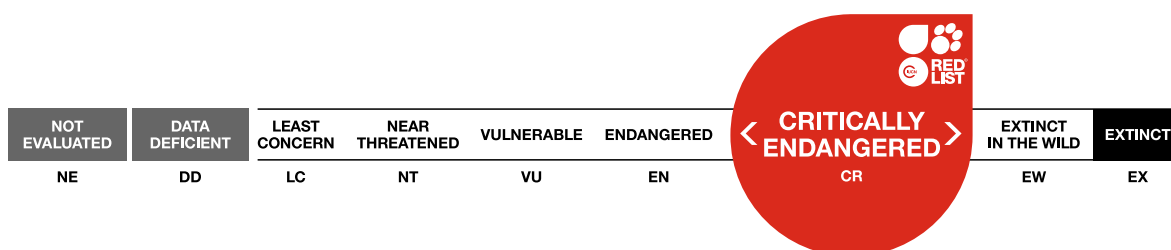


Mauremys annamensis, Vietnamese Pond Turtle

Amendment version

Assessment by: McCormack, T., van Dijk, P.P., Robertson, S. & Dawson, J.E.



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Taxonomy

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Reptilia	Testudines	Geoemydidae

Scientific Name: *Mauremys annamensis* (Siebenrock, 1903)

Synonym(s):

- *Annamemys annamensis* (Siebenrock, 1903)
- *Annamemys merkleni* Bourret, 1940
- *Cyclemys annamensis* Siebenrock, 1903

Common Name(s):

- English: Vietnamese Pond Turtle, Annam Pond Turtle
- Vietnamese: Rùa Trung Bộ

Taxonomic Source(s):

TTWG (Turtle Taxonomy Working Group: Rhodin, A.G.J., Iverson, J.B., Bour, R. Fritz, U., Georges, A., Shaffer, H.B. and van Dijk, P.P.). 2017. Turtles of the World: Annotated Checklist and Atlas of Taxonomy, Synonymy, Distribution, and Conservation Status (8th Ed.). In: Rhodin, A.G.J., Iverson, J.B., van Dijk, P.P., Saumure, R.A., Buhlmann, K.A., Pritchard, P.C.H., 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*, pp. 1-292. Chelonian Research Monographs.

Taxonomic Notes:

The common name for this species in Vietnamese is Rùa Trung Bộ.

Assessment Information

Red List Category & Criteria: Critically Endangered A2bcd+4bcd; B2ab(i,ii,iii,iv,v); D [ver 3.1](#)

Year Published: 2020

Date Assessed: March 14, 2018

Justification:

Mauremys annamensis qualifies for Critically Endangered under criteria A2cd and A4cd on account of its recent severe population collapse, from 'locally abundant' up to the 1980s to exceedingly rare by 2000 (an estimated 99% reduction in population) due to targeted over-exploitation in the past 2–3 turtle generations (assuming a generation time of 15 years), and certain to continue for the foreseeable future (A4: two past generations + one future generation). In addition, the remaining area of occupancy in the wild is at best limited to one or a few small wetlands, unlikely to amount to more than 10 km², thus qualifying the species for CR B2a+b(ii,iv,v). It probably also qualifies for CR under criterion D, as it appears unlikely that more than 50 mature individuals survive in the wild.

Mauremys annamensis has been assessed on the IUCN Red List as Critically Endangered since 2000 (Hilton-Taylor 2000, IUCN/SSC TFTSG and ATWG 2000). This species was not included in the 1982

Amphibia-Reptilia Red Data Book; it was listed as 'K – Insufficiently Known (suspected to be threatened)' from 1988 to 1994 (IUCN 1988, IUCN 1990, Groombridge 1994), before it was re-assessed in 1996 as Least Concern (Baillie and Groombridge 1996). These enormous changes over time in assessments by IUCN reflect both the lack of information in the 1980s and 1990 as well as the steep increase in collection and trade since about 1990.

Date last seen: 2006

Previously Published Red List Assessments

2020 – Critically Endangered (CR)

<https://dx.doi.org/10.2305/IUCN.UK.2020-2.RLTS.T12876A510309.en>

2000 – Critically Endangered (CR)

<https://dx.doi.org/10.2305/IUCN.UK.2000.RLTS.T12876A3393755.en>

1996 – Lower Risk/least concern (LR/LC)

1994 – Insufficiently Known (K)

1990 – Insufficiently Known (K)

1988 – Insufficiently Known (K)

Geographic Range

Range Description:

