CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES
OF WILD FAUNA AND FLORA

Twenty-third meeting of the Animals Committee
Geneva (Switzerland), 19-24 April 2008

Review of Significant Trade in specimens of Appendix-II species

SPECIES SELECTED FOLLOWING COP13

1. This document has been prepared by the Secretariat.

Background

2. At its 21st meeting (AC21, Geneva, May 2005), the Animals Committee agreed that, under the terms of paragraph b) of Resolution Conf 12.8 (Rev. CoP13), a review should be undertaken of trade in *Monodon monoceros* [populations of Canada and Greenland (Denmark)], *Testudo graeca* [population of Lebanon] and *Mantella* spp.

3. The Secretariat notified the range States of the selected species, explained the reason for this selection and requested comments regarding possible problems with the implementation of Article IV of the Convention. At AC22 (Lima, July 2006), the Committee reviewed the available information according to paragraph f) of Resolution Conf. 12.8 (Rev. CoP13) and decided to eliminate *Monodon monoceros* [populations of Canada and Greenland (Denmark)] from the review and agreed not to eliminate *Testudo graeca* (population of Lebanon) and *Mantella* spp. from the review pursuant to paragraph g) of the same Resolution.

4. IUCN – The World Conservation Union was engaged to compile information about the biology and management of and trade in *Testudo graeca* (population of Lebanon), and *Mantella* spp. and to provide a preliminary categorization of these species in compliance with paragraphs h) and i) of Resolution Conf. 12.8 (Rev. CoP13).

5. The Secretariat transmitted the resulting reports to the range States, which had 60 days to submit comments, as set in Resolution Conf. 12.8 (Rev. CoP13), paragraph j). The reports are attached as Annexes 1 and 2 to this document.

6. The reports referred to above present conclusions about the effects of international trade on the selected species, the basis on which such conclusions are made, and problems with the implementation of Article IV of the Convention. They provide preliminary categorizations of the selected species into three categories as outlined in Resolution Conf. 12.8 (Rev. CoP13) as follows:

    i) 'species of urgent concern' shall include species for which the available information indicates that the provisions of Article IV, paragraph 2 (a), 3 or 6 (a) of the Convention are not being implemented;

    ii) 'species of possible concern' shall include species for which it is not clear whether or not these provisions are being implemented; and

iii) 'species of least concern' shall include species for which the available information appears to indicate that these provisions are being met.

Actions required by the Animals Committee

7. In accordance with paragraphs k) and l) of Resolution Conf. 12.8 (Rev. CoP13), the Animals Committee is requested to review the reports and the responses received from range States and, if appropriate, to revise the preliminary categorizations proposed by the consultant.

8. Problems identified that are not related to the implementation of Article IV, paragraph 2 (a), 3 or 6 (a), should be referred to the Secretariat.

9. In accordance with paragraphs m) to o) of the same Resolution, the Animals Committee is also requested to formulate recommendations for species or urgent concern and of possible concern. Such recommendations should differentiate between short-term and long-term actions, and be directed to the range States concerned. Species of least concern shall be eliminated from the review.

Testudo graeca Linnaeus, 1758

FAMILY*:* Testudinidae

COMMON NAMES: Spur-thighed Tortoise, Common Tortoise, Greek Tortoise, Moorish Tortoise, (English); Tortue Mauresque (French); Tortuga Mora (Spanish)

GLOBAL CONSERVATION STATUS: Categorised as Vulnerable: VU-A1cd (Assessed 1996) but this is now considered out of date (IUCN, 2007).

SIGNIFICANT TRADE REVIEW FOR: Lebanon (Not a Party to CITES)

SUMMARY

The Spur-thighed or Greek Tortoise *Testudo graeca* is reported to be widespread in Lebanon. There are no detailed population data although anecdotal observations indicate that the species is reasonably abundant. It is, however, believed to be affected by increasing urbanisation and agricultural intensification. Moderate numbers of individuals have been exported from Lebanon in the period 1996–2005 (about 34,000 in total), of which half have been declared as captive-bred. Although captive-breeding facilities are reported to exist in Lebanon, it is not clear whether they have the capacity to produce the number exported. The practice of rearing young from eggs laid by gravid wild females taken temporarily into captivity has been observed, although it is also not clear on what scale this takes place.

In view of uncertainties regarding the true extent of captive-breeding, and some concerns raised about the status of the species in the wild, the Lebanese authorities suspended exports of all *Testudo graeca* in June 2004. This ban remains in place and will not be lifted until appropriate regulations are in place, including registration of farms, establishment of quotas and the implementation of an export control mechanism. In view of this, trade in this species from the Lebanon is of **Least Concern**.

SPECIES CHARACTERISTICS

The Spur-thighed or Greek Tortoise, *Testudo graeca*, has a wide distribution in northern Africa, southern Europe and south-west Asia as far east as the Islamic Republic of Iran (Buskirk, 1996). Range States are: Albania, Algeria, Armenia, Azerbaijan, Bulgaria, Egypt, Georgia, Greece, Iran (Islamic Republic of), Iraq, Israel, Jordan, Lebanon, Libyan Arab Jamahiriya, Moldova, Republic of, Morocco, Romania, Russian Federation, Serbia and Montenegro, Spain, Syrian Arab Republic, the former Yugoslav Republic of Macedonia, Tunisia, Turkey, Turkmenistan, Ukraine. It has also been introduced to Cyprus, France and Italy (UNEP-WCMC, 2007).

Testudo graeca is diurnal, oviparous and vegetarian (Ramadan-Jaradi, 2004). Adults grow to around 25 cm in carapace length and reach reproductive age at 11–14 years. They have a long life expectancy (54–57 years (Gibbons, 1987), with some individuals reaching 120 years Scherpner, 1955 in Auliya, 2003). Most females reproduce every year, laying one to four clutches from April to June with inter-nesting intervals ranging from 21 to 29 days. Clutch size varies from one to seven eggs, averaging 3.5 eggs (Diaz-Paniagua *et al*., 1996; Lapid and Robinzon, 2001). Hatching rates in the wild have been found to be relatively low; Keller *et al.* (1998) found an overall hatchling survival rate in the first year to be 0.39. Mortality due to predation was low and survival rates were believed to be more closely linked to prevailing climatic conditions.

The species can adapt to moderate levels of disturbance from human activities (Anadón *et al*., 2006a, 2006b; Stubbs 1989). However, numbers are said to be steadily declining in the wild due to agricultural development and exploitation for the pet trade (van der Kuyl, *et al*., 2005). The species was classified in the 1996 IUCN Red List as Vulnerable (Tortoise & Freshwater Turtle Specialist Group,

1996), although this assessment is now considered to be out of date (IUCN, 2007). The species has not subsequently been re-assessed.

INTERNATIONAL TRADE

Testudo species including the Spur-thighed Tortoise are popular in the pet trade. All species of Testudinidae have been included in the CITES Appendices since 1977. During the late 1970s and early 1980s Germany and the UK were the main importers of *Testudo graeca* with annual gross imports of wild specimens averaging almost 60,000 per year for the UK (1976–1983) and around 27,000 into Germany (1977–1981). In 1984 an import ban on wild-caught Mediterranean tortoises came into force in the European Union with only captive-bred or pre-ban tortoises allowed to be traded. This resulted in an increase in trade of African and Eurasian tortoise species. In February 1999, all wild-caught specimens were banned from import into the EU (TRAFFIC, 2003).

Table 1: Exports excluding re-exports of wild (W) and captive-bred (C) specimens of *Testudo graeca* from Lebanon (1996–2005)

Exporting Country	Source	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total 1996-2005
Lebanon	W		18	9	805	304	200	4829	5585	5209		16,959
Lebanon	C	1034	1124	650		3000	4052	5774	500	300		16,434

Note: Captive-bred specimens includes those reported as of ranched or farmed origin
(Source: CITES trade statistics derived from the *CITES Trade Database*, UNEP World Conservation Monitoring Centre, Cambridge, UK.)

Between 1996 and 2005 CITES trade data indicate that approximately 26,800 specimens of *Testudo graeca* were traded as wild caught specimens. The majority (just under 17,000) were recorded as originating in Lebanon, with most of the remainder (6000) originating in Turkey, almost all in the years 1996 to 1998. Most were imported by Japan and the USA. In addition, significant numbers of specimens reported as "captive-bred" have been recorded in international trade, mainly from Lebanon (Table 1) and more recently from Jordan (about 6000 per year between 2002 and 2005). Although imports of captive-bred specimens were still permitted into the EU after the ban on wild imports of Mediterranean tortoises in 1984, no significant imports of captive-bred specimens were noted in trade until 1994/1995 when Poland, Germany and Japan started importing in significant numbers.

COUNTRY ACCOUNTS

Lebanon

Status:

Testudo graeca is widely distributed in the country from north to south and from the Mediterranean coast in the west to the Beqaa in the East. Its altitudinal limit is around 1700m. There are no records from the Anti-Lebanon mountain range (Sadek, 2007). The species is found in grasslands, maquis, guarrigue, cultivated areas and semi-arid zones.

Jandzik (2007) reported that during a 20 day visit he found *Testudo graeca* to be widespread and with an apparently good population structure in the wild; all age categories were represented including very old animals. His subjective conclusion was that the population status was good. Based on five trips to the Lebanon Široký (2007) concurred that tortoises seemed to be quite abundant in many areas. Taskavak (2007), based on observations made in 2005, noted a moderate population in coastal areas but considered that the species was less abundant inland.

The Authority competent to issue export documentation comparable to CITES certificates stated that no population status studies had been carried out and therefore the status of the species in the wild

was not known. However, some biologists at the Lebanese University had raised concerns over the status of the species (Phrem, 2007).

Široký (2007) considered that tortoises were not particularly threatened by trade in Lebanon, but considered that agriculture was likely to be having an important impact locally; in some parts of the range where the species was living directly on farmland a huge percentage of individuals had damaged carapaces. Sadek (2007) noted that many of the preferred habitats of the species were shrinking owing to urbanisation and increase in mechanised agriculture. Lapid *et al.* (2004) also note industry and pollution as putting pressure on the population.

Management and trade:

Local demand is not large (Phrem, 2007). The species occurs in the Al Chouf Cedar Nature Reserve, although is reported to be rare there (Ramadan-Jaradi, 2004). It also occurs within Horj Ehden and in the vicinity of Ammiq marshes protected areas as well as in other areas that are protected by Ministerial Decree (Sadek, 2007)

Due to concerns raised by biologists at the Lebanese University commercial export of wild and captive-bred specimens has been banned since the end June 2004. There are no export quotas as no export is permitted. This ban remains in place and will not be lifted until appropriate regulations are in place, including registration of farms, establishment of quotas and the implementation of an export control mechanism (Phrem, 2007). The Authority has sought advice through this review process in working towards this.

Captive breeding
The Management Authority equivalent noted that one breeding operation reported in the early 2000s that it produced an average of 712 offspring in captivity per year between 1986 -2002 from a breeding stock of 132 – 305 females 67% of which were still of the founding stock (Phrem, 2007). The Authority believed that this facility was no longer in operation. However, another larger facility in Jahiliyeh is known to exist (Phrem, 2007; Sadek, 2007); all age classes of tortoises have been observed but production capacity is not known. Taskavak (2007) reported that he had not encountered any tortoise breeding farms whilst in Lebanon but observed wild females being brought into captivity to lay eggs in gardens and then returned to the wild. Eggs would be incubated in boxes and juveniles sold as captive-bred. There was no information on the extent of this type of activity.

PROBLEMS IDENTIFIED THAT ARE NOT RELATED TO THE IMPLEMENTATION OF ARTICLE IV PARAS 2A, 3 OR 6A

None identified.

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Overview of Mantellas

Mantella is a genus of small, predominantly terrestrial frogs from Madagascar in the family Mantellidae ranging in size from 1.5 to 3.5 cm. They are very variable in colouration; many are brightly coloured and attractively patterned.

The taxonomy of the group has been and continues to be unstable. Forms may be considered different colour morphs of the same species by some authorities and as separate species by others. Hybridisation occurs relatively readily in captivity and there are also indications of hybrids in the wild. Current CITES taxonomy, which follows Frost (2004) recognizes 15 species (Table 1). A further species, *M. ebenaui,* has recently been removed from synonymy with *M. betsileo* and is included in the current version of Frost (2007), and is therefore likely to be recognized under CITES at the next CoP. It does not feature in trade data and is not addressed further here. Vences and Glaw (2003) place the species into five groups based on likely affinities derived from molecular studies (Table 1). They believe that some of these groups, such the *M. cowani* group, can be considered superspecies or species complexes.

Table 1: Affinities of *Mantella* species

Species group	***M. betsileo***	***M. bernhardi***	***M. cowani***	***M. laevigata***	***M. madagascariensis***
Species	*M. betsileo* *M. ebenaui*[1] *M. expectata* *M. manery* *M. viridis*	*M. bernhardi*	*M. baroni* *M. cowani* *M. haraldmeieri* *M. nigricans*	*M. laevigata*	*M. aurantiaca* *M. crocea* *M. madagascariensis* *M. milotympanum* *M. pulchra*

[1] not currently recognized under CITES taxonomy.

