. — *Kinosternon angustipons* occurs at low density along the lowlands of the Caribbean versant of southern Central America, from southeastern Nicaragua, near the southern shores of Lago de Nicaragua (San Juan Department) through northern and eastern Costa Rica (Alajuela, Heredia, and Limón Provinces) to the Almirante region of northwestern Panama (Bocas del Toro Province) (Legler 1965; Iverson 1992; Acuña-Mesén 1998; Sunyer et al. 2009; TTWG 2025). The few recorded localities and areas of occupancy are severely fragmented across eastern lowland Costa Rica. Known localities of the species are at fairly low elevations, from sea level to approximately 250 m a.s.l.

Despite this somewhat broad geographical extent, the species is known from remarkably few localities. Only 16 historical collecting sites are documented across its range, and many lack recent confirmations; however, 10 research-grade observations, including two records from Caño Negro Wildlife Refuge (Alajuela Province, northern Costa Rica) have been documented on iNaturalist, providing additional recent occurrence data (Rhodin and Mittermeier 1974; iNaturalist 2026; Iverson 1982; TFTSG 1996; Bello-Suazo et al. 2025; Azcona et al. 2026; Rhodin et al. 2026). The estimated historical indigenous Area of Occupancy (AOO) is approximately 24,000 sq. km, but the current AOO is conservatively estimated at ≤2,000 sq. km due to severe fragmentation and apparent loss from large portions of the historical range (TTWG 2025; Rhodin et al. in press). The historical Extent of Occurrence (EOO) is estimated at approximately 37,500 sq. km (TTWG 2025; Rhodin et al. 2026).

Habitat and Ecology. — *Kinosternon angustipons* is known to occupy the margins of streams, permanent open ponds, and pools with abundant broad-leaved aquatic vegetation, as well as swamps with dense vegetation characterized by "foamy," soft, acidic stagnant water with temperatures reaching or exceeding 30°C, and residential drainage channels, as well as ponds in agricultural monoculture plantations (Legler 1966; Nickerson et al. 1978; Acuña-Mesén 1994; Matlock and Hartshorn 1999; Reed and Gilles 2014; Rhodin et al. 2026; F. Wollinger, unpubl. data). Recent studies have documented the presence of *K. angustipons* in six different habitat types (Bello-Suazo et al. 2025; Azcona et al. 2026).), including lagoon wetlands, stagnant stream wetlands with shrub and tree cover, degraded emergent wetlands in active cattle pastures with abundant excrement in the water, as well as the type locality, a wetland community that has wastewater drainage channels and ponds located within an agricultural landscape. These six habitats cover a wide range of hydrological and vegetative conditions, suggesting greater ecological adaptability than previously assumed (Bello-Suazo et al. 2025; Azcona et al. 2026).

Although *K. angustipons* appears capable of persisting in highly modified landscapes, the available data suggest some reliance on shallow, vegetated wetlands with stable hydroperiods, suggesting sensitivity to hydrological disruption. Many occupied habitats are seasonally isolated, stagnant, or subject to water quality degradation, conditions that may limit dispersal and increase vulnerability to local extirpation. The species' apparent tolerance of polluted or nutrient-enriched waters likely reflects physiological resilience rather than habitat preference and should not be interpreted as evidence of long-term population viability in degraded systems. Furthermore, it is essential to conduct physicochemical water quality