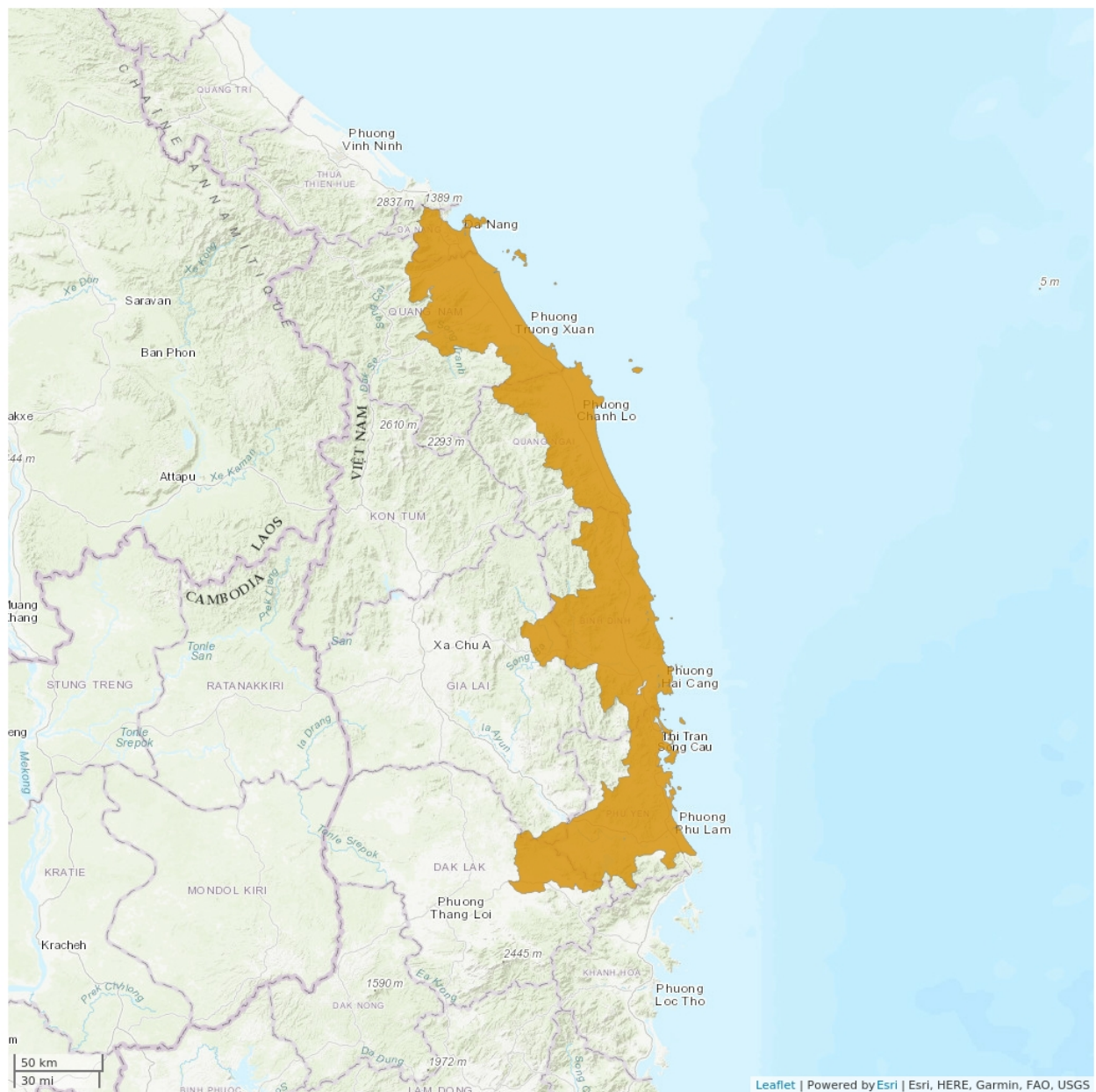
Mauremys annamensis is endemic to central Viet Nam, where it occurs in a narrow strip of coastal lowlands between the South China Sea to the east and the Annamite Mountains to the west. Eastward extensions of mountains reaching to the sea form the northern (Hai Van Pass) and southern (Ca Pass) boundaries of the species' distribution (Iverson 1992, Le *et al.* 2004, Fritz and Havas 2007, Nguyen *et al.* 2009, McCormack *et al.* 2014). Published records of *M. annamensis* exist from Quang Nam, Da Nang, and Gia Lai Provinces (Siebenrock 1903, Bourret 1941, Parham *et al.* 2006, Dawson *et al.* 2013, TTWG 2017). A wider range for the species has been suggested in some literature, although this idea appears to have been based on traded or misidentified specimens (McCormack *et al.* 2014).

The extent of occurrence (EOO) for *M. annamensis* is estimated at 12,500 km² using the Delaunay triangulation technique. However, the area currently occupied by the species within this EOO is considerably smaller. At best, the estimated area of occupancy (AOO) is 10 km² and continuing to decline. In recent decades, *M. annamensis* has only been reliably recorded from a single wild animal at one restricted location, although the species is suspected to occur in a few locations.

Country Occurrence:

Native, Extant (resident): Viet Nam

Distribution Map

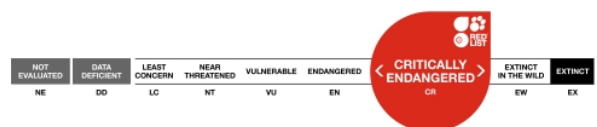


Legend

■ EXTANT (RESIDENT)

Compiled by:

Chelonian Research Foundation 2018



The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.