With the exception of *M. laevigata* (q.v.), all those species whose breeding has been observed lay clutches of up to 130 eggs in leaf litter adjacent to swamps or brooks into which the tadpoles are flushed by rain. Breeding tends to be highly seasonal, coinciding with the rainy season (December to February or March). At this time dense or very dense breeding aggregations of some species may occur, with males calling loudly to attract mates. For much of the rest of the time the frogs are dispersed and often difficult to find, hiding during the day in leaf litter, in caves or under stones. In captivity females may lay multiple clutches in the course of the year. It is not known whether this occurs in the wild or not. Longevity in the wild is unknown, but captive specimens can survive for at least five years. Distribution and habitat requirements of each species are provided in the separate accounts where known.

Status in the wild

The global ranges of the species vary considerably (see maps in Figure 1). Some species are widespread while others have very small known distributions, some of these in areas that are suffering considerable habitat loss and degradation. In 2004 the status of all species was assessed at a workshop held under the auspices of the Global Amphibian Assessment (GAA), a joint venture of IUCN, Conservation International and NatureServe which used scientific expertise to assess all the world's amphibians and assign them an IUCN status category (GAA, 2006). These categories are indicated in the summary table below and in each individual species account. The categories assigned range from Least Concern, indicating that the species is believed to be under no current threat of extinction, to Critically Endangered, the most threatened category. The assessment as Critically Endangered was generally based on the very small ranges and the perceived degree of threat to the habitat of the species concerned.

No global population estimate for any of the species is available. However, most species appear to be numerous and sometimes very abundant within their ranges (the notable exception is *Mantella cowani* (q.v.)). Some local estimates of abundance have been made. In particular, Rabemananjara *et al.* (in press) present the results of a series of rapid population assessments for ten species made in 2003 and 2004. These were based on mark-and-recapture surveys carried out over small, sometimes very small, areas generally during the breeding season. Based on these, notional population densities per hectare

were derived, some of which were extremely high (in the case of *Mantella viridis* reaching a maximum of nearly 100,000 individuals). However, the authors point out that the data essentially emphasise that the species can occur in dense breeding aggregations and should not be extrapolated to larger areas. Indirect indications of population size for some species are given in Vences *et al.* (2004) who found high genetic (mitochondrial) diversity in three closely related species (*M. aurantiaca, M. crocea* and *M. milotympanum*) which were consistent with large population sizes despite very small global ranges in each case.

Trade and use

Mantellas are not used locally. However, their attractive colouration makes them appealing as exotic pets and they have found a market overseas as live animals, chiefly in North America, Europe and, to a lesser extent, Japan. They have been exported from Madagascar in some quantity since the early 1990s, when a general live animal export trade (with an emphasis on reptiles and amphibians) began to develop. At first the main species exported was *M. aurantiaca* (see relevant account), although exports under this name probably also included quantities of the similar and closely related *M. crocea* and *M. milotympanum*. This group, in which frogs are predominantly or entirely bright orange or orange-red, are the most distinctively coloured and have proved the most popular in the pet trade. More recently, and particularly with the suspension of exports of *M. aurantiaca* since 2002, other species have begun to be exported in some number. Trade data for *M. aurantiaca* before 1995 (when the species was included in Appendix II) are incomplete, as are data for all other species prior to 2000, when the rest of the genus was included in Appendix II.

Mantellas have been exported in considerable number in the past few years - import figures indicate around 125,000 in the period from 2000 to 2005, export figures indicate around 150,000 (the reason for the discrepancy is explained below). Levels of export in the preceding five years (when only *M. aurantiaca* was included in the Appendices) were probably similar. At present virtually all export is to North America (very largely USA with some to Canada), largely as a result of the imposition of stricter domestic measures by the European Union. Under these import of wild specimens of all species of *Mantella* except *M. aurantiaca* and *M. betsileo* has been banned since 2001 and import of *M. aurantiaca* since 2006.

Demand cannot be judged by price alone. FOB (free on board) wholesale export prices have remained essentially unchanged since the early 1990s at USD 1-4 per individual (Anon., 2003; Edwards, 2007; Jenkins and Rakotomanampison, 1994; Rabemananjara *et al.,* 2007). Retail prices are variable but individuals advertised on the internet are currently mostly in the range USD 20-65, this also showing relatively little change over time. As noted above, the orange-red *M. aurantiaca*-type species are the most popular amongst collectors, and *M. aurantiaca* itself does command relatively high prices at present (around USD 65, (Anon., 2007a)) because wild-collected specimens are not available and all demand must be met by captive-bred individuals. Conversely, the least desirable forms are reportedly *M. betsileo* (qv) and *M. laevigata* (qv). In general, however, the spread of prices between species has never been very high, indicating that there is not a strong 'collectors' market (unlike, for example, the case in chameleons and geckos in the genus *Phelsuma* where new forms, particularly distinctively marked ones, are generally in high demand and fetch premium prices). Overall, mantellas have never been as sought-after as the South American dendrobatid (arrow-poison) frogs which fill a very similar place in the market, are more readily available and include a wider range of spectacularly marked forms. Edwards (2007) notes that markets for mantellas are generally somewhat depressed at present and considers global demand to be decreasing.

Rabemananjara *et al.* (2007) describe the local supply chain. Normally frogs are collected by local villagers during the breeding season. These are then sold on to intermediaries who supply the limited number of exporters (fewer than a dozen). Collection is not generally carried out on an *ad hoc* basis, but rather to fulfill a specific order from an exporter. In some cases frogs are apparently collected directly by the intermediaries. On the basis of interviews carried out in 2003-2005, Rabemananjara *et al.* (2007) indicated that prices paid to collectors varied from 250 to 2000 FMG (USD 0.04-0.35) depending on the species while intermediaries were paid from 750 to 6000 FMG (USD 0.13-1.00). They presented data for all species except *M. manery*, which is not in trade; individual figures are given in each of the species accounts. Rabemananjara *et al.* (2007) note that the number of individuals collected would generally be 50-100% higher than the number intended for export to account for pre-export mortality.

Impact of collection

No quantitative studies of the possible impact of collection on wild populations have been carried out to date. At the time of the Global Amphibian Assessment, some concern was expressed on possible impacts of collection on a number of species and for the majority of species collection for international trade was identified as an actual or possible threat in a checklist of threats. However, the GAA also noted that general observations indicated that populations of the most heavily collected species (*M. aurantiaca*) did not seem to have decreased noticeably in abundance over the past decade, Further, Rabemananjara *et. al.* (2007), amongst others, have noted that there do not seem to be observable difference in breeding population densities between populations of this species that are known to have been the subject of collection and those that were not. The GAA generally noted, in its more detailed discussion of each of the species, that adverse impact of collection had generally not been demonstrated, and in many of the species noted that a controlled and regulated trade presented the best management option for the species concerned. Urgent concern was, however, expressed regarding the status of *M. cowani,* where it was strongly suspected that collection might have had a significant adverse impact on this species, which has a very small known range and is evidently rare within that range. As noted below this species is now completely protected under new regulations, with a ban on exports. Particular concern was also expressed on possible impacts of collection on *M. expectata*. As noted under the account for that species, new information since then has largely alleviated these concerns.

Regulations and control of trade

Control of the wildlife export trade in Madagascar has changed considerably in the past few years through the ongoing implementation of the Action Plan for the Reform of Madagascar's Wildlife Export Trade (2003). The plan arose as a direct result of the CITES Significant Trade Review for Madagascar, initiated in 2001. A detailed report on implementation of the plan up to the end of 2005, prepared by the Malagasy Management Authority, was submitted to the Animals and Plants Committees in 2006 (Document AC22 Doc. 10.4 Annex 1). Several parts of this are of direct relevance to trade in mantellas. First, *M. cowani* was included in 2005 in a list of protected species established under Government Decree. Second, the controls governing collection of wild species have been reformed, with the open season for collecting reptiles and amphibians now coinciding with the rainy season (December to February) when most of these species are active and therefore can be collected. Previously the open season, based on colonial legislation, was during the austral winter from May to October when many species were dormant or in hiding and could not be collected; this meant that collectors of groups such as mantellas were forced to operate during the closed season and were *de facto* breaking the law. Third and most importantly, export quotas have been established by the Scientific Authority for each mantella species based on non-detriment assessments.

In April 2004 a CITES implementation workshop was held in Madagascar, attended by the Scientific Authority for Animals (the Department of Animal Biology at the University of Antananarivo), the Management Authority and some 50 local experts on fauna (Anon. 2004). At this workshop, preliminary quotas for each mantella species were proposed, based on local knowledge of the status of the species and using the IUCN non-detriment finding checklist provided in Rosser and Heywood (2002) (Edwards, 2007). These quotas were then reviewed by the four principal international authorities on the genus (F. Andreone, F. Glaw, M. Vences and C. Raxworthy), all of whom had participated in the assessment of the status of mantellas under the IUCN Global Amphibian Assessment, which had assigned the IUCN Red List status categories for the species. On the basis of this expert input, final export quotas were decided by the Scientific Authority for Animals. These quotas, which are presented below and in each species account, were valid for 2005. They have been reviewed annually since then but have remained unchanged in 2006 and 2007. Three species (*M. cowani*, *M. bernhardi* and *M. haraldmeierii*) have been assigned zero quotas while a quota for *M. aurantiaca* has yet to be agreed, so that this is also currently under an effective zero quota for this species. In view of the absence of detailed population data, all quotas set were deliberately conservative (Document AC22 Doc. 10.4 Annex 1; Edwards, 2007). In one case (*M. laevigata*), one authority on revisiting the quotas in 2007 wondered whether that set for this species might be slightly high, on the basis of its being a rainforest species which he considered more vulnerable to exploitation (Andreone, 2007). However, additional information obtained during this study would appear to indicate that this quota is also conservative and that levels of export in this species are not cause for concern (see relevant account).

Quota allocation and reporting
Export quotas are assigned to operators (exporters) some time during the middle of the calendar year. While some export orders are filled in that year, a significant number are held over until the first two or three months of the following year (that is the end of the collecting season), which is when they will be reported as imports by importing countries. Rather than reporting actual numbers exported, Madagascar has been reporting its exports on the basis of the quotas (and export permits) issued in the year in which they were issued. This means that a proportion of exports reported in one year by Madagascar will be reported as imports by importing countries in the following year. This is almost certainly why import figures for 2005 give the impression in many cases that the export quotas for that year have been exceeded – in reality, many of these imports are a result of export certificates issued by Madagascar in 2004 and reported by them in that year. The fact that exporters frequently do not fill their entire quota almost certainly explains why Madagascar has generally reported higher numbers of exports overall than importing countries have reported imports. Madagascar reported virtually no exports in 2003 as it voluntarily imposed a moratorium on the issuing of commercial export permits of CITES-listed species in that year while the Action Plan referred to above was being developed. Exports were permitted in 2004. In one case (*M. madagascariensis*) the reported exports in 2005 have exceeded the export quota (around 1200 exported against a quota of 500). This may be a reporting error, or may be owing to taxonomic confusion with two other exported species (*M. baroni* and *M. pulchra*). This discrepancy, in a species which is not regarded by IUCN as highly threatened, is not considered to be sufficient to cause concern.

Captive-breeding
With the exception of a small number of individuals reported as of 'ranched' origin, all exports from Madagascar of mantellas have been reported as of wild origin. Edwards (2007) notes that in it is not economically viable to breed mantellas for export as the prices they command are too low. All species in trade have been bred in destination countries, and most are available, often in small quantities and only intermittently, as captive-bred animals. Captive-bred specimens tend to be offered for sale at somewhat higher prices than wild-caught ones (as with most reptiles and amphibians they are usually better adapted to captivity and have higher survival prospects) (Mattioli *et al.,* 2006). In a preliminary economic analysis of captive breeding of some Malagasy reptiles and amphibians, Mattioli *et al.* (2006) calculated rough input costs of Eur 7.5 per individual for captive-bred *M. aurantiaca* in Italy, and concluded on the basis of current market value that it might be economically viable to breed this species commercially in Italy. However, current indications (eg. from discussions on the froglog internet forum) are that captive-breeding at present only supplies a limited number of individuals.

Illegal trade
Mantella frogs are fragile in transport and are liable to high mortality unless transported in appropriate conditions. This, combined with their low unit value, makes it highly unlikely that there is any extensive illegal trade (Rabemananjara *et al.*, 2007).