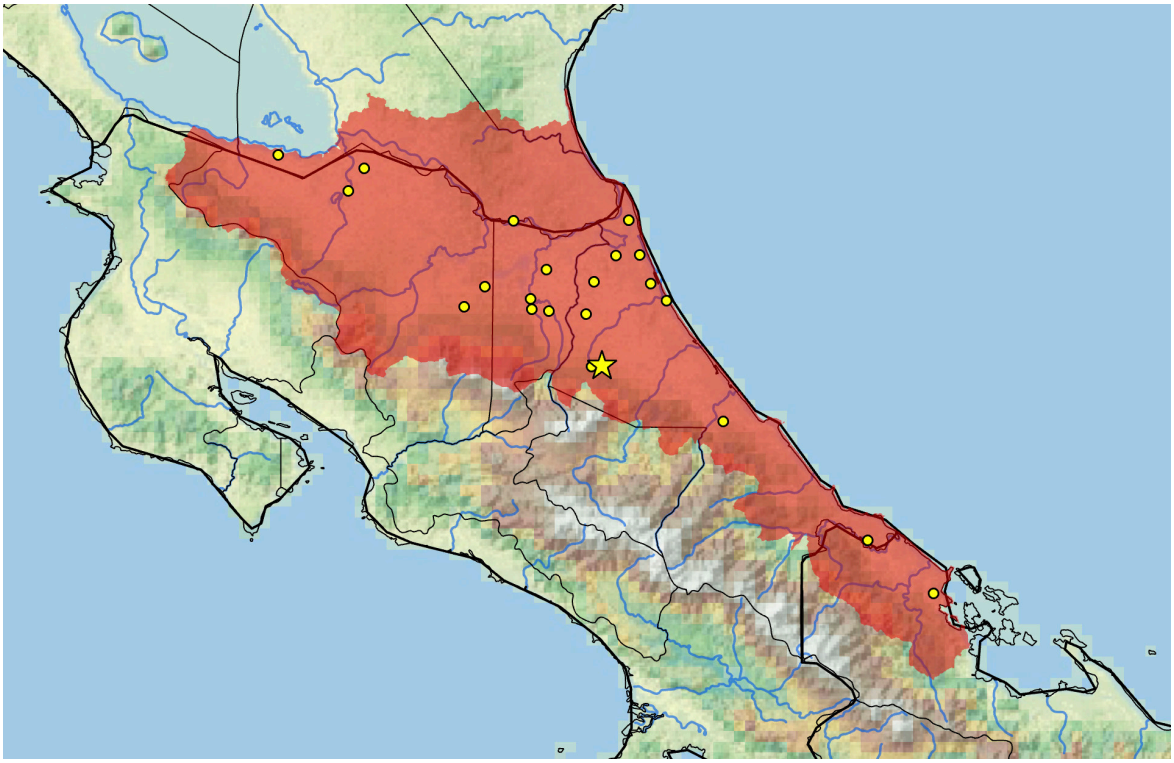

Figure 7. Estimated historical indigenous distribution of *Kinosternon angustipons* in Nicaragua, Costa Rica, and Panama. Yellow dots = museum and current and historical occurrence records of presumed native populations based on literature and online records (TTWG 2025); yellow star = type locality (Legler 1965; TTWG 2025). Colored shading = estimated historical indigenous range. Distribution is based on fine-scaled GIS-defined level 12 HUCs (hydrologic unit compartments) constructed around localities and then adding HUCs that connect point localities in the same watershed or physiographic region, and similar habitats and elevations as verified HUCs, based on TTWG (2021, 2025) and adjusted based on data from the authors. Map by Chelonian Research Foundation.

studies and ecotoxicological analyses to accurately assess the impacts of agrochemicals and pollutants, and to understand the vulnerability of viable populations to habitat loss and pollution in environments altered by urbanization and agriculture. The species shares its habitat with other aquatic and semi-aquatic species, including *Chelydra acutirostris, K. leucostomum postinguinale, Rhinoclemmys funerea, Trachemys grayi emolli*, and the mostly terrestrial *R. annulata* (Legler 1966; Acuña-Mesén 1998; Azcona et al. 2026). In Nicaragua, the species has also been collected in association with *K. albogulare* (Sunyer 2009).

Predation. — In Costa Rica, other species of *Kinosternon* are apparently preyed upon by felines (*Leopardus pardalis, L. wiedii, Panthera onca, Puma concolor*); this assumption is reinforced by observing lesions on the shells of dead or live turtles matching the dimensions and patterns of the claws and canines of felids (Acuña-Mesén 1998). Hatchling and juvenile *Kinosternon* are preyed upon by birds of prey (Acuña-Mesén et al. 2003). It is possible, though undocumented for *K. angustipons* specifically (which lacks evidence of the terrestrial movements seen in *K. leucostomum* and *K. albogulare*), that these species could potentially include *K. angustipons* in their diets.

