Reeves' Turtle (*Mauremys reevesii*)
Ecological Risk Screening Summary

U.S. Fish and Wildlife Service, February 2022
Revised, April 2022
Web Version, 6/20/2023

Organism Type: Reptile
Overall Risk Assessment Category: Uncertain

Photo: Σ64. Licensed under CC BY-SA 3.0. Available: https://commons.wikimedia.org/w/index.php?curid=4387153 (February 2022).

1 Native Range and Status in the United States

Native Range

From NIES (2022):

"Korean Peninsula, continental China"

From van Dijk (2011):

"*Mauremys reevesii* is native to most of temperate and subtropical China, North Korea and South Korea; [...]"

Status in the United States

From Fuller et al. (2022):

"Status: Failed in California, Guam, and Massachusetts."

Mauremys reevesii is for sale in the United States pet trade (e.g., Turtle Source 2022).

From Turtle Source (2022):

"This is the same friendly, sharp featured, little turtle that was popular in the pet trade in the 1970's and before. Thankfully, they have been breed [sic] readily for several US keepers today."

According to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) trade database, approximately 4700 live *M. reevesii* were imported into the United States from 2005 through 2019. Exporting jurisdictions included Canada, China, Great Britain, Hong Kong, and Japan (CITES 2022).

Mauremys reevesii (as *Chinemys reevesi*) is on Hawaii's Restricted Animal List (Part B) (Hawaii Department of Agriculture 2019). *Mauremys reevesii* is listed in Group II of the Director's Species Importation List for New Mexico (NMDGF 2010). *M. reevesii* is also listed as a Prohibited Level 3 species in Washington State (Washington State Senate 2019).

Means of Introductions in the United States

From Fuller et al. (2022):

"Pet escape or release."

Remarks

From van Dijk (2011):

"Traditionally placed in *Chinemys, reevesii* has in recent years been widely accepted as a species of *Mauremys* (Fritz and Havas 2007, TTWG 2010). The species includes the forms *Chinemys megalocephala* Fang, 1934, *Geoclemys grangeri* Schmidt, 1925, and *Damonia unicolor* Gray, 1873, which have on occasion been considered as valid species or subspecies, but have in recent years been treated consistently as synonyms of *reevesii* (Guo et al. 1997; Fritz and Havas 2007, TTWG 2010)."

"Over the past 30 years the species has disappeared from at least half its original area of occurrence as a result of targeted collection, and collection pressures continue, qualifying the species for EN A2bcd+A4bcd. [IUCN Red List Category Endangered]."

"*Mauremys reevesii* is listed in CITES [Convention on International Trade in Endangered Species] Appendix III (China). Assurance colonies (comprising animals of generally unknown geographic origin and genetic profile) and large-scale commercial farm holdings will ensure that the species itself will not go extinct anytime soon, but it has already disappeared as a common landscape species across most of its range; […]"

Literature searches for this assessment were conducted for the valid scientific name *Mauremys reevesii* and the synonym *Chinemys reevesii.*

Additional information for *Mauremys reevesii* was found during this assessment in languages other than English.

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

According to WoRMS (2022), *Mauremys reevesii* (Gray, 1831) is the accepted name for this species.

From ITIS (2022):

Kingdom Animalia
Subkingdom Bilateria
Infrakingdom Deuterostomia
Phylum Chordata
Subphylum Vertebrata
Infraphylum Gnathostomata
Superclass Tetrapoda
Class Reptilia
Order Testudines
Superorder Cryptodira
Superfamily Testudinoidea
Family Geoemydidae
Subfamily Geoemydinae
Genus *Mauremys*
Species *Mauremys reevesii* (Gray, 1831)

Size, Weight, and Age Range

From van Dijk (2011):

"Males rarely exceed 11 cm carapace length (CL), females can reach up to 24 cm CL. Females reach maturity in about five to six years in captivity […]"

From Lovich et al. (2011):

"Captives have lived for over 24 years (Snider and Bowler 1992)."