Conclusions
In view of the existence of conservative export quotas for all mantella species in trade (including some zero quotas), the thorough approach used in the development of these quotas, the fact that these quotas are under annual review, and the absence of any indication that collection for export has an adverse impact on wild populations of those species currently exported, trade in all the mantellas is considered of **Least Concern.**

Table 2. Overview of all *Mantella* species. Trade considered of Least Concern for all species

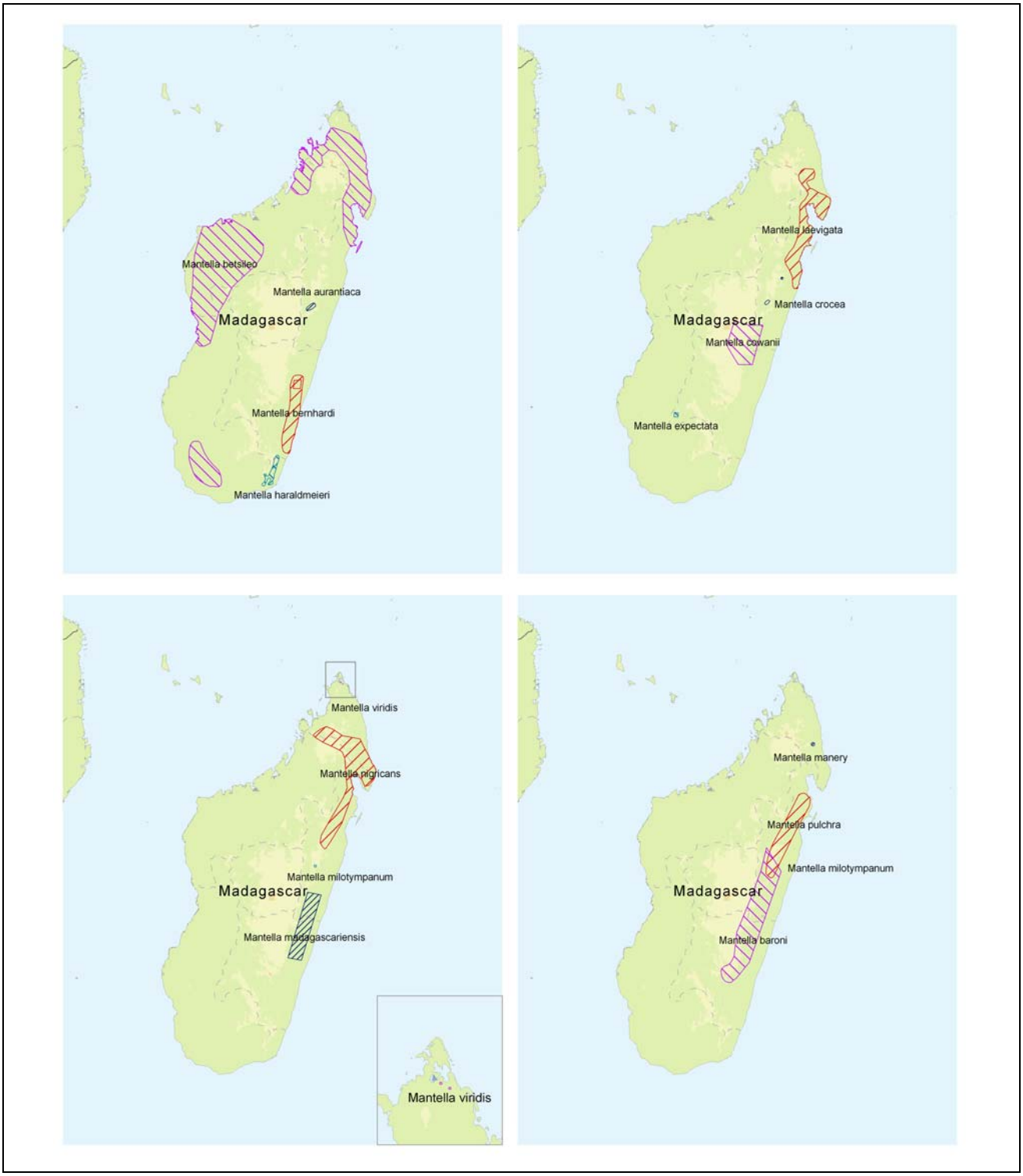
Species	Reported trade levels (1996-2005)[1]	Current quota (est. 2005)	IUCN Global Category[2]	Comments
M. aurantiaca	57,000 - 97,000	"in prep"	CR	No quotas assigned in 2005, 2006 or 2007 and no export reported since 2002. A conservation project for the species was initiated in 2007.
M. baroni	3315 - 3655	5000	LC	Species widespread and at least locally abundant and not considered globally threatened in the Global Amphibian Assessment. Annual export quotas of 5000 set since 2005. Current recorded trade considerably lower than quota (although

				there may be confusion with two other species) and international demand not believed to be high.
M. bernhardi	ca 1600-1900	0	EN	Zero export quota imposed since 2005. Recorded international trade at a low level.
M. betsileo	ca 12,000	5000	LC	A widespread and adaptable species not considered of conservation concern by the Global Amphibian Assessment. Annual export quota of 5000 set in 2005 and continued in 2006 and 2007. Quota almost certainly extremely conservative compared with the global population and international demand low.
M. cowani	1600-2600	0	CR	Zero export quota and species fully protected within Madagascar.
M. crocea	6500	1000	EN	Export quota of 1000 set in 2005 and maintained in 2006 and 2007. Species has limited range (area of occupancy probably less than 500 km^2) but is reportedly common within this.
M. expectata	8200-9300	1000	CR	Export quota of 1000 established in 2005 and maintained in 2006 and 2007. Species more widespread than previously thought and locally very abundant. Quota considered sustainable by authorities on the species.
M. haraldmeieri	940-1580	0	VU	Zero export quota in force. Low level of reported trade prior to this and species not considered highly threatened by the Global Amphibian Assessment. Zero quotas established by Malagasy SA from 2005 onwards.
M. laevigata	11,000-12,500	2000	NT	Export quota of 2000 set in 2005 and continued in 2006 and 2007. Species widespread and at least locally common and likely to have a large or very large global population and in low demand in international trade.
M. madagascariensis	23,000-29,000	500	VU	Species considered not highly threatened by IUCN and with a reasonably extensive range. Conservative annual export quota (500) established in 2005, maintained in 2006 and 2007. Reported exports exceeded quota by some 700 individuals in 2005, although this may have been owing to confusion with other species.
M. maneri	None reported	no quota	DD	Known only from one specimen and not in trade.
M. milotympanum	ca 4400-5000	1000	CR	Quota of 1000 established in 2005 and maintained in 2006 and 2007. Species reported to be locally common within its very limited range and current export quota considered sustainable.
M. nigricans	500-1000	1000	LC	Species widespread and not considered threatened with extinction. Quota of 1000 established in 2005 and maintained in 2006 and 2007; reported level of export low.
M. pulchra	13,500-18,000	3000	VU	Species widespread in Madagascar and can be at least locally moderately abundant. Export quota of 3000 established in 2005 and maintained in 2006 and 2007. Reported exports in 2005 lower than quota.
M. viridis	11,200	1000	CR	Species has very limited distribution but is common and locally very abundant within its range and can survive in modified habitats. Export quota of 1000 specimens per year believed to be sustainable.

[1] Trade not recorded in all years, particularly for species listed in 2000. See individual accounts for further explanation of trade figures.

[2] Key to IUCN Categories: CR = Critically Endangered; EN= Endangered; VU = Vulnerable; NT = Near Threatened; LC = Least Concern; DD = Data Deficient (Categories and Criteria 2001 version 2.3) Specific criteria are enumerated in each data sheet.

Figure 1: Range of *Mantella* species (based on GAA data)



Mantella aurantiaca Mocquard, 1900

FAMILY: Mantellidae

COMMON NAMES: Golden Mantella, Ginger Tree Frog, Golden Frog (English); Mantelle dorée (French); Rana dorada; Ranita dorada de Madagascar (Spanish)

GLOBAL CONSERVATION STATUS: Critically Endangered (CR); criteria: B2ab (iii,v) (Assessed 2004)

SIGNIFICANT TRADE REVIEW FOR: Madagascar

SUMMARY

Mantella aurantiaca is an attractive bright golden-yellow or orange terrestrial frog endemic to a small area of eastern central Madagascar, where it breeds in swampy areas of screw-pine. The species can be locally very abundant, but its very small global distribution and the range of threats that its habitat faces led to its being classified in 2004 as Critically Endangered by IUCN. The species has been exported for the exotic pet trade since the late 1980s; export reached high levels in the late 1990s and early 2000s, with between 57,000 and 97,000 individuals recorded as exported between 1996 and 2003. Although detailed studies have not been carried out, observers have not recorded any noticeable impact of collection, and there is reportedly no apparent difference between abundances at sites subject to collection and those not subject to collection.

Mantella aurantiaca was included in CITES Appendix II in 1995. No export has been reported since 2003. No quotas have been allocated for the species since then and the species is effectively under a zero export quota. A conservation project for the species was launched in 2007 which aims to assess wild status in detail and develop a management plan for the species.

In view of the absence of any trade at present, and the current imposition of what is, in effect, a zero export quota trade in *Mantella aurantiaca* is considered of **Least Concern.**

SPECIES CHARACTERISTICS

Mantella aurantiaca is a terrestrial species of primary and secondary mid-altitude rainforest, usually found in damp, swampy areas, often associated with screw pine (*Pandanus*) forest.
Eggs are deposited in moist leaf litter outside water. Clutch size is generally reported as 20-60 eggs (GAA, 2006), although clutches of 120 eggs have been recorded in captivity (Anon., 2007b). Development of the embryo lasts around 14 days and the tadpoles are flooded into small pools by heavy rain. The tadpoles develop within about 70 days into froglets measuring 11 mm (Glaw and Vences, 2000). In captivity at least multiple clutches may be laid in one year (Anon, 2007b).

INTERNATIONAL TRADE

Table 1. Recorded trade in *Mantella aurantiaca* originating in Madagascar, 1996-2005

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Reported Imports	6853	11260	13422	7815	5676	7545	1450	2681			56,702
Reported exports	16637	16906	30890	7920	10953	9865	3450				96,621
Quota								none set	none set	none set	

(Source: CITES trade statistics derived from the *CITES Trade Database*, UNEP World Conservation Monitoring Centre, Cambridge, UK.)

There has been some very limited trade in the species for scientific research; otherwise it has featured in international trade exclusively as an exotic pet with main markets in North America (particularly the USA, which accounts for around 70% of recorded imports) and Europe although imports of wild

specimens from Madagascar into the European Union have been banned since 2006 under Commission Regulation (EC) No 605/2006.

The species is bred in captivity in a number of countries (GAA, 2006) and is offered for sale as captive-bred specimens. However, discussions on internet amphibian forums indicated in 2007 that there was not a large supply in market countries and that prices were higher than previously (Anon. 2007a).

COUNTRY ACCOUNT

Madagascar

Status:

M. aurantiaca has a very restricted distribution in east-central Madagascar, centred on the Torotorofotsy area (c. 7 km north-west of Andasibe) and the Andromena Forest at Samarirana River. Its recorded altitudinal range is 920 - 960m asl. Within its range the species is extremely localized, being very abundant in tiny areas, often of just a few hectares. Its total area of occupancy may be under 10 km^2 (GAA, 2006). Three separate rapid assessments of population densities, using mark-and-recapture methods, carried out in 2004 and 2007 indicated densities of between roughly 800 and 1300 animals per hectare although the surveyors stressed that these figures were based on sampling of very small areas and should not be used to extrapolate to larger areas (Rabemananjara *et al*, in press). Vences *et al.* (2003) found high genetic (mitochondrial) diversity in samples of *M. aurantiaca* consistent with large population sizes despite a very small global range.

The habitat of *M. aurantiaca* comprises a small area of forest surrounded by degraded land, and the remaining forest is under threat from subsistence agriculture, timber extraction, fires and expanding human settlements. In 2005 it was noted that recent surveys indicated that habitat was being degraded in all the areas where the species occurred. In 2001 a significant amount of the remaining suitable habitat at Torotorofotsy was affected by fire (although three years later the species was still common in the affected areas) (GAA, 2006). The species was classified as Critically Endangered by the Global Amphibian Assessment (GAA) on the basis of its very small range and threats to its habitat.

Management and trade:

See overview to Mantellas for general discussion.

Until recently, *M. aurantiaca* was by far the most abundant mantella in international trade. Its highly distinctive, bright golden-yellow or orange colouration, which made it very appealing in the exotic pet market, and the accessibility of collecting areas were both undoubtedly contributory factors in this.

