



Astrochelys radiata

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Taxonomy:

Kingdom ANIMALIA Phylum CHORDATA
Class REPTILIA Order TESTUDINES
Family TESTUDINIDAE

Scientific Name: *Astrochelys radiata*

Species Authority: (Shaw, 1802)

Common Name/s:

English – Radiated Tortoise

French – Tortue Radiée De Madagascar, Tortue Rayonnée

Spanish – Tortuga Estrellada De Madagascar, Tortuga Rayada

Synonym/s:

Asterochelys radiata (Shaw, 1802) [orth. error]

Geochelone radiata (Shaw, 1802)

Testudo coui Daudin, 1802

Testudo desertorum Grandidier, 1869

Testudo hypselonata Bourret, 1941

Testudo radiata Shaw, 1802

Assessment Information:

Red List Category & Criteria:

Critically Endangered A4d; E ver 3.1

Year Published: 2008

Date Assessed: 2008-01-15

Assessor/s: Leuteritz, T. & Rioux Paquette, S. (Madagascar Tortoise and Freshwater Turtle Red List Workshop)

Reviewer/s: Rhodin, A. & Mittermeier, R.A. (IUCN SSC Tortoise & Turtle Freshwater Turtle Red List Authority)

Justification:

Generation time is considered as 42 years; the assessment is carried out by considering documented impacts over a period encompassing less than two past generations (67 years) and anticipated impacts on the next generation (next 33 years) for a maximum assessment period of 100 years. Available information indicates that the species has disappeared entirely from about 40% of its past range through a combination of habitat loss and exploitation, and that remaining populations have been severely depleted by recent and ongoing exploitation predominantly for domestic consumption; an overall population reduction of 80% over two past and one future generation is a conservative estimate, thus qualifying as Critically Endangered under criterion A4d. Population modeling indicates collapse and extinction in a period of on average 45 years into the future, thus meeting Critically Endangered under criterion E. Habitat loss

rates approach or exceed 80% over the three generation period, thus A4c may also be met.

History:

1996 – Vulnerable (Baillie and Groombridge 1996)

1994 – Vulnerable (Groombridge 1994)

1990 – Vulnerable (IUCN 1990)

1988 – Vulnerable (IUCN Conservation Monitoring Centre 1988)

1986 – Vulnerable (IUCN Conservation Monitoring Centre 1986)

1982 – Vulnerable

Geographic Range:

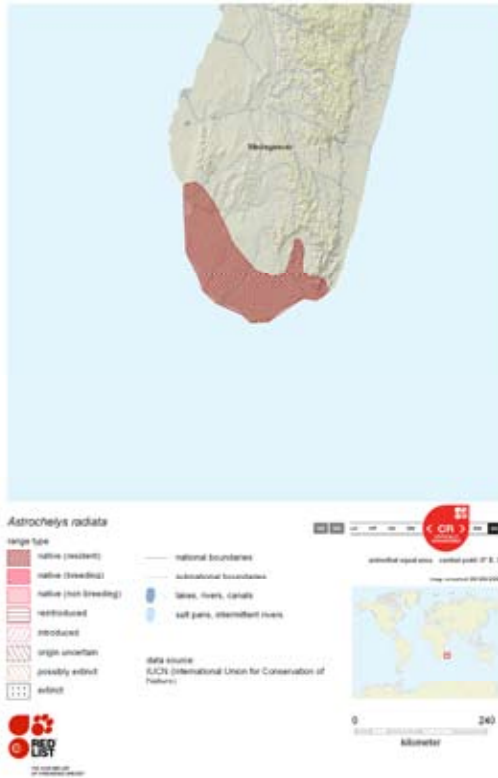
Range Description: Radiated Tortoises are found in the dry spiny forests of southern and southwestern Madagascar, from the area of Amboasary in the south across the Karimbola and Mahafaly plateaus north of Tuléar (where the habitat is highly fragmented and tortoises may be close to extinction) to Morombe. They are usually found in a narrow band within about 50 to 100 km from the coast (Glaw and Vences 1994, Leuteritz et al. 2005). Is sympatric with *Pyxis arachnoides*. The species' core range comprises about 10,000 square km.

Countries: Native: Madagascar

Range Map: See Figure.

Population:

Historically this species has been quite abundant, often being found along roadways and has served as symbol of Madagascar's south. This is not the case anymore. Tortoises are not found along major roadways but may be locally abundant in certain areas. According to O'Brien et al. (2003) the species is declining, with its range having contracted by one fifth over the last 25 years. Lewis (1995) reports density estimates based on line distance sampling of 262.2 to 1,076.7 tortoises/km², from which he extrapolated a conservative total population size of 1.6–4 million. Leuteritz et al. (2005) reported densities of 27–5,744 tortoises/km² with a total population estimate of 12 million. Rioux Paquette et al. (2006) undertook a microsatellite genetic analysis, which identified three distinct conservation units with relatively high assignments rates. The study supported the role of the Menarandra and Manambovo Rivers as major barriers to the dispersal for most Radiated Tortoises.



Population models were calculated at the 2005 Population and Habitat Viability Analysis (PHVA) workshop based on a number of variables including estimated population size and annual harvest intensity. Depending on the variables selected, the species was predicted to reach extinction at various times, with most estimates clustering around 45 years into the future (range 20-100+ years) (Randriamahazo et al. 2007).

Population Trend: Decreasing.