Population

There are no quantifiable data available on the historic or present population sizes of *Mauremys annamensis*. However, Bourret (1941) described the species as abundant in ponds and streams at one site in the late 1930s. Over the next several decades, armed conflicts and politics in Viet Nam largely prevented additional fieldwork, and only one specimen, caught in 1966, has been documented from this time period (Dawson *et al.* 2013). Nevertheless, during recent interviews conducted by the Asian Turtle Programme (ATP), local residents indicated that the species was locally common in many areas through the 1970s and early 1980s; turtles would wander into houses and were even considered pests as large individuals trampled rice plants (McCormack 2012 in CITES AC 28 Doc. 20.3.9, McCormack *et al.* 2014).

Over the past 30–45 years (equivalent to approximately 2–3 generations of *M. annamensis*), a 99% reduction in the species' population is estimated to have occurred. Interviewees have reported to the ATP that when collection of turtles for trade first began locally in the mid-1980s, rice sacks filled with turtles (including *M. annamensis* and other species) could be collected in a single night (McCormack 2012 in CITES AC 28 Doc. 20.3.9, McCormack *et al.* 2014). Collection of the species intensified rapidly, and by the late 1990s, the *M. annamensis* population appeared to have declined steeply from prior years. Hendrie (2000) noted that “where once this species was observed more frequently in trade seizures, only a few specimens have been observed in 1998 and 1999. This reduction in observed occurrence within the trade, combined with loss in habitat and continued hunting pressures within its extremely limited known range, would suggest that *M. annamensis* is under serious threat of extirpation.”

Field surveys for *M. annamensis* in recent years have been mostly unsuccessful, indicating that the species is now extremely rare in the wild (Hendrie 2000 in CITES Proposal 12.21) In 2006, one individual was trapped by scientists within natural habitat (McCormack *et al.* 2014). The species has continued to appear occasionally in illegal trade, but only in small numbers (Le *et al.* 2004; McCormack and Hendrie 2007; McCormack and Nguyen 2009). At one site in Quang Ngai Province closely monitored by the ATP, fewer than five new turtles were observed each year between 2008 and 2013 in local village households (McCormack *et al.* 2014). Given the economic value of *M. annamensis* in the trade, it is almost certain that any wild animal encountered by local people will be collected, and the species' population is suspected to continue to decline by 50% over the next 15 years. By combining the population trends over the past two turtle generations and the one future generation, the ongoing population decline in this species is estimated to be 99%.

No specific details of the population structure of *M. annamensis* in the wild are known. However, a notable discovery occurred in 2012, when seven turtles identifiable as hybrids between *M. annamensis* and *Mauremys sinensis* were found in the wild (Blanck and Braun 2013). Genetic analyses have demonstrated the hybrid origin of such specimens, which previously received the name '*Ocadia glyphistoma*' (Spinks *et al.* 2004, Stuart and Parham 2007). *Mauremys annamensis* appears to be sympatric with *M. sinensis* over much of the former's range, and local people have portrayed *M. annamensis* as naturally being fewer in number, with a 10:1 ratio of *M. sinensis* to *M. annamensis* described during ATP interviews (McCormack 2012 in CITES AC 28 Doc. 20.3.9). The occurrence of hybrid offspring in the wild suggests that adult *M. annamensis* may now be so scarce that the few remaining individuals cannot locate suitable mates, leading to the interbreeding with other species (McCormack *et al.* 2014). It is likely that no more than 50 mature individuals remain in the wild.

Current Population Trend: Decreasing

Habitat and Ecology (see Appendix for additional information)

Mauremys annamensis inhabits marshes and slow-moving streams, along with small lakes, ponds and riparian areas of large rivers (such as the Thu Bon River in Quang Nam Province) at elevations up to 150 m. Local people interviewed by the Asian Turtle Programme (ATP) have reported that the species was also frequently encountered within rice fields around villages in the past. Ongoing habitat destruction is a threat to the species. Throughout the range of the species, the climate is monsoonal with distinct wet and dry seasons. In the wet season (October–December), large areas can be inundated by flood waters, during which time, turtles are likely to disperse. During the dry season (January–September), *M. annamensis* may estivate on land; local hunters have reported to the ATP that specimens were found in the leaf litter at the base of bamboo stands (Le *et al.* 2004, McCormack 2012 in CITES AC 28 Doc. 20.3.9, McCormack *et al.* 2014).

Mauremys annamensis is a moderately large freshwater turtle; females reach a carapace (dorsal shell) length of 28.5 cm, while males reach 23.2 cm. Due to the lack of early field studies and the current rarity of the species, little is known about the biology of the species in the wild. It appears to be a generalist omnivore in diet, with an apparent preference for carnivory (McCormack *et al.* 2014). When *M. annamensis* was more abundant in the past, it may have been an important contributor to nutrient cycling and biocontrol in the ecosystem.

