



## *Astrochelys yniphora*

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### Taxonomy:

Kingdom ANIMALIA    Phylum CHORDATA  
Class REPTILIA        Order TESTUDINES  
Family TESTUDINIDAE

Scientific Name: *Astrochelys yniphora*

Species Authority: (Vaillant, 1885)

Common Name/s:

English – Ploughshare Tortoise, Madagascar Tortoise,  
Angonoka, Madagascar Angulated Tortoise

French – Tortue à plastron éperonné, Tortue à éperon,  
Tortue à soc de Madagascar, Tortue de Madagascar

Spanish – Tortuga de Madagascar, Tortuga Globulosa Malagache

### Synonym/s:

*Angonoka yniphora* (Vaillant, 1885)

*Geochelone yniphora* (Vaillant, 1885)

*Testudo yniphora* Vaillant, 1885

### Assessment Information:

Red List Category & Criteria:

Critically Endangered A4ad; B2ab(v); C1; E ver 3.1

Year Published: 2008

Date Assessed: 2008-01-15

Assessor/s: Leuteritz, T. & Pedrono, M. (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:

The Ploughshare Tortoise qualifies as Critically Endangered under several criteria:

Its population, historically depleted for local/regional consumption and habitat burning to less than 1,000 animals for the past few decades, has declined sharply in recent years as a result of poaching for the illegal pet trade, with the current population estimate being somewhere near 200 mature animals in the wild and the threat of poaching increasing; thus, criterion A4ad appears to be met.

As a result of historical exploitation and habitat loss, the species is now restricted to five small subpopulations which are discontinuous from each other, with an estimated area of occupancy of about 12 square km, and ongoing threat of losses of animals from poaching, thus very nearly meeting B2a+b(v) (it just exceeds the area threshold for CR, but is so close that listing as CR under this criterion seems justified).

With the lower population estimate at 200 mature animals and a high threat of removal of some of these animals for the illegal pet trade, a 25% population decline over one generation (42 years) is met by poaching levels as low as three animals every two years; current (2008) documented confiscation numbers exceed this. Thus criterion C1 is met.

Based on population dynamics and threat impacts, by analogy with *Astrochelys radiata*, the species is nearly certain to go extinct within the next generation if current threats continue unabated.

### History:

1996 – Endangered (Baillie and Groombridge 1996)

1994 – Endangered (Groombridge 1994)

1990 – Endangered (IUCN 1990)

1988 – Endangered (IUCN Conservation Monitoring Centre 1988)

1986 – Endangered (IUCN Conservation Monitoring Centre 1986)

### Geographic Range:

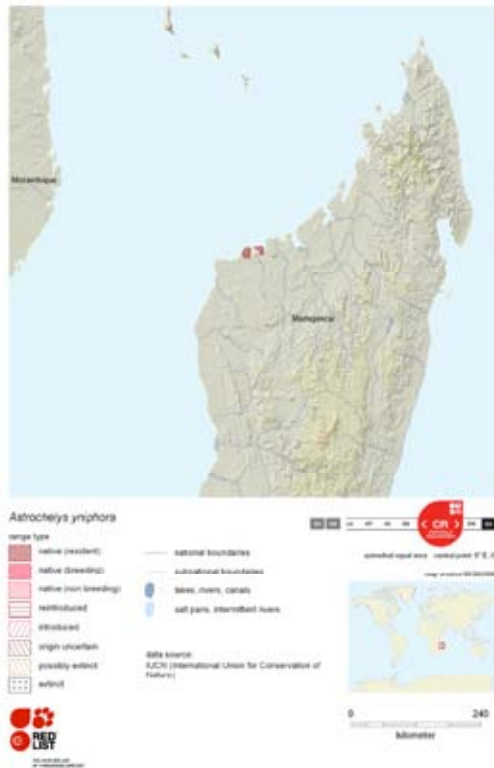
Range Description: This species has a very small distribution and is known from a 25 to 60 sq. km range around Baly Bay in northwestern Madagascar (Durrell et al. 1989, Glaw and Vences 1994, Bour 2007). The area of suitable habitat may extend up to 70-92 sq.km. (DWCT survey results 1999-2000), while the area of occupancy may be restricted to just 12.4 sq. km (Pedrono 2008).

Countries: Native: Madagascar

Range Map: See Figure.

### Population:

It was estimated that the total wild population is about 600 individuals (440 to 770). These are found within five subpopulations: two to the east of the Andranomavo river (Sada and Beheta) and three to the west of the river (Ambatomainty, Betainalika, Andrafiafaly) (Smith et al. 1999, Pedrono 2000). Based on distance sampling surveys and the extent of suitable habitat (by 2005), DWCT estimated a maximum of 800 wild animals. Recent impacts (illegal collection for the international pet trade) have reduced the estimated population substantially, and the wild population is currently estimated to possibly be as low as 400 individuals, of which 200 adults (G. Pedrono pers.comm., 2008). Based on the Population Viability Analysis performed for this species (Pedrono et al. 2004), and recent level of



poaching for international trade, the Angonoka is at extreme risk of extinction in the wild within 10 to 15 years, less than one generation time of 42 years.

Population Trend: Decreasing.