Commercial export of the species began in the late 1980s or early 1990s, with Malagasy export data indicating a few thousand a year exported at that time (Jenkins and Rakotomanampison, 1994). The species was included in Appendix II of CITES in 1995. Recorded trade originating in Madagascar increased considerably during the mid-1990s, peaking in 1998 at somewhere between 13,000 and 31,000. After this, trade decreased gradually and then markedly. Precise figures for trade cannot be given as there is a wide discrepancy between the level reported by importing countries and that reported by Madagascar. Over the period 1996-2003, export levels reported by Madagascar were 70% higher than reported import levels (see Table 1 above). This is likely to be mainly owing to the fact that Malagasy export figures are reported on the basis of permits issued, rather than actual exports, and it probable that at this time the former considerably exceeded the latter. There may also have been some recording of export of other species as *M. aurantiaca,* including *M. crocea* and, particularly, *M. milotympanum,* which was not described until 1996 and which is sometimes considered a subspecies of the former (Rabemananjara *et al.*, 2007a). However, trade in the latter taxon from 2002 (when it was first recorded in trade) has been at a relatively low level (see relevant account), and this is unlikely to have been a major factor in the lack of agreement.

No export quotas for *M. aurantiaca* have been set since 2002 and no exports recorded since then (imports recorded in 2003 are very likely to have been of specimens for which export permits were issued in 2002). It appears that the setting of export quotas and the resumption of export is pending a fuller understanding of the status of the species in the wild. Although the impact of collection on populations is not known in detail Rabemananjara *et al*, (in press) note that results of their rapid assessments and observations by other herpetologists over the past decade have noted no apparent differences in population densities between areas subject to collection for export and those not known to be subject to such collection. The GAA (2006) also noted, in discussing threats to the species: "it is also possible that over-collecting for commercial and private purposes is a threat, but so far such harvesting has not had a visible effect on its populations."

A project that intends to survey in some detail all known sites where the species occurs and to formulate concrete conservation and management plans began in 2007 (Jenkins, 2007).

Surveys of the trade in the period 2003-2004 (when specimens were being collected and stockpiled in anticipation of export quotas being designated) indicated field-collectors were paid 400-500 FMG per frog (USD 0.04-0.08), with intermediaries paid 1000-1500 FMG. This is average for mantellas in general, which have a range of 250-2000 FMG paid to field-collectors and 750 to 6000 FMG paid to intermediaries (Rabemananjara *et al.* 2007).

A few populations of Golden Mantella are found in a Ramsar site ("Marais de Torotorofotsy avec leur bassins versants", covering 10,000 ha and declared in 2005 (Ramsar, 2007)), which may eventually be included in a new protected area in the Zahamena-Ankeniheny corridor. All of the other known sites where the species occurs are unprotected (Jenkins, 2007).

The Global Amphibian Assessment (2006) noted: "plans to implement a controlled, sustainable trade through a trade quota should be encouraged, and would help ensure the survival of its habitat, as well as probably being more effective than complete trade bans."

PROBLEMS IDENTIFIED THAT ARE NOT RELATED TO THE IMPLEMENTATION OF ARTICLE IV PARAS 2A, 3 OR 6A

None identified.

Mantella baroni Boulenger, 1888

FAMILY: Mantellidae

COMMON NAMES: Baron's Mantella, Baron's Mantella, Harlequin Mantella, Variegated Golden Frog, Variegated Mantella (English).

GLOBAL CONSERVATION STATUS: Least Concern (Assessed 2004).

SIGNIFICANT TRADE REVIEW FOR: Madagascar

SUMMARY

Mantella baroni is an attractively marked, small terrestrial frog that occurs over a reasonably wide range in eastern Madagascar, where it is at least locally abundant. It is likely to have a very large global population, and is not considered threatened with extinction by IUCN. The species was included in Appendix II in 2000 as part of the listing for the genus *Mantella* species. Reported trade levels have been low – between 3300 and 3700 exported from Madagascar in the period 2001-2005, although actual trade levels in the early part of this period (and in the late 1990s when the species was not listed in the Appendices) are likely to have been higher, as taxonomic confusion with *M. madagascariensis* is likely to have led to much export of *M. baroni* being recorded under the latter name.

In 2005 an annual export quota of 5000 was established by Madagascar, maintained in 2006 and 2007. Reported export in 2005 was considerably lower than this.

In view of the existence of what is considered to be a conservative export quota for the species, the low current level of reported exports, and the fact that the species is not considered threatened, trade in *M. baroni* is considered of **Least Concern.**

SPECIES CHARACTERISTICS

M. baroni is a terrestrial species whose primary habitat is rainforest. It has also been found outside forest in slash-and-burn areas, even at considerable distance from forest, although it probably cannot tolerate complete opening up of the habitat (GAA, 2006). The eggs are laid on land, and the larvae are washed by rain into streams, where they develop.

This species is one of the so-called painted mantellas, which also include *M. bernhardi, M. cowani, M. madagascariensis M. haraldmeieri* and *M. pulchra*. Specimens of the different taxa may be very hard to distinguish from each other and the taxonomy of the group is not fully resolved. In particular, the names *M. baroni*, *M. madagascariensis* and *M. pulchra* have been used interchangeably.

The Global Amphibian Assessment (2006) notes that *M. haraldmeieri* is believed by some to be possibly conspecific with *M. baroni*.

INTERNATIONAL TRADE

Table 1. Recorded trade in *Mantella baroni* originating in Madagascar, 1996-2005

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Reported imports						12	10	650	313	2670	3655
Reported exports							10		2569	736	3315
Export quota										5000	

(Source: CITES trade statistics derived from the *CITES Trade Database*, UNEP World Conservation Monitoring Centre, Cambridge, UK.)

There is some very limited trade in the species for scientific research; otherwise it features in international trade exclusively as an exotic pet with main markets in North America (particularly the USA, which accounts for 80% of recorded imports) and imports of wild specimens from Madagascar into the European Union have been banned since 2001 under Commission Regulation (EC) No 2087/2001 and its various updates.

Reported trade in the species is at a relatively low level. However, Edwards (2007) notes that in the past the vast majority of specimens exported as *M. madagascariensis* have in fact been of this species. Trade reported as the latter has been at a considerably higher level than that reported as *M. baroni* (reported exports of some 27,500 and reported imports of ca 16,000 for the period 2000-2004).

The species is bred in captivity in a number of countries (GAA, 2006) and is offered for sale as captive-bred specimens. It is said to be one of the more amenable mantella species in captivity (Edmonds, no date). Sale prices on the internet are average for mantellas (usually around USD 25 as of mid-2007).

COUNTRY ACCOUNT

Madagascar

Status:

Mantella baroni is widely distributed in east-central Madagascar from Fierenana south to Andringitra, at 600 - 1,200m altitude. The species occurs in modified habitats, although is believed likely to be adversely affected by complete deforestation (GAA, 2006). Rapid population assessments using mark-and-recapture techniques carried out in three sites in 2003 and 2004 produced population density estimates of between 600 and 900 individuals per hectare (Rabemananjara *et al*. in press). Although the surveyors noted that these results should not be extrapolated to larger areas, it seems very likely that the overall population of the species is large or very large, given the extensive range over which the species occurs (see Figure 1 in Overview for mantellas) and its ability to survive in quite extensively modified habitat. Other researchers (e.g. Andreone *et al*., 2000; Cadle, 2001) report the species to be at least locally very abundant.

Management and trade:

See overview to mantellas for general information on management.

The export quota of 5000 specimens initiated in 2005 has been continued in 2006 and 2007. As noted above, recorded trade in wild specimens has been at a low level. However, the great majority of trade reported up to 2005 as *M. madagascariensis* was apparently in fact in specimens of this species (Edwards, 2007), indicating that real trade levels were considerably higher.

Recorded trade in 2005 (which is more likely to be an accurate representation of trade in this species than in previous years) was considerably lower than the set quota (see Table 1).

Andreone *et al*. (2000) reported that in the area where *M. cowani* (qv) and *M. baroni* occurred together and were both collected for export, local people were paid ten times as much for the former as the latter (4-5000 FMG (0,7-0,8 €) vs. 250-500 (0.04-0.08 €)), indicating high demand for and rarity of the former and low demand for the latter. Rabemananjara *et al*. (2007) quote prices paid to field collectors in 2003-2004 of 300-500 FMG per frog (USD 0.05-0.08), with intermediaries paid 750-1500 FMG. This is relatively low for mantellas in general, which have a range of 250-2000 FMG paid to field-collectors and 750 to 6000 FMG paid to intermediaries.

The species is known to occur in the Ranomafana, Mantadia and Andringitra National Parks, and in the Pic Ivohibe Special Reserve (GAA, 2006).

The Global Amphibian Assessment (2006) considers that carefully regulated trade is the best management option for the species.

PROBLEMS IDENTIFIED THAT ARE NOT RELATED TO THE IMPLEMENTATION OF ARTICLE IV PARAS 2A, 3 OR 6A

None identified.

Mantella bernhardi Vences, Glaw, Peyrieras, Böhme & Busse, 1994

FAMILY: Mantellidae

COMMON NAMES: Bernhard's Mantella, Black Mantella, Tolongoina Golden Frog (English)

GLOBAL CONSERVATION STATUS: Endangered (EN); Criteria B2ab(iii, v) (Assessed 2004).

SIGNIFICANT TRADE REVIEW FOR: Madagascar

SUMMARY

Mantella bernhardi is a small terrestrial frog known from a small area of eastern Madagascar, where it can be locally abundant, and is known to occur in two protected areas. The limited extent of its range, and the threats that its habitat faces led to its being classified by IUCN in 2004 as Endangered. It was included in Appendix II in 2000 as part of the listing for the genus *Mantella*. Recorded trade levels since then have been low (ca 1600-1900 exported). A zero export quota was imposed by Madagascar in 2005 (although a small number of individuals were reported as exported in that year), maintained in 2006 and 2007.

In view of the continuing zero export quota imposed by Madagascar, trade in *M. bernhardi* is considered of **Least Concern.**

SPECIES CHARACTERISTICS

M. bernhardi lives in rainforest, including very tiny patches. Current records are from degraded rainforest, probably because of severe habitat degradation within its range. It is not found in open areas, or in littoral forest on a sandy substrate. The species has been little studied in the wild. It presumably breeds in swamps or small streams, with the eggs being laid on the ground near water (GAA, 2006).

INTERNATIONAL TRADE

Table 1. Recorded trade in *Mantella bernhardi* originating in Madagascar, 1996-2005

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Reported Imports				30	440	543	460	60	105*	60	1698
Reported exports					380	1005	650		90*	50	2175
Export quota										0	

(Source: CITES trade statistics derived from the *CITES Trade Database*, UNEP World Conservation Monitoring Centre, Cambridge, UK.)
* includes 80 reported as ranched.

There is some very limited trade in the species for scientific research; otherwise it features in international trade exclusively as an exotic pet with main markets in North America (particularly the USA, which accounts for the great majority of recorded imports) and Europe. Commercial imports of wild specimens from Madagascar into the European Union have been banned since 2001 under Commission Regulation (EC) No 2087/2001 and its various updates. Recorded exports have been at a low level, with only 1700-2200 recorded in trade since the species was listed in Appendix II of CITES in 2000.

The species is known to be bred in captivity (e.g. Anon. 2006) although web-searches indicate that it is not widely kept, nor does it appear to be regularly offered for sale.

COUNTRY ACCOUNT

Madagascar

Status:

This species occurs in southeastern Madagascar from Ranomafana south to near Manambondro, from c. 21.00° to 24.15°S and 47.00° to 48.00°E, and over 60–629 m altitude (Rabemananjara *et al.*, 2005). Its area of occupancy is probably less than 500 km^2 (GAA, 2006).

Rapid population assessments using mark-and-recapture techniques carried out at four sites in 2003 and 2004 showed that the species could be locally abundant, with population density estimates of between 600 and 4500 individuals per hectare (Rabemananjara *et al*. in press). However, the surveyors noted that these were based on small or very small areas, and that they should not be extrapolated to larger areas.

The area where the species occurs is being degraded rapidly due to subsistence agriculture, timber extraction, charcoal manufacture, livestock grazing, fires and expanding human settlements.

Management and trade:

See overview to mantellas for general information on management.

A zero export quota for the species was instigated by the Malagasy Authorities in 2005 although a small number of specimens (50) was reported as exported in that year. The zero quota has been maintained in 2006 and 2007.

Data gathered during 2003-2004 by Rabemananjara *et al*. (2007) indicate that the species was in high demand at that time, as intermediaries were reportedly paid 4000-6000 FMG per individual at that time, this being high for mantellas in general, which had a range at this point in the supply chain of between 750 and 6000 FMG (USD 0.7-1.05).

The species occurs within two protected areas (Ranomafana National Park and Manombo Special Reserve) (Rabemananjara *et al.*, 2005).

PROBLEMS IDENTIFIED THAT ARE NOT RELATED TO THE IMPLEMENTATION OF ARTICLE IV PARAS 2A, 3 OR 6A

None identified.

Mantella betsileo Grandidier, 1872

FAMILY: Mantellidae

COMMON NAMES: Brown Mantella, Betsileo Golden Frog, Bronze Mantella (English)

GLOBAL CONSERVATION STATUS: Least Concern (LC) (Assessed 2004).