Reliable data on age at maturity, reproductive senescence, and maximum longevity in the wild are lacking for the species. At zoos in the United States and the Turtle Conservation Centre (TCC) of Cuc Phuong National Park, Viet Nam, females have attained maturity at around seven years of age. Captive females are known to be reproductively active through at least 25–30 years of age (McCormack *et al.* 2014). The lifespan of *M. annamensis* under human care is at least 46 years (Dawson *et al.* 2013). Based on this information, a generation length of at least 15 years is estimated.

At the TCC, well north of the species' natural range, clutch sizes of up to six eggs have been reported, with only a single clutch produced per female per year (McCormack 2012 in CITES AC 28 Doc. 20.3.9). Clutches of five to eight eggs, and up to two clutches per female per year, have been reported in captivity by a private breeder in the United States (Davis 2011). Females in the breeding programme of a zoo in the United States laid between one to four (median = 2) clutches per year, with a mean of 5.5 eggs per clutch and a maximum of 17 eggs per female in a season (McCormack *et al.* 2014).

Systems: Terrestrial, Freshwater (=Inland waters)

Use and Trade

Historically, *Mauremys annamensis* was consumed locally for food as part of a subsistence diet. However, local subsistence consumption largely ceased following the start of commercial trade in the 1980s. Since then, most of the turtles captured were sold into the trade because of the greater economic incentive. The majority of *M. annamensis* that entered international trade were destined for consumption in China. The species has been widely observed in the food and traditional medicine markets of southern China (Lee *et al.* 2004, Cheung and Dudgeon 2006, McCormack *et al.* 2014).

In central Viet Nam, the use of *M. annamensis* in local traditional medicines continues, and this usage potentially has received greater promotion recently. Blood from the species is mixed with strong rice wine and drunk in the belief that it is a cure for heart disease. This alleged curative property gives *M. annamensis* a higher local price than other, closely related local species such as *M. sinensis*. Soups and other tonics are also made from the species (McCormack 2012 in CITES AC28 Doc. 20.3.9).

Mauremys annamensis has also been widely sold in the international pet trade, with availability in Asia, Europe and North America (Jenkins 1995, Gong *et al.* 2009, McCormack *et al.* 2014). In the United States, the first specimens offered by reptile importers appeared in the late 1980s and early 1990s (Dawson *et al.* 2013). In captivity, *M. annamensis* is generally hardy and reproduces readily under appropriate conditions (McCormack *et al.* 2014). However, in Europe and North America, breeding of *M. annamensis* is primarily an effort by hobbyists, with limited commercial interest, and only relatively low numbers of captive-bred offspring are produced.

In Viet Nam and China, commercial interest in breeding *M. annamensis* has been higher. While the species previously had a relatively modest value in the trade, prices have risen dramatically over time. As a result, farming operations have been established in Viet Nam and China (Shi and Parham 2001, McCormack *et al.* 2014). Successful reproduction has occurred at some farms, but little information is available on the numbers produced annually. However, recent trade observations in markets in China have documented significant quantities of *M. annamensis* that appear to have originated from captive production facilities (P.P. van Dijk pers. comm. to Vietnamese Scientific Authority 16 June 2015). Yet, rather than reducing the threat to the species, farming ventures reportedly continue to acquire breeding stock from the wild, fuelling ongoing illegal collection and cross-border trade (Shi *et al.* 2007). Some farmers may also engage in speculation, laundering of wild-caught turtles, and other schemes with negative impacts on the species (McCormack *et al.* 2014).

No complete records of trade in *M. annamensis* exist from the 1980s or 1990s, but the species was reportedly common in 1996 in the local trade of central Viet Nam (Le *et al.* 2004). *Mauremys annamensis* was regularly found in Viet Nam trade seizures headed toward China prior to 1998, but observations in the trade declined afterward (Hendrie 2000). This decline likely resulted from a reduction in the number of turtles in the wild, which made collection more difficult. The increased economic value of *M. annamensis* in the trade may have also possibly prompted authorities to permanently confiscate fewer animals; instead, turtles may have been briefly impounded, then sold back into the trade using regulatory loopholes without being reported (McCormack *et al.* 2014).

During the period 2000–2014, the UNEP-WCMC (2019) CITES trade database recorded a total of 421 live animals, as well as 22 specimens and 1.5 kg of specimens, of *M. annamensis*. Over 1,600 live animals, all with source codes of captive-bred or farmed, were recorded in the CITES database during 2015–2017 (UNEP-WCMC 2019). In addition to legal trade, trafficking of the species presently continues, with small numbers of turtles observed in illegal trade each year in central Viet Nam (Le *et al.* 2004, McCormack and Hendrie 2007, McCormack and Nguyen 2009, McCormack *et al.* 2014).

