TurtleLog:
Online Newsletter of the IUCN/SSC Tortoise and Freshwater Turtle Specialist Group
International Union for Conservation of Nature / Species Survival Commission
ISSN 1947-7635 (online) • www.iucn-tftsg.org/turtlelog_online_newsletter/
TurtleLog Number 2 • Published 2 April 2009 • doi:10.3854/tln.002.2009

Preliminary Results of a Population Range and Density Survey for *Pyxis arachnoides brygooi* in Madagascar

Ryan C.J. Walker[1]

[1]*Nautilus Ecology, 1 Pond Lane, Greetham, Rutland, LE15 7NW, United Kingdom*
[ryan@nautilusecology.org]

The endemic Madagascar spider tortoise (*Pyxis arachnoides*), one of the flagship species of the southern dry forests of Madagascar, is suffering increasing pressure to its survival due to unsustainable harvesting and habitat destruction (Walker et al. 2004, 2007; Pedrono 2008) (Fig. 1). During 2008 the species was designated as Critically Endangered on the IUCN Red List (Leuteritz and Walker 2008; www.iucnredlist.org) following a Red Listing and Action Plan turtle workshop organized in Madagascar by the IUCN/SSC Tortoise and Freshwater Turtle Specialist Group (TFTSG) (Mittermeier et al. 2008).

A number of researchers and conservationists, principally associated with the TFTSG, have taken an interest in the conservation biology of this species. This research note details the preliminary results of a recent range-wide population density survey of the northern subspecies, *Pyxis arachnoides brygooi* (Fig. 2) and the subsequent conservation outcomes of the work. Of the three subspecies of *P. arachnoides*, this subspecies is thought to face the greatest pressures to its long-term survival (Pedrono 2008) and therefore requires swift investigation of its true population density and conservation status.

Methods. — This field work was undertaken between 23 January and 21 February 2009 during southern Madagascar's wet season, when the species is at its most active (Walker et al. 2007). Sixty survey sites were selected using Google Earth imagery across the suspected range of *P. a. brygooi*. The sites were selected based on areas identified as optimal or suboptimal habitat from the imagery. Each survey waypoint was uploaded into a geo-referenced GIS loaded onto a toughened military specification laptop with inbuilt GPS (Fig. 3). Researchers navigated to as close as possible by 4x4 vehicle to each predetermined survey site. When passage by 4x4 became impossible (normally 2-3 km from the predetermined survey site) the rest of the journey was undertaken on foot, using a hand-held GPS for navigation.

Upon reaching each site, two investigators would walk one linear kilometer of transect using a hand-held GPS to navigate a predetermined bearing through the forest. A rigorous DISTANCE sampling method was employed as described by Buckland et al. (2004), with each investigator surveying their respective side of the transect, being careful to check thoroughly any low-lying vegetation. Upon detection of a tortoise, the perpendicular distance would be recorded from the center of the transect line to the point at which the tortoise was first recorded. Each tortoise was marked with a small dot of nail polish to avoid duplicate counting, then aged and sexed. Over 150 man-hours of searching were employed throughout the survey.

Results. — Only 96 tortoises were detected across 60 km of transects (Fig. 3), during approximately 150 man-hours of surveying, between Toliara and the Mangoky

Figure 1. Left: an area of Mikea forest cleared for cultivation, Salary region. Right: feral goats grazing; a cause of habitat destruction and alteration. Photos by R.C.J. Walker.

Figure 2. Left: adult *Pyxis arachnoides brygooi*. Right: hatchling *P. a. brygooi*. Photos by R.C.J. Walker.

River, north of Morombe. This low level of detection is cause for concern for the survival for the subspecies.

Pyxis arachnoides is now probably extinct between Toliara and the Fiherenana River. Rigorous surveying revealed no recorded individuals, in addition to this, much of the area has now been cultivated. *Pyxis a. brygooi* was found in small numbers as far south as approximately 4.3 km north of the village of Belalanda (Fig. 3). These records are further south than any other published reports for the subspecies.

There appears to be an overlap zone, between Belalanda and the Manombo River, where both *P. a. arachnoides* and *P. a. brygooi* occur; as yet undocumented in any of the available literature.

There appears to be a previously undocumented population of *P. arachnoides* in the Ifaty/Mangily region that displays morphological characteristics inconsistent with either *P. a. arachnoides* or *P. a. brygooi*. This unusual phenomenon was also noted in January 2008 by a team visiting the area from the IUCN Turtle Survival Alliance (R. Hudson, pers. comm.).

Specific locations of the remaining populations are deliberately not documented in specific detail of location to protect them from potential poaching (Stuart et al. 2006). However, it would appear that there are now possibly only four main isolated populations of *P. a. brygooi* with the largest two populations centered around the Ifaty/Mangily region and further north around the Baie de Fanamotra area.

1. Population one—sparse, between north of Belalanda to south of the Manombo River, including the forests of Ifaty/Mangily. Detection in the Ifaty/Mangily area was approximately 6-8 individuals per km.

2. Population two—a concentrated population was detected north of the Baie de Fanamotra and south of Morombe. Detection was recorded at 40-50 individuals per km.