SIGNIFICANT TRADE REVIEW FOR: Madagascar

SUMMARY

Mantella betsileo is a small terrestrial frog endemic to Madagascar, where it is widespread in the north and west. It is an adaptable species and, as with almost all other mantella species, can be at least locally abundant, so that its global population is almost certainly very large. It is not considered threatened by IUCN. The species was included in Appendix II in 2000 as part of the listing for the genus *Mantella* species. Since then some 10,000 to 12,000 have been reported as exported from Madagascar. *M. betsileo* is currently the only *Mantella* species that can be legally imported as wild specimens into the European Community.

An annual export quota of 5000 individuals was established by Madagascar in 2005, maintained in 2006 and 2007. Recorded exports in 2005 were considerably lower than this. This species, along with *M. laevigata,* is said to be the least desirable mantella in the international pet trade.

In view of the non-threatened status of the species, the imposition of a conservative export quota since 2005 and low international demand, trade in *M. betsileo* is considered of **Least Concern.**

SPECIES CHARACTERISTICS

Mantella betsileo is a terrestrial species that occurs in a variety of habitats including rainforest, dry woods, degraded forest and in open areas. The eggs are laid on land near water, and the larvae develop in temporary and permanent pools, and sometimes in brooks. Tadpoles and metamorphosing juveniles have been recorded in February. The species feeds on small insects, particularly fruit flies (*Drosophila*) and ants (Glaw and Vences, 2000).

INTERNATIONAL TRADE

Table 1. Recorded trade in *Mantella betsileo* originating in Madagascar, 1996-2005

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Reported Imports		1000	435	175	855	2926	450	1490	995[1]	3415	11741
Reported exports					1332	3985	1215	37	3436[1]	2347	12352
Export quota										5000	

(Source: CITES trade statistics derived from the *CITES Trade Database*, UNEP World Conservation Monitoring Centre, Cambridge, UK.)

[1] includes 50 declared as ranched

There is some very limited trade in the species for scientific research; otherwise it features in international trade exclusively as an exotic pet with main markets in North America (particularly the USA, which accounts for 60-70% of recorded imports) and Europe. This is the only currently recognised species of mantella that is not subject to a ban on import into the EU of wild-collected specimens.

The species is not in high demand as a captive animal, probably because it is relatively subdued in colouration compared with most other species and also because it is evidently quite shy in captivity

(Staniszewski, no date). Edwards (2007) notes that this species, along with *M. laevigata,* is the least desirable mantella in international trade. Trade recorded both as imports and exports in both of the years 2004 and 2005 has been substantially lower than the allocated export quota trade, despite this being the only species of mantella that can be imported legally as a wild animal into the EU for commercial purposes.

COUNTRY ACCOUNT

Madagascar

Status:

This species is widely distributed in western, northwestern, northern and northeastern Madagascar. It ranges from sea level up to 900m asl. A list of localities is provided on Amphibiaweb (and see Figure 1).

Two separate rapid assessments of population densities, using mark-and-recapture methods, carried out in 2003 indicated densities of between roughly 3400 and 6700 animals per hectare, although the surveys were of very small areas and the surveyors stressed that extreme caution was necessary when extrapolating from these findings to larger areas (Rabemananjara *et al*, in press).

M. betsileo is an adaptable species, and there are few, if any, habitat-related threats, though it might be impacted by fires and by overgrazing by livestock (GAA, 2006).

Management and trade:

See overview of Mantellas for general information on management.

An annual export quota of 5000 p.a. was established by the Malagasy authorities for 2005, and continued in 2006 and 2007. As noted above, recorded trade in 2005 was substantially lower than this. Rabemananjara *et al.*(2007) remark that the species is not intensively collected anywhere because of low demand. They quote prices paid to field-collectors in 2003-2004 of 250-500 FMG per frog (USD 0.04-0.08), with intermediaries paid around 1000 FMG. This is low to average for mantellas in general, which have a range of 250-2000 FMG paid to field-collectors and 750 to 6000 FMG paid to intermediaries.

PROBLEMS IDENTIFIED THAT ARE NOT RELATED TO THE IMPLEMENTATION OF ARTICLE IV PARAS 2A, 3 OR 6A

None identified.

TAXONOMIC NOTE

Mantella ebenaui has recently been removed from synonymy with *M. betsileo* (Glaw and Vences, 2006), in a revision accepted by the 2007 electronic version of Amphibians of the World (Frost, 2007). Current CITES taxonomy, adopted at CoP14 is based on the 2004 version of the checklist which does not recognise this as a separate species. Individuals identified as of this form have been offered for sale in the UK (Anon. 2007), but it is not considered further here.

Mantella cowanii Boulenger, 1882

FAMILY: Mantellidae

COMMON NAMES: Cowan's Mantella, Harlequin Mantella, Black Golden Frog (English).

GLOBAL CONSERVATION STATUS: Critically Endangered (CR)
Criteria: A2acd + B2ab (iii) (Assessed 2004)

SIGNIFICANT TRADE REVIEW FOR: Madagascar

SUMMARY

Mantella cowanii is a small, strikingly-marked terrestrial frog known from only a small upland area in eastern-central Madagascar. It is evidently rare within this range, and was classified as Critically Endangered by IUCN in 2004. It was included in Appendix II in 2000 as part of the general listing for the genus *Mantella*. Recorded levels of international trade have been relatively low (1500 to 2600 since 2000). Serious concern was expressed at the time of the global assessment of the status of the species regarding the possible impact of collection for international trade. In 2005 the species was classified as fully protected under Malagasy legislation, and a zero export quota was imposed. No trade was reported in that year.

In view of the fully protected status of the species, and the existence of a zero export quota, trade in *Mantella cowanii* is considered of **Least Concern.**

SPECIES CHARACTERISTICS

Mantella cowani is a terrestrial species, living along small streams in montane grassland and moorland. The species usually lives within a few metres of water, but may move into savannah during the rains. It spends much of its time hidden among rocks, particularly in the dry season. It presumably breeds like other mantellas, with the eggs laid on the ground, and the larvae developing in streams. It appears to be active mainly during the first hours of the day, namely from 5h00 to 7h30. In general individuals are very shy and difficult to detect, even during optimal weather conditions and warm temperatures. It is difficult to say if this secretiveness is due to original habits or is a consequence of the heavy deforestation which occurred in the species' natural sites. Observations in captivity report clutches of around 40 whitish eggs (Andreone & Randrianirina, 2003; Andreone *et al.*, 2004; GAA, 2006).

INTERNATIONAL TRADE

Table 1. Recorded trade in *Mantella cowani* originating in Madagascar, 1996-2005

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Reported Imports			52	150	170	434	241	500	120		1667
Reported exports					415	960	1240				2615
Quota										0	

(Source: CITES trade statistics derived from the *CITES Trade Database*, UNEP World Conservation Monitoring Centre, Cambridge, UK.)

Relatively low levels of export have been reported. The species was classified as a protected species in 2005 and all export has been banned since then. Commercial imports of wild specimens from Madagascar into the European Union have been banned since 2001 under Commission Regulation (EC) No 2087/2001 and its various updates.

COUNTRY ACCOUNT

Madagascar

Status:

This species occurs on the high plateau of east-central Madagascar from Tsinjoarivo to Antoetra, with old records to the west that require further investigation. It occurs at 1,000 - 2,000m asl and has a tiny area of occupancy within its mapped range (GAA, 2006). Surveys in 2003 confirmed the presence of the species at Antoetra, with several isolated small populations scattered within this area and confirmed presence in the Ankaratra-Tsinjoarivo area (Andreone & Randrianirina, 2003; Andreone *et al.*, 2004).

It was formerly reported as being common, but was reported in 2003 as having undergone a very marked recent decline in its distribution and in the number of mature adults (Andreone and Randrianirina, 2003). It was by then a rare species at all known sites (with each subpopulation estimated to number only about 50 mature individuals), with no reproduction recorded in recent years.

Andreone and Randrianira (2003) reported that collection pressure on the species at that time was very high, with prices paid to collectors some ten times higher than those paid for *M. baroni*, which was also collected in the same region (4000-5000 FMG as opposed to 250-500 FMG).

Management and trade

Because of concerns raised during 2003 over the rarity of the species and the apparent impact of collection, a zero export quota was imposed and the species was included as a fully protected species in revised legislation introduced in 2005 (Edwards, 2007).

M. cowani is not known to occur in any protected area.

PROBLEMS IDENTIFIED THAT ARE NOT RELATED TO THE IMPLEMENTATION OF ARTICLE IV PARAS 2A, 3 OR 6A

None identified.

Mantella crocea Pintak & Böhme, 1990

FAMILY: Mantellidae

COMMON NAMES: Yellow Mantella, Eastern Golden Frog (English)

GLOBAL CONSERVATION STATUS: Endangered (EN) Criteria: B1ab(iii, v) + 2ab(iii, v) (Assessed 2004).

SIGNIFICANT TRADE REVIEW FOR: Madagascar

SUMMARY

Mantella crocea is a small, brightly coloured terrestrial frog found in a small part of eastern Madagascar. It is patchy in occurrence but can be locally common. The limited extent of its range and the threats that its habitat faces led to it being classified in 2004 by IUCN as Endangered. The species was included in Appendix II in 2000 as part of the general listing of the genus *Mantella*. Some 6000-7000 have been reported as exported since then for the exotic pet trade. An annual export quota of 1000 specimens was imposed by Madagascar in 2005, maintained in 2006 and 2007.

In view of the presence of a conservative export quota for the species, subject to review and established in consultation with experts, trade in *Mantella crocea* is considered of **Least Concern.**

SPECIES CHARACTERISTICS

Mantella crocea is a terrestrial species of forest edge around swamps. It has been found in secondary forest, but not in open areas. It breeds in a similar way to other mantella species, with the eggs laid on the ground, and the larvae developing in swamps. Clutches contain 42-65 white eggs. Tadpoles hatch after 9-14 days and complete metamorphosis after 65-68 days (at 21-23°C) (GAA, 2006; Glaw and Vences, 2000).

INTERNATIONAL TRADE

Table 1. Recorded trade in *Mantella crocea* originating in Madagascar, 1996-2005

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Reported Imports			395	250	788	1223	330	125	1022	2295	6428
Reported exports					1178	1770	630		2235	1079	6892
Export quota										1000	

(Source: CITES trade statistics derived from the *CITES Trade Database*, UNEP World Conservation Monitoring Centre, Cambridge, UK.)

Recorded export levels from Madagascar are not high (around 6400-6900 in total from 1998 onwards, of which the USA accounted for 70%). The number reported as imports is close to the total reported by Madagascar as exports, but there are considerable discrepancies within individual years. Around 10% of reported imports are from 1998 and 1999, before the species was included in CITES Appendix II. Commercial imports of wild specimens from Madagascar into the European Union have been banned since 2001 under Commission Regulation (EC) No 2087/2001 and its various updates.

COUNTRY ACCOUNT

Madagascar

Status:

Mantella crocea is known from a few localities covering a very small area in east-central Madagascar: Ifoha west of Mantadia National Park; a forest area east of Ambohimanarivo; and outside Zahamena Strict Nature Reserve (see Figure 1 in Overview of Mantellas). Its recorded altitudinal range is 800 - 1,057m asl. It is locally common, but is very patchy in occurrence and its area of occupancy is believed to be probably less than 500 km^2 (GAA, 2006; Glaw and Vences, 2000).

A rapid population assessment using mark and recapture, carried out in 2004, produced a population density estimate of some 2000 animals per hectare (Rabemananjara *et al*. in press). However, the survey was carried out over a very small area and the surveyors emphasised that the results should not be extrapolated to larger areas. Vences *et al.* (2003) found high genetic (mitochondrial) diversity in this species, which was consistent with a large population size.

The forest habitat of the species is reported to be receding due to subsistence agriculture, timber extraction, charcoal manufacture, and invasive spread of eucalyptus, livestock grazing and expanding human settlements (GAA, 2006).

Management and trade:

An annual export quota of 1000 individuals was set by the Malagasy authorities in 2005, continued in 2006 and 2007. Exports recorded by the Malagasy authorities for 2005 are very near this. Declared imports were considerably higher (2295) but, as noted elsewhere this is almost certainly a reflection of the fact that exports from Madagascar (which are based on permits issued) in one calendar year are very likely to be reported as imports in the following calendar year.

Surveys of the trade in the period 2003-2004 indicated field-collectors were paid 300-500 FMG per frog (USD 0.04-0.08), with intermediaries paid 1000-1500 FMG. This is average for mantellas in general, which have a range of 250-2000 FMG paid to field-collectors and 750 to 6000 FMG paid to intermediaries (Rabemananjara *et al.,* 2007).

The species has not been recorded from any protected areas, although is believed likely to occur in Mantadia National Park and Zahamena Strict Nature Reserve (GAA, 2006). It is known to occur in a Ramsar site ("Marais de Torotorofotsy avec leur bassins versants", covering 10,000 ha and declared in 2005 (Ramsar, 2007)), which may eventually be included in a new protected area in the Zahamena-Ankeniheny corridor.