Threats (see Appendix for additional information)

The greatest threat to the survival of *Mauremys annamensis* is unsustainable exploitation as part of the so-called Asian Turtle Crisis (Hendrie 2000) – the expansive international trade in Asian chelonians for food, traditional medicine, and pets (van Dijk *et al.* 2000). Collection of the species for trade reportedly

began in the mid-1980s. Local people interviewed by the Asian Turtle Programme (ATP) state that during that time, rice sacks filled with turtles (including *M. annamensis* and other species) could be collected in a single night (McCormack 2012 in CITES AC 28 Doc. 20.3.9, McCormack *et al.* 2014). Collection intensified rapidly, and by the late 1990s, the species' population appeared to have dropped sharply. Most *M. annamensis* that entered the trade were destined for consumption in China, while smaller numbers were locally consumed in Viet Nam or entered the international pet trade (McCormack *et al.* 2014).

In recent years, *M. annamensis* has rarely been observed in wildlife trade shipments of central Viet Nam. Only modest numbers (less than 10) of the species have been seen annually in local trade since 2007 (McCormack and Hendrie 2007, McCormack and Nguyen 2009). This low volume of trade is probably due to a reduction in the number of wild turtles, which has made collection more difficult. However, although few turtles seem to remain in the wild, the high economic value of the species in trade means that people continue to have financial incentive to collect every individual encountered. Since 2007, the ATP has observed hatchling and juvenile turtles being collected from the wild and entering the trade. These small turtles are kept with the intention of raising them to a larger size before sale (thereby increasing their value) or in hopes of being able to breed the species in the future. Often, the realisation that the species is becoming rare is cited by local people as the reason behind collecting such small turtles, before someone else has the opportunity to capture the animals (McCormack 2012 in CITES AC 28 Doc. 20.3.9).

Another major threat to *M. annamensis* is habitat destruction (Dawson *et al.* 2013, McCormack *et al.* 2014). The lowlands of central Viet Nam have an extended history of human occupation. Despite this long period of settlement and the anthropogenic changes to the landscape (such as agricultural conversion) that occurred over time, *M. annamensis* has persisted in the wild until relatively recently. However, the loss of habitat to intensive rice cultivation and urban areas has increased dramatically as the human population of Viet Nam has grown tremendously in the 20th century. The central lowlands are now a major socio-economic centre of Viet Nam, containing cities such as Da Nang, one of the country's largest and most densely populated urban areas. Many watercourses in the area have been substantially impacted by channelization, filling of low-lying areas, and draining of wetlands (McCormack *et al.* 2014). At one location where *M. annamensis* formerly occurred, suitable habitat no longer appears to exist (Dawson *et al.* 2013). Although the species could potentially still inhabit some modified habitats (e.g. flooded rice fields or urban canals), turtles in these areas have a greater chance of human contact, leading to an increased potential for collection. Development also poses the problem of environmental contamination from sewage, industrial effluents, and other pollution (McCormack *et al.* 2014).

Conservation Actions (see Appendix for additional information)

Mauremys annamensis is protected by national legislation in Viet Nam. It is included in Schedule IIB of Decree 32/2006/ND-CP, dated 30 March 2006, on Management of Endangered, Precious, and Rare Species of Wild Plants and Animals. Schedule II includes species whose utilisation is restricted to scientific research, establishing breeding populations, and international exchange; any such activities require a collection permit from the Ministry of Agriculture and Rural Development. Wildlife also needs permits to be transported nationally; such transport permits can be issued by provincial Forest Protection Department offices. A veterinary health certificate may also be required. Viet Nam's Decree No. 159/2007/ND-CP sets out penalties for forest and wildlife crimes. Substantial strides have been

made in enforcement of wildlife laws in Viet Nam, and recent confiscations of the species by government authorities have been transferred to a conservation programme (McCormack and Nguyen 2009, McCormack *et al.* 2014). *Mauremys annamensis* is also listed as a priority species for protection in Viet Nam under Decree 160/2013/ND-CP, dated 12 November 2013, on Criteria to Determine Species and the Regime of Managing Species Under Lists of Endangered, Precious and Rare Species Prioritized Protection. This law creates a system for identifying protected species, provides principles for the protection of listed species, and establishes a mechanism for managing the exploitation of these species.

Mauremys annamensis was included in CITES Appendix II at CoP 12 (Proposal 21, Santiago, Chile, 2002), which came into effect by 13 February 2003. A zero quota was imposed at CoP 16 (CoP16 Prop.32), effective 12 June 2013. The species was uplisted to CITES Appendix I in 2019, which came into effect on 26 November 2019. It is also included in Annex B of EU Commission Regulation no. 709/2010 (amending EC Regulation 338/97), which requires that a corresponding import permit must be issued by the country of import before a shipment of the species can enter the European Union.

In recent years, *ex situ* efforts to breed the species in captivity have developed from isolated attempts at reproduction towards coordinated breeding programmes, involving information exchange and management of genetics. A European studbook for the species has been established. Captive breeding at some European facilities has been so successful, with placement options being limited, that some institutions have started incubating only a portion of the eggs produced (Meier and Raffel 2011). In North America, a studbook and a Species Survival Plan for *M. annamensis* have been created through the Association of Zoos and Aquariums (Stern 2014).