Parasites and Commensals. — Leeches (Hirudinea) have been observed attached between the sutures of the plastron and in the axillary and inguinal regions. A recent study highlighted the presence of leeches of the family Glossiphoniade, likely *Placodbella* sp. (Azcona et al. 2026). The presence of nematodes or other endoparasites has not been described in this species (Bursey and Brooks 2011), but it is highly likely that *K. angustipons* harbors them (Acuña-Mesén 1998), since the closely related species *K. albogulare* and *K. leucostomum postinguinale* from Costa Rica harbor nematodes (Bursey and Brooks 2011).

Behavior. — Unlike other members of the genus *Kinosternon*, evaluated individuals of *K. angustipons* do not exhibit aggressive defensive behaviors, such as biting. Instead, the documented behavioral repertoire includes terrestrial locomotion towards bodies of water and active immersion for burial purposes in the mud, taking 5 to 10 seconds to fully bury themselves and using their head as the primary digging tool (Azcona et al. 2026).

Diet. — Data on the diet of *K. angustipons* are limited. Gastric lavage of two adult specimens captured in the wild revealed unidentifiable fragments of vascular aquatic plants, parts of a terrestrial tree leaf, and the remains of a single orthopteran insect (Legler 1966). Captive individuals have been observed consuming various

Figure 8. Typical habitats of *Kinosternon angustipons* in Costa Rica. *Top left*: Wetland complex with areas of open water, Caño Negro, Alajuela Province; photo by Rio Dante. *Middle left*: Perennial creek and wetland system with vegetated and open water sections, Boca Tapada, Alajuela Province; photo by Rio Dante. *Bottom left*: Open cow pasture with wide permanently wet channels and expansive flooded areas, including deeper pools, Puerto Viejo de Sarapiqui, Heredia Province; photo by Andrew Walde. *Top right*: Large open wetland with vegetated tussocks surrounded by forest, Santa Rita, Heredia Province; photo by Andrew Walde. *Bottom right*: Large vegetated wetland within an active cow pasture, Puerto Viejo de Sarapiqui, Heredia Province; photo by Andrew Walde.

types of fruit. A recent study has documented wild *K. angustipons* individuals feeding on various types of meat, vegetables, and fruits, such as chicken, mango, and raw pork (Azcona et al. 2026). Preliminary examination of multiple stomachs and colons from *Kinosternon* specimens in the University of Utah vertebrate collection revealed no appreciable differences in diet among *K. angustipons*, *K. leucostomum*, and *K. albogulare*; all appeared to function as opportunistic feeders with predominantly herbivorous diets (Legler 1966).

Canned sardines and bananas can be used to attract specimens to traps. In captivity, tuna, seafood, sardines, and raw beef have been consumed by the species (Acuña-Mesén 1998).

Reproduction and Life History. — Virtually nothing is known about the reproductive biology of *K. angustipons* in wild populations. Limited captive observations suggest very low fecundity, with clutches consisting of one or two elongate, brittle-shelled eggs measuring 33–39 mm long (mean 36.4) by 19–23 mm wide (mean 20.3) ($n = 20$), and a single hatchling measuring 30 mm SCL (Legler 1966; Rhodin et al. 2026; W. Sachsse, unpubl. data). Age at sexual maturity, courtship behavior, nesting phenology, and survivorship have not been documented. Generation

time is estimated at approximately 10–15 years, inferred from life-history parameters of closely related Kinosternon species (Ernst and Lovich 2009; Iverson 2024; Rhodin et al. 2026).

Longevity. — Longevity in *K. angustipons* can be inferred from two adults collected by Mittermeier and Rhodin in 1970 and 1974 as adults in Costa Rica and subsequently kept in captivity by W. Sachsse in Germany until transferred to the care of P. Praschag, and still alive in 2026, at this time well over 56 and 52 years old, respectively (Sachsse and Mittermeier, unpubl. data; Praschag, unpubl. data).

Eggshell. — The ultrastructure of the shell of non-hatched and hatched eggs was described by Acuña-Mesén et al. (2001). The non-hatched eggs have a porous, irregular, scaly surface, with numerous spongoid structures. The pores resemble small craters with irregular edges, measuring on average 0.4 mm in diameter and half as deep. The shell of hatched eggs of *K. angustipons* is thicker than that of the eggs of *K. albogulare* and *K. leucostomum postinguinale*. This suggests that the eggs of *K. angustipons* may be less fragile and experience lower evaporative water loss than those of the other two species (Acuña-Mesén et al. 2001).