Environment

From van Dijk (2011):

"Systems: Terrestrial, Freshwater"

"*Mauremys reevesii* is a generalist inhabitant of vegetated shallow lowland ponds, pools and marshes, including wetlands in agricultural landscapes if the species is not collected."

Climate

From van Dijk (2011):

"[…] temperate and subtropical […]"

Distribution Outside the United States

Native

From NIES (2022):

"Korean Peninsula, continental China"

From van Dijk (2011):

"*Mauremys reevesii* is native to most of temperate and subtropical China, North Korea and South Korea; […]"

Introduced

From Suzuki et al. (2012):

"Although the Japanese populations have generally been considered to be native, a few recent studies have yielded circumstantial evidence that suggested that they had originated from relatively recent artificial introductions from abroad. […] The results revealed the presence of 3 distinct genetic groups (groups A, B, and C) in the Japanese samples, of which groups A and B included haplotypes that were almost identical with some haplotypes from the Korean sample and the Chinese and Taiwanese samples, respectively. […] The current Japanese populations of *M. reevesii* seem to have been derived from multiple artificial introductions from adjacent countries."

From van Dijk (2011):

"Introduced: Hong Kong; Indonesia (Lesser Sunda Is.); Japan; Palau; Taiwan, Province of China; Timor-Leste"

From NIES (2022):

“Hokkaido and Okinawajima Is. There were also records from Kumejima (Okinawa Islands) and Kikaijima (Amami Islands), where if the turtle is established or not is unclear. The populations on remaining parts of mainland of Japan are possibly non-native ones introduced from Korea, according to a recent literature investigation. In addition, additional introduction from continental China may occur [*sic*] recently.”

From Lovich et al. (2011):

“Based on the recent genetic surveys of *Mauremys* in Taiwan, Fong and Chen (2010) surmised that *M. reevesii* on the island are also derived from artificial introductions from mainland Asia.”

From González de la Vega et al. (2021):

“[…] *M. reevesii* was cited in Galicia [Spain] (Ayres, 2016) and Catalonia [Spain] (Poch et al., 2020).”

“In sum, the new records included five of the eight provinces of Andalusia [Spain]. Both species constitute new records to Andalusia.”

“The results suggest that the introduction of *Mauremys reevesii* and *M. sinensis* is not an anecdotal fact, but rather reproduces the ‘sale-release-naturalisation-invasion’ process […]”

Means of Introduction Outside the United States

From NIES (2022):

“Deliberate: Release or escape of pet animals.”

Short Description

From Fuller et al. (2022):

“Three strong keels on the carapace, which is usually brown. The legs are webbed and the tail is quite long. Coloration: body usually grey with yellowish spots and the head has a pattern of stripes. Some Reeve's turtles entire body and soft parts might be dark brown or completely black.”

Biology

From van Dijk (2011):

“*Mauremys reevesii* is a generalist inhabitant of vegetated shallow lowland ponds, pools and marshes, including wetlands in agricultural landscapes if the species is not collected. It feeds on a variety of plant and small animal matter, with snails possibly representing a significant part of the diet of mature females.”

“Females reach maturity in about five to six years in captivity and may produce several clutches of three to five eggs annually; reproductive data of wild populations appear unreported.”

From Lovich et al. (2011):

“In Japan, the egg-laying season of *M. reevesii* is usually from June to July (Fukada 1965).”

Human Uses

From van Dijk (2011):

“*Mauremys reevesii* has become subject to intensive exploitation for food and medicine and to supply the aquaculture industry with breeding animals, […]”

“Historically a common and widespread species, *Mauremys reevesii* is now a rare species in the wild. The species is commercially farmed in vast quantities in P.R. China and captive populations likely amount to millions of individuals.”

“*Mauremys reevesii* traditionally was widely used and traded for medicinal purposes, the plastron bones being used in Traditional Chinese Medicine. As wild supplies dwindled, aquaculture of the species expanded greatly since the early 1990s.”

From Lovich et al. (2011):

“A large number of *M. reevesii* have been imported from continental China into Japan, the United States, and elsewhere for the pet trade since the early 1970s (Aoki 1990; Cheung and Dudgeon 2006).”