Since 2006, an international programme has taken shape to reintroduce a viable population of *M. annamensis* into its native range. This project is led by the Asian Turtle Programme (ATP), and supported by local and national authorities, national universities, and the global turtle conservation community. Captive-bred turtles produced in Hong Kong, Europe and North America have been repatriated to Viet Nam, boosting the captive assurance population in the country in terms of numbers and genetic lineages. Field surveys in central Viet Nam have failed to confirm the species' presence in any existing protected areas, and its occurrence in these protected areas seems unlikely due to a lack of suitable habitat (McCormack *et al.* 2014). To secure protected habitat, the ATP has been working with the Forest Protection Department of Quang Ngai Province and the local People's Committee to establish a small Species Habitat Conservation Area (SHCA) for *M. annamensis* (McCormack and Ngyuen 2009). Approximately 100 hectares of suitable habitat have been identified by the ATP and its partners for the reintroduction programme (Horne *et al.* 2012). This project also includes a large outreach component to generate local support for conservation of the species through awareness and community engagement, a training component for local authorities, and a population monitoring programme (McCormack and Hendrie, 2007, McCormack and Ngyuen 2009, McCormack *et al.* 2014).

Credits

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Authority/Authorities: IUCN SSC Tortoise and Freshwater Turtle Specialist Group

Bibliography

- Baillie, J. and Groombridge, B. (eds). 1996. *1996 IUCN Red List of Threatened Animals*. pp. 378. International Union for Conservation of Nature, Gland, Switzerland and Cambridge, UK.
- Blanck, T. and Braun, S. 2013. Zentral-Vietnam: Ostasiatischen “Bachschildkröten” und Hybriden auf der Spur. *Marginata* 23: 18–30.
- Bourret, R. 1940 ["1939"].. Notes herpétologiques sur l'Indochine française. XVIII. Reptiles et batraciens reçus au Laboratoire des Sciences Naturelles de l'Université au cours de l'année 1939. Descriptions de quatre espèces et d'une variété nouvelles. *Annexe au Bulletin Générale de l'Instruction Publique* 1939(4)[1940]:1–40.
- Bourret, Rene. 1941. Les Tortues de l'Indochine. *Bulletin de l'Institut Océanographique de l'Indochine* Note 38: 1-235.
- Cheung, S.M. and Dudgeon, D. 2006. Quantifying the Asian turtle crisis: market surveys in southern China, 2000–2003. *Aquatic Conservation: Marine and Freshwater Ecosystems* 16: 751–770.
- Davis, S. 2011. Significant Breedings. *Turtle Survival Magazine* 2011: 20–23.
- Dawson, J.E., Hatcher, R.E. and Calloway-Burke, G.F. 2013. *Mauremys annamensis*: locality and longevity. *Herpetological Review* 44(1): 91–93.
- Fritz, U. and Havas, P. 2007. Checklist of chelonians of the world. *Vertebrate Zoology* 57(2): 149–368.
- Gong, S., Chow, A.T., Fong, J.J. and Shi, H. 2009. The chelonian trade in the largest pet market in China: scale, scope and impact on turtle conservation. *Oryx* 43(2): 213–216.
- Groombridge, B. (ed.). 1994. *1994 IUCN Red List of Threatened Animals*. IUCN, Gland, Switzerland and Cambridge, UK.
- Hendrie, D.B. 2000. Status and conservation of tortoises and freshwater turtles in Vietnam. In: P.P. van Dijk, B.L. Stuart and A.G.J. Rhodin (eds), *Asian Turtle Trade: Proceedings of a Workshop on Conservation and Trade of Freshwater Turtles and Tortoises in Asia. Chelonian Research Monographs* 2: 63–73.
- Hilton-Taylor, C. 2000. *2000 IUCN Red List of Threatened Species*. IUCN, Gland, Switzerland and Cambridge, UK.
- Horne, B.D., Poole, C.M. and Walde, A.D. 2012. Conservation of Asian tortoises and freshwater turtles: Setting priorities for the next ten years. Recommendations and conclusions from the workshop in Singapore, February 21–24, 2011. Wildlife Conservation Society, Singapore.
- IUCN. 1990. *IUCN Red List of Threatened Animals*. IUCN, Gland, Switzerland and Cambridge, UK.
- IUCN. 2020. The IUCN Red List of Threatened Species. Version 2020-2. Available at: www.iucnredlist.org. (Accessed: 13 June 2020).
- IUCN. 2020. The IUCN Red List of Threatened Species. Version 2020-3. Available at: www.iucnredlist.org. (Accessed: 10 December 2020).
- IUCN Conservation Monitoring Centre. 1988. *IUCN Red List of Threatened Animals*. IUCN, Gland, Switzerland and Cambridge, UK.
- IUCN/SSC Tortoise and Freshwater Turtle Specialist Group and Asian Turtle Trade Working Group. 2000. Changes to 1996 IUCN Red List Status of Asian Turtle Species. In: P.P. van Dijk, B.L. Stuart and A.G.J. Rhodin (eds). *Asian Turtle Trade: Proceedings of a Workshop on Conservation and Trade of Freshwater*

Turtles and Tortoises in Asia, pp.156-164. Chelonian Research Monographs 2. Chelonian Research Foundation, Lunenburg, Massachusetts, USA.