Fecundity. — The apparent low fecundity observed in *K. angustipons*, combined with likely delayed maturity and extended generation time, suggests limited capacity for rapid population recovery following disturbance. These traits are consistent with life-history strategies observed in other small-bodied kinosternids, but may be particularly consequential for *K. angustipons* given its fragmented distribution and apparent rarity. Even modest increases in adult mortality or reductions in nesting success could therefore have disproportionate demographic impacts.

Population Status. — *Kinosternon angustipons* is widely regarded as rare and its populations highly fragmented across its known range, with consistently low encounter rates even in habitats that appear otherwise suitable. Extensive historical and contemporary sampling efforts underscore this apparent scarcity. During four major collecting expeditions to Central America between 1960 and 1965, University of Utah researchers obtained 1,494 specimens of *Kinosternon* spp., primarily using baited hoop nets across most available aquatic habitats at each locality; additional specimens were collected via trammel nets and hand capture. Of this total, only 14 individuals (0.9%) were identified as *K. angustipons* (Legler 1966; Rhodin et al. 2026).

Subsequent targeted surveys conducted between 1970 and 1974 in the Río San Juan drainage of Costa Rica similarly yielded low numbers, with only six *K. angustipons* captured among approximately 60 *K. leucostomum* (Rhodin and Mittermeier 1974). More recent trapping efforts in 2014 within the Maquenque Wildlife Refuge of north-central Costa Rica, again employing baited hoop nets, produced only two *K. angustipons* among 18 *K. leucostomum* captures (Reed and Gilles 2014).

In October 2025, field sampling was conducted at four sites in the central part of the known range of *K. angustipons* (Bello-Suazo et al. 2025). The species was detected at all four study sites, occupying a diversity of habitat types with a wide range of hydrological regimes and vegetation structures. This supports the previously inferred wide ecological breadth of *K. angustipons*. In total, 16 individuals (11 males and 5 females) were captured across all sites, representing multiple size classes. During the same study period, 103 turtles of various species were captured, with *K. angustipons* accounting for only ca. 16% of the total catch.

A study conducted between May and November 2025 at three locations recorded a total of 30 individual *K. angustipons*, making it a key site for continuing long-term natural history studies (Azcona et al. 2026). In early 2026, another seven new individuals were captured at the main study site (Azcona and Bello, pers. comm.).

Threats to Survival. — Primary threats to *K. angustipons* include habitat loss and degradation associated with agricultural expansion, cattle ranching, and wetland drainage; hydrological modification through surface water extraction and channelization; and pollution linked to agro-industrial practices, particularly intensive pineapple (*Ananas comosus*) cultivation (Daniels and Cummings 2008), and possibly also banana (*Musa acuminata*) plantations. Climate change poses an additional threat through increased frequency and severity of droughts and episodic flooding, which may disproportionately affect shallow wetland habitats (Blaustein et al. 2010).

The species' feeding strategy may facilitate persistence in disturbed habitats but does not offset the species' vulnerability to habitat loss, given its low encounter rates and limited reproductive output.

Limited but persistent collection for the international pet trade has been documented and may be significant given the species' apparent rarity and low reproductive output (Ceballos and Fitzgerald 2004; Rhodin et al. 2026). Telecky (2001) reported that between 1989 and 1997, 127 live specimens of *K. angustipons* were exported from range countries and three imported to the United States.

Collectively, these threats act synergistically across the species' range, reducing habitat availability, increasing fragmentation, and potentially limiting recolonization of extirpated sites. Given the species' low detectability and limited baseline data, ongoing declines may remain cryptic while populations are being gradually depleted. It can be inferred that the global population trend for *K. angustipons* is declining due to ongoing habitat loss, wetland drying, urbanization, pollution, and constant landscape alteration in the Caribbean lowlands of Central America (Azcona et al. 2026; Rhodin et al. 2026).