The GAA (2006) states that a carefully regulated trade is the best management option for this species.

PROBLEMS IDENTIFIED THAT ARE NOT RELATED TO THE IMPLEMENTATION OF ARTICLE IV PARAS 2A, 3 OR 6A

None identified.

TAXONOMIC NOTE

M. Vences and F. Glaw, cited in the GAA (2006), note that this taxon and *Mantella milotympanum* might represent colour variants of the same species.

Mantella expectata Busse & Böhme, 1992

FAMILY: Mantellidae

COMMON NAMES: Blue-legged Mantella, Tulear Golden Frog (English)

GLOBAL CONSERVATION STATUS: Critically Endangered (CR) Criteria: B2ab (iii, v) (Assessed 2004).

SIGNIFICANT TRADE REVIEW FOR: Madagascar

SUMMARY

Mantella expectata is an attractive, small terrestrial frog only known to occur in and around the Isalo Massif in south-west Madagascar. In 2004 the species was classified as Critically Endangered on the basis of its very small known distribution and the range of potential threats to its habitat; it was also thought possible that unregulated collection might be a threat, although this had not been demonstrated. The species can be locally extremely abundant, and is now known to be more widespread than had hitherto been thought.

M. expectata was included in Appendix II in 2000 in the general listing for the genus *Mantella*. Since then reported trade from Madagascar has been around 7000-9000 individuals in total. In 2005 an annual export quota for the species of 1000 was established by Madagascar, maintained in 2006 and 2007.

In view of the presence of an export quota regarded as easily sustainable and subject to review, trade in *M. expectata* is considered of **Least Concern.**

SPECIES CHARACTERISTICS

Mantella expectata is one of the larger species of Mantella, growing up to 3 cm (Staniszewski, no date). It appears to be principally a savannah- species, living around small and temporary streams. The preferred habitat in and around the Isalo massif comprises relatively open canyons, and rocky areas next to water bodies. Individuals are reportedly mainly active during the early hours of the day, remaining hidden under rocks or in caves the rest of the time (Andreone *et al.*, 2000; GAA, 2006) .

Breeding is typically explosive, with large numbers of animals emerging simultaneously at the start of the rains in October-November. As with other mantellas, it seems that the eggs are laid on the ground near to temporary or permanent pools into which the tadpoles are washed by rain on hatching (Andreone *et al.*, 2000; GAA, 2006).

INTERNATIONAL TRADE

Table 1. Recorded trade in *Mantella expectata* originating in Madagascar, 1996-2005

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Reported Imports		100	624	105	220	660[1]	1390	1126	1328[2]	2675	8228
Reported exports					1230	1720	2385		4277	1047	9288
Export quotas										1000	

(Source: CITES trade statistics derived from the *CITES Trade Database*, UNEP World Conservation Monitoring Centre, Cambridge, UK.)

[1] includes 30 declared as ranched; [2] includes 80 declared as ranched.

Recorded trade in *Mantella expectata* has been at a moderate level, with ca 8000-9000 recorded as originating in Madagascar in the period 1996-2005. Exports have been reported by Madagascar from 2000 when the species was included in Appendix II. Importers reported the import of ca 800

specimens before this, in the period 1997-1999. Most of the trade is to north America, with the USA and Canada between them accounting for over 80% of declared imports. Along with all other mantellas except for *M. aurantiaca* (banned in 2006) and *M. betsileo* (not banned), commercial import of wild specimens of this species into the EU has been banned since 2001 under Commission Regulation (EC) No 2087/2001 and its various updates.

The species is reported to be bred in captivity, and is currently offered for sale on the internet at average or slightly higher than average prices for mantellas in general (ca USD 25-35 in Canada and the USA).

COUNTRY ACCOUNT

Madagascar

Status:

Mantella expectata is endemic to a small region in south-western Madagascar centred on the Islao Massif (at 700-1,000m) (see Figure 1 in Overview of Mantellas). Previously known from only one or two sites, recent records have extended the range of the species which is now known to be quite widespread in the Isalo Massif both within and outside Isalo National Park (Andreone, 2007). Records from near Toliara (Busse and Böhme, 1992) are probably erroneous (Vences *et al*., 1999), while records from the Morondava region and Mandena (Glaw and Vences, 1994) are unreliable because no voucher specimens or recent field surveys document the species' presence in these areas. However, there are reports of large, *expectata*-like mantellas from south-west Madagascar outside the Isalo Massif area which may be of this species, or a closely related one.

Andreone (2007) notes that the species can be very abundant in the areas where it occurs.

The species may be suffering the effects of habitat loss due to grazing and fire, and also locally due to mining for sapphires (GAA, 2006).

Management and trade:

Andreone *et al.* (2000) noted that collection at that time was carried out in the Ilakaka region (Ilakaka being a town on the main road connecting two of Madagascar's principal towns, Fianarantsoa and Toliara). Specimens were usually collected at the beginning of the rainy season when they gathered together in large numbers to breed. The GAA (2006) noted that collection for the pet trade might constitute an important threat, but observed that this had not yet been demonstrated.

Data gathered during 2003-2004 by Rabemananjara *et al*. (2007) corroborate the relatively high demand for the species, with field-collectors reportedly paid 1000-2000 FMG and intermediaries were 4000-6000 FMG per individual at that time, this being high for mantellas in general, which had a range of 250-2000 FMG paid to field collectors and 750-6000 FMG (USD 0.07-1.05) paid to intermediaries.

In 2005 the Malagasy authorities established an annual export quota of 1000 specimens, continued in 2006 and 2007. Declared exports in 2005 were extremely close to this (1047). Declared imports were considerably higher (2675) but, as noted elsewhere this is almost certainly a reflection of the fact that exports from Madagascar (which are based on permits issued) in one calendar year are very likely to be reported as imports in the following calendar year. Andreone (2007) and Vences (2007) both believe the current quota to be sustainable; the former considers that it could be increased somewhat without undue concern, in view of the great abundance of the species at some sites, and the fact that it is now known to be more widespread than had hitherto been thought.

The species occurs in the Isalo National Park.

PROBLEMS IDENTIFIED THAT ARE NOT RELATED TO THE IMPLEMENTATION OF ARTICLE IV PARAS 2A, 3 OR 6A

None identified.

Mantella haraldmeieri Busse, 1981

FAMILY: Mantellidae

COMMON NAMES: Haraldmeier's Mantella, Tolagnaro Golden Frog (English).

GLOBAL CONSERVATION STATUS: Vulnerable (VU) Criteria: B1ab(iii)
(Assessed 2004).

SIGNIFICANT TRADE REVIEW FOR: Madagascar

SUMMARY

Mantella haraldmeieri is a small terrestrial frog from south-east Madagascar. It was classified in 2004 by IUCN as Vulnerable. It has been included in Appendix II since 2000 under the general listing for the genus *Mantella*. Reported levels of trade since then have been low (between 900 and 1600 in total). In 2005 a zero annual export quota for the species was imposed by Madagascar, maintained in 2006 and 2007. Because no exports of wild specimens for commercial purposes are currently permitted, trade in *M. haraldmeieri* from Madagascar is considered of **Least Concern.**

SPECIES CHARACTERISTICS

Mantella haraldmeieri is a terrestrial species found in rainforest, including in slightly degraded forest where it lives along brooks and streams. Egg clutches deposited outside water of up to 65 eggs have been reported. Juveniles of 10-11 mm were found near a slow-moving brook in January (GAA, 2006; Glaw and Vences, 2000).

INTERNATIONAL TRADE

Table 1. Recorded trade in *Mantella haraldmeieri* originating in Madagascar, 1996-2005

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Reported Imports						180		350	410		940
Reported exports					240	310	380		650		1580
Export quota										0	

(Source: CITES trade statistics derived from the *CITES Trade Database*, UNEP World Conservation Monitoring Centre, Cambridge, UK.)

Virtually all trade has been to the USA. Commercial imports of wild specimens from Madagascar into the European Union have been banned since 2001 under Commission Regulation (EC) No 2087/2001 and its various updates.

COUNTRY ACCOUNT

Madagascar

Status:

Mantella haraldmeieri is known from at least ten localities in extreme southeastern Madagascar, at 300 – 950 m altitude (GAA, 2006; Glaw and Vences, 2000). No information on levels of abundance has been located.

Its forest habitat is receding due to subsistence agriculture, timber extraction, charcoal manufacture, and invasive spread of eucalyptus, livestock grazing and expanding human settlements. Collection for the pet trade is not regarded as a significant pressure (GAA, 2006; Glaw and Vences, 2000).

Management and trade:

A zero export quota was established by the Malagasy authorities for this species in 2005, maintained in 2006 and 2007.

Rabemananjara *et al.,* (2007) report on the basis of surveys in 2003-2004 that field-collectors were paid 1000 FMG (USD 0.18) per specimen and intermediaries 4000 FMG per specimens. This was relatively high for mantellas in general (ranges 250-2000 FMG for field-collectors and 750-6000 FMG for intermediaries). However, Rabemananajara *et al*. (2007) also noted that collection of this species at that time was only carried out on an occasional basis.

The species is known to occur in the Andohahela National Park (GAA, 2006; Glaw and Vences, 2000).

PROBLEMS IDENTIFIED THAT ARE NOT RELATED TO THE IMPLEMENTATION OF ARTICLE IV PARAS 2A, 3 OR 6A

None identified.

Mantella laevigata Methuen & Hewitt, 1913

FAMILY: Mantellidae

COMMON NAMES: Climbing Mantella, Arboreal Mantella, Folohy Golden Frog, Green-backed Mantella (English)

GLOBAL CONSERVATION STATUS: Near Threatened (NT) (Assessed 2004).

SIGNIFICANT TRADE REVIEW FOR: Madagascar

SUMMARY

Mantella laevigata is a small frog from rainforests in northern and north-east Madagascar. It is unusual in the genus in being at least partially arboreal and in laying eggs one or two at a time in tree-holes and hollow bamboo stems, rather than in producing clutches of several tens of eggs on the ground as other mantellas do. It is widespread and can occur at high densities, indicating a large or very large global population. It was classified as Near Threatened by IUCN in 2004 on the basis of multiple threats to its habitat. The species was included in Appendix II in 2000 as part of the general listing for the genus *Mantella*. Recorded exports (for the exotic pet trade) since then have been in the range 10,000-12,500 specimens. In 2005 an annual export quota of 2000 was established by Madagascar, continued in 2006 and 2007. Exports reported by Madagascar in 2005 were lower than this and the species is, along with *M. betsileo,* reportedly the least sought-after mantella in international trade.

In view of the existence of an export quota subject to annual review, low reported international demand, and likely large global population, trade in *Mantella laevigata* is considered of **Least Concern.**

SPECIES CHARACTERISTICS

Mantella laevigata is a rainforest species, which is often particularly abundant in bamboo forest and other types of forest with abundant tree holes (in which it breeds). It is found both on the forest floor and in water-filled holes in trees, shrubs and bamboo up to a height of around 4 metres. Up to six, though usually two, adults may be found in one tree hole. Stomachs of dissected specimens contained many small ants and termites, and some flies. The species occurs in both native and introduced bamboo stands (Heying, 2001)

Eggs are deposited singly 1-2 cm above the water surface of tree-holes. Embryonic development is visible two days after egg-laying. On Nosy Mangabe (an island in the Baie d'Antongil) eggs were observed in October and March, indicating an extended breeding period. Tree-holes were populated by one tadpole, or by two tadpoles in different developmental stages. The tadpoles are sometimes oophagous, feed on eggs either specifically laid for the purpose by the mother or of other tree-hole nesting frogs such as various Cophylines (Glaw and Vences, 2000; Heying, 2001).

INTERNATIONAL TRADE

Table 1: Recorded trade in *Mantella laevigata* originating in Madagascar, 1996-2005

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Reported Imports		100	435	415	869	2167[1]	539	1618	1795	2910	10848
Reported exports					2537	2795	1170		4333	1605	12440
Export quota										2000	

(Source: CITES trade statistics derived from the *CITES Trade Database*, UNEP World Conservation Monitoring Centre, Cambridge, UK.)

Note: species first listed in Appendix II (as part of genus *Mantella*) effective as of 19 June 2000; pre-2001 records are therefore incomplete.

[1] includes 225 declared as ranched specimens

The species has appeared in trade in reasonable numbers with ca 80% of reported trade to the USA. However, Edwards (2007) reports that this species, along with *M. betsileo*, is regarded as the least desirable species in international trade.