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

Jenkins, M.D. 1995. *Tortoises and Freshwater Turtles: The Trade in Southeast Asia*. TRAFFIC International, Cambridge.

Lee, K.S., Lau, M.W.N. and Chan, B.P.L. 2004. Wild animal trade monitoring at selected markets in Guangzhou and Shenzhen, South China, 2000–2003. Hong Kong SAR: Kadoorie Farm and Botanic Garden.

Le, M., Hoang, T. and Le, D. 2004. Trade data and some comments on the distribution of *Mauremys annamensis* (Siebenrock, 1903). *Asiatic Herpetological Research* 10: 110–113.

McCormack, T. and Hendrie, D. 2007. Turtle conservation developments in Vietnam. *TSA Magazine*: 32–33.

McCormack, T. and Ngyuen, N.C. 2009. Reintroduction preparations for captive bred Vietnamese Pond Turtles. *Turtle Survival Magazine*: 86–88.

McCormack, T.E.M., Dawson, J.E., Hendrie, D.B., Ewert, M.A., Iverson, J.B., Hatcher, R.E. and Goode, J.M. 2014. *Mauremys annamensis* (Siebenrock 1903) – Vietnamese Pond Turtle, Annam Pond Turtle, Rùa Trung Bộ. In: A.G. J. Rhodin, P.C.H. Pritchard, P.P. van Dijk, R.A. Saumure, K.A. Buhlmann, J.B. Iverson and R.A. Mittermeier (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(7), pp. 081.1–14. Chelonian Research Foundation, Lunenburg, MA, USA.

Meier, E. and Raffel, M. 2011. Update from the International Centre for the Conservation of Turtles (IZS) at Münster Zoo. *Turtle Survival Magazine* 54.

Nguyen, V.S., Ho, T.C., and Nguyen, Q.T. 2009. Herpetofauna of Vietnam. *Frankfurt am Main, Germany: Edition Chimaira*, 768 pp.

Parham, J.F., Stuart, B.L. and Orlov, N.L. 2006. Geographic distribution: *Mauremys annamensis*. *Herpetological Review* 37(2): 239.

Shi, H. and Parham, J.F. 2001. Preliminary observations of a large turtle farm in Hainan Province, People's Republic of China. *Turtle and Tortoise Newsletter* 3:4–6.

Shi, H., Parham, J.F., Lau, M. and Chen, T.-H. 2007. Farming endangered turtles to extinction in China. *Conservation Biology* 21(1): 5–6.

Siebenrock, F. 1903. Schildkröten des östlichen Hinterindien. *Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften in Wien (Mathematisch-Naturwissenschaftliche Klasse). Abt. 1* 112: 333–353.

Spinks, P.Q., Shaffer, H.B., Iverson, J.B. and McCord, W.P. 2004. Phylogenetic hypotheses for the turtle family Geoemydidae. *Molecular Phylogenetics and Evolution* 32(1): 164–182.

Spinks, P.Q., Shaffer, H.B., Iverson, J.B. and McCord, W.P. 2004. Phylogenetic hypotheses for the turtle family Geoemydidae. *Molecular Phylogenetics and Evolution* 32(1): 164–182.

Stern, A.G. 2014. *Mauremys annamensis* Vietnamese Leaf Turtle North American Regional Studbook. Zoo Miami, Miami, Florida.

Stuart, B.L. and Parham, J.F. 2007. Recent hybrid origin of three rare Chinese turtles. *Conservation*

Genetics 8(1): 169–175.

TTWG (Turtle Taxonomy Working Group: Rhodin, A.G.J., Iverson, J.B., Bour, R. Fritz, U., Georges, A., Shaffer, H.B. and van Dijk, P.P.). 2017. Turtles of the World: Annotated Checklist and Atlas of Taxonomy, Synonymy, Distribution, and Conservation Status (8th Ed.). In: Rhodin, A.G.J., Iverson, J.B., van Dijk, P.P., Saumure, R.A., Buhlmann, K.A., Pritchard, P.C.H., 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*, pp. 1-292. Chelonian Research Monographs.

UNEP-WCMC (United Nations Environment Programme World Conservation Monitoring Centre). 2019. CITES Trade Database. Available at: trade.cites.org.

Van Dijk, P. P., Stuart, B. L. and Rhodin, A. G. J. (eds). 2000. Asian Turtle Trade: Proceedings of a Workshop on Conservation and Trade of Freshwater Turtles and Tortoises in Asia. *Chelonian Research Monographs* 2, Chelonian Research Foundation, Lunenburg, Massachusetts, USA.

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External Resources

For [Supplementary Material](#), and for [Images and External Links to Additional Information](#), please see the Red List website.