Conservation Measures Taken. — *Kinosternon angustipons* has recently been re-assessed as Vulnerable (VU B2ab(ii,iii,iv)) on the IUCN Red List (Rhodin et al. 2026). It was previously also assessed as Vulnerable in 1996 under earlier criteria (TFTSG 1996; Rhodin et al. 2018; Berriozábal-Islas et al. 2023). The species could plausibly meet criteria for Endangered status if further reductions in its current Area of Occupancy or a decrease in the number of occupied locations are documented. *Kinosternon angustipons* is included in CITES Appendix II under *Kinosternon* spp. (CITES 2023).

National legal protection is as follows:

Nicaragua – protected under Decreto No. 8-98 (Lista de Especies en Peligro de Extincion, MARENA); all freshwater turtles protected from commercial exploitation.

Costa Rica – protected under Ley de Conservación de la Vida Silvestre No. 7317 and implementing regulations; all native reptiles are protected by default.

Panama – protected under Ley No. 24 de 1995 (Vida Silvestre); harvest of freshwater turtles requires permits not routinely granted.

All three countries are CITES signatories.

The species occurs in at least four protected areas: Los Guatuzos (San Juan Department, Nicaragua), Maquenque (Heredia Province, Costa Rica), Barra del Colorado Wildlife Refuges (Limón Province, Costa Rica), Tortuguero National Park (Limón Province, Costa Rica), and Caño Negro Wildlife Refuge (Alajuela Province, Costa Rica; confirmed via iNaturalist research-grade records), as well as potentially in the San San Pond Sak RAMSAR Wetland (Bocas del Toro Province, Panama).

Conservation Measures Proposed. — Although *K. angustipons* occurs in some protected areas, effective conservation is constrained by external hydrological and land-use pressures (Bello-Suazo et al. 2025). Priority conservation actions needed include the protection and restoration of lowland wetland habitats, the maintenance of natural hydrological regimes, and the monitoring and regulation of domestic exploitation and international trade. Critical research needs include basic life-history and reproductive ecology, population size and trends, habitat use and seasonal movements, and genetic connectivity among fragmented populations. Long-term capture-mark-recapture and occupancy studies, coupled with genetic analyses, are essential to establish demographic baselines and inform future reassessments of extinction risk (Bodie and Semlitsch 2000; Munscher et al. 2023).

Because *K. angustipons* occupies landscapes undergoing rapid agricultural and infrastructural change, effective conservation will require integration of wetland protection into broader land-use planning and watershed-scale management. Engagement with private landowners, particularly in agricultural regions, may be essential to maintaining functional native habitat networks and hydrological connectivity.

Captive Husbandry. — Walter Sachsse (unpubl. data) kept four *K. angustipons* in captivity in Germany for about 50 years that had been collected in Costa Rica by Mittermeier and Rhodin. He recorded the production of 20 eggs over this period, which were incubated in moist vermiculite at 30ºC, but obtained only a single hatchling, noting concern that the eggs of this species may require a natural diapause, which he had not instituted.

Current Research. — Biologists from the Turtle Survival Alliance, including E.C. Munscher and A.D. Walde, have recently begun a study and natural history work on *K. angustipons* in Costa Rica, in collaboration with biologists from Costa Rica Wild and Turtle Love Costa Rica (A.E. Bello-Suazo et al.). In addition, J.T. Donini of Florida Southwestern State College, and N.E. Azcona, R.S. Bruno, and their colleagues at Turtle Love Costa Rica are also conducting ongoing studies on the natural history of populations of *K. angustipons* in Costa Rica.

Acknowledgments. — Rhodin, Mittermeier, and Acuña-Mesén are grateful for the valuable contributions and information on *K. angustipons* provided earlier by our late friends and colleagues, Don Moll and Walter Sachsse. Munscher, Walde, and Bello-Suazo would like to thank Turtle Survival Alliance, Costa Rica Wild, Turtle Love Costa Rica, and the field team at SWCA Environmental Consultants, as well as an anonymous donor who helped fund the current fieldwork. We thank Rio Dante, Renae Reed, and Walter Sachsse for the use of their photos. We also thank John Iverson, Peter Paul van Dijk, and Craig Stanford for their peer review and editorial input, which helped improve the manuscript, and Peter Praschag, who provided updated details on longevity in captivity.