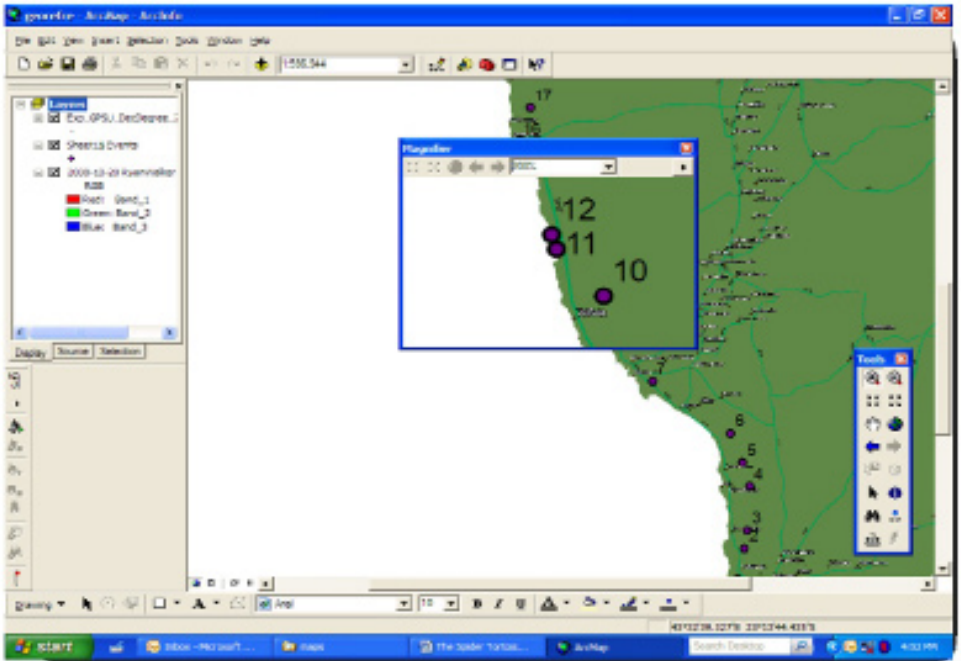

Figure 3. Screen capture of the GIS file used to navigate to the survey sites.

3. Population three—a very sparse and small population was detected north of Morombe.

4. Population four—a very sparse population was detected in the forests east of Morombe.

It would appear from anecdotal information collected from local communities that the more northern populations suffer very heavily from collection for food (however, the larger populations between Baie de Fanamotra and south of Morombe have escaped harvesting by the local community who appear to be quite environmentally progressive in their thinking). Detection dropped to 0 for transects undertaken approximately >8 km inland.

Discussion. — Our preliminary results show that the long-term survival *P. a. brygooi* is in question unless rapid conservation measures are initiated. Therefore, in the month preceding the survey a number of efforts were made to publicize our findings within the wider conservation community within Madagascar, with the aim of establishing a directed conservation effort for *P. a. brygooi*.

A pdf summary of our preliminary results has been made available in both English and French to key stakeholders involved in the formation of two new proposed protected areas (PK32 and Northern Mikea Protected Areas) as part of Madagascar's Protected Areas Expansions Program. Since the last remaining good populations of *P. a. brygooi* fall just outside of both proposed park boundaries, the aim has been to stimulate discussion about adjusting those boundaries. World Wide Fund for Nature (WWF, the facilitating NGO, charged with managing the new protected area proposals) has taken an interest in our results and is endeavoring to incorporate the new data into their management plans.

Meetings have been undertaken (March 2009) with Conservation International (Madagascar) and Durrell Wildlife Conservation Trust, informing them of the preliminary results. Possible funding opportunities for a community-based monitoring project in the small region with the larger populations to the north of the Baie de Fanamotra and south of Morombe, were discussed. CI showed an interest in financially supporting the project.

This study also supported and funded a botanical survey of the habitat selection of *P. a. brygooi*, as part of a DEA (Masters) project by a student from the University of Antananarivo.

Acknowledgments. — Thanks to our project partners MICET and the University of Antananarivo. Further thanks are extended to the following individuals and organizations; Charlie Gardener (WWF Tulear), Al Harris and all the staff at Blue Ventures, Andavadoaka, and Harison Randriansolo (Conservation International Madagascar). This work was financially supported by the Turtle Conservation Fund, IUCN Turtle Survival Alliance, The Royal Geographic Society and the British Chelonia Group.

Literature Cited

Buckland, S.T., Anderson, D.R., Laake, J.L., Burnham, K.P., Borchers, D.L., and Thomas, L. 2004. Advanced Distance Sampling. Oxford University Press, 416 pp.

Leuteritz, T., and Walker, R. 2008. *Pyxis arachnoides*. In: IUCN 2008. 2008 IUCN Red List of Threatened Species. www.iucnredlist.org.

Mittermeier, R.A., Rhodin, A.G.J., Randriamahazo, H., Lewis, R.E., van Dijk, P.P., Hudson, R., and Rioux Paquette, S. 2008. Vision sokatra gasy—Madagascar turtle vision. Turtle and Tortoise Newsletter 12:7-9.

Pedrono, M. 2008. The Tortoises and Turtles of Madagascar. Natural History Publications (Borneo), Kota Kinabalu, Malaysia.

Stuart, B.L., Rhodin, A.G.J., Grismer, L.L., and Hansel, T. 2006. Scientific description can imperil species. Science 312(5777):1137.

Walker, R.C.J., Rix, C., and Woods-Ballard, A. 2004. The legal and illegal trade in the Madagascar spider tortoise *Pyxis arachnoides*, for the exotic pet trade. The Herpetological Bulletin 90:2-9.

Walker, R.C.J., Woods-Ballard, A.J., and Rix, C.E. 2007. Population density and seasonal activity of the threatened Madagascar spider tortoise (*Pyxis arachnoides arachnoides*) of the southern dry forests, south west Madagascar. African Journal of Ecology 46:67-73.

Citation Format for this Publication:

Walker, R.C.J. 2009. Preliminary results of a population range and density survey for *Pyxis arachnoides brygooi* in Madagascar. TurtleLog No. 2, doi:10.3854/tln.002.2009, http://www.iucn-tftsg.org/turtlelog_online_newsletter/tln002/.