From González de la Vega et al. (2021):

“Between 2006 and 2019, 55,825 live individuals of Reeves’ pond turtle *Mauremys reevesii* […] have been imported into Spain, mainly from China, Hong Kong, Taiwan and Japan (Cites Trade Database, 2020).”

Mauremys reevesii is for sale in the United States pet trade (e.g., Turtle Source 2022).

From Turtle Source (2022):

“This is the same friendly, sharp featured, little turtle that was popular in the pet trade in the 1970's and before. Thankfully, they have been breed [sic] readily for several US keepers today.”

According to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) trade database, approximately 4700 live individuals of *M. reevesii* were imported into the United States from 2005 through 2019. Exporting jurisdictions included Canada, China, Great Britain, Hong Kong, and Japan (CITES 2022).

Diseases

No records of OIE-reportable diseases (OIE 2021) were found for *Mauremys reevesii*.

According to Poelen et al. (2014), *Mauremys reevesii* hosts the following parasites: *Prionosomoides* spp.*, Adenogaster selfi*, and *Diaschistorchis takahashii*.

According to WoRMS (2022), *Mauremys reevesii* hosts the following parasites: *Paradenogaster selfi, Prionosomoides taiwanensis, Geoclemys reevesii, Telorchis clemmydis, Telorchis geoclemmydis*, and *Telorchis konoi*.

Threat to Humans

No information on threats to humans was found for *Mauremys reevesii.*

3 Impacts of Introductions

Although there are records of introductions for *Mauremys reevesii* outside of its native range, the impacts of these introductions are unknown. The following quotations describe potential impacts of introductions discussed in the literature.

From NIES (2022):

"Potentially: Hybridization, competition, predation. Hybridization often occur [*sic*] between turtle species of Geoemydidae. Affected organism: Freshwater fishes and invertebrates (predation). Native turtles *Mauremys japonicua* (hybridization and competition) and *Geoemyda japonica* (hybridization)."

From Ueno et al. (2021):

"In Japan, the endemic turtle species *Mauremys japonica* is known to hybridize with the alien species *Mauremys reevesii*, and putative hybrids have been encountered in the wild. If *M. japonica* × *M. reevesii* hybrids can readily crossbreed with *M. japonica*, the hybridization with *M. reevesii* could lead to the extinction of pure *M. japonica* populations. However, information on the reproductive ability of *M. japonica* × *M. reevesii* hybrids is limited. […] The results showed that female hybrids nested during the same months as the parental species and had similar clutch sizes and hatching success. No embryonic development abnormalities were detected, and viable sperm were observed in all hybrid male semen samples. In conclusion, the fertility of *M. japonica* × *M. reevesii* hybrids appears to be similar to the fertilities of the parental species, posing a potential challenge for *M. japonica* conservation."

The importation, possession, or trade of *Mauremys japonica* is restricted in the following States (see Section 1 for detailed information): Hawaii (Hawaii Department of Agriculture 2019), New Mexico (NMDGF 2010), and Washington (Washington State Senate 2019).

4 History of Invasiveness

Mauremys reevesii has been introduced to several continents outside of its mainland east Asian native range, including to North America. However, established populations are only known from Hong Kong, Indonesia, Palau, Japan, and Taiwan. Only potential impacts of introductions were discussed in the literature, with evidence of successful reproduction by hybrid crosses of *M. japonica* (native) and *M. reevesii* (introduced) in Japan. There was no evidence presented showing that hybridization was having a deleterious effect on the *M. japonica* populations. *M. reevesii* has a long history of human use and is currently used both in the aquarium and aquaculture trades. International trade is regulated by the Convention on International Trade in Endangered Species of Wild Flora and Fauna, so international trade data are recorded and available. Due to the lack of information on actual impacts of introduction, the History of Invasiveness is classified as Data Deficient.

5 Global Distribution

Figure 1. Known global distribution of *Mauremys reevesii*. Observations are reported primarily from China, South Korea, and Japan; but also from Taiwan, Vietnam, Singapore, Indonesia, Philippines, Russia, Germany, The Netherlands, Belgium, Spain, Portugal, United States, Canada, and Colombia. Map from GBIF Secretariat (2022).