COUNTRY ACCOUNT

Madagascar

Status:

Mantella laevigata is relatively widely distributed in north-eastern Madagascar, from Marojejy south to Folohy (where its habitat has been degraded), and has been recorded at altitudes from 0 - 600m asl. Rapid population assessments, using mark and recapture methods, carried out in late 2003 and early 2004 at Marojejy provided high population density estimates of 9000-9500 individuals per hectare (Rabemananjara *et al*., in press). The surveys were carried out over a very small area and the surveyors counselled that these should not be extrapolated to larger areas. Heying (2001) in a behavioural study on Nosy Mangabe in the late 1990s marked 218 individuals in one season and a further 83 in a second season in an area of just over 1500 m^2 of which only around 150 m^2 was made up of optimum bamboo habitat, where the great majority of the frogs were found. Extrapolation from these indicates a very rough population density of perhaps 2000 individuals per hectare for mixed habitat and a much higher local density for optimum habitat. The species occurs over an area of many thousands of square kilometres, although it is not known how much of this comprises suitable habitat.

The forest habitat of *M. laevigata* is receding due to subsistence agriculture, timber extraction, charcoal manufacture, invasive spread of eucalyptus, livestock grazing and expanding human settlements. However, the species can make use of non-native as well as native bamboo species (Heying, 2001) and can therefore evidently survive in at least partially modified habitats.

Management and trade:

An export quota of 2000 individuals was established by the Malagasy authorities in 2005, maintained in 2006 and 2007. Reported exports in 2005 were somewhat less than this. Reported imports were somewhat higher, but this almost certainly reflects import of specimens in 2005 that were reported by Madagascar in 2004.

Surveys of the trade in the period 2003-2004 carried out by Rabemananjara *et al.* (2007) indicated field-collectors were paid 250-500 FMG per frog (USD 0.04-0.08), with intermediaries generally paid 1500 FMG. This is average for mantellas in general, which have a range of 250-2000 FMG paid to field-collectors and 750 to 6000 FMG paid to intermediaries. Rabemananjara *et al.* (2007) noted that collection of this species was carried out on an occasional basis and in relatively low numbers.

Andreone (2007) expressed some concern over the level of the quota, on the basis that the species was a rainforest dweller, which he believed made it more vulnerable to overexploitation than some more open-habitat species. However, as noted above, indications from Rabemananjara *et al.* (in press) and Heying (2001) are that the species can be at least locally abundant. Edwards (2007) also notes that a significant proportion of the range of the species is along an inaccessible coastline where no commercial collection occurs. He reports that they are mostly collected around Fenerive, north of Toamasina (Tamatave) and observes that in general local people are reluctant to collect the species because they are not paid enough to make it worth their while.

This species occurs in several protected areas including Masoala and Marojejy National Parks and Nosy Mangabe Special Reserve.

PROBLEMS IDENTIFIED THAT ARE NOT RELATED TO THE IMPLEMENTATION OF ARTICLE IV PARAS 2A, 3 OR 6A

None identified.

Mantella madagascariensis Grandidier, 1872

FAMILY: Mantellidae

COMMON NAMES: Madagascan Mantella, Madagascar Golden Frog, Malagasy Mantella, Painted Mantella (English).

GLOBAL CONSERVATION STATUS: Vulnerable (VU) Criteria: B1ab(iii)
(Assessed 2004)

SIGNIFICANT TRADE REVIEW FOR: Madagascar

SUMMARY

Mantella madagascariensis is a small, brightly-coloured terrestrial frog with a relatively limited range in eastern Madagascar. Its status in the wild and in trade are not very well known, largely owing to confusion with other species, most notably *M. baroni*. It is not considered at very high risk of extinction by IUCN, having been classified as Vulnerable in 2004 on the basis of perceived threats to its habitat. The species was included in Appendix II in 2000 in the general listing of the genus *Mantella*. Recorded levels of trade in the period 2000-2005 have be fairly high (between 19,000 and 29,000 recorded as exported); however, it seems that the great majority of this trade was in fact in *M. baroni*. In 2005 an annual export quota of 500 was established by Madagascar, maintained in 2006 and 2007. Actual levels reported as exported in 2005 were somewhat higher than this (ca 1200), although this may have been because of ongoing taxonomic confusion. This level of trade, even if all in *M. madagascariensis,* is highly unlikely to be a cause of concern.

In view of the conservative export quota established, the low current levels of export and the fact that the species is not considered very highly threatened, trade in *M. madagascariensis* is considered of **Least Concern.**

SPECIES CHARACTERISTICS

Mantella madagascariensis is one of the less well known species. It is terrestrial, living in forest and forest edge, in particular along streams. The eggs are laid on land, and the larvae develop in streams. In the wild males have been observed emitting intense calls during the day from refuges on the ground, under grass and shrubs along river banks, or in cavities under large rocks, near a fast running brook (GAA, 2006; Glaw and Vences, 2000).

In captivity clutches of 26-27 eggs have been recorded. Tadpoles reached a total length of 26 mm (9 mm body, 17 mm tail) 22 days after hatching, and metamorphosis was completed after 61 days (GAA, 2006; Glaw and Vences, 2000).

This species is one of the so-called painted mantellas, which also include *M. baroni, M. bernhardi, M. cowani, M. haraldmeieri* and *M. pulchra*. Specimens of the different taxa may be very hard to distinguish from each other and the taxonomy of the group is not fully resolved. In particular, the names *M. baroni*, *M. madagascariensis* and *M. pulchra* have been used interchangeably (Edwards, 2007; GAA, 2006; Glaw and Vences, 2000).

INTERNATIONAL TRADE

Table 1. Recorded trade in *Mantella madagascariensis* originating in Madagascar, 1996-2005

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Reported Imports		*125*	*2214*	*1535*	450	3231	3325	4873	4245	3385	23,383
Reported exports					6365	8805	5590		6714	1212	28,686
Export quota										500	

(Source: CITES trade statistics derived from the *CITES Trade Database*, UNEP World Conservation Monitoring Centre, Cambridge, UK.)

[1] includes 150 declared as ranched

Note: species first listed in Appendix II (as part of genus *Mantella*) effective as of 19 June 2000; pre-2001 records are therefore incomplete.

Recorded trade in the species, particularly in the period 2000-2004 has been substantial (around 19,000-29,000, depending on whether declared exports or imports are used as the basis). However, Edwards (2007) notes that the vast majority of specimens exported as *M. madagascariensis* were in fact *M. baroni*, a more widespread species until recently often considered synonymous with *M. madagascariensis*. Imports of wild specimens from Madagascar into the European Union have been banned since 2001 under Commission Regulation (EC) No 2087/2001 and its various updates.

COUNTRY ACCOUNT

Madagascar

Status:

This species occurs in east-central Madagascar from near Niagarakely south to Ranomafana. It has been recorded from 700 - 1,050m asl. Because of the similarity of this species to the other so-called painted mantellas (*M. baroni, M. bernhardi, M. cowani, M. haraldmeieri* and *M. pulchra*), old records from outside this area are not considered reliable, being more likely to refer to *M. baroni* or *M. pulchra.* A list of more recently accepted site records is provided in Glaw and Vences (2000). The area of occurrence is believed to be less than 20,000 km^2 (GAA, 2006). There is very little information on levels of abundance of the species

Management and trade:

See overview of mantellas for general information.

An annual export quota of 500 individuals was set by the Malagasy authorities in 2005 and has been continued in 2006 and 2007. Recorded exports in 2005 were higher than this (just over 1200) although with the confusion over identification of specimens, it is possible that some of these were not in fact *M. madagascariensis*.

Its presence is not confirmed in any protected areas, but it occurs close to the Ranomafana National Park boundary (GAA, 2006).

PROBLEMS IDENTIFIED THAT ARE NOT RELATED TO THE IMPLEMENTATION OF ARTICLE IV PARAS 2A, 3 OR 6A

As noted above, in 2005 Madagascar reported the export of some 700 more specimens of *M. madagascariensis* than were allowed for in the export quota for that year. This may be a reporting error, or a problem with the allocation of quotas for this species, or because of continuing taxonomic confusion regarding this species and a number of others.

Mantella manery Vences, Glaw & Böhme, 1999

FAMILY: Mantellidae

COMMON NAMES: Marojejy Mantella, Marojezy, Mountain Mantella (English)

GLOBAL CONSERVATION STATUS: Data Deficient (DD) (Assessed 2004)

SIGNIFICANT TRADE REVIEW FOR: Madagascar

SUMMARY

Mantella manery is a small Malagasy frog known from a single specimen collected in Marojejy National Park in north-eastern Madagascar. This area is relatively inaccessible and the species has never been recorded in international trade. It is therefore classified as of **Least Concern.**

SPECIES CHARACTERISTICS

Mantella manery is known only from a single specimens, collected in low elevation rainforest (300m asl). No mention was made of the microhabitat in the original description, but the species is presumably terrestrial. There is no information on its adaptability to altered habitats. Its breeding is unknown, but it is likely to be like other mantellas, with the eggs laid on the ground, and the larvae developing in water (GAA, 2006).

INTERNATIONAL TRADE

None reported.

COUNTRY ACCOUNT

Madagascar

Status:

This species has been relatively recently described based on a single specimen in the collections of the Zoological Institute of the University Antananarivo collected from Marojejy National Park in northeastern Madagascar. The original description was based on a colour slide, but the holotype has since been found and a re-description has been published (GAA, 2006).

Management and trade:

The species occurs in Marojejy National Park (GAA, 2006).

PROBLEMS IDENTIFIED THAT ARE NOT RELATED TO THE IMPLEMENTATION OF ARTICLE IV PARAS 2A, 3 OR 6A

None identified.

Mantella milotympanum Staniszewski, 1996

FAMILY: Mantellidae

COMMON NAMES: Black-eared Mantella, Black-eared Golden Mantella (English).

GLOBAL CONSERVATION STATUS: Critically Endangered (CR) Criteria: B2ab (iii) (Assessed 2004)

SIGNIFICANT TRADE REVIEW FOR: Madagascar

SUMMARY

Mantella milotympanum is a brightly coloured small terrestrial frog with a very small range in eastern Madagascar. The limited extent of its distribution and the perceived threats to its habitat led to its being classified by IUCN in 2004 as Critically Endangered. However, it can reportedly be locally common within its range, and genetic studies have indicated that it is likely to have a large overall population size. It was included in Appendix II in 2000 in the general listing for the genus *Mantella*. Relatively low levels of trade have been reported since then (4500-5000 exported in total). In 2005 an annual export quota of 1000 individuals was set by Madagascar, maintained in 2006 and 2007. Reported exports in 2005 were lower than this.

In view of the presence of a low export quota subject to review and considered sustainable by authorities on mantellas, trade in *M. milotympanum* is considered of **Least Concern.**

SPECIES CHARACTERISTICS

Mantella milotympanum is a terrestrial species living in gallery forest around large swamps, and in seasonally flooded forest. Breeding is the same as other mantellas, with the eggs being laid on land and the larvae being washed into swamps by rain. The species is very seasonal in its breeding, and reportedly hard to find when it is not breeding (GAA, 2006).

INTERNATIONAL TRADE

Table 1. Recorded trade in *Mantella milotympanum* originating in Madagascar, 1996-2005

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Reported Imports							710	1780	860	1575	4925
Reported exports							1270		2275	873	4418
Quota										1000	

(Source: CITES trade statistics derived from the *CITES Trade Database*, UNEP World Conservation Monitoring Centre, Cambridge, UK.)

Recorded trade has been at a low level although it is likely that trade in this species has been recorded under *M. aurantiaca* in the past. Imports of wild specimens from Madagascar into the European Union have been banned since 2001 under Commission Regulation (EC) No 2087/2001 and its various updates.

COUNTRY ACCOUNT

Madagascar

Status:

Mantella milotympanum is recorded from many fragmented localities in east-central Madagascar covering a small area south of Fierenana, at 900 - 1,000m asl (GAA, 2006).

It is a locally common species, and has been observed at high densities (GAA, 2006). Rapid population assessments using mark and recapture techniques carried out in 2003 and 2004 found population densities of between 1100 and 3600 individuals per hectare. However, the surveys were carried out over extremely small areas (625 m^2) and the surveyors noted that these figures should not be used to derive population estimates for more extensive areas. A separate estimate, based on a larger area surveyed (6000 m^2) produced a somewhat lower estimate (470 animals per hectare) (Vieietes *et al.,* 2005). Vences *et al.* (2003) found high genetic (mitochondrial) diversity in sampled populations of *M. milotympanum* which were consistent with a large population size.

The area where this species occurs is severely threatened, with its forest habitat receding due to the impacts of subsistence agriculture, timber extraction, charcoal production, the spread of eucalyptus, livestock grazing, fires, and expanding human settlements (GAA, 2006).

Management and trade:

An annual export quota of 1000 specimens was imposed by the Malagasy authorities in 2005, continued in 2006 and 2007. Recorded exports in 2005 were lower than this.

Rabemananjara *et al*. (2007) quote prices paid to field collectors in 2003-2004 of 300-500 FMG per frog (USD 0.05-0.08), with intermediaries paid 1000-1500 FMG. This is low to average for mantellas in general, which have a range of 250-2000 FMG paid to field-collectors and 750 to 6000 FMG paid to intermediaries.