#### Habitat and Ecology:

The species is found in the Baly Bay region (over an area of approximately 700 km<sup>2</sup>, though only 66 km<sup>2</sup> of this is considered suitable habitat). This region is comprised of dry deciduous forest, savanna, and mangrove swamps. The climate is tropical with a distinctly seasonal rainfall patterns. Angonoka utilize bamboo-scrub habitat, which is considered to be a secondary stage of the dry deciduous forest (Curl et al. 1986). Bamboo-scrub habitat consists of a mosaic of shrubs, bamboo, savanna grasses, and open, non vegetated areas. The shrubs are generally under 2 m and the dominant species include *Bauhinia* sp. and *Terminalia* sp. Bamboo (*Perrierbambos madagascariensis*) occurs in dense thickets within the habitat. Andrianandrasana (2000) estimates there are 7,975 ha of suitable habitat of which 6,669 ha have tortoises occupying them. Elevation is less than 50 m above sea level (Smith et al. 1999a and b).

Adult male tortoises are larger and heavier than females. Mean adult male length and weight is 414.8 mm (range 361–486 mm) and 10.3 kg (range 7.2–18.9 kg) respectively. Mean adult female length and weight is 370.1 mm (range 307–426 mm) and 8.8 kg (range 5.5–12 kg) respectively (Pedrono and Markwell 2001).

According to Smith (1999) grasses and forbs in open rocky areas of bamboo scrub habitat appeared to be important

food items. Feeding was observed from October through May. Tortoises were observed to feed upon herbs, forbs and shrubs (*Bauhinia* sp. and *Terminalia* sp.) rather than grasses. Tortoises were never observed feeding on live bamboo, however, on several occasions they consumed leaf litter that included dead bamboo leaves. Angonoka were also observed feeding on dried carnivore and African bush pig feces (Smith 1999).

Smith (1999) estimates sexual maturity at a minimum of 15 years old. A study by Pedrono et al. (2001) showed the reproductive period was from 15 January to 30 May and tortoises produced 1–6 eggs (mean 3.2) per clutch and up 4 (mean 2.45) clutches per season. Despite low densities the egg fertility rate was 71.9% and resulting hatching success was 54.6% (Pedrono et al. 2001). This yields an estimated annual production of  $3.2 \times 2.45 \times 54.6\% = 4.3$  hatchlings per reproducing female. By analogy with *Astrochelys radiata*, the average age of reproducing animals per generation time is estimated as being 42 years (Madagascar WS 2008).

Systems: Terrestrial.

#### Major Threat(s):

The tortoise's restricted distribution and threatened status are believed to result from exploitation in historical times and from frequent human-caused fires, which were deliberately started to create and improve grazing conditions for Zebu cattle (Juvik et al. 1981, Curl et al. 1985). According to Lewis et al. (2005) "since 1995, the local communities, with the assistance of the Water and Forests Department and Durrell Wildlife, have annually burnt the savannah fringes during the wet season creating a system of natural firebreaks". Outbreaks of fires within tortoise habitat have continued to decrease annually. There was less than 50 ha of tortoise habitat burnt in 2004, but larger areas of Angonoka habitat were burnt in other years.

The other major and ongoing threat comes from illegal collection for the international pet trade (Lewis et al. 2005, Pedrono 2008); marked wild animals have been recorded from pet trade in Asia and despite some successful enforcement and confiscation actions, the species remains in extremely high demand in the global illegal pet trade which severely threatens the remaining wild animals.

#### Conservation Actions:

The species is protected under Madagascar national law and is also included in CITES Appendix I (Lewis et al. 2005). The species' area of occurrence at Soalala (area west of Baly Bay; 113,000 ha) was considered a "Site of Biological Interest" but it held no legal protection status (Nicoll and Langrand 1989), until in 1997 the Baly Bay area was gazetted as a national park (Lewis et al. 2005). The parks authority have had a permanent presence (eight personnel) at Soalala since 2001. There is also a network of 40 village 'para-rangers' who actively watch out for possible smugglers (and outbreaks of fires).

Durrell Wildlife Conservation Trust established a conservation program for the Ploughshare Tortoise in 1986 that strongly integrated local people (Durbin et al. 1996). A summary of early research concerning the species was provided by Bour (2007). The history of Durrell Wildlife Conservation Trust's Project Angonoka was described by Lewis et al. (2005): Project Angonoka began in 1986 as a project to safeguard *A. yniphora*. The project was established as collaboration between Durrell Wildlife Conservation Trust (then known as Jersey Wildlife Preservation Trust) and the Water and Forests Department of the Government of Madagascar, together with support from the Worldwide Fund for Nature (WWF). Given the extreme rarity of the species, the initial goal was the establishment of a captive-breeding project. This was successfully achieved. In December 2004, the captive project had 224 captive-bred juveniles from 17 founder adults (10 males, 7 females). From the 1990s, work progressed to ecological research on the species in the wild, and developing conservation strategies with the surrounding local communities. The latter work formed the basis of community-led firebreaks and with the communities themselves proposing the creation of a park to safeguard the tortoise and the remaining forests.

Ongoing monitoring of the species' occurrence in the global pet trade is needed, along with effective enforcement and repatriation and/or safe, conservation-oriented maintenance of confiscated animals in appropriate facilities.

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