Habitat and Ecology:

The Radiated Tortoise is found in low irregular rainfall areas with xerophytic spiny vegetation dominated by *Didieaceae* and *Ephorbia* (Durrell et al. 1989). They can be found on the high plateaus inland and also on the sandy dunes close to the coast (Leuteritz et al. 2005).

Radiated Tortoises are herbivores feeding predominantly on grasses and in some areas on the alien invasive *Opuntia*. On occasion they are also known to ingest animal matter. During the rainy season wild tortoises drink from water that collects on rocks after it rains (Leuteritz 2003).

Adult female tortoises range in carapace length from 24.2 - 35.6 cm and males ranged in from 28.5 - 39.5 cm (Pedrono 2008). Males exhibit distinct secondary sexual characteristics by about 26 cm carapace length (Leuteritz 2002). Mature females produce up to three clutches per season with 1–5 eggs per clutch (Leuteritz and Ravolanaivo 2005), leading to an estimated average production of two clutches of four eggs each per breeding female; an estimated 82% of mature females breed in an average

year (Randriamahazo et al. 2007). No solid data exists on longevity but estimated life span is believed to be up to 100 years (Randriamahazo et al. 2007). A detailed overview of natural history is presented by Pedrono (2008).
Systems: Terrestrial.

Major Threat(s):

Threats to the tortoise's survival include collection and habitat loss (Durrell et al. 1989, Nussbaum and Raxworthy, 1998, O'Brien 2002, O'Brien et al. 2003). "Collection" can be subdivided into two further categories: collection for the international wildlife trade and collection for utilization by local people.

International collection has been documented with Asian smugglers collecting tortoises for the pet trade and for their livers (Behler 2002).

However, domestic utilization of this species is of greater concern. Within Madagascar, the Mahafaly and the Antandroy, whose land covers the range of the Radiated Tortoise do not utilize the tortoise. They have a taboo (termed a 'fady') against eating or touching the tortoises (Nussbaum and Raxworthy 1998, Lingard et al. 2003). However, large quantities of Radiated Tortoises are gathered by people from other areas of Madagascar who recently moved into this region, or by Malagasy people who are passing through. O'Brien et al. (2003) estimated that up to 45,000 adult Radiated Tortoises are harvested each year. Anecdotal information indicates that annual harvest numbers have increased since then; estimates calculated at the 2005 PHVA workshop ranged from 22,000 to 241,000 tortoises collected annually. Tortoise meat is especially popular around Christmas and Easter (Lewis 1995). Declared protected areas are insufficiently patrolled and resourced to deter large-scale collection right inside these nominal strongholds.

Besides being used as food, the Malagasy often keep the tortoises as pets and in pens with chickens and ducks as a means of warding off poultry diseases (Durrell et al. 1989, Leuteritz et al. 2005).

Habitat loss includes deforestation for use as agricultural land, the grazing of livestock, and the burning of wood for charcoal (Nussbaum and Raxworthy 1998). Recent analyses by Conservation International (May 2007) of the state of the spiny forest biome, using aerial imagery, indicate that deforestation rates have significantly increased over the last five years (compared with the period 1990-2000) (H. Crowley pers. comm. to Leuteritz). The 2001 Conservation Assessment and Management Plan (CAMP) workshop estimated habitat loss at 21-50% during the period 1990-2000, and forecast a habitat loss rate of 51-80% for the period 2001-2010. Harper et al. (2007) documented a consistent annual forest loss rate of 1.2% for the spiny forest (primary Radiated Tortoise habitat) throughout the period 1970-2000, and measured an overall reduction from 29,782 to 21,322 sq km over this period, a 29% reduction in less than one tortoise generation.

Invasive plant species affecting habitat suitability were considered a significant threat at the 2001 CAMP workshop.

Conservation Actions:

Very little research has been done on this species and most of it only in the last ten years.

The species is protected nationally under Malagasy law (Decree 60126; October, 1960). Internationally, the Radiated Tortoise was listed as Category A of the African Conservation Convention of 1968, and, since 1975, it has been listed on Appendix I of CITES, which affords species the highest level of protection (Durrell et al. 1989, Hilton-Taylor 2000).

Four protected areas and three additional sites (Lac Tsimanampetsotsa National Park 43,200 ha, Beza-Mahafaly Special Reserve 67,568 ha, Cap Sainte Marie Special Reserve 1,750 ha, Andohahela National Park 76,020 ha, and Berenty Private Reserve 250 ha, Site of Biological Interest – (1) Hatokaliotsy 21,850 ha and (2) PK3 north of Tulear 12,500 ha) fall within the range of this species. A captive breeding centre (Village de Tortues de Mangily) was established in Ifaty.

In August 2005, an international meeting of the Population and Habitat Viability Assessment (PHVA) group produced an alarming prediction that without immediate and significant intervention, viable populations of Radiated Tortoises will likely be extirpated from the wild within one tortoise generation, that is, 45 years (Randriamahazo et al. 2007). It was suggested that a systematic monitoring program be established. This will have to involve the training of local people so that the programme can be viable. This and other recommended conservation measures are detailed in the PHVA workshop report (Randriamahazo et al. 2007). In addition, monitoring of exploitation trends at the wholesale and consumer parts of the trade chain (surveys of markets, traders and restaurants in Madagascar; monitoring international pet trade) is important.

Additionally, ensuring adequate coverage of Radiated Tortoise populations as Madagascar expands its protected area network is essential. Research on habitat usage, specifically the impacts and benefits from *Opuntia* and other invasive vegetation, is desirable.

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