Appendix

Habitats

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Habitat	Season	Suitability	Major Importance?
5. Wetlands (inland) -> 5.3. Wetlands (inland) - Shrub Dominated Wetlands	Resident	Unknown	-
5. Wetlands (inland) -> 5.4. Wetlands (inland) - Bogs, Marshes, Swamps, Fens, Peatlands	Resident	Suitable	Yes
5. Wetlands (inland) -> 5.7. Wetlands (inland) - Permanent Freshwater Marshes/Pools (under 8ha)	Resident	Suitable	Yes
5. Wetlands (inland) -> 5.8. Wetlands (inland) - Seasonal/Intermittent Freshwater Marshes/Pools (under 8ha)	Seasonal occurrence unknown	Unknown	-
15. Artificial/Aquatic & Marine -> 15.2. Artificial/Aquatic - Ponds (below 8ha)	Resident	Unknown	-
15. Artificial/Aquatic & Marine -> 15.7. Artificial/Aquatic - Irrigated Land (includes irrigation channels)	Resident	Unknown	-
15. Artificial/Aquatic & Marine -> 15.8. Artificial/Aquatic - Seasonally Flooded Agricultural Land	-	Unknown	-
15. Artificial/Aquatic & Marine -> 15.9. Artificial/Aquatic - Canals and Drainage Channels, Ditches	Resident	Unknown	-

Use and Trade

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

End Use	Local	National	International
Medicine - human & veterinary	Yes	Yes	Yes
Food - human	Yes	Yes	Yes
Establishing ex-situ production *	No	No	Yes
Pets/display animals, horticulture	No	No	Yes

Threats

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Threat	Timing	Scope	Severity	Impact Score
2. Agriculture & aquaculture -> 2.1. Annual & perennial non-timber crops -> 2.1.2. Small-holder farming	Ongoing	Majority (50-90%)	Negligible declines	Low impact: 5
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion		

2. Agriculture & aquaculture -> 2.1. Annual & perennial non-timber crops -> 2.1.3. Agro-industry farming	Ongoing	Minority (50%)	Negligible declines	Low impact: 4
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion		
5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.1. Intentional use: (subsistence/small scale) [harvest]	Ongoing	Whole (>90%)	Very rapid declines	High impact: 9
	Stresses:	2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.3. Indirect species effects		
5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.2. Intentional use: (large scale) [harvest]	Ongoing	Whole (>90%)	Very rapid declines	High impact: 9
	Stresses:	2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.3. Indirect species effects		

Conservation Actions in Place

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Conservation Action in Place
In-place research and monitoring
Action Recovery Plan: Yes
Systematic monitoring scheme: Yes
In-place land/water protection
Conservation sites identified: Yes, over entire range
Percentage of population protected by PAs: 0
Area based regional management plan: No
Occurs in at least one protected area: No
Invasive species control or prevention: Not Applicable
In-place species management
Harvest management plan: No
Successfully reintroduced or introduced benignly: Unknown
Subject to ex-situ conservation: Yes
In-place education
Subject to recent education and awareness programmes: Yes
Included in international legislation: Yes
Subject to any international management / trade controls: Yes

Conservation Actions Needed

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Conservation Action Needed
1. Land/water protection -> 1.1. Site/area protection
2. Land/water management -> 2.1. Site/area management
3. Species management -> 3.2. Species recovery
3. Species management -> 3.3. Species re-introduction -> 3.3.1. Reintroduction
4. Education & awareness -> 4.3. Awareness & communications
5. Law & policy -> 5.1. Legislation -> 5.1.1. International level
5. Law & policy -> 5.4. Compliance and enforcement -> 5.4.1. International level
5. Law & policy -> 5.4. Compliance and enforcement -> 5.4.2. National level
5. Law & policy -> 5.4. Compliance and enforcement -> 5.4.3. Sub-national level
6. Livelihood, economic & other incentives -> 6.4. Conservation payments

Research Needed

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Research Needed
1. Research -> 1.2. Population size, distribution & trends
1. Research -> 1.6. Actions
2. Conservation Planning -> 2.1. Species Action/Recovery Plan
2. Conservation Planning -> 2.2. Area-based Management Plan
3. Monitoring -> 3.1. Population trends
3. Monitoring -> 3.3. Trade trends
3. Monitoring -> 3.4. Habitat trends

Additional Data Fields

Distribution
Estimated area of occupancy (AOO) (km ²): 4-10
Continuing decline in area of occupancy (AOO): Yes
Estimated extent of occurrence (EOO) (km ²): 12500
Continuing decline in extent of occurrence (EOO): Yes
Number of Locations: 1
Continuing decline in number of locations: Yes
Extreme fluctuations in the number of locations: Unknown

Distribution
Upper elevation limit (m): 150
Population
Number of mature individuals: 0-100, 50
Continuing decline of mature individuals: Yes
Habitats and Ecology
Continuing decline in area, extent and/or quality of habitat: Yes
Generation Length (years): 15
Movement patterns: Not a Migrant

Amendment

Amendment Correction of author initials from J.S. Dawson to J.E. Dawson.
reason:

The IUCN Red List Partnership



The IUCN Red List of Threatened Species™ is produced and managed by the [IUCN Global Species Programme](#), the [IUCN Species Survival Commission \(SSC\)](#) and [The IUCN Red List Partnership](#).

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