Points from Vietnam, Singapore, Indonesia, Philippines, Russia, Germany, The Netherlands, Belgium, Spain, Portugal, United States, Canada, and Colombia were excluded from the climate matching analysis. These occurrences were not found to represent established populations of *M. reevesii* and were found to represent captive individuals, museum specimens, and presumed pet releases of individual animals.

6 Distribution Within the United States

Figure 2. Known distribution of *Mauremys reevesii* in the United States. Map from GBIF-US (2022). No locations in the United States were used for the climate matching analysis as they were found to represent museum specimens and presumed pet releases of individual animals and not established populations.

7 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Mauremys reevesii* in the contiguous United States was generally medium. The largest areas of high match were found along the Atlantic and Gulf coasts, in the southern portion of the Great Plains, and in an area generally east of the Rocky Mountains spanning from western Montana to Minnesota and into the Southwest. Much of the eastern interior contiguous United States had a medium match with low matches restricted to portions of the Intermountain West, Pacific Coast States, and northern Northeast. The overall Climate 6 score (Sanders et al. 2021; 16 climate variables; Euclidean distance) for the contiguous United States was 0.548, High (scores equal to or greater than 0.103 are classified as High.). Most States had High individual Climate 6 scores. Arizona, Connecticut, Idaho, Michigan, New York, and Utah had Medium scores. California, Massachusetts, Maine, New Hampshire, Nevada, Oregon, Rhode Island, Vermont, and Washington had Low individual scores.