Literature Cited

Acuña-Mesén, R.A. 1994. Conservación y ecología de las Tortugas terrestres, semiacuáticas y acuáticas (de agua dulce y marinas) de Costa Rica. San José, Costa Rica: EUNED (Editorial de la Universidad Estatal a Distancia), 56 pp.

Acuña-Mesén, R.A. 1998. Las Tortugas Continentales de Costa Rica. Editorial Universidad de Costa Rica. Segunda Edición. San José, Costa Rica. 92 pp.

Acuña-Mesén, R.A. and Márquez-B., C. 1993. El dimorfismo sexual de *Kinosternon scorpioides* (Testudines: Kinosternidae) en Palo Verde, Costa Rica. Revista de Biologia Tropical 41:261–265.

Acuña-Mesén, R.A., Solís-Segura, S., Alvarado, L., and Sachsse, W. 2001. La ultraestructura de la cáscara de los huevos eclosionados y no eclosionados de *Kinosternon angustipons* (Testudinata: Kinosternidae). Revista de Biología Tropical 49:1121–1130.

Acuña-Mesén, R.A., Lizano, A.V., Mora-Urpi, J., Barrantes, R., Morales, M.A., Gómez, J., Ortiz, R., Carranza, J., Hanson, P., Bolaños, F., Mora-Benavides, J.M., Barrantes, G., Chaves, J., Monge-Nájera, J., Fournier-Origgi, L., and Chávez-Chávez, S. 2003. La Biodiversidad. San José, Costa Rica: Editorial Universidad de Costa Rica, 253 pp.

Azcona-Orellana, N.E., Bello-Suazo, A.E., Orozco-Rodriguez, E., Ortiz-Lopez, G., Esquivel Vega, K.A., Gurierrez Bell, E., Arias, E., Saragoça Bruno, R., and Donini, J. In press. La Tortuga Fantasma de Costa Rica: natural history of the understudied Narrow-Bridged Mud Turtle (*Kinosternon angustipons*) in the Atlantic Lowlands. Chelonian Conservation and Biology.

Bello-Suazo, A.E., Munscher, E.C., Para, R.D., Ramirez, C., Cordero, N.F.S., Gallego-García, N., Siders, Z., Tuggle, A. and Walde, A.D. 2025. In search of the Narrow-bridged Mud Turtle, *Kinosternon angustipons* Legler, 1965: a knowledge gap and forgotten species. Herpetology Notes 18:1181–1189.

Berriozábal-Islas, C.S., Ramírez-Bautista, A., Nava-Jiménez, A.I., Rojas-Domínguez, M., Reyes-Grajales, E., and Loc-Barragán, J.A. 2023. Ni conocidas, ni carismáticas: estado de conservación de las tortugas del género *Kinosternon* (Spix, 1824) (Testudines: Kinosternidae) y sus factores de amenaza. Cuadernos de Biodiversidad 64:6–18.

Blaustein, A.R., Walls, S.C., Bancroft, B.A., Lawler, J.J., Searle, C.L., and Gervasi, S.S. 2010. Direct and indirect effects of climate change on amphibian populations. Diversity 2(2):281–313.

Bodie, J.R. and Semlitsch, R.D. 2000. Spatial and temporal use of floodplain habitats by lentic and lotic species of aquatic turtles. Oecologia 122:138–146.

Bursey, C.R. and Brooks, D.R. 2011. Nematode parasites of five species of turtles from the Área de Conservación Guanacaste, Costa Rica, with description of a new species of *Falcaustra*. Comparative Parasitology 78:107–119.

Ceballos, C.P. and Fitzgerald, L.A. 2004. The trade in native and exotic turtles in Texas. Wildlife Society Bulletin 32:881–891.

CITES. 2023. Appendices I, II and III, valid from 23 February 2023. Convention on International Trade in Endangered Species of Wild Fauna and Flora. Available at https://cites.org/eng/app/appendices.php. Accessed 29 May 2026.

Daniels, A.E. and Cumming, G.S. 2008. Conversion or conservation? Understanding wetland change in northwest Costa Rica. Ecological Applications 18:49–63.

Duméril, A.M.C. and Bibron, G. 1851. [*Cinosternon leucostomum*]. In: Duméril, A.M.C. and Duméril, A.H.A. Catalogue méthodique de la collection des reptiles du Muséum d'Histoire Naturelle de Paris. Paris: Gide et Baudry/Roret, 224 pp.