The Global Amphibian Assessment (2006) expressed some concern that the species might be impacted by collection for international trade and stressed that any such collection should be carefully regulated. Both Andreone (2007) and Vences (2007) consider the current quota to be sustainable.

The species is not known from any protected areas.

PROBLEMS IDENTIFIED THAT ARE NOT RELATED TO THE IMPLEMENTATION OF ARTICLE IV PARAS 2A, 3 OR 6A

None identified.

TAXONOMIC NOTE

The species was considered a form of *M. aurantiaca* until 1996, when it was elevated to species level (Frost, 2007).

This species and *Mantella crocea* might represent colour variants of the same species (GAA, 2006).

Mantella nigricans Guibé, 1978

FAMILY: Mantellidae

COMMON NAMES: Guibé's Mantella (English)

GLOBAL CONSERVATION STATUS: Least Concern (LC) (Assessed 2004).

SIGNIFICANT TRADE REVIEW FOR: Madagascar

SUMMARY

Mantella nigricans is a small, attractive terrestrial frog from northern and north-eastern Madagascar, where it occurs in forested areas. It has a wide distribution and is reported to be locally common. It is not considered threatened by IUCN. It was included in Appendix II in the general listing for the genus *Mantella* in 2000.

Very little trade in the species has been reported under CITES (between 500 and 1000 specimens, all in 2004 and 2005). The taxon was first recognised as a full species in 1999, having previously been considered a subspecies of *M. madagascariensis*. It is possible that some trade reported as the latter species has in fact been in *M. nigricans*. An annual export quota of 1000 specimens was established by Madagascar in 2005, continued in 2006 and 2007. Reported trade in 2005 was considerably less than this.

In view of its non-threatened status, the establishment of a conservative export quota subject to review and the very low level of export, trade in *M. nigricans* is considered of **Least Concern.**

SPECIES CHARACTERISTICS

Mantella nigricans lives on the ground along streams in rainforest and forest edge, but not in severely degraded habitats (GAA, 2006). Its breeding biology is presumed to be similar to that of other mantellas, with the eggs laid on land, and the larvae developing in streams (GAA, 2006).

INTERNATIONAL TRADE

Table 1. Recorded trade in *Mantella nigricans* originating in Madagascar, 1996-2005

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Reported Imports									200	315	515
Reported exports									750	237	987
Quota										1000	

(Source: CITES trade statistics derived from the *CITES Trade Database*, UNEP World Conservation Monitoring Centre, Cambridge, UK.)

Recorded international trade from Madagascar has been at a very low level since the species was first included in Appendix II in 2000. Imports of wild specimens from Madagascar into the European Union have been banned since 2001 under Commission Regulation (EC) No 2087/2001 and its various updates.

Mantella nigricans was first recognised as a full species by Vences *et al.* (1999), having previously been considered a subspecies of *M. madagascariensis*. It is possible that some trade reported as in the latter species has in fact been in *M. nigricans*¸ although relatively little collection of amphibians takes place with the latter's range (Edwards, 2007).

COUNTRY ACCOUNT

Madagascar

Status:

Mantella nigricans occurs in northern and northeastern Madagascar from Tsaratanana south to Zahamena, at 100 - 1,000m asl. Much of this area is inaccessible. The range of the species is extensive and it is reportedly locally abundant (GAA, 2006).

Its forest habitat is receding due to subsistence agriculture, timber extraction, charcoal manufacture, and invasive spread of eucalyptus, livestock grazing and expanding human settlements (GAA, 2006).

Management and trade:

See overview of mantellas for general information.

An annual export quota of 1000 specimens was established by the Malagasy authorities in 2005, continued in 2006 and 2007. Reported exports in 2005 were only around one quarter of this.

Rabemananjara *et al.* (2007) report a price of 5000 FMG (USD 0.90) paid to intermediaries for this species in 2003-2004. This was a relatively high price at this stage in the supply chain for mantellas in general (range 700-6000 FMG). However, they also noted that collection of this species only took place on an occasional basis and in low number in each year.

The species occurs in several protected areas (GAA, 2006).

PROBLEMS IDENTIFIED THAT ARE NOT RELATED TO THE IMPLEMENTATION OF ARTICLE IV PARAS 2A, 3 OR 6A

None identified.

Mantella pulchra Parker, 1925

FAMILY: Mantellidae

COMMON NAMES: Beautiful Mantella, Parker's Mantella, Parker's Golden Frog, Splendid Mantella (English)

GLOBAL CONSERVATION STATUS: Vulnerable (VU) Criteria: B1ab (iii)
(Assessed 2004)

SIGNIFICANT TRADE REVIEW FOR: Madagascar

SUMMARY

Mantella pulchra is an attractive, small terrestrial frog from north-eastern Madagascar. It has a relatively wide range and is at least locally common, although was classified as Vulnerable in 2004 by IUCN chiefly on the basis of threats to its habitat. It occurs in at least two protected areas and probably others. It was included in Appendix II in 2000 as part of the general listing for the genus *Mantella*. Between 12,000 and 18,000 have been recorded in international trade in the period 2000-2005. In 2005 an annual export quota of 3000 individuals was established by Madagascar, maintained in 2006 and 2007. Reported exports in 2005 were considerably lower than this.

In view of the existence of a conservative export quota, subject to review and believed sustainable by authorities on the genus, trade in *M. pulchra* from Madagascar is considered of **Least Concern.**

SPECIES CHARACTERISTICS

Mantella pulchra is a terrestrial species found in swampy rainforest, not recorded in secondary habitats. It breeds in swamps in forest, laying clutches of eggs on the ground near to water sources into which the tadpoles are washed by rains (GAA, 2006). In captivity multiple clutches in one year have been recorded (Anon, 2007a), although it is not known if this is also the case in the wild.

INTERNATIONAL TRADE

Table 1. Recorded trade in *Mantella pulchra* originating in Madagascar, 1996-2005

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Reported Imports			803	905	270	1658	1870	2585	2085	3455	13631
Reported exports					3297	4480	2890		5457[1]	1552	17676
Quota										3000	

(Source: CITES trade statistics derived from the *CITES Trade Database*, UNEP World Conservation Monitoring Centre, Cambridge, UK.)
[1] includes 120 declared as ranched.

Recorded international trade from Madagascar has been at a moderate level since the species was first included in Appendix II in 2000. Actual levels of export may have been somewhat higher, as at least some specimens recorded in trade before 2005 as *M. madagascariensis* (qv.) may have been of this species (Rabemananjara *et al.,* 2007) although Edwards (2007) notes that in the vast majority of cases specimens exported as *M. madagascariensis* were in fact *M. baroni* (q.v.). Imports of wild specimens from Madagascar into the European Union have been banned since 2001 under Commission Regulation (EC) No 2087/2001 and its various updates.

COUNTRY ACCOUNT

Madagascar

Status:

Mantella pulchra species has been recorded in northeastern Madagascar from Mananara-Nord south to An'Ala, at 300 - 950m asl (GAA, 2006).

The GAA (2006) notes that the species occurs at low densities. However, a rapid population assessment, using mark and recapture techniques, carried out at a single site (An'Ala) in January 2004 estimated a population density of just over 2500 animals per hectare, which was moderately high for mantellas (Rabemananjara *et al, in press*). The surveyors noted that this was based on the survey of a very small area (400 m^2) and should not be used to derive population estimates over larger areas.

Its forest habitat is receding due to subsistence agriculture, timber extraction, charcoal manufacture, and invasive spread of eucalyptus, livestock grazing and expanding human settlements (GAA, 2006).

Management and trade:

See overview of mantellas for general information.

An annual export quota of 3000 specimens was imposed by the Malagasy authorities in 2005, continued in 2006 and 2007. Recorded exports in 2005 were around half this level. As noted in the overview, imports in 2005 almost certainly include a significant number of specimens for which export permits were issued by Madagascar in 2004 (before quotas were imposed) and which were reported by Madagascar in that year. Andreone (2007) and Vences (2007) both consider the quota to be sustainable.

Rabemananjara *et al*. (2007) quote prices paid to field collectors in 2003-2004 of 300-500 FMG per frog (USD 0.05-0.08), with intermediaries paid 700-1000 FMG. This is relatively low for mantellas in general, which have a range of 250-2000 FMG paid to field-collectors and 750 to 6000 FMG paid to intermediaries.

The species occurs in the Mananara-Nord Biosphere Reserve and the Ambatovaky Special Reserve, and probably also in others (GAA, 2006).

PROBLEMS IDENTIFIED THAT ARE NOT RELATED TO THE IMPLEMENTATION OF ARTICLE IV PARAS 2A, 3 OR 6A

None identified.

TAXONOMIC NOTE

The species has in the past been confused with other *Mantella* species, particularly *M. madagascariensis* and *M. pulchra* (see introduction).

Mantella viridis Pintak & Böhme, 1988

FAMILY: Mantellidae

COMMON NAMES: Green Mantella, Green Golden Frog; Lime Mantella (English)

GLOBAL CONSERVATION STATUS: Critically Endangered (CR), Criteria: B2ab(iii) (Assessed 2004).

SIGNIFICANT TRADE REVIEW FOR: Madagascar

SUMMARY

Mantella viridis is an attractive small frog found in a small area of extreme northern Madagascar. The very limited extent of its range and perceived threats to its habitat led to its being classified by IUCN in 2004 as Critically Endangered. However, the species can be locally very abundant within its range, can adapt to secondary habitats, such as mango plantations, and is now known to occur over a somewhat wider range than had hitherto been thought. The species was included in Appendix II in 2000 as part of the general listing for the genus *Mantella*. Around 11000 specimens have been reported in trade from Madagascar in the period 2000-2005. In 2005 an annual export quota of 1000 individuals was established by Madagascar, maintained in 2006 and 2007.

In view of the establishment of a conservative export quota, considered sustainable by authorities on the species and subject to review, trade in *M. viridis* is considered of **Least Concern.**

SPECIES CHARACTERISTICS

Mantella viridis is the largest mantella reaching a maximum length of 3.5 cm. It is a terrestrial species of deciduous dry forest on karst landscape, usually found near temporary brooks and streams, where it breeds. It needs shade and good vegetation cover (GAA, 2006) but can survive in some modified habitats. Indeed Andreone *et al.* (2006) found it to be more abundant in extensive mango plantations than in adjacent areas of natural forest.

INTERNATIONAL TRADE

Table 1. Recorded trade in *Mantella viridis* originating in Madagascar, 1996-2005

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Reported Imports		125	700	385	1392	2945	1110	2065	958	1460	11140
Reported exports					1921	3825	2370	200	2056	890	11262
Quota										1000	

(Source: CITES trade statistics derived from the *CITES Trade Database*, UNEP World Conservation Monitoring Centre, Cambridge, UK.)

Recorded international trade from Madagascar has been at a moderate level since the species was first included in Appendix II in 2000. Commercial imports of wild specimens from Madagascar into the European Union have been banned since 2001 under Commission Regulation (EC) No 2087/2001 and its various updates.

COUNTRY ACCOUNT

Madagascar

Mantella viridis occurs in extreme northern Madagascar, principally on the Montagne des Français and the Massif of Antogombato which lies south of Diego Suarez (Antsiranana), at 50 - 300m asl, and also

in the Montagne d'Ambre region (GAA, 2006). Recent fieldwork (Andreone *et al.*, 2006) has found the species to be more widespread in the area than previously thought.

The species is reportedly common within its limited range and can reach very high population densities, for example around Antongombato (Andreone, 2007). Rapid population assessments using mark-and-recapture methods carried out on four occasions and at two different locations in 2003 found very dense breeding aggregations of frogs (up to 680 individuals in 50 m^2) (Rabemananjara *et al,.* in press). These cannot be quantitatively extrapolated to larger areas but indicate that the species can be at least locally extremely abundant.

The area where *Mantella viridis* occurs is subject to the impacts of fires, selective logging and collection of firewood, and livestock grazing, although as noted above the species can survive in some modified habitats (GAA, 2006).

Management and trade:

See overview of mantellas for general information.

An annual export quota of 1000 specimens a year was established by the Malagasy authorities in 2005, maintained in 2006 and 2007. Reported exports in 2005 were just under the quota level.

Rabemananjara *et al.* (2007) report a price of 4000 FMG (USD 0.90) paid to intermediaries for this species in 2003-2004. This was a reasonably high price at this stage in the supply chain for mantellas in general (range 700-6000 FMG).

Andreone *et al.* (2006) believe that the quota of 1000 specimens a year exported is easily sustainable and Andreone (2007) further considers that it could be increased somewhat without undue concern.

The species has recently been recorded within Montagne d'Ambre National Park (Andreone *et al.*, 2006) and also occurs with at least one classified forest (GAA, 2006).

PROBLEMS IDENTIFIED THAT ARE NOT RELATED TO THE IMPLEMENTATION OF ARTICLE IV PARAS 2A, 3 OR 6A

None identified.

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