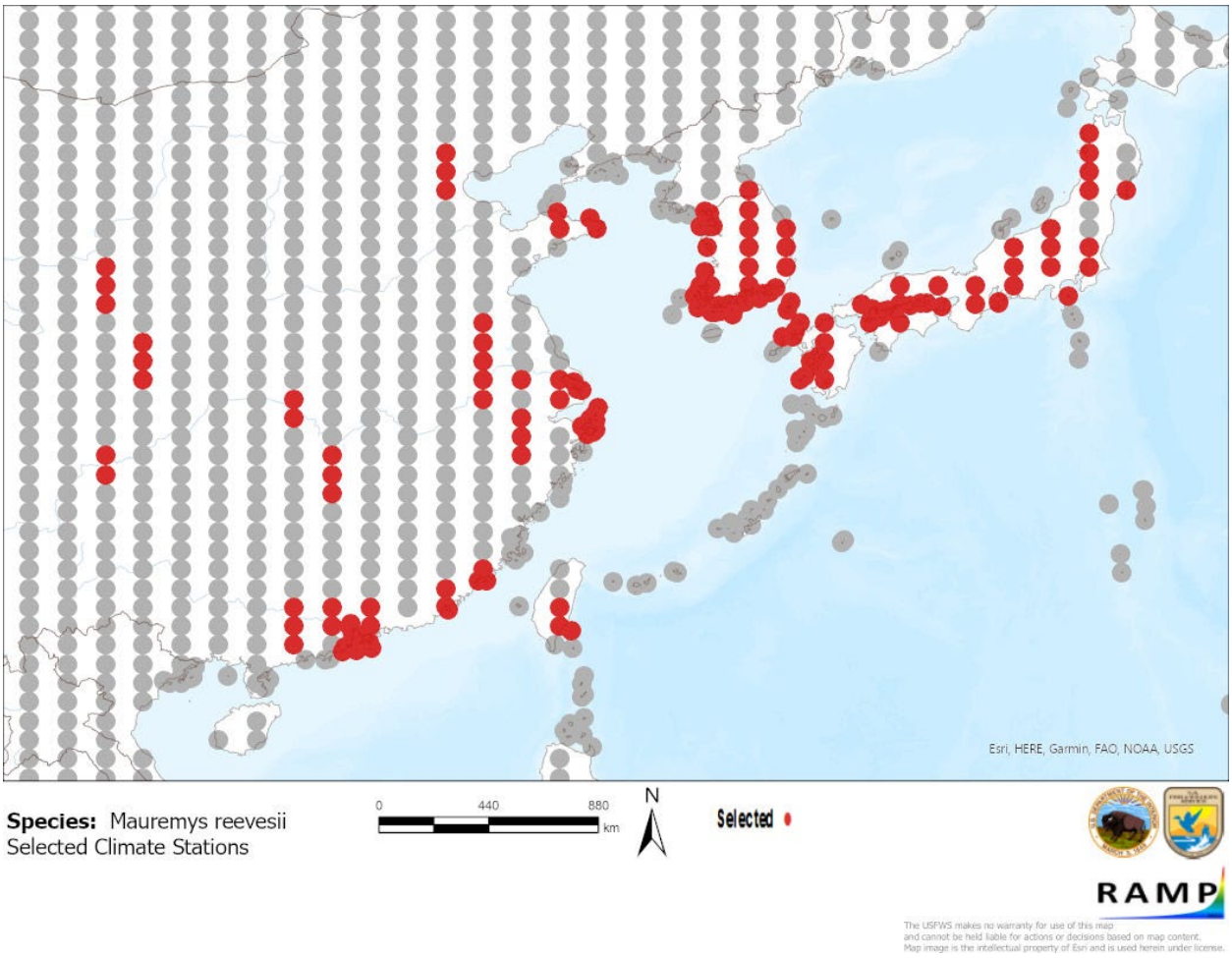

Figure 3. RAMP (Sanders et al. 2021) source map showing weather stations in eastern Asia selected as source locations (red; China, Taiwan, North Korea, South Korea, and Japan) and non-source locations (gray) for *Mauremys reevesii* climate matching. Source locations from GBIF Secretariat (2022). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