Ernst, C.H. and Barbour, R.W. 1989. Turtles of the World. Washington, DC: Smithsonian Institution Press, 313 pp.

Ernst, C.H. and Lovich, J.E. 2009. Turtles of the United States and Canada (2nd ed.). Baltimore, Maryland: Johns Hopkins University Press, 827 pp.

Hurtado-Gómez, J.P., Vargas-Ramírez, M., Iverson, J.B., Joyce, W., McCranie, J., Paetzold, C., and Fritz, U. 2024. Diversity and biogeography of South American mud turtles elucidated by multilocus DNA sequencing (Testudines: Kinosternidae). Molecular Phylogenetics and Evolution 197:108083, pp. 1–19.

iNaturalist. 2026. iNaturalist Research-grade Observations. iNaturalist.org. Occurrence dataset. https://doi.org/10.15468/ab3s5x. Accessed via GBIF.org, 29 May 2026.

Iverson, J.B. 1982. Biomass in turtle populations: a neglected subject. Oecologia 55:69–76.

Iverson, J.B. 1992. A Revised Checklist with Distribution Maps of the Turtles of the World. Richmond, Indiana: Privately published, 363 pp.

Iverson, J.B. 2024 ["2023"]. Estimating generation time in freshwater and terrestrial turtles. Herpetological Review 54:546–549.

Iverson, J.B. and Iverson, S.A. 1980. A bibliography to the mud and musk turtle family Kinosternidae. Smithsonian Herpetological Information Service, No. 48, 73 pp.

Iverson, J.B., Le, M., and Ingram, C. 2013. Molecular phylogenetics of the mud and musk turtle family Kinosternidae. Molecular Phylogenetics and Evolution 69:929–939.

Legler, J.M. 1965. A new species of mud turtle, genus *Kinosternon*, from Central America. University of Kansas Publications, Museum of Natural History 15:615–625.

Legler, J.M. 1966. Notes on the natural history of a rare Central American mud turtle, *Kinosternon angustipons*. Herpetologica 22:118–122.

Matlock, R.B., Jr. and Hartshorn, G.S. 1999. La Selva Biological Station (OTS). Bulletin of the Ecological Society of America 80:189–193.

Munscher, E.C., Serano, J., Tuggle, A., Weber, A., McAvinchey, C., Dubon, J., Pop, T., Hauge, J.B., Barrett, H., Marlin, J., Butterfield, B.P., and Walde, A.D. 2023. Quantifying freshwater and terrestrial turtle species diversity, richness, and abundance at the Belize Foundation for Research and Environmental Education (BFREE) Privately Protected Area in southern Belize, including range extensions. Neotropical Naturalist 4(7):1–16.

Nickerson, M.A., Sajdak, R.A., Henderson, R.W., and Ketcham, S. 1978. Notes on the movements of some Neotropical snakes (Reptilia, Serpentes). Journal of Herpetology 12:419–422.

Parsons, T.S. 1968. Variation in the choanal structure of Recent turtles. Canadian Journal of Zoology 46(6):1235–1263.

Reed, R. and Gilles, A. 2014. Quantifying an active population of Central America's rarest turtle, *Kinosternon angustipons*. Unpublished Report to Turtle Conservation Fund.

Rhodin, A.G.J. and Mittermeier, R.A. 1974. På jakt efter *Kinosternon angustipons*, centralamerikas sällsyntaste sköldpadda. [In search of *Kinosternon angustipons*, Central America's rarest turtle.]. Snoken – National Swedish Herpetological Association 4(5):6–8. [In Swedish]