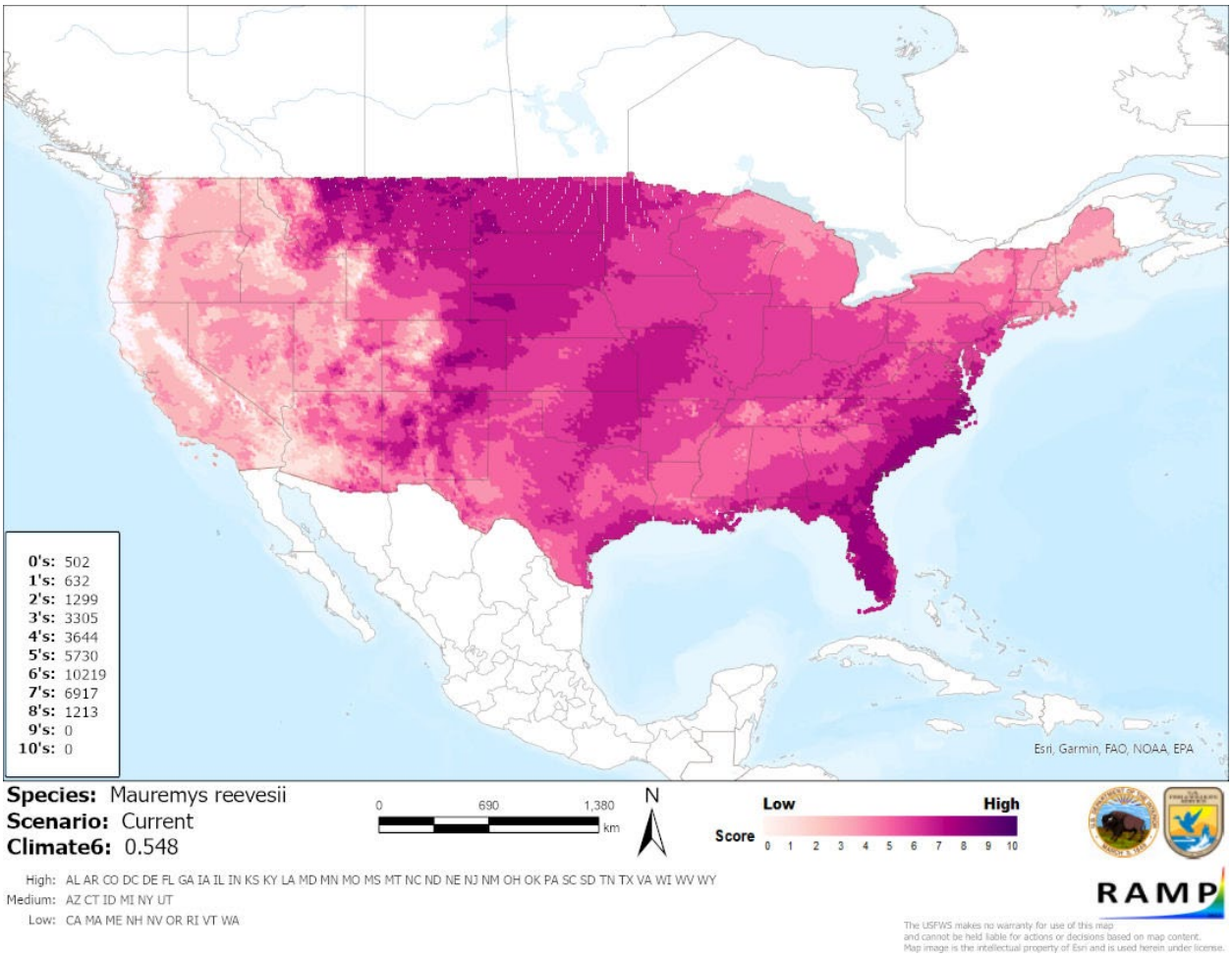

Figure 4. Map of RAMP (Sanders et al. 2021) climate matches for *Mauremys reevesii* in the contiguous United States based on source locations reported by GBIF Secretariat (2022). Counts of climate match scores are tabulated on the left. 0/Pale Pink = Lowest match, 10/Dark Purple = Highest match.

The High, Medium, and Low Climate match Categories are based on the following table:

Climate 6: (Count of target points with climate scores 6-10)/ (Count of all target points)	Overall Climate Match Category
0.000≤X≤0.005	Low
0.005<X<0.103	Medium
≥0.103	High

8 Certainty of Assessment

The Certainty of Assessment is Low. There is reasonably complete information regarding the distribution, ecology, and international trade history of *Mauremys reevesii*. Records of introductions and established populations were found. Only information regarding the potential impacts of these introduced populations was found.

9 Risk Assessment

Summary of Risk to the Contiguous United States

Reeves' turtle (*Mauremys reevesii*) is a reptile native to China and the Korean peninsula. *M. reevesii* originally had a wide range but population levels have dropped due to overharvesting. *M. reevesii* is available via the pet and aquaculture trades globally. *M. reevesii* has been reported as introduced to the United States and is currently available from pet retailers. However, these introductions have not resulted in any established populations. Possession of *M. reevesii* is regulated in Hawaii, New Mexico, and Washington. This species has been introduced outside of its native range in eastern Asia and in Europe, with the introductions in eastern Asia resulting in established populations. Only information regarding the potential impacts, not observed impacts, of these introduced populations was found. The History of Invasiveness is classified as Data Deficient. The Overall Climate Match Category for *M. reevesii* to the contiguous United States was High. Most areas of high match could be found between either just east of the Rocky Mountains or along the southern Atlantic Coast and Florida. The Certainty of this Assessment is Low due to a lack of information regarding this species' impacts in its introduced range. The Overall Risk Assessment Category for *M. reevesii* is Uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 4): Data Deficient**
- **Overall Climate Match Category (Sec. 7): High**
- **Certainty of Assessment (Sec. 8): Low**
- **Remarks, Important additional information: No additional remarks.**
- **Overall Risk Assessment Category: Uncertain**

10 Literature Cited

Note: The following references were accessed for this ERSS. References cited within quoted text but not accessed are included below in Section 11.

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11 Literature Cited in Quoted Material

Note: The following references are cited within quoted text within this ERSS, but were not accessed for its preparation. They are included here to provide the reader with more information.

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