Rhodin, A.G.J., Stanford, C.B., Dijk, P.P.V., Eisemberg, C., Luiselli, L., Mittermeier, R.A., Hudson, R., Horne, B.D., Goode, E.V., Kuchling, G., Walde, A., Baard, E.H.W., Berry, K.H., Bertolero, A., Blanck, T.E.G., Bour, R., Buhlmann, K.A., Cayot, L.J., Collett, S., Currylow, A., Das, I., Diagne, T., Ennen, J.R., Forero-Medina, G., Frankel, M.G., Fritz, U., García, G., Gibbons, J.W., Gibbons, P.M., Shiping, G., Guntoro, J., Hofmeyr, M.D., Iverson, J.B., Kiester, A.R., Lau, M., Lawson, D.P., Lovich, J.E., Moll, E.O., Páez, V.P., Palomo-Ramos, R., Platt, K., Platt, S.G., Pritchard, P.C.H., Quinn, H.R., Rahman, S.C., Randrianjafizanaka, S.T., Schaffer, J., Selman, W., Shaffer, H.B., Sharma, D.S.K., Haitao, S., Singh, S., Spencer, R., Stannard, K., Sutcliffe, S., Thomson, S., and Vogt, R.C. 2018. Global conservation status of turtles and tortoises (Order Testudines). Chelonian Conservation and Biology 17(2):135–161.

Rhodin, A.G.J., Villegas Raygoza, B.Y., Folt, B., and Mittermeier, R.A. 2026. *Kinosternon angustipons*. The IUCN Red List of Threatened Species 2026: e.T11005A500376.

Schmidt, K.P. 1947. A new kinosternid turtle from Colombia. Fieldiana: Zoology 31(13):109–112.

Spinks, P.Q., Thomson, R.C., Gidiș, M., and Shaffer, H.B. 2014. Multilocus phylogeny of the New-World Mud Turtles (Kinosternidae) supports the traditional classification of the group. Molecular Phylogenetics and Evolution 76:254–260.

Spix, J.B. 1824. Animalia Nova sive Species Novae Testudinum et Ranarum. Monachii: 53 pp.

Sunyer, J., Townsend, J.H., Wilson, L.D., Travers, S.L., Obando, L.A., Páiz, G., Griffith, D.M., and Köhler, G. 2009. Three new country records of reptiles from Nicaragua. Salamandra 45(3):186–190.

Telecky, T.M. 2001. United States import and export of live turtles and tortoises. Turtle and Tortoise Newsletter 4:8–13.

TFTSG [Tortoise and Freshwater Turtle Specialist Group]. 1996. *Kinosternon angustipons*. The IUCN Red List of Threatened Species 1996: e.T11005A3239054.

TTWG [Turtle Taxonomy Working Group: Rhodin, A.G.J., Iverson, J.B., Fritz, U., Gallego-García, N., Georges, A., Shaffer, H.B., and van Dijk, P.P.]. 2025. Turtles of the World: Annotated Checklist and Atlas of Taxonomy, Synonymy, Distribution, and Conservation Status (10th Ed.). In: Rhodin, A.G.J., Iverson, J.B., van Dijk, P.P., Stanford, C.B., Goode, E.V., Buhlmann, K.A., and Mittermeier, R.A. (Eds.). Conservation Biology of Freshwater Turtles and Tortoises: A Compilation Project of the IUCN SSC Tortoise and Freshwater Turtle Specialist Group. Chelonian Research Monographs 10:1–575.

Waagen, G.N. 1972. Musk glands in recent turtles. M.S. Thesis, University of Utah, Salt Lake City.

Winokur, R.M. and Legler, J.M. 1974. Rostral pores in turtles. Journal of Morphology 143:107–120.

Citation Format for this Account:

Munscher, E.C., Acuña-Mesén, R., Bello-Suazo, A.E., Azcona-Orellana, N., Acuña-Castillo, R., Mittermeier, R.A., Walde, A.D., and Rhodin, A.G.J. 2026. *Kinosternon angustipons* Legler 1965 – Narrow-Bridged Mud Turtle, Tortuga Pequeña, Tortuga Fantasma, Pecho Quebrado, Pecho en Cruz. In: Rhodin, A.G.J., Iverson, J.B., van Dijk, P.P., Stanford, C.B., Goode, E.V., Buhlmann, K.A., and Mittermeier, R.A. (Eds.). Conservation Biology of Freshwater Turtles and Tortoises: A Compilation Project of the IUCN/SSC Tortoise and Freshwater Turtle Specialist Group. Chelonian Research Monographs 5(20):137.1–10. doi: 10.3854/crm.5.137.angustipons.v1.2026; www.iucn-tftsg.org/